

WHO GUIDELINES ON PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR



World Health
Organization

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CONTENTS

Acknowledgements	iv	Evidence to recommendations	66
Abbreviations and acronyms	v	Assessment of the certainty of evidence	66
Glossary of terms	vi	Benefits and harms	67
Executive summary	1	Values and preferences	67
Background	15	Resource implications	67
Methods	18	Equity, acceptability and feasibility	68
Recommendations	24	Research needs	69
> Children and adolescents (aged 5–17 years)	25	Adoption, dissemination, implementation and evaluation	70
<i>Physical activity recommendation</i>	25	Adoption	70
<i>Sedentary behaviour recommendation</i>	29	Dissemination	71
> Adults (aged 18–64 years)	32	Communication campaigns	71
<i>Physical activity recommendation</i>	32	Implementation of policy and programmes	72
<i>Sedentary behaviour recommendation</i>	38	Surveillance and evaluation	73
> Older adults (aged 65 years and older)	43	Updating	73
<i>Physical activity recommendation</i>	43		
<i>Sedentary behaviour recommendation</i>	46		
> Pregnant and postpartum women	47	References	75
<i>Physical activity recommendation</i>	47		
<i>Sedentary behaviour recommendation</i>	51	Annex 1: Management of guideline development process	85
> Adults and older adults with chronic conditions (aged 18 years and older)	52	Annex 2: Guideline development group, external peer reviewers, and who staff involved in the development of these guidelines	88
<i>Physical activity recommendation</i>	52		
<i>Sedentary behaviour recommendation</i>	58	Annex 3: Summary of declaration of interest and how these were managed	92
> Children and adolescents (aged 5–17 years) and adults (aged 18 years and over) living with disability	60		
<i>Physical activity recommendation</i>	60	Web Annex: Evidence profiles https://apps.who.int/iris/bitstream/handle/10665/336657/9789240015111-eng.pdf	
<i>Sedentary behaviour recommendation</i>	64		

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ABBREVIATIONS AND ACRONYMS

ADHD	attention deficit hyperactive disorder
AOR	adjusted odds ratio
BMI	body mass index
CI	confidence interval
CVD	cardiovascular disease
DBP	diastolic blood pressure
EtD	Evidence to Decisions
GDG	Guideline Development Group
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HR	hazards ratio
MET	Metabolic Equivalent of Task
MD	mean difference
MICT	moderate intensity continuous training
NCD	noncommunicable disease
OR	odds ratio
PA	physical activity
PAGAC	United States Physical Activity Guidelines Advisory Committee
PI/ECO	Population, Intervention/Exposure, Comparison, Outcome
RaR	Relative attributable risk
RCT	randomized control trial
RR	relative risk
SBP	systolic blood pressure
SMD	standardized mean difference
SPPB	short physical performance battery
TV	television
WHA	World Health Assembly
WHO	World Health Organization

GLOSSARY OF TERMS

Term	Definition
Aerobic physical activity	Activity in which the body's large muscles move in a rhythmic manner for a sustained period of time. Aerobic activity – also called endurance activity – improves cardiorespiratory fitness. Examples include walking, running, swimming, and bicycling.
Anaerobic physical activity	Anaerobic physical activity consists of brief intense bursts of exercise, such as weightlifting and sprints, where oxygen demand surpasses oxygen supply.
Balance training	Static and dynamic exercises that are designed to improve an individual's ability to withstand challenges from postural sway or destabilizing stimuli caused by self-motion, the environment, or other objects.
Body mass index (BMI)	Weight (kg) / height (m) ²
BMI-for-age or BMI z-score	BMI adjusted for age, standardized for children. BMI standard deviation scores are measures of relative weight adjusted for child age and sex. Given a child's age, sex, BMI, and an appropriate reference standard, a BMI z-score (or its equivalent BMI-for-age percentile) can be determined.
Bone-strengthening activity	Physical activity primarily designed to increase the strength of specific sites in bones that make up the skeletal system. Bone-strengthening activities produce an impact or tension force on the bones that promotes bone growth and strength. Running, jumping rope, and lifting weights are examples of bone-strengthening activities.
Cardiometabolic health	The interplay of blood pressure, blood lipids, blood glucose and insulin on health.
Cardiorespiratory fitness (endurance)	A health-related component of physical fitness. The ability of the circulatory and respiratory systems to supply oxygen during sustained physical activity. Usually expressed as measured or estimated maximal oxygen uptake ($VO_2 \text{ max}$).
Cognitive function	Cerebral activities, i.e. reasoning, memory, attention, and language that lead to the attainment of information and knowledge. This can also include learning.
Disability	From the International Classification of Functioning, Disability and Health, an umbrella term for impairments, activity limitations, and participation restrictions, denoting the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual factors (environmental and personal factors).
Domains of physical activity	Physical activity levels can be assessed in various domains, including one of more of the following: leisure-time, occupation, education, household and/or transportation.
Exercise	A subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective. "Exercise" and "exercise training" frequently are used interchangeably and generally refer to physical activity performed during leisure time with the primary purpose of improving or maintaining physical fitness, physical performance, or health.
Executive function	Includes constructs such as: working memory, cognitive flexibility (also called flexible thinking) and inhibitory control (which includes self-control).
Fitness	A measure of the body's ability to function efficiently and effectively in work and leisure activities, and includes, for example, physical fitness and cardiorespiratory fitness.
Flexibility	A health- and performance-related component of physical fitness that is the range of motion possible at a joint. Flexibility is specific to each joint and depends on a number of specific variables including, but not limited to, the tightness of specific ligaments and tendons. Flexibility exercises enhance the ability of a joint to move through its full range of motion.
Functional exercises	Exercises that can be embedded into everyday tasks to improve lower-body strength, balance, and motor performance. Examples include tandem and one-leg stands, squatting, chair stands, toe raises, and stepping over obstacles.
Household domain physical activity	Physical activity undertaken in the home for domestic duties (such as cleaning, caring for children, gardening etc.).
Leisure-domain physical activity	Physical activity performed by an individual that is not required as an essential activity of daily living and is performed at the discretion of the individual. Such activities include sports participation, exercise conditioning or training, and recreational activities such as going for a walk, dancing, and gardening.

Term	Definition
Light-intensity physical activity	Light-intensity physical activity is between 1.5 and 3 METs, i.e. activities with energy cost less than 3 times the energy expenditure at rest for that person. This can include slow walking, bathing, or other incidental activities that do not result in a substantial increase in heart rate or breathing rate.
Major muscle groups	Major muscle groups include the legs, back, abdomen, chest, shoulders and arms.
Metabolic equivalent of task (MET)	The metabolic equivalent of task, or simply metabolic equivalent, is a physiological measure expressing the intensity of physical activities. One MET is the energy equivalent expended by an individual while seated at rest.
Moderate-intensity physical activity	On an absolute scale, moderate-intensity refers to the physical activity that is performed between 3 and less than 6 times the intensity of rest. On a scale relative to an individual's personal capacity, moderate-intensity physical activity is usually a 5 or 6 on a scale of 0–10.
Muscle-strengthening activity	Physical activity and exercise that increase skeletal muscle strength, power, endurance, and mass (e.g. strength training, resistance training, or muscular strength and endurance exercises).
Multicomponent physical activity	For older adults, multicomponent physical activity is important to improve physical function and decrease the risk of falls or injury from a fall. These activities can be done at home or in a structured group setting. Many studied interventions combine all types of exercise (aerobic, muscle strengthening, and balance training) into a session, and this has been shown to be effective. An example of a multicomponent physical activity programme could include walking (aerobic activity), lifting weights (muscle strengthening), and incorporates balance training. Examples of balance training can include walking backwards or sideways or standing on one foot while doing an upper body muscle-strengthening activity, such as bicep curls. Dancing also combines aerobic and balance components.
Occupation domain physical activity	See work domain physical activity.
Physical activity	Any bodily movement produced by skeletal muscles that requires energy expenditure.
Physical inactivity	An insufficient physical activity level to meet present physical activity recommendations.
Psychosocial health	Include mental, emotional and social dimensions of health.
Recreational screen time	Time spent watching screens (television (TV), computer, mobile devices) for purposes other than those related to education/study or work.
Sedentary screen time	Time spent watching screen-based entertainment (TV, computer, mobile devices). Does not include active screen-based games where physical activity or movement is required.
Sedentary behaviour	Any waking behaviour characterized by an energy expenditure of 1.5 METS or lower while sitting, reclining, or lying. Most desk-based office work, driving a car, and watching television are examples of sedentary behaviours; these can also apply to those unable to stand, such as wheelchair users. The guidelines operationalize the definition of sedentary behaviour to include self-reported low movement sitting (leisure time, occupational, and total), television (TV viewing or screen time, and low levels of movement measured by devices that assess movement or posture).
Sport	Sport covers a range of activities performed within a set of rules and undertaken as part of leisure or competition. Sporting activities involve physical activity carried out by teams or individuals and may be supported by an institutional framework, such as a sporting agency.
Transport domain physical activity	Physical activity performed for the purpose of getting to and from places, and refers to walking, cycling and wheeling (the use of non-motorized means of locomotion with wheels, such as scooters, rollerblades, manual wheelchair etc.).
Vigorous-intensity physical activity	On an absolute scale, vigorous-intensity refers to physical activity that is performed at 6.0 or more METS. On a scale relative to an individual's personal capacity, vigorous-intensity physical activity is usually a 7 or 8 on a scale of 0–10.
Work domain physical activity	Physical activity undertaken during paid or voluntary work.

EXECUTIVE SUMMARY

The *WHO Guidelines on physical activity and sedentary behaviour* provide evidence-based public health recommendations for children, adolescents, adults and older adults on the amount of physical activity (frequency, intensity and duration) required to offer significant health benefits and mitigate health risks. For the first time, recommendations are provided on the associations between sedentary behaviour and health outcomes, as well as for subpopulations, such as pregnant and postpartum women, and people living with chronic conditions or disability.

The guidelines are intended for policy-makers in high-, middle-, and low-income countries in ministries of health, education, youth, sport and/or social or family welfare; government officials responsible for developing national, sub regional or municipal plans to increase physical activity and reduce sedentary behaviour in population groups through guidance documents; people working in nongovernmental organizations, the education sector, private sector, research; and health-care providers.

The guidelines were prepared in accordance with the *WHO handbook for guideline development*. Systematic reviews of evidence were conducted for the critical and important outcomes, and recommendations were developed after consideration of the benefits and harms, values, preferences, feasibility and acceptability, and the implications for equity and resources.

The final public health recommendations presented are for all populations and age groups ranging from 5 years to 65 years and older, irrespective of gender, cultural background or socioeconomic status, and are relevant for people of all abilities. Those with chronic medical conditions and/or disability and pregnant and postpartum women should try to meet the recommendations where possible and as able.

The development of these guidelines provide a set of evidence-based recommendations that governments can adopt as part of their national policy frameworks to support comprehensive approaches to increasing population levels of physical activity. Within the adoption process, consideration should be given to the need to contextualize the guidelines. Practical tools to support adoption, dissemination, communication campaigns and implementation of the guidelines will support governments and stakeholders work together to increase physical activity and reduce sedentary behaviours across the life course. These supporting resources will be available through the WHO website following publication of the guidelines

Despite the large quantity of supporting data relating physical activity and, increasingly, sedentary behaviours to health outcomes across the life-span, important evidence gaps remain. In particular, there is less evidence from low- and middle-income countries and economically disadvantaged or underserved communities, and a dearth of evidence from subpopulations including people living with disabilities. Investment in more research is needed to build evidence particularly in these areas. In addition, the changes introduced to these recommendations will have some implications for surveillance systems and assessment instruments currently used to monitor national levels of physical activity. Existing global and national instruments should be reviewed, and reporting protocols updated, to inform future reporting against the new guidelines.

The *Global action plan on physical activity 2018–2030* set a target to reduce physical inactivity by 15% by 2030, and outlined 20 recommended policy actions and interventions. These guidelines support all countries to implement the GAPPAs recommendations and “ACTIVE”, the technical package of toolkits that provides guidance on how to promote physical activity across the life course and through multiple settings.

CHILDREN AND ADOLESCENTS

(aged 5–17 years)



In children and adolescents, physical activity confers benefits for the following health outcomes: improved physical fitness (cardiorespiratory and muscular fitness), cardiometabolic health (blood pressure, dyslipidaemia, glucose, and insulin resistance), bone health, cognitive outcomes (academic performance, executive function), mental health (reduced symptoms of depression); and reduced adiposity.



It is recommended that:

- > **Children and adolescents should do at least an average of 60 minutes per day of moderate-to vigorous-intensity, mostly aerobic, physical activity, across the week.**

Strong recommendation, moderate certainty evidence



GOOD PRACTICE STATEMENTS

- Doing some physical activity is better than doing none.
- If children and adolescents are not meeting the recommendations, doing some physical activity will benefit their health.
- Children and adolescents should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.
- It is important to provide all children and adolescents with safe and equitable opportunities, and encouragement, to participate in physical activities that are enjoyable, offer variety, and are appropriate for their age and ability.



In children and adolescents, higher amounts of sedentary behaviour are associated with the following poor health outcomes: increased adiposity; poorer cardiometabolic health, fitness, behavioural conduct/pro-social behaviour; and reduced sleep duration.

It is recommended that:

- > **Children and adolescents should limit the amount of time spent being sedentary, particularly the amount of recreational screen time.**

Strong recommendation, low certainty evidence



ADULTS (aged 18–64 years)

In adults, physical activity confers benefits for the following health outcomes: improved all-cause mortality, cardiovascular disease mortality, incident hypertension, incident site-specific cancers,¹ incident type-2 diabetes, mental health (reduced symptoms of anxiety and depression); cognitive health, and sleep; measures of adiposity may also improve.



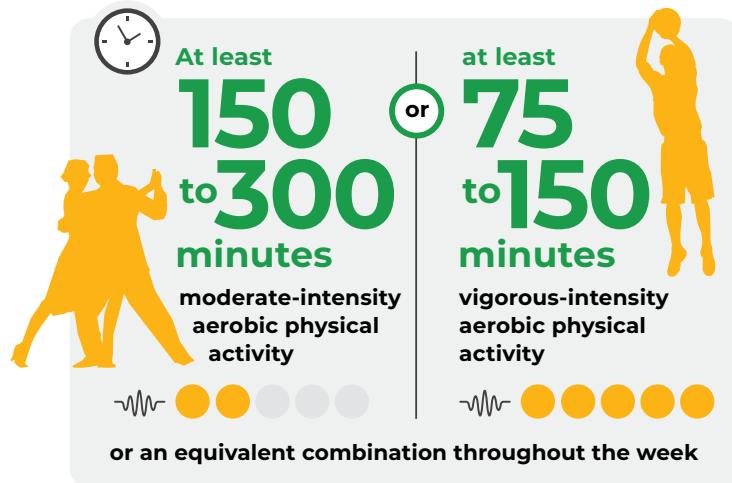
It is recommended that:

- › All adults should undertake regular physical activity.

Strong recommendation, moderate certainty evidence

- › Adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for substantial health benefits.

Strong recommendation, moderate certainty evidence



For additional health benefits:

On at least

2 days a week

muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups.



- › Adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.

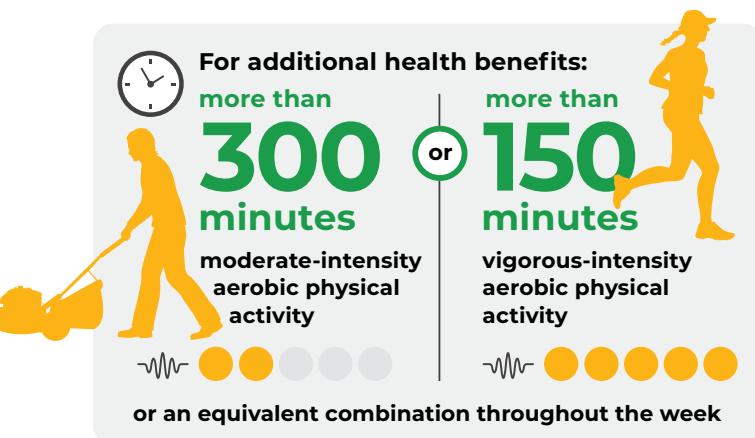
Strong recommendation, moderate certainty evidence



¹ Site-specific cancers of: bladder, breast, colon, endometrial, oesophageal adenocarcinoma, gastric, and renal.



ADULTS (aged 18–64 years)



> Adults may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.

Conditional recommendation, moderate certainty evidence

GOOD PRACTICE STATEMENTS

- Doing some physical activity is better than doing none.
- If adults are not meeting these recommendations, doing some physical activity will benefit their health.
- Adults should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.



In adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality and incidence of cardiovascular disease, cancer and type-2 diabetes.

It is recommended that:

> **Adults should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.**

Strong recommendation, moderate certainty evidence

> **To help reduce the detrimental effects of high levels of sedentary behaviour on health, adults should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity.**

Strong recommendation, moderate certainty evidence

LIMIT

the amount of time spent being sedentary



REPLACE

with more physical activity of any intensity (including light intensity).



OLDER ADULTS

(aged 65 years and older)



In older adults, physical activity confers benefits for the following health outcomes: improved all-cause mortality, cardiovascular disease mortality, incident hypertension, incident site-specific cancers, incident type-2 diabetes, mental health (reduced symptoms of anxiety and depression), cognitive health, and sleep; measures of adiposity may also improve. In older adults, physical activity helps prevent falls and falls-related injuries and declines in bone health and functional ability.

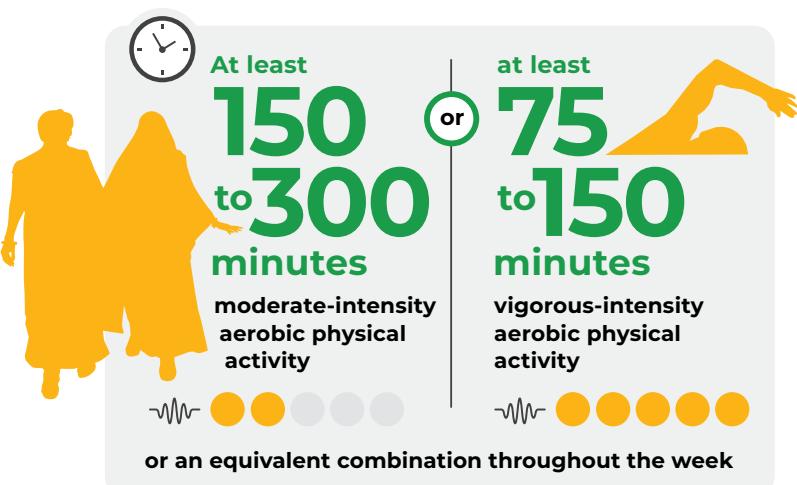
It is recommended that:

> All older adults should undertake regular physical activity.

Strong recommendation, moderate certainty evidence

> Older adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for substantial health benefits.

Strong recommendation, moderate certainty evidence



For additional health benefits:

On at least

2 days a week

muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups.



> Older adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.

Strong recommendation, moderate certainty evidence

On at least

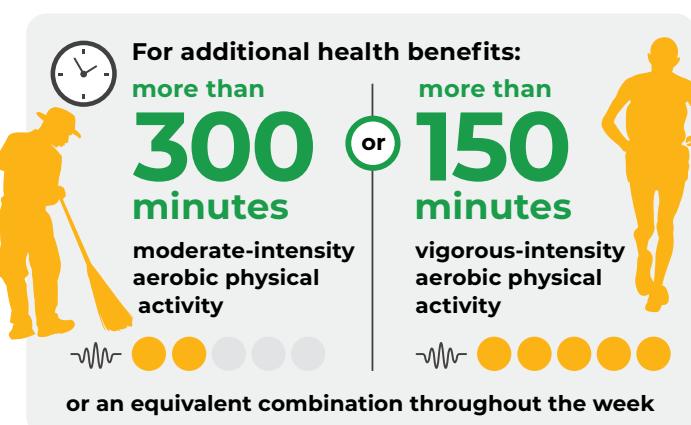
3 days a week

varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity.



> As part of their weekly physical activity, older adults should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls.

Strong recommendation, moderate certainty evidence

GOOD PRACTICE STATEMENTS

> Older adults may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for additional health benefits.

Conditional recommendation, moderate certainty evidence

- Doing some physical activity is better than doing none.
- If older adults are not meeting the recommendations, doing some physical activity will bring benefits to health.
- Older adults should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.
- Older adults should be as physically active as their functional ability allows, and adjust their level of effort for physical activity relative to their level of fitness.



In older adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality, and incidence of cardiovascular disease, cancer and incidence of type-2 diabetes.

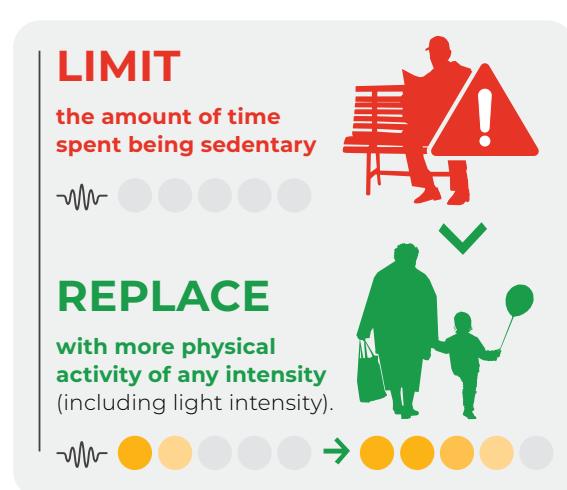
It is recommended that:

> **Older adults should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.**

Strong recommendation, moderate certainty evidence

> **To help reduce the detrimental effects of high levels of sedentary behaviour on health, older adults should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity.**

Strong recommendation, moderate certainty evidence



PREGNANT AND POSTPARTUM WOMEN

In pregnant and postpartum women, physical activity during pregnancy and postpartum confers benefits on the following maternal and fetal health benefits: decreased risk of pre-eclampsia, gestational hypertension, gestational diabetes, excessive gestational weight gain, delivery complications and postpartum depression, and fewer newborn complications, no adverse effects on birthweight; and no increase in risk of stillbirth.



It is recommended that all pregnant and postpartum women without contraindication should:

- › **Undertake regular physical activity throughout pregnancy and postpartum.**

Strong recommendation, moderate certainty evidence



- › **Do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week for substantial health benefits.**

Strong recommendation, moderate certainty evidence

- › **Incorporate a variety of aerobic and muscle-strengthening activities. Adding gentle stretching may also be beneficial.**

Strong recommendation, moderate certainty evidence

In addition:

- › **Women who, before pregnancy, habitually engaged in vigorous-intensity aerobic activity, or who were physically active, can continue these activities during pregnancy and the postpartum period.**

Strong recommendation, moderate certainty evidence



- Doing some physical activity is better than doing none.
- If pregnant and postpartum women are not meeting the recommendations, doing some physical activity will benefit their health.
- Pregnant and postpartum women should start by doing small amounts of physical activity, and gradually increase frequency, intensity and duration over time.
- Pelvic floor muscle training may be performed on a daily basis to reduce the risk of urinary incontinence.

Additional safety considerations for pregnant women when undertaking physical activity are:

- Avoid physical activity during excessive heat, especially with high humidity.
- Stay hydrated by drinking water before, during, and after physical activity.
- Avoid participating in activities which involve physical contact; pose a high risk of falling; or might limit oxygenation (such as activities at high altitude, when not normally living at high altitude).
- Avoid activities in supine position after the first trimester of pregnancy.
- When considering athletic competition, or exercising significantly above the recommended guidelines pregnant women should seek supervision from a specialist health-care provider.
- Pregnant women should be informed by their health-care provider of the danger signs alerting them as to when to stop; or to limit physical activity and consult a qualified health-care provider immediately should they occur.
- Return to physical activity gradually after delivery, and in consultation with a health-care provider, in the case of delivery by Caesarean section.



In pregnant and postpartum women, as in all adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality and incidence of cardiovascular disease, cancer and incidence of type-2 diabetes.



It is recommended that:

- > **Pregnant and postpartum women should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.**

Strong recommendation, low certainty evidence

Doing some physical activity is better than doing none.

ADULTS AND OLDER ADULTS WITH CHRONIC CONDITIONS (aged 18 years and older)



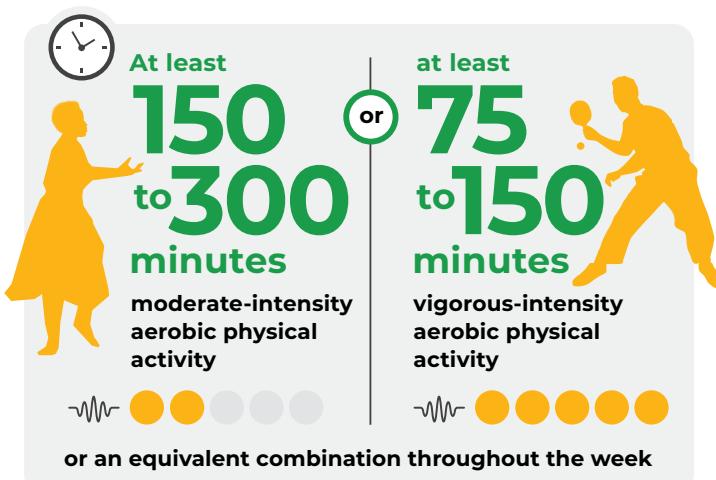
Physical activity can confer health benefits for adults and older adults living with the following chronic conditions:

for cancer survivors – physical activity improves all-cause mortality, cancer-specific mortality, and risk of cancer recurrence or second primary cancer; **for people living with hypertension** – physical activity improves cardiovascular disease mortality, disease progression, physical function, health-related quality of life; **for people living with type-2 diabetes** – physical activity reduces rates of mortality from cardiovascular disease and indicators disease progression; and **for people living with HIV** – physical activity can improve physical fitness and mental health (reduced symptoms of anxiety and depression), and does not adversely affect disease progression (CD4 count and viral load) or body composition.

It is recommended that:

- › All adults and older adults with the above chronic conditions should undertake regular physical activity. *Strong recommendation, moderate certainty evidence*

WHO guidelines on physical activity and sedentary behaviour



- › Adults and older adults with these chronic conditions should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for substantial health benefits.

Strong recommendation, moderate certainty evidence

- › Adults and older adults with these chronic conditions should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional benefits.

Strong recommendation, moderate certainty evidence

For additional health benefits:

On at least

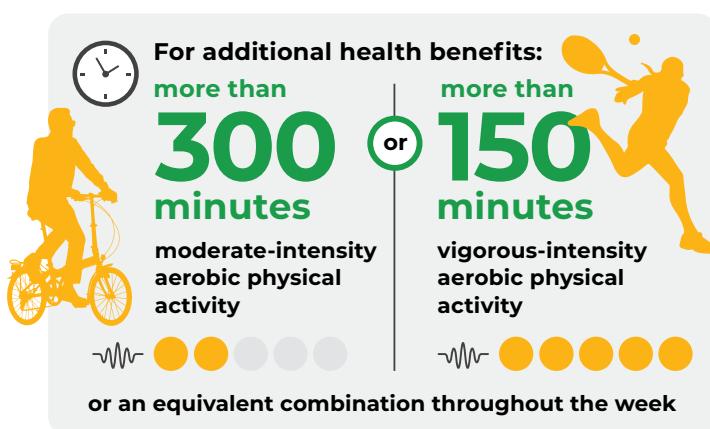
2 days a week

muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups.



- › As part of their weekly physical activity, older adults with these chronic conditions should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity on 3 or more days a week, to enhance functional capacity and prevent falls.

Strong recommendation, moderate certainty evidence



› When not contraindicated, adults and older adults with these chronic conditions may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.

Conditional recommendation, moderate certainty evidence

- When not able to meet the above recommendations, adults with these chronic conditions should aim to engage in physical activity according to their abilities.
- Adults with these chronic conditions should start by doing small amounts of physical activity and gradually increase the frequency, intensity and duration over time.
- Adults with these chronic conditions may wish to consult with a physical activity specialist or health-care professional

for advice on the types and amounts of activity appropriate for their individual needs, abilities, functional limitations/complications, medications, and overall treatment plan.

- Pre-exercise medical clearance is generally unnecessary for individuals without contraindications prior to beginning light- or moderate-intensity physical activity not exceeding the demands of brisk walking or everyday living.



In adults, including cancer survivors and people living with hypertension, type-2 diabetes and HIV, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality, and incidence of cardiovascular disease, cancer and incidence of type-2 diabetes.

For cancer survivors, and adults living with hypertension, type-2 diabetes and HIV, it is recommended that:

› Adults and older adults with chronic conditions should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.

Strong recommendation, low certainty evidence

› To help reduce the detrimental effects of high levels of sedentary behaviour on health, adults and older adults with chronic conditions should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity.

Strong recommendation, low certainty evidence



CHILDREN AND ADOLESCENTS (aged 5–17 years) LIVING WITH DISABILITY



Many of the health benefits of physical activity for children and adolescents, as set out in the section above, also relate to those children and adolescents living with disability. Additional benefits of physical activity to health outcomes for those living with disability include: improved cognition in individuals with diseases or disorders that impair cognitive function, including attention-deficit/hyperactivity disorder (ADHD); improvements in physical function may occur in children with intellectual disability.



It is recommended that:

- › Children and adolescents living with disability should do at least an average of 60 minutes per day of moderate- to vigorous-intensity, mostly aerobic, physical activity, across the week.



- › Vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone should be incorporated at least 3 days a week.

Doing some physical activity is better than doing none.

- Doing some physical activity is better than doing none.
- If children and adolescents living with disability are not meeting these recommendations, doing some physical activity will bring benefits to health.
- Children and adolescents living with disability should start by doing small amounts of physical activity and gradually increase the frequency, intensity and duration over time.
- There are no major risks for children and adolescents living with disability engaging in physical activity when it is appropriate to an individual's current activity level, health status and physical function; and the health benefits accrued outweigh the risks.
- Children and adolescents living with disability may need to consult a health-care professional or other physical activity and disability specialist to help determine the type and amount of activity appropriate for them.



In children and adolescents, higher amounts of sedentary behaviour are associated with the following poor health outcomes: increased adiposity; poorer cardiometabolic health, fitness, and behavioural conduct/pro-social behaviour; and reduced sleep duration.

It is recommended that:

> Children and adolescents living with disability should limit the amount of time spent being sedentary, particularly the amount of recreational screen time.

Strong recommendation, low certainty evidence

LIMIT

the amount of time spent being sedentary, particularly recreational screen time.



Start by doing small amounts of physical activity.

ADULTS (aged 18 years and older) LIVING WITH DISABILITY

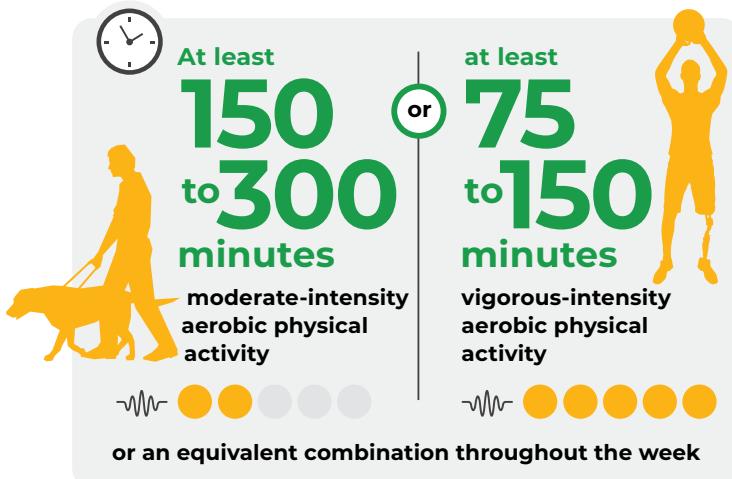


Many of the health benefits of physical activity for adults, as set out in the section above, also relate to adults living with disability. Additional benefits of physical activity to health outcomes for those living with disability include the following: **for adults with multiple sclerosis** – improved physical function, and physical, mental, and social domains of health-related quality of life; **for individuals with spinal cord injury** – improved walking function, muscular strength, and upper extremity function; and enhanced health-related quality of life; **for individuals with diseases or disorders that impair cognitive function** – improved physical function and cognition (in individuals with Parkinson's disease and those with a history of stroke); beneficial effects on cognition; and may improve quality of life (in adults with schizophrenia); and may improve physical function (in adults with intellectual disability); and improves quality of life (in adults with major clinical depression).

It is recommended that:

- › All adults living with disability should undertake regular physical activity.

Strong recommendation, moderate certainty evidence



- › Adults living with disability should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for substantial health benefits.

Strong recommendation, moderate certainty evidence

- › Adults living with disability should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.

Strong recommendation, moderate certainty evidence



ADULTS (aged 18 years and older) LIVING WITH DISABILITY

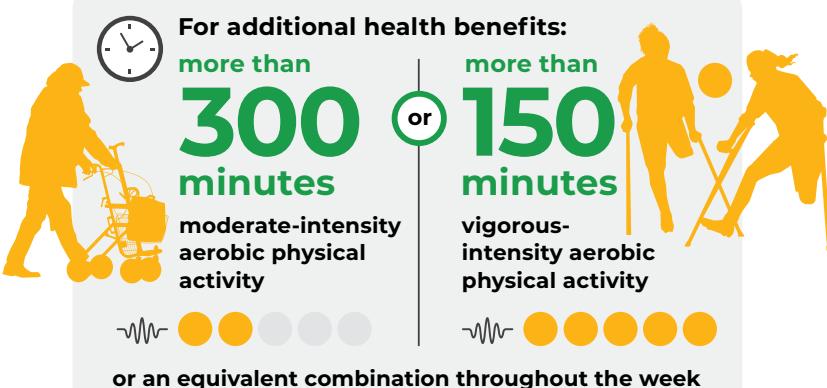


As part of their weekly physical activity, older adults living with disability should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity on 3 or more days a week, to enhance functional capacity and prevent falls.

Strong recommendation, moderate certainty evidence

Adults living with disability may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.

Conditional recommendation, moderate certainty evidence



GOOD PRACTICE STATEMENTS

- Doing some physical activity is better than doing none.
- If adults living with disability are not meeting these recommendations, doing some physical activity will bring benefits to health.
- Adults living with disability should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.

- There are no major risks to adults living with disability engaging in physical activity when it is appropriate to the individual's current activity level, health status and physical function; and when the health benefits accrued outweigh the risks.
- Adults living with disability may need to consult a healthcare professional or other physical activity and disability specialist to help determine the type and amount of activity appropriate for them.



In adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality and incidence of cardiovascular disease, cancer and type-2 diabetes.

It is recommended that:

Adults living with disability should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.

Strong recommendation, low certainty evidence

To help reduce the detrimental effects of high levels of sedentary behaviour on health, adults living with disability should aim to do more than the recommended levels of moderate-to vigorous-intensity physical activity.

Strong recommendation, low certainty evidence





BACKGROUND

Regular physical activity is a known protective factor for the prevention and management of noncommunicable diseases such as cardiovascular disease, type-2 diabetes, breast and colon cancer (1–3). Physical activity also has benefits for mental health (4), delays the onset of dementia (5), and can contribute to the maintenance of healthy weight (7) and general well-being (6).

Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure (1) and can be performed at a variety of intensities, as part of work, domestic chores, transportation or during leisure time, or when participating in exercise or sports activities. At the low end of the intensity range, sedentary behaviour is defined as any waking behaviour while in a sitting, reclining or lying posture with low energy expenditure (7). Emerging new evidence indicates that high levels of sedentary behaviour are associated with cardiovascular disease and type-2 diabetes as well as cardiovascular, cancer and all-cause mortality (8–10).

Physical inactivity is defined as not meeting the 2010 *Global recommendations on physical activity for health* (1) and is a leading contributor to global mortality. It is estimated that between four and five million deaths per year could be averted if the global population was more active (2, 11). Global estimates of physical inactivity indicate that in 2016, 27.5% of adults (12) and 81% of adolescents (13) did not meet the 2010 WHO recommendations (1), and trend data show limited global improvement during the past decade. The data also highlight that women are less active than men in most countries and that there are significant differences in levels of physical activity within and between countries and regions. These differences can be explained by inequities in access to opportunities to be physically active, further amplifying inequalities in health.

Currently, there are no global estimates of sedentary behaviour, but technological innovation and the transition towards more sedentary occupations and recreation, and the increasing use of personal motorized transportation are contributing to changing patterns of physical activity and increased sedentary behaviour across the world. The *Global action plan on physical activity 2018–2030* (14) sets out 4 strategic objectives and 20 policy actions to achieve a 15% relative reduction in the global prevalence of physical inactivity in adults and adolescents by 2030.

In 2010, WHO published the *Global recommendations on physical activity for health* (1), the first population-based public health guidelines for children and adolescents, adults and older adults. In 2018, the World Health Assembly, in resolution WHA71.6,¹ called for WHO to update the 2010 recommendations.

In 2019, WHO published *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age* (15). The guidelines were called for by the Commission on Ending Childhood Obesity (recommendation 4.12) (16), and address the omission of this younger age group in the 2010 *Global recommendations on physical activity for health* (1).

The 2020 WHO *Guidelines on physical activity and sedentary behaviour*, replace the 2010 guidelines and are based on the most recent advances in the evidence for the selected behaviours and associated health consequences. They will form part of the overall set of global recommendations on physical activity and sedentary behaviour.

¹ WHA71.6 WHO Global Action Plan on Physical Activity 2018–2030.

OTHER KEY WHO GUIDELINES

The importance of physical activity for health is recognized in other WHO guidelines. The *WHO Package of essential noncommunicable disease interventions for primary health care in low-resource settings* (17) provides a protocol for the clinical management of hypertension, type-2 diabetes, raised cardiovascular risk, asthma, and chronic obstructive pulmonary disease, and includes counselling to progressively increase physical activity to moderate levels (such as brisk walking) and at least 150 minutes per week, in line with the 2010 global recommendations. Recent WHO guidance in *Risk reduction of cognitive decline and dementia* (18) states that physical activity should be recommended to adults with normal cognition (strong recommendation) and those with mild cognitive impairment (conditional recommendation) to reduce the risk of cognitive decline. WHO *Integrated care for older people: guidelines on community-level interventions to manage declines in intrinsic capacity* (19) recommend multimodal exercises to prevent falls, and exercises for older adults with declining mobility. WHO *Recommendations on antenatal care for a positive pregnancy experience* (20) recommend counselling on healthy eating and being physically active during pregnancy to stay healthy and to prevent excessive weight gain, but do not address the wider health benefits of physical activity during pregnancy and the postpartum period.

The existing WHO guidelines, combined with these updated guidelines, provide an increasingly comprehensive set of global guidance on the contribution of physical activity and sedentary behaviours to the prevention and management of key diseases and to the promotion of health and well-being across the life course.

RATIONALE AND PURPOSE

The past 10 years has seen a significant increase in the body of evidence on the health impact of different types, amounts and durations of physical activity, as well as on the impact of sedentary behaviours and its interrelationship with levels of physical activity and health. In addition, the evidence base for physical activity in subpopulations, such as pregnant women and those living with chronic conditions and/or disability now permits the examination of the relationship between physical activity and health outcomes in these groups.

In the *Global action plan on physical activity 2018–2030* (14), action 4.1 calls for WHO to develop and disseminate global recommendations for physical activity and sedentary behaviours in children under 5 years of age, young people, adults, older adults and specific subpopulations, such as pregnant women, people living with chronic conditions and disability. Updating and broadening the scope of the guidelines, as requested by the World Health Assembly, ensures that population groups not included in the 2010 recommendations are provided with specific recommendations for physical activity. This aligns with the key principles and goals of the global action plan on physical activity, namely to reduce inequalities and to support all people to be more physically active every day.

The overarching purpose of these guidelines is to provide evidence-based public health recommendations on how much and what type of physical activity children and adolescents, adults, older adults and subpopulations such as pregnant women and those living with chronic conditions or disability, should do for significant health benefits and mitigation of health risks. The guidelines also provide evidence-based recommendations on the associations between sedentary behaviour and health outcomes.



TARGET AUDIENCE

The guidelines have been developed for children and adolescents (aged 5–17 years), adults (aged 18–64 years), older adults (aged 65 years and above), and include for the first time specific recommendations on physical activity for subpopulations such as pregnant women and those living with chronic conditions or disability. Recommendations are made for each specific age group and subpopulation, to provide those working with particular communities easy access to the relevant information. Providing separate recommendations for subpopulations, especially people living with chronic conditions or with disability, highlights the importance of including these subpopulations in policy and planning of physical activity and sedentary behaviour interventions.

These guidelines do not address sleep as a behaviour. Sleep is an important health-related issue and an emerging topic within population health science. However, it was deemed beyond the scope of the mandate to include sleep in the updated recommendations. Nonetheless, the importance of sleep is recognized and was included as an important health outcome when considering the impact of physical activity and sedentary behaviour.

This document reports the process and summarizes the evidence-base reviewed to develop the recommendations. **The primary audiences are:**

1. Policy-makers in ministries of health, education, youth, sport and/or social or family welfare, working in high as well as low- and middle-income countries, who formulate country-specific guidelines, and who plan health, education, workplace, residential or community-based intervention programmes across the life course.
2. Government officials who develop national, subregional or municipal plans to increase physical activity and reduce sedentary behaviours in population groups through guidance documents.
3. Persons working in nongovernmental organizations, education and workplace organizations or research.
4. Persons working in health services and those providing advice and guidance, such as community, family, primary or tertiary nurses or doctors, or allied health and exercise professionals working beyond the health sector. These guidelines can inform the content of their advice on these topics, if national guidance is not available.

The recommendations on physical activity and sedentary behaviour contained within the guidelines should be used to inform pre-service training and professional development courses for health-care workers, physical activity specialists and education professionals.

Derivative products are needed that convey these guidelines to specific end-users, stakeholders in sectors outside of health, and the wider community, that use tailored communications to meet the specific needs of each audience.



METHODS

These guidelines were developed in accordance with the *WHO Handbook for guideline development* (2nd edition) (21). A WHO Steering Group, led by the Department of Health Promotion, was established, with representation from WHO regional offices and relevant WHO departments. A Guideline Development Group (GDG) was formed, consisting of 27 experts and stakeholders, taking into account gender balance and geographical diversity. The draft guidelines were externally reviewed by seven independent reviewers, who provided feedback on the scientific evidence, its interpretation and content. In addition, an online public consultation was conducted on the draft guidelines, and feedback was received from over 400 contributors. These inputs from scientists, practitioners and the general public were collated and used by the GDG to finalize the guidelines. Full details of the management of the guideline development process are available in Annex 1.

SCOPE OF GUIDELINES AND QUESTIONS OF INTEREST

The GDG reviewed the scope of the guidelines and, at their first meeting, agreed on the most relevant PI/ECO (Population, Intervention/Exposure, Comparison, Outcome) questions. The key questions addressed for each subpopulation are summarized as follows:

For physical activity:

- a. What is the association between physical activity and health-related outcomes?
- b. Is there a dose-response association (volume, duration, frequency, intensity)?
- c. Does the association vary by type or domain of physical activity?

For sedentary behaviour:

- a. What is the association between sedentary behaviour and health-related outcomes?
- b. Is there a dose-response association (total volume, frequency, duration and intensity of interruption)?
- c. Does the association vary by type and domain of sedentary behaviour?
- d. In adults only: Does physical activity modify the effect of sedentary behaviour on mortality?

For each population (P), the exposure (E) was greater volume, duration, frequency or intensity of physical activity; for, as comparison (C) no physical activity or lesser volume, frequency, intensity or duration of physical activity. The critical and important outcomes for each population are summarized in Table 1 and the details of each PI/ECO question in the relevant section of the Web Annex: Evidence profiles .

 Available online at <https://apps.who.int/iris/bitstream/handle/10665/336657/9789240015111-eng.pdf>

Table 1: Summary of critical and important* health outcomes addressed by population groups

Outcomes (in alphabetical order)	Children and adolescents aged 5–17 years: PA and sedentary	Adults aged 18–64 years: PA	Adults aged over 18 years: sedentary	Adults aged over 65 years: PA ^a	Pregnancy and postpartum	Chronic conditions ^b	Children and adults with disability ^c
Adiposity (weight gain, weight change, weight control, weight stability, weight status and weight maintenance)	Critical	Critical	Critical	Critical ^a	Critical	Critical – HIV	–
Adverse events	Critical	Critical	–	Critical ^a	Critical (fetal outcomes)	–	–
All-cause and cause-specific mortality	–	Critical (cancer and CVD specific)	Critical	Critical ^a	–	Critical	–
Bone health	Critical	–	Important	–	–	–	–
Cardiometabolic health	Critical	–	–	–	–	–	–
Cognitive outcomes	Critical	Critical	Important	Critical ^a	–	–	Critical – MS, PD, Stk, Sch, ADHD
Delivery complications	–	–	–	–	Important	–	–
Disease progression	–	–	–	–	–	Critical – HT, T2D, HIV, Critical – cancer recurrence	–
Falls and fall-related injuries	–	–	–	Critical	–	–	–
Fetal outcomes (birthweight, preterm birth)	–	–	–	–	Critical	–	–
Functional ability	–	–	–	Critical	–	–	–
Gestational diabetes mellitus	–	–	–	–	Critical	–	–
Gestational hypertension/ preeclampsia	–	–	–	–	Critical	–	–
Health-related quality of life	–	Important	Important	Important ^a	–	Critical – HT, T2D, HIV	Critical – MS, SCI, ID, MCD, Sch
Incidence of cancer	–	Critical	Critical	Critical ^a	–	–	–
Incidence of CVD	–	Critical	Critical	Critical ^a	–	–	–
Incidence of hypertension	–	Important		Important ^a	–	–	–
Incidence of type-2 diabetes	–	Critical	Critical	Critical ^a	–	–	–
Mental health (symptoms of anxiety and depression)	Critical	Critical	Important	Critical ^a	Critical	–	–
Osteoporosis	–	–	–	Critical	–	–	–
Physical fitness	Critical	–	Important	–	–	–	–
Physical function	–	–	Important	–	–	Critical – HT, T2D, HIV	Critical – MS, SCI, ID, PD, Stk
Pro-social behaviour	Important	–	–	–	–	–	–
Psychosocial outcomes	–	–	–	Important	–	–	–
Risk of co-morbid conditions	–	–	–	–	–	Critical – HT, T2D, HIV	Critical – MS, SCI, ID
Sleep	Important	Important	Important	Important ^a	–	–	–

* Critical outcome: an outcome that is critical to decision-making; Important outcome: an outcome that is important, but not critical to decision-making.

^a The critical and important outcomes considered for the adult population, including older adults.

^b Outcomes are for subpopulation condition as listed: Cancer – cancer survivors; HT – hypertension; T2D – type-2 diabetes; HIV.

^c Outcomes are for subpopulation condition as listed: MS – muscular sclerosis; SCI – spinal cord injury; ID – intellectual disability; PD – Parkinson's disease; Stk – in stroke survivors; Sch – schizophrenia; ADHD – attention deficit/hyperactivity disorder.

Critical and important outcomes for the age-specific population were considered and extrapolated.

THE EVIDENCE

The revision of the 2010 WHO recommendations on physical activity was conducted by identifying, and then updating, the most recent, relevant umbrella reviews related to the scope of these guidelines.

This approach was adopted due to an extensive body of recent systematic reviews which were conducted to inform the development of several national physical activity guidelines. The additional updating was undertaken to ensure the new WHO guidelines reflect the most recent available data in a rapidly developing field of public health.

Umbrella reviews were selected if they met the following three criteria: **i)** the evidence reviews had been conducted according to standard systematic processes that were well documented; **ii)** the assessment of the certainty of the evidence used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) method or an equivalent methodology that was clearly described and documented; and **iii)** the evidence reviews addressed the populations of interest with no restrictions to country or country income level.

The PI/ECO questions and the critical and important health outcomes were mapped against existing evidence reviews and, where needed, additional new reviews were commissioned to address gaps. The GDG requested that the evidence reviews be updated, using the same search terms, search languages, and databases as the original reviews.

The following evidence reviews were identified as meeting the above three criteria and were chosen for recency and comprehensiveness:

- A systematic review of the literature conducted by Poitras et al. (2016) on the association between physical activity and health indicators in school-aged children and youth (22) as part of the process for developing the *Canadian 24-hour movement guidelines for children and youth* (23). This review focused solely on studies that used objective measurements of physical activity. A total of 162 studies were included, representing 204 171 participants from 31 countries.
- A systematic review of the literature of the association between sedentary behaviour and health indicators in school-aged children conducted by Carson et al. (2016) (24), as part of the process for developing the *Canadian 24-hour movement guidelines for children and youth* (23). A total of 235 studies (194 unique samples) were included representing 1 657 064 unique participants from 71 countries.
- A systematic review conducted by Okely et al. (2019) (25) undertaken to update Poitras et al. (2016) (22) and Carson et al. (2018) (24) as part of the development of the 2019 *Australian 24-hour movement guidelines for children and young people* (aged 5–17 years) (26). This report identified an additional 42 studies on physical activity, and 32 on sedentary behaviour, published through to July 2018 (25). The GRADE tables developed by Okely et al. were used as the basis for the commissioned update conducted for WHO. The GRADE tables along with the evidence profiles are presented in the [Web Annex: Evidence profiles](#).
- The 12 systematic reviews conducted and synthesized as part of the development of the 2019 *Canadian guideline for physical activity throughout pregnancy* (27). These 12 reviews assessed over 25 000 related studies in English, Spanish and French language on maternal physical activity during pregnancy that reported on maternal, fetal, or neonatal morbidity, or fetal mortality outcomes. Seven of these systematic reviews addressed outcomes deemed critical and important by the GDG (28–34) The GRADE tables from these evidence reviews were used as the basis for the literature search conducted to update and inform the development of WHO recommendations. The updated evidence profiles are presented in the [Web Annex: Evidence profiles](#).
- The scientific report of the Physical Activity Guidelines Advisory Group (PAGAC) (35) which provides a systematic update of evidence on physical activity and sedentary behaviours and health outcomes published 2008–2016 as part of the development of the 2018 *Physical activity guidelines for Americans, 2nd Edition* (36). The evidence summarized addressed a total of 38 main research questions and 104 subquestions selected for their public health relevance. The evidence comprised results from systematic reviews which consisted of a total of 1130 articles, each abstracted to answer the 38 research questions (35). The protocols used a modified version of "A Measurement Tool to Assess Systematic Reviews" (AMSTARExBP) to assess the methodological quality of systematic reviews and meta-analyses. Risk of bias, or internal validity, was assessed for each original study using an adapted version of the USDA NEL Bias Assessment Tool (BAT) (37). The new evidence identified in the updated searches conducted for these WHO guidelines is presented in the evidence profiles in the [Web Annex: Evidence profiles](#); links are provided to the report and supplementary materials of PAGAC (35).

Available online at <https://apps.who.int/iris/bitstream/handle/10665/336657/9789240015111-eng.pdf>

Methods for updating the evidence and data extraction

A search for systematic reviews and pooled analyses of cohort studies was conducted for studies published from the date of the last searches carried out for each of the included reviews (listed above) to September 2019; standardized data extraction protocols were developed and employed.

To update the searches conducted by Poitras et al. (2016) (22), Carson et al. (2016) (24), and Okely et al. (2019) (25), the databases MEDLINE, EMBASE, PsycINFO, and SportDiscus were searched to identify reviews that were peer-reviewed, written in English or French. To update the searches conducted by PAGAC (35), PubMed, CINAHL and Cochrane databases were searched to identify reviews that were peer-reviewed, written in English. A de novo search for important outcomes, where these were not included by PAGAC (35), was not conducted due to resource constraints.

Searches were performed with no restriction by country or country income status, and inclusive of reviews addressing any subjectively or objectively measured physical activity or sedentary behaviour. It was decided not to conduct searches in languages other than those of the original searches, due to resource constraints and previous experience in the field indicating that such searches yielded very few, if any, additional reviews. Reviews were considered that examined an association between physical activity or sedentary behaviour and health-related outcomes (based on levels above or below a threshold of physical activity or sedentary behaviour), and that explored the dose-response relationship between these and health-related outcomes.

An external team of reviewers used the AMSTAR 2 (Assessment of Multiple Systematic Reviews) instrument to rate the credibility of the systematic reviews under consideration for inclusion (38). The AMSTAR 2 tool contains 16 items that relate to the planning and conduct of the review. The overall confidence in the results of each review was rated according to published guidance: a rating of "high" reflects that the review had zero or one noncritical weakness; "moderate" indicates the review was judged to have more than one noncritical weakness; "low" means the review was judged to have one critical flaw with or without noncritical weaknesses, or multiple noncritical weaknesses; and "critically low" signifies that more than one critical flaw was present. One reviewer completed the AMSTAR 2 tool for all provisionally included reviews. Reviews that were rated critically low by one reviewer were reviewed by a

second reviewer using the same tool. Reviews ultimately rated as critically low were excluded because they were judged to be too unreliable to provide an accurate and comprehensive summary of the available evidence, unless it was the only review available for a particular outcome.

This body of evidence also included pooled cohort studies. An external team of reviewers used the Newcastle-Ottawa Scale to assess the quality of the studies (39). Each study was given a quality rating of "good", "fair", or "poor". In general, a good-quality study met all criteria on the Newcastle-Ottawa scale. A fair-quality study did not meet, or it was unclear whether it met, at least one criterion, but also had no known important limitations that could invalidate its results. A poor-quality study had a single fatal flaw, or multiple important limitations. Poor-quality studies were excluded.

There was an assessment for overlap, recognizing potential for duplication of studies in multiple reviews. Reviews containing redundant bodies of evidence, overviews of reviews, and some pooled cohort studies were excluded, where other more comprehensive and/or recent reviews were identified.

Methods for new reviews

Where gaps in existing evidence were identified, new umbrella reviews were commissioned to examine:

1. the relationship between occupational (i.e. work-related) physical activity and health-related outcomes (40); and
2. the association between leisure-domain physical activity and adverse health outcomes (41).

(For numbers 1 and 2 above, searches were undertaken using PubMed, SportDiscus and EMBASE for reviews published from 2009 to December 2019.)

3. the association between physical activity and falls prevention; the 2019 Cochrane Collaboration Systematic Review by Sherrington et al. (42) was used, and updated with evidence published from the end search date of their original review, through to November 2019.
4. the association between physical activity and osteoporosis and sarcopenia. The search for existing systematic reviews on osteoporosis and sarcopenia, conducted in PubMed for reviews published from 2008 up to November 2019, identified no new reviews and eight new primary studies.
5. the evidence on associations between physical activity and health outcomes in people living with HIV. A scoping review ascertained the availability of

evidence on physical activity and health-related outcomes among people living with HIV to support conducting an umbrella review which was conducted for evidence published up to October 2019 with no start date limitation using PubMed, CINAHL and Web of Science.

Summary of characteristics of the evidence and assessment methods of physical activity and sedentary behaviour

Until recently, the primary methods for measuring physical activity and sedentary behaviours in adults has been by self-report (i.e. survey) and, for children, either self-report or parental recall. Although these methods have well-established strengths, limitations include being prone to reporting bias and measurement error (43). In recent years, with digital technology rapidly growing in this area, there has been an increase in the use of device-based measures for assessing physical activity and sedentary time and their associations with health outcomes. However, challenges remain in comparing results between studies due to differences between the technical features and placement of different devices (accelerometers), and differences in the analyses and reporting of the data. For example, when measuring sedentary time with device-based measures, miscalculation may occur as many of the devices do not currently distinguish between positions (e.g. lying, sitting and standing still). Difficulties also exist when comparing findings from studies using device-based measures with those reporting results from self-report measures.

Self-report instruments vary in content, in the examples of physical activity, response options and domains covered. Until recently, studies focused primarily on assessing either total physical activity, or physical activity in the leisure/recreation domain only, but now increasingly include other domains such as physical activity for transport (e.g. walking and cycling), at work, and in the household. The majority of evidence reports on associations between aerobic physical activity and health outcomes, however studies are now assessing the benefits of muscle-strengthening exercise, as well as combinations of different types of activity and other domains.

Results on the association between physical activity levels and health outcomes are reported and compared in different ways. Many studies report comparisons between quartiles or quintiles of physical activity, other studies compare those “meeting” versus “not meeting” national guidelines.

Calculation of total physical activity, when reported, is usually estimated in MET-hours per week and some studies compare “highest” versus “lowest”, although categories also vary across studies. The literature frequently reports results from analyses that apply data cut points based on an existing guideline, or the current WHO Global recommendation, or metrics from previous research (for example the cut points of 60 minutes per day in research on youth populations, or the frequency of 2–3 times per week for strength training intervention). When such cut points become commonplace the building of evidence on the associations of higher or lower levels of physical activity exposure on health outcomes can be limited.

Most of the evidence assessing the associations between sedentary behaviours and health outcomes for children and adolescents is cross-sectional in nature, and a majority of studies rely on self- or parent-reported measures of sedentary time that are subject to measurement errors and recall biases.

Evidence from longitudinal observational studies and intervention trials was prioritized, and reviews that solely or primarily synthesized cross-sectional evidence were not considered. Greater emphasis was given to evidence provided by reviews graded moderate certainty and above, and to those providing evidence from studies using device-based measures of exposure.

Grading the body of evidence

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) method was used to rate the certainty of the evidence for each PI/ECO (44), based on the underlying evidence in the reviews. When available, the GRADE “Evidence Profiles” or “Summary of Findings” tables from each review, were used as a starting point. If no table was available within the existing systematic reviews, “Evidence Profile” tables for each population and outcome of interest were constructed.

The GRADE method was used to rate the certainty of the evidence for each PI/ECO (44) with the following criteria considered: study design; risk of bias; consistency of effect; indirectness; precision of effect; and other limitations, including publication bias and factors for upgrading observational evidence (magnitude of effect, dose-response, and effects of confounders). Observational evidence from well-conducted longitudinal studies was also upgraded to reflect more appropriately the increased certainty in findings regarding associations between physical

activity or sedentary behaviour and outcomes from such studies. Studies that evaluated intermediate/indirect outcomes were not necessarily downgraded, as the outcomes (including intermediate outcomes) were prioritized by the GDG; the GRADE rating reflects the certainty in effects on those outcomes. In some cases, the GRADE ratings from existing reviews were modified to ensure consistency in application of GRADE methods. The certainty in the body of evidence for each outcome was assigned based on the following guidance (45):

High	Very confident that the true effect lies close to that of the estimate of the effect.
Moderate	Moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
Very low	Very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

Going from evidence to recommendations

The GDG employed the GRADE Evidence to Decisions (EtD) framework for generating question-specific recommendations. The EtD framework is a systematic, structured and transparent approach to decision-making. The framework uses explicit criteria for generating guideline recommendations considering research evidence, certainty of evidence and, where required, expert opinion and topical knowledge from the perspective of the target audience. The criteria elicit judgments about the balance between the observed evidence of desirable and undesirable outcomes, overall certainty of evidence, relative values of patients for desirable and undesirable outcomes, resource use (cost considerations) where applicable, potential impact on inequities in health, acceptability and feasibility of recommendations.

The GDG considered the body of evidence in totality for each recommendation for all critical outcomes, and all available important outcomes. For a particular exposure/intervention and outcome link, studies differed widely in the specific exposure/intervention assessed, outcomes assessed, study design, and

analytic methods, resulting in heterogeneity in the available evidence. Therefore, it was not possible to apply the classic GRADE approach to each specific exposure/intervention and outcome link; rather, GRADE was applied for the overall body of evidence addressing each exposure/intervention and outcome link, across study design types and variations in exposure/intervention measurements and analyses. When these factors resulted in concerns regarding the coherence of the evidence (i.e. that the evidence for a particular exposure/intervention and outcome link did not correspond when looked at in different ways), the panel downgraded the certainty of evidence (21).

The GDG prioritized the following health outcomes to consider the effects of physical activity and sedentary behaviour: reduced all-cause and cause-specific mortality (cardiovascular disease and cancer); reduced incidence of cardiovascular disease; cancer (site-specific); type-2 diabetes; improved physical fitness (e.g. cardiorespiratory, motor development, muscular fitness); improved cardiometabolic health (e.g. blood pressure, dyslipidaemia, glucose, insulin resistance); bone health; mental health (e.g. reduction in depressive symptoms, self-esteem, anxiety symptoms, ADHD); and improved cognitive outcomes (e.g. academic performance, executive function); and reduced adiposity. Adverse effects (e.g. injuries and harms) were also considered.

Additional considerations

For each population and all PI/ECO questions, the GDG also considered values and preferences of those affected by the guidelines; the resource implications of the recommendations; the impact on health equity; and the acceptability and feasibility of the recommendations. As there was considerable duplication in these considerations, and in the GDG's assessment, for each population group, a summary of the discussions regarding assessments for these elements are described in the "Evidence to recommendations" section.

RECOMMENDATIONS

The public health recommendations presented in the *WHO Guidelines on physical activity and sedentary behaviour* are for all populations and age groups ranging from 5 years to 65 years and older, irrespective of gender, cultural background or socioeconomic status, and are relevant for people of all abilities.

The new guidelines are presented by age group and behaviour (physical activity and sedentary). For each set of recommendations, an introductory statement summarizes the health outcomes associated with physical activity and sedentary behaviour respectively; the recommendations then follow. A set of good practice statements is provided to further clarify how the recommendation can be met safely by the target population. These good practice statements are not "graded recommendations" per se, but are derived from scientific evidence and from practical considerations reviewed and recommended by the GDG.

For each set of recommendations, a summary of the supporting scientific evidence is provided, structured by the three PI/ECO questions; presenting first the evidence on the associations with the critical health outcomes, followed by a summary of evidence on dose response. Finally, a summary of evidence on the relationships between different types or domains of exposure and health outcomes is presented, where this exists.





PHYSICAL ACTIVITY RECOMMENDATION

For children and adolescents, physical activity can be undertaken as part of recreation and leisure (play, games, sports or planned exercise), physical education, transportation (wheeling, walking and cycling) or household chores, in the context of educational, home, and community settings.

In children and adolescents, physical activity confers benefits for the following health outcomes: improved physical fitness (cardiorespiratory and muscular fitness), cardiometabolic health (blood pressure, dyslipidaemia, glucose, and insulin resistance), bone health, cognitive outcomes (academic performance, executive function), mental health (reduced symptoms of depression); and reduced adiposity.

It is recommended that:

› **Children and adolescents should do at least an average of 60 minutes per day of moderate- to vigorous-intensity, mostly aerobic, physical activity, across the week.**

Strong recommendation, moderate certainty evidence

› **Vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone, should be incorporated at least 3 days a week.**

Strong recommendation, moderate certainty evidence

- Doing some physical activity is better than doing none.
- If children and adolescents are not meeting the recommendations, doing some physical activity will benefit their health.
- Children and adolescents should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.
- It is important to provide all children and adolescents with safe and equitable opportunities, and encouragement, to participate in physical activities that are enjoyable, offer variety, and are appropriate for their age and ability.



Supporting evidence and rationale

For these guidelines for children and adolescents, systematic reviews (22, 25, 35) were used and updated with 16 new reviews identified that met inclusion criteria. Full details of the methods, data extraction and evidence profiles can be found in the Web Annex: Evidence profiles

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In children and adolescents (aged 5–17 years), what is the association between physical activity and health-related outcomes?

A large body of evidence previously established that greater amounts and higher intensities of physical activity in children and adolescents are associated with multiple beneficial health outcomes (1). Recent evidence reaffirms that increased physical activity improves **cardiorespiratory fitness** and **musculoskeletal fitness** in children and adolescents (22, 35). For example, positive impacts are obtained when participating in moderate- to vigorous-intensity physical activity for 3 or more days per week, for 30 to 60 minutes (22, 35).

Regular physical activity, largely aerobic, in children and adolescents is positively associated with beneficial **cardiometabolic health** outcomes, including improved blood pressure, lipid profile, glucose control and insulin resistance (35). Recent reviews examined the effectiveness of school-based physical activity programmes (46), high-intensity interval training (47) and resistance training (48), versus no intervention on measures of cardiometabolic health. Within all 3 reviews, there was consistent evidence that interventions were associated with better cardiometabolic outcome measures, although there was varied precision in effect sizes and few individual trials found statistically significant benefits of physical activity across all cardiometabolic outcomes. One review of 19 RCTs ($n= 11\,988$) (46) reported that school-based physical activity programmes were associated with statistically significant improvements in diastolic blood pressure ($ES= 0.21$ [95% CI: 0.42 to 0.01]; $p= 0.04$) and fasting insulin ($ES= 0.12$ [95% CI: 0.42 to 0.04]; $p= 0.03$) compared with no physical activity interventions.

Physical activity has been reported to be favourably associated with **adiposity**, and higher levels of activity may be associated with healthy weight status in children and adolescents (22, 35). The results are generally strongest in cross-sectional studies, while the results are more mixed from prospective observational studies, which limits understanding of the directionality of the reported associations. More recent reviews of physical activity interventions trials (laboratory-based high-intensity interval training [HIIT], classroom-based active learning, resistance training) reported inconsistent results with the majority of the studies included in the reviews not reporting an effect (47, 49, 50). However, a review of longitudinal and cross-sectional studies reported a negative relationship between pedometer-

measured physical activity and measures of adiposity, BMI or waist circumference (51). Overall there is low certainty evidence that physical activity is associated with the management of a healthy weight status and more research is needed to determine directionality and strength of association.

There is less evidence examining the association between physical activity and **motor skill development** in children and adolescents, with current reviews demonstrating null findings (22). More research is needed with motor development as an outcome to inform future guidelines.

For children and adolescents, bone-loading activities can be performed as part of playing games, running, turning, or jumping. Physical activity is positively associated with bone mass accrual and/or bone structure, and recent evidence supports that children and adolescents who are more physically active than their peers have greater bone mass, higher bone mineral content or density, and greater bone strength (35). Maximizing **bone health** in childhood and adolescence can help protect from osteoporosis and related fractures later in life.

Developing and maintaining cognitive function is essential across the entire lifespan. In children and adolescents, physical activity has positive effects on **cognitive function** and **academic outcomes** (e.g. school performance, memory and executive function) (22, 35). One recent review (19 RCTs; $n= 5038$) demonstrated that exercise interventions with multiple sessions per week, for 6 weeks or longer, were associated with greater change in measures of cognitive function such as inhibitory control (SMD 0.26 [95% CI: 0.08 to 0.45], $p= < 0.01$); working memory (SMD 0.10 [95% CI: -0.05 to 0.25], $p= < 0.02$), and cognitive flexibility (SMD 0.14 [95% CI: -0.03 to 0.31], $p= < 0.04$) compared with no exercise interventions (52). Physical activity also reduces the risk of experiencing depression and depressive symptoms in children and adolescents with and without major **depression** (35), and may be comparable to psychological and pharmaceutical therapies in reducing symptoms.

Although all physical activity comes with some **risk of adverse event** (53) there is limited evidence reporting harms associated with physical activity levels recommended for health benefit (35). Based on available evidence and expert opinion, the potential risks associated with the amounts and types of physical activity recommended for children and adolescents

were considered to be low (35) and can be reduced by a progressive increase in the activity level and intensity, especially in children and adolescents who are inactive. It is known that participation in some sports increases the risk of injury, as does increasing exercise intensity (53). More research is needed to strengthen the knowledge base in this area.

The GDG concluded that:

- There is moderate certainty evidence that greater amounts of moderate- and vigorous-intensity physical activity are associated with improved cardiorespiratory fitness and muscular fitness, cardiometabolic health and bone health in children and adolescents.
- There is moderate certainty evidence that both short- and long-term moderate- to vigorous-intensity physical activity have positive effects on cognitive function, academic outcomes and mental health.
- There is low certainty evidence that physical activity is favourably associated with the management of healthy weight status in children and adolescents.
- There is low-certainty evidence that the risks for the amounts and types of physical activity recommended for children and adolescents are low and are outweighed by the benefits.

Is there a dose-response association (volume, duration, frequency, intensity)?

Although there is a substantial body of evidence demonstrating a positive association between physical activity and health outcomes in children and adolescents, very few studies have addressed the issue of dose-response. Therefore, the exact shape of the dose-response curve and/or the presence of threshold values (that differentiate lower versus higher risk) for physical activity and specific health outcomes is less well understood in children and adolescents compared with adult populations. Nonetheless, a substantial body of evidence shows that many of the health benefits occur with 60 minutes of physical activity daily (22, 35), and given no contradictory evidence, it was concluded that the updated evidence reaffirms the current WHO recommendation for 60 minutes of moderate- to vigorous-intensity physical activity per day (1).

However, the review of all evidence, including recent results from studies using device-based measures of physical activity, did not support retaining the specification of a “minimum” daily threshold of 60 minutes of moderate- to vigorous-intensity physical

activity for health benefits, given that studies broadly used “an average” threshold of 60 minutes per day, not a *minimum* daily threshold of 60 minutes, to assess the benefits of physical activity on health outcomes. The review concluded that the new guideline should be amended to more closely reflect this evidence.

The benefits of regular vigorous-intensity activity on cardiometabolic health outcomes has been previously established (1) and recent reviews provided further supporting evidence (35). For example, a recent review (54) showed that high-intensity interval training, compared with moderate-intensity continuous training, had a moderate beneficial effect on cardiorespiratory fitness ($SMD = 0.51$ [95% CI: 0.33 to 0.69], $p < 0.01$; $I^2 = 0\%$). There was no evidence that intervention duration, exercise modality, exercise and rest ratio, and total bouts modified the effect on cardiorespiratory fitness. These results were consistent overall with other recent reviews (22, 35, 47) and provide support to retaining the recommendation that youth and adolescents should do regular vigorous-intensity activity to improve cardiorespiratory fitness.

The GDG concluded that:

- Evidence affirms the previous WHO recommendation for 60 minutes of moderate- to vigorous-intensity physical activity per day.
- Evidence supports amending the previous specification of a minimum daily threshold of 60 minutes of physical activity to an average of 60 minutes per day per week, which more closely reflects the evidence.
- There is moderate certainty evidence that greater amounts of vigorous-intensity physical activity are associated with improved cardiorespiratory fitness.

Does the association vary by type or domain of physical activity?

For children and adolescents, physical activity includes play, games, sports, transportation, recreation, physical education or planned exercise, in the context of family, school, and community activities. However, few studies have directly compared different types or domains of physical activity in children and adolescents and thus there is insufficient evidence to determine if the association between physical activity and health outcomes varies by type of activity (e.g. aerobic versus muscle-strengthening exercise) or domain of physical activity (e.g. active transport (walking and cycling) versus physical education, versus sports/recreation).

There is evidence showing that both increased levels of aerobic moderate- to vigorous-intensity physical activity are associated with increased cardiorespiratory fitness, and that increased muscle-strengthening activity increases muscular fitness in children and adolescents. This evidence informed the 2010 WHO *Global recommendations on physical activity for health* (1) which recommended incorporating activities that strengthen muscles and bones at least 3 days per week. Updated evidence reaffirmed that regular muscle-strengthening activity 3 times per week was effective for improving indicators of muscular fitness; however, there is insufficient evidence to state specific details of session duration and intensity, largely due to the heterogeneity of exposures assessed in the literature (22, 35). There is

less evidence for a protective effect of resistance training on cardiometabolic health. Given the absence of new evidence on characteristics other than the frequency of muscle strengthening activities for children and adolescents, such as duration, it was not possible to specify any further details. Future research should address the health benefits of specific types and domains of physical activity in order to provide more specificity to this component of the guidelines.

The GDG concluded that:

- There is moderate certainty evidence that muscle-strengthening activities should be incorporated at least 3 days a week.





SEDENTARY BEHAVIOUR RECOMMENDATION

Sedentary behaviour is defined as time spent sitting or lying with low energy expenditure, while awake, in the context of educational, home, and community settings and transportation.

In children and adolescents, higher amounts of sedentary behaviour are associated with the following poor health outcomes: increased adiposity; poorer cardiometabolic health, fitness, behavioural conduct/pro-social behaviour; and reduced sleep duration.

It is recommended that:

› **Children and adolescents should limit the amount of time spent being sedentary, particularly the amount of recreational screen time.**

Strong recommendation, low certainty evidence

Supporting evidence and rationale

Sedentary behaviour was not included in the WHO 2010 recommendations, yet during the past decade, there has been a growing body of research examining the health outcomes associated with different measures and types of sedentary behaviours. Technology and digital communications have influenced how people work, study, travel and spend leisure-time. In most countries, children and adolescents are spending greater time engaged in sedentary behaviours, particularly for recreation, such as screen-based entertainment (television and computers) and digital communications, such as mobile phones.

For these guidelines for children and adolescents, systematic reviews (24, 25) were used and updated with seven new reviews identified that met inclusion criteria. Full details of the methods, data extraction and evidence profiles can be found in the [Web Annex: Evidence profiles](#).

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In children and adolescents (aged 5–17 years), what is the association between sedentary behaviour and health-related outcomes?

Evidence indicates that greater time spent in sedentary behaviour, especially recreational screen time, is related to poorer health outcomes (24, 35). For example, higher duration of screen time (including television viewing) is associated with poorer **fitness** and **cardiometabolic health** (24, 25) in children and adolescents. Evidence from device-based assessment of association with sedentary behaviour and interventions studies showed modest effects, although stronger effects for those already living with obesity (55). There is limited evidence suggesting that sedentary behaviour is not related to bone health in children and adolescents.

Despite more mixed results, evidence also suggests that sedentary behaviour may be associated with unfavourable measures of **adiposity** (24, 25). One review of largely cross-sectional studies, reported that sedentary behaviour (measured as total screen time) of more than 2 hours per day was positively associated with childhood overweight/obesity compared with lower levels (< 2 hours/day) (56). However, another review of 20 cross-sectional studies (57) found no statistically significant association between sedentary video gaming and body mass index among children or adolescents. A large review of 29 systematic reviews concluded that many studies report unfavourable associations between sedentary behaviour and markers of adiposity in young people when the behaviour is self-reported as some form of screen time (55). However, the review noted that the magnitude of such associations was small and, for studies using device-based assessment of sedentary time, largely zero (55). Intervention studies showed modest effects, although stronger effects for those already living with obesity (55). Further research is needed to inform the association between sedentary behaviours and measures of adiposity.

Although still an emerging area of research, some evidence shows that there may be a negative association between sedentary behaviour and **well-being and quality of life**, as well as an unfavourable relationship between **depression** and leisure screen time in children and adolescents (58, 59). For example, higher durations of sedentary behaviour, assessed as screen time, and some aspects of computer use, can be associated with poorer mental health (24). In another recent review, an association between sedentary behaviour

and anxiety symptoms was found in 5 of 8 studies, although results were inconsistent across different measures of sedentary behaviour within studies (60). Other evidence demonstrates that higher durations of television viewing and video game use were significantly associated with unfavourable measures of **behavioural conduct/pro-social behaviour** (24); and more screen time and television viewing is associated with shorter **sleep** duration, although there was no association between computer use/gaming and sleep duration (61). Investigations into the relationship between sedentary behaviours and mental health is a rapidly developing field with many unknowns, and reverse causality is likely to be in evidence. Further research is needed to inform on the direction and strength of this association.

The GDG concluded that:

- There is low certainty evidence that higher duration of sedentary behaviour (screen time) is significantly associated with lower physical fitness and cardiometabolic health in children and adolescents.
- There is very low to moderate certainty evidence that higher durations of sedentary behaviour (screen time, television viewing and video game use) are significantly associated with unfavourable measures of mental health and behavioural conduct/pro-social behaviour in children and adolescents.
- There is low certainty evidence that greater time spent in sedentary behaviour (screen time and television viewing) is associated with detrimental effects on sleep duration in children and adolescents.
- The benefits of limiting the amount of sedentary behaviour for children and adolescents outweigh the harms.

Is there a dose-response association (total volume, duration, frequency, intensity of interruption)?

There is insufficient evidence available to determine whether a dose-response relationship exists between sedentary time (including recreational screen time) and health outcomes in children and adolescents. Most of the evidence assessing the associations between sedentary behaviours and health outcomes in children and adolescents is cross-sectional in nature, with low certainty evidence according to GRADE, and a majority of studies relied on self- or parent-reported measures of sedentary time that are subject to measurement errors and recall biases. There is, however, evidence that less time spent in sedentary behaviours appears to be

better for health outcomes, and the association between sedentary behaviour and adverse health outcomes is generally stronger for sedentary behaviour when assessed as television viewing or recreational screen time as the exposure variable, than for total sedentary time. However, overall the evidence was considered insufficient to support specifying time limits.

Evidence that sedentary behaviours are linked to adverse health outcomes could be the result of either direct effects of the sedentary behaviours, displacement of time spent in more physically active behaviours, or both. Although there are studies that have reported associations between screen time and adverse health outcomes in children and adolescents, total sedentary time (as assessed in studies using device-based measurements of sedentary behaviour) has consistently not been associated with health outcomes when time in moderate- to vigorous-intensity physical activity is taken into account (62). Conversely, the evidence linking moderate- to vigorous-intensity physical activity to positive health outcomes is strong and well documented across diverse settings; replacing some sedentary behaviour with physical activity (especially moderate- to vigorous-intensity physical activity) may improve health outcomes.

Research investigating the associations and interplay between sedentary behaviour, physical activity and health outcomes is rapidly growing, and evidence from device-based measures of sedentary behaviour and cardiometabolic health show the association is attenuated when moderate- to vigorous-intensity physical activity is taken into account (i.e. statistically adjusted for) (62–64). There is therefore a need for further prospective studies using device-based measures of exposure, to advance knowledge of these associations and inform future recommendations.

The GDG concluded that:

- There is low certainty evidence that greater time spent in sedentary behaviour is related to poorer health outcomes.
- There is insufficient evidence to specify time limits on sedentary behaviour.
- Replacing sedentary time with moderate- to vigorous-intensity physical activity may provide health benefits.

Does the association vary by type or domain of sedentary behaviour?

The study of health effects of sedentary behaviour is a relatively new field of research. As such the findings are from studies using different instruments and measures of exposure. Exposure assessed as “total time spent doing sedentary behaviours” is frequently used, as is sedentary time spent using “screens” or “television viewing”.

Available evidence suggests that the association between sedentary behaviour and adverse health outcomes is generally stronger for television viewing or recreational screen time than for total sedentary time (24, 35). The increased use of device-based assessment of sedentary behaviour in the more recent research is advancing knowledge, and when combined with standardized reporting will help inform future guidelines.

It is acknowledged that not all sedentary behaviour is harmful. Evidence suggests certain types of sedentary behaviour, such as reading and doing homework outside of school, are associated with higher academic achievement, indicating that there are differences in outcome depending on the activity (24, 25). Sedentary behaviour may include time spent engaged in educational pursuits/study or quiet play, or social interaction without electronic media. These pursuits (e.g. reading, doing puzzles, drawing, crafting, singing, music) are important for child development and have cognitive as well as other benefits.

The GDG acknowledged that:

- Some sedentary activities confer benefits for cognitive function and social interaction in children and adolescents.
- Evidence on the adverse health effects of sedentary behaviour is generally stronger for television viewing or recreational screen time than for total sedentary time.



PHYSICAL ACTIVITY RECOMMENDATION

For adults, physical activity can be undertaken as part of recreation and leisure (play, games, sports or planned exercise), transportation (wheeling, walking and cycling), work or household chores, in the context of daily occupational, educational, home and community settings.

In adults, physical activity confers benefits for the following health outcomes: improved all-cause mortality, cardiovascular disease mortality, incident hypertension, incident site-specific cancers,¹ incident type-2 diabetes, mental health (reduced symptoms of anxiety and depression); cognitive health, and sleep; measures of adiposity may also improve.

It is recommended that:

> All adults should undertake regular physical activity.

Strong recommendation, moderate certainty evidence

> Adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for substantial health benefits.

Strong recommendation, moderate certainty evidence

> Adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.

Strong recommendation, moderate certainty evidence

> Adults may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.

Conditional recommendation, moderate certainty evidence

- Doing some physical activity is better than doing none.
- If adults are not meeting these recommendations, doing some physical activity will benefit their health.
- Adults should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.



¹ Site-specific cancers of: bladder, breast, colon, endometrial, oesophageal adenocarcinoma, gastric, and renal.

Supporting evidence and rationale

For these guidelines, the synthesis of evidence undertaken by the United States Physical Activity Guidelines Advisory Committee (PAGAC) (35) was used and updated.

The GDG considered the entire body of evidence, including both the findings reported by PAGAC and the 28 reviews and 3 pooled cohort studies, published from 2017 through to November 2019, that met inclusion criteria, and contributed evidence on the association between physical activity and health-related outcomes in adults. In addition, two umbrella reviews were commissioned to address evidence gaps and examine **i**) the relationship between occupational (i.e. work-related) physical activity and health-related outcomes (40); and **ii**) the association between leisure-domain physical activity and adverse health outcomes (41). The umbrella reviews identified 36 and 15 systematic reviews respectively. Evidence from longitudinal observational studies and intervention trials was prioritized, and reviews that solely, or primarily, synthesized cross-sectional evidence were not considered. Greater emphasis was given to evidence provided by reviews graded moderate certainty and above, and to those providing evidence from studies using device-based measures of exposure.

Full details of the methods, data extraction and evidence profiles can be found in the [Web Annex: Evidence profiles](#).

In adults (aged 18–64 years), what is the association between physical activity and health-related outcomes?

The association between physical activity and **all-cause mortality and cardiovascular disease mortality** in adults is already well-established (1). Findings from recent reviews reaffirmed that compared with the lowest levels of physical activity, higher levels of physical activity were associated with a lower risk of mortality. New evidence from studies using device-based measures of physical activity reaffirmed and extended the evidence showing that compared with the lowest levels of physical activity, *any* level and *all intensities* (including light intensity) of physical activity, were associated with a lower risk of mortality (65). For example, compared with the least active (referent, 1.00), adjusted HR for quartiles of total physical activity improved across quartiles of physical activity: 2nd quartile (0.48 [95% CI: 0.43 to 0.54]); 3rd quartile (0.34 [95% CI: 0.26 to 0.45]); and 4th quartile (0.27 [95% CI: 0.23 to 0.32]) (65). New evidence also reaffirmed the well-established (1) inverse relationship between physical activity and **cardiovascular disease mortality** (66).

The benefits of physical activity for reducing cardiovascular disease and hypertension incidence is well-documented (1). Physical activity promotes many physiological responses that cause beneficial short- and long-term autonomic and haemodynamic adaptations, resulting in lowered risk of **hypertension**, which is a key risk factor for **cardiovascular disease**.

Evidence reaffirmed an inverse relationship between physical activity and incident hypertension among adults with normal blood pressure, and that physical activity reduces blood pressure among adults with prehypertension and normal blood pressure (35).

The inverse association between physical activity and developing **type-2 diabetes** in adults is well-established (1). Recent evidence reaffirmed an inverse curvilinear relationship between higher volumes of physical activity and incidence of type-2 diabetes (35), with a decreasing slope at higher levels of physical activity. A new review found that this effect is consistent across individuals of different backgrounds with a reduced risk of developing type-2 diabetes in “highest” versus “lowest” levels of physical activity among non-Hispanic whites (RR= 0.71 [95% CI: 0.60 to 0.85]); Asians (RR= 0.76 [95% CI: 0.67 to 0.85]); Hispanics (RR = 0.74 [95% CI 0.64 to 0.84]); and American Indians (RR = 0.73 [95% CI: 0.60 to 0.88]), although the effect among non-Hispanic blacks was not significant (RR = 0.91 [95% CI: 0.76 to 1.08]) (67). Evidence suggests there is no effect modification by weight status and that the inverse relationship between a higher volume of physical activity and lower incidence of type-2 diabetes exists for people who have normal weight, overweight or obesity (35).

The associations between higher levels of physical activity and reduced risks of **colon cancer and breast cancer** have been well-established (1). In previous reviews of the evidence, higher levels of physical activity have been found to be associated with a reduced risk of

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developing breast cancer and colon cancer (1). Following an extensive increase in physical activity and cancer research, there is new evidence demonstrating higher levels of physical activity are also associated with reduced risk of developing bladder, endometrial, oesophageal adenocarcinoma, gastric and renal cancers, as well as reaffirming that physical activity is protective for breast cancer and colon cancer (35). Higher levels of physical activity are associated with risk reductions ranging from approximately 10–20% (35). For example, one review reported an inverse association with liver cancer risk when comparing high levels of physical activity to low levels of physical activity ($HR= 0.75$ [95% CI: 0.63 to 0.89]) (68). There is insufficient evidence on the association between increased physical activity and decreased risks of hematologic, head and neck, ovary, pancreas, prostate, thyroid, rectal and brain cancer (35). While evidence suggests a reduction in risk of lung cancer between the highest versus lowest levels of physical activity, these findings may be confounded by tobacco use and it was determined that overall there is insufficient evidence to establish an association.

The association between physical activity and **adiposity** in adult populations is less well established despite a large, but heterogeneous, body of evidence assessing this relationship across various outcome measures (weight gain, weight change, weight control, weight stability, weight status and weight maintenance) (35, 69, 70). Overall the evidence shows that higher levels of physical activity may be associated with more favourable measures of adiposity and attenuation of weight gain in adults (35). Further research is needed to establish consistent results and strength of associations.

Research on physical activity and **mental health, cognition and sleep** has increased substantially since the development of the 2010 *Global recommendations on physical activity for health* (1). At that time, there was sufficient evidence to conclude only that physical activity may reduce the risk of depression and cognitive decline in adults. New evidence reviewed for these guidelines showed that adults engaging in higher versus lower physical activity are at reduced risk of developing anxiety and depression. For example, adults with high, versus low, levels of physical activity were at reduced odds of developing anxiety ($AOR= 0.81$ [95% CI: 0.69 to 0.95]) (71) or depression ($AOR= 0.78$ [95% CI: 0.70 to 0.87]) (72). Greater amounts of moderate- to vigorous-intensity physical activity are associated with improvements in cognition (e.g. processing speed, memory, and executive function) (35), brain function and structure, and a reduced

risk of developing **cognitive impairment**, including Alzheimer's disease (73–76). The evidence included several adult populations representing a gradient of normal to impaired cognitive health status and the beneficial effects of physical activity were reported across a variety of types, including aerobic activity, walking, muscle-strengthening activity, and yoga (74). There is evidence that both acute bouts and regular physical activity improve **sleep and health-related quality of life** outcomes in adults (35).

Evidence examining physical activity and **symptoms of depression, symptoms of anxiety, and the development of anxiety and depression** indicated that physical activity was associated with reduced symptoms of anxiety (77, 78) and reduced symptoms of depression (77, 79).

All physical activity comes with some risk. Evidence from a commissioned review on the adverse effects, injuries and harms associated with leisure physical activity in adults (41) suggests an unfavourable association between levels of leisure-time physical activity and musculoskeletal injuries, and a favourable relationship between leisure-time physical activity and risk of fracture and onset of knee or hip osteoarthritis. Additional existing evidence (35) indicates sudden cardiac adverse events are rare and associated with acute sessions of relatively vigorous-intensity physical activity. Generally, the risks of adverse events are very low with moderate-intensity physical activity and when increases in physical activity frequency, intensity and duration are gradual (35).

The GDG concluded that:

- There is high certainty evidence that any level and any intensity of physical activity is associated with lower risk of all-cause mortality and cardiovascular disease mortality, incidence of hypertension, cardiovascular disease and type-2 diabetes.
- There is moderate to high certainty evidence on the associations between higher levels of physical activity and lower risk of incidence of site-specific cancers.
- There is moderate certainty evidence supporting an association between physical activity and improvements in mental health, cognitive health and sleep outcomes.
- There is evidence of an association between higher levels of physical activity and more favourable measures of adiposity and attenuation of weight gain in adults.
- There is low certainty evidence that physical activity recommended for adults will not be harmful and that the health benefits from such activity outweigh the risks.

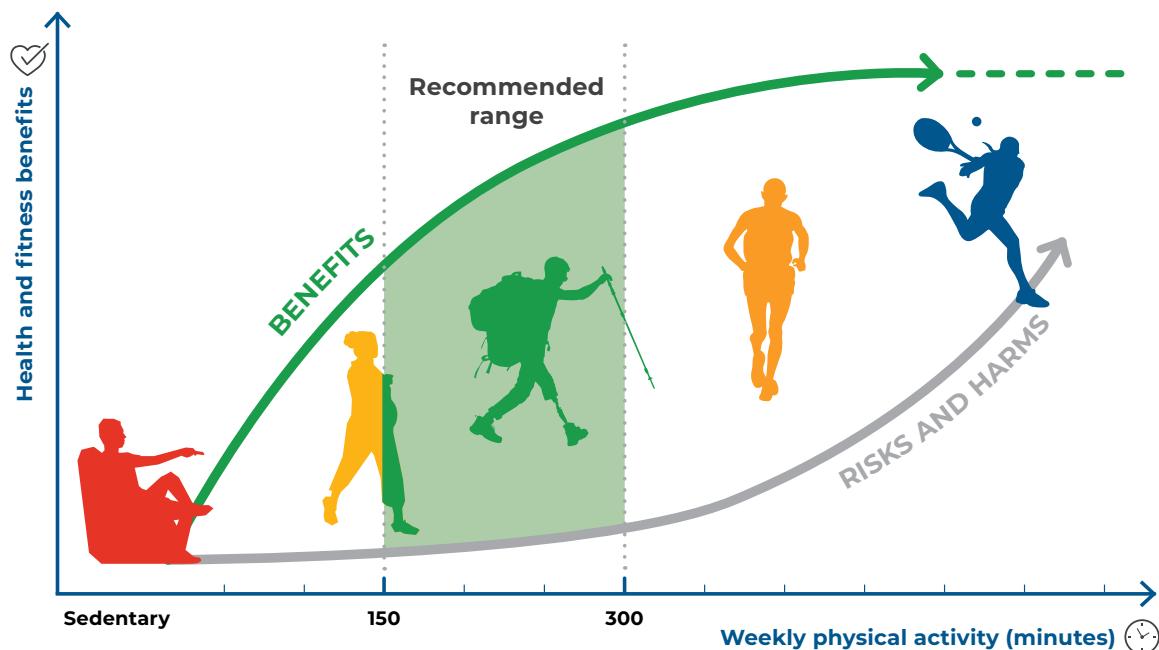


Figure 1: Dose response curve

Is there a dose-response association (volume, duration, frequency, intensity)?

Overall the evidence across cardiovascular and metabolic health outcomes shows a consistent curvilinear inverse dose-response relationship between physical activity and major outcomes such as all-cause mortality, cardiovascular disease mortality, incident type-2 diabetes (67), and incident site-specific cancers in adults. As described in **Figure 1**, the shape of the dose-response curve indicates that there is no lower threshold for benefit, and the greatest benefits are seen at the lower end of the dose-response curve (65). The curvilinear inverse association is consistently reported and across studies using different measures of physical activity. Important new evidence was provided in a meta-analysis of eight prospective cohort studies, with mean follow-up of 5.8 years (range 3–14.5 years) (65) that reported the adjusted HR for quartiles of total physical activity using device-based measures of exposure and **all-cause mortality**. The results showed a dose-response with increasing volume of physical activity and benefits of higher levels of *any* intensity of physical activity compared with the least active (referent, 1.00): 2nd quartile (adjusted HR= 0.48 [95% CI: 0.43 to 0.54]); 3rd quartile (adjusted HR= 0.34 [95% CI: 0.26 to 0.45]); and 4th quartile (adjusted HR= 0.27 [95% CI: 0.23 to 0.32]). Maximal risk reductions for moderate- to vigorous-intensity physical activity were observed at 24 minutes per day (equivalent to 168 minutes per week), which

closely reflects the recommendation of 150 minutes per week, and provides new device-based evidence reinforcing the existing global guidance to adults of 150–300 minutes of physical activity per week (65). These findings are consistent with the evidence from existing reviews (35) and the other new identified reviews (66).

At the upper end, higher levels of physical activity continue to provide benefits in terms of reduced risk of mortality with no increased risk of harms. For example, evidence from a new review with findings from a meta-analysis of individual data from device-based measures of exposure (65), indicates that although reduced risk of mortality is observed up to 750 minutes of moderate-to vigorous-intensity physical activity per week, the relative risk of mortality levels off beyond 300 minutes per week. These results accord with previous evidence which consistently showed that more physical activity is associated with further health benefits, although the relative benefits are reduced at higher levels of physical activity (35, 80, 81). There is, however, insufficient evidence to identify the exact physical activity level where diminished returns of health benefits begin for adults.

Evidence also reaffirmed the well-established inverse relationship between physical activity and **cardiovascular disease mortality**, providing additional evidence of a dose-response relationship well beyond current recommended volumes of physical activity.

A meta-analysis of 48 prospective studies assessing physical activity (total, leisure, and occupational) provided additional evidence of a dose-response relationship (66) well beyond current recommended volumes of physical activity. Compared with the recommended level of 750 MET minutes per week, participation in 5000 MET minutes per week (1000 minutes of moderate-intensity activity) resulted in a significantly lower risk for cardiovascular disease mortality ($HR= 0.73$ [95% CI: 0.56 to 0.95]) (66). Previous WHO recommendations (1) concluded that aerobic activity should be performed in bouts of at least 10 minutes duration. However, new evidence, using device-based assessments, demonstrates that physical activity of *any* duration, without a minimum threshold, is associated with improved health outcomes, including all-cause mortality (65, 82). For example, new evidence from reviews of studies assessing physical activity by accelerometry reaffirms similar associations between all indices of physical activity and all-cause mortality, with hazard ratios of 0.27 for total physical activity, 0.28 for 5-minute bouts, and 0.35 for 10-minute bouts, comparing the highest versus lowest quartiles (83). These results, reaffirmed by findings in the new review by Ekelund et al. 2019 (65), provide evidence that physical activity of any bout duration is associated with improved health outcomes, including all-cause mortality (82). Based on new evidence, the recommendation for bouts of least 10 minutes duration has been removed.

Although evidence showing the associations between higher levels of physical activity and lower risk of incidence of **site-specific cancers** was deemed to be consistent overall, there is insufficient evidence to determine the specific levels of physical activity that correspond to the reported risk reduction due to the large heterogeneity in the assessment and classification of exposure across studies. There is however, no evidence to suggest that there is a lower threshold below which no beneficial effect of physical activity is evident, thus suggesting that any level of physical activity can confer benefit on reducing the risk of site-specific cancers. Future research assessing the nature of the dose-response and using more consistent measures and reporting is needed to inform future guidelines.

Although there is a large body of evidence on the associations between physical activity and various measures of adiposity, weight gain and the management of a healthy weight status (35), currently there is insufficient evidence to describe more specifically

the dose-response relationship or identify a threshold of effect. Further research is needed to inform future guidelines.

Greater amounts of moderate- to vigorous-intensity physical activity are associated with improvements in **cognition** (e.g. processing speed, memory, and executive function) (35), brain function and structure, and a reduced risk of developing **cognitive impairment**, including Alzheimer's disease (73–76). There is evidence that both acute bouts and regular physical activity improve **sleep and health-related quality of life** outcomes in adults (35). There is however insufficient evidence to describe more specifically the dose-response relationship between physical activity and individual mental and cognitive health outcomes. Similarly, more evidence is needed to further describe the dose-response relationship between volume and/or intensity of aerobic physical activity and muscle-strength training and specific health outcomes. Such information is key to establishing minimal effective doses and maximum safety thresholds of physical activity for different population subgroups.

The GDG concluded that:

- There is evidence that more physical activity is associated with larger effects on health outcomes, although the relative benefits level off at higher levels of physical activity. There was insufficient evidence to identify the exact level where diminished returns start to occur.
- There is high certainty evidence that higher levels of physical activity are associated with lower risk of all-cause mortality, cardiovascular disease mortality, cancer mortality, cardiovascular disease incidence, and incidence of hypertension and type-2 diabetes, with no increased risk of harms.
- There is moderate certainty evidence that physical activity of any duration is associated with improved health outcomes, and prior specification that aerobic activity should be performed in bouts of at least 10 minutes duration should be removed.
- There is evidence that higher amounts of physical activity may be associated with more favourable measures of adiposity and attenuation of weight gain in adults and there is a low risk that physical activity will be harmful for the management of healthy weight status in adults.
- There is moderate certainty evidence that 150–300 minutes of moderate intensity aerobic physical activity or equivalent, per week, reduces risk for multiple health outcomes, and risk reduction continues, but starts to plateau, beyond 300 minutes per week.

Does the association vary by type or domain of physical activity?

Evidence shows that different types of physical activity and physical activity undertaken in different domains (i.e. occupation, transport, or leisure) can provide favourable health outcomes. For all-cause and cardiovascular disease mortality, undertaking aerobic physical activity alone, or combining with strength-promoting exercise shows beneficial associations, although performing recommended levels of both types is optimal (84).

More recent moderate certainty evidence indicates that muscle-strengthening physical activity, independent of aerobic physical activity, is also associated with lower risk of all-cause mortality. Results reported by Stamatakis et al. (2018), from a pooled analysis of 11 cohorts examining the 2 days per week muscle-strengthening exercise recommendation against all-cause mortality, showed that undertaking both aerobic and muscle-strengthening physical activity at recommended levels (1) versus not meeting either recommendation (adjusted HR= 0.71 [95% CI: 0.57 to 0.87]) as well as adherence to just the strength exercise recommendation versus not adhering (HR= 0.80 [95% CI: 0.70 to 0.91]) was associated with significantly lower risk of all-cause mortality (84). These data affirm that health benefits associated with muscle-strengthening exercise were independent of aerobic physical activity and also provide evidence to support recommending a frequency of 2 days per week of muscle-strengthening exercise. Other findings reported by Dinu et al. (2019) provided supporting evidence reaffirming that physical activity undertaken in domains other than leisure (or recreation) can be beneficial and specifically showed that active commuting (i.e. walking and cycling for transport) can significantly lower risk of all-cause mortality (RR= 0.92 [95% CI: 0.85–0.98]) (85).

Recent research provides evidence demonstrating that for those who participate in active commuting (i.e. walking or cycling for transport), there is reduced risk of cardiovascular disease (coronary heart disease, stroke and heart failure) compared with those participating in no active commuting (RR= 0.91 [95% CI 0.83 to 0.99]) (85); and that there is sufficient evidence from these health outcomes to conclude that activity in different domains can be beneficial. However, there is insufficient evidence to differentiate the effect of different domains of physical activity on every health outcome. For example, there is insufficient evidence to determine if the association between physical activity and cancer risk or type-2 diabetes incidence varies by type or domain of physical activity.

For mental health outcomes, evidence (35) shows that a variety of types of physical activity, including aerobic activity, walking, muscle-strengthening activity, and yoga can provide beneficial effects for reducing symptoms of depression and development of anxiety (74, 79, 86). For example recent evidence for the beneficial effects of resistance exercise interventions and mental health was provided by two reviews reporting moderately large reductions in symptoms of depression (77) and small reductions in symptoms of anxiety (78) compared with control conditions.

Evidence from a new review affirmed that high levels of occupational physical activity is associated with reduced risk of many cancers, coronary heart disease, and type-2 diabetes (40). However, higher levels of occupational physical activity may also be associated with an increased risk of osteoarthritis, poor sleep quality, and all-cause mortality among males (but not among females). There is insufficient evidence to determine the relationship between occupational physical activity and adiposity, prevention of body weight gain, mental health, and health-related quality of life (40). There is also insufficient evidence to determine if the association between physical activity and cancer risk varies by type or domain of physical activity. There is less evidence on associations by different domains of physical activity, and therefore it was difficult to differentiate the effect of different domains of physical activity on various health outcomes.

The GDG concluded that:

- There is moderate certainty evidence that muscle-strengthening activities undertaken on 2 or more days a week, provide additional health benefits, but there is insufficient evidence to specify a specific duration for optimal health benefits.
- There is moderate certainty evidence that physical activity undertaken in different domains (e.g. leisure, transport, occupational) can provide health benefits, although currently it is not possible to differentiate the effect of different domains of physical activity on various health outcomes.
- Although higher levels of occupational physical activity may be associated with an increased risk of osteoarthritis, poor sleep quality, and all-cause mortality among males (but not among females), overall there is moderate certainty evidence that occupational physical activity can provide health benefits.



SEDENTARY BEHAVIOUR RECOMMENDATION

For adults, sedentary behaviour is defined as time spent sitting or lying with low energy expenditure, while awake, in the context of occupational, educational, home and community settings, and transportation.

In adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality and incidence of cardiovascular disease, cancer and type-2 diabetes.

It is recommended that:

› **Adults should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.**

Strong recommendation, moderate certainty evidence

› **To help reduce the detrimental effects of high levels of sedentary behaviour on health, adults should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity.**

Strong recommendation, moderate certainty evidence

Supporting evidence and rationale

For these guidelines, the synthesis of evidence undertaken by PAGAC (35) was used and updated. The GDG considered the entire body of evidence, including both the findings reported by PAGAC and the 13 new reviews that met inclusion criteria, to contribute evidence on the association between sedentary behaviour and health-related outcomes in adults. Investigating the association between sedentary behaviour and health outcomes is a relatively new field of public health compared with that of physical inactivity, yet it has developed rapidly in the past decade. Studies have typically measured sedentary behaviour using either **i**) self-report questionnaires which ask about “total time” spent in sedentary behaviours, or time spent in specific behaviours, such as television viewing, computer/screen use, and sitting; or **ii**) device-based assessments. There are no standardized measures or analytical protocols for sedentary behaviour and thus the reporting of results is heterogeneous. Recent methodological developments include the use of device-based assessment of time spent sedentary which can reduce measurement error and other biases inherent in self-reported recall.

In considering the total body of evidence, the GDG gave greater emphasis to evidence provided by reviews graded moderate and above, taken from reviews providing evidence from studies using measures of total sedentary or sitting time, or device-based measures of sedentary behaviour where available.

Full details of the methods, data extraction and evidence profiles can be found in the [Web Annex: Evidence profiles](#).

Research on the potential adverse health effects associated with sedentary behaviour has rapidly accumulated during the past decade. In more recent studies, notable developments include an increase in evidence reporting on dose-response relationships between sedentary behaviour and multiple health outcomes, and on the interplay between sedentary behaviour and physical activity.

Available online at <https://apps.who.int/iris/bitstream/handle/10665/336657/9789240015111-eng.pdf>

In adults (aged over 18 years), what is the association between sedentary behaviour and health-related outcomes?

Overall, there is evidence of an association between greater time spent in sedentary behaviour (examined mostly via self-reporting or device-based assessments of sitting or television viewing time) and higher all-cause mortality, cardiovascular mortality, cardiovascular disease incidence and type-2 diabetes incidence (8, 35, 65, 87). For example, supporting evidence includes results from a recent large meta-analysis ($n= 36\,383$; mean age 62.6 years; 72.8% women) of accelerometer assessed total sedentary time and **all-cause mortality** (65) and showed that increasing time spent in sedentary behaviour was significantly associated with all-cause mortality. Similar findings from a meta-analysis comprising more than 1 million participants (87) showed associations for total sedentary behaviour with **all-cause mortality**, and **cardiovascular disease mortality**, after adjustment for physical activity (87), although in this study the associations with **cancer mortality** were not statistically significant after adjustment for physical activity (87).

Another recent meta-analysis (8) reported significant associations between sedentary behaviour (assessed as sitting) and **cardiovascular disease and cancer mortality**, with results indicating a 9–32% (p for trend < 0.001) higher risk of cardiovascular disease mortality with higher levels of sedentary behaviour when measured as sitting time in the “inactive”, lowest quartile of physical activity (~ 5 min/day). The study reported that adults who were sedentary (sitting) for more than 8 hours per day had a higher risk of cardiovascular disease mortality, except for those who were “most active” (i.e. > 35.5 MET-hours/week, or ~ 60 –75 mins/day), where the association was mitigated. Results on the associations between sedentary behaviours and **cancer mortality** were generally weaker, although a 6–21% higher dose-related risk was observed with longer sitting time (particularly > 8 hours/day), but only among those in the lowest quartile of physical activity (< 2.5 MET-hours/week) (8).

Evidence supports an association between sedentary behaviour (measured as total sitting time) and increased **incident cardiovascular disease** ($HR = 1.29$ [95% CI: 1.27 to 1.30]) which was attenuated following adjustment for potential covariates, including level of physical activity ($HR = 1.14$ [95% CI: 1.04 to 1.23]) (88). A review of studies in south-east Asian populations provided

evidence of low certainty that greater sedentary time was associated with an increased likelihood of unfavourable **cardiometabolic indicators** (including type-2 diabetes, higher BMI, higher blood pressure) (89).

Two recent reviews report on the association of total daily sitting time (88) and total sedentary behaviour and television viewing (87) with **type-2 diabetes incidence**. Both studies found a higher level of sedentary behaviour was associated with increased risk of type-2 diabetes incidence. For example, a linear association with type-2 diabetes was observed for total sedentary behaviour ($RR = 1.01$ [95% CI: 1.00 to 1.01] $p = < 0.001$) and television viewing ($RR = 1.09$ [95% CI: 1.07 to 1.12] $p = < 0.001$), when adjusted for physical activity (87).

There is also supporting evidence for a significant association between sedentary behaviour (when measured as time spent viewing television) and **cancer mortality** (35, 87). Several more recent reviews, of low and very low certainty, provide supporting evidence for an association between sedentary behaviours and colorectal cancer (90), but no associations with incident prostate, breast or rectal cancer (90–93). Additional evidence (35) reported significant associations between greater time spent in sedentary behaviour and higher risk of developing endometrial, colon and lung cancers (35).

There is low certainty evidence of an unfavourable relationship between time spent in sedentary behaviour and **adiposity** and other indicators of weight status, and whether the relationship between sedentary behaviour and weight status varies by amount of moderate-to vigorous-intensity physical activity. Overall, it was concluded that there was insufficient evidence to inform these recommendations/guidelines and that further research is needed.

There is limited evidence assessing adverse effects of reducing sedentary time. Expert opinion informed the conclusion that recommending the reduction in sedentary time would be unlikely to increase risk of injury, especially if replaced with light-intensity physical activity.

The GDG concluded that:

- Overall there is sufficient evidence to support the development of a new WHO recommendation to limit sedentary behaviour to reduce health risks.
- There is moderate certainty evidence of an association between greater time spent in sedentary behaviour and higher all-cause mortality, cardiovascular disease mortality, cancer mortality and incidence of cardiovascular disease and type-2 diabetes.
- There is low to moderate certainty evidence of an association between greater time spent in sedentary behaviour and higher risk of incident endometrial, colon, and lung cancers.
- There is insufficient evidence on the association between sedentary behaviour and measures of adiposity and further research is needed.
- The benefits of limiting sedentary behaviour outweigh any potential risks.

Is there a dose-response association (total volume, frequency, duration, intensity of interruption)?

Overall, moderate certainty evidence indicates a non-linear dose-response relationship between sedentary time (sitting or television viewing time assessed by self-reporting, or by device-based assessments) and all-cause mortality, cardiovascular disease mortality, cancer mortality, and incident cardiovascular disease (8, 35, 87).

A recent meta-analysis provided high certainty evidence on the dose-response relationship between accelerometer assessed total sedentary time and **all-cause mortality** (65) reporting that increasing time spent in sedentary behaviour was significantly associated with all-cause mortality. The hazard ratios for increasing quartiles of sedentary time were 1.00 (referent; least sedentary); 1.28 (1.09– 1.51); 1.71 (1.36–2.15); and 2.63 (1.94–3.56), after adjustment for potential confounders including time spent in moderate- to vigorous-intensity physical activity (65). This analysis of dose-response relations between sedentary time and mortality showed risk increased gradually from about 7.5–9 hours and was more pronounced at greater than 9.5 hours. Sedentary behaviour of 10 hours and 12 hours each day were associated with 1.48 (1.22–1.79) and 2.92 (2.24–3.83) higher risk of death, respectively (65).

Another recent meta-analysis assessed dose-response and reported non-linear associations for total sedentary time and **all-cause mortality** (RR per 1 hour/day = 1.01 (1.00–1.01) for ≤ 8 hours/day; and 1.04 (1.03–1.05) for > 8 hours/day of exposure); and **cardiovascular disease mortality** (RR= 1.01 (0.99–1.02) for ≤ 6 hours/day; and RR= 1.04 (1.03–1.04) for > 6 hours/day) after adjustment for physical activity (87). In this same study, a small linear dose-response association between **type-2 diabetes** was observed for total sedentary behaviour (1.01 (1.00–1.01)) when adjusted for physical activity and television viewing (1.09 (1.07–1.12)) (87).

Overall, evidence supports that higher amounts of sedentary behaviour are associated with less favourable health outcomes and it was concluded that there is sufficient evidence to support minimizing sedentary time to reduce health risks. However, given the considerable variations in how sedentary behaviour was assessed across reviews (via self-reported sitting time, television viewing time, or device-based (accelerometer) assessments) and the probability that thresholds for sedentary time might vary across health outcomes, by levels of moderate- to vigorous-intensity physical activity, and among population subgroups, there is insufficient evidence to set a time-based (quantified) recommendation.

In addition to overall volume of sedentary behaviour, evidence on the patterns by which sedentary behaviour is accrued was reviewed. However, there was limited evidence to make recommendations on the frequency and/or duration of breaks in sedentary behaviour.

The GDG concluded that:

- There is insufficient evidence to set quantified (time-based) recommendations on sedentary behaviours.
- There is insufficient evidence to make recommendations on the frequency and/or duration of breaks in sedentary behaviour.



Does the association vary by type and domain of sedentary behaviour?

Some domains or different types of sedentary behaviour may be more detrimental than others, both in terms of their direct associations and in their potential to displace time spent in more healthful physical activity. Although there has been a rapid growth in research on sedentary behaviour, there is limited evidence available directly comparing the association between different types of sedentary behaviour and different health outcomes. For example, some studies report stronger results with sedentary behaviour measured as television viewing compared with total sitting time (87). This may be due to the differential measurement error or residual confounding associated with self-report measures and instruments. Currently, there is insufficient evidence to determine the different associations with different health outcomes and how these may vary by subpopulation.

A growing number of studies are using device-based measures of physical activity and sedentary time in relation to health outcomes. However, some misclassification may occur from device-based measures of sedentary time as many of these device placements (e.g. wrist, waist) do not currently distinguish between positions (e.g. lying, sitting and standing still). Future research using harmonized reporting, and methods that distinguish between positions, will help to strengthen the knowledge on the patterns of sedentary behaviour.

The GDG concluded that:

- There is insufficient evidence to make recommendations on different types or domains of sedentary behaviour.



Does level of physical activity modify the effect of sedentary behaviour on mortality?

The increased interest in the impact of sedentary behaviour on health outcomes has stimulated investigation into the potential interplay between different levels of physical activity and levels of sedentary behaviour. Based on available research, there is moderate certainty evidence that the relationship between sedentary behaviour and **all-cause mortality, cardiovascular disease mortality** and **cancer mortality** varies by amount of moderate- to vigorous-intensity physical activity (8, 9, 35). Overall findings show that the effect of sedentary behaviour is stronger in those who do low amounts of moderate- to vigorous-intensity physical activity or, phrased conversely, that higher amounts of moderate- to vigorous-intensity physical activity can mitigate the unfavourable health outcomes associated with higher levels of sedentary behaviours.

The risk associated with sedentary time and all-cause mortality has been shown to be more pronounced at lower levels of physical activity than at higher levels (35). In a harmonized meta-analysis, Ekelund et al. investigated the joint and stratified effects of sedentary behaviour and physical activity with **all-cause mortality** in more than 1 million men and women, and showed that the associations differed depending on the level of physical activity (9). The analyses used quartiles of sedentary behaviour (sitting) and quartiles of moderate- to vigorous-intensity physical activity, and found that compared with the referent (< 4 hours of sitting per day and highest quartile of moderate- to vigorous-intensity physical activity [> 35.5 MET-hours/week]), there was no increased risk of dying during follow-up in those who sat for more than 8 hours per day but who also reported more than 35.5 MET-hours per week of activity ($HR = 1.04$ [95% CI: 0.99 to 1.10]). In contrast, those who sat the least (< 4 hours/day) and were in the lowest (< 2.5 MET-hours/week) physical activity quartile had a significantly increased risk of dying during follow-up ($HR = 1.27$ [95% CI: 1.22 to 1.31]). The study concluded that levels of moderate- to vigorous-intensity physical activity of about 60–75 minutes per day (the highest quartile) can attenuate, and even eliminate, the detrimental association between sedentary behaviour and health outcomes (9).

ADULTS (aged 18–64 years)

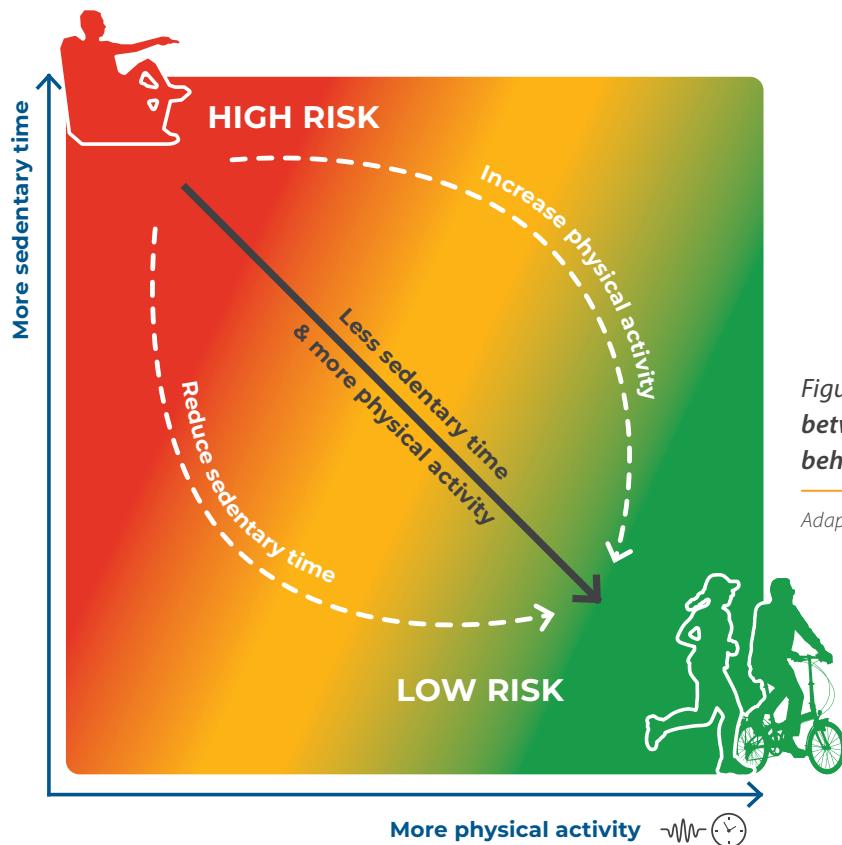


Figure 2: The relationship between levels of sedentary behaviour and physical activity

Adapted from PAGAC

This relationship between levels of sedentary behaviour and moderate- to vigorous-intensity physical activity was summarized in the systematic review by PAGAC (35) as shown in **Figure 2**.

Another recent study provided new evidence investigating the same associations with cause-specific mortality and showed similar findings (8). In a large harmonized meta-analysis (9 studies, $n=850\,000$, CVD mortality; 8 studies, $n=777\,000$, cancer mortality), results showed that higher levels of moderate- to vigorous-intensity physical activity mitigated the increased risk of **cardiovascular disease mortality** with high levels of sedentary behaviour, whether measured as time spent sitting or time spent viewing television (8). The study showed that in individuals who were sitting for more than 8 hours per day, there was an association with higher risk of death, except in the most active quartile, where the association was mitigated. More specifically, the hazard of cardiovascular disease mortality was 32% higher in those who sat for more than 8 hours per day compared with the reference group (< 4 hours/day) (p for trend < 0.001). The results were less pronounced but remained significant compared with the reference group for the other quartiles of physical activity (2nd quartile, HR= 1.11 [95% CI: 1.03 to 1.20]; 3rd quartile, HR= 1.14 [95% CI: 1.03 to 1.26]). Similar associations

were observed for television time and cardiovascular disease mortality across strata of moderate- to vigorous-intensity physical activity (8). The associations for **cancer mortality** were more mixed, although generally showed that higher levels of physical activity attenuated the detrimental effects of sedentary behaviour when assessed as total sitting time.

Based on this evidence, it was agreed that higher levels of moderate- to vigorous-intensity physical activity should be recommended for those individuals who undertake high levels of sedentary behaviour and that the benefits would outweigh the risks.

The GDG concluded that:

- There is moderate certainty evidence that the relationship between sedentary behaviour and all-cause mortality, cardiovascular disease and cancer mortality varies by amount of moderate- to vigorous-intensity physical activity.
- Higher amounts of moderate- to vigorous-intensity physical activity can attenuate the detrimental association between sedentary behaviour and health outcomes.



PHYSICAL ACTIVITY RECOMMENDATION

For older adults, physical activity can be undertaken as part of recreation and leisure (play, games, sports or planned exercise), transportation (wheeling, walking and cycling), work, or household chores, in the context of daily occupational, educational, home or community settings.

In older adults, physical activity confers benefits for the following health outcomes: improved all-cause mortality, cardiovascular disease mortality, incident hypertension, incident site-specific cancers, incident type-2 diabetes, mental health (reduced symptoms of anxiety and depression), cognitive health, and sleep; measures of adiposity may also improve. In older adults, physical activity helps prevent falls and falls-related injuries and declines in bone health and functional ability.

It is recommended that:

› **All older adults should undertake regular physical activity.**

Strong recommendation, moderate certainty evidence

› **Older adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for substantial health benefits.**

Strong recommendation, moderate certainty evidence

› **Older adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.**

Strong recommendation, moderate certainty evidence

› **As part of their weekly physical activity, older adults should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls.**

Strong recommendation, moderate certainty evidence

› **Older adults may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for additional health benefits.**

Conditional recommendation, moderate certainty evidence

- Doing some physical activity is better than doing none.
- If older adults are not meeting the recommendations, doing some physical activity will bring benefits to health.
- Older adults should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.
- Older adults should be as physically active as their functional ability allows, and adjust their level of effort for physical activity relative to their level of fitness.



Supporting evidence and rationale

For these guidelines, for older adults, the comprehensive synthesis of evidence undertaken by PAGAC (35) was used and updated. Fifteen reviews met the inclusion criteria and informed the examination of the association between physical activity and health-related outcomes specific to older adults (falls prevention, fall-related injuries, physical function, frailty, and osteoporosis).

The evidence for falls prevention used and updated the 2019 Cochrane Collaboration Systematic Review by Sherrington et al. (42), with evidence published from the end search date of their original review, to November 2019 (9 new studies). A search for existing systematic reviews on osteoporosis and sarcopenia was conducted in PubMed for reviews published from 2008 through to November 2019 and identified no new reviews and 8 new studies.

Full details of the methods, data extraction and evidence profiles can be found in the [Web Annex: Evidence profiles](#).

In older adults (aged 65 years and over), what is the association between physical activity and health-related outcomes?

The primary evidence base for assessing the associations between physical activity and health outcomes, such as all-cause and cause-specific mortality, cardiovascular disease, type-2 diabetes, cancer incidence, adiposity, mental health, and cognitive outcomes in older adult populations was the same scientific literature collated and reviewed for adult populations. This same body of evidence was accepted and extrapolated to older adults because the majority of studies stated no upper age limit criterion and therefore included adults over the age of 65 years.

A further review of evidence was conducted to examine and inform on the association between physical activity and health-related outcomes specific to older adults, including falls prevention, fall-related injuries, physical function, frailty and osteoporosis.

Declining physical capacity in older people often manifests in falls and fall-related injuries that can have serious consequences. Accidental falls are due to a combination of extrinsic (environmental) and intrinsic (e.g. musculoskeletal or nervous system abnormalities affecting postural control) factors. Evidence demonstrates that physical activity – in particular multicomponent physical activity programmes that include combinations of balance, strength, endurance, gait, and physical function training – is associated with a reduced rate of **falls** and risk of **injury from falls** in older adults. Recent evidence demonstrates that exercise may reduce the rate of falls by as much as 23% (pooled rate ratio (RaR) 0.77 [95% CI: 0.71 to 0.83]) in older adults,

which can significantly reduce the risk of injury from falls, including severe falls that result in bone fracture, head trauma, open wound, soft tissue injury, or any other injury requiring medical care or admission to hospital (42). This evidence was consistent with, and reaffirmed findings in, other reviews (35).

After reaching a peak in early adulthood, muscle and bone mass tends to decline with increasing age (i.e. sarcopenia and osteopaenia/osteoporosis), and this can be associated with declining strength and physical function. Evidence demonstrates that regular physical activity improves **physical function** and reduces the risk of age-related loss of physical function in older adults. Findings show beneficial effects on dynamic balance ($SMD= 1.10$ [95% CI: 0.29 to 1.90]); muscle strength ($SMD= 1.13$ [95% CI: 0.30 to 1.96]); flexibility ($SMD= 1.22$ [95% CI: 0.39 to 2.04]); and cardiorespiratory fitness ($SMD= 1.48$ [95% CI: 0.42 to 2.54]) (94). Evidence also shows that higher levels of physical activity may improve bone health and thus prevent **osteoporosis** in older adults (pooled standardized effect size 0.21 [95% CI: 0.06 to 0.36]) (95). Physical activity interventions may improve lumbar spine and femoral neck (hip) bone mineral density.

The GDG concluded that:

- There is moderate certainty evidence that physical activity improves physical function and reduces risk of age-related loss of physical function in the general ageing population.
- There is low-certainty evidence that the risks for the amounts and types of physical activity recommended for older adults are low and are outweighed by the benefits.

 Available online at <https://apps.who.int/iris/bitstream/handle/10665/336657/9789240015111-eng.pdf>

Is there a dose-response association (volume, duration, frequency, intensity)?

Evidence shows an inverse relationship between the amount of physical activity performed by older adults and the risk of physical function limitations. In general, more physical activity (frequency, duration and/or volume) is associated with greater benefits (35). Evidence suggests that fast-intended velocity resistance training may be superior to moderate-velocity resistance training for improvements in general functional capacity ($SMD= 0.41$ [95% CI: 0.18 to 0.65]; and SPPB ($SMD= 0.52$ [95% CI: 0.10 to 0.94])) (96).

There is limited evidence examining the dose-response relationship between physical activity and prevention of falls; however the majority of studies providing supportive evidence show testing a programme consistent with 3 days per week.

The GDG concluded that:

- There is high certainty evidence of an inverse dose-response relationship between volume of aerobic physical activity and risk of physical functional limitations in the general older adult population.

Does the association vary by type or domain of physical activity?

Physical activity programmes that include combinations of balance, strength, endurance, gait, and physical function training are associated with a reduced rate of falls and risk of injury from falls in older adults.

Evidence from a review of 11 RCT showed that by engaging in a variety of different physical activity interventions (commonly balance and functional exercises plus resistance exercises), older adults can reduce rate of falls by up to 28% ($RaR= 0.72$ [95% CI: 0.56 to 0.93]) (42). The effect of resistance exercises was uncertain and based on limited data ($RR= 0.97$ [95% CI: 0.14 to 6.49]; 1 trial; $n= 73$) (42).

Evidence also suggests that programmes which include multiple exercise types have greater positive effects on bone health (standardized effect size 0.45 [95% CI: 0.20 to 0.71]; $p= 0.001$), compared with those which do not (95).

The GDG concluded that:

- There is high certainty evidence that higher levels of physical activity that combines balance, strength, gait, and functional training (e.g. multicomponent physical activity) are associated with a reduced rate of falls and risk of injury from falls in older adults.
- There is moderate certainty evidence that programmes involving multiple exercise types may have significant effects on bone health and osteoporosis prevention.





SEDENTARY BEHAVIOUR RECOMMENDATION

For older adults, sedentary behaviour is defined as time spent sitting or lying with low energy expenditure, while awake, in the context of occupational, educational, home and community settings and transportation.

In older adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality, and incidence of cardiovascular disease, cancer and incidence of type-2 diabetes.

It is recommended that:

- › **Older adults should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.**
Strong recommendation, moderate certainty evidence
- › **To help reduce the detrimental effects of high levels of sedentary behaviour on health, older adults should aim to do more than the recommended levels of moderate-to vigorous-intensity physical activity.**
Strong recommendation, moderate certainty evidence

Supporting evidence and rationale

Sedentary behaviour was not included in the 2010 *Global recommendations on physical activity for health* (1). Due to a lack of population-specific evidence, the primary evidence base for assessing the associations between sedentary behaviour and health outcomes in older adult populations was the same scientific literature collated and reviewed for adult populations because the majority of studies stated no upper age limit criterion and therefore included adults over the age of 65 years. The findings from evidence on sedentary behaviours in the general adult population were reviewed, including assessing if there was evidence that the outcomes would be any different, or would not apply to, or would be contraindicated, for older adults.

Full details of the methods, data extraction and evidence profiles can be found in the [Web Annex: Evidence profiles](#)

Available online at <https://apps.who.int/iris/bitstream/handle/10665/336657/9789240015111-eng.pdf>



These guidelines address physical activity and maternal and fetal health outcomes during pregnancy and the postpartum period. They are for all pregnant and postpartum women, irrespective of age, cultural background, or socioeconomic status. Pregnancy and the period after delivery are stages in a woman's life, and the benefits of being physically active throughout adulthood are detailed in the recommendations provided for adults.

Pregnant and postpartum women should be under the care of a health-care provider for antenatal and postnatal care who can advise on special considerations given their medical history and any contraindications to participating in physical activity during pregnancy or in the postpartum period. These guidelines are public health and population-based. Clinical guidance should be sought for women with complications associated with pregnancy or delivery.

Pregnant and postpartum women should try to meet these recommendations where possible, as able, and without contraindication.

PHYSICAL ACTIVITY RECOMMENDATION

For pregnant and postpartum women, physical activity can be undertaken as part of recreation and leisure (play, games, sports or planned exercise), transportation (wheeling, walking and cycling), work, household chores, in the context of daily occupational, educational, home and community settings.

In pregnant and postpartum women, physical activity during pregnancy and postpartum confers benefits on the following maternal and fetal health benefits: decreased risk of pre-eclampsia, gestational hypertension, gestational diabetes, excessive gestational weight gain, delivery complications and postpartum depression, and fewer newborn complications, no adverse effects on birthweight; and no increase in risk of stillbirth.

It is recommended that all pregnant and postpartum women without contraindication should:

> undertake regular physical activity throughout pregnancy and postpartum;

Strong recommendation, moderate certainty evidence

> do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week for substantial health benefits; and

Strong recommendation, moderate certainty evidence

> incorporate a variety of aerobic and muscle-strengthening activities. Adding gentle stretching may also be beneficial.

Strong recommendation, moderate certainty evidence

In addition:

> Women who, before pregnancy, habitually engaged in vigorous-intensity aerobic activity, or who were physically active, can continue these activities during pregnancy and the postpartum period.

Strong recommendation, moderate certainty evidence



- Doing some physical activity is better than doing none.
- If pregnant and postpartum women are not meeting the recommendations, doing some physical activity will benefit their health.
- Pregnant and postpartum women should start by doing small amounts of physical activity, and gradually increase frequency, intensity and duration over time.
- Pelvic floor muscle training may be performed on a daily basis to reduce the risk of urinary incontinence.

Additional safety considerations for pregnant women when undertaking physical activity are:

- Avoid physical activity during excessive heat, especially with high humidity;
- Stay hydrated by drinking water before, during, and after physical activity;
- Avoid participating in activities which involve physical contact; pose a high risk of falling; or might limit oxygenation (such as activities at high altitude, when not normally living at high altitude);
- Avoid activities in supine position after the first trimester of pregnancy;
- When considering athletic competition, or exercising significantly above the recommended guidelines pregnant women should seek supervision from a specialist health-care provider;
- Pregnant women should be informed by their health-care provider of the danger signs alerting them as to when to stop; or to limit physical activity and consult a qualified health-care provider immediately should they occur;
- Return to physical activity gradually after delivery, and in consultation with a health-care provider, in the case of delivery by Caesarean section.

Supporting evidence and rationale

For these *Guidelines on physical activity and sedentary behaviour* (2020) for pregnant and postpartum women, the evidence syntheses from 7 systematic reviews addressing the critical and important outcomes (28–34) were used and updated. Four of the 7 reviews met inclusion criteria.

Full details of the methods, data extraction and evidence profiles can be found in the [Web Annex: Evidence profiles](#).

In pregnant and postpartum women, what is the association between physical activity and health-related outcomes?

Physical activity before and during pregnancy can help reduce the risk of common complications of pregnancy. Engaging in physical activity during pregnancy is significantly associated with reduced **gestational weight gain** ($MD= 1.14 \text{ kg}$ [95% CI: 1.67 to 0.62]) (97), and a reduced risk of **gestational diabetes** ($RR= 0.71$ [95% CI: 0.57 to 0.89]) (97), as is being physically active before pregnancy ($OR= 0.70$ [95% CI: 0.57 to 0.85]) (31, 34, 97), including in women with overweight or obesity (97).

Physical activity during pregnancy does not appear to increase the incidence of **gestational hypertension or preeclampsia** (31). Evidence suggests that among pregnant women with overweight or obesity, there is no significant difference in the incidence of gestational hypertension ($RR= 0.63$ [95% CI: 0.38 to 1.05]) or in

preeclampsia ($RR= 1.39$ [95% CI: 0.66 to 2.93]) between physical activity intervention groups versus standard antenatal care (97).

There have been long-standing concerns about potential adverse effects of maternal physical activity on the developing fetus and delivery. However, recent evidence demonstrates that physical activity is not associated with increased risk of the incidence of **miscarriage, stillbirth or delivery complications** (32). Evidence suggests no difference in the incidence of Caesarean delivery among pregnant women with overweight or obesity between physical activity intervention groups versus standard antenatal care (97).

Physical activity during pregnancy is not associated with increased risk of adverse effects on **birthweight** (98) or preterm birth (32), and may even be protective, reducing the overall risk (98), even among pregnant women with overweight or obesity ($RR= 1.02$ [95% CI: 0.54 to 1.92]) or

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large-for-gestational-age babies ($RR= 0.90$ [95% CI: 0.65 to 1.25]) between physical activity intervention groups versus standard antenatal care) (97).

In the postpartum period, mothers can experience many physical and emotional changes. Evidence demonstrates that physical activity during pregnancy may be inversely associated with **postpartum depression** (29). Evidence from a meta-analysis of 6 trials and 11 observational studies of physical activity during pregnancy (99) showed a significant inverse relationship between physical activity during pregnancy and postpartum depression ($SMD= 0.58$ [95% CI: 1.09 to 0.08]). The effect was stronger when limited to 5 studies with at least moderate-intensity interventions ($SMD= 0.70$ [95% CI: 1.19 to 0.22]) (99).

The GDG concluded that:

- There is high certainty evidence that physical activity during pregnancy may reduce gestational weight gain and risk of gestational diabetes mellitus.
- There is moderate to high certainty evidence that physical activity does not increase the incidence of gestational hypertension.
- There is moderate certainty evidence that physical activity does not increase the incidence of miscarriage, stillbirth or delivery complications; and moderate certainty evidence of a reduced risk of preterm birth for mothers engaged in vigorous-intensity physical activity.
- There is low to moderate certainty evidence that physical activity does not increase the risk of low birth weight, or small-for-gestational-age, or large-for-gestational-age babies.
- There is low certainty evidence that physical activity during pregnancy is associated with lower levels of postpartum depression.
- The risks for the amounts and types of physical activity recommended for pregnant and postpartum women are low and are outweighed by the benefits.

Is there a dose-response association (volume, duration, frequency, intensity)?

Across the evidence on physical activity during pregnancy and the postpartum period, the interventions varied in the amount (i.e. dose) of physical activity, both in duration in minutes and frequency per week. In general, the evidence available reflected a frequency of aerobic physical activity of at least 3 times per week, typically for between 30 and 60 minutes. This evidence is taken from studies assessing the health impact of a dose broadly consistent with the amount of activity recommended for the general adult population – namely 150 minutes of moderate-intensity physical activity per week.

While more physical activity (frequency, duration and/or volume) is generally found to be associated with greater benefits, further research is needed to understand in more detail the dose-response relationship. Participating in higher versus lower amounts of leisure time physical activity pre-pregnancy is associated with a significantly lower risk of gestational diabetes ($OR= 0.54$ [95% CI: 0.34 to 0.87]) (100). There is also evidence of a small, but significant, reduced risk of preterm birth in babies of mothers who engaged in vigorous-intensity physical activity ($RR= 0.20$ [95% CI: 0.36 to 0.03]) (98). No evidence was identified regarding the safety or additional benefit of exercising at levels significantly above the recommendations.

The GDG concluded that:

- There is insufficient evidence to determine a dose-response association between physical activity and specific critical health outcomes during pregnancy and the postpartum period.
- The overall evidence shows benefits to critical health outcomes and is based on interventions that are broadly consistent with the amount of physical activity recommended for the general adult population, namely 150 minutes of moderate-intensity physical activity per week.
- There was no reason to alter the amount or frequency of recommended moderate-intensity physical activity for pregnant and postpartum women compared with the general adult population.
- There is moderate certainty evidence of a reduced risk of preterm birth for mothers engaged in vigorous-intensity physical activity.

Does the association vary by type or domain or timing (pre-pregnancy, antenatal or postnatal) of physical activity?

Evidence is available from studies that mostly assessed leisure domain physical activity; the type of activity was mostly aerobic (such as walking or swimming), although there is some evidence from studies assessing interventions that also included strength training (e.g. circuit training), or combinations of aerobic and muscle-strengthening exercise. However, overall there is insufficient evidence to determine if the associations between physical activity and health outcomes vary by type or domain or timing (pre-pregnancy, antenatal or postnatal) of physical activity.

The GDG concluded that:

- There is moderate certainty evidence that pregnant and postpartum women should incorporate a variety of aerobic and muscle-strengthening activities. Gentle stretching may also be beneficial.





SEDENTARY BEHAVIOUR RECOMMENDATION

For pregnant and postpartum women, sedentary behaviour is defined as time spent sitting or lying with low energy expenditure while awake, in the context of occupational, educational, home and community settings and transportation.

In pregnant and postpartum women, as in all adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality and incidence of cardiovascular disease, cancer and incidence of type-2 diabetes.

It is recommended that:

› **Pregnant and postpartum women should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.**

Strong recommendation, low certainty evidence

Supporting evidence and rationale

Sedentary behaviour was not included in the 2020 *Global recommendations on physical activity for health* (1). Due to a lack of population-specific evidence, the primary evidence base for assessing the associations between sedentary behaviour and health outcomes in pregnant and postpartum women was the scientific literature collated and reviewed for adult populations.

The findings from evidence on sedentary behaviours in the general adult population were reviewed, including assessing whether the outcomes would be any different, or would not apply to, or would be contraindicated, for pregnant and postpartum women.

Based on available evidence and expert opinion, the evidence was extrapolated to inform the new WHO recommendations on sedentary behaviour for pregnant and postpartum women for the common set of critical health outcomes. Due to indirectness of the evidence, the level of certainty was downgraded.

Given the lack of evidence specific to this population, and that pregnant women were excluded from studies, the recommendation to increase levels of physical activity beyond recommended levels to counter the detrimental effect of high sedentary behaviour was not extrapolated for women during pregnancy and the postpartum period.

The GDG concluded that:

- The evidence on sedentary behaviours in the general adult population could be extrapolated to inform recommendations for pregnant and postpartum women for the common set of critical health outcomes.
- The benefits of minimizing sedentary behaviour outweigh the risks for pregnant and postpartum women.
- The certainty of the evidence should be downgraded due to indirectness.

ADULTS AND OLDER ADULTS WITH CHRONIC CONDITIONS (aged 18 years and older)



To date, most physical activity guidelines for people with chronic conditions have been limited to clinical or therapeutic guidance. For example, there are clinical practice recommendations and resources developed by the professional medical associations for oncology (101), type-2 diabetes (102), hypertension (103), and other chronic diseases (104). WHO also has clinical practice guidance which includes recommending physical activity to patients with chronic disease (17).

These guidelines are the first WHO population-based guidelines on physical activity for people living with chronic conditions, specifically those living with cancer (from here on referred to as "cancer survivors"), hypertension, type-2 diabetes, and HIV.

Given the advances of effective and widely available antiretroviral treatment for HIV, this condition is now also considered a chronic condition. For patients undergoing acute treatment (e.g. chemotherapy), or not yet stabilized on their chronic medication, health-care providers should also refer to clinical practice guidelines relevant to each chronic condition.

PHYSICAL ACTIVITY RECOMMENDATION

For adults living with chronic conditions, physical activity can be undertaken as part of recreation and leisure (play, games, sports or planned exercise), transportation (wheeling, walking and cycling), work or household chores, in the context of daily occupational, educational, home or community settings.

All adult cancer survivors and those living with hypertension, type-2 diabetes and HIV, should try to meet these recommendations where possible, as able and without contraindication.

Physical activity can confer health benefits for adults and older adults living with the following chronic conditions: for **cancer survivors** – physical activity improves all-cause mortality, cancer-specific mortality, and risk of cancer recurrence or second primary cancer; for **people living with hypertension** – physical activity improves cardiovascular disease mortality, disease progression, physical function, health-related quality of life; for **people living with type-2 diabetes** – physical activity reduces rates of mortality from cardiovascular disease and indicators disease progression; and for **people living with HIV** – physical activity can improve physical fitness and mental health (reduced symptoms of anxiety and depression), and does not adversely affect disease progression (CD4 count and viral load) or body composition.

It is recommended that:

- › **All adults and older adults with these chronic conditions should undertake regular physical activity.**
Strong recommendation, moderate certainty evidence
- › **Adults and older adults with these chronic conditions should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for substantial health benefits.**
Strong recommendation, moderate certainty evidence

- Adults and older adults with these chronic conditions should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional benefits.

Strong recommendation, moderate certainty evidence

- As part of their weekly physical activity, older adults with these chronic conditions should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity on 3 or more days a week, to enhance functional capacity and prevent falls.

Strong recommendation, moderate certainty evidence

- When not contraindicated, adults and older adults with these chronic conditions may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.

Conditional recommendation, moderate certainty evidence

- When not able to meet the above recommendations, adults with these chronic conditions should aim to engage in physical activity according to their abilities.
- Adults with these chronic conditions should start by doing small amounts of physical activity and gradually increase the frequency, intensity and duration over time.
- Adults with these chronic conditions may wish to consult with a physical activity specialist or health-care professional for advice on the types and amounts of activity appropriate for their individual needs, abilities, functional limitations/ complications, medications, and overall treatment plan.
- Pre-exercise medical clearance is generally unnecessary for individuals without contraindications prior to beginning light- or moderate-intensity physical activity not exceeding the demands of brisk walking or everyday living.



Supporting evidence and rationale

The scope of these guidelines assessed the associations between physical activity and the following health outcomes: **for cancer survivors** – all-cause mortality, cancer-specific mortality, and risk of cancer recurrence or second primary cancer; **for people living with hypertension** – cardiovascular disease mortality, risk of co-morbid conditions, physical function, health-related quality of life, and disease progression (here defined as the blood pressure response to physical activity); **for people living with type-2 diabetes** – cardiovascular disease mortality, risk of co-morbid conditions, physical function, health-related quality of life, and disease progression; and **for people living with HIV** – physical function (physical fitness, exercise tolerance and strength), health-related quality of life, mental health (symptoms of anxiety and depression), cardiometabolic disease risk indicators (blood lipids, blood glucose and body composition) and adverse effects on disease progression (namely CD4 count and viral load).

The evidence informing these guidelines was the report of PAGAC (35) which was updated with 16 new reviews identified from 2017 to 2019 for cancer ($n= 1$), hypertension ($n= 2$) and type-2 diabetes ($n= 13$). In addition, a commissioned umbrella review on physical activity and health-related outcomes among people living with HIV provided evidence from 19 eligible reviews published 2002–2018. Full details of the methods, data extraction and evidence profiles can be found in the Web Annex: Evidence profiles

In adults and older adults (aged 18 years and over) living with cancer (cancer survivors), hypertension, type-2 diabetes, or HIV, what is the association between physical activity and health-related outcomes?

Physical activity promotes beneficial short- and long-term changes in metabolic, hormonal, and inflammatory pathways, which are thought to be protective for **cancer** incidence and survival (35). Evidence shows that higher levels of physical activity after cancer diagnosis were found to be protective for all-cause mortality following breast cancer ($HR= 0.58$ [95% CI: 0.52 to 0.65], 17 studies); colorectal cancer ($HR= 0.63$ [95% CI: 0.50 to 0.78], 10 studies), female reproductive cancer ($HR= 0.66$ [95% CI: 0.49 to 0.88], 4 studies); glioma ($HR= 0.64$ [95% CI: 0.46 to 0.91], 1 study); hematologic cancer ($HR= 0.60$ [95% CI: 0.51 to 0.69], 2 studies); kidney cancer ($HR= 0.60$ [95% CI: 0.38 to 0.95], 1 study); lung cancer ($HR= 0.76$ [95% CI: 0.60 to 0.97], 2 studies); prostate cancer ($HR= 0.60$ [95% CI: 0.46 to 0.79], 5 studies); and stomach cancer ($HR= 0.75$ [95% CI: 0.61 to 0.93], 1 study) (105).

Greater amounts of physical activity after cancer diagnosis are also associated with lower risks of cause-specific mortality in breast cancer, colorectal cancer, and prostate cancer survivors. The meta-analysis found reduced hazards of mortality for those in the highest versus the lowest levels of postdiagnosis total physical activity for all cancers combined ($HR= 0.63$ [95% CI: 0.53 to 0.75], 4 studies); breast cancer ($HR= 0.63$ [95% CI: 0.50 to 0.78], 13 studies); colorectal cancer ($HR= 0.62$ [95% CI: 0.44 to 0.86], 6 studies); and prostate cancer ($HR= 0.70$ [95% CI: 0.55 to 0.90], 4 studies) (105). There was, however, insufficient evidence to determine if physical activity is associated with cancer recurrence or second primary cancer.

Physical activity is important for both the primary prevention and management of **hypertension**, with evidence showing that physical activity improves physical function, cardiovascular disease progression (i.e. blood pressure response to physical activity), and cardiovascular disease mortality in people living with hypertension (35). For example, compared with no exercise control groups, people with hypertension who are physically active can reduce systolic blood pressure by approximately 12mm Hg and diastolic blood pressure by approximately 6mm Hg ($SBP\ MD= 12.26\ mm\ Hg$ [95% CI: 15.17 to 9.34], $p= < 0.05$; $DBP\ MD= 6.12\ mm\ Hg$ [95% CI: 7.76 to 4.48], $p= < 0.05$) (106). Emerging evidence demonstrates that people with

hypertension who are physically active can significantly improve their health-related quality of life compared with those with hypertension who are inactive (54).

Physical activity, including aerobic activity, muscle-strengthening activity, and aerobic plus muscle-strengthening activity, is associated with improved secondary indicators of risk of progression (HbA1c, blood pressure, BMI, and lipids) in adults with **type-2 diabetes** (35). For example, recent research found that resistance training was associated with greater reduction in HbA1c versus control groups, and that high-intensity resistance training has significant positive effects on fasting insulin (107). There is insufficient evidence to assess the effects of physical activity on health-related quality of life and physical function in adults with type-2 diabetes.

Physical activity in people living with **HIV** improves cardiorespiratory fitness. The interventions studied involved either aerobic exercise, or exercise combined with progressive muscle-strengthening exercise, for at least 30 minutes, 3 times per week (108, 109). There is also evidence that physical activity interventions can improve markers of cardiometabolic risk (e.g. lipids) although results are mixed; no effects were established on insulin concentration, although glucose was lowered after aerobic training (110). Physical activity, whether aerobic, or combined with muscle-strengthening exercise, in people living with HIV is positively associated with health-related quality of life (111) and a reduction in symptoms of depression and anxiety (112). The meta-analysis for depression (9 studies) showed an SMD of 0.84 (95% CI: 1.57 to 0.11) favouring the intervention groups ($p= 0.02$). The SMD for reduction in anxiety (5 studies) was also statistically significant, favouring the intervention (1.23 [95% CI: 2.42 to 0.04], $p= 0.04$) (112). Physical activity is also associated with significant standardized mean increases in lean body mass of 1.75 kg and a significant decrease in percent body fat of 1.12% for participants in the exercising control groups, as well as an increase in peripheral leg and arm muscle area, compared with participants in the non-exercising control groups (111), but is not associated with changes in BMI or waist circumference in people living with HIV (111). Physical activity does not adversely influence markers of HIV disease progression, such as CD4 count (cells/mm³) or viral load (111). Importantly, this evidence suggests that HIV as a chronic disease will not be adversely affected by physical activity.

The GDG concluded that:

- There is moderate certainty evidence that greater amounts of physical activity after cancer diagnosis are associated with lower risks of all-cause, cause-specific, and cancer-specific mortality in cancer survivors.
- There is high certainty evidence that physical activity reduces the risk of cardiovascular disease progression in adults with hypertension.
- There is moderate certainty evidence that physical activity improves physical function and health-related quality of life outcomes in adults with hypertension.
- There is high certainty evidence that physical activity improves markers of disease progression (HbA1c, blood pressure, BMI, and lipids) in adults with type-2 diabetes.
- There is moderate certainty evidence of an association between physical activity and improvements in fitness (maximal oxygen consumption, exercise tolerance) and muscular strength for people living with HIV, and favourable associations between physical activity and body composition, health-related quality of life, reduced symptoms of depression and anxiety, and no change in viral load or CD4 count in people living with HIV.
- The benefits associated with engaging in regular physical activity in cancer survivors and people living with hypertension, type-2 diabetes, and HIV in relation to specific health outcomes, outweigh the risks.

**Is there a dose-response association
(volume, duration, frequency, intensity)?**

Greater amounts of physical activity after **cancer** diagnosis have been linked with lower risks of all-cause, and cancer-specific mortality. Evidence demonstrates a non-linear relationship between increasing levels of post-diagnosis physical activity and breast cancer-specific and all-cause mortality up to 10–15 MET-hours per week (consistent with 150 mins/week of moderate- to vigorous-intensity physical activity) with no evidence for harms at higher levels (105). There is a suggestion of similar dose-response association for other cancer sites however there were too few studies to permit a formal meta-analysis. Further research is needed to determine strength of association.

There is a clear dose-response relationship between physical activity and cardiovascular disease mortality for people living with **hypertension** (35). Findings show that as systolic blood pressure increases within hypertensive ranges, the risk of cardiovascular disease mortality increases, but this increased risk is attenuated with higher levels of physical activity (35). Similar to

recommendations for the general population, most of the traditional interventions are based around 30–60 minutes of moderate-intensity aerobic activity, 3 days per week, and/or 2–3 sessions of resistance training per week.

There is substantial evidence of an inverse curvilinear association between volume of physical activity and risk of cardiovascular mortality in adults with **type-2 diabetes** (113–115). Higher amounts of physical activity (from both below and at, or above the recommended levels of 150 mins/week of moderate-intensity activity) progressively reduce risk. For example, compared with doing no activity, engaging in some activity was associated with a 32% reduction in risk of cardiovascular disease mortality (adjusted HR= 0.68 [95% CI: 0.51 to 0.92]), while engaging in amounts of activity meeting physical activity guidelines or above was associated with a larger 40% reduction in risk of cardiovascular disease mortality (adjusted HR= 0.60 [95% CI: 0.44 to 0.82]) (115). Most interventions are based around 150–300 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity activity, and/or 2–3 sessions of resistance training per week. For some outcomes (e.g. HbA1c and blood pressure) in adults with type-2 diabetes, there is evidence for a stronger effect with more aerobic activity (i.e. greater than 150 mins/week versus less than 150 mins/week), but limited evidence for intensity (35).

In people living with **HIV**, there is insufficient evidence to establish a dose-response relationship between physical activity and body composition, or for intermediate markers of cardiometabolic diseases (such as blood lipid profiles, insulin resistance, fasting glucose concentrations or blood pressure). The majority of studies providing evidence involved physical activity interventions conducted at least 3 times a week for 12–48 weeks, and involved at least 30 minutes of moderate- to vigorous-intensity aerobic exercise alone or in combination with progressive resistance training. There is also insufficient evidence to establish more precisely the dose-response relationship for mental health and health-related quality of life outcomes. The available evidence is from studies typically assessing physical activity interventions of 3 or more times weekly.

Overall there was evidence ranging from moderate to high certainty to support a physical activity recommendation of 150–300 minutes of moderate-intensity physical activity (or equivalent) for the specified populations of people living with chronic disease and the specific set of health outcomes. There was clearer evidence of higher levels of activity being associated with greater benefits in the evidence addressing people living with hypertension,

type-2 diabetes and cancer survivors. The variations in the certainty and directness of the evidence according to the specific chronic condition and specific outcomes examined was acknowledged. Where evidence showed positive outcomes from strength training exercise, the frequency of activity was 2 or 3 sessions of resistance training per week.

The GDG concluded that:

- There is moderate certainty evidence of a dose-response relationship between physical activity and decreased all-cause mortality and cancer-specific mortality in cancer survivors.
- There is high certainty evidence of a dose-response relationship between physical activity and cardiovascular disease mortality for adults with hypertension.
- There is evidence of an inverse, curvilinear dose-response relationship between activity volume and risk of cardiovascular mortality among adults with type-2 diabetes.
- There is insufficient evidence for a dose-response relationship between physical activity and intermediate markers of cardiometabolic diseases, body composition, and health-related quality of life symptoms of anxiety and depression in people living with HIV.
- Interventions in the range of 150–300 minutes of moderate-intensity aerobic activity (or equivalent) provided favourable health outcomes, and positive outcomes from strength training exercise, where noted, with 2 or 3 sessions of resistance training per week.

Does the association vary by type or domain of physical activity?

There is evidence that different types and domains of physical activity provide favourable health outcomes. **Cancer survivors** who are meeting recommended levels of aerobic and muscle-strengthening physical activity, versus not meeting either recommendation, have significantly lower risk of cancer mortality (adjusted HR= 0.70 [95% CI: 0.50 to 0.98]) (84). Evidence demonstrates that adhering solely to muscle-strengthening physical activity recommendations versus not adhering is also beneficial in improving cancer mortality outcomes (HR= 0.66 [95% CI: 0.48 to 0.92]) (84). A meta-analysis also reported these associations by physical activity domain and found the most consistent reductions in mortality for all cancers, breast cancer, and colorectal cancer-specific mortality for recreational

physical activity (105). For adults living with **hypertension**, evidence supports aerobic activity, muscle-strengthening activity, and combinations of the two for improving cardiovascular disease progression. The blood pressure lowering effects between traditional modes of physical activity (i.e. aerobic and resistance activity) do not appear to vary significantly among people with hypertension (35); however, this evidence is not based on direct comparisons between activity types. There is also emerging evidence to support beneficial effects of other forms of exercises in people living with hypertension (e.g. Tai Chi, yoga, Qigong), however further research is needed to explore these specific types of activity to determine strength of association.

Aerobic activity, muscle-strengthening activity, or a combination of both, is associated with improved secondary indicators of risk of progression (HbA1c, blood pressure, BMI, and lipids) among adults with **type-2 diabetes** (35, 107). One review of 24 RCTs ($n= 962$) reported that resistance training was associated with greater reduction in HbA1c versus control groups (MD= 0.45 [95% CI: 0.65 to 0.25], 20 trials; $n= 824$). Statistically significant effects were found for high-intensity resistance training versus control groups on fasting insulin (MD= 4.60 [95% CI: 7.53 to 1.67], 5 trials; $n= 174$) (107). Another review of 7 RCTs ($n= 189$) reported that interval training (2–5 times/week; intervals 1–4 mins duration; total session lengths 20–60 mins) was associated with statistically significantly decreased HbA1c by 0.26% (95% CI: 0.46 to 0.07%, 5 RCTs) compared with MICT, and by 0.83% (95% CI: 1.39% to 0.27%, 4 RCTs) compared with no-exercise control groups (116). As with recommendations for the general population, most of these interventions are based around aerobic activity consistent with the recommendation of 150–300 minutes of moderate-intensity aerobic activity (or 75 minutes of vigorous-intensity activity) and muscle-strengthening activity conducted 2–3 sessions per week. For some outcomes (e.g. HbA1c and blood pressure), there is evidence for a stronger effect with more aerobic activity (i.e. greater than 150 mins/week versus less than 150 mins/week), but limited evidence for intensity. More recent studies provide evidence that traditional Chinese exercise, such as Tai Chi may have glycaemic benefits, but these were of moderate and variable certainty (i.e. risk of bias or inconsistency). Further research is needed to determine these associations.

ADULTS AND OLDER ADULTS WITH CHRONIC CONDITIONS (aged 18 years and older)

Multiple types of physical activity, including aerobic and resistance-training, have been shown to have positive effects on health-related quality of life in people living with HIV (111). Recent research examining changes in health-related quality of life in response to aerobic, progressive resistance exercise, or a combination of both, demonstrates significant improvements in general health, and mental health. There is also evidence that both aerobic and multicomponent activity is related to a reduction in symptoms of depression and anxiety in people living with HIV (112). Evidence for the effects of physical activity on mental health symptoms has involved aerobic or aerobic combined with progressive muscle-strengthening activity, or yoga. Evidence also demonstrates that aerobic exercise alone, or when combined with resistance exercise, does not result in any significant change in viral load or CD4 count in people living with HIV (111).

Direct evidence, from both the existing and updated literature, supports the inclusion of the recommendations for people living with type-2 diabetes and hypertension to undertake aerobic and muscle-strengthening physical activity. Although there is a lack of published evidence, there is biological plausibility for the benefits of aerobic and muscle-strengthening physical activity for adults living with HIV and cancer survivors. Furthermore, as

noted by the GDG, established international clinical practice guidelines recommend aerobic and muscle-strengthening physical activity for these populations (for example ACSM "Moving Through Cancer" guidelines (101) based on a systematic review of evidence (3)). Recognizing this evidence base is still emerging, the level of certainty was downgraded.

The GDG concluded that:

- There is moderate certainty evidence for combined or additive effects of aerobic or muscle-strengthening activity for reduced cancer mortality, improvements in blood pressure among those with hypertension.
- There is high certainty evidence that aerobic activity, muscle-strengthening activity, and aerobic plus muscle-strengthening activity improve markers of disease progression (HbA1C, blood pressure, BMI, and lipids) in adults with type-2 diabetes.
- There is moderate certainty evidence that regular aerobic exercise alone, or combined with resistance exercise, does not result in any significant change in viral load or CD4 count in people living with HIV.
- There is insufficient evidence for an effect of strength training alone on health-related quality of life in people living with HIV.





SEDENTARY BEHAVIOUR RECOMMENDATION

Sedentary behaviour was not included in the 2010 *Global recommendations on physical activity for health* (1). The scope of this new recommendation on sedentary behaviours in cancer survivors and those people living with hypertension, type-2 diabetes and HIV.

Sedentary behaviour is defined as time spent sitting or lying with low energy expenditure, while awake, in the context of occupational, educational, home and community settings, and transportation.

In adults, including **cancer survivors** and people living with **hypertension, type-2 diabetes** and **HIV**, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality; cardiovascular disease mortality; cancer mortality; incidence of cardiovascular disease; cancer; and type-2 diabetes.

For cancer survivors, and adults living with hypertension, type-2 diabetes and HIV, it is recommended that:

› **Adults and older adults with chronic conditions should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.**

Strong recommendation, low certainty evidence

› **To help reduce the detrimental effects of high levels of sedentary behaviour on health, adults and older adults with chronic conditions should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity.**

Strong recommendation, low certainty evidence

Supporting evidence and rationale

Due to a lack of population-specific evidence, the primary evidence base for assessing the associations between sedentary behaviour and health outcomes in adults and older adult cancer survivors and those adults and older adults living with hypertension, type-2 diabetes, and HIV, was the scientific literature collated and reviewed for adult populations.

The findings from evidence on sedentary behaviours in the general adult population were reviewed, including assessing if there was evidence that the outcomes would be any different, or would not apply to, or would be contraindicated, for adults and older adults living with chronic conditions.

ADULTS AND OLDER ADULTS WITH CHRONIC CONDITIONS (aged 18 years and older)

Based on available evidence and expert opinion, the evidence was extrapolated to inform the new WHO recommendations on sedentary behaviour for adults living with chronic conditions for the common set of critical health outcomes. The extrapolation of evidence is supported largely by the assessment that the majority of studies imposed no upper age limit criterion, included adults over the age of 65 years and may have included adults with chronic conditions, such as cancer survivors, those living with hypertension or type-2 diabetes. For people living with HIV, no reasons were identified as to why the evidence on the health impacts of sedentary behaviours would not apply. Due to indirectness of the evidence to develop these recommendations, the level of certainty was downgraded.

The applicability of evidence on the benefit of undertaking more moderate- and vigorous-intensity physical activity to help counteract the potential risks of high levels of sedentary behaviour was also considered and was also extrapolated to inform recommendations for adults with chronic conditions for the common set of critical health outcomes. Given the indirectness, the certainty of the evidence was downgraded.

The GDG concluded that:

- The evidence on sedentary behaviours in the general adult population could be extrapolated to inform recommendations for adult and older adult cancer survivors and those adults and older adults living with hypertension, type-2 diabetes, and HIV for the common set of critical outcomes, with the level of certainty of the evidence downgraded due to indirectness.
- The evidence on the benefits of undertaking more moderate- and vigorous-intensity physical activity to help counteract the potential risks of high levels of sedentary behaviour in the general adult population could be extrapolated to inform recommendations for adult and older adult cancer survivors and those adults and older adults living with hypertension, type-2 diabetes, and HIV for the common set of critical outcomes, with the level of certainty of the evidence downgraded due to indirectness.
- The benefits for minimizing sedentary behaviours outweigh the harms for cancer survivors and those people living with hypertension, type-2 diabetes, and HIV.





PHYSICAL ACTIVITY RECOMMENDATION

Children, adolescents and adults living with disability can achieve important health benefits from physical activity. Children, adolescents and adults with disability should try to meet these recommendations where possible and as able.

For children, adolescents and adults living with disability, physical activity can be undertaken as part of recreation and leisure (play, games, sports or planned exercise), physical education, transportation (wheeling, walking and cycling) or household chores, in the context of home, educational, occupational and community settings. It is important to provide all children, adolescents and adults living with disability with opportunities and encouragement to participate in physical activities appropriate for their age and ability, that are enjoyable, and that offer variety.

Many of the health benefits of physical activity for children and adolescents, as set out in the section above, also relate to those children and adolescents living with disability. Additional benefits of physical activity to health outcomes for those living with disability include: improved cognition in individuals with diseases or disorders that impair cognitive function, including attention-deficit/hyperactivity disorder (ADHD); improvements in physical function may occur in children with intellectual disability.

It is recommended that:

› **Children and adolescents living with disability should do at least an average of 60 minutes per day of moderate-to vigorous-intensity, mostly aerobic, physical activity, across the week.**

Strong recommendation, moderate certainty evidence

› **Vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone should be incorporated at least 3 days a week.**

Strong recommendation, moderate certainty evidence

- Doing some physical activity is better than doing none.
- If children and adolescents living with disability are not meeting these recommendations, doing some physical activity will bring benefits to health.
- Children and adolescents living with disability should start by doing small amounts of physical activity and gradually increase the frequency, intensity and duration over time.
- There are no major risks for children and adolescents living with disability engaging in physical activity when it is appropriate to an individual's current activity level, health status and physical function; and the health benefits accrued outweigh the risks.
- Children and adolescents living with disability may need to consult a health-care professional or other physical activity and disability specialist to help determine the type and amount of activity appropriate for them.



Many of the health benefits of physical activity for adults, as set out in the section above, also relate to adults living with disability. Additional benefits of physical activity to health outcomes for those living with disability include the following: **for adults with multiple sclerosis** – improved physical function, and physical, mental, and social domains of health-related quality of life; **for individuals with spinal cord injury** – improved walking function, muscular strength, and upper extremity function; and enhanced health-related quality of life; **for individuals with diseases or disorders that impair cognitive function** – improved physical function and cognition (in individuals with Parkinson's disease and those with a history of stroke); beneficial effects on cognition; and may improve quality of life (in adults with schizophrenia); and may improve physical function (in adults with intellectual disability); and improves quality of life (in adults with major clinical depression).

It is recommended that:

› **All adults living with disability should undertake regular physical activity.**

Strong recommendation, moderate certainty evidence

› **Adults living with disability should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for substantial health benefits.**

Strong recommendation, moderate certainty evidence

› **Adults living with disability should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.**

Strong recommendation, moderate certainty evidence

› **As part of their weekly physical activity, older adults living with disability should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity on 3 or more days a week, to enhance functional capacity and prevent falls.**

Strong recommendation, moderate certainty evidence

› **Adults living with disability may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.**

Conditional recommendation, moderate certainty evidence

- Doing some physical activity is better than doing none.
- If adults living with disability are not meeting these recommendations, doing some physical activity will bring benefits to health.
- Adults living with disability should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.
- There are no major risks to adults living with disability engaging in physical activity when it is appropriate to the individual's current activity level, health status and physical function; and when the health benefits accrued outweigh the risks.
- Adults living with disability may need to consult a health-care professional or other physical activity and disability specialist to help determine the type and amount of activity appropriate for them.



Supporting evidence and rationale

For these guidelines for children, adolescents and adults living with disability, the comprehensive evidence synthesis undertaken by PAGAC (35) was used and updated. Full details of the methods, data extraction and summary evidence tables of this existing evidence on physical activity and health outcomes is available (35) and was reviewed by the GDG in addition to the findings of the updated search.

The update conducted for these guidelines identified 39 reviews published from 2017 to 2019. Of these, 27 met the inclusion criteria and informed the examination of the association between physical activity and health-related outcomes among children, adolescents and adults living with disability.

Full details of the methods, data extraction and summary evidence portfolios can be found in the [Web Annex: Evidence profiles](#).

The evidence reviewed considered the association between physical activity and health-related outcomes in children, adolescents and adults living with disability resulting from the following health conditions: multiple sclerosis, spinal cord injury, intellectual disability, Parkinson's disease, stroke, major clinical depression, schizophrenia, and attention-deficit/hyperactivity disorder (ADHD). The four health-related outcomes examined included risk of co-morbid conditions, physical function, cognitive function and health-related quality of life, although not all outcomes were explored for each condition. The impact of environmental factors on disability in the context of physical activity was beyond the scope of these guidelines and was not analysed.

In children and adolescents (aged 5–17 years) and adults (aged over 18 years) living with disability, what is the association between physical activity and health-related outcomes?

For people living with **multiple sclerosis**, physical activity improves physical function, functional mobility, walking speed and endurance, and cardiorespiratory fitness, strength and balance. For example, high-intensity interval training over 3–12 weeks demonstrated improvements in cardiorespiratory fitness or muscle strength (117) and lower limb strength training found strength increased by 23.1% (95% CI: 11.8 to 34.4) over an average training period of 13.2 weeks (118) over an average of 13 weeks resulted in increases in strength, and dance interventions studies reported improvements in functional mobility and balance (119). As well as physical health benefits, existing evidence demonstrates that physical activity can benefit cognition in people living with multiple sclerosis (35). Newer research reveals that aerobic exercise has

a small yet significant effect on physical, mental and social domains of health-related quality of life (including symptoms of fatigue and depressive symptoms) (35, 120).

For people living with **spinal cord injury**, physical activity can improve walking function, muscular strength and upper extremity function (35). Physical activity may also reduce shoulder pain, improve vascular function and enhance health-related quality of life (35).

For people living with **Parkinson's disease**, physical activity can improve motor symptoms, functional mobility and performance, endurance, freezing of gait and velocity of forward and backward movement (35, 121, 122). New evidence suggests that exercise can also help global cognitive function in individuals with Parkinson's disease (123).

For people with a history of **stroke**, physical activity can improve physical function, notably upper limb function, sensory motor function of the lower limb, balance, walking speed, distance, ability and endurance, cardiorespiratory fitness, mobility and activities of daily living. Existing evidence suggests that physical activity may also have beneficial effects on cognition (35).

For people with **major clinical depression**, new reviews (124, 125) supported existing evidence (35) that physical activity can improve health-related quality of life (35, 124, 125).

For individuals with **diseases or disorders that impair cognitive function, including schizophrenia** –physical activity can have beneficial effects on cognition, working memory, social cognition and attention/vigilance (35, 126). One review found that moderate- to vigorous-intensity physical activity delivered significant improvements in health-related quality of life and disability (35, 124).

Available online at <https://apps.who.int/iris/bitstream/handle/10665/336657/9789240015111-eng.pdf>

CHILDREN AND ADOLESCENTS (aged 5–17 years) AND ADULTS (aged 18 years and over) LIVING WITH DISABILITY

For people living with **intellectual disability**, physical activity has been shown to improve physical function. The interventions reviewed largely focused on balance and strength activities over 6–24 weeks and reported significant improvement in static balance, dynamic balance and static-dynamic balance compared with controls (35, 127, 128).

For children with **attention-deficit/hyperactivity disorder**, evidence, including one review of 5 RCTs involving ADHD (129), demonstrates a positive association between exercise and attention, executive function and social disorders (35, 129).

The GDG considered the evidence from the general population of children, adolescents and adults and concluded that as there is no reason to believe that there would be an effect modification due to impairment and that the same health physiological benefits will be conferred by being physically active. The GDG acknowledged that few studies include people living with disability, and that effect modification is seldom tested.

This evidence in the area disability, combined with the broader evidence for the general population, supported the general population recommendation being inclusive of people with disability, noting reference to “all adults”, “all older adults” and “people of all abilities”.

The GDG concluded that:

In individuals with spinal cord injury, there is:

- low certainty evidence that physical activity reduces shoulder pain and improves vascular function in paralysed limbs and enhances health-related quality of life; and
- moderate certainty evidence that physical activity improves walking function, muscular strength, and upper extremity function.

In individuals with diseases or disorders that impair cognitive function, including Parkinson’s disease, there is:

- high certainty evidence that physical activity improves a number of functional outcomes including walking, balance, strength, and disease specific motor scores; and
- moderate certainty evidence that moderate- to vigorous-intensity physical activity can have beneficial effects on cognition.

In individuals with a history of stroke, there is:

- moderate certainty evidence that mobility-oriented physical activity can have beneficial effects on physical function and cognition.

In individuals with diseases or disorders that impair cognitive function, including schizophrenia, there is:

- moderate certainty evidence that physical activity improves quality of life; and
- high certainty evidence that moderate- to vigorous-intensity physical activity can have beneficial effects on cognition, working memory, social cognition and attention.

In adults with major clinical depression there is:

- moderate certainty evidence that physical activity improves quality of life.

In adults with multiple sclerosis, there is:

- high certainty evidence that physical activity, particularly aerobic and muscle-strengthening activities, improves physical function, functional mobility, walking speed and endurance, and cardiorespiratory fitness, strength and balance;
- moderate certainty evidence that physical activity can have a beneficial effect on cognition; and
- low certainty evidence that physical activity improves quality of life including symptoms of fatigue and depressive symptoms.

In children and adults with intellectual disability, there is:

- low certainty evidence that physical activity improves physical function.

In children and adolescents with ADHD, there is:

- moderate certainty evidence that moderate- to vigorous-intensity physical activity can have beneficial effects on cognition, including attention, executive function, and social disorders.

The GDG further concluded that there is sufficient scientific evidence on the positive impact of physical activity on a variety of health outcomes across a broad range of impairment areas, and that the benefits of physical activity for people living with disability outweigh the potential harms.

Due to indirectness of the evidence to develop these recommendations, the level of certainty was downgraded.



SEDENTARY BEHAVIOUR RECOMMENDATION

For children, adolescents and adults living with disability, sedentary behaviour is defined as time spent sitting or lying with low energy expenditure, while awake, in the context of educational, home and community settings, and transportation. It is possible to avoid sedentary behaviour and be physically active while sitting or lying, through, for example, upper body led activities, inclusive and/or wheelchair-specific sport and activities.

In children and adolescents, higher amounts of sedentary behaviour are associated with the following poor health outcomes: increased adiposity; poorer cardiometabolic health, fitness, and behavioural conduct/pro-social behaviour; and reduced sleep duration.

It is recommended that:

- › **Children and adolescents living with disability should limit the amount of time spent being sedentary, particularly the amount of recreational screen time.**

Strong recommendation, low certainty evidence

In adults, higher amounts of sedentary behaviour are associated with the following poor health outcomes: all-cause mortality, cardiovascular disease mortality and cancer mortality, and incidence of cardiovascular disease, cancer and type-2 diabetes.

It is recommended that:

- › **Adults living with disability should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light-intensity) provides health benefits.**

Strong recommendation, low certainty evidence

- › **To help reduce the detrimental effects of high levels of sedentary behaviour on health, adults living with disability should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity.**

Strong recommendation, low certainty evidence

Supporting evidence and rationale

Sedentary behaviour was not included in *The Global recommendations on physical activity for health (2010)*.

Due to a lack of population-specific evidence, the primary evidence base for assessing the associations between sedentary behaviour and health outcomes in children, adolescents and adults living disability was the scientific literature collated and reviewed for populations without disability.

The findings from evidence on sedentary behaviours in the general population were reviewed including assessing if there was evidence that the outcomes would be any different, or would not apply to, or would be contraindicated for children, adolescents and adults living with disability.

CHILDREN AND ADOLESCENTS (aged 5–17 years) AND ADULTS (aged 18 years and over) LIVING WITH DISABILITY

Based on available evidence and expert opinion, the evidence was extrapolated to inform new WHO recommendations on sedentary behaviour for individuals living with disability for the common set of critical health outcomes, recognizing that certain population groups, such as wheelchair users, unavoidably sit for long periods of time and sitting may therefore be the norm. For these groups, sedentary behaviour should be defined as time spent with low energy expenditure, e.g. moving in a power chair or being pushed while sitting in a manual wheelchair. There is a lack of research on the association between sedentary behaviour and health outcomes in individuals living with disability. However, based on expert opinion, there are no reasons to believe that there would be an effect modification due to impairment, and therefore the same physiological health benefits will be conferred by limiting sedentary behaviour in individuals living with disability. Due to indirectness of the evidence to develop these recommendations, the level of certainty was downgraded.

The applicability of evidence on the benefit of adults undertaking more moderate- and vigorous-intensity physical activity to help counteract the potential risks of high levels of sedentary behaviour was also considered and was also extrapolated to inform recommendations for adults living with disability for the common set of critical health outcomes. Given the indirectness, the certainty of the evidence was downgraded.

The GDG concluded that:

- The evidence on sedentary behaviours in child and adolescent populations could generally be extrapolated to children and adolescents living with disability, according to their specific ability.
- The evidence on sedentary behaviours in the general adult population, including the benefit for adults of undertaking more moderate- to vigorous-intensity physical activity to help counteract the potential risks of high levels of sedentary behaviour, could generally be extrapolated to adults and older adults living with disability, according to their specific ability. However, the certainty of the evidence was downgraded due to indirectness.
- The benefits of minimizing sedentary behaviour in children, adolescents, adults and older adults living with disability outweigh the harms.



EVIDENCE TO RECOMMENDATIONS

In accordance with the GRADE process, the proposed wording of the updated recommendations, and the rating of their strength ("strong" or "conditional"), were based on consideration of the balance of benefits to harms; the certainty of evidence; sensitivity to the values and preferences of those affected by the guidelines; the potential impact on gender, social and health equity; and acceptability, feasibility and resource implications. These were considered for each population group, but given the similarity of issues and considerations discussed, are consolidated and presented here.

The strength of the recommendation was primarily based on the assessed balance of benefits to harms. Recommendations were graded "strong" if the balance of benefits to harms was assessed as substantial for the target population for the recommendation, and "conditional" if the balance of benefits to harms was small or there was important likely variability in benefits in the target population. The evidence on harms was specifically sought through the commissioning of a new systematic review. However, this was limited, as most evidence focuses on injuries and harms to elite and competitive athletes, rather than the general population. Overall, despite the limited evidence, and informed by expert opinion, it was concluded that the risk was no greater than small. The evidence generally indicated that the benefits of physical activity far outweighed the harms, and that physical activity can be an important intervention to support closing an existing health gap, particularly for disadvantaged populations.

Issues of health equity, feasibility and acceptability were also considered by the GDG and formed part of the online public consultation on the draft recommendations held between 31 March 2020 and 17 April 2020. The survey for the public consultation asked specific questions on the balance between the costs to individuals and governments of implementing the recommendations, and the potential health benefits, and whether the guidelines would improve health equity. In addition, the draft recommendations and the feedback form were sent to countries that had recently

expressed an interest in developing, or had initiated the process of drafting, national guidelines on physical activity. Feedback was received from more than 420 submissions to the online consultation, and additional collation of feedback from the WHO European Regional Office, incorporating comments from WHO Collaborating Centres and Member States. The feedback from this consultation was collated, reviewed by the GDG, and used to further inform the consideration on feasibility, resource implications, and health equity through consultation with the Steering Group and the GDG.

Decisions were reached by consensus through discussion. The GDG came to consensus on each recommendation and on the strength of the recommendation; ratings and voting were not required.

ASSESSMENT OF THE CERTAINTY OF EVIDENCE

The GRADE framework was used by the GDG to examine the certainty of primary research contributing to each outcome identified in the PI/ECOs, and assessed the overall certainty of evidence taking into consideration the risk of bias, inconsistency, imprecision, indirectness of the evidence and publication bias across each outcome. GRADE tables detailing this information for each PI/ECO are available in the [Web Annex: Evidence profiles](#). The assessment of the certainty of the evidence was based on an overall assessment across all evaluated outcomes and prioritized all-cause mortality and cardiovascular mortality as the most critical outcomes, followed by other clinical outcomes (falls, depression, cognition, health-related quality of life, etc), then intermediate outcomes (e.g. cardiometabolic markers, other metabolic markers), as well as harms. Where the evidence had not been specifically reviewed, such as for sedentary behaviour in subpopulations primarily due to a lack of evidence for these groups, the evidence for the general population was extrapolated and downgraded where this was deemed appropriate, due to indirectness.

BENEFITS AND HARMS

The development of the recommendations included an assessment of adverse impacts or risks. Where there was limited evidence, decisions were based on the expertise of the GDG. Overall, for all populations it was concluded that the benefits of physical activity and limiting sedentary behaviour outweighed the potential harms. These guidelines are for the general population and do not address the benefits and harms experienced by athletes undertaking the types and amounts of activity necessary to improve performance-related fitness for participation in competition.

Doing some physical activity is better than doing none. If individuals are not currently meeting these recommendations, doing some physical activity will bring benefits to their health. They should start by doing small amounts of physical activity, gradually increasing frequency, intensity and duration over time. Pre-exercise medical clearance is generally unnecessary. Inactive individuals who gradually progress to undertaking moderate-intensity activity have no known risk of sudden cardiac events and very low risk of bone, muscle, or joint injuries. An individual who is habitually engaging in moderate-intensity activity can gradually increase to vigorous-intensity without needing to consult a health-care provider. Those who develop new symptoms when increasing their levels of activity should consult a health-care provider.

The choice of appropriate types and amounts of physical activity can be affected by pregnancy, chronic conditions, and disability, and should be undertaken as able and without contraindication. These individuals may wish to consult with a physical activity specialist or health-care professional for advice on the types and amounts of activity appropriate for their individual needs, abilities, functional limitations/complications, medications, and overall treatment plan. Light- and moderate-intensity physical activity are generally low risk and are recommended for all.

VALUES AND PREFERENCES

The values and preferences of those affected by the guidelines (in this case parents and caregivers, children and adolescents, adults, older adults, pregnant and postpartum women, people living with chronic conditions and/or disability) were considered. Overall it was concluded that there was little or no uncertainty about preferences regarding the main outcomes, including mortality and cardiovascular mortality.

The estimated potential benefits greatly outweighed any potential harms, and as such, the GDG considered the recommendations to be not preference-sensitive.

RESOURCE IMPLICATIONS

The expert opinion of the GDG, and a small body of evidence reporting on economic analyses of interventions and savings to the health-care systems from increasing levels of physical activity, informed discussion on the resource implications of the recommendations in different settings. In addition, results from the online public consultation showed that over 75% of respondents agreed, or strongly agreed, that the benefits of implementing the guidelines would outweigh the cost to the individual, and 81% agreed, or strongly agreed, that the benefits of implementing the guidelines would outweigh the cost to government.

Available evidence and expert opinion recognize that substantial health benefits can be achieved at low risk through activities such as walking, that require no specific equipment or cost to the individual. Further, it was acknowledged that other forms of physical activities, for example structured sports, cycling and exercise classes, may incur costs, which can be a barrier for some individuals, particularly those with lower incomes. Government implementation of policy and programmes to promote and enable physical activity also requires investments in areas such as human resources, policy development, provision of facilities and services and potentially, equipment, some of which is incurred by ministries of health, but also in sectors outside of health, such as sport, education, transport and urban planning. The resources required may be at more than one level of government (national, subnational and local levels) to ensure all communities have equal access to physical activity opportunities.

These investments may involve new resources, but also can be addressed by reallocation of existing budgets to reflect the prioritization of facilities and programmes towards increasing population levels of physical activity. Examples of budget reallocation include towards infrastructure for walking and cycling from the existing transport budget, and towards "sports for all" from the sports budgets. In key settings, such as schools and workplaces, low-cost interventions, combined with changes to the physical environment, can support participation in physical activity and would also contribute to reducing inequities in opportunities to be active,

experienced by some subpopulation groups. Overall, it was assessed that while there are resource implications to achieve these draft recommendations, implementation of actions is possible within current governance structures.

Further, evidence supports that substantial health savings are possible for the health-care system resulting from increasing levels of physical activity. In 2013 the global annual cost of physical inactivity was estimated at INT\$ 54 billion due to direct health costs alone (130); and at a national level, inactivity is estimated to cost between 1–3 % of health-care budgets (131).

Within the wider context of noncommunicable disease (NCD) prevention, additional costs to government and nongovernmental organizations of guideline implementation may be minimized if recommended physical activity can be relatively easily incorporated by individuals into their lives; likewise if existing resources in primary and secondary care, schools, workplaces or transportation can be shifted, resulting in increased physical activity.

Analysis of the cost and benefits of physical activity promotion indicate positive returns on investment over 15 years, in terms of NCD prevention, in many countries where the investment cases have been conducted (132). Interventions such as public education and awareness campaigns and physical activity counselling and referral are a “best buy” and a “good buy” respectively, of recommended interventions to address NCDs based on an update of Appendix 3 of the *Global action plan for the prevention and control of NCDs 2013–2020* (133). Overall, the GDG concluded that the benefits of implementing the recommendations outweigh the costs.

Delivering on physical activity guidelines for people with disability may require investment, such as the training of activity specialists, adapted equipment where needed, and facilities that need to be made accessible. These investments can facilitate the needs of a wide range of population groups. Evidence demonstrates a significant participation gradient between people with and without disability in relation to physical activity, due to multiple barriers regarding access, choice of activities offered, and the attitudes of others. Universal design principles should be applied to ensure full and effective participation by people living with disability. With innovation, it is possible to address many of these resource implications. Adopting universal design approaches would mitigate against these costs in the future.

EQUITY, ACCEPTABILITY AND FEASIBILITY

In updating the 2010 recommendations the decision was taken to explicitly include consideration of vulnerable populations, such as those living with chronic conditions and/or disability. The GDG and Steering Group included members representing such groups. The GDG discussed each recommendation at length, considering whether implementing the recommendations would decrease health equity, and the issues related to implementation, to ensure that the recommendations did not worsen equity issues (for example, ensuring that there are safe facilities and opportunities accessible for all, including people living with disability, and socioeconomically and other disadvantaged people, to engage in physical activity; addressing gender and other cultural biases that could restrict access and opportunity to participate in physical activity, etc.). Of respondents to the online public consultation, 76% agreed, or strongly agreed, that implementing the guidelines can achieve a reduction in health inequity by increasing opportunities for all to be active and improve health outcomes. It was noted that supporting environments are key to enabling participation in physical activity. A comprehensive approach to the design and implementation of policies across a number of sectors will be required to address barriers to physical activity for vulnerable groups, such as socioeconomically disadvantaged women and girls, and people with disability.

People with disability experience worse health outcomes than people without disability, yet the benefits of physical activity far outweigh the harms and can be an important intervention to close this health gap. Evidence demonstrates a significant participation gradient between people with and without disability in relation to physical activity, due to multiple barriers regarding access, choice of activities offered, and the attitudes of others. For many people with disability, it should be possible to engage in various forms of physical activity without the need for adapted equipment or facilities. However, in order for people with disability to engage in physical activity on an equal basis with others, adapted equipment may need to be obtained, facilities may need to be made accessible, and activity specialists may need to be trained.



RESEARCH NEEDS

Despite the large quantity of data relating physical activity and, increasingly, sedentary behaviours to health outcomes across the life span, the GDG discussions revealed important evidence gaps, which should be prioritized to inform future guidelines. Evidence gaps across population subgroups included a lack of information on:

- 1) the more precise details on the dose-response relationship between physical activity and/or sedentary behaviour and several of the health outcomes studied;
- 2) the health benefits of light-intensity physical activity and of breaking up sedentary time with light-intensity activity;
- 3) differences in the health effects of different types and domains of physical activity (leisure time; occupational; transportation; household; education) and of sedentary behaviour (occupational; screen time; television viewing); and
- 4) the joint association between physical activity and sedentary time with health outcomes across the life course.

It was also noted that there remains limited evidence from low- and middle-income countries, economically disadvantaged or underserved communities, and in people living with disability and/or chronic disease. Many studies are not designed or powered to test for effect modification by various sociodemographic factors (age, sex, race/ethnicity, socioeconomic status) that may modify the health effects of physical activity. Such information is important for making more specific public health recommendations and for reducing health disparities in more vulnerable sectors of the population. Further details on the research gaps arising from these new guidelines can also be found in published literature (134).

ADOPTION, DISSEMINATION, IMPLEMENTATION AND EVALUATION

The goal of these guidelines is to provide policy-makers, and those who develop health-care, education, workplace and community intervention programmes, with recommendations on how much time children, adolescents, adults and older adults should spend each day being physically active, and recommendations on limiting time spent being sedentary. However, developing global guidelines is not an end in itself: without dissemination and implementation, changes in physical activity levels will not be achieved.

ADOPTION

WHO undertakes a rigorous and extensive process to develop globally relevant guidelines (21) for use by all countries. These *Guidelines on physical activity and sedentary behaviour* provide evidence-based recommendations on the health impacts of physical activity and sedentary behaviour that national governments can adopt and use as part of their national policy frameworks. The development of global guidelines, with extensive consultation, should largely remove the need for individual countries to use resources to undertake the lengthy scientific process. Reviewing and adopting these global physical activity and sedentary behaviour guidelines provides a rapid and cost-effective method to develop guidelines tailored to local context.

Adopting the WHO guidelines at regional or national level will ensure countries provide consistent recommendations on physical activity and sedentary behaviour, which are informed by the latest and best available scientific evidence. In addition, consistency of the recommendations across countries will facilitate national surveillance, global estimates of physical activity and sedentary behaviour, and cross-country comparisons. Throughout the adoption process, consideration should be given to the need to contextualize and tailor the guidelines. Translation into the local language is one element of adoption and contextualization. Examples of physical activities may need to be changed to be locally relevant and the use of images tailored to reflect local cultures, norms and values.

A step-by-step framework to support country adoption of the Global guidelines is under development, following a series of regional workshops with relevant stakeholders. This framework can be populated with relevant national data (for example physical activity prevalence estimates), and will provide a fast-track approach to the development of a national guidelines document. These supporting resources will be available in 2021 through the WHO website.

When considering adopting the guidelines it is recommended that the following ten-step process is applied:

1. Advocate for a review of current national guidelines on physical activity and the adoption of the WHO guidelines to secure government authorization.
2. Engage key stakeholders both within the health sector and other relevant sectors, such as sport, education, transport; engage relevant professional associations and scientists, with topic expertise.
3. Assess the applicability, acceptability and feasibility of the recommendations.
4. Adapt guidelines to the local context, including language, examples, and other cultural considerations.
5. Conduct an external review with target users, including policy-makers, practitioners, and the general public.
6. Establish a budget and clear plan for dissemination and communication.
7. Publish and promote the national guidelines, ideally alongside a launch event to generate publicity and interest.
8. Engage relevant professional bodies or organizations and support policy alignment and/or endorsement.
9. Implement national policies and practices to support implementation of national guidelines and behaviour change.
10. Agree a timeline for evaluation, review, and update of the guidelines.

DISSEMINATION

National physical activity guidelines are a core component of the governance structures for a comprehensive approach to increasing population levels of physical activity. National guidelines inform the development and priorities of national and subnational strategy planning and require dissemination of the correct information, to the relevant groups of people, in an appropriate way. Unfortunately, too often, national guidelines are not disseminated, and so awareness of recommendations among both professional audiences and the wider community can remain very low. Securing dedicated resources to support wide-scale dissemination is an important first step to changing awareness and knowledge about the importance of increasing physical activity and reducing sedentary behaviours.

Key audiences for dissemination of national guidelines on physical activity and sedentary behaviour include:

- **Policy-makers within and outside the health sector** (including transport, planning, education, workplaces, sport, parks and recreation), to increase:
 - a. knowledge of the contribution that increasing physical activity and reducing sedentary behaviour can have in improving not only health, but also a range of diverse yet related agendas, including gender equity, human rights obligations, and sustainable development;
 - b. integration of policy and programmes on physical activity and sedentary behaviour into all relevant policies; and
 - c. investment in scaled-up and coordinated national and local actions.
- **Non-state actors** (including nongovernmental organizations, academic and research organizations, the private sector as well as the media and research funding agencies), to:
 - a. raise awareness of the importance of increasing physical activity and reducing sedentary behaviours across all ages;
 - b. encourage and ensure policy alignment; and
 - c. increase collaboration and investment in policy implementation and local action.

- **Practitioners in health and non-health sectors**

(including sport, education, transport, and planning) to increase:

- a. awareness and knowledge of national guidelines on physical activity and sedentary behaviours;
- b. knowledge, skills and confidence in promoting increased physical activity and reduction in sedentary behaviours; and
- c. integration of physical activity promotion into routine practice where applicable.

- **The general public and specific population subgroups**, to increase:

- a. awareness and knowledge of the guidelines on physical activity and sedentary behaviour;
- b. knowledge of how to achieve the physical activity and sedentary behaviour guidelines; and
- c. intentions and motivation to be more physically active and to reduce sedentary behaviour.

COMMUNICATION CAMPAIGNS

Different stakeholders will benefit from different materials; therefore to communicate guidelines to multiple audiences effectively, consideration must be given to the content, format, and delivery channels for guideline communication. When developing a guideline communication strategy, formative research can help determine the key audiences and understand the values, needs and preferences that influence levels of physical activity and sedentary behaviour. This should include exploration of the barriers to physical activity or to the integration of physical activity into policy and practice, as well as testing of draft messages and materials with different groups. This will help inform the key messages that are used, as well as the appropriate format(s) and channel(s) for communication. A comprehensive communication strategy will include a range of communications aimed at different audiences. Countries may need to prioritize specific groups depending on available resources (human and financial).

Communication campaigns on physical activity targeting the general public or specific subpopulations are a cost-effective intervention (133) and recommended in the WHO *Global action plan on physical activity 2018–2030* (14). National and subnational campaigns on physical activity typically establish an overarching campaign slogan (for example “Be Active” or “Move More”), and develop design elements or characters, which may include tailored messages for different audiences

(such as for young children, adolescents, adults or older adults, the less active, people living with disability or chronic conditions). Campaign messages and resources that are tailored to specific population groups are likely to be more effective than generic materials.

Communication campaigns should consider the reach and effectiveness of both traditional media channels (such as television, radio, billboards, printed resources) as well as digital media channels (websites, mobile phones, Apps). Providing information on the national guidelines in a variety of formats is also useful. For example, a relatively new but increasingly common approach to communicating physical activity guidelines is through the use of infographics or short animated videos. WHO has supporting materials for developing and implementing such communication campaigns (135).

The academic and research community are likely to be interested in the scientific report which details the epidemiological evidence on which the guidelines are based. However the specific details of the underlying research is unlikely to be of interest to other more general audiences. Policy-makers may prefer a summary of the science, or even a short briefing document. Other audiences, such as health and non-health professionals, are more likely to favour different types of resources, for example a brochure or factsheet about the guidelines, or about how to integrate physical activity promotion into routine practice (for example in patient consultations in a health-care setting, or when developing building or transport plans for urban environments). Different professionals will require resources that are tailored to their role. Health professions, in particular, may benefit from a suite of resources to reflect the diverse population groups that they work with.

IMPLEMENTATION OF POLICY AND PROGRAMMES

National guidelines on physical activity and sedentary behaviour, in isolation, are unlikely to lead to increases in population levels of physical activity and should therefore be seen as one element of a policy and planning framework. It is critical that national guidelines are disseminated to key audiences and supported by a sustained national communication strategy that will lead to increased awareness and knowledge about the multiple benefits of regular physical activity and reducing sedentary behaviours. However, in order to achieve sustained behaviour change, these actions must be supported by policies that create supportive environments that enable and encourage people to be active, along with increased local, appropriate opportunities for people to participate in physical activity. Policies and programmes must consider and be adapted to the local context, in terms of both the health system and the complex multisector institutions that have an interest in, or opportunity to support, physical activity promotion. Action should be taken using a "whole of government" approach and consider the "system" of policies and multiple actions that can, through engagement of a wide range of stakeholders, support more people to be physically active across multiple sectors and settings. Using a "systems" approach that is aligned with a sustained communication strategy ensures that increased demand for physical activity, generated through effective communication, is matched by the provision of environments and opportunities for people to be physically active.



The WHO *Global action plan on physical activity 2018–2030* set a target to reduce physical inactivity by 15% by 2030, and outlined 20 recommended policy actions and interventions (14). These included recommending that all countries implement sustained national public education and awareness campaigns and the integration of physical activity counselling programmes into primary and secondary health care. Other recommendations included the creation of appropriate environments for physical activity, including walking, cycling and wheeling, for all population groups and the provision of more opportunities and programmes for physical activity in schools, workplaces and sports clubs and venues. Implementation across all 20 recommendations may not be feasible in the short term in all countries, but should be viewed as a long-term goal. To identify an appropriate and feasible set of immediate actions, WHO Member States should conduct a situational analysis of current policy and practice. This will enable multisector collaboration and help identify areas of strength as well as gaps and opportunities, and can be used as the basis for developing or updating national and subnational plans.

These new WHO guidelines support expanding the scope of actions to include additional groups, such as people living with disability or chronic conditions, and women who are pregnant or postpartum. Policy will need to support appropriate programme delivery and practice that recognizes community needs and the diversity of groups and contexts. A number of sector-specific toolkits are under development to support implementation of the ACTIVE technical package (135); these will provide each sector with guidance on how to promote physical activity, for example through schools, through primary health care, or by improving provision for walking and cycling. The ACTIVE toolkit, as well as other WHO regional and national resources will support implementation of these physical activity and sedentary behaviour guidelines.

SURVEILLANCE AND EVALUATION

The WHO *Global recommendations for physical activity for health* have been used as benchmarks for population health monitoring and surveillance since 2010. The changes introduced to the recommendations in these updated guidelines will have some implications for surveillance systems and assessment instruments currently used to monitor national levels of physical activity. The publication of these new guidelines will call for a review of current instruments and reporting protocols to inform any adjustments and recommendations on future reporting against the new guidelines. Instruments, such as the Global Physical Activity Questionnaire and Global Student Health Survey, will be reviewed and protocols updated to align with these new guidelines; supporting guidance to all countries will be provided in 2021.

The WHO NCD Country Capacity Survey (CCS) is the main instrument used to monitor global progress on NCD policy implementation, and is conducted every two years. The CCS includes specific questions on population surveillance systems on physical activity for each age group covered by these WHO guidelines on physical activity and sedentary behaviour, and since 2019, on the existence of national physical activity guidelines. WHO Member States are requested to upload documentation to support their response. In 2019, of the 194 WHO Member States, 78 (40%) reported having physical activity guidelines (136). A detailed document analysis of responses to the CCS in 2019 was carried out, and identified that only two thirds of the 78 Member States (52/78) with national guidelines include statements on how much physical activity their populations should do; and of these, only 42 countries aligned fully with the 2010 WHO *Global recommendations on physical activity for health* (1). Data from the 2021 and subsequent surveys will provide information on uptake of these updated guidelines.

UPDATING

These guidelines will be updated after ten years, unless advances in the science of how physical activity is assessed using device-based measurement, and the rapidly evolving science on sedentary behaviour, prompt an earlier update.



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ANNEX 1:

MANAGEMENT OF GUIDELINE DEVELOPMENT PROCESS

Contributors to guideline development

WHO Steering Group

The Steering Group included experts in the areas of physical activity, adolescent health, ageing disability, mental health, injury prevention, cancer, pregnancy and surveillance from both headquarters and regional offices.

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The Steering Group drafted the scope of the guidelines, and the PI/ECOs. They reviewed the declaration of interests; and drafted, reviewed and finalized the guidelines.

Guideline Development Group (GDG)

The Guideline Development Group consisted of a broad group of relevant experts in the field and end users of, and persons affected by, the recommendations. The members of the Guideline Development Group included:

Dr Salih Saad Al-Ansari (advocate in health promotion and education to combat NCDs through physical activity and walking); **Dr Stuart Biddle** (physical activity and sedentary behaviour, and behaviour change); **Dr Katja Borodulin** (physical activity in pregnancy and older adults); **Dr Matthew Buman** (sleep, sedentary behaviour, and physical activity in people living with chronic conditions); **Dr Greet Cardon** (physical activity in children and adolescents); **Ms Catherine Carty** (physical activity in people living with disability); **Dr Jean-Philippe Chaput** (sleep, sedentary behaviour and physical activity in children and adolescents); **Dr Sebastien Chastin** (physical activity, sedentary behaviour and health, objective measurement of physical activity and sedentary behaviour); **Dr Paddy Dempsey** (physical activity and sedentary behaviour in adults and people living with chronic conditions); **Dr Loretta DiPietro** (physical activity in pregnancy and older adults); **Dr Ulf Ekelund** (sedentary behaviour and physical activity, physical activity in children and adolescents); **Dr Joseph Firth** (physical activity and mental health); **Dr Christine Friedenreich** (physical activity in people living with chronic conditions, physical activity and cancer risk); **Dr Leandro Garcia** (physical activity and health in adults); **Dr Muthoni Gichu**

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A first GDG meeting was held 2–4 July 2019, at which the GDG decided on the PI/ECO questions, reviewed the existing systematic reviews, and identified updates required. The Group agreed on the process for decision-making on recommendations and the strength of the evidence to be applied at the second GDG meeting. The second meeting was held 11–14 February 2020; updated evidence was reviewed and final recommendations agreed upon by consensus.

External Review Group (ERG)

Seven peer reviewers were drawn from a list of individuals suggested by the GDG and Steering Group. They provided relevant expertise, including programme implementation and represented all six WHO regions. The ERG reviewed the draft guidelines and provided feedback to the Steering Group on issues of clarity and implementation, which was incorporated, as appropriate. External peer reviewers did not make changes to the recommendations. External peer reviewers are listed in Annex 2.

Declarations of Interest

All GDG members and external peer reviewers completed and submitted a WHO Declaration of Interests form and signed confidentiality undertakings prior to attending any GDG meetings. The Steering Group reviewed and assessed the submitted curriculum vitae and declarations of interest and performed an internet and publications search to identify any obvious public controversies or interests that may lead to compromising situations. The names and brief biographies of all proposed GDG members were published on the WHO Physical Activity webpage for public consultation for a period of 14 days. No comments were received. If additional guidance on management of any declaration or conflicts of interest had been required, the Steering Group would have consulted with colleagues in Office of Compliance, Risk Management and Ethics. If deemed necessary, individuals found to have conflicts of interest, financial or non-financial, would have been excluded from participation on any topics where interests were conflicting. The management of conflicts of interest was reviewed throughout the process. GDG members were required to update their Declaration of Interest, if necessary, before each meeting and a verbal declaration of interest was solicited at the beginning of each GDG meeting. Declared interests of the GDG and of the external peer reviewers are summarized in Annex 3. No conflict of interest was identified.

Peer review

The draft guidelines were reviewed by seven external peer reviewers identified by the GDG and Steering Group. External peer reviewers were requested to provide comments on issues of clarity, presentation of the evidence, and implementation; comments were incorporated as appropriate. External peer reviewers could not change the recommendations decided upon by the GDG. External peer reviewers are listed in Annex 2; a summary of declarations of interest are provided in Annex 3. In addition, inputs were actively sought from WHO regional offices.



ANNEX 2:

GUIDELINE DEVELOPMENT GROUP, EXTERNAL PEER REVIEWERS, AND WHO STAFF INVOLVED IN THE DEVELOPMENT OF THESE GUIDELINES

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ANNEX 3:

SUMMARY OF DECLARATION OF INTEREST AND HOW THESE WERE MANAGED

Guideline Development Group members

Name	Gender	Expertise	Disclosure of interest	Conflict of interest and management
Dr Salih Saad Al-Ansari	Male	Advocate in health promotion and education to combat NCDs through physical activity and walking	Owner and Chief Executive Officer of the Health Promotion Center	No conflict of interest identified
Dr Stuart Biddle	Male	Physical activity in youth	Research funds and paid consultancy	No conflict of interest identified
Dr Katja Borodulin	Female	Physical activity in pregnancy	Employment at National Institute for Health and Welfare and Age Institute; research funds	No conflict of interest identified
Dr Matthew Buman	Male	Sleep and physical activity in people living with chronic conditions	None declared	No conflict of interest identified
Dr Greet Cardon	Female	Physical activity in youth	None declared	No conflict of interest identified
Ms Catherine Carty	Female	Physical activity in people living with disability	Research funds	No conflict of interest identified
Dr Jean-Philippe Chaput	Male	Sleep	None declared	No conflict of interest identified
Dr Sebastien Chastin	Male	Physical activity and health, objective measurement of physical activity	Research funds	No conflict of interest identified
Dr Paddy Dempsey	Male	Physical activity and sedentary behaviour in adults and people living with chronic conditions	Employment and research funds	No conflict of interest identified
Dr Loretta DiPietro	Female	Physical activity in older adults	None declared	No conflict of interest identified
Dr Ulf Ekelund	Male	Sedentary behaviour and physical activity in youth	None declared	No conflict of interest identified
Dr Joseph Firth	Male	Physical activity and mental health	None declared	No conflict of interest identified
Dr Christine Friedenreich	Female	Physical activity in people living with chronic conditions, physical activity and cancer risk	None declared	No conflict of interest identified
Dr Leandro Garcia	Male	Physical activity and mental health	Employment and paid consultancy	No conflict of interest identified
Dr Muthoni Gichu	Female	Policy implementation (national government)	None declared	No conflict of interest identified
Dr Russ Jago	Male	Physical activity in youth	None declared	No conflict of interest identified

Name	Gender	Expertise	Disclosure of interest	Conflict of interest and management
Dr Peter Katzmarzyk	Male	Physical activity and sedentary behaviour in youth	Travel support to assist guideline committees	No conflict of interest identified
Dr Estelle V. Lambert	Female	Physical activity and obesity	None declared	No conflict of interest identified
Dr Michael Leitzmann	Male	Sedentary behaviour and chronic conditions	None declared	No conflict of interest identified
Dr Karen Milton	Female	Translating recommendations into practice	Travel support to assist guideline committee	No conflict of interest identified
Dr Francisco Ortega	Male	Physical activity in youth, mental health and objective measurement	None declared	No conflict of interest identified
Dr Chathuranga Ranasinghe	Male	Promotion of physical activity and health in the community, workplace and school settings	Research funds	No conflict of interest identified
Dr Emmanuel Stamatakis	Male	Physical activity and multiple health outcomes in adults	Grant for technology company for objective measurement of physical activity	No conflict of interest identified
Dr Anne Tiedemann	Female	Physical activity and health outcomes in older adults	None declared	No conflict of interest identified
Dr Richard Troiano	Male	Policy development	None declared	No conflict of interest identified
Dr Hidde van der Ploeg	Male	Physical activity, sedentary behaviour and health outcomes in adults	Travel support to assist 2017 Dutch Physical Activity Guidelines committee and research funds	No conflict of interest identified
Ms Vicky Wari	Female	Policy implementation (national government)	Shares (not relevant to guideline)	No conflict of interest identified

External peer reviewers

Name	Gender	Expertise	Disclosure of interest	Conflict of interest and management
Kingsley Akinroye	Male	Advocacy, noncommunicable diseases	None declared	No conflict of interest identified
Dr Huda Alsiyabi	Female	Policy and programme implementation	None declared	No conflict of interest identified
Dr Alberto Flórez-Pregonero	Male	Physical activity and sedentary behaviour measurement and surveillance	None declared	No conflict of interest identified
Dr Shigeru Inoue	Male	Epidemiology and physical activity promotion	None declared	No conflict of interest identified
Dr Agus Mahendra	Male	Physical activity and movement skills in children	None declared	No conflict of interest identified
Dr Deborah Salvo	Female	Health and social disparities, with a particular emphasis on chronic disease prevention	None declared	No conflict of interest identified
Dr Jasper Schipperijn	Male	Physical activity and the built environment	President-Elect of the International Society for Physical Activity and Health (ISPAH)	No conflict of interest identified



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Table of Contents

Message From the Secretaries.....	v
Acknowledgments.....	vi
Executive Summary	vii
Introduction.....	1
Setting the Stage	3
Grounded in Science and Focused on Public Health	3
A Spotlight on Dietary Patterns	6
Healthy Dietary Patterns at Every Life Stage.....	6
Dietary Guidelines for Americans:	
What It Is, What It Is Not.....	7
Quantitative Guidance on Foods, Not Nutrient Requirements.....	7
Health Promotion, Not Disease Treatment	7
Developing the <i>Dietary Guidelines for Americans</i>	7
Stage 1: Identify Topics and Supporting Scientific Questions	8
Stage 2: Appoint a Dietary Guidelines Advisory Committee To Review Current Scientific Evidence ..	8
Stage 3: Develop the <i>Dietary Guidelines</i>	11
Stage 4: Implement the <i>Dietary Guidelines</i>	12
A Roadmap to the <i>Dietary Guidelines for Americans, 2020-2025</i>	14
Chapter 1: Nutrition and Health Across the Lifespan: The Guidelines and Key Recommendations.....	15
The Guidelines	17
Guideline 1: Follow a Healthy Dietary Pattern at Every Life Stage	19
What Is a Dietary Pattern?.....	19
The Health Benefits of a Healthy Dietary Pattern ...	23
A Healthy Dietary Pattern Supports Appropriate Calorie Levels	23
Most Americans Do Not Follow a Healthy Dietary Pattern.....	26
Guideline 2: Customize and Enjoy Food and Beverage Choices To Reflect Personal Preferences, Cultural Traditions, and Budgetary Considerations.....	27
Guideline 3: Focus on Meeting Food Group Needs With Nutrient-Dense Foods and Beverages, and Stay Within Calorie Limits	30
Vegetables	31
Fruits	32
Grains	32
Dairy and Fortified Soy Alternatives	33
Protein Foods.....	33
Oils.....	35
Beverages	35
Dietary Components of Public Health Concern for Underconsumption	36
Guideline 4: Limit Foods and Beverages Higher in Added Sugars, Saturated Fat, and Sodium, and Limit Alcoholic Beverages.....	37
Added Sugars	41
Saturated Fat	44
Sodium	46
Alcoholic Beverages	49
Support Healthy Dietary Patterns for All Americans	50
Looking Toward the Life Stages	50
Chapter 2: Infants and Toddlers	51
Introduction	53
Putting the Key Recommendations Into Action	54
Feed Infants Human Milk for the First 6 Months, If Possible.....	54
Provide Infants Supplemental Vitamin D Beginning Soon After Birth.....	56
Introduce Infants to Nutrient-Dense Complementary Foods at About 6 Months Old.....	56
Introduce Infants to Potentially Allergenic Foods Along With Other Complementary Foods	58
Encourage Infants and Toddlers To Consume a Variety of Complementary Foods and Beverages To Meet Energy and Nutrient Needs.....	59
Establish a Healthy Beverage Pattern	61
Healthy Dietary Pattern During a Toddler's Second Year of Life.....	63
Current Intakes	65
Supporting Healthy Eating	67
Accessing a Healthy Dietary Pattern	68
Looking Toward Chapter 3: Children and Adolescents	68

Chapter 3: Children and Adolescents	69
Introduction	71
Healthy Dietary Patterns.....	72
Current Intakes	75
Special Considerations	87
Sugar-Sweetened Beverages	87
Dairy and Fortified Soy Alternatives.....	88
Adolescent Nutrition.....	88
Supporting Healthy Eating	89
Accessing a Healthy Dietary Pattern	90
Looking Toward Chapter 4: Adults	90

Chapter 4: Adults.....	91
Introduction	93
Healthy Dietary Patterns.....	95
Current Intakes	97
Special Considerations	101
Dietary Fiber	101
Calcium and Vitamin D	101
Saturated Fat	102
Sodium	102
Added Sugars	103
Alcoholic Beverages	104
Supporting Healthy Eating	104
Accessing a Healthy Dietary Pattern	105
Looking Toward Chapter 5:	
Women Who Are Pregnant or Lactating	
and Chapter 6: Older Adults	106

Chapter 5: Women Who Are Pregnant or Lactating	107
Introduction	109
Healthy Dietary Patterns.....	110
Current Intakes	113
Special Considerations	115
Meeting Nutrient Needs.....	115
Folate/Folic Acid	115
Iron	115
Iodine	116
Choline.....	117
Seafood.....	117
Alcoholic Beverages	117
Caffeine.....	118
Supporting Healthy Eating	120

Chapter 6: Older Adults	121
Introduction	123
Healthy Dietary Patterns.....	124
Current Intakes	126
Special Considerations	128
Protein	128
Vitamin B ₁₂	128
Beverages	129
Supporting Healthy Eating	129
Healthy Eating Through the Lifespan	130

Appendices	131
Appendix 1: Nutritional Goals for Age-Sex Groups	131
Appendix 2: Estimated Calorie Needs	139
Appendix 3: USDA Dietary Patterns.....	142

List of Tables

Table I-1: Facts About Nutrition-Related Health Conditions in the United States	5
Table 1-1: Healthy U.S.-Style Dietary Pattern at the 2,000-Calorie Level, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	20
Table 2-1: Healthy U.S.-Style Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	64
Table 2-2: Signs a Child is Hungry or Full	67
Table 3-1: Healthy U.S.-Style Dietary Pattern for Children Ages 2 Through 8, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	74
Table 3-2: Healthy U.S.-Style Dietary Pattern for Children and Adolescents Ages 9 Through 13, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	81
Table 3-3: Healthy U.S.-Style Dietary Pattern for Adolescents Ages 14 Through 18, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	84
Table 4-1: Healthy U.S.-Style Dietary Pattern for Adults Ages 19 Through 59, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	96
Table 5-1: Healthy U.S.-Style Dietary Pattern for Women Who Are Pregnant or Lactating, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	111
Table 5-2: Estimated Change in Calorie Needs During Pregnancy and Lactation for Women With a Healthy Prepregnancy Weight.....	112
Table 5-3: Weight Gain Recommendations for Pregnancy	112
Table 6-1: Healthy U.S.-Style Dietary Pattern for Adults Ages 60 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	125
Table A1-1: Daily Nutritional Goals, Ages 6 Through 11 Months and 12 Through 23 Months.....	131
Table A1-2: Daily Nutritional Goals, Ages 2 and Older	133
Table A1-3: Daily Nutritional Goals for Women Who Are Pregnant, by Age Group and Trimester	135
Table A1-4: Daily Nutritional Goals for Women Who Are Lactating, by Age Group and Months Postpartum.....	137
Table A2-1: Estimated Calorie Needs per Day, by Age and Sex, Ages 12 Through 23 Months.....	139
Table A2-2: Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level, Ages 2 and Older	141
Table A2-3: Estimated Change in Calorie Needs During Pregnancy and Lactation for Women With a Healthy Prepregnancy Weight	141
Table A3-1: Healthy U.S.-Style Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	143
Table A3-2: Healthy U.S.-Style Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	144
Table A3-3: Healthy Vegetarian Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	147
Table A3-4: Healthy Vegetarian Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	148
Table A3-5: Healthy Mediterranean-Style Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components	149

List of Figures

Figure 1-1: Adherence of the U.S. Population to the <i>Dietary Guidelines</i> Over Time, as Measured by the Average Total Healthy Eating Index-2015 Scores	4
Figure 1-1: Examples of Calories in Food Choices That Are Not Nutrient Dense and Calories in Nutrient-Dense Forms of These Foods	21
Figure 1-2: Making Nutrient-Dense Choices: One Food or Beverage At a Time.....	22
Figure 1-3: The Science Underlying the <i>Dietary Guidelines</i> Demonstrates That Healthy Eating Across the Lifespan Can Promote Health and Reduce Risk of Chronic Disease.....	24
Figure 1-4: Adherence of the U.S. Population to the <i>Dietary Guidelines</i> Across Life Stages, as Measured by Average Total Healthy Eating Index-2015 Scores....	26
Figure 1-5: Customizing the <i>Dietary Guidelines</i> Framework.....	28
Figure 1-6: Dietary Intakes Compared to Recommendations: Percent of the U.S. Population Ages 1 and Older Who Are Below and At or Above Each Dietary Goal	30
Figure 1-7: The 85-15 Guide: Percentage of Calories Needed To Meet Food Group Needs With Nutrient-Dense Choices and Percentage Left for Other Uses	37
Figure 1-8: Making Nutrient-Dense Choices: One Meal At a Time.....	38
Figure 1-9: Making Healthy Choices: One Day At a Time.....	39
Figure 1-10: Top Sources and Average Intakes of Added Sugars: U.S. Population Ages 1 and Older	43
Figure 1-11: Top Sources and Average Intakes of Saturated Fat: U.S. Population Ages 1 and Older.....	45
Figure 1-12: Top Sources and Average Intakes of Sodium: U.S. Population Ages 1 and Older	47
Figure 2-1: Make Healthy Shifts To Empower Toddlers To Eat Nutrient-Dense Foods in Dietary Patterns	63
Figure 2-2: Current Intakes: Ages 12 Through 23 Months.....	65
Figure 2-3: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 12 Through 23 Months.....	66
Figure 3-1: Healthy Eating Index Scores Across Childhood and Adolescence.....	75
Figure 3-2: Current Intakes: Ages 2 Through 4	77
Figure 3-3: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 2 Through 4	78
Figure 3-4: Current Intakes: Ages 5 Through 8.....	79
Figure 3-5: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 5 Through 8	80
Figure 3-6: Current Intakes: Ages 9 Through 13	82
Figure 3-7: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 9 Through 13.....	83
Figure 3-8: Current Intakes: Ages 14 Through 18.....	85
Figure 3-9: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 14 Through 18.....	86
Figure 4-1: Current Intakes: Ages 19 Through 30.....	97
Figure 4-2: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 19 Through 30.....	98
Figure 4-3: Current Intakes: Ages 31 Through 59.....	99
Figure 4-4: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 31 Through 59.....	100
Figure 5-1: Current Intakes: Women Who Are Pregnant or Lactating	113
Figure 5-2: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Women Who Are Pregnant or Lactating	114
Figure 6-1: Current Intakes: Ages 60 and Older	126
Figure 6-2: Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 60 and Older	127

Message From the Secretaries

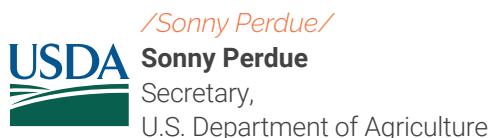
We are pleased to present the *Dietary Guidelines for Americans*, 2020-2025. This edition marks the first time the Guidelines provide recommendations by life stage, from birth through older adulthood.

Each stage of life is distinct and has unique needs that affect health and disease risk. Early food preferences influence food and beverage choices later. And the science has evolved to focus on the importance of a healthy dietary pattern over time. The science also shows it's never too late to start and maintain a healthy dietary pattern, which can yield health benefits in the short term and cumulatively over years. This new edition of the *Dietary Guidelines* includes specific recommendations for all life stages, now including infants and toddlers, and pregnant and lactating women. We are excited this is the first edition to provide guidance for every life stage.

This edition of the *Dietary Guidelines* is grounded in robust scientific reviews of the current body of evidence on key nutrition and health topics for each life stage. We thank the 20 distinguished scientists on the 2020 Dietary Guidelines Advisory Committee for their expertise and dedication in conducting an independent scientific review that was characterized by more transparency and public participation throughout the process than ever before. The Committee's work culminated in a comprehensive scientific report on the current state of nutrition science and provided advice to the Departments for our development of this 9th edition of the *Dietary Guidelines*. The Committee also included important considerations for future research, such as a need to reconsider the Dietary Reference Intakes. The U.S. and Canadian Dietary Reference Intake Steering Committees are currently developing plans to re-examine energy, protein, fat, and carbohydrate—the timeline for these macronutrient reviews has not been established. USDA and HHS are looking forward to jointly funding the work to help guide our Departments' research agendas in the coming years.

With the science must come practice—that is, making food and beverage choices that align with the *Dietary Guidelines*. Using the new edition of the *Dietary Guidelines*, we hope Americans can find ways to "Start Simple" and incorporate modest changes each day that push Americans closer to meeting the recommendations. It's more important than ever to make healthy eating a priority in the United States. With the release of the *Dietary Guidelines for Americans*, 2020-2025, we have an important call to action for you as health professionals and policymakers. We are asking you to help the public "make every bite count with the *Dietary Guidelines for Americans*." Help people make food and beverage choices that are rich in nutrition—individual choices that can become a healthy routine over time, choices they can enjoy in good health for many years to come.

Thank you for all you do to help Americans make strides toward aligning closer to the *Dietary Guidelines* as we all work together to help the public lead healthier lives.



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DATA
FACTS

Executive Summary

The foods and beverages that people consume have a profound impact on their health. The scientific connection between food and health has been well documented for many decades, with substantial and increasingly robust evidence showing that a healthy lifestyle—including following a healthy dietary pattern—can help people achieve and maintain good health and reduce the risk of chronic diseases throughout all stages of the lifespan: infancy and toddlerhood, childhood and adolescence, adulthood, pregnancy and lactation, and older adulthood. The core elements of a healthy dietary pattern are remarkably consistent across the lifespan and across health outcomes.

Since the first edition was published in 1980, the *Dietary Guidelines for Americans* have provided science-based advice on what to eat and drink to promote health, reduce risk of chronic disease, and meet nutrient needs. Publication of the *Dietary Guidelines* is required under the 1990 National Nutrition Monitoring and Related

Research Act, which states that at least every 5 years, the U.S. Departments of Agriculture (USDA) and of Health and Human Services (HHS) must jointly publish a report containing nutritional and dietary information and guidelines for the general public. The statute (Public Law 101-445, 7 United States Code 5341 et seq.) requires that the *Dietary Guidelines* be based on the preponderance of current scientific and medical knowledge. The 2020-2025 edition of the *Dietary Guidelines* builds from the 2015 edition, with revisions grounded in the *Scientific Report of the 2020 Dietary Guidelines Advisory Committee* and consideration of Federal agency and public comments.

The *Dietary Guidelines* is designed for policymakers and nutrition and health professionals to help all individuals and their families consume a healthy, nutritionally adequate diet. The information in the *Dietary Guidelines* is used to develop, implement, and evaluate Federal food, nutrition, and health policies

and programs. It also is the basis for Federal nutrition education materials designed for the public and for the nutrition education components of USDA and HHS nutrition programs. State and local governments, schools, the food industry, other businesses, community groups, and media also use *Dietary Guidelines* information to develop programs, policies, and communication for the general public.

The aim of the *Dietary Guidelines* is to promote health and prevent disease. Because of this public health orientation, the *Dietary Guidelines* is not intended to contain clinical guidelines for treating chronic diseases. Chronic diseases result from a complex mix of genetic, biological, behavioral, socioeconomic, and environmental factors, and people with these conditions have unique health care requirements that require careful oversight by a health professional. The body of scientific evidence on diet and health reviewed to inform the *Dietary Guidelines* is representative of the U.S. population—it includes people who are healthy, people at risk for diet-related chronic conditions and diseases, such as cardiovascular disease, type 2 diabetes, and obesity, and some people who are living with one or more of these diet-related chronic illnesses. At the same time, it is essential that Federal agencies, medical organizations, and health professionals adapt the *Dietary Guidelines* to meet the specific needs of their patients as part of an individual, multifaceted treatment plan for the specific chronic disease.

Consistent and Evolving

Although many recommendations have remained relatively consistent over time, the *Dietary Guidelines* also has built upon previous editions and evolved as scientific knowledge has grown. The *Dietary Guidelines for Americans, 2020-2025* reflects this in three important ways:

The first is its recognition that diet-related chronic diseases, such as cardiovascular disease, type 2 diabetes, obesity, and some types of cancer, are very prevalent among Americans and pose a major public health problem. Today, more than half of adults have one or more diet-related chronic diseases. As a result, recent editions of the *Dietary Guidelines* have focused on healthy individuals, as well as those with overweight or obesity and those who are at risk of

chronic disease. A fundamental premise of the *2020-2025 Dietary Guidelines* is that just about everyone, no matter their health status, can benefit from shifting food and beverage choices to better support healthy dietary patterns.

The second is its focus on dietary patterns. Researchers and public health experts, including registered dietitians, understand that nutrients and foods are not consumed in isolation. Rather, people consume them in various combinations over time—a dietary pattern—and these foods and beverages act synergistically to affect health. The *Dietary Guidelines for Americans, 2015-2020* puts this understanding into action by focusing its recommendations on consuming a healthy dietary pattern. The *2020-2025 Dietary Guidelines* carries forward this emphasis on the importance of a healthy dietary pattern as a whole—rather than on individual nutrients, foods, or food groups in isolation.

The third is its focus on a lifespan approach. This edition of the *Dietary Guidelines* highlights the importance of encouraging healthy dietary patterns at every life stage from infancy through older adulthood. It provides recommendations for healthy dietary patterns by life stage, identifying needs specific to each life stage and considering healthy dietary pattern characteristics that should be carried forward into the next stage of life. For the first time since the 1985 edition, the *2020-2025 Dietary Guidelines* includes recommendations for healthy dietary patterns for infants and toddlers.

The Guidelines

The *2020-2025 Dietary Guidelines* provides four overarching Guidelines that encourage healthy eating patterns at each stage of life and recognize that individuals will need to make shifts in their food and beverage choices to achieve a healthy pattern. The Guidelines also explicitly emphasize that a healthy dietary pattern is not a rigid prescription. Rather, the Guidelines are a customizable framework of core elements within which individuals make tailored and affordable choices that meet their personal, cultural, and traditional preferences. Several examples of healthy dietary patterns that translate and integrate the recommendations in overall healthy ways to eat are provided. The Guidelines are supported by Key Recommendations that provide further guidance on healthy eating across the lifespan.

The Guidelines

Make every bite count with the *Dietary Guidelines for Americans*.
Here's how:

1

Follow a healthy dietary pattern at every life stage.

At every life stage—infancy, toddlerhood, childhood, adolescence, adulthood, pregnancy, lactation, and older adulthood—it is never too early or too late to eat healthfully.

- **For about the first 6 months of life,** exclusively feed infants human milk. Continue to feed infants human milk through at least the first year of life, and longer if desired. Feed infants iron-fortified infant formula during the first year of life when human milk is unavailable. Provide infants with supplemental vitamin D beginning soon after birth.
- **At about 6 months,** introduce infants to nutrient-dense complementary foods. Introduce infants to potentially allergenic foods along with other complementary foods. Encourage infants and toddlers to consume a variety of foods from all food groups. Include foods rich in iron and zinc, particularly for infants fed human milk.
- **From 12 months through older adulthood,** follow a healthy dietary pattern across the lifespan to meet nutrient needs, help achieve a healthy body weight, and reduce the risk of chronic disease.

2

Customize and enjoy nutrient-dense food and beverage choices to reflect personal preferences, cultural traditions, and budgetary considerations.

A healthy dietary pattern can benefit all individuals regardless of age, race, or ethnicity, or current health status. The *Dietary Guidelines* provides a framework intended to be customized to individual needs and preferences, as well as the foodways of the diverse cultures in the United States.

3

Focus on meeting food group needs with nutrient-dense foods and beverages, and stay within calorie limits.

An underlying premise of the *Dietary Guidelines* is that nutritional needs should be met primarily from foods and beverages—specifically, nutrient-dense foods and beverages. Nutrient-dense foods provide vitamins, minerals, and other health-promoting components and have no or little added sugars, saturated fat, and sodium. A healthy dietary pattern consists of nutrient-dense forms of foods and beverages across all food groups, in recommended amounts, and within calorie limits.

The core elements that make up a healthy dietary pattern include:

- **Vegetables of all types**—dark green; red and orange; beans, peas, and lentils; starchy; and other vegetables
- **Fruits**, especially whole fruit
- **Grains**, at least half of which are whole grain
- **Dairy**, including fat-free or low-fat milk, yogurt, and cheese, and/or lactose-free versions and fortified soy beverages and yogurt as alternatives
- **Protein foods**, including lean meats, poultry, and eggs; seafood; beans, peas, and lentils; and nuts, seeds, and soy products
- **Oils**, including vegetable oils and oils in food, such as seafood and nuts

Limit foods and beverages higher in added sugars, saturated fat, and sodium, and limit alcoholic beverages.

At every life stage, meeting food group recommendations—even with nutrient-dense choices—requires most of a person's daily calorie needs and sodium limits. A healthy dietary pattern doesn't have much room for extra added sugars, saturated fat, or sodium—or for alcoholic beverages. A small amount of added sugars, saturated fat, or sodium can be added to nutrient-dense foods and beverages to help meet food group recommendations, but foods and beverages high in these components should be limited. Limits are:

- **Added sugars**—Less than 10 percent of calories per day starting at age 2. Avoid foods and beverages with added sugars for those younger than age 2.
- **Saturated fat**—Less than 10 percent of calories per day starting at age 2.
- **Sodium**—Less than 2,300 milligrams per day—and even less for children younger than age 14.
- **Alcoholic beverages**—Adults of legal drinking age can choose not to drink, or to drink in moderation by limiting intake to 2 drinks or less in a day for men and 1 drink or less in a day for women, when alcohol is consumed. Drinking less is better for health than drinking more. There are some adults who should not drink alcohol, such as women who are pregnant.



Terms to Know

Several terms are used throughout the *Dietary Guidelines* and are essential to understanding the Guidelines and putting them into action. These terms are defined here:

- **Dietary pattern:** It is the combination of foods and beverages that constitutes an individual's complete dietary intake over time. This may be a description of a customary way of eating or a description of a combination of foods recommended for consumption.
- **Nutrient dense:** Nutrient-dense foods and beverages provide vitamins, minerals, and other health-promoting components and have little added sugars, saturated fat, and sodium. Vegetables, fruits, whole grains, seafood, eggs, beans, peas, and lentils, unsalted nuts and seeds, fat-free and low-fat dairy products, and lean meats and poultry—when prepared with no or little added sugars, saturated fat, and sodium—are nutrient-dense foods.

For most individuals, no matter their age or health status, achieving a healthy dietary pattern will require changes in food and beverage choices. Some of these changes can be accomplished by making simple substitutions, while others will require greater effort to accomplish. This edition of the *Dietary Guidelines* presents overall guidance on choosing nutrient-dense foods and beverages in place of less healthy choices and also discusses special nutrition considerations for individuals at each life stage—infants and toddlers, children and adolescents, adults, women who are pregnant or lactating, and older adults.

Although individuals ultimately decide what and how much to consume, their personal relationships; the settings in which they live, learn, work, play, and gather; and other contextual factors—including their ability to consistently access healthy and affordable food—strongly influence their choices. Health professionals, communities, businesses and industries, organizations, government, and other segments of society all have a role to play in supporting individuals and families in making choices that align with the *Dietary Guidelines* and ensuring that all people have access to a healthy and affordable food supply. Resources, including Federal programs that support households, regardless of size and make-up, in choosing a healthy diet and improving access to healthy food, are highlighted throughout this edition of the *Dietary Guidelines for Americans*.





Introduction



Setting the Stage

The foods and beverages that people consume have a profound impact on their health. The scientific connection between food and health has been well documented for many decades, with substantial evidence showing that healthy dietary patterns can help people achieve and maintain good health and reduce the risk of chronic diseases throughout all stages of the lifespan. Yet, Federal data show that from the first edition of the *Dietary Guidelines for Americans* in 1980 through today, Americans have fallen far short of meeting its recommendations, and diet-related chronic disease rates have risen to pervasive levels and continue to be a major public health concern.



The *Dietary Guidelines* is an important part of a complex, multifaceted approach to promote health and reduce chronic disease risk. The *Dietary Guidelines* provides science-based advice on what to eat and drink to promote health, help reduce risk of chronic disease, and meet nutrient needs. The *Dietary Guidelines* is the foundation of Federal food, nutrition, and health policies and programs. An important audience is health professionals and nutrition program administrators who work with the general public to help them consume a healthy and nutritionally adequate diet and establish policies and services to support these efforts. Comprehensive, coordinated strategies built on the science-based foundation of the *Dietary Guidelines*—and a commitment to drive these strategies over time across sectors and settings—can help all Americans consume healthy dietary patterns, achieve and maintain good health, and reduce the risk of chronic diseases.

Grounded in Science and Focused on Public Health

The U.S. Departments of Agriculture (USDA) and of Health and Human Services (HHS) update the *Dietary Guidelines* at least every 5 years, based on the current science. A fundamental premise of the *Dietary Guidelines* is that everyone, no matter their age, race, or ethnicity, economic circumstances, or health status, can benefit from shifting food and beverage choices to better support healthy dietary patterns.

To make sure that the dietary advice provided in the *Dietary Guidelines* is aimed at improving public health, the science used to inform the Guidelines has examined diet through a lens of health promotion and disease prevention and considered various segments of the United States population, including ethnic populations who have disproportionately and/or historically been affected by diet-related disparities. This means that priority has been placed on scientific studies that examine the relationship between diet and health across all life stages, in men, women, and children from diverse racial and ethnic backgrounds, who are healthy or at risk of chronic disease.

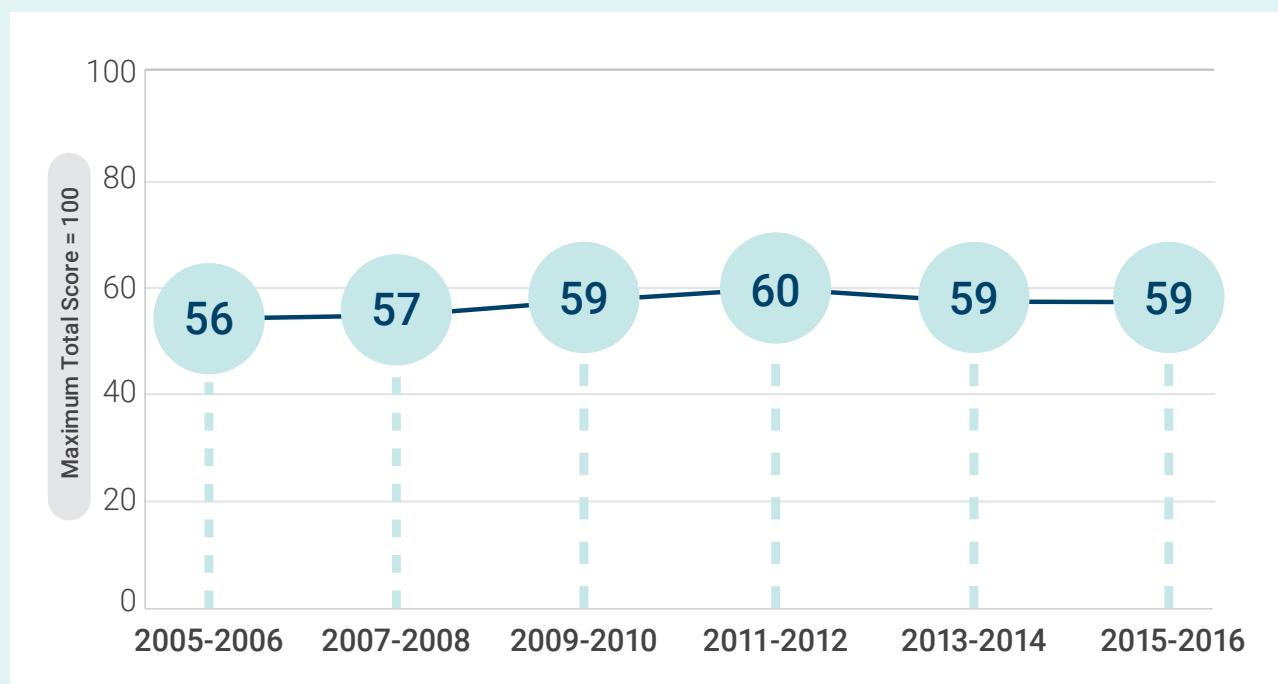
Over time, eating patterns in the United States have remained far below *Dietary Guidelines* recommendations (**Figure I-1**). Concurrently, it has become increasingly clear that diet-related chronic diseases, such as cardiovascular disease, type 2 diabetes, obesity, liver disease, some types of cancer, and dental caries, pose a major public health problem for Americans. Today,

60 percent of adults have one or more diet-related chronic diseases (**Table I-1**). Given its aim to prevent further disease incidence by promoting health and reducing chronic disease risk, the *Dietary Guidelines* focuses on the general public, including healthy individuals, as well as those with overweight or obesity and those who are at risk of chronic disease. The importance of following the *Dietary Guidelines* across all life stages has been brought into focus even more with the emergence of COVID-19, as people living with diet-related chronic conditions and diseases are at an increased risk of severe illness from the novel coronavirus.

Grounded in the current body of scientific evidence on diet and health that is relevant to all Americans, the *Dietary Guidelines* is a critically important tool for health professionals, policymakers, and many other professionals. It is designed to help people make food and beverage choices all through life that are enjoyable and affordable and that also promote health and help prevent chronic disease.

Figure I-1

Adherence of the U.S. Population to the *Dietary Guidelines* Over Time, as Measured by the Average Total Healthy Eating Index-2015 Scores



NOTE: HEI-2015 total scores are out of 100 possible points. A score of 100 indicates that recommendations on average were met or exceeded. A higher total score indicates a higher quality diet.

Data Source: Analysis of What We Eat in America, National Health and Nutrition Examination Survey (NHANES) data from 2005-2006 through 2015-2016, ages 2 and older, day 1 dietary intake data, weighted.

Table I-1

Facts About Nutrition-Related Health Conditions in the United States

HEALTH CONDITIONS	STATISTICS
Overweight and Obesity	<ul style="list-style-type: none"> About 74% of adults are overweight or have obesity. Adults ages 40 to 59 have the highest rate of obesity (43%) of any age group with adults 60 years and older having a 41% rate of obesity. About 40% of children and adolescents are overweight or have obesity; the rate of obesity increases throughout childhood and teen years.
Cardiovascular Disease (CVD) and Risk Factors: <ul style="list-style-type: none"> Coronary artery disease Hypertension High LDL and total blood cholesterol Stroke 	<ul style="list-style-type: none"> Heart disease is the leading cause of death. About 18.2 million adults have coronary artery disease, the most common type of heart disease. Stroke is the fifth leading cause of death. Hypertension, high LDL cholesterol, and high total cholesterol are major risk factors in heart disease and stroke. Rates of hypertension and high total cholesterol are higher in adults with obesity than those who are at a healthy weight. About 45% of adults have hypertension.^a More Black adults (54%) than White adults (46%) have hypertension. More adults ages 60 and older (75%) than adults ages 40 to 59 (55%) have hypertension. Nearly 4% of adolescents have hypertension.^b More than 11% of adults have high total cholesterol, ≥240 mg/dL. More women (12%) than men (10%) have high total cholesterol, ≥240 mg/dL. 7% of children and adolescents have high total cholesterol, ≥200 mg/dL.
Diabetes	<ul style="list-style-type: none"> Almost 11% of Americans have type 1 or type 2 diabetes. Almost 35% of American adults have prediabetes, and people 65 years and older have the highest rate (48%) compared to other age groups. Almost 90% of adults with diabetes also are overweight or have obesity. About 210,000 children and adolescents have diabetes, including 187,000 with type 1 diabetes. About 6–9% of pregnant women develop gestational diabetes.
Cancer^c <ul style="list-style-type: none"> Breast Cancer Colorectal Cancer 	<ul style="list-style-type: none"> Colorectal cancer in men and breast cancer in women are among the most common types of cancer. About 250,520 women will be diagnosed with breast cancer this year. Close to 5% of men and women will be diagnosed with colorectal cancer at some point during their lifetime. More than 1.3 million people are living with colorectal cancer. The incidence and mortality rates are highest among those ages 65 and older for every cancer type.
Bone Health and Muscle Strength	<ul style="list-style-type: none"> More women (17%) than men (5%) have osteoporosis. 20% of older adults have reduced muscle strength. Adults over 80 years, non-Hispanic Asians, and women are at the highest risk for reduced bone mass and muscle strength.

^a For adults, hypertension is defined as systolic blood pressure (SBP) >130 mm Hg and/or a diastolic blood pressure (DBP) >90 mm Hg.

^b For children, hypertension was defined using the 2017 American Academy of Pediatrics (AAP) Clinical Practice Guideline.

^c The types of cancer included here are not a complete list of all diet- and physical activity-related cancers.



A Spotlight on Dietary Patterns

Although many of its recommendations have remained relatively consistent over time, the *Dietary Guidelines* has evolved as scientific knowledge has grown. Early *Dietary Guidelines* editions used evidence that examined the relationships between individual nutrients, foods, and food groups and health outcomes. In recent years, researchers, public health experts, and registered dietitians have acknowledged that nutrients and foods are not consumed in isolation. Rather, people consume them in various combinations over time—a dietary pattern—and these foods and beverages act synergistically to affect health.

The 2015-2020 *Dietary Guidelines* put this understanding into action by focusing its recommendations on consuming a healthy dietary pattern. The 2020-2025 *Dietary Guidelines* carries forward this emphasis on the importance of a healthy dietary pattern as a whole—rather than on individual nutrients or foods in isolation.

Serving as a framework, the Guidelines' dietary patterns approach enables policymakers, programs, and health professionals to help people personalize their food and beverage choices to accommodate their wants and needs, food preferences, cultural traditions and customs, and budgetary considerations.



Healthy Dietary Patterns at Every Life Stage

The 2020-2025 *Dietary Guidelines* takes the dietary patterns approach one step further by focusing on the importance of encouraging healthy dietary patterns at every stage of life, from birth to older adulthood. It provides recommendations for healthy dietary patterns by life stage, identifying needs specific to each life stage and considering healthy dietary pattern characteristics that should be carried forward into the next stage of life. And, for the first time since the 1985 edition, this edition of the *Dietary Guidelines* includes recommendations for infants and toddlers as well as continuing the emphasis on healthy dietary patterns during pregnancy and lactation.

This approach recognizes that each life stage is distinct—nutrient needs vary over the lifespan and each life stage has unique implications for food and beverage choices and disease risk. At the same time, it recognizes an important continuity. Because early food preferences influence later food choices, establishing a healthy dietary pattern early in life may have a beneficial impact on health promotion and disease prevention over the course of decades.

Dietary Guidelines for Americans: What It Is, What It Is Not

The *Dietary Guidelines* translates the current science on diet and health into guidance to help people choose foods and beverages that comprise a healthy and enjoyable dietary pattern—the “what” and “how much” of foods and beverages to consume to achieve good health, reduce risk of diet-related chronic diseases, and meet nutrient needs. The *Dietary Guidelines* is just one piece of the nutrition guidance landscape, however. Other guidance is designed to address requirements for the specific nutrients contained in foods and beverages or to address treatments for individuals who have a chronic disease. The following section describes the role of the *Dietary Guidelines* within this larger nutrition guidance landscape.

Quantitative Guidance on Foods, Not Nutrient Requirements

Nutrient requirements are established and updated by the National Academies of Sciences, Engineering, and Medicine. At the request of the U.S. and Canadian Federal Governments, the Academies set the quantitative requirements or limits—known as Dietary Reference Intakes (DRI)—on nutrients, which include macronutrients (i.e., protein, carbohydrates, and fats), vitamins and minerals (e.g., vitamin C, iron, and sodium), and food components (e.g., dietary fiber).

Because foods provide an array of nutrients and other components that have benefits for health, nutritional needs should be met primarily through foods. Thus, the *Dietary Guidelines* translates the Academies’ nutrient requirements into food and beverage recommendations. The *Dietary Guidelines* recognizes, though, that in some cases, fortified foods and dietary supplements are useful when it is not possible otherwise to meet needs for one or more nutrients (e.g., during specific life stages such as pregnancy).

Health Promotion, Not Disease Treatment

At its core, the *Dietary Guidelines* has a public health mission—that is, health promotion and disease prevention. Medical and nutrition professionals may use or adapt the *Dietary Guidelines* to encourage their patients or clients to follow a healthy dietary pattern. The body of current scientific evidence on diet and health reviewed to inform the *Dietary Guidelines* included study participants who represent the U.S.

population, including healthy individuals and people at risk of diet-related chronic conditions and diseases, such as cardiovascular disease, type 2 diabetes, or obesity, and some people who are living with a diet-related chronic illness.

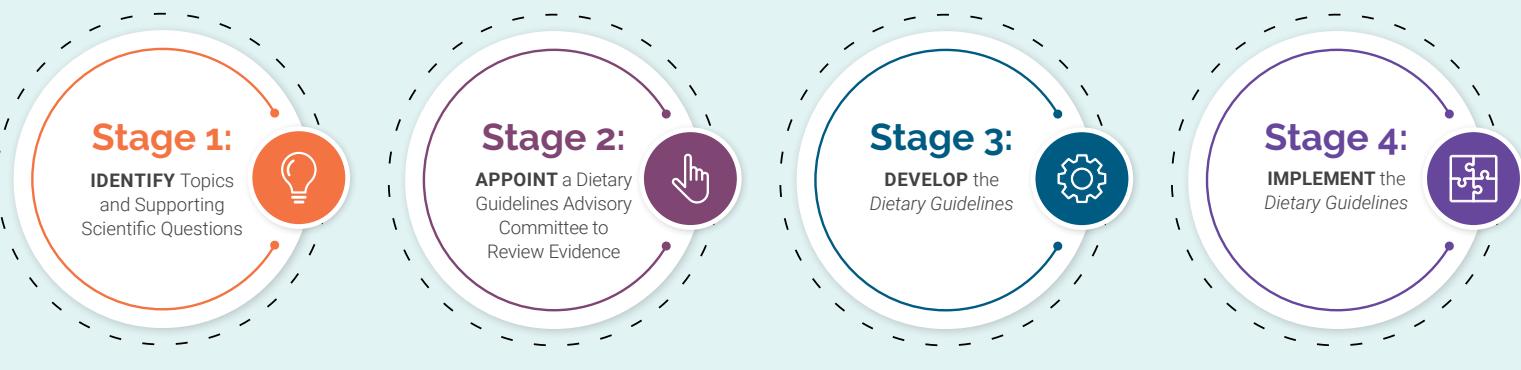
Because of this public health orientation, the *Dietary Guidelines* is not intended to be a clinical guideline for treating chronic diseases. However, the *Dietary Guidelines* often has served as a reference for Federal, medical, voluntary, and patient care organizations as they develop clinical nutrition guidance tailored for people living with a specific medical condition. Chronic diseases result from a complex mix of genetic, biological, behavioral, socioeconomic, and environmental factors, and people with these conditions have unique health care requirements that require careful oversight by a health professional. Health professionals can adapt the *Dietary Guidelines* to meet the specific needs of their patients with chronic diseases, as part of a multi-faceted treatment plan.

Developing the Dietary Guidelines for Americans

The process to develop the *Dietary Guidelines* has evolved over time, in step with developments in nutrition science, public health, and best practices in scientific review and guidance development. USDA and HHS work together to determine the approach for each edition.

As stipulated by law, USDA and HHS must update the *Dietary Guidelines* at least every 5 years. The Guidelines must be grounded in the body of scientific and medical knowledge available at that time, not in individual studies or individual expert opinion. In establishing the process for the 2020-2025 *Dietary Guidelines*, USDA and HHS considered and integrated recommendations from a comprehensive 2017 National Academies’ study, *Review of the Process to Update the Dietary Guidelines*. Greater transparency figured prominently in the Academies’ recommendations. As a result, in developing the 2020-2025 process, USDA and HHS made significant changes to increase transparency and public participation while maintaining the core element of scientific integrity.

One of these changes was the addition of a new stage at the beginning of the process. Thus, the 2020-2025 process consisted of four stages: (1) identify the topics



and supporting scientific questions to be examined; (2) appoint a Dietary Guidelines Advisory Committee to review current scientific evidence; (3) develop the new edition of the *Dietary Guidelines*; and (4) implement the *Dietary Guidelines* through Federal programs. The following information provides an overview of the 4-stage process. More details are available at [DietaryGuidelines.gov](https://www.dietaryguidelines.gov).

Stage 1: Identify Topics and Supporting Scientific Questions

The Departments added a new step of identifying topics and scientific questions to begin the process of developing the next *Dietary Guidelines*. This was done to promote a deliberate and transparent process, better define the expertise needed on the Committee, and ensure the scientific review conducted by the Committee would address Federal nutrition policy and program needs and help manage resources.

In consultation with agencies across the Federal Government, USDA and HHS identified potential topics and supporting scientific questions that were of greatest importance and relevance to Federal nutrition programs, policies, and consumer education priorities. Compared to all previous *Dietary Guidelines* processes, the topic areas for 2020-2025 expanded due to the added focus on infants and toddlers from birth through age 23 months, as well as women who are pregnant. The Agricultural Act of 2014 mandated that, beginning with the 2020-2025 edition, the *Dietary Guidelines* should expand to include dietary guidance for these populations. Thus, the topics and questions—and areas of expertise needed on the Committee—reflected this change.

The Departments posted the topics and questions publicly on [DietaryGuidelines.gov](https://www.dietaryguidelines.gov), allowing the public

and Federal agencies 30 days to view and provide comments. Following review of the comments, USDA and HHS posted the final topics and questions, along with the public call for nominations to the 2020 Committee. Having topics and questions identified upfront helped inform the public's nominations by defining which areas of nutrition expertise were needed on the Committee.

Stage 2: Appoint a Dietary Guidelines Advisory Committee To Review Current Scientific Evidence

In the second stage, the Secretaries of USDA and HHS appointed the Committee with the single, time-limited task of reviewing the 2015-2020 *Dietary Guidelines*, examining the evidence on the selected nutrition and public health topics and scientific questions, and providing independent, science-based advice and recommendations to USDA and HHS. The 20 nationally recognized scientific experts appointed to the Committee represented a mix of practitioners, epidemiologists, scientists, clinical trialists, and others from every region of the United States.

The use of a Federal advisory committee is a commonly used best practice to ensure the Federal Government seeks sound, external scientific advice to inform decisions. The Committee's work concluded with its scientific report submitted to the Secretaries of USDA and HHS in June 2020.¹ This report was not a draft of the *Dietary Guidelines*; it was a scientific document that detailed the Committee's evidence review and provided advice to USDA and HHS.

The Committee was divided into six subcommittees to conduct its work: Dietary Patterns, Pregnancy and Lactation, Birth to Age 24 Months, Beverages and Added Sugars, Dietary Fats and Seafood, and Frequency

¹ Dietary Guidelines Advisory Committee. 2020. *Scientific Report of the 2020 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Agriculture and the Secretary of Health and Human Services*. U.S. Department of Agriculture, Agricultural Research Service, Washington, DC.

of Eating. The Committee also formed one cross-cutting working group—Data Analysis and Food Pattern Modeling—to support work across the subcommittees.

The Committee's work had three defining characteristics: the use of three approaches to examine the evidence, the creation of transparent protocols before the evidence review began, and the development of scientific review conclusion statements for the scientific reviews conducted.

THREE APPROACHES TO EXAMINE THE EVIDENCE

The 2020 Committee used three state-of-the-art approaches to conduct its robust and rigorous reviews:



Data analysis: Using Federal, nationally representative data, this approach provided insights into current eating habits of the U.S. population and current diet-related chronic disease rates in the United States. These data helped make the *Dietary Guidelines* practical, relevant, and achievable.

The Committee used data analysis to address scientific questions that looked at current dietary patterns and beverage consumption, current intakes of food groups and nutrients, dietary components of public health concern, prevalence of nutrition-related chronic health conditions, and relationships between eating habits and achieving nutrient and food group recommendations.



Nutrition Evidence Systematic Review (NESR): Systematic reviews are research projects that follow meticulously defined protocols (i.e., plans) to answer clearly formulated scientific questions by searching for, evaluating, and synthesizing all relevant, peer-reviewed studies. Systematic reviews are considered a gold standard method to inform development of evidence-based guidelines by ensuring consideration of the strongest, most appropriate body of evidence available on a topic. USDA's Nutrition Evidence Systematic Review is a team of scientists who specialize in conducting systematic reviews focused on nutrition and disease prevention and evaluating scientific evidence on nutrition topics relevant to Federal policy and programs. NESR used its rigorous, protocol-driven methodology to support the Committee in conducting its systematic reviews. New to the 2020 process, USDA and HHS added a step for peer review of the systematic reviews by Federal scientists.



TRANSPARENT PROTOCOLS FIRST, THEN REVIEW

To answer each scientific question, the Committee first created a protocol that described how the Committee would apply one of the three approaches to examine the evidence related to that specific question. The Committee created each protocol before examining any evidence, and, for the first time, the protocols were posted online for the public as they were being developed. This enabled the public to understand how a specific scientific question would be answered and to have the opportunity to submit public comments before the Committee completed the protocols and conducted its reviews of the scientific evidence. Detailed information on the Committee's review is documented in its scientific report, which is available on [DietaryGuidelines.gov](https://www.dietaryguidelines.gov).



Health Status of Participants in Studies Included in Nutrition Evidence Systematic Reviews

To ensure that the *Dietary Guidelines* promotes the health of and reduce risk of disease among all Americans, the evidence base that informs the *Dietary Guidelines* must comprise studies conducted with people who are representative of the general public and must examine diet through a health promotion and disease prevention lens.

As outlined in the Committee's systematic review protocols, the Committee's reviews included studies with participants who were healthy and/or who were at risk of a chronic disease, including participants with obesity, as well as studies that enrolled some participants with a disease. Because the *Dietary Guidelines* is not intended to be a clinical guideline for treating chronic diseases, the Committee excluded studies that enrolled only patients with a disease with the intention to treat those individuals.

In general, the majority of the reviews conducted to inform the *Dietary Guidelines* included trials that exclusively enrolled participants with overweight or obesity, or who were at high risk of cardiovascular disease or type 2 diabetes, and observational studies that enrolled participants from a wide range of health and weight status, including those with healthy weight, overweight, or obesity. The reviews included few studies that enrolled only healthy participants.

Thus, the *Dietary Guidelines* are applicable to the overall U.S. population, including healthy individuals and people at risk of diet-related chronic conditions and diseases, such as cardiovascular disease, type 2 diabetes, and obesity. In addition, people living with a diet-related chronic illness can benefit from a healthy dietary pattern. The *Dietary Guidelines* can serve as a reference for Federal, medical, voluntary, and patient care organizations as they develop nutrition guidance tailored for people living with a specific medical condition. Health professionals can adapt the *Dietary Guidelines* to meet the specific needs of their patients with chronic diseases, as part of a multifaceted treatment plan.



CONCLUSION STATEMENTS FOR THE SCIENTIFIC REVIEWS CONDUCTED

For all topics and questions, regardless of the approach used to identify and evaluate the scientific evidence, the Committee developed conclusion statements. Each conclusion statement provided a succinct answer to the specific question posed. The Committee took the strengths and limitations of the evidence base into consideration when formulating conclusion statements.

For questions answered using NESR systematic reviews, the conclusion statements included a grade to indicate the strength of the evidence supporting the conclusion statement. The grades were Strong, Moderate, Limited, or Grade Not Assignable.



Grading the strength of the evidence applied only to questions answered using NESR systematic reviews; it did not apply to questions answered using data analysis or food pattern modeling. Therefore, data analysis and food pattern modeling conclusion statements were not graded.

As it completed its work, the Committee looked across all of the conclusion statements to develop overarching advice for USDA and HHS to consider as the Departments developed the next edition of the *Dietary Guidelines*.

Using these three approaches, the Committee worked collaboratively for 16 months and deliberated on the scientific reviews in six meetings, all of which were open to the public. Two of the six meetings included an opportunity for the public to provide oral comments to the Committee. An ongoing period for written public comments to the Committee spanned 15 months of its work. And, for the first time, a final public meeting was included for the Committee to discuss its draft scientific report 1 month before the final report was posted for public comment.

In addition to documenting its rigorous review of the evidence to answer the scientific questions from USDA and HHS and providing advice for the Departments' development of the next *Dietary Guidelines* edition, the Committee provided recommendations for future research. These research recommendations reflected an acknowledgment that science in nutrition, diet, and health associations continues to evolve, and that new findings build on and enhance existing evidence.

Upon submitting its final scientific report to the USDA and HHS Secretaries, the Committee disbanded. The Departments then posted the scientific report and asked the public for comments. The Departments received written comments on the report over a 30-day period and also held an online meeting to hear oral comments.

Stage 3: Develop the *Dietary Guidelines*

Each edition of the *Dietary Guidelines* builds on the preceding edition, with the scientific justification for revisions informed by the Committee's scientific report and consideration of public and Federal agency comments. As with previous editions, development of the 2020-2025 *Dietary Guidelines* involved a step-by-step process of writing, review, and revision conducted by a writing team of Federal staff from USDA and HHS.

The writing team included Federal nutrition scientists with expertise in the *Dietary Guidelines* and related research and programs as well as specialists with expertise in communicating nutrition information.

Key tenets of writing the *Dietary Guidelines* are that it must:

- Represent the totality of the evidence examined
- Address the needs of Federal programs
- Reduce unintended consequences
- Follow best practices for developing guidelines
- Use plain language

The draft *Dietary Guidelines* went through internal and external review. Ultimately, the document was reviewed by all Agencies with nutrition policies and programs across USDA and HHS, such as USDA's Food and Nutrition Service and its Food Safety and Inspection Service, and HHS' National Institutes of Health, Food and Drug Administration, and Centers for Disease Control and Prevention. The draft *Dietary Guidelines* also went through an external expert peer review to ensure that it accurately reflected the body of evidence documented in the Committee's scientific report.

This process culminated with approval by the Secretaries of USDA and HHS. After approval by the Secretaries, the Departments released the *Dietary Guidelines* to Federal agencies and the public for implementation across programs and through educational activities.

Stage 4: Implement the *Dietary Guidelines*

The U.S. Government uses the *Dietary Guidelines* as the basis of its food assistance and meal programs, nutrition education efforts, and decisions about national health objectives. For example, the National School Lunch Program and the Older Americans Act Nutrition Program incorporate the *Dietary Guidelines* in menu planning; the Special Supplemental Nutrition Program for Women, Infants, and Children applies the *Dietary Guidelines* in its program and educational materials; and the Healthy People objectives for the Nation include objectives based on the *Dietary Guidelines*.

The *Dietary Guidelines* also provides a critical structure for State and local public health promotion and disease prevention initiatives. In addition, it provides foundational, evidence-based nutrition guidance for use by individuals and those who serve them in public and private settings, including health professionals, public health and social service agencies, health care and educational institutions, researchers, agricultural producers, food and beverage manufacturers, and more.



Implementation of the *Dietary Guidelines* Through MyPlate

Using MyPlate as a Guide To Support Healthy Dietary Patterns

The *Dietary Guidelines for Americans* is developed and written for a professional audience. Therefore, its translation into actionable consumer messages and resources is crucial to help individuals, families, and communities achieve healthy dietary patterns.

MyPlate is one example of consumer translation. Created to be used in various settings and adaptable to meeting personal preferences, cultural foodways, traditions, and budget needs, MyPlate is used by professionals across sectors to help people become more aware of and informed about making healthy food and beverage choices over time. More information is available at MyPlate.gov.

Following a healthy dietary pattern from birth through older adulthood can have a profound impact on a person's lifelong health. The *Dietary Guidelines* provides the framework for following such a pattern. However, broad and multisector collaboration is needed to help people achieve that goal. Action on many fronts is needed to ensure that healthy dietary choices at home, school, work, and play are the affordable, accessible norm. Everyone has a role to play in helping all Americans shift to a healthy dietary pattern and achieve better health.

Try the MyPlate Plan

A healthy eating routine is important at every stage of life and can have positive effects that add up over time. It's important to eat a variety of fruits, vegetables, grains, dairy or fortified soy alternatives, and protein foods. When deciding what to eat or drink, choose options that are full of nutrients.

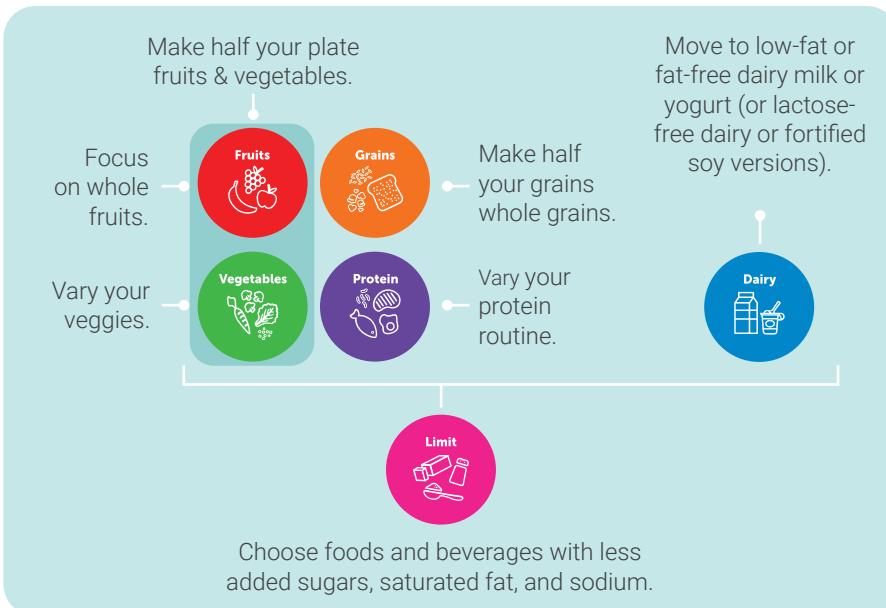
Make every bite count.

Think about how the following recommendations can come together over the course of your day or week to help you create a healthy eating routine:



To learn what the right amounts are for you, try the personalized [MyPlate Plan](#).²

Based on decades of solid science, MyPlate advice can help you day to day and over time.



The benefits of healthy eating add up over time, bite by bite. Small changes matter. [Start Simple with MyPlate](#).



[Start simple with MyPlate](#)

² Available at: MyPlate.gov/myplate-plan

A Roadmap to the *Dietary Guidelines for Americans, 2020-2025*

Reflecting the accumulating body of evidence about the relationships between diet and health outcomes, the 2020-2025 *Dietary Guidelines* presents its recommendations with a primary emphasis on encouraging the consumption of a healthy overall dietary pattern at every stage of life, from birth through older adulthood. This edition of the *Dietary Guidelines* consists of an Executive Summary, this Introduction, six chapters, and three appendixes.

❑ **Chapter 1: Nutrition and Health Across the Lifespan: The Guidelines and Key Recommendations** discusses the health benefits of lifelong healthy dietary choices and explains the four Guidelines and supporting Key Recommendations. This chapter is the basis for all the succeeding chapters. Chapters 2 through 6 should be read in tandem with Chapter 1.

❑ **Chapter 2: Infants and Toddlers** is the first of five chapters that focus on healthy dietary patterns for a specific life stage. This edition of the *Dietary Guidelines* is the first since the 1985 edition to provide guidance for infants and toddlers (birth through age 23 months). The chapter provides specific key recommendations for this age group, along with guidance on how to put these recommendations into action. The chapter closes with a Healthy Dietary Pattern during the second year of life and a look toward the next life stage—Children and Adolescents.

❑ **Chapter 3: Children and Adolescents** first sets the stage by describing nutrition issues specific to children and adolescents ages 2 through 18. It then presents the recommended Healthy Dietary Patterns for this age group, explains how current intakes compare to recommendations, and discusses special dietary guidance considerations for this life stage. The chapter concludes with a discussion of ways to support healthy dietary patterns among children and adolescents and a look toward the next life stage—Adults.

❑ **Chapter 4: Adults** opens with a discussion of selected nutrition issues that characterize the adult life stage (ages 19 through 59). It then presents the recommended Healthy Dietary

Patterns for this age group, explains how current intakes compare to recommendations, and discusses special dietary guidance considerations for adults. The chapter concludes with suggestions for how to support healthy dietary patterns among adults and a look toward two important adult life stages—Women Who Are Pregnant or Lactating and Older Adults.

❑ **Chapter 5: Women Who Are Pregnant or Lactating** opens with a discussion of selected nutrition issues important to this stage of adult life. It then presents the recommended Healthy Dietary Patterns for this life stage, explains how current intakes compare to recommendations, and discusses special dietary guidance considerations for women who are pregnant or lactating. The chapter concludes with suggestions for how to support healthy dietary patterns among this population group.

❑ **Chapter 6: Older Adults** opens with a discussion of selected nutrition issues that are important for older adults, ages 60 and older. It then presents the recommended Healthy Dietary Patterns for this life stage, explains how current intakes compare to recommendations, and discusses special dietary guidance considerations for this age group. The chapter concludes with suggestions for how to support healthy dietary patterns among older adults.

❑ **Appendices** include a table summarizing nutritional goals for age-sex groups, estimated calorie needs for all ages and at three physical activity levels, and the USDA Dietary Patterns.





CHAPTER **1**

Nutrition and Health Across the Lifespan: The Guidelines and Key Recommendations

The Guidelines

Make every bite count
with the *Dietary Guidelines for Americans*. Here's how:



Key Recommendations



Follow a healthy dietary pattern at every life stage.

At every life stage—infancy, toddlerhood, childhood, adolescence, adulthood, pregnancy, lactation, and older adulthood—it is never too early or too late to eat healthfully.

- **For about the first 6 months of life**, exclusively feed infants human milk. Continue to feed infants human milk through at least the first year of life, and longer if desired. Feed infants iron-fortified infant formula during the first year of life when human milk is unavailable. Provide infants with supplemental vitamin D beginning soon after birth.
- **At about 6 months**, introduce infants to nutrient-dense complementary foods. Introduce infants to potentially allergenic foods along with other complementary foods. Encourage infants and toddlers to consume a variety of foods from all food groups. Include foods rich in iron and zinc, particularly for infants fed human milk.
- **From 12 months through older adulthood**, follow a healthy dietary pattern across the lifespan to meet nutrient needs, help achieve a healthy body weight, and reduce the risk of chronic disease.



Customize and enjoy nutrient-dense food and beverage choices to reflect personal preferences, cultural traditions, and budgetary considerations.

A healthy dietary pattern can benefit all individuals regardless of age, race, or ethnicity, or current health status. The *Dietary Guidelines* provides a framework intended to be customized to individual needs and preferences, as well as the foodways of the diverse cultures in the United States.



Focus on meeting food group needs with nutrient-dense foods and beverages, and stay within calorie limits.

An underlying premise of the *Dietary Guidelines* is that nutritional needs should be met primarily from foods and beverages—specifically, nutrient-dense foods and beverages. Nutrient-dense foods provide vitamins, minerals, and other health-promoting components and have no or little added sugars, saturated fat, and sodium. A healthy dietary pattern consists of nutrient-dense

forms of foods and beverages across all food groups, in recommended amounts, and within calorie limits.

The core elements that make up a healthy dietary pattern include:

- Vegetables of all types—dark green; red and orange; beans, peas, and lentils; starchy; and other vegetables
- Fruits, especially whole fruit
- Grains, at least half of which are whole grain
- Dairy, including fat-free or low-fat milk, yogurt, and cheese, and/or lactose-free versions and fortified soy beverages and yogurt as alternatives
- Protein foods, including lean meats, poultry, and eggs; seafood; beans, peas, and lentils; and nuts, seeds, and soy products
- Oils, including vegetable oils and oils in food, such as seafood and nuts



Limit foods and beverages higher in added sugars, saturated fat, and sodium, and limit alcoholic beverages.

At every life stage, meeting food group recommendations—even with nutrient-dense choices—requires most of a person's daily calorie needs and sodium limits. A healthy dietary pattern doesn't have much room for extra added sugars, saturated fat, or sodium—or for alcoholic beverages. A small amount of added sugars, saturated fat, or sodium can be added to nutrient-dense foods and beverages to help meet food group recommendations, but foods and beverages high in these components should be limited. **Limits are:**

- **Added sugars**—Less than 10 percent of calories per day starting at age 2. Avoid foods and beverages with added sugars for those younger than age 2.
- **Saturated fat**—Less than 10 percent of calories per day starting at age 2.
- **Sodium**—Less than 2,300 milligrams per day—and even less for children younger than age 14.
- **Alcoholic beverages**—Adults of legal drinking age can choose not to drink or to drink in moderation by limiting intake to 2 drinks or less in a day for men and 1 drink or less in a day for women, when alcohol is consumed. Drinking less is better for health than drinking more. There are some adults who should not drink alcohol, such as women who are pregnant.



Guideline 1

Follow a Healthy Dietary Pattern at Every Life Stage

A fundamental premise of the *Dietary Guidelines* is that almost everyone, no matter an individual's age, race, or ethnicity, or health status, can benefit from shifting food and beverage choices to better support healthy dietary patterns.

Healthy eating starts at birth with the exclusive consumption of human milk, if possible, for about the first 6 months. If human milk is unavailable, infants should be fed an iron-fortified commercial infant formula (i.e., labeled "with iron") regulated by the U.S. Food and Drug Administration (FDA), which are based on standards that ensure nutrient content and safety. Healthy eating continues with the introduction of complementary foods and beverages at about 6 months of age. By 12 months, infants should maintain their healthy eating as they transition to developmentally appropriate foods and beverages. Healthy eating continues in each life stage thereafter. Even though nutrient needs vary across life stages, the foods and beverages that individuals should eat over the lifespan are remarkably consistent.

This chapter provides foundational guidance about maintaining a healthy dietary pattern across each life stage—infancy, toddlerhood, childhood, adolescence, adulthood, pregnancy, lactation, and older adulthood. Because the nutritional needs and transition of infants and toddlers are unique, [Chapter 2](#) provides a focused discussion on this age group. [Chapters 3, 4, 5, and 6](#) then provide tailored nutrition information specific to children and adolescents, adults, women who are pregnant or lactating, and older adults, respectively.

What Is a Dietary Pattern?

Over the course of any given day, week, or year, individuals consume foods and beverages¹ in combination—a dietary pattern. A dietary pattern represents the totality of what individuals habitually eat and drink, and the parts of the pattern act synergistically to affect health. As a result, the dietary pattern may better predict overall health status and disease risk than individual foods or nutrients.

A healthy dietary pattern consists of nutrient-dense

forms of foods and beverages across all food groups, in recommended amounts, and within calorie limits. Achieving a healthy dietary pattern at each life stage not only supports health at that point in time, but also supports health in the next life stage and possibly for future generations. If healthy dietary patterns can be established early in life and sustained thereafter, the impact on health could be significant. Establishing and maintaining a healthy dietary pattern can help minimize diet-related chronic disease risk. Conversely, consuming foods and beverages that are not nutrient-dense may lead to disease expression in later years. High intakes of such foods (i.e., an unhealthy dietary pattern) throughout the lifespan can increase the risk of developing chronic diseases.

The good news is that at any stage of life, individuals can make efforts to adopt a healthy dietary pattern and improve their health. The Healthy U.S.-Style Dietary Pattern, USDA's primary Dietary Pattern, provides a framework for healthy eating that all Americans can follow. It is based on the types and proportions of foods Americans of all ages, genders, races, and ethnicities typically consume, but in nutrient-dense forms and appropriate amounts.

The Healthy U.S.-Style Dietary Pattern is carried forward from the *2015-2020 Dietary Guidelines for Americans*. The 2,000-calorie level of the pattern is shown in [Table 1-1](#). The Healthy Mediterranean-Style Dietary Pattern and the Healthy Vegetarian Dietary Pattern—also carried forward from the *2015-2020 Dietary Guidelines for Americans*—are variations of the Healthy U.S.-Style Dietary Pattern that have the same core elements. The USDA Dietary Patterns are described in [Appendix 3. USDA Dietary Patterns](#) and are meant to be tailored to meet cultural and personal preferences and used as guides to plan and serve meals for individuals, households, and in a variety of institutions and other settings. The Dietary Approaches to Stop Hypertension (DASH) dietary pattern is an example of a healthy dietary pattern and has many of the same characteristics as the Healthy U.S.-Style Dietary Pattern. Additional details on DASH are available at nhlbi.nih.gov/health-topics/dash-eating-plan.

¹ If not specified explicitly, references to "foods" refer to "foods and beverages."

Table 1-1

Healthy U.S.-Style Dietary Pattern at the 2,000-Calorie Level, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

FOOD GROUP OR SUBGROUP ^a	Daily Amount ^b of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)
Vegetables (cup eq/day)	2 ½
	Vegetable Subgroups in Weekly Amounts
Dark-Green Vegetables (cup eq/wk)	1 ½
Red and Orange Vegetables (cup eq/wk)	5 ½
Beans, Peas, Lentils (cup eq/wk)	1 ½
Starchy Vegetables (cup eq/wk)	5
Other Vegetables (cup eq/wk)	4
Fruits (cup eq/day)	2
Grains (ounce eq/day)	6
Whole Grains (ounce eq/day)	≥ 3
Refined Grains (ounce eq/day)	< 3
Dairy (cup eq/day)	3
Protein Foods (ounce eq/day)	5 ½
	Protein Foods Subgroups in Weekly Amounts
Meats, Poultry, Eggs (ounce eq/wk)	26
Seafood (ounce eq/wk)	8
Nuts, Seeds, Soy Products (ounce eq/wk)	5
Oils (grams/day)	27
Limit on Calories for Other Uses (kcal/day)^c	240
Limit on Calories for Other Uses (%/day)	12%

^a Definitions for each food group and subgroup are provided throughout the chapter and are compiled in [Appendix 3](#).

^b Food group amounts shown in cup or ounce equivalents (eq). Oils are shown in grams. Quantity equivalents for each food group are defined in [Appendix 3](#). Amounts will vary for those who need <2,000 or >2,000 calories per day.

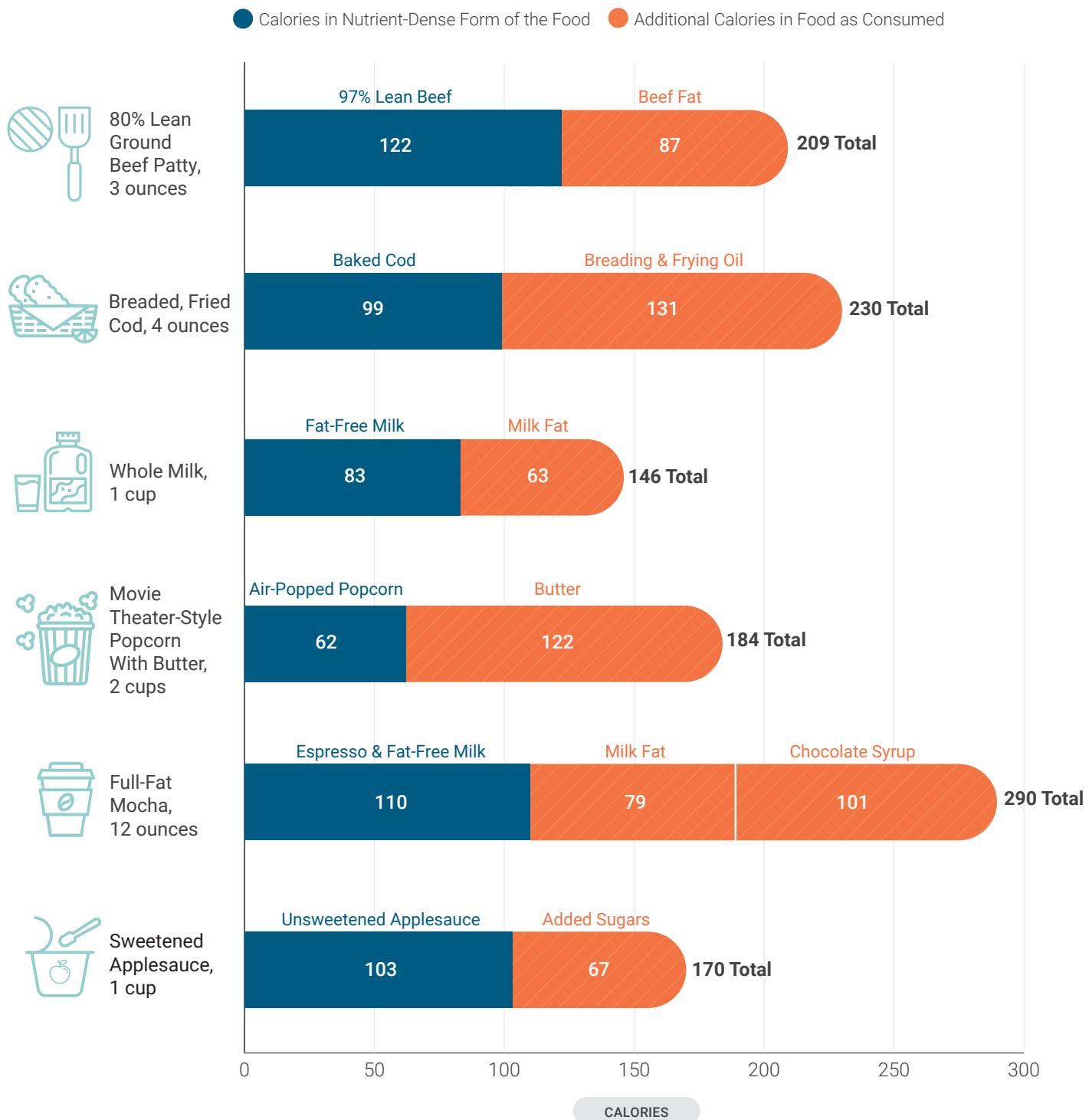
^c Foods are assumed to be in nutrient-dense forms, lean or low-fat and prepared with minimal added sugars, refined starches, saturated fat, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The amount of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars, saturated fat, and/or alcohol, or to eat more than the recommended amount of food in a food group.

NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars, saturated fat, and alcohol; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded. See [Appendix 3](#) for all calorie levels of the pattern.



Figure 1-1

Examples of Calories in Food Choices That Are Not Nutrient Dense and Calories in Nutrient-Dense Forms of These Foods



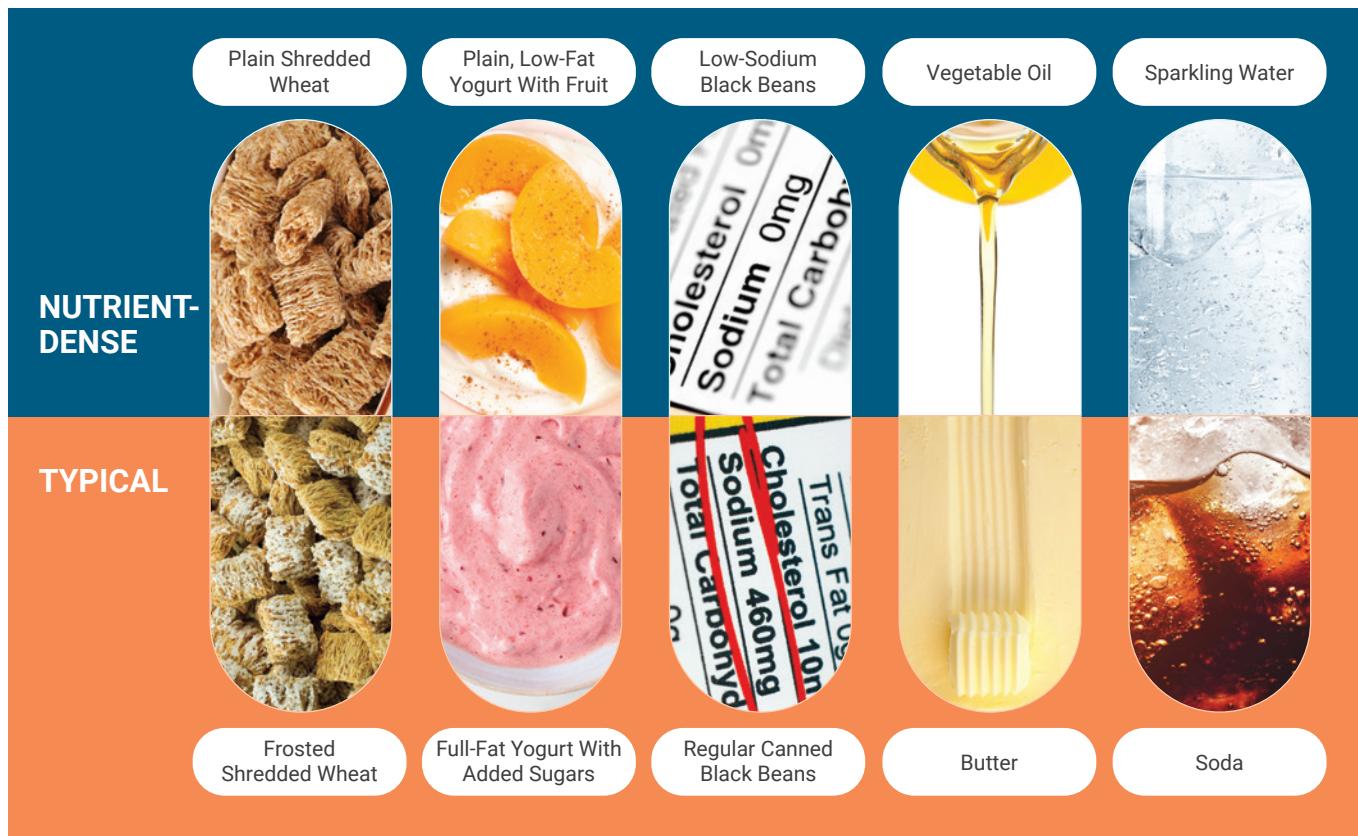
Data Source: U.S. Department of Agriculture, Agricultural Research Service. FoodData Central, 2019. fdc.nal.usda.gov.



Figure 1-2

Making Nutrient-Dense Choices: One Food or Beverage At a Time

Every food and beverage choice is an opportunity to move toward a healthy dietary pattern. Small changes in single choices add up and can make a big difference. These are a few examples of realistic, small changes to nutrient-dense choices that can help people adopt healthy dietary patterns.





The Health Benefits of a Healthy Dietary Pattern

Science is the foundation of the *Dietary Guidelines* recommendations on what Americans should eat and drink to promote health, reduce risk of chronic disease, and meet nutrient needs. The science shows that consuming a healthy dietary pattern, meeting food group and nutrient needs with nutrient-dense foods and beverages, and limiting intake of foods and beverages that are not nutrient-dense is related to many health benefits. Science also supports the idea that every life stage provides an opportunity to make food choices that promote health and well-being, achieve and maintain appropriate weight status, and reduce risk of diet-related chronic disease.

The science supporting the *Dietary Guidelines* is extensively documented in the *Scientific Report of the 2020 Dietary Guidelines Advisory Committee*, which describes the state of the science on key topics related to diet and health. Outcomes with Strong or Moderate evidence are provided in **Figure 1-3**. The report is available at [DietaryGuidelines.gov](https://www.dietaryguidelines.gov).

Evidence on the association between dietary patterns and reduced risk of diet-related chronic diseases has expanded in recent years and supports the use of dietary patterns as a foundation for the recommendations in the *Dietary Guidelines for Americans, 2020-2025*. Consistent evidence demonstrates that a healthy dietary pattern is associated with beneficial outcomes for all-cause mortality, cardiovascular disease, overweight and obesity, type 2 diabetes, bone health, and certain types of cancer (breast and colorectal).

Common characteristics of dietary patterns associated with positive health outcomes include relatively higher intake of vegetables, fruits, legumes, whole grains,

low- or non-fat dairy, lean meats and poultry, seafood, nuts, and unsaturated vegetable oils, and relatively lower consumption of red and processed meats, sugar-sweetened foods and beverages, and refined grains. The evidence examined showed broad representation across a number of populations and demographic groups. This suggests a consistent association no matter the region or cultural context in which a healthy dietary pattern is consumed. In addition, dietary patterns characterized by higher intake of red and processed meats, sugar-sweetened foods and beverages, and refined grains are, in and of themselves, associated with detrimental health outcomes. These findings are consistent with—and build on—the evidence base that informed the 2015-2020 *Dietary Guidelines*.

A Healthy Dietary Pattern Supports Appropriate Calorie Levels

The total number of calories a person needs each day varies depending on a number of factors, namely the person's age, sex, height, weight, level of physical activity, and pregnancy or lactation status. Due to reductions in basal metabolic rate that occur with aging, calorie needs generally decrease for adults as they age. In addition, a need to lose, maintain, or gain weight affects how many calories should be consumed. Estimated amounts of calories needed based on age, sex, and level of physical activity are provided in **Appendix 2**.

Estimated Calorie Needs, and estimated calorie needs relevant for different ages are provided in each life stage chapter. These estimates are based on the Estimated Energy Requirement (EER) equations established by the National Academies of Sciences, Engineering, and Medicine (National Academies) using reference heights (average) and reference weights (healthy) for each age-sex group. These amounts are estimates. **The best way to evaluate calorie intake, in comparison to calorie needs, is by measuring body weight status.**

Rather than focus on weight status at any one point in life, **the *Dietary Guidelines* supports healthy weight trajectories at each stage of life—appropriate weight gain during pregnancy and postpartum weight loss, healthy growth and development from infancy through adolescence, weight stability during mid-life, and healthy body composition late in life. Meeting the *Dietary Guidelines* recommendations within calorie needs can help prevent excess weight gain at every life stage and support overall good health.**





Figure 1-3

The Science Underlying the *Dietary Guidelines* Demonstrates That Healthy Eating Across the Lifespan Can Promote Health and Reduce Risk of Chronic Disease

Birth Through 23 Months

- Lower risk of overweight and obesity
- Lower risk of type 1 diabetes
- Adequate iron status and lower risk of iron deficiency
- Lower risk of peanut allergy
- Lower risk of asthma



Women Who Are Pregnant or Lactating

- Favorable cognitive development in the child
- Favorable folate status in women during pregnancy and lactation



Children and Adolescents

- Lower adiposity
- Lower total and low-density lipoprotein (LDL) cholesterol



Adults, Including Older Adults

- Lower risk of all-cause mortality
- Lower risk of cardiovascular disease
- Lower risk of cardiovascular disease mortality
- Lower total and LDL cholesterol
- Lower blood pressure
- Lower risk of obesity
- Lower body mass index, waist circumference, and body fat
- Lower risk of type 2 diabetes
- Lower risk of cancers of the breast, colon, and rectum
- Favorable bone health, including lower risk of hip fracture



NOTE: The 2020 Dietary Guidelines Advisory Committee examined the evidence on diet and health across the lifespan. Evidence is not available for all combinations of exposures and outcomes for the population subgroups presented in this figure. The Committee rated the evidence on diet and health as Strong, Moderate, Limited, or Grade Not Assignable. Only outcomes with Strong or Moderate evidence are included in this table. See the [Committee's Report](#) for specific graded conclusion statements.



Key Dietary Principles

To help people meet the Guidelines and Key Recommendations, the following are important principles when making decisions about nutrient-dense food and beverage choices to achieve a healthy dietary pattern.

MEET NUTRITIONAL NEEDS PRIMARILY FROM FOODS AND BEVERAGES

The *Dietary Guidelines* are designed to meet the Recommended Dietary Allowances and Adequate Intakes for essential nutrients, as well as Acceptable Macronutrient Distribution Ranges, all set by the National Academies. An underlying premise of the *Dietary Guidelines* is that nutritional needs should be met primarily from foods and beverages—specifically, nutrient-dense foods and beverages. In some cases, when meeting nutrient needs is not otherwise possible, fortified foods and nutrient-containing dietary supplements are useful. It is important to note that the nutrient density and healthfulness of what people eat and drink often is determined ultimately by how a food item, dish, or meal is prepared, at home and away from home or produced by a manufacturer. Based on the U.S. food supply and marketplace, the examples of healthy dietary patterns in this edition are achievable through thoughtful, informed choices one decision, one meal, one day at a time—and consistently over time.



CHOOSE A VARIETY OF OPTIONS FROM EACH FOOD GROUP

Enjoy different foods and beverages within each food group. This can help meet nutrient needs—and also allows for flexibility so that the *Dietary Guidelines* can be tailored to meet cultural and personal preferences. All forms of foods, including fresh, canned, dried, frozen, and 100% juices, in nutrient-dense forms, can be included in healthy dietary patterns.



PAY ATTENTION TO PORTION SIZE

Portion size is a term often used to describe the amount of a food or beverage served or consumed in one eating occasion. It is important to pay attention to portion size when making food and beverage choices, particularly for foods and beverages that are not nutrient-dense. A concept that can help people choose appropriate portions is **serving size**. This term is included on the Nutrition Facts label and refers to the amount of a food or beverage that is customarily consumed—it is not a recommendation of how much to eat or drink. Consuming less than the stated serving size results in consuming fewer calories and other nutrients or food components. Some products may have multiple servings per package.



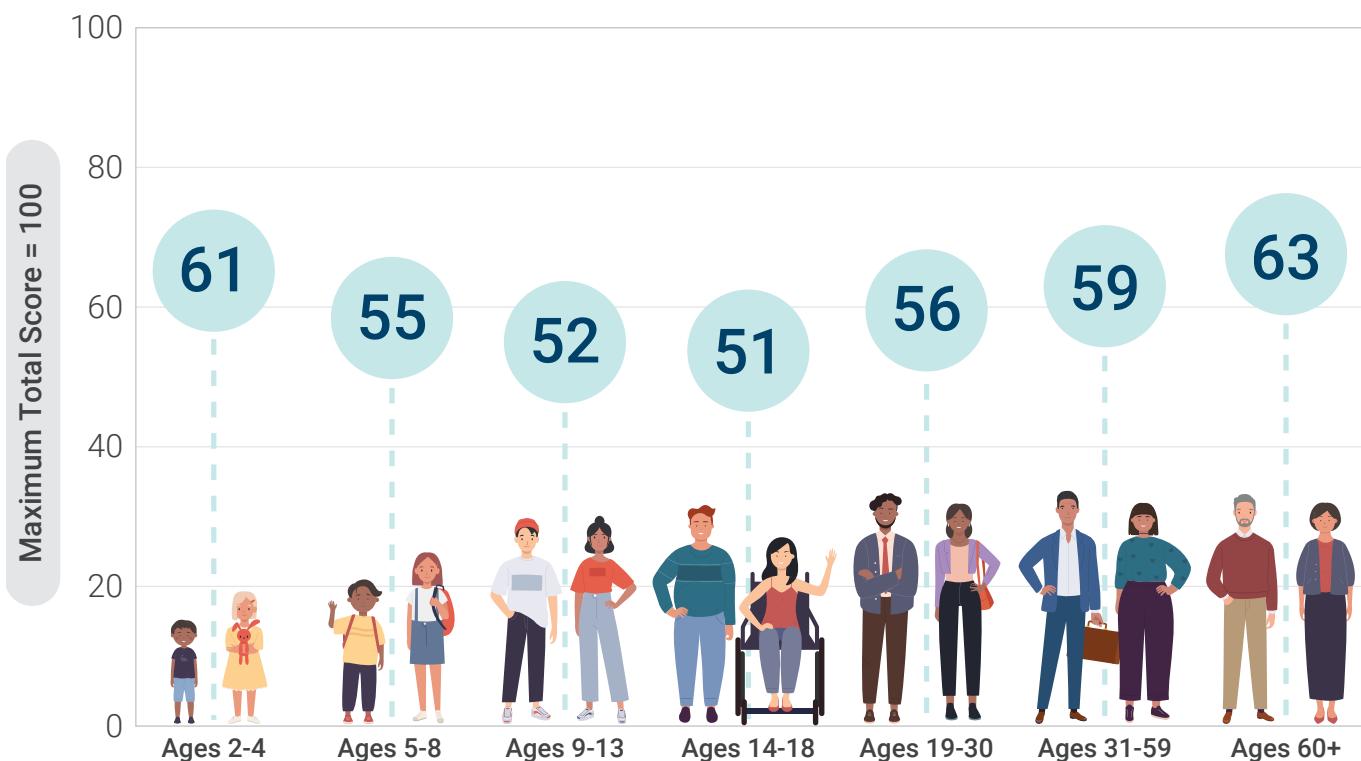


Most Americans Do Not Follow a Healthy Dietary Pattern

The typical dietary patterns currently consumed by many in the United States do not align with the *Dietary Guidelines* ([Figure 1-4](#)). The Healthy Eating Index (HEI) is a measure of diet quality that can be used to assess compliance with the *Dietary Guidelines*. For Americans ages 2 and older, HEI-2015 scores indicate that intakes are not consistent with recommendations for a healthy dietary pattern. Average diet quality has slightly improved in the past 10 years, but the average score of 59 (on a scale from 0 to 100) indicates that people have much room for improvement. Differences in overall HEI scores are seen across age, sex, race-ethnic, and income subgroups and by pregnancy and lactation status, though poor diet quality is observed across all groups. With each step closer to a diet that aligns with the core elements of a healthy dietary pattern, HEI scores will increase and risk for chronic disease will decrease.

Figure 1-4

Adherence of the U.S. Population to the *Dietary Guidelines* Across Life Stages, as Measured by Average Total Healthy Eating Index-2015 Scores



NOTE: HEI-2015 total scores are out of 100 possible points. A score of 100 indicates that recommendations on average were met or exceeded. A higher total score indicates a higher quality diet.

Data Source: Analysis of What We Eat in America, NHANES 2015-2016, ages 2 and older, day 1 dietary intake data, weighted.

In addition, the high percentage of the population with overweight or obesity suggests that many people in the United States consume foods and beverages that contribute to a calorie imbalance, a situation more likely to occur with low physical activity. As shown in the [Introduction, Table I-1](#), 74 percent of all adults and 40 percent of all children and youth in the United States have either overweight or obesity.

Even from the youngest ages, almost all Americans should shift to healthier food and beverage choices and consume smaller portions to achieve a healthy dietary pattern within an appropriate number of calories. It is never too early or too late to improve intake and establish a healthy dietary pattern.



Guideline 2

Customize and Enjoy Food and Beverage Choices to Reflect Personal Preferences, Cultural Traditions, and Budgetary Considerations

Eating should be enjoyed, and a healthy dietary pattern can be enjoyable, from early life to older adulthood. The science reviewed to inform the *Dietary Guidelines* represents the diversity of Americans, including all ages and life stages, different racial and ethnic backgrounds, and a range of socioeconomic statuses. A healthy dietary pattern can benefit all individuals regardless of age, race or ethnicity, or current health status.

The *Dietary Guidelines* provides a framework intended to be customized to fit individual, household, and Federal program participants' preferences, as well as the foodways of the diverse cultures in the United States. The U.S. population is diverse in myriad ways. The *Dietary Guidelines* framework purposely provides recommendations by food groups and subgroups—not specific foods and beverages—to avoid being prescriptive. This framework approach ensures that people can “make it their own” by selecting healthy foods, beverages, meals, and snacks specific to their needs and preferences.

The food groups include a broad variety of nutrient-dense food and beverage choices. In every setting, across all cultures, and at any age or budget, there are foods and beverages that can fit within the *Dietary Guidelines* framework.



Start with Personal Preferences

Exposure to different types of food is important early in life to better develop a child's interest and willingness to eat and enjoy a variety of foods. Through each life stage that follows, a key starting point for establishing and maintaining a healthy dietary pattern is to ensure that individual and/or family preferences—in nutrient-dense forms—are built into day-to-day choices.

Incorporate Cultural Traditions

Cultural background can have significant influence on food and beverage choices. Customizing the *Dietary Guidelines* framework to reflect specific cultures and traditions is an important strategy to help communities across the country eat and enjoy a healthy dietary pattern. Nutrient-dense culturally relevant foods and beverages are part of all of the food groups. Spices and herbs can help flavor foods when reducing added sugars, saturated fat, and sodium, and they also can add to the enjoyment of nutrient-dense foods, dishes, and meals that reflect specific cultures. Relying on the expertise of professionals in nutrition and in specific cultural foodways can help people prepare foods healthfully while retaining heritage.

Consider Budget

Despite a common perception that eating healthfully is expensive, a healthy dietary pattern can be affordable and fit within budgetary constraints. There are a range of strategies that can be used to help individuals and families follow a healthy dietary pattern including advanced planning; considering regional and seasonal food availability; and incorporating a variety of fresh, frozen, dried, and canned options. **The USDA Food Plans—Thrifty, Low-Cost, Moderate-Cost, and Liberal-Cost food plans**—each represent a nutritious diet at a different cost level. These plans are scheduled to be revised, with an updated Thrifty Food Plan published by the end of 2022 to reflect this edition of the *Dietary Guidelines* and updated food availability and food cost data.



Figure 1-5

Customizing the *Dietary Guidelines* Framework

The *Dietary Guidelines* approach of providing a framework—not prescriptive details—ensures that its recommendations can “meet people where they are,” from personal preferences to cultural foodways, and including budgetary considerations. The examples below are a sample of the range of options in each food group—to be eaten in nutrient-dense forms. Additional examples are listed under [Table A3-2 in Appendix 3](#).

Vegetables

- **Dark-Green Vegetables:** All fresh, frozen, and canned dark-green leafy vegetables and broccoli, cooked or raw: for example, amaranth leaves, bok choy, broccoli, chamnamul, chard, collards, kale, mustard greens, poke greens, romaine lettuce, spinach, taro leaves, turnip greens, and watercress.
- **Red and Orange Vegetables:** All fresh, frozen, and canned red and orange vegetables or juice, cooked or raw: for example, calabaza, carrots, red or orange bell peppers, sweet potatoes, tomatoes, 100% tomato juice, and winter squash.
- **Beans, Peas, Lentils:** All cooked from dry or canned beans, peas, chickpeas, and lentils: for example, black beans, black-eyed peas, bayo beans, chickpeas (garbanzo beans), edamame, kidney beans, lentils, lima beans, mung beans, pigeon peas, pinto beans, and split peas. Does not include green beans or green peas.
- **Starchy Vegetables:** All fresh, frozen, and canned starchy vegetables: for example, breadfruit, burdock root, cassava, corn, jicama, lotus root, lima beans, plantains, white potatoes, salsify, taro root (dasheen or yautia), water chestnuts, yam, and yucca.
- **Other Vegetables:** All other fresh, frozen, and canned vegetables, cooked or raw: for example, asparagus, avocado, bamboo shoots, beets, bitter melon, Brussels sprouts, cabbage (green, red, napa, savoy), cactus pads (nopales), cauliflower, celery, chayote (mirliton), cucumber, eggplant, green beans, kohlrabi, luffa, mushrooms, okra, onions, radish, rutabaga, seaweed, snow peas, summer squash, tomatillos, and turnips.

Fruits

- All fresh, frozen, canned, and dried fruits and 100% fruit juices: for example, apples, Asian pears, bananas, berries (e.g., blackberries, blueberries, currants, huckleberries, kiwifruit, mulberries, raspberries, and strawberries); citrus fruit (e.g., calamondin, grapefruit, lemons, limes, oranges, and pomelos); cherries, dates, figs, grapes, guava, jackfruit, lychee, mangoes, melons (e.g., cantaloupe, casaba, honeydew, and watermelon); nectarines, papaya, peaches, pears, persimmons, pineapple, plums, pomegranates, raisins, rhubarb, sapote, and soursop.



Figure 1-5 Customizing the *Dietary Guidelines* Framework (continued)



Grains

- **Whole grains:** All whole-grain products and whole grains used as ingredients: for example, amaranth, barley (not pearled), brown rice, buckwheat, bulgur, millet, oats, popcorn, quinoa, dark rye, whole-grain cornmeal, whole-wheat bread, whole-wheat chapati, whole-grain cereals and crackers, and wild rice.
- **Refined grains:** All refined-grain products and refined grains used as ingredients: for example, white breads, refined-grain cereals and crackers, corn grits, cream of rice, cream of wheat, barley (pearled), masa, pasta, and white rice. Refined-grain choices should be enriched.



Dairy and Fortified Soy Alternatives

- All fluid, dry, or evaporated milk, including lactose-free and lactose-reduced products and fortified soy beverages (soy milk), buttermilk, yogurt, kefir, frozen yogurt, dairy desserts, and cheeses. Most choices should be fat-free or low-fat. Cream, sour cream, and cream cheese are not included due to their low calcium content.



Protein Foods

- **Meats, Poultry, Eggs:** Meats include beef, goat, lamb, pork, and game meat (e.g., bison, moose, elk, deer). Poultry includes chicken, Cornish hens, duck, game birds (e.g., ostrich, pheasant, and quail), goose, and turkey. Organ meats include chitterlings, giblets, gizzard, liver, sweetbreads, tongue, and tripe. Eggs include chicken eggs and other birds' eggs. Meats and poultry should be lean or low-fat.
- **Seafood:** Seafood examples that are lower in methylmercury include: anchovy, black sea bass, catfish, clams, cod, crab, crawfish, flounder, haddock, hake, herring, lobster, mullet, oyster, perch, pollock, salmon, sardine, scallop, shrimp, sole, squid, tilapia, freshwater trout, light tuna, and whiting.
- **Nuts, Seeds, Soy Products:** Nuts and seeds include all nuts (tree nuts and peanuts), nut butters, seeds (e.g., chia, flax, pumpkin, sesame, and sunflower), and seed butters (e.g., sesame or tahini and sunflower). Soy includes tofu, tempeh, and products made from soy flour, soy protein isolate, and soy concentrate. Nuts should be unsalted.



**Guideline 3**

Focus on Meeting Food Group Needs With Nutrient-Dense Foods and Beverages, and Stay Within Calorie Limits

The Dietary Guidelines include recommendations for food groups—vegetables, fruits, grains, dairy, and protein foods—eaten at an appropriate calorie level and in forms with limited amounts of added sugars, saturated fat, and sodium. Science shows that these same core elements of a healthy dietary pattern are consistent across each life stage.

However, as shown in **Figure 1-6**, when compared to the Healthy U.S.-Style Dietary Pattern, most Americans have substantial room for improvement:

- More than 80 percent have dietary patterns that are low in vegetables, fruits, and dairy.
- More than half of the population is meeting or exceeding total grain and total protein foods recommendations, but are not meeting the recommendations for the subgroups within each of these food groups.

Figure 1-6

Dietary Intakes Compared to Recommendations: Percent of the U.S. Population Ages 1 and Older Who Are Below and At or Above Each Dietary Goal



***NOTE:** Recommended daily intake of whole grains is to be at least half of total grain consumption, and the limit for refined grains is to be no more than half of total grain consumption.

Data Source: Analysis of What We Eat in America, NHANES 2013-2016, ages 1 and older, 2 days dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).



Learn More:

Table A3-2 in Appendix 3 provides the food group-based Healthy U.S.-Style Dietary Pattern as a sample framework. Information on what counts as a cup- or ounce-equivalent is also provided under this table in [footnote c](#).



About Beans, Peas, and Lentils

“Beans, peas, and lentils” is a new name for the vegetable subgroup formerly called “legumes (beans and peas).” Beans, peas, and lentils, which also are known as pulses, include the dried edible seeds of legumes. The foods in this vegetable subgroup have not changed. However, the new name of the subgroup more accurately reflects the category of foods included. Beans include varieties such as kidney beans, pinto beans, white beans, black beans, lima beans, and fava beans. Also included are dried peas (e.g., chickpeas, black-eyed peas, pigeon peas, and split peas) and lentils. Edamame, which is the soybean in the pod, is counted in the beans, peas, and lentils subgroup even though it is eaten fresh and not dried.

Because beans, peas, and lentils have a similar nutrient profile to foods in both the vegetable group and the protein foods group, they may be thought of as either a vegetable or a protein food when aiming to meet recommended intakes.

Green peas and green (string) beans are not counted in the beans, peas, and lentils subgroup because the nutrient content of these vegetables is more similar to vegetables in other subgroups. Green peas, which are not dried before consumption, are grouped with starchy vegetables and green beans are in the other vegetables subgroup, which includes onions, iceberg lettuce, celery, and cabbage. Generally, foods made from processed soybeans are a part of the nuts, seeds and soy products protein foods subgroup.

The following sections use the Healthy U.S.-Style Dietary Pattern to show how people can make shifts in their choices to achieve a healthy dietary pattern. Information on the amounts to consume—in cup and ounce equivalents—for each life stage is discussed in the subsequent life stage chapters and [Appendix 3. USDA Dietary Patterns](#).

Eating an appropriate mix of foods from the food groups and subgroups—within an appropriate calorie level—is important to promote health at each life stage. Each of the food groups and their subgroups provides an array of nutrients, and the amounts recommended reflect eating patterns that have been associated with positive health outcomes. Foods from all of the food groups should be eaten in nutrient-dense forms. The following sections describe special considerations related to each food group.

Vegetables

Healthy dietary patterns include a variety of vegetables from all five vegetable subgroups—dark green; red and orange; beans, peas, and lentils; starchy; and other. These include all fresh, frozen, canned, and dried options in cooked or raw forms, including 100% vegetable juices. Vegetables in their nutrient-dense forms have limited additions such as salt, butter, or creamy sauces. Examples of vegetables in each of the subgroups are available in [Appendix 3](#).

Almost 90 percent of the U.S. population does not meet the recommendation for vegetables. In addition, with few exceptions, the U.S. population does not meet intake recommendations for any of the vegetable subgroups. About 45 percent of all vegetables are eaten as a separate food item; about 40 percent as part of a mixed dish; and the remainder are mostly consumed as snack foods and condiments. Vegetables, when consumed on their own, are generally consumed in forms with additional sodium either from salt added in cooking or added sauces such as soy sauce or bottled stir-fry sauces. Many vegetables are consumed as part of mixed dishes like sandwiches, pasta with a tomato-based sauce, or casseroles that may have other ingredients that are sources of saturated fat and/or sodium.

For most individuals, following a healthy eating pattern will require an increase in total vegetable intake and from all vegetable subgroups, shifting to nutrient-dense forms, and an increase in the variety of different vegetables consumed over time. Vegetables can be part of many types of mixed dishes, from burgers, sandwiches, and tacos, to pizza, stews, pasta dishes, grain-based casseroles, and soups. Strategies to increase vegetable intake include increasing the vegetable content of mixed dishes or eating less of a main dish to allow for more vegetables as side dishes—keeping these nutrient dense.



Fruits

The fruit food group includes whole fruits and 100% fruit juice. Whole fruits include fresh, canned, frozen, and dried forms. Whole fruits can be eaten in various forms, such as cut, sliced, diced, or cubed. At least half of the recommended amount of fruit should come from whole fruit, rather than 100% juice. When juices are consumed, they should be 100% juice and always pasteurized or 100% juice diluted with water (without added sugars). Also, when selecting canned fruit, choose options that are canned with 100% juice or options lowest in added sugars.

About 80 percent of the U.S. population does not meet fruit recommendations. Over 60 percent of all fruit intake comes from whole forms—fresh, canned, frozen, or dried—or 100% juice. Fruit is generally consumed in nutrient-dense forms such as plain bananas, apples, oranges, or grapes. However, some fruit is consumed as part of foods that may not be nutrient-dense, such as fruit pie or similar desserts.

Most people would benefit from increasing their intake of fruit, mostly as whole fruits in nutrient-dense forms. A wide variety of fruits are available in the U.S. marketplace, some year-round and others seasonally. Strategies to help achieve this shift include choosing more whole fruits as snacks and including them in meals.

Grains

Healthy dietary patterns include whole grains and limit the intake of refined grains. At least half of total grains should be whole grains. Individuals who eat refined grains should choose enriched grains. Individuals who consume all of their grains as whole grains should include some that have been fortified with folic acid. Grain-based foods in nutrient-dense forms limit the additions of added sugars, saturated fat, and sodium.

A food is a 100% whole-grain food if the only grains it contains are whole grains. A 1 ounce-equivalent of 100% whole grains has 16 grams of whole grains. The recommendation to consume at least half of total grains as whole grains can be met in a number of ways.

- Choose 100% whole-grain foods for at least half of all grains consumed. The relative amount of whole grain in the food can be inferred by the placement of the grain in the ingredient list. The whole grain should be the first ingredient—or the second ingredient after water. For foods with multiple whole-grain ingredients, they should appear near the beginning of the ingredient list.



- Choose products with at least 50 percent of the total weight as whole-grain ingredients. If a food has at least 8 grams of whole grains per ounce-equivalent then half of the grains are whole-grain ingredients.

Most Americans meet recommendations for total grain intakes, although 98 percent fall below recommendations for whole grains and 74 percent exceed limits for refined grains. Almost half of all intake of refined grains is from mixed dishes, such as sandwiches, burgers, tacos, pizza, macaroni and cheese, and spaghetti with meatballs.

About 20 percent of intake of refined grains comes from snacks and sweets, including crackers, pretzels, cakes, cookies, and other grain desserts. The remaining refined grains are generally eaten as separate food items, such as pancakes, cereals, breads, tortillas, pasta, or rice. About 60 percent of whole-grain intake in the United States is from individual food items, mostly cereals and crackers, rather than mixed dishes. Grains are generally consumed in forms with higher amounts of sodium (e.g., breads, tortillas, crackers) and added sugars (e.g., grain-based desserts, many ready-to-eat breakfast cereals) rather than the nutrient-dense forms. Further, grains are often consumed as part of mixed dishes, such as pasta dishes, casseroles, and sandwiches that may have other ingredients that are not in nutrient-dense forms.

Shifting from refined to whole-grain versions of commonly consumed foods—such as from white to 100% whole-wheat breads, and white to brown rice where culturally appropriate—would increase whole-grain intakes and lower refined grain intakes to help meet recommendations. Additionally, shifting to more nutrient-dense forms of grains, such as ready-to-eat breakfast cereals with less sugar, will help meet healthy dietary patterns. With careful planning, limited amounts of salt, butter, or sources of added sugars can be used to make



some grain-based foods more palatable while staying within calorie and nutrient limits, but most grains should be eaten in their most nutrient-dense forms. Reducing intakes of cakes, cookies, and other grain desserts will also support reducing refined grain intakes and staying within calorie needs.

Dairy and Fortified Soy Alternatives

Healthy dietary patterns feature dairy, including fat-free and low-fat (1%) milk, yogurt, and cheese. Individuals who are lactose intolerant can choose low-lactose and lactose-free dairy products. For individuals who choose dairy alternatives, fortified soy beverages (commonly known as “soy milk”) and soy yogurt—which are fortified with calcium, vitamin A, and vitamin D—are included as part of the dairy group because they are similar to milk and yogurt based on nutrient composition and in their use in meals.

Other products sold as “milks” but made from plants (e.g., almond, rice, coconut, oat, and hemp “milks”) may contain calcium and be consumed as a source of calcium, but they are not included as part of the dairy group because their overall nutritional content is not similar to dairy milk and fortified soy beverages. Therefore, consuming these beverages does not contribute to meeting the dairy group recommendation.

About 90 percent of the U.S. population does not meet dairy recommendations. The percent of Americans who drink milk as a beverage on a given day is 65 percent among young children, 34 percent in adolescents, and about 20 percent for adults. Dairy is generally consumed in forms with higher amounts of sodium (e.g., cheeses as part of mixed dishes such as sandwiches, pizza, and pasta dishes) and saturated fat (e.g., higher fat milks and yogurts) and can be a source of added sugars such as flavored milk, ice cream, and sweetened yogurts.

Most individuals would benefit by increasing intake of dairy in fat-free or low-fat forms, whether from milk

(including lactose-free milk), yogurt, and cheese, or from fortified soy beverages or soy yogurt. Strategies to increase dairy intake include drinking fat-free or low-fat milk or a fortified soy beverage with meals or incorporating unsweetened fat-free or low-fat yogurt into breakfast or snacks.

Protein Foods

Healthy dietary patterns include a variety of protein foods in nutrient-dense forms. The protein foods group comprises a broad group of foods from both animal and plant sources, and includes several subgroups: meats, poultry, and eggs; seafood; and nuts, seeds, and soy products. As noted previously, beans, peas, and lentils may be considered a part of the protein foods group as well as the vegetable group. Protein also is found in some foods from other food groups, such as dairy. Meats and poultry vary in fat content and include both fresh and processed forms. Most intake of meats and poultry should be from fresh, frozen, or canned, and in lean forms (e.g., chicken breast or ground turkey) versus processed meats (e.g., hot dogs, sausages, ham, luncheon meats).

A healthy vegetarian dietary pattern can be achieved by incorporating protein foods from plants. Compared with the Healthy U.S.-Style Dietary Pattern, the Healthy Vegetarian Dietary Pattern is higher in soy products (particularly tofu and other processed soy products); beans, peas, and lentils; nuts and seeds; and whole grains. Inclusion of dairy and eggs make this an example of a lacto-ovo vegetarian pattern. Meats, poultry, and seafood are not included.

Seafood, which includes fish and shellfish, is a protein foods subgroup that provides beneficial fatty acids (e.g., eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]). In addition, mercury, in the form of methylmercury, is found in seafood in varying levels. The U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) provide



joint advice regarding seafood consumption to limit methylmercury exposure for women who might become or are pregnant or lactating and young children.² Seafood choices higher in EPA and DHA and lower in methylmercury are encouraged. Seafood varieties commonly consumed in the United States that are higher in EPA and DHA and lower in methylmercury include salmon, anchovies, sardines, Pacific oysters, and trout. Tilapia, shrimp, catfish, crab, and flounder are commonly consumed varieties that also are lower in methylmercury.

Intakes of protein foods are close to the target amounts, but many Americans do not meet recommendations for specific protein subgroups. About three-quarters of Americans meet or exceed the recommendation for meats, poultry, and eggs. However, almost 90 percent do not meet the recommendation for seafood and more than half do not meet the recommendation for nuts, seeds, and soy products. Slightly less than half (43%) of all protein foods are consumed as a separate food item, such as a chicken breast, a steak, an egg, a fish

filet, or peanuts. About the same proportion are consumed as part of a mixed dish (48%), with the largest amount from sandwiches including burgers and tacos. Protein foods are generally consumed in forms with higher amounts of saturated fat or sodium and often part of mixed dishes (e.g., sandwiches, casseroles, pasta dishes) that include other ingredients that are not in nutrient-dense forms.

Shifts are needed within the protein foods group to add variety to subgroup intakes. Selecting from the seafood subgroup or the beans, peas, and lentils subgroup more often could help meet recommendations while still ensuring adequate protein consumption. Replacing processed or high-fat meats (e.g., hot dogs, sausages, bacon) with seafood could help lower intake of saturated fat and sodium, nutrients that are often consumed in excess of recommended limits. Replacing processed or high-fat meats with beans, peas, and lentils would have similar benefits, as well as increasing dietary fiber, a dietary component of public health concern.

² Available at [FDA.gov/fishadvice](https://www.fda.gov/fishadvice) and [EPA.gov/fishadvice](https://www.ePA.gov/fishadvice).

Follow Food Safety Recommendations

An important part of healthy eating is keeping food safe. Individuals in their own homes can help keep food safe by following safe food handling practices. Four basic food safety principles work together to reduce the risk of foodborne illness—Clean, Separate, Cook, and Chill.



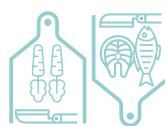
1: Clean

Wash hands and surfaces often.



2: Separate

Separate raw meats from other foods.



3: Cook

Cook food to safe internal temperatures.



4: Chill

Refrigerate foods promptly.



Some eating behaviors, such as consuming raw, undercooked, or unpasteurized food products, increase the risk of contracting a foodborne illness. Populations at increased risk of foodborne illness, or those preparing food for them, should use extra caution. These include women who are pregnant, young children, and older adults. Specific guidance for these life stages is discussed in subsequent chapters. Individuals with weakened immune systems are also at increased risk for foodborne illness. More information about food safety is available at:

- Your Gateway to Food Safety: [foodsafety.gov](https://www.foodsafety.gov)
- USDA Food Safety Education campaigns: fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/teachers/fsis-educational-campaigns
- Fight BAC!®: [fightbac.org](https://www.fightbac.org) and for Babies and Toddlers: [fightbac.org/kids/](https://www.fightbac.org/kids/)
- CDC 4 Steps to Food Safety: [cdc.gov/foodsafety](https://www.cdc.gov/foodsafety)
- FDA: Buy, Store & Serve Safe Food at [fda.gov/food/consumers/buy-store-serve-safe-food](https://www.fda.gov/food/consumers/buy-store-serve-safe-food)



Oils

Oils are important to consider as part of a healthy dietary pattern as they provide essential fatty acids. Commonly consumed oils include canola, corn, olive, peanut, safflower, soybean, and sunflower oils. Oils also are naturally present in nuts, seeds, seafood, olives, and avocados. The fat in some tropical plants, such as coconut oil, palm kernel oil, and palm oil, are not included in the oils category because they contain a higher percentage of saturated fat than do other oils.

Strategies to shift intake include cooking with vegetable oil in place of fats high in saturated fat, including butter, shortening, lard, or coconut oil. However, some foods, such as desserts and sweet snacks, that are prepared with oils instead of fats high in saturated fat are still high in added sugars, and are thus not a nutrient-dense food choice.

Beverages

When choosing beverages in a healthy dietary pattern, both the calories and nutrients that they provide are important considerations. Beverages that are calorie-free—especially water—or that contribute beneficial nutrients, such as fat-free and low-fat milk and 100% juice, should be the primary beverages consumed. Coffee, tea, and flavored waters also are options, but the most nutrient-dense options for these beverages include little, if any, sweeteners or cream. For discussion on sugar-sweetened beverages or alcohol, see “[Added Sugars](#)” and “[Alcoholic Beverages](#),” respectively.

CAFFEINE

Caffeine is a dietary component that functions in the body as a stimulant. Most intake of caffeine in the United States comes from coffee, tea, and soda. Caffeine is a substance that is Generally Recognized as Safe (GRAS) in cola-type beverages by the Food and Drug Administration (FDA). For healthy adults, the FDA has cited 400 milligrams per day of caffeine as an amount not generally associated with dangerous, negative effects. Additional information related to caffeine is provided in subsequent life stage chapters.

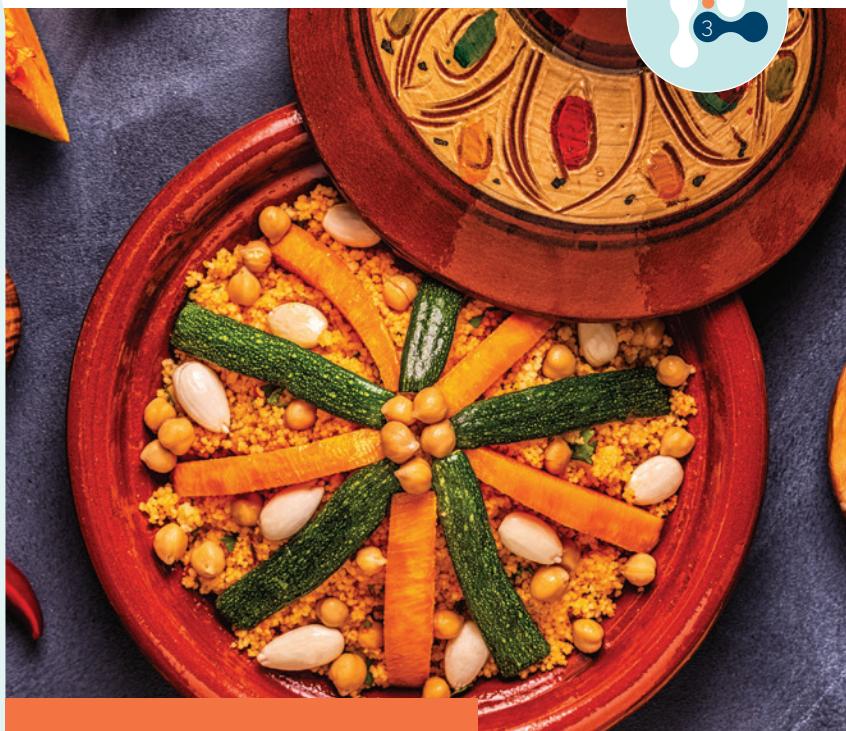


Beverages and Added Sugars

Examples of beverages that often have added sugars are regular soda (i.e., not sugar-free), fruit drinks, sports drinks, energy drinks, sweetened waters, and coffee and tea beverages with added sugars. Coffee and tea beverages from restaurants can contain many extra calories because of the addition of cream or milk and sugar. See below for examples of 12-ounce beverages showing the added sugars and total calories.

Drink (12-ounce serving)	Total Calories	Added Sugars (Grams)	Added Sugars (Tea- spoons)
Plain Water	0	0	0
Unsweetened Tea	0	0	0
Sports Drinks	97	20	5
Cafe Mocha	290	21	5
Chai Tea Latte	180	23	5 ½
Sweetened Tea	115	29	7
Regular Soda	156	37	9
Lemonade	171	43	10
Fruit Drinks	238	59	14

Data Source: U.S. Department of Agriculture, Agricultural Research Service. 2020. *USDA Food and Nutrient Database for Dietary Studies and USDA Food Patterns Equivalents Database 2017-2018*. Food Surveys Research Group Home Page, ars.usda.gov/neal/bhrc/fsrg.



Dietary Components of Public Health Concern for Underconsumption

Current inadequate intake of nutrient-dense foods and beverages across food groups has resulted in underconsumption of some nutrients and dietary components. Calcium, potassium, dietary fiber, and vitamin D are considered dietary components of public health concern for the general U.S. population because low intakes are associated with health concerns. Additional dietary components that are underconsumed during specific life stages are highlighted in subsequent chapters.



If a healthy dietary pattern is consumed, amounts of calcium, potassium, and dietary fiber can meet recommendations. Individuals should be encouraged to make shifts to increase the intake of vegetables, fruits, beans, whole grains, and dairy to move intakes of these underconsumed dietary components closer to recommendations. In some cases, fortified foods and dietary supplements may be useful in providing one or more nutrients that otherwise may be consumed in less than recommended amounts. Vitamin D recommendations are harder to achieve through natural sources from diet alone and would require consuming foods and beverages fortified with vitamin D. In many cases, taking a vitamin D supplement may be appropriate especially when sunlight exposure is limited due to climate or the use of sunscreen. Lists of dietary sources of calcium, potassium, dietary fiber, and vitamin D are available at DietaryGuidelines.gov.

Guideline 4

Limit Foods and Beverages Higher in Added Sugars, Saturated Fat, and Sodium, and Limit Alcoholic Beverages

A healthy dietary pattern is designed to meet food group and nutrient recommendations while staying within calorie needs. Additionally, a healthy dietary pattern is designed to not exceed the Tolerable Upper Intake Level (UL) or Chronic Disease Risk Reduction (CDRR) level for nutrients. To achieve these goals, the pattern is based on consuming foods and beverages in their nutrient-dense forms—forms with the least amounts of added sugars, saturated fat, and sodium.

Most of the calories a person needs to eat each day—around 85 percent—are needed to meet food group recommendations healthfully, in nutrient-dense forms. The remaining calories—around 15 percent—are calories available for other uses, including for added sugars or saturated fat beyond the small amounts found in nutrient-dense forms of foods and beverages within the pattern, to consume more than the recommended amount of a food group, or for alcoholic beverages. This equates to 250 to 350 remaining calories for calorie patterns appropriate for most Americans.

Figure 1-7

The 85-15 Guide: Percentage of Calories Needed To Meet Food Group Needs With Nutrient-Dense Choices and Percentage Left for Other Uses

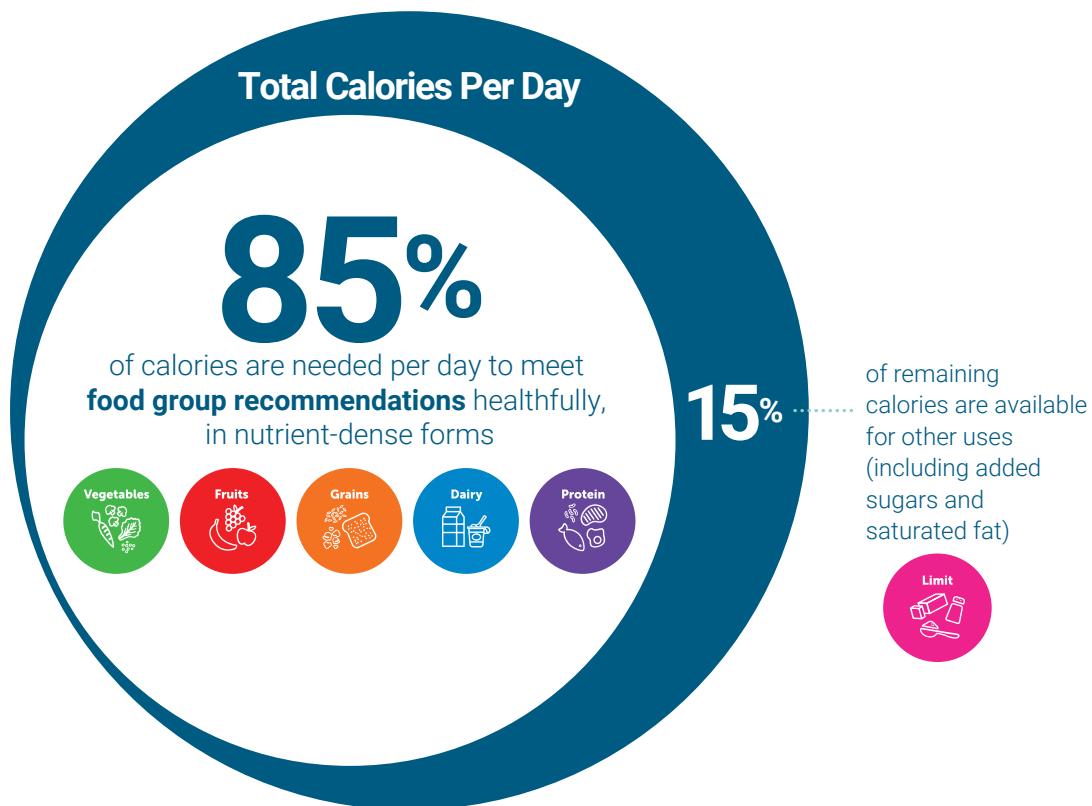




Figure 1-8

Making Nutrient-Dense Choices: One Meal At a Time

Slight changes to individual parts of a meal can make a big difference. This meal shows examples of small shifts to more nutrient-dense choices that significantly improve the nutritional profile of the meal overall while delivering on taste and satisfaction.



Typical Burrito Bowl Total Calories = 1,120	Nutrient-Dense Burrito Bowl Total Calories = 715
White rice (1½ cups)	Brown rice (1 cup) + Romaine lettuce (½ cup)
Black beans (½ cup)	Black beans, reduced sodium (½ cup)
Chicken cooked with sauce (2 ounces)	Grilled chicken with spice rub (2 ounces)
No grilled vegetables	Added grilled vegetables (⅓ cup)
Guacamole (½ cup)	Sliced avocado (5 slices)
Jarred salsa (¼ cup)	Fresh salsa/pico de gallo (¼ cup)
Sour cream (¼ cup)	No sour cream
Cheese (½ cup)	Reduced-fat cheese (½ cup)
Jalapeño (5 slices)	Jalapeño (5 slices)
Iced tea with sugar (16 ounces)	Iced tea, no sugar (16 ounces)



Figure 1-9

Making Healthy Choices: One Day At a Time

Small changes to more nutrient-dense, single food and beverage choices that, when combined, become a nutrient-dense meal, can lead to a whole day made up of nutrient-dense meals and snacks. The following example, which comes in under 2,000 calories, shows how people can make thoughtful choices that meet their food group needs, stay within limits, and, importantly, that they can enjoy.



BREAKFAST

Total calories: 375

- **Banana-Walnut Overnight Oats (350 calories):**
 - » Oats ($\frac{1}{2}$ cup raw)
 - » Low-fat, plain Greek yogurt ($\frac{1}{4}$ cup)
 - » Fat-free milk ($\frac{1}{4}$ cup)
 - » Banana ($\frac{1}{2}$ banana)
 - » Walnuts (4 nuts)
 - » Honey (1 tsp)
- **Coffee (25 calories):**
 - » Coffee (1 cup)
 - » Fat-free milk ($\frac{1}{4}$ cup)



LUNCH

Total calories: 715

- **Chicken Burrito Bowl (710 calories)**
 - » Brown rice (1 cup)
 - » Romaine lettuce ($\frac{1}{2}$ cup)
 - » Black beans, low sodium ($\frac{1}{3}$ cup)
 - » Grilled chicken with spice rub (2 ounces)
 - » Grilled vegetables ($\frac{1}{3}$ cup)
 - » Sliced avocado (5 slices)
 - » Fresh salsa/pico de gallo ($\frac{1}{4}$ cup)
 - » Reduced-fat cheese ($\frac{1}{3}$ cup)
 - » Jalapeño (5 slices)
- **Iced Tea, No Sugar (16 ounces) (5 calories)**



The nutrient density and healthfulness of what people eat and drink often is determined ultimately by how a food item, dish or meal is prepared, at home and away from home, or produced by a manufacturer. Based on the U.S. food supply and marketplace, the examples of healthy dietary patterns in this edition are achievable through thoughtful, informed choices one decision, one meal, one day at a time—and consistently over time.



DINNER

Total calories: 585

- **Oven-Roasted Tilapia and Vegetables With Pasta (510 calories)**
 - » Tilapia (4 ounces)
 - » Broccoli ($\frac{1}{2}$ cup)
 - » Carrots ($\frac{1}{3}$ cup)
 - » Summer squash ($\frac{1}{3}$ cup)
 - » Pasta ($\frac{3}{4}$ cup cooked)
 - » Garlic-herb oil (1 Tbsp)
- **Orange (1 medium) (75 calories)**
- **Sparkling Water (8 ounces) (0 calories)**



SNACKS

Total calories: 300

- **Air-Popped Popcorn (2 cups) (60 calories)**
- **Yogurt and Peaches (240 calories)**
 - » Plain, low-fat Greek yogurt (1 cup yogurt)
 - » Canned peaches packed in 100% juice ($\frac{1}{2}$ cup)



TOTAL CALORIES FOR THE DAY:

2,000



As such, a nutrient-dense diet, where most nutritional needs are met by 85% of the calories consumed, offers a small amount of leeway to add minimal amounts of added sugars or saturated fat to the diet. For example, one way to use remaining calories is to add small amounts of added sugars or saturated fat to some nutrient-dense foods to help make some foods more palatable while working towards meeting food group recommendations—for example, oatmeal with a small amount of brown sugar or vegetables prepared with small amounts of butter. However, to achieve a healthy dietary pattern, all (or mostly all) food group recommendations should be met with foods and beverages that are in nutrient-dense forms.

A healthy dietary pattern has little room available for foods and beverages high in added sugars, saturated fat, and/or sodium. Intakes of foods and beverages high in these components should be limited. These foods and beverages should be occasional choices—consumed in small portions.

While intakes of added sugars, saturated fat, and sodium should be limited, the guidance below is intended to allow programs and individuals to have some flexibility to choose a healthy dietary pattern within calorie limits that fits personal preferences and cultural traditions—and allows day-to-day flexibility

to support a healthy dietary pattern over time. Additionally, if alcoholic beverages are consumed, intakes should be within the limits described in this chapter, and calories should be accounted for to keep total calorie intake at an appropriate level.

Added Sugars

A healthy dietary pattern limits added sugars to less than 10 percent of calories per day. Added sugars can help with preservation; contribute to functional attributes such as viscosity, texture, body, color, and browning capability, and/or help improve the palatability of some nutrient-dense foods. In fact, the nutrient-dense choices included in the Healthy U.S.-Style Dietary Pattern are based on availability in the U.S. food supply and include 17–50 calories from added sugars, or 1.5–2 percent of total calories.

Foods and beverages high in calories from added sugars should be limited to help achieve healthy dietary patterns within calorie limits. When added sugars in foods and beverages exceed 10 percent of calories, a healthy dietary pattern within calories limits is very difficult to achieve. Most Americans have less than 8 percent of calories available for added sugars, including the added sugars inherent to a healthy dietary pattern. The limit for added sugars is based on the following assumptions:





- Most calorie levels have less than 15 percent of calories remaining after meeting food group recommendations through nutrient-dense choices.
- Approximately half of remaining calories are consumed as saturated fat and half consumed as added sugars.
- Total saturated fat intakes meet the recommendation for less than 10 percent of total calorie intake.
- No alcoholic beverages are consumed.
- Overall calorie intake does not exceed intake needs to maintain or achieve a healthy weight.

Based on the assumptions above, an individual who needs 2,000 calories per day (based on age, sex, and physical activity level) has less than 7 percent of calories available for added sugars. Individuals who need 2,800 calories per day or less have less than 8 percent of calories available for added sugars. Individuals who need more than 3,000 calories may have a total of 9 to 10 percent of calories available for added sugars. In this portion of the population that requires high calorie intake, an upper limit of 10 percent of calories from added sugars may be consumed while still meeting food group recommendations in nutrient-dense forms. The 10 percent added sugar limit allows for flexibility in food choices over time but also requires careful planning. For example, if one chooses to eat

less than the allotted amount of calories for saturated fat, 10 percent of added sugars may fit in a healthy dietary pattern.

Added sugars account on average for almost 270 calories—or more than 13 percent of total calories—per day in the U.S. population. As shown in **Figure 1-10**, the major sources of added sugars in typical U.S. diets are sugar-sweetened beverages, desserts and sweet snacks, sweetened coffee and tea, and candy. Together, these food categories make up more than half of the intake of all added sugars while contributing very little to food group recommendations.

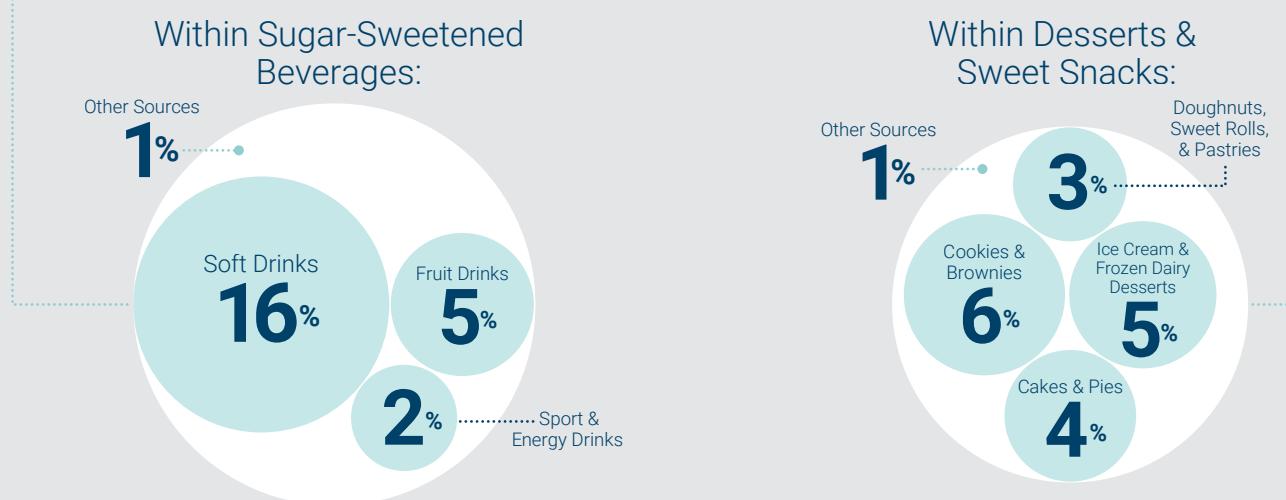
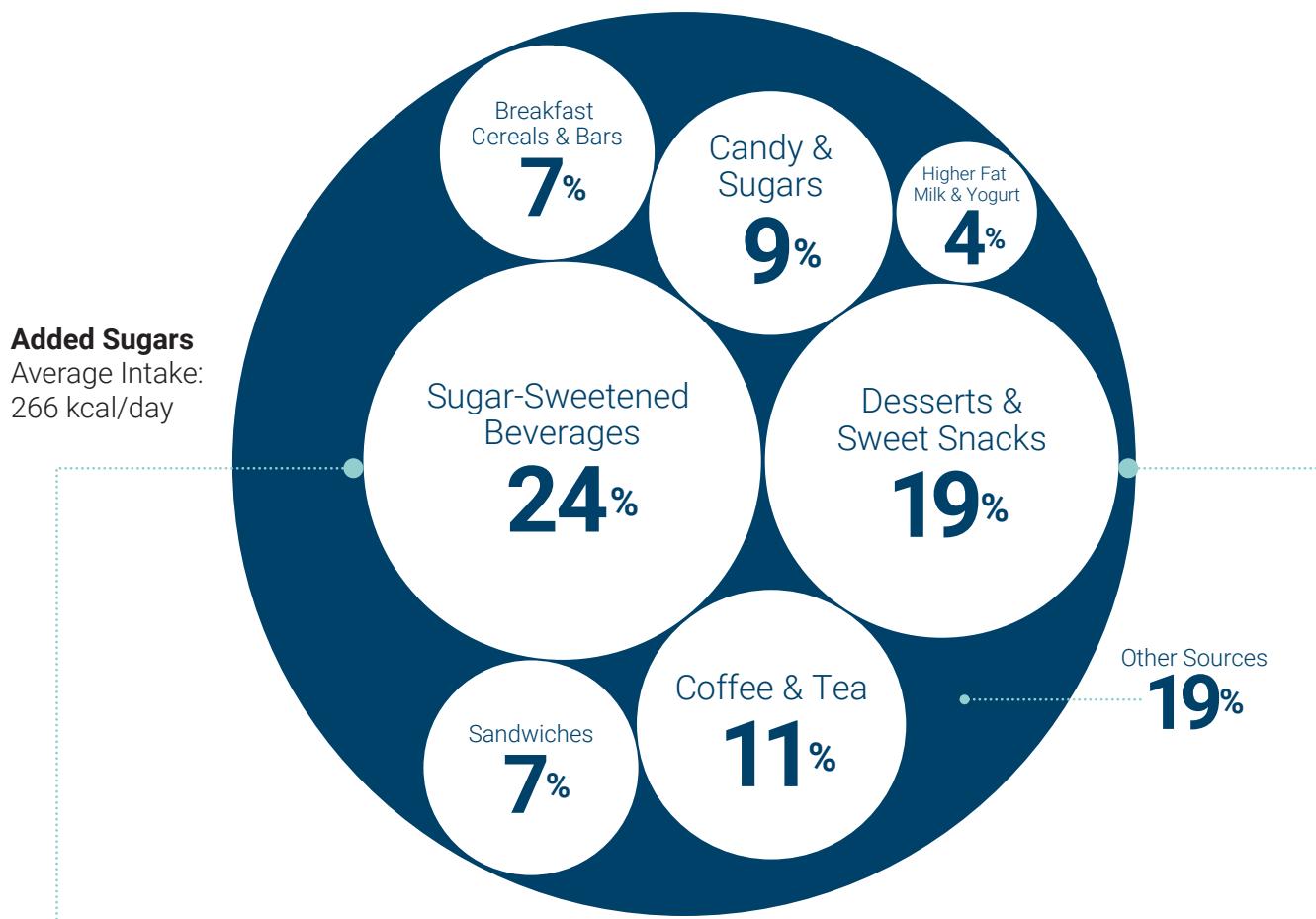
Individuals have many potential options for reducing the intake of added sugars, including reducing the intake of major sources of added sugars. Strategies include reducing portions, consuming these items less often, and selecting options low in added sugars. For those with a weight loss goal, limiting intake of foods and beverages high in added sugars is a strategy to help reduce calorie intake.

It should be noted that replacing added sugars with low- and no-calorie sweeteners may reduce calorie intake in the short-term and aid in weight management, yet questions remain about their effectiveness as a long-term weight management strategy. For additional information about high-intensity sweeteners permitted for use in food in the United States, see fda.gov/food/food-additives-petitions/high-intensity-sweeteners.



Figure 1-10

Top Sources and Average Intakes of Added Sugars: U.S. Population Ages 1 and Older



Data Source: Analysis of What We Eat in America, NHANES, 2013-2016, ages 1 and older, 2 days dietary intake data, weighted.



Saturated Fat

For those 2 years and older, intake of saturated fat should be limited to less than 10 percent of calories per day by replacing them with unsaturated fats, particularly polyunsaturated fats. Although some saturated fat is inherent in foods (e.g., high-fat meat), some sources are added (e.g., butter on toast). Similar to added sugars, some of the nutrient-dense choices included in the Healthy U.S.-Style Dietary Pattern include saturated fat. Approximately 5 percent of total calories inherent to the nutrient-dense foods in the Healthy U.S.-Style Dietary Pattern are from saturated fat from sources such as lean meat, poultry, and eggs; nuts and seeds; grains; and saturated fatty acids in oils. As such, there is little room to include additional saturated fat in a healthy dietary pattern while staying within limits for saturated fat and total calories.

Current average intakes of saturated fat are 11 percent of calories. Only 23 percent of individuals consume amounts of saturated fat consistent with the limit of less than 10 percent of calories. The main sources of saturated fat in the U.S. diet include sandwiches, including burgers, tacos, and burritos; desserts and sweet snacks; and rice, pasta, and other grain-based mixed dishes (**Figure 1-11**). Saturated fat is commonly found in higher amounts in high-fat meat, full-fat dairy products (e.g., whole milk, ice cream, cheese), butter, coconut oil, and palm kernel and palm oil.

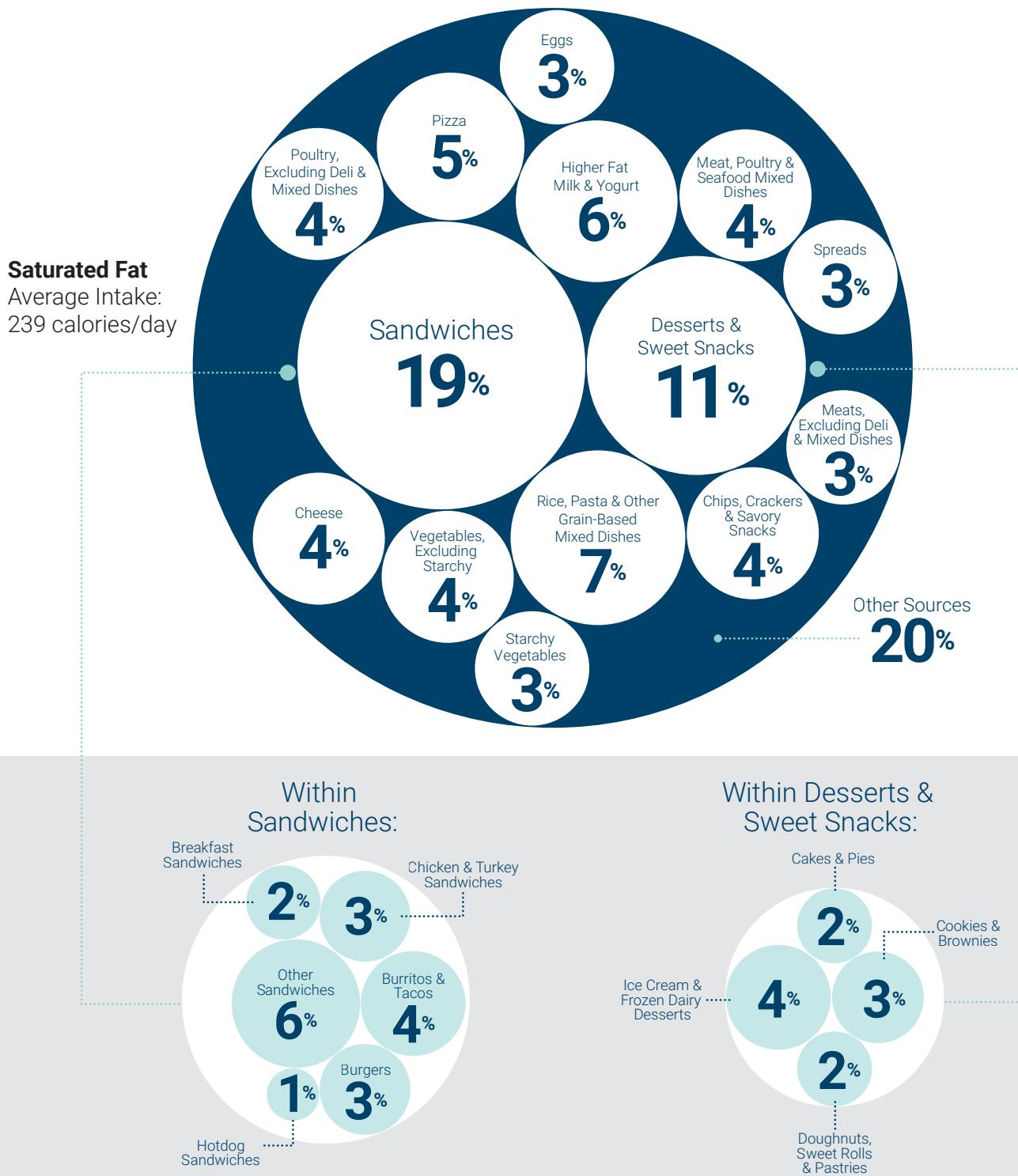
Strategies to lower saturated fat intake include reducing intakes of dessert and sweet snacks by consuming smaller portion sizes and eating these foods less often. Additional strategies include reading food labels to choose packaged foods lower in saturated fats and choosing lower fat forms of foods and beverages (e.g., fat-free or low-fat milk instead of 2 percent or whole milk; lean rather than fatty cuts of meat). When cooking and purchasing meals, select lean meat and lower fat cheese in place of high-fat meats and regular cheese—or replace them with ingredients with oils, such as nuts, seeds, or avocado. Cook and purchase products made with oils higher in polyunsaturated and monounsaturated fat (e.g., canola, corn, olive, peanut, safflower, soybean, and sunflower) rather than butter, shortening, or coconut or palm oils.

A note on *trans* fats and dietary cholesterol: The National Academies recommends that *trans* fat and dietary cholesterol consumption to be as low as possible without compromising the nutritional adequacy of the diet. The USDA Dietary Patterns are limited in *trans* fats and low in dietary cholesterol. Cholesterol and a small amount of *trans* fat occur naturally in some animal source foods. As of June 2018, partially hydrogenated oils (PHOs), the major source of artificial *trans* fat in the food supply, are no longer Generally Recognized as Safe (GRAS). Therefore, PHOs are no longer added to foods.



Figure 1-11

Top Sources and Average Intakes of Saturated Fat: U.S. Population Ages 1 and Older



Data Source: Analysis of What We Eat in America, NHANES, 2013-2016, ages 1 and older, 2 days dietary intake data, weighted.



Sodium

Sodium is an essential nutrient primarily consumed as salt (sodium chloride). Healthy eating patterns limit sodium to the Chronic Disease Risk Reduction (CDRR) levels defined by the National Academies—1,200 mg/day for ages 1 through 3; 1,500 mg/day for ages 4 through 8; 1,800 mg/day for ages 9 through 13; and 2,300 mg/day for all other age groups. The CDRR for sodium was established using evidence of the benefit of reducing sodium intake on cardiovascular risk and hypertension risk.

As a food ingredient, sodium is used in multiple ways, including curing meat, baking, as a thickening agent, as a flavor enhancer, as a preservative, and to retain moisture. The nutrient-dense choices in the Healthy U.S.-Style Dietary Pattern provide approximately 60-100 percent of the age-specific CDRR for sodium across calorie levels with amounts ranging from about 1,000 to 2,200 mg. For most calorie levels and at most ages, there is very little room for food choices that are high in sodium.

Average intakes of sodium are high across the U.S. population compared to the CDRRs. Average intakes for those ages 1 and older is 3,393 milligrams per day, with a range of about 2,000 to 5,000 mg per day. Only a small proportion of total sodium intake is from sodium inherent in foods or from salt added in home cooking or at the table. Most sodium consumed in the United States comes from salt added during commercial food processing and preparation, including foods prepared at restaurants.

Sodium is found in foods from almost all food categories across the food supply ([Figure 1-12](#)), including mixed dishes such as sandwiches, burgers, and tacos; rice, pasta, and grain dishes; pizza; meat, poultry, and seafood dishes; and soups. Calorie intake is highly associated with sodium intake (i.e., the more foods and beverages people consume, the more sodium they tend to consume).

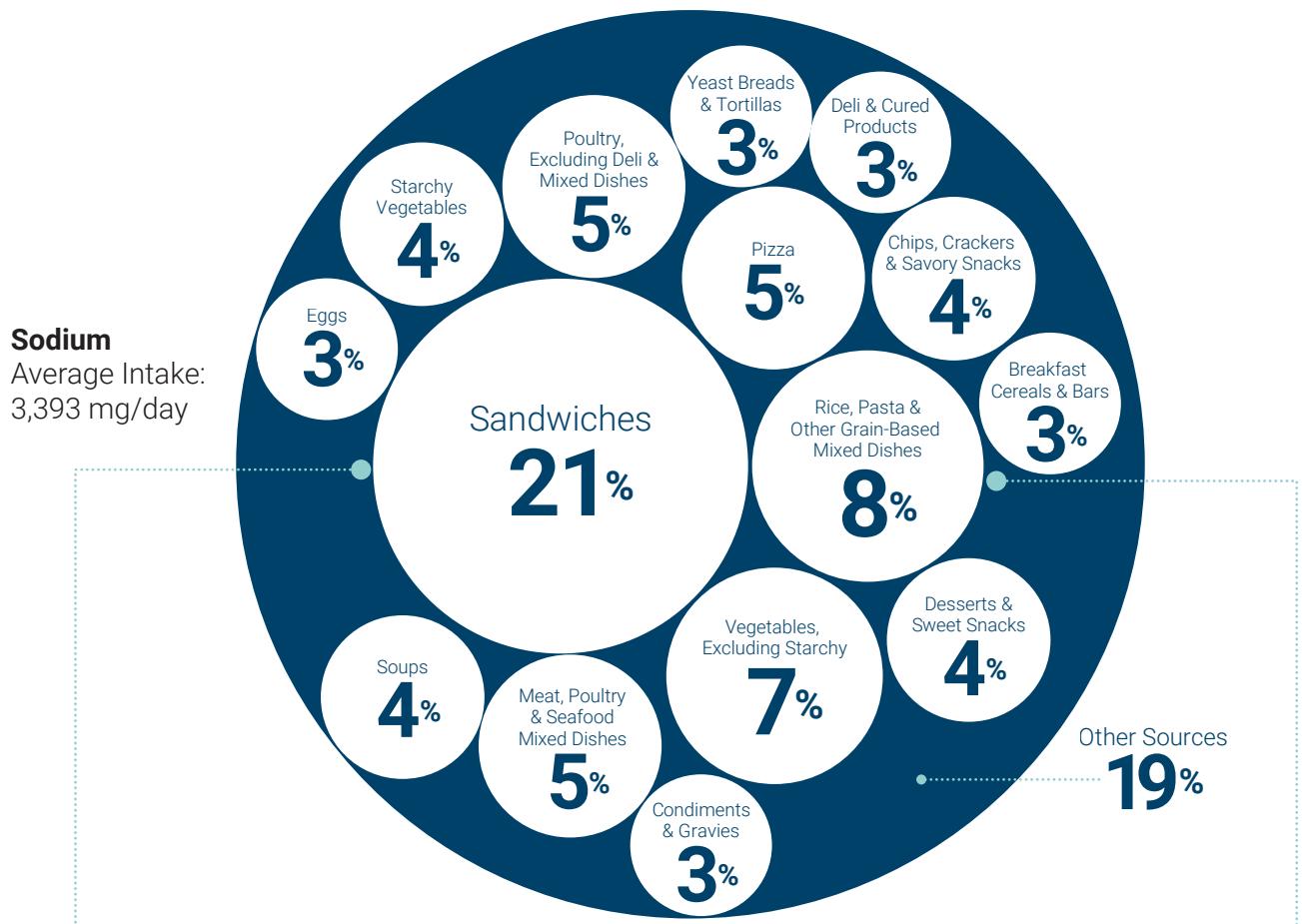
Because sodium is found in so many foods, multiple strategies should be implemented to reduce sodium intake to the recommended limits. Careful choices are needed in all food groups to reduce intake. Strategies to lower sodium intake include cooking at home more often; using the Nutrition Facts label to choose products with less sodium, reduced sodium, or no-salt-added, etc.; and flavoring foods with herbs and spices instead of salt based on personal and cultural foodways.



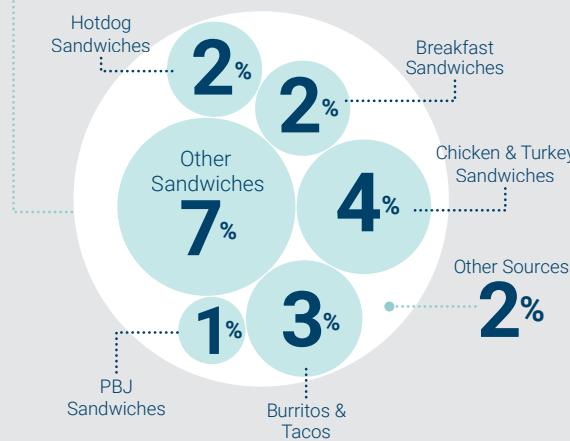


Figure 1-12

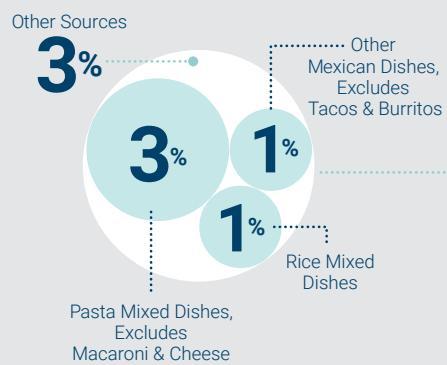
Top Sources and Average Intakes of Sodium: U.S. Population Ages 1 and Older



Within Sandwiches:



Within Rice, Pasta & Other Grain-Based Mixed Dishes:



Data Source: Analysis of What We Eat in America, NHANES, 2013-2016, ages 1 and older, 2 days dietary intake data, weighted.



Nutrition Facts Label

The Nutrition Facts label on packaged foods and beverages is a tool for making informed and healthy food choices. For the first time in more than 20 years, the U.S. Food and Drug Administration (FDA) has updated the Nutrition Facts label. There are a number of key changes to the label including:



- The serving size information is now in large, bold font and has been updated to better reflect the amount that people typically eat and drink.

- Calories are displayed in larger, bolder font.

- Some Daily Values have been updated. The percent Daily Value (%DV) shows how much a nutrient in a serving of food contributes to a total daily diet. Five percent or less is low; 20 percent or more is high.

- Added sugars, vitamin D, and potassium are now listed.

Along with the updated design, the Nutrition Facts label helps support healthy dietary patterns by providing information on nutrients of public health concern—dairy fiber, vitamin D, calcium, iron, and potassium—and on dietary components to limit, such as added sugars, saturated fat, and sodium.

More information on the Nutrition Facts label is available at: fda.gov/NewNutritionFactsLabel.



Menu Nutrition Labeling

Americans eat and drink about one-third of their calories from foods prepared away from home. Usually, these foods provide more calories, saturated fat, and sodium than meals prepared at home. To help individuals make informed and healthy decisions, many food establishments and chain restaurants list calories in foods or beverages on menus or menu boards and additional nutrition information is available upon request. More information is available at fda.gov/CaloriesOnTheMenu.



Alcoholic Beverages

The *Dietary Guidelines* does not recommend that individuals who do not drink alcohol start drinking for any reason. There are also some people who should not drink at all, such as if they are pregnant or might be pregnant; under the legal age for drinking; if they have certain medical conditions or are taking certain medications that can interact with alcohol; and if they are recovering from an alcohol use disorder or if they are unable to control the amount they drink. If adults age 21 years and older choose to drink alcoholic beverages, drinking less is better for health than drinking more.

Evidence indicates that, among those who drink, higher average alcohol consumption is associated with an increased risk of death from all causes compared with lower average alcohol consumption. Alcohol misuse or consuming alcohol in excess of recommendations increases risk of several other conditions such as liver disease, cardiovascular disease, injuries, and alcohol use disorders.

For the purposes of evaluating amounts of alcohol that may be consumed, the *Dietary Guidelines* defines drink equivalents. One alcoholic drink equivalent is defined as containing 14 grams (0.6 fl oz) of pure alcohol. The following count as one alcoholic drink equivalent: 12 fluid ounces of regular beer (5% alcohol), 5 fluid ounces of wine (12% alcohol), or 1.5 fluid ounces of 80 proof distilled spirits (40% alcohol). To help Americans move toward a healthy dietary pattern and minimize risks associated with drinking, adults of legal drinking age can choose not to drink or to drink in moderation by limiting intakes to 2 drinks or less in a day for men and 1 drink or less in a day for women, on days when alcohol is consumed. This is not intended as an average over several days, but rather the amount consumed on any single day. Binge drinking,³ defined as 5 or more drinks for the typical adult male or 4 or more drinks for

³ More information is available at nccih.nih.gov/health/alcohol-health/overview-alcohol-consumption/moderate-binge-drinking.

Calories in Alcoholic Beverages

Alcoholic beverages supply calories but few nutrients, and calories from alcoholic beverages should be accounted for to keep total calorie intake at an appropriate level. Alcoholic beverages may contain calories from both alcohol and other ingredients, such as soda, juice, and added sugars. It is important to consider ingredients and portion size. The range of calories in cocktails varies widely depending on serving size and ingredients. Examples of calories contained in alcoholic beverages include:

the typical adult female in about 2 hours, should be avoided. Emerging evidence suggests that even drinking within the recommended limits may increase the overall risk of death from various causes, such as from several types of cancer and some forms of cardiovascular disease. Alcohol has been found to increase risk for cancer, and for some types of cancer, the risk increases even at low levels of alcohol consumption (less than 1 drink in a day). Caution, therefore, is recommended.

Alcoholic beverages are not a component of the USDA Dietary Patterns. The amount of alcohol and calories in beverages varies and should be accounted for within the limits of healthy dietary patterns, so that calorie limits are not exceeded (see “[Calories in Alcoholic Beverages](#)”).

Approximately 60 percent of adults report alcoholic beverage consumption in the past month. Of those, approximately 30 percent binge drink, sometimes multiple times per month. During days when men and women consume alcohol, their consumption typically exceeds current guidance. Among adults, including those who do not drink, alcoholic beverages contribute approximately 5 percent of calorie intake (3 to 4% of calories for women and 5 to 7% for men); this translates into approximately 9 percent of calories among those who drink. As such, among those who drink, alcoholic beverages, alone, account for most of the calories that remain after meeting food group recommendations in nutrient-dense forms—leaving very few calories for added sugars or saturated fat.

Adults who choose to drink, and are not among the individuals listed above who should not drink, are encouraged to limit daily intakes to align with the *Dietary Guidelines*—and to consider calories from alcoholic beverages so as not to exceed daily calorie limits.

12 fluid ounces of regular beer (5% alcohol):
about 150 calories



5 fluid ounces of wine (12% alcohol):
about 120 calories



1.5 fluid ounces of 80 proof distilled spirits (40% alcohol): about 100 calories



7 fluid ounces of a rum (40% alcohol) and cola: about 190 calories



More information on calories in alcoholic beverages is available at rethinkingdrinking.nccih.nih.gov/Tools/Calculators/calorie-calculator.aspx.



Support Healthy Dietary Patterns for All Americans

Everyone has a role to play to support access to healthy foods and beverages in multiple settings nationwide where people live, learn, work, play, and gather. Having access to healthy, safe, and affordable food is crucial for an individual to achieve a healthy dietary pattern. Concerted efforts within communities, businesses and industries, organizations, government, and other segments of society are needed to support individuals and families in making lifestyle choices that align with the *Dietary Guidelines*.

Food manufacturers and retail establishments can support Americans in achieving a healthy dietary pattern by providing healthy options in all the places where foods and beverages are purchased. During the past few decades, food products and menus have evolved substantially in response to consumer demand and public health concerns. Food reformulation and menu and retail modification opportunities include offering more vegetables, fruits, whole grains, low-fat and fat-free dairy, and a greater variety of protein foods that are nutrient dense, while also reducing sodium and added sugars, reducing saturated fat and replacing it with unsaturated fats, and reducing added refined starches. Portion sizes also can be reduced to help individuals make choices that better fit within their calorie needs. Food manufacturers are encouraged to consider the entire composition of the food or beverage, and not just individual nutrients or ingredients when developing or reformulating products.

Similarly, when developing or modifying menus, establishments can consider the range of offerings both within and across food groups and other dietary components to determine whether the healthy options offered reflect the proportions in healthy dietary patterns. In taking these actions, care should be taken to assess any potential unintended consequences so that as changes are made to better align with the *Dietary Guidelines*, undesirable changes are not introduced. For example, a change made to reduce the amount of added sugars in a product should not come at the expense of increasing the amount of saturated fat or sodium.

Food access is influenced by diverse factors, such as proximity to food retail outlets (e.g., the number and

types of stores in an area), ability to prepare one's own meals or eat independently, and the availability of personal or public transportation. The underlying socioeconomic characteristics of a neighborhood also may influence an individual's ability to access foods to support healthy eating patterns.

In 2019, 10.5 percent of households were food insecure at least some time during the year. Food insecurity occurs when access to nutritionally adequate and safe food is limited or uncertain. Food insecurity can be temporary or persist over time, preventing individuals and families from following a healthy dietary pattern that aligns with the *Dietary Guidelines*. The prevalence of food insecurity typically rises during times of economic downturn as households experience greater hardship. Government and nongovernment nutrition assistance programs help alleviate food insecurity and play an essential role by providing food, meals, and educational resources so that participants can make healthy food choices within their budget.

Chapters 2, 3, 4, 5, and 6 highlight examples of these resources at each life stage.

As discussed in subsequent chapters, everyone has an important role in leading disease prevention efforts within their organizations and communities to make healthy eating an organizational and societal norm. Changes at multiple levels of society are needed, and these changes, in combination and over time, can have a meaningful impact on the health of current and future generations.

Looking Toward the Life Stages

This chapter has provided guidance about the fundamentals of a healthy dietary pattern. These fundamentals are remarkably consistent across life stages, even though each stage also has its own specific nutrition considerations. The following chapters build on this chapter and take a closer look at each of the life stages: **Chapter 2** provides a focused discussion of the unique nutritional needs of infants and toddlers.

Chapters 3, 4, 5, and 6 present recommended dietary patterns, describe current nutrition intakes, and provide tailored nutrition information specific to children and adolescents, adults, women who are pregnant or lactating, and older adults, respectively.





CHAPTER **2**

Infants and Toddlers

Introduction

The time from birth until a child's second birthday is a critically important period for proper growth and development. It also is key for establishing healthy dietary patterns that may influence the trajectory of eating behaviors and health throughout the life course. During this period, nutrients critical for brain development and growth must be provided in adequate amounts. **Children in this age group consume small quantities of foods, so it's important to make every bite count!**

Key Recommendations

- **For about the first 6 months of life,** exclusively feed infants human milk. Continue to feed infants human milk through at least the first year of life, and longer if desired. Feed infants iron-fortified infant formula during the first year of life when human milk is unavailable.
- Provide infants with supplemental vitamin D beginning soon after birth.
- **At about 6 months,** introduce infants to nutrient-dense complementary foods.
- Introduce infants to potentially allergenic foods along with other complementary foods.
- Encourage infants and toddlers to consume a variety of foods from all food groups. Include foods rich in iron and zinc, particularly for infants fed human milk.
- Avoid foods and beverages with added sugars.
- Limit foods and beverages higher in sodium.
- As infants wean from human milk or infant formula, transition to a healthy dietary pattern.



Human milk feeding alone is the ideal form of nutrition from birth through about age 6 months. Human milk provides necessary nutrients, protective factors against disease, and other unique immunological benefits. If human milk is unavailable, infants should be fed an iron-fortified commercial infant formula. Once an infant is developmentally ready, foods and beverages should be introduced to complement human milk feeding. These complementary foods and beverages are essential to meet the nutrient requirements of infants starting at about age 6 months and should be selected carefully to help meet these needs. As an infant becomes a toddler, and learns to eat a variety of foods, flavors, and textures, the goal of complementary feeding becomes establishing a healthy dietary pattern and transitioning to a healthy family diet by age 2.



immunologic properties that support infant health and growth and development.

U.S. data show that about 84 percent of infants born in 2017 were ever fed human milk, with only 25 percent fed human milk exclusively through age 6 months, and 35 percent continuing to be fed any human milk at age 12 months. Nearly one-quarter of infants were fed some human milk beyond age 12 months, with about 15 percent of toddlers being fed human milk at age 18 months.

Putting the Key Recommendations Into Action

Feed Infants Human Milk for the First 6 Months, If Possible

Exclusive human milk feeding is one of the best ways to start an infant off on the path of lifelong healthy nutrition. Exclusive human milk feeding, commonly referred to as exclusive breastfeeding, refers to an infant consuming only human milk, and not in combination with infant formula and/or complementary foods or beverages (including water), except for medications or vitamin and mineral supplementation.

Human milk can support an infant's nutrient needs for about the first 6 months of life, with the exception of vitamin D and potentially iron. In addition to nutrients, human milk includes bioactive substances and

Families may have a number of reasons for not having human milk for their infant. For example, a family may choose not to breastfeed, a child may be adopted, or the mother may be unable to produce a full milk supply or may be unable to pump and store milk safely due to family or workplace pressures. If human milk is unavailable, infants should be fed an iron-fortified commercial infant formula (i.e., labeled "with iron") regulated by the U.S. Food and Drug Administration (FDA), which is based on standards that ensure nutrient content and safety. Infant formulas are designed to meet the nutritional needs of infants and are not needed beyond age 12 months. It is important to take precautions to ensure that expressed human milk and prepared infant formula are handled and stored safely (see ["Proper Handling and Storage of Human Milk and Infant Formula"](#)).

Donor Human Milk

If families do not have sufficient human milk for their infant but want to feed their infant human milk, they may look for alternative ways to obtain it. It is important for the family to obtain pasteurized donor human milk from a source, such as an accredited human milk bank, that has screened its donors and taken appropriate safety precautions. When human milk is obtained directly from individuals or through the internet, the donor is unlikely to have been screened for infectious diseases, and it is unknown whether the human milk has been collected or stored in a way to reduce possible safety risks to the baby. More information is available at fda.gov/science-research/pediatrics/use-donor-human-milk.





Proper Handling and Storage of Human Milk and Infant Formula

- Wash hands thoroughly before expressing human milk or preparing to feed human milk or infant formula.
- If expressing human milk, ensure pump parts are thoroughly cleaned before use.
- If preparing powdered infant formula, use a safe water source and follow instructions on the label.
- Refrigerate freshly expressed human milk within 4 hours for up to 4 days. Previously frozen and thawed human milk should be used within 24 hours. Thawed human milk should never be refrozen. Refrigerate prepared infant formula for up to 24 hours.
- Do not use a microwave to warm human milk or infant formula. Warm safely by placing the sealed container of human milk or infant formula in a bowl of warm water or under warm, running tap water.
- Once it has been offered to the infant, use or discard leftovers quickly (within 2 hours for human milk or 1 hour for infant formula).
- Thoroughly wash all infant feeding items, such as bottles and nipples. Consider sanitizing feeding items for infants younger than 3 months of age, infants born prematurely, or infants with a compromised immune system.

More information on storing and handling human milk is available at [cdc.gov/breastfeeding/recommendations/handling_breastmilk.htm](https://www.cdc.gov/breastfeeding/recommendations/handling_breastmilk.htm). More information on storing and preparing powdered infant formula is available at [cdc.gov/nutrition/downloads/prepare-store-powered-infant-formula-508.pdf](https://www.cdc.gov/nutrition/downloads/prepare-store-powered-infant-formula-508.pdf).

Additional information on how to clean, sanitize, and store infant feeding items is available at [cdc.gov/healthywater/hygiene/healthycare/infantfeeding/cleansanitize.html](https://www.cdc.gov/healthywater/hygiene/healthycare/infantfeeding/cleansanitize.html).



Homemade infant formulas and those that are improperly and illegally imported into the United States without mandated FDA review and supervision should not be used. Toddler milks or toddler formulas should not be fed to infants, as they are not designed to meet the nutritional needs of infants.

Provide Infants Supplemental Vitamin D Beginning Soon After Birth

All infants who are fed human milk exclusively or who receive both human milk and infant formula (mixed fed) will need a vitamin D supplement of 400 IU per day beginning soon after birth. Infant formula is fortified with vitamin D, thus, when an infant is receiving full feeds of infant formula, vitamin D supplementation is not needed. Families who do not wish to provide a supplement directly to their infant should discuss with a healthcare provider the risks and benefits of maternal high dose supplementation options. Even when consuming a varied diet, achieving adequate vitamin D from foods and beverages (natural sources) alone is challenging, suggesting that young children may need to continue taking a vitamin D supplement after age 12 months. Parents, caregivers, and guardians should consult with a healthcare provider to determine how long supplementation is necessary.

Introduce Infants To Nutrient-Dense Complementary Foods at About 6 Months Old

At about age 6 months, infants should be introduced to nutrient-dense, developmentally appropriate foods to complement human milk or infant formula feedings. Some infants may show developmental signs of readiness before age 6 months (see "[Developmental Readiness for Beginning to Eat Solid Foods](#)"), but introducing complementary foods before age 4 months is not recommended. Waiting until after age 6 months to introduce foods also is not recommended. Starting around that time, complementary foods are necessary to ensure adequate nutrition and exposure to flavors, textures, and different types of foods. Infants should be given age- and developmentally appropriate foods to help prevent choking. It is important to introduce potentially allergenic foods along with other complementary foods. For infants fed human milk, it is particularly important to include complementary foods that are rich in iron and zinc when starting complementary foods (see [Appendix 1: Nutritional Goals for Age-Sex Groups](#)).

About one-third (32%) of infants in the United States are introduced to complementary foods and beverages before age 4 months, highlighting the importance of providing guidance and support to parents, guardians, and caregivers on the timing of introduction to complementary foods. Early introduction of complementary foods and beverages is higher among infants receiving infant formula (42%) or a combination of infant formula and human milk (32%) than among infants exclusively fed human milk (19%).



Supplemental Vitamin B₁₂

Human milk has sufficient vitamin B₁₂ to meet infant needs unless the mother's vitamin B₁₂ status is inadequate. This can occur for different reasons, including when the mother eats a strictly vegan diet without any animal source foods. When the mother is at risk of vitamin B₁₂ deficiency, human milk may not provide sufficient vitamin B₁₂. In these cases, the mother and/or infant fed human milk may require a vitamin B₁₂ supplement. Parents, caregivers, and guardians should consult with a healthcare provider to determine whether supplementation is necessary.





Developmental Readiness for Beginning To Eat Solid Foods

The age at which infants reach different developmental stages will vary. Typically between age 4 and 6 months, infants develop the gross motor, oral, and fine motor skills necessary to begin to eat complementary foods. As an infant's oral skills develop, the thickness and texture of foods can gradually be varied. Signs that an infant is ready for complementary foods include:

- Being able to control head and neck.
- Sitting up alone or with support.
- Bringing objects to the mouth.
- Trying to grasp small objects, such as toys or food.
- Swallowing food rather than pushing it back out onto the chin.

Infants and young children should be given age- and developmentally appropriate foods to help prevent choking. Foods such as hot dogs, candy, nuts and seeds, raw carrots, grapes, popcorn, and chunks of peanut butter are some of the foods that can be a choking risk for young children. Parents, guardians, and caregivers are encouraged to take steps to decrease choking risks, including:

- Offering foods in the appropriate size, consistency, and shape that will allow an infant or young child to eat and swallow easily.
- Making sure the infant or young child is sitting up in a high chair or other safe, supervised place.
- Ensuring an adult is supervising feeding during mealtimes.
- Not putting infant cereal or other solid foods in an infant's bottle. This could increase the risk of choking and will not make the infant sleep longer.

More information on foods that can present choking hazards is available from USDA at wicworks.fns.usda.gov/resources/reducing-risk-choking-young-children-mealtimes.

Introduce Infants to Potentially Allergenic Foods Along With Other Complementary Foods

Potentially allergenic foods (e.g., peanuts, egg, cow milk products, tree nuts, wheat, crustacean shellfish, fish, and soy) should be introduced when other complementary foods are introduced to an infant's diet. Introducing peanut-containing foods in the first year reduces the risk that an infant will develop a food allergy to peanuts. Cow milk, as a beverage, should be introduced at age 12 months or later (see "[Establish a Healthy Beverage Pattern](#)"). There is no evidence that delaying introduction of allergenic foods, beyond when other complementary foods are introduced, helps to prevent food allergy. For more information, see "[For Infants at High Risk of Peanut Allergy, Introduce Peanut-Containing Foods at Age 4 to 6 Months.](#)"



For Infants at High Risk of Peanut Allergy, Introduce Peanut-Containing Foods at Age 4 to 6 Months

If an infant has severe eczema, egg allergy, or both (conditions that increase the risk of peanut allergy), age-appropriate, peanut-containing foods should be introduced into the diet as early as age 4 to 6 months. This will reduce the risk of developing peanut allergy.

Caregivers should check with the infant's healthcare provider before feeding the infant peanut-containing foods. A blood test or skin prick may be recommended to determine whether peanut should be introduced to the infant, and, if so, the safest way to introduce it. More information is available in the *Addendum Guidelines for the Prevention of Peanut Allergy in the United States* at [niaid.nih.gov/sites/default/files/addendum-peanut-allergy-prevention-guidelines.pdf](https://www.niaid.nih.gov/sites/default/files/addendum-peanut-allergy-prevention-guidelines.pdf).

Encourage Infants and Toddlers To Consume a Variety of Complementary Foods and Beverages To Meet Energy and Nutrient Needs

Parents, caregivers, and guardians are encouraged to introduce foods across all the food groups—as described below and carrying forward the principles in **Chapter 1**—including items that fit within a family’s preferences, cultural traditions, and budget. Complementary foods and beverages should be rich in nutrients, meet calorie and nutrient requirements during this critical period of growth and development, and stay within limits of dietary components such as added sugars and sodium. Although the *Dietary Guidelines* does not provide a recommended dietary pattern for infants ages 6 through 11 months, infants should be on the path to a healthy dietary pattern that is recommended for those ages 12 through 23 months (see **Appendix 3: USDA Dietary Patterns**).

In the United States, some dietary components are of public health concern for infants and toddlers. Iron is a dietary component of public health concern for underconsumption among older infants ages 6 through 11 months who are fed primarily human milk and consume inadequate iron from complementary foods. Older infants who are fed primarily human milk also underconsume zinc and protein from complementary foods, and vitamin D, choline, and potassium are notably underconsumed by all older infants. During the second year of life, the dietary components of public health concern for underconsumption are vitamin D, calcium, dietary fiber, and potassium and for overconsumption are added sugars and sodium. Lists of dietary sources of

iron, calcium, potassium, dietary fiber, and vitamin D are available at [DietaryGuidelines.gov](https://www.dietaryguidelines.gov).

INTRODUCE IRON-RICH FOODS TO INFANTS STARTING AT ABOUT 6 MONTHS OLD

Iron-rich foods (e.g., meats and seafood rich in heme iron and iron-fortified infant cereals) are important components of the infant’s diet from age 6 through 11 months to maintain adequate iron status, which supports neurologic development and immune function. Infants are typically born with body stores of iron adequate for about the first 6 months of life, depending on gestational age, maternal iron status, and timing of umbilical cord clamping. By age 6 months, however, infants require an external source of iron apart from human milk.

Caregivers of infants exclusively fed human milk should talk with their pediatric care provider about whether there may be a need for infants supplementation with iron before age 6 months. A complementary food source of iron beginning at about 6 months is particularly important for infants fed human milk because the iron content of human milk is low and maternal iron intake during lactation does not increase its content. In the United States, an estimated 77 percent of infants fed human milk have inadequate iron intake during the second half of infancy, highlighting the importance of introducing iron-rich foods starting at age 6 months.

Infants receiving most of their milk feeds as iron-fortified infant formula are likely to need less iron from complementary foods beginning at 6 months of age. After



age 12 months, children have a lower iron requirement, but good food sources of iron are still needed to maintain adequate iron status and prevent deficiency.

INTRODUCE ZINC-RICH FOODS TO INFANTS STARTING AT ABOUT 6 MONTHS OLD

Zinc-rich complementary foods (e.g., meats, beans, zinc-fortified infant cereals) are important from age 6 months onwards to support adequate zinc status, which supports growth and immune function. Although the zinc content of human milk is initially high and efficiently absorbed, the concentration declines over the first 6 months of lactation and is not affected by maternal zinc intake. During the second half of infancy, approximately half (54%) of U.S. infants fed human milk have inadequate zinc intake. Prioritizing zinc-rich foods starting at 6 months of age to complement human milk feedings will help infants meet their requirement for zinc.

ENCOURAGE A VARIETY OF FOODS FROM ALL FOOD GROUPS TO INFANTS STARTING AT ABOUT 6 MONTHS OLD

To support nutrient adequacy, foster acceptance of healthy foods, and set intakes on a path toward a healthy pattern, it is important to encourage foods from all food groups. Because very young children are being exposed to new textures and flavors for the first time, it may take up to 8 to 10 exposures for an infant to accept a new type of food. Repeated offering of foods such as fruits and vegetables increases the likelihood of an infant accepting them. A nutrient-dense, diverse diet from age 6 through 23 months of life includes a variety of food sources from each food group.

- Protein foods, including meats, poultry, eggs, seafood, nuts, seeds, and soy products, are important sources of iron, zinc, protein, choline, and long chain polyunsaturated fatty acids. The long-chain polyunsaturated fatty acids, specifically the essential omega-3 and omega-6 fatty acids supplied through seafood, nuts, seeds, and oils, influence the infant's fatty acid status and are among the key nutrients needed for the rapid brain development that occurs through the infant's first 2 years of life. Some types of fish such as salmon and trout are also natural sources of vitamin D. To limit exposure to methylmercury from seafood, the U.S. Food and Drug Administration and the U.S. Environmental Protection Agency issued joint guidance regarding the types of seafood to choose.¹

¹ U.S. Food and Drug Administration and U.S. Environmental Protection Agency. Advice About Eating Fish. Available at [FDA.gov/fishadvice](https://www.fda.gov/fishadvice); [EPA.gov/fishadvice](https://www.epa.gov/fishadvice).



- Vegetables and fruits, especially those rich in potassium, vitamin A, and vitamin C, should be offered to infants and toddlers age 6 through 23 months. The vegetable subgroup of beans, peas, and lentils also provides a good source of protein and dietary fiber.
- For dairy, families can introduce yogurt and cheese, including soy-based yogurt, before 12 months. However, infants should not consume cow milk, as a beverage, or fortified soy beverage, before age 12 months as a replacement for human milk or infant formula (see "[Cow Milk and Fortified Soy Beverages](#)"). In the second year of life, when calcium requirements increase, dairy products, including milk, yogurt, cheese, and fortified soy beverages and soy yogurt provide a good source of calcium. Vitamin D-fortified milk and soy beverages also provide a good source of vitamin D. For those younger than the age of 2, offer dairy products without added sugar (see "[Avoid Added Sugars](#)").
- Grains, including iron-fortified infant cereal, play an important role in meeting nutrient needs during this life stage. Infant cereals fortified with iron include oat, barley, multigrain, and rice cereals. Rice cereal fortified with iron is a good source of nutrients for infants, but rice cereal shouldn't be the only type of cereal given to infants. Offering young children whole grains more often than refined grains will increase dietary fiber as well as potassium intake during the second year of life and help young children establish healthy dietary practices.

DIETARY COMPONENTS TO LIMIT

While encouraging intake from each food group, some dietary components should be limited.

Avoid Added Sugars

Infants and young children have virtually no room in their diet for added sugars. This is because the nutrient requirements for infants and young children are quite high relative to their size, but the amount of complementary foods they consume is small. Complementary foods need to be nutrient-dense and not contain additional calories from added sugars. In addition, low- and no-calorie sweeteners, which can also be called high-intensity sweeteners, are not recommended for children younger than age 2. Taste preferences are being formed during this time period, and infants and young children may develop preferences for overly sweet foods if introduced to very sweet foods during this timeframe. For more information on added sugars, see [Chapter 1](#).

Avoid Foods Higher in Sodium

Sodium is found in a number of foods, including some salty snacks, commercial toddler foods, and processed meats. In addition to keeping sodium intake within limits for toddlers (see [Appendix 1](#)), another reason to avoid high-sodium foods is that taste preferences for salty food may be established early in life. Choose fresh or low-sodium frozen foods, when available, and low-sodium canned foods to minimize sodium content. For more information on sodium, see [Chapter 1](#).

Avoid Honey and Unpasteurized Foods and Beverages

Infants should not be given any foods containing raw or cooked honey. Honey can contain the *Clostridium botulinum* organism that could cause serious illness or death among infants. Infants and young children also should not be given any unpasteurized foods or beverages, such as unpasteurized juices, milk, yogurt, or cheeses, as they could contain harmful bacteria.

Establish a Healthy Beverage Pattern

An important part of establishing an overall healthy dietary pattern is careful consideration of beverages. Guidance for different beverage categories is provided below.

WATER

For healthy infants with adequate intake of human milk or infant formula, supplemental water is typically not needed in the first 6 months. Small amounts (up to 4 to 8 ounces per day) of plain, fluoridated drinking water can be given to infants with the introduction of complementary foods. Plain, fluoridated drinking water intake can slowly be increased after age 1 to meet hydration and fluoride needs.



COW MILK AND FORTIFIED SOY BEVERAGES

Infants should not consume cow milk or fortified soy beverages before age 12 months to replace human milk or infant formula. Cow milk does not have the correct amount of nutrients for infants, and its higher protein and mineral content are hard for an infant's kidneys and digestive system to process. Plain cow milk (whole milk) or fortified unsweetened soy beverage can be offered beginning around 12 months of age to help meet calcium, potassium, vitamin D, and protein needs. Flavored milks for children age 12 through 23 months should be avoided because they contain added sugars.

PLANT-BASED MILK ALTERNATIVES

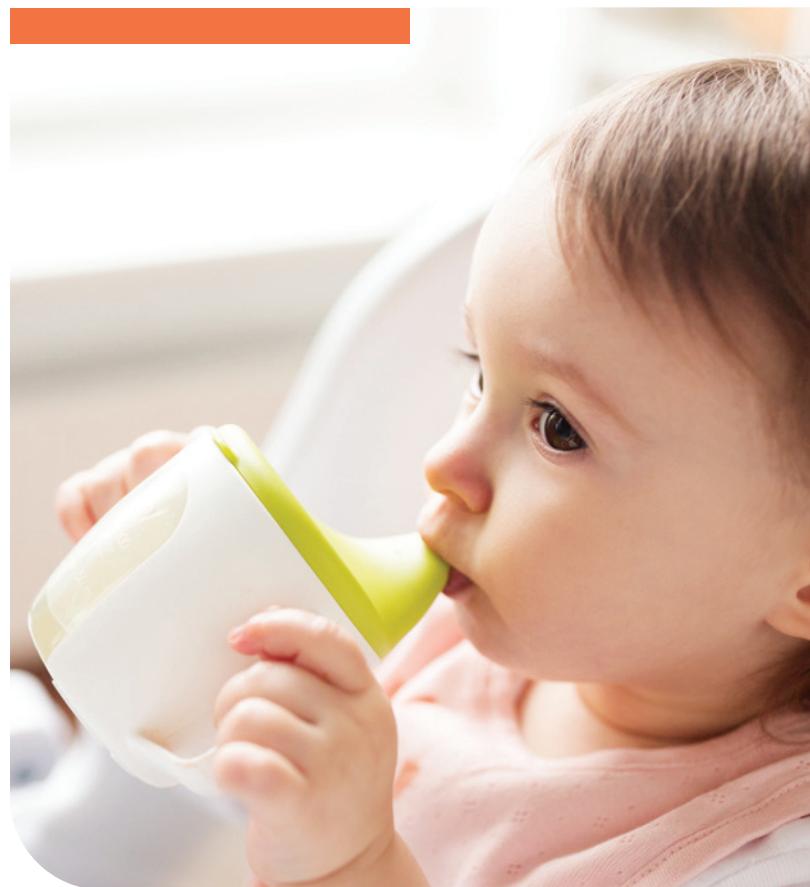
Plant-based milk alternatives, which are sometimes referred to as milk alternatives, include beverages made from plants, such as soy, oat, rice, coconut, and almond. These beverages should not be used in the first year of life to replace human milk or infant formula. They may come in different flavors and some forms have added sugars. Unsweetened versions of these beverages may be accommodated in small amounts in the diet during the second year of life, but most have significantly less protein than cow milk and are not always fortified with calcium and vitamin D. Among plant-based milk alternatives, only fortified soy beverage is currently considered a dairy equivalent. Thus, consuming other plant-based beverages does not contribute to meeting dairy recommendations.

100% FRUIT JUICE

Before age 12 months, 100% fruit or vegetable juices should not be given to infants. In the second year of life, fruit juice is not necessary, and most fruit intake should come from eating whole fruit. If 100% fruit juice is provided, up to 4 ounces per day can fit in a healthy dietary pattern. Juices that contain added sugars should be avoided.

TODDLER MILK AND TODDLER DRINKS

There are no clear needs for toddler milks or drinks. Needed nutrients can be obtained from cow milk or fortified soy beverage and appropriate solid foods. Toddler milks and toddler drinks are drinks supplemented with nutrients, and typically contain added sugars. A variety of nutrient-dense complementary foods and beverages without added sugars should be emphasized for achieving nutrient recommendations.



SUGAR-SWEETENED BEVERAGES

Sugar-sweetened beverages (e.g., regular soda, juice drinks [not 100% fruit juice], sports drinks, and flavored water with sugar) should not be given to children younger than age 2. Drinks labeled as fruit drinks or fruit-flavored drinks are not the same as 100% fruit juice and contain added sugars. These beverages displace nutrient-dense beverages and foods in the diet of young children. Infants and toddlers do not have room in their diets for the additional calories from added sugars found in these beverages. In addition, sugar-sweetened beverage intake in infancy and early childhood may predispose children to consume more of these beverages later in life.

CAFFEINATED BEVERAGES

Concerns exist about potential negative health effects of caffeine for young children, and no safe limits of caffeine have been established for this age group. Caffeine is a stimulant that can occur naturally in foods and beverages or as an additive. Major sources of caffeine for Americans include beverages such as soft drinks, tea, coffee, and sports drinks. Beverages containing caffeine should be avoided for children younger than age 2.

Healthy Dietary Pattern During a Toddler's Second Year of Life

In the second year of life, toddlers consume less human milk, and infant formula is not recommended. Calories and nutrients should predominantly be met from a healthy dietary pattern of age-appropriate foods and beverages. The Healthy U.S.-Style Dietary Pattern presented here is intended for toddlers ages 12 through 23 months who no longer consume human milk or infant formula. The pattern represents the types and amounts of foods needed to meet energy and nutrition requirements for this period (**Table 2-1**). For toddlers who are still consuming human milk (approximately one-third at 12 months and 15 percent at 18 months), a healthy dietary pattern should include a similar combination of nutrient-dense complementary foods and beverages.

Table 2-1 displays the Healthy U.S.-Style Dietary Pattern to illustrate the specific amounts and limits for food groups and other dietary components that make up healthy dietary patterns. The pattern is provided at calorie levels ranging from 700 to 1,000 calories per day, which are appropriate for most toddlers ages 12 through 23 months (see **Appendix 2. Estimated Calorie Needs**). A healthy dietary

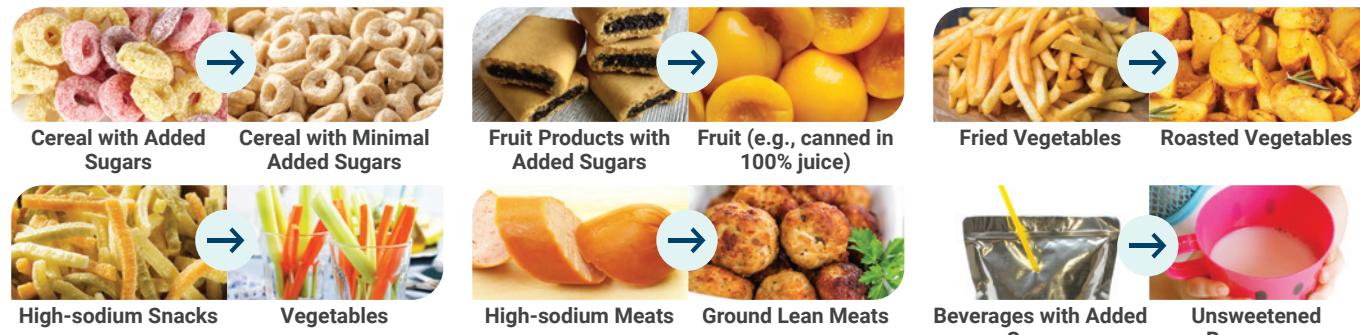
pattern includes a variety of nutrient-dense fruits, vegetables, grains, protein foods (including lean meats, poultry, eggs, seafood, nuts, and seeds), dairy (including milk, yogurt, and cheese), and oils. Based on FDA and EPA's joint "Advice About Eating Fish," young children should eat seafood lowest in methylmercury, and certain species of seafood should be avoided.² If young children are lower in body weight, they should eat less seafood than the amounts in the Healthy U.S.-Style Dietary Pattern. More information is available on the FDA or EPA websites at FDA.gov/fishadvice and EPA.gov/fishadvice.

After food group and subgroup recommendations are met, a small number of calories are allocated to oils. The recommendation to limit saturated fat to less than 10 percent of calories per day does not apply to those younger than age 2, and the inclusion of higher fat versions of dairy is a notable difference in the pattern for toddlers ages 12 through 23 months compared to patterns for ages 2 and older. However, no calories remain in the pattern for additional saturated fat or for added sugars. To illustrate the concept of nutrient density, **Figure 2-1** shows examples of foods and beverages appropriate for this life stage in forms that are not in nutrient-dense forms compared to those that are in nutrient-dense forms. This dietary pattern requires careful choices of foods and beverages but does not require inclusion of fortified products specifically formulated for infants or toddlers to meet nutrient recommendations.

Figure 2-1

Make Healthy Shifts To Empower Toddlers To Eat Nutrient-Dense Foods in Dietary Patterns

Science shows that early food preferences influence later food choices. Make the first choice the healthiest choices that set the toddlers on a path of making nutrient-dense choices in the years to come. Examples of shifts in common choices to healthier, more nutrient-dense food choices include:



²If consuming up to 2 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list in the FDA/EPA joint "Advice About Eating Fish," available at FDA.gov/fishadvice and EPA.gov/fishadvice. If consuming up to 3 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list that contain even lower methylmercury: flatfish (e.g., flounder), salmon, tilapia, shrimp, catfish, crab, trout, haddock, oysters, sardines, squid, pollock, anchovies, crawfish, mullet, scallops, whiting, clams, shad, and Atlantic mackerel. If consuming up to 3 ounces of seafood per week, many commonly consumed varieties of seafood should be avoided because they cannot be consumed at 3 ounces per week by children without the potential of exceeding safe methylmercury limits; examples that should not be consumed include: canned light tuna or white (albacore) tuna, cod, perch, black sea bass. For a complete list please see: FDA.gov/fishadvice and EPA.gov/fishadvice.

Table 2-1

Healthy U.S.-Style Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	700	800	900	1,000
FOOD GROUP OR SUBGROUP^{b,c}	Daily Amount of Food From Each Group^d (Vegetable and protein foods subgroup amounts are per week.)			
Vegetables (cup eq/day)	$\frac{2}{3}$	$\frac{3}{4}$	1	1
Vegetable Subgroups in Weekly Amounts				
Dark-Green Vegetables (cup eq/wk)	1	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{2}$
Red and Orange Vegetables (cup eq/wk)	1	$1\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$
Beans, Peas, Lentils (cup eq/wk)	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{2}$
Starchy Vegetables (cup eq/wk)	1	$1\frac{1}{2}$	2	2
Other Vegetables (cup eq/wk)	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Fruits (cup eq/day)	$\frac{1}{2}$	$\frac{3}{4}$	1	1
Grains (ounce eq/day)	$1\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	3
Whole Grains (ounce eq/day)	$1\frac{1}{2}$	2	2	2
Refined Grains (ounce eq/day)	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	1
Dairy (cup eq/day)	$1\frac{2}{3}$	$1\frac{3}{4}$	2	2
Protein Foods (ounce eq/day)	2	2	2	2
Protein Foods Subgroups in Weekly Amounts				
Meats, Poultry (ounce eq/wk)	$8\frac{3}{4}$	7	7	$7\frac{3}{4}$
Eggs (ounce eq/wk)	2	$2\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$
Seafood (ounce eq/wk) ^e	2-3	2-3	2-3	2-3
Nuts, Seeds, Soy Products (ounce eq/wk)	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$
Oils (grams/day)	9	9	8	13

^a Calorie level ranges: Energy levels are calculated based on median length and body weight reference individuals. Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals, available at usda.gov/fnic/dri-calculator, can be used to estimate calorie needs based on age, sex, and weight.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Appendix 3](#).

^c All foods are assumed to be in nutrient-dense forms and prepared with minimal added sugars, refined starches, or sodium. Foods are also lean or in low-fat forms with the exception of dairy, which includes whole-fat fluid milk, reduced-fat plain yogurts, and reduced-fat cheese. There are no calories available for additional added sugars, saturated fat, or to eat more than the recommended amount of food in a food group.

^d In some cases, food subgroup amounts are greatest at the lower calorie levels to help achieve nutrient adequacy when relatively small number of calories are required.

^e If consuming up to 2 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list in the FDA/EPA joint "Advice About Eating Fish," available at FDA.gov/fishadvice and EPA.gov/fishadvice. If consuming up to 3 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list that contain even lower methylmercury: flatfish (e.g., flounder), salmon, tilapia, shrimp, catfish, crab, trout, haddock, oysters, sardines, squid, pollock, anchovies, crawfish, mullet, scallops, whiting, clams, shad, and Atlantic mackerel. If consuming up to 3 ounces of seafood per week, many commonly consumed varieties of seafood should be avoided because they cannot be consumed at 3 ounces per week by children without the potential of exceeding safe methylmercury limits; examples that should not be consumed include: canned light tuna or white (albacore) tuna, cod, perch, black sea bass. For a complete list please see: FDA.gov/fishadvice and EPA.gov/fishadvice.

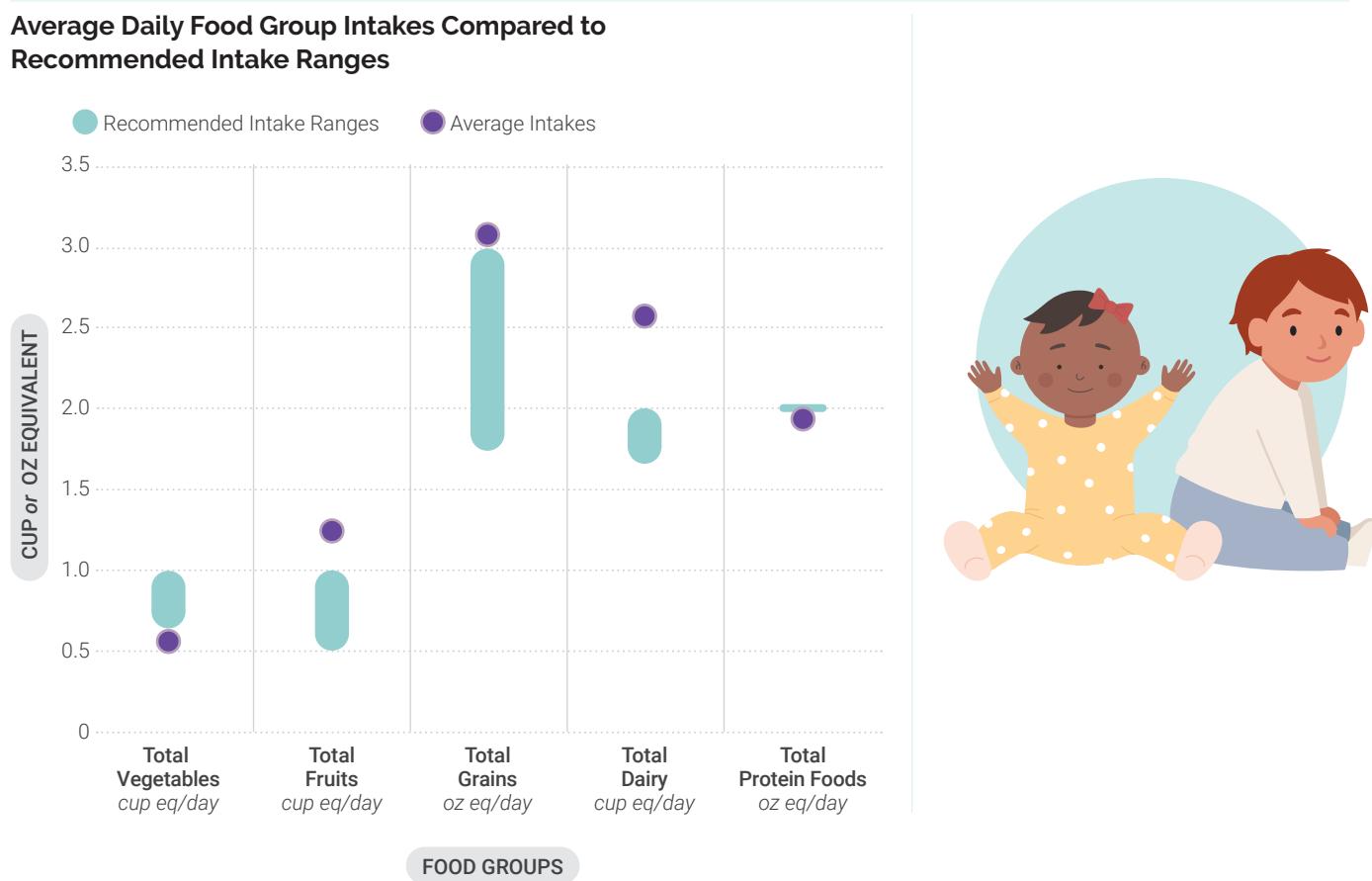
Current Intakes

Figure 2-2 and **2-3** highlight the dietary intakes of toddlers during the second year of life. Average intakes of the food groups are compared to the range of recommended intakes at the calorie levels most relevant to males and females in this age group (**Figure 2-2**). Additionally, the average intakes and range of intakes of added sugars, saturated fat, and sodium are displayed. Average intakes compared to recommended intake ranges of the subgroups for grains are represented in daily amounts; subgroups for vegetables and protein foods are represented in weekly amounts (**Figure 2-3**).

Figure 2-2

Current Intakes: Ages 12 Through 23 Months

Average Daily Food Group Intakes Compared to Recommended Intake Ranges



Average Intakes of Added Sugars, Saturated Fat, and Sodium

Added Sugars

Limit: Avoid

Average Intakes

104 kcals

Saturated Fat

Limit: N/A

Average Intakes

167 kcals

Sodium

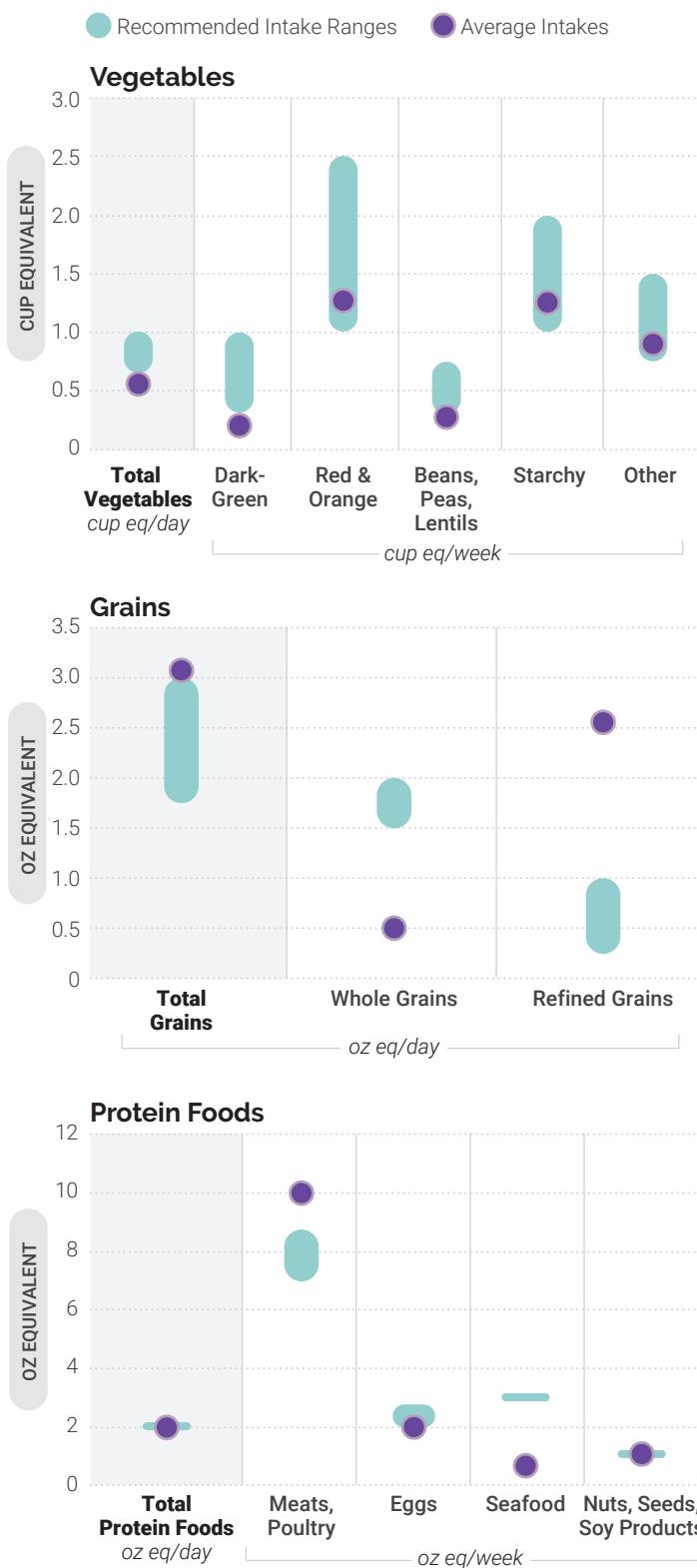
Limit: 1,200 mg

Average Intakes

1,586 mg

Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2007-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

Figure 2-3
Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 12 Through 23 Months



Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2007-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

Approximately 60 percent of toddlers meet or exceed recommended intakes for fruit. A majority of fruit is consumed as whole fruit (fresh, canned, puréed, frozen) or as 100% fruit juice. Average intake of total vegetables is below the range of recommended amounts, with nearly 90 percent of toddlers falling short of recommendations. About one-half of vegetables are consumed on their own, one-quarter are consumed as part of a mixed dish, and nearly 5 percent are consumed as savory snacks (e.g., potato chips).

Total grains, particularly refined grains, are consumed in amounts that exceed recommendations. Conversely, intakes of whole grains fall short of recommended amounts for more than 95 percent of toddlers. A majority of grains are consumed through breads, rolls, tortillas, or other bread products or as part of a mixed dish. Ten percent of grains come from sweet bakery products and approximately 15 percent come from crackers and savory snacks. Many of these categories are top sources of sodium or added sugars in this age group.

Average intakes of dairy foods, most of which is consumed as milk, generally exceed recommended amounts in this age group. Intakes of yogurt and cheese account for about 10 percent of dairy intakes. Plant-based beverages and flavored milks each make up about 2 percent of dairy intakes among toddlers.

Protein foods intakes fall within recommended range, on average. Intakes of meats, poultry, and eggs make up a majority of protein foods intakes, however seafood intakes in this age group is low. Children in this age group can reduce sodium intake by eating less cured or processed meats including hot dogs, deli meats, and sausages.

Due to the relatively high nutrient needs of toddlers, a healthy dietary pattern has virtually no room for added sugars. Toddlers consume an average of more than 100 calories from added sugars each day, ranging from 40 to 250 calories a day (about 2.5 to 16 teaspoons). Sugar-sweetened beverages, particularly fruit drinks, contribute more than 25 percent of total added sugars intakes and sweet bakery products contribute about 15 percent. Other food category sources contribute a smaller proportion of total added sugars on their own, but the wide variety of sources, which include yogurts, ready-to-eat cereals, candy, fruits, flavored milk, milk substitutes, baby food products, and breads, points to the need to make careful choices across all foods.

Vegetarian Dietary Pattern During the Second Year of Life

A Healthy Vegetarian Dietary Pattern for young children ages 12 through 23 months who are not fed human milk or infant formula is included in [Appendix 3](#). This pattern describes a lacto-ovo vegetarian diet that includes regular consumption of eggs, dairy products, soy products, and nuts or seeds, in addition to vegetables including beans, peas, and lentils, fruits, grains, and oils. Iron may be of particular concern because plant source foods contain only non-heme iron, which is less bioavailable than is heme iron. Food source lists for both heme and non-heme iron are available at [DietaryGuidelines.gov](#). Vitamin B₁₂ also may be of concern because it is present only in animal source foods. When feeding infants and toddlers a lacto-ovo vegetarian diet, parents, caregivers, and guardians should consult with a healthcare provider to determine whether supplementation of iron, vitamin B₁₂, and/or other nutrients is necessary and if so, appropriate levels to meet their unique needs.



Supporting Healthy Eating

Parents, guardians, and caregivers play an important role in nutrition during this life stage because infants and toddlers are fully reliant on them for their needs. In addition to “what” to feed children, “how” to feed young children also is critical. As noted above, repeated exposure to foods can increase acceptance of new foods. Another important concept is responsive feeding, a feeding style that emphasizes recognizing and responding to the hunger or fullness cues of an infant or young child (see “[Responsive Feeding](#)”).

Responsive Feeding

Responsive feeding is a term used to describe a feeding style that emphasizes recognizing and responding to the hunger or fullness cues of an infant or young child. Responsive feeding helps young children learn how to self-regulate their intake.

See [Table 2-2](#) for some examples of signs a child may show for hunger and fullness when he or she is a newborn through age 5 months, and signs a child may start to show between age 6 through 23 months.

It is important to listen to the child's hunger and fullness cues to build healthy eating habits during this critical age. If parents, guardians, or caregivers have questions or concerns, a conversation with a healthcare provider will be helpful.

Table 2-2
Signs a Child is Hungry or Full

Birth Through Age 5 Months	
<p>A child may be hungry if he or she:</p> <ul style="list-style-type: none"> • Puts hands to mouth. • Turns head toward breast or bottle. • Puckers, smacks, or licks lips. • Has clenched hands. 	<p>A child may be full if he or she:</p> <ul style="list-style-type: none"> • Closes mouth. • Turns head away from breast or bottle. • Relaxes hands.
Age 6 Through 23 Months	
<p>A child may be hungry if he or she:</p> <ul style="list-style-type: none"> • Reaches for or points to food. • Opens his or her mouth when offered a spoon or food. • Gets excited when he or she sees food. • Uses hand motions or makes sounds to let you know he or she is still hungry. 	<p>A child may be full if he or she:</p> <ul style="list-style-type: none"> • Pushes food away. • Closes his or her mouth when food is offered. • Turns his or her head away from food. • Uses hand motions or makes sounds to let you know he or she is still full.

For more information on signs a child is hungry or full, see: [cdc.gov/nutritioninfantandtoddlernutrition/mealtime/signs-your-child-is-hungry-or-full.html](#). More information on infant development skills, hunger and satiety cues, and typical daily portion sizes is available at [wicworks.fns.usda.gov/sites/default/files/media/document/Infant_Nutrition_and_Feeding_Guide.pdf](#).

Accessing a Healthy Dietary Pattern

Many resources exist to support healthy growth and development during infancy and toddlerhood. These include the following Government programs that aim to support a healthy dietary pattern for infants and toddlers living in households with limited incomes:

- The **Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)** supports infant and early childhood nutrition through supplementing the diets of women who are pregnant or lactating and by providing breastfeeding support and iron-fortified infant formula when human milk is unavailable or fed only partially. WIC accommodates the transition to solid foods by providing nutrient-dense foods in the supplemental food packages offered to older infants and toddlers. Nutrition education and counseling and referrals to healthcare and social services are other important resources offered to income-eligible WIC participants.
- The **Child and Adult Care Food Program (CACFP)** provides reimbursement for nutrient-dense meals and snacks served to infants and toddlers in participating child care centers, including at **Head Start** programs, and day care homes where infants and toddlers also have access to health screenings and families can be connected to health services to support their overall well-being.
- The **Supplemental Nutrition Assistance Program (SNAP)** is the largest food assistance program in the United States. SNAP helps meet the nutritional needs of infants and toddlers living in low-income households by providing temporary monthly benefits that can be used to access a healthy dietary pattern.

These Government nutrition programs are especially important for the 14 percent³ of families with children who experience food insecurity and may struggle to access the foods needed to support a healthy dietary pattern. Professionals can use these, and additional Government and non-Government resources that exist within communities, to support healthy eating during infancy and toddlerhood.

Looking Toward Chapter 3: Children and Adolescents

This chapter focused on nutrition issues important to infants and toddlers—exclusive human milk feeding, if possible; introducing nutrient-dense complementary foods at about age 6 months; and encouraging infants and toddlers to sample and consume a variety of nutrient-dense foods and beverages to meet their needs. As toddlers grow and their dietary patterns become more integrated with the family's food patterns, new issues arise. These issues, and how to accommodate them within a lifelong healthy dietary pattern, are discussed in the next chapter, which focuses on children and adolescents.

³ More information on food insecurity is available at ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/food-security-and-nutrition-assistance.







CHAPTER **3**

Children and Adolescents

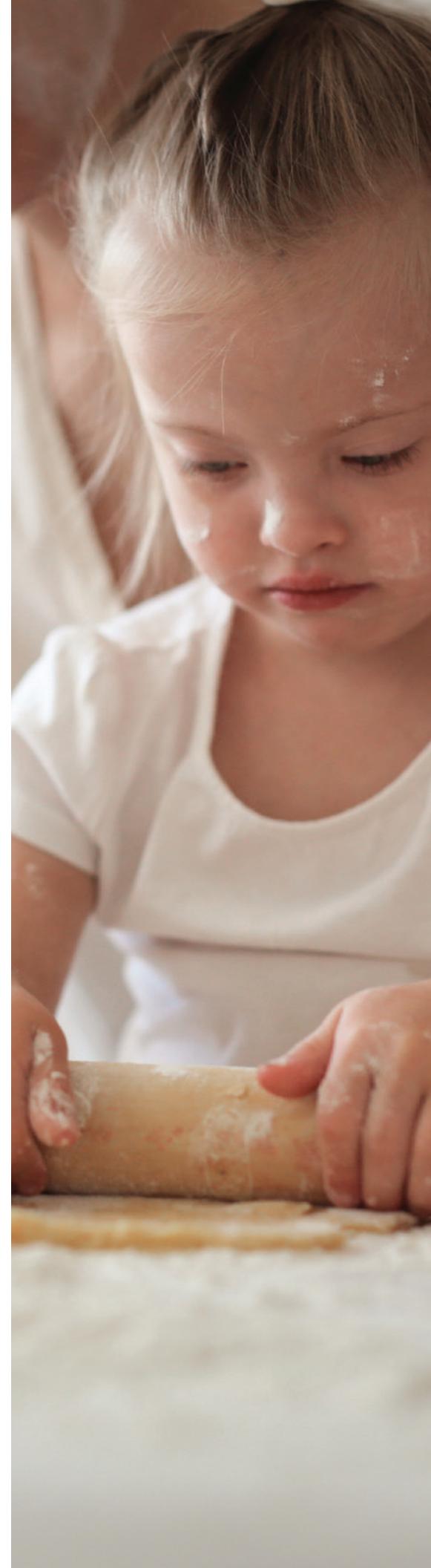
Introduction

Children and adolescents include individuals ages 2 through 18—a life stage characterized by transitions and the formation of dietary patterns. Suboptimal current intake patterns among children and adolescents and inadequate physical activity contribute to overweight and obesity in this life stage and risk of chronic disease (e.g., type 2 diabetes, cardiovascular disease) later in life.

Changing this trajectory is crucial because dietary patterns established during this life stage tend to continue into adult years.

Healthy eating throughout this life stage involves the child or adolescent, families and caregivers, and institutions and settings where food is provided and consumed. Young children are fully reliant on others to provide their meals and snacks. As children transition to school-age and through adolescence, they are exposed to new food choices and begin to have more autonomy in the foods that are selected. New influences on eating behavior also emerge, such as peer pressure, which can create opportunities or challenges for establishing dietary patterns consistent with health and longevity. Adolescents acquire ever-greater independence in their food choices as they mature, with more time spent on their own with peers and more foods and beverages frequently consumed in social settings. Other factors that influence eating behavior include social supports, exposure to food marketing and promotion, and policies that determine community design.

Youth have diverse calorie and nutrient needs based on age and patterns of growth, development, and physical activity. Current intake data of young children show some components of a healthy dietary pattern that continue from the infant and toddler life stages. Before these components of a healthy dietary pattern are established, however, diet quality worsens through childhood and into adolescence and intake patterns drift further from recommendations in the *Dietary Guidelines*. Active community support is needed to help youth meet food group and nutrient goals with nutrient-dense foods and beverages.



Childhood Overweight and Obesity

In the United States, 41 percent of children and adolescents are overweight or have obesity, and the prevalence is higher among Hispanic and non-Hispanic Black children and adolescents as compared to non-Hispanic Asians and Whites. Overweight and obesity put youth at high risk of serious health concerns. Youth with obesity are more likely to have immediate health risks, including high blood pressure, high cholesterol, and impaired glucose tolerance. They also are at increased risk of cardiovascular disease and type 2 diabetes beginning as soon as the teenage years and into adulthood. Psychological (e.g., anxiety, depression) and social concerns (e.g., bullying, stigma) also are more likely in children and adolescents with overweight or obesity.

The causes of childhood obesity are complex and interconnected. Behaviors (e.g., eating habits, level of physical activity, sedentary time) and the community in which a child or adolescent resides can influence risk of obesity. Genetics and the fetal environment also play a role in the development of obesity. However, many opportunities exist to help prevent or manage overweight and obesity as children transition through these life stages. The goal for children and adolescents with overweight or obesity is to reduce the rate of weight gain while allowing normal growth and development. This can primarily be done by emphasizing nutrient-dense food and beverage choices, minimizing calories from sources that do not contribute to a healthy dietary pattern, and encouraging regular physical activity.



Healthy Dietary Patterns

Children and adolescents are encouraged to follow the recommendations on the types of foods and beverages that make up a healthy dietary pattern described in

Chapter 1. Nutrition and Health Across the Lifespan: The Guidelines and Key Recommendations. Tables 3-1

to ***3-3*** display the Healthy U.S.-Style Dietary Pattern to illustrate the specific amounts and limits for food groups and other dietary components that make up healthy dietary patterns at the calorie levels appropriate for most children and adolescents across four age ranges: one table combining patterns relevant for ages 2 through 4 and ages 5 through 8, and single tables for ages 9 through 13 and for ages 14 through 18. ***Tables 3-1*** to ***3-3*** also show the calories remaining for other uses—about 10-15 percent of the total available—after meeting food group and nutrient goals through the selection of nutrient-dense foods and beverages.

Calorie needs generally increase throughout this life stage to support growth and development. Child and adolescent females generally have lower calorie needs

than do males, with variations based on size and level of physical activity. During adolescence, the range of calorie intakes widens to support diverse growth trajectories. More information on the calorie estimates is provided in ***Tables 3-1*** to ***3-3*** (see ***footnote a***) and in ***Appendix 2. Estimated Calorie Needs***.

The USDA Dietary Patterns, including the Healthy U.S.-Style Dietary Pattern, provide a framework to help children and adolescents follow a healthy dietary pattern and meet the Guidelines and their Key Recommendations. The USDA Foods Patterns can be customized based on dietary needs, personal preferences, and budgetary constraints. A variety of nutrient-dense foods and beverages can be selected across the food group and subgroups as part of an overall healthy dietary pattern. For more information about the USDA Food Patterns, see ***Chapter 1*** and ***Appendix 3. USDA Dietary Patterns***. For this age group,

as for all the others, a figure comparing current intakes to recommendations is presented. See “***Current Intakes***” for more information.

Children Ages 2 Through 8

In early childhood (ages 2 through 4), females require about 1,000 to 1,400 calories per day and males require about 1,000 to 1,600 calories per day. With the transition to school-age (ages 5 through 8), females require about 1,200 to 1,800 calories per day and males require about 1,200 to 2,000 calories per day.



Physical Activity

Childhood and adolescence is a critical period for developing movement skills, learning healthy habits, and establishing a firm foundation for lifelong health and well-being. For youth, regular physical activity can improve bone health, cardiorespiratory and muscular fitness, and cognition (including academic achievement), and reduce the symptoms of depression.

Preschool-aged children should be active throughout the day to enhance growth and development. Adults caring for children during this age should encourage active play that includes a variety of activity types (light, moderate, or vigorous intensity) and aim for at least 3 hours per day.

School-aged children and adolescents need at least 60 minutes of moderate-to-vigorous activity daily to attain the most health benefits from physical activity. Most activity can be aerobic, like walking, running, or anything that makes their heart beat faster. They also need muscle-strengthening and bone-strengthening activities that make their muscles and bones strong, like climbing on playground equipment, playing basketball, and jumping rope.

The U.S. Department of Health and Human Service's ***Physical Activity Guidelines for Americans*** and related Move Your Way® resources have more information about the benefits of physical activity and tips on how to get started. Available at health.gov/paguidelines.

Nutrient-Dense Foods and Beverages

Nutrient-dense foods and beverages provide vitamins, minerals, and other health-promoting components and have little added sugars, saturated fat, and sodium. Vegetables, fruits, whole grains, seafood, eggs, beans, peas, and lentils, unsalted nuts and seeds, fat-free and low-fat dairy products, and lean meats and poultry—when prepared with no or little added sugars, saturated fat, and sodium—are nutrient-dense foods.



Table 3-1

Healthy U.S.-Style Dietary Pattern for Children Ages 2 Through 8, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,000	1,200	1,400	1,600	1,800	2,000
FOOD GROUP OR SUBGROUP ^b	Daily Amount of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)					
Vegetables (cup eq/day)	1	1 ½	1 ½	2	2 ½	2 ½
Vegetable Subgroups in Weekly Amounts						
Dark-Green Vegetables (cup eq/wk)	½	1	1	1 ½	1 ½	1 ½
Red and Orange Vegetables (cup eq/wk)	2 ½	3	3	4	5 ½	5 ½
Beans, Peas, Lentils (cup eq/wk)	½	½	½	1	1 ½	1 ½
Starchy Vegetables (cup eq/wk)	2	3 ½	3 ½	4	5	5
Other Vegetables (cup eq/wk)	1 ½	2 ½	2 ½	3 ½	4	4
Fruits (cup eq/day)	1	1	1 ½	1 ½	1 ½	2
Grains (ounce eq/day)	3	4	5	5	6	6
Whole Grains (ounce eq/day)	1 ½	2	2 ½	3	3	3
Refined Grains (ounce eq/day)	1 ½	2	2 ½	2	3	3
Dairy (cup eq/day)	2	2 ½				
Protein Foods (ounce eq/day)	2	3	4	5	5	5 ½
Protein Foods Subgroups in Weekly Amounts						
Meats, Poultry, Eggs (ounce eq/wk)	10	14	19	23	23	26
Seafood (ounce eq/wk) ^c	2-3 ^d	4	6	8	8	8
Nuts, Seeds, Soy Products (ounce eq/wk)	2	2	3	4	4	5
Oils (grams/day)	15	17	17	22	22	24
Limit on Calories for Other Uses (kcal/day)^e	130	80	90	150	190	280
Limit on Calories for Other Uses (%/day)	13%	7%	6%	9%	10%	14%

^a Calorie level ranges: Ages 2 through 4, Females: 1,000-1,400 calories; Males: 1,000-1,600 calories. Ages 5 through 8, Females: 1,200-1,800 calories; Males: 1,200-2,000 calories. Energy levels are calculated based on reference height (median) and reference weight (healthy) corresponding with a healthy body mass index (BMI). Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals, available at nal.usda.gov/fnic/dri-calculator, can be used to estimate calorie needs based on age, sex, height, weight, and activity level.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Appendix 3](#).

^c The U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) provide joint advice regarding seafood consumption to limit methylmercury exposure for children. Depending on body weight, some children should choose seafood lowest in methylmercury or eat less seafood than the amounts in the Healthy US-Style Dietary Pattern. More information is available on the FDA and EPA websites at FDA.gov/fishadvice and EPA.gov/fishadvice.

^d If consuming up to 2 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list in the FDA/EPA joint "Advice About Eating Fish," available at FDA.gov/fishadvice and EPA.gov/fishadvice. If consuming up to 3 ounces of seafood per week, children should only be fed cooked varieties from the "Best

Choices" list that contain even lower methylmercury: flatfish (e.g., flounder), salmon, tilapia, shrimp, catfish, crab, trout, haddock, oysters, sardines, squid, pollock, anchovies, crawfish, mullet, scallops, whiting, clams, shad, and Atlantic mackerel. If consuming up to 3 ounces of seafood per week, many commonly consumed varieties of seafood should be avoided because they cannot be consumed at 3 ounces per week by children without the potential of exceeding safe methylmercury limits; examples that should not be consumed include: canned light tuna or white (albacore) tuna, cod, perch, black sea bass. For a complete list please see: FDA.gov/fishadvice and EPA.gov/fishadvice.

^e Foods are assumed to be in nutrient-dense forms; lean or low-fat; and prepared with minimal added sugars, refined starches, saturated fat, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The number of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars and/or saturated fat, or to eat more than the recommended amount of food in a food group.

NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars and saturated fat; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded. See [Appendix 3](#) for all calorie levels of the pattern.

Current Intakes

Figures 3-2 to 3-9 highlight the dietary intakes of children and adolescents, including the Healthy Eating Index-2015 score, which is an overall measure of how intakes align with the *Dietary Guidelines*, as well as information on the components of a healthy diet—specifically, the food groups. **Figures 3-1, 3-3, 3-5, and 3-7** display the average intakes of the food groups compared to the range of recommended intakes at the calorie levels most relevant to males and females in these age groups. Additionally, the percent of children and adolescents exceeding the recommended limits for added sugars, saturated fat, and sodium are shown, along with average intakes of these components. Average intakes compared to recommended intake ranges of the subgroups for grains are represented in daily amounts; subgroups for vegetables and protein foods are represented in weekly amounts (see **Figures 3-2, 3-4, 3-6, and 3-8**).

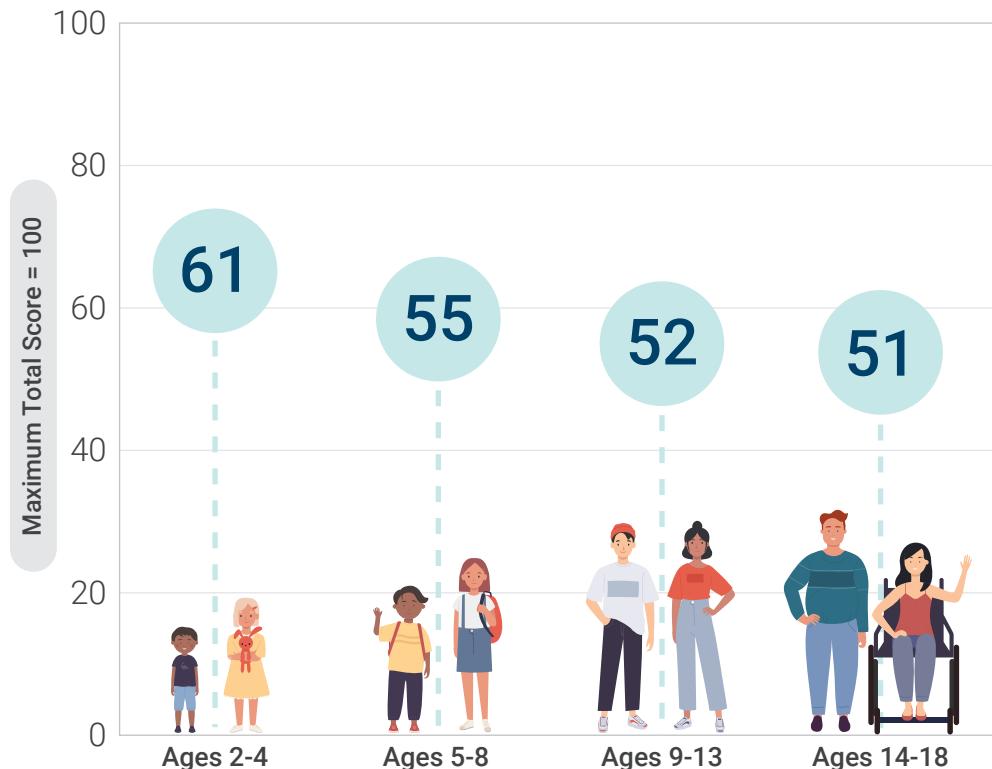
Current intakes show that from an early age, dietary patterns are not aligned with the *Dietary Guidelines*. The Healthy Eating Index score of 61 out of 100 for children ages 2 through 4 indicates that overall diet

quality is poor. Notably, HEI Scores decline throughout childhood and adolescence, with scores for adolescents approximately 10 points lower than those for young children (**Figure 3-1**).

Among children ages 2 through 4, consumption of total fruit is generally adequate for about 60 percent of children. Compared to other age groups, a higher percentage of young children also have intakes of total vegetables at or above recommended levels. The difference between recommended and actual intakes of total fruit and total vegetables emerges and expands as children age. By late adolescence, average fruit and vegetable consumption is about half of the recommended range of intake. Throughout youth, starchy vegetables (e.g., white potatoes, corn)—often in forms that are fried or prepared with additions such as butter and salt—are more frequently consumed than the red and orange; dark green; or beans, peas, and lentils vegetable subgroups. For fruit, about 70 percent of intake comes from whole forms—fresh, canned, frozen, or dried—and 100% juice, which are often nutrient-dense forms. Some fruit is consumed through sources that are not nutrient-dense; for example, fruit as part of a baked dessert or juice drink.

Figure 3-1

Healthy Eating Index Scores Across Childhood and Adolescence



Data Source: Analysis of What We Eat in America, NHANES 2015-2016, ages 2 through 18, day 1 dietary intake, weighted.



The amount of dairy foods consumed by children and adolescents is relatively stable across age groups. Beginning at age 9 the amount of dairy foods in a healthy dietary pattern increases from 2 ½ to 3 cup equivalents per day to support an increase in calcium intake that is needed during these life stages. As a result, average intake of dairy foods is close to or at recommended levels for children younger than age 9 while consumption among adolescents is typically below recommended intake levels.

Although the gaps between recommended and current intakes widen throughout these life stages for some dietary components, others, principally whole grains and seafood, are infrequently consumed by any youth. Whole grains are consumed below recommended levels even by young children. As the difference between recommended and current intakes widens across age groups, the types of refined and whole-grain foods consumed remains consistent. Mixed dishes, such as pizza, pasta, sandwiches, burgers, and tacos, contribute about 50 percent of total grains intake, and snacks and sweets, such as chips, crackers, and cookies, about 20 percent. Breakfast cereals and bars, including ready-to-eat and cooked varieties, are the top contributor to whole-grains intake during these life stages. Despite the underconsumption of whole grains, intakes of

total grains trend toward overconsumption due to the contribution of refined grains.

Total protein intake generally meets targets except for adolescent females ages 14 through 18. Youth typically meet or exceed recommendations for meats, poultry, and eggs. Seafood, a protein subgroup that can support intakes of beneficial fatty acids, is consumed at levels far below the lower end of the recommended intakes range. When seafood is consumed, it is typically as part of a mixed dish rather than as an individual food item.

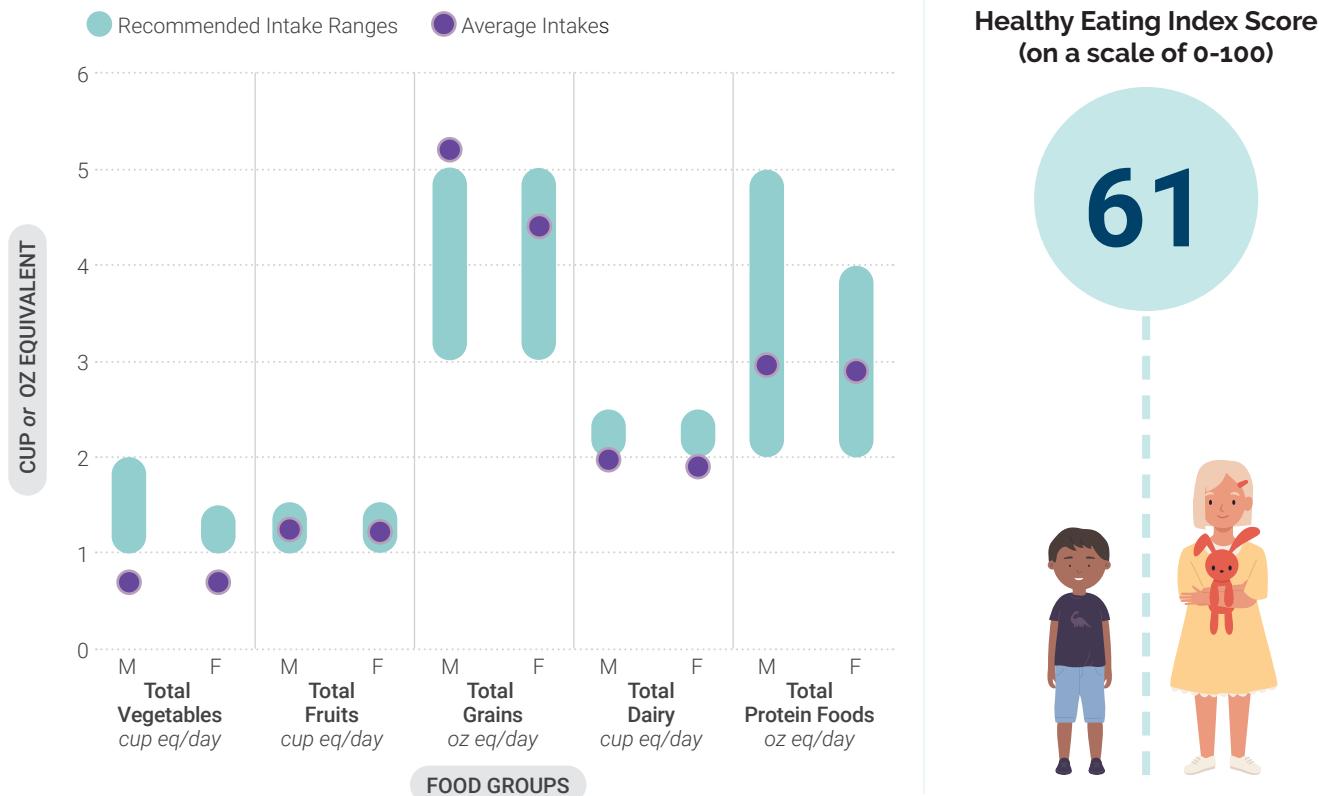
Children and adolescents can improve intake patterns by maintaining the components of a healthy diet that are evident in early childhood, particularly total fruit and dairy foods, while increasing consumption of food groups that are underconsumed across all age groups, specifically total vegetables and vegetable subgroups, whole grains, and seafood. Reducing intakes of added sugars, saturated fat, and sodium—components of a dietary pattern that are often consumed above recommended limits beginning at an early age—also will support youth in achieving a healthy dietary pattern, particularly when considering the very limited amount of calories available outside of those needed for meeting food group and nutrient goals.

Current Intakes

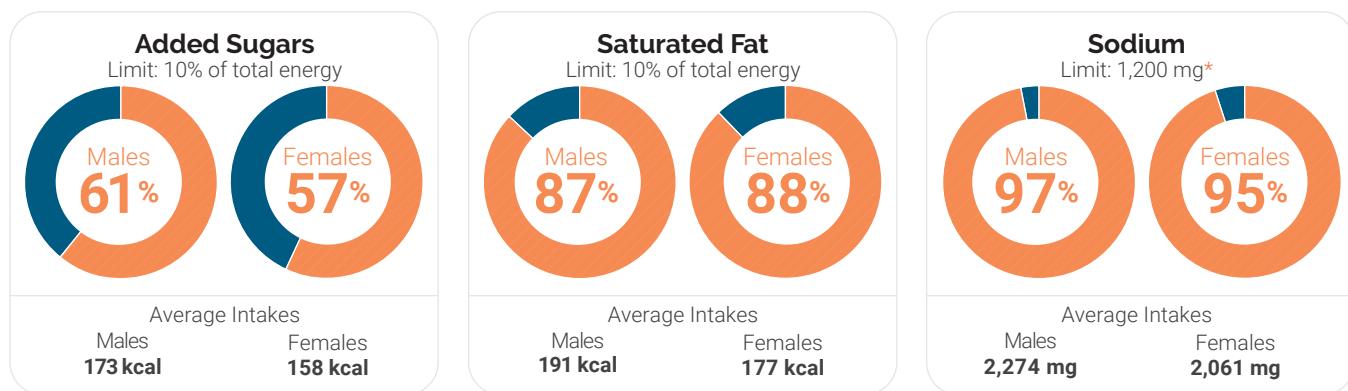
Figure 3-2

Current Intakes: Ages 2 Through 4

Average Daily Food Group Intakes Compared to Recommended Intake Ranges



Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium

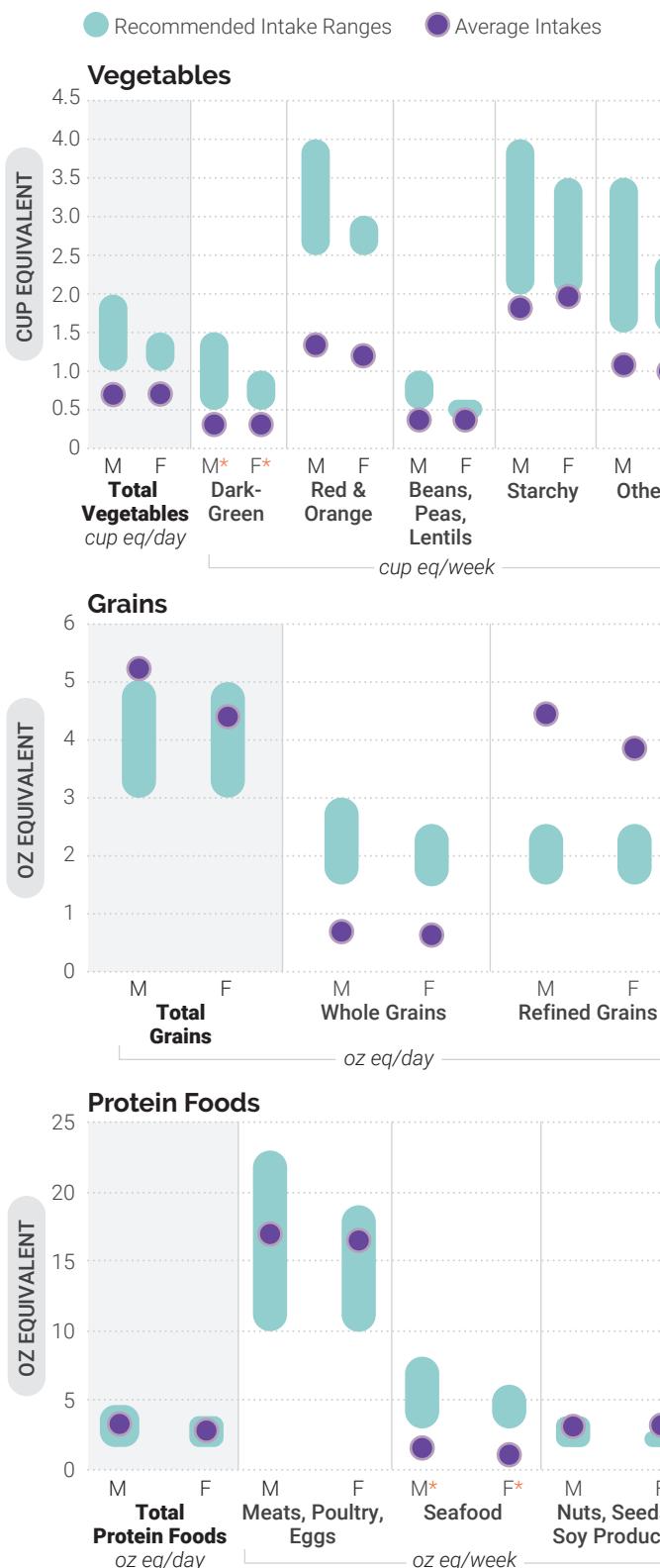


*NOTE: Children ages 2 through 3 should reduce sodium intake if above 1,200 mg/d and those age 4 should reduce intake if above 1,500 mg/d.

Data Sources: Average Intakes and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

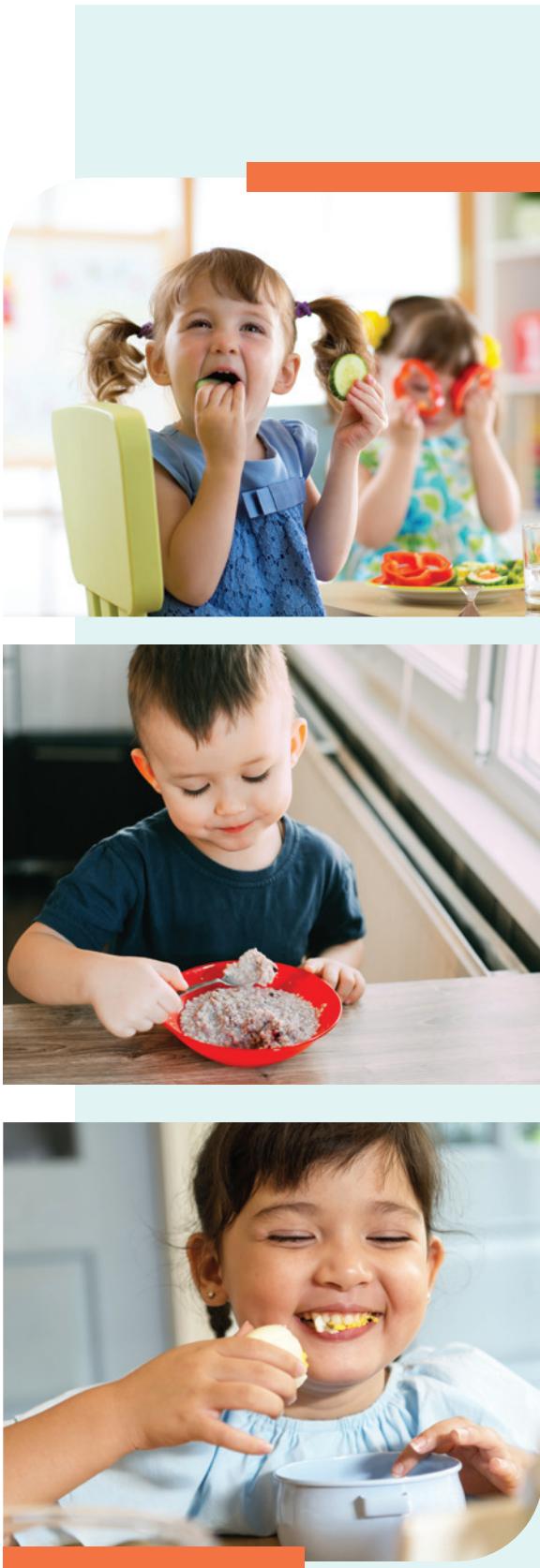
Figure 3-3

Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 2 Through 4



*NOTE: Estimates may be less precise than others due to small sample size and/or large relative standard error.

Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

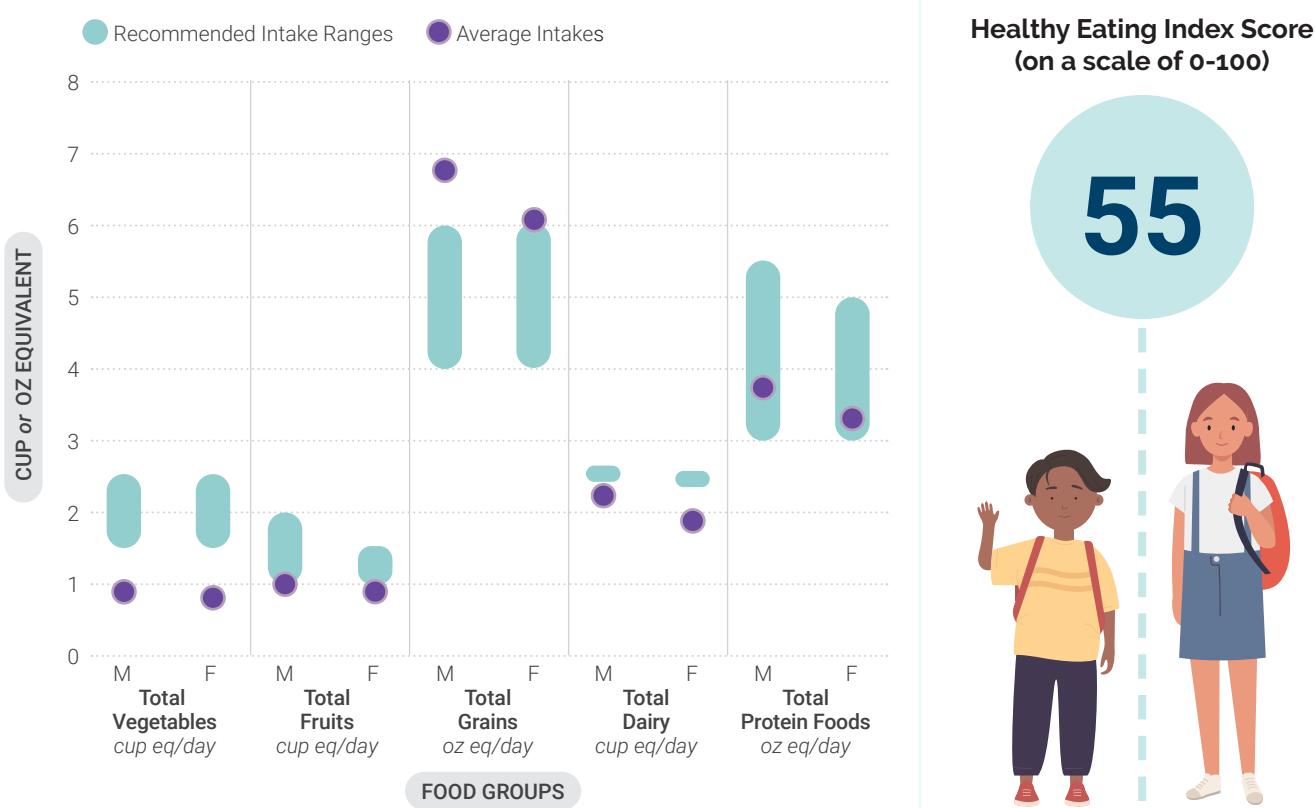


Current Intakes

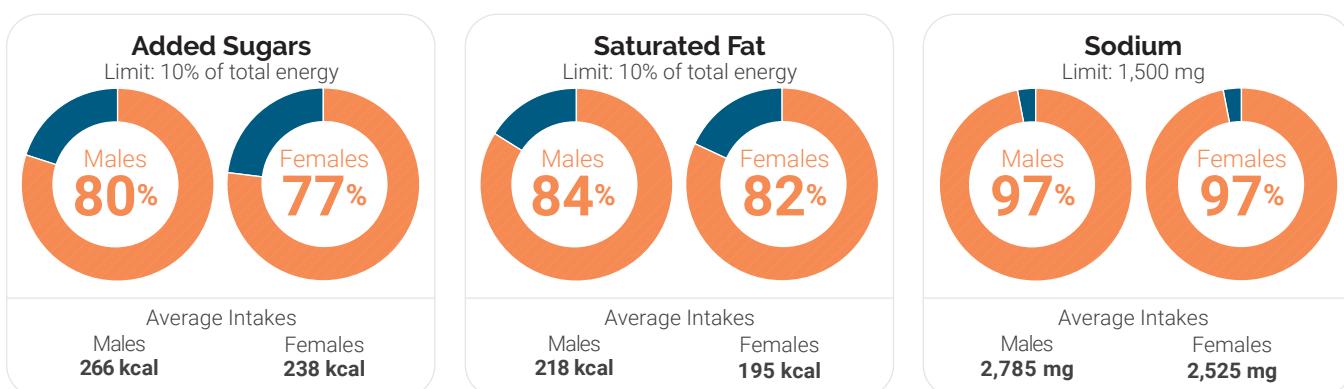
Figure 3-4

Current Intakes: Ages 5 Through 8

Average Daily Food Group Intakes Compared to Recommended Intake Ranges



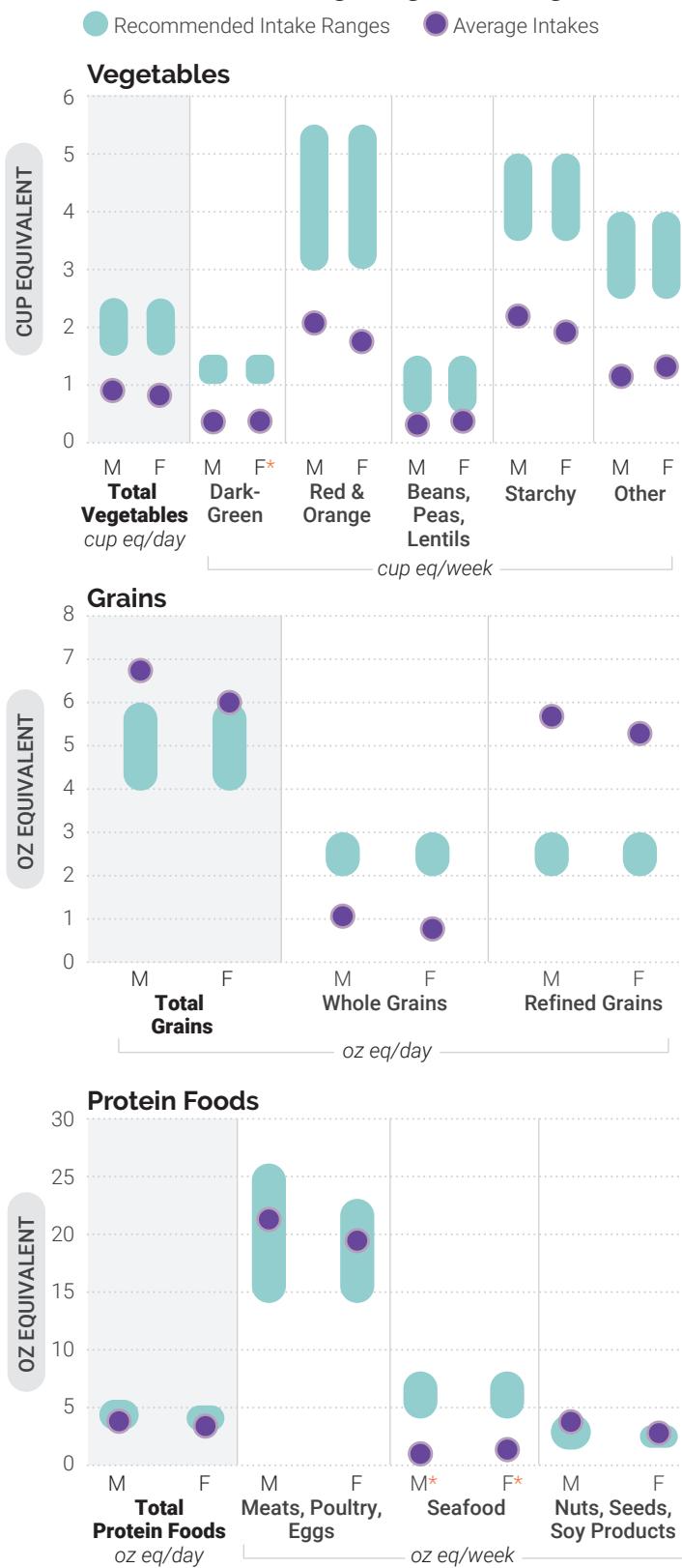
Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium



Data Sources: Average Intakes and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

Figure 3-5

Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 5 Through 8



*NOTE: Estimates may be less precise than others due to small sample size and/or large relative standard error.

Data Sources: Average Intake: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).



Children and Adolescents Ages 9 Through 13

In the late childhood and early adolescence stage, females require about 1,400 to 2,200 calories per day and males require about 1,600 to 2,600 calories per day.

Table 3-2

Healthy U.S.-Style Dietary Pattern for Children and Adolescents Ages 9 Through 13, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,400	1,600	1,800	2,000	2,200	2,400	2,600
FOOD GROUP OR SUBGROUP ^b	Daily Amount of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)						
Vegetables (cup eq/day)	1 ½	2	2 ½	2 ½	3	3	3 ½
Vegetable Subgroups in Weekly Amounts							
Dark-Green Vegetables (cup eq/wk)	1	1 ½	1 ½	1 ½	2	2	2 ½
Red & Orange Vegetables (cup eq/wk)	3	4	5 ½	5 ½	6	6	7
Beans, Peas, Lentils (cup eq/wk)	½	1	1 ½	1 ½	2	2	2 ½
Starchy Vegetables (cup eq/wk)	3 ½	4	5	5	6	6	7
Other Vegetables (cup eq/wk)	2 ½	3 ½	4	4	5	5	5 ½
Fruits (cup eq/day)	1 ½	1 ½	1 ½	2	2	2	2
Grains (ounce eq/day)	5	5	6	6	7	8	9
Whole Grains (ounce eq/day)	2 ½	3	3	3	3 ½	4	4 ½
Refined Grains (ounce eq/day)	2 ½	2	3	3	3 ½	4	4 ½
Dairy (cup eq/day)	3	3	3	3	3	3	3
Protein Foods (ounce eq/day)	4	5	5	5 ½	6	6 ½	6 ½
Protein Foods Subgroups in Weekly Amounts							
Meats, Poultry, Eggs (ounce eq/wk)	19	23	23	26	28	31	31
Seafood (ounce eq/wk) ^c	6	8	8	8	9	10	10
Nuts, Seeds, Soy Products (ounce eq/wk)	3	4	4	5	5	5	5
Oils (grams/day)	17	22	24	27	29	31	34
Limit on Calories for Other Uses (kcal/day)^d	50	100	140	240	250	320	350
Limit on Calories for Other Uses (%/day)	4%	6%	8%	12%	11%	13%	13%

^a Calorie level ranges: Females: 1,400-2,200; Males: 1,600-2,600. Energy levels are calculated based on reference height (median) and reference weight (healthy) corresponding with a healthy body mass index (BMI). Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals, available at nal.usda.gov/fnic/dri-calculator, can be used to estimate calorie needs based on age, sex, height, weight, and activity level.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Appendix 3](#).

^c The U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) provide joint advice regarding seafood consumption to limit methylmercury exposure for children. Depending on body weight, some children should choose seafood lowest in methylmercury or eat less seafood than the amounts in the Healthy US-Style Dietary Pattern. More information is available on the FDA and EPA websites at FDA.gov/fishadvice and EPA.gov/fishadvice.

^d All foods are assumed to be in nutrient-dense forms; lean or low-fat; and prepared with minimal added sugars, saturated fat, refined starches, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The number of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars and/or saturated fat, or to eat more than the recommended amount of food in a food group.

NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars and saturated fat; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded. See [Appendix 3](#) for all calorie levels of the pattern.

Current Intakes

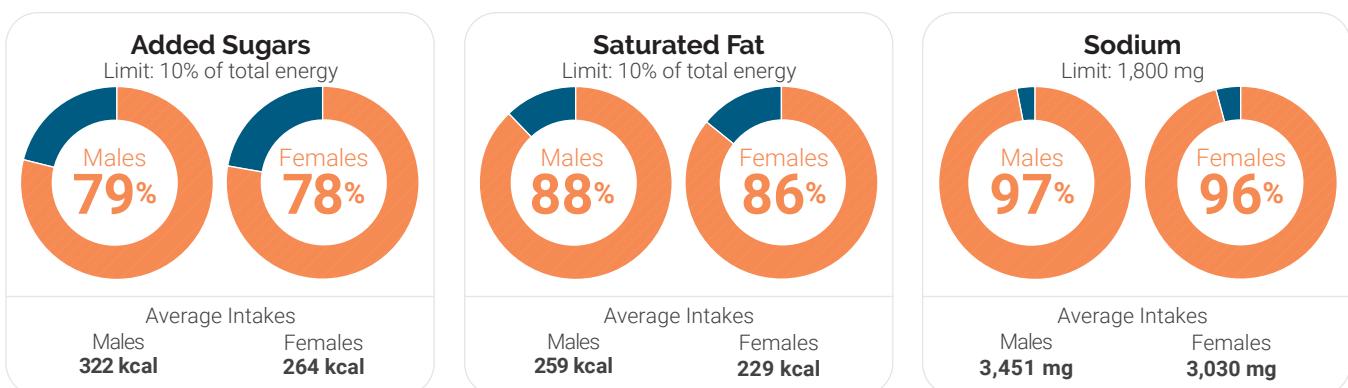
Figure 3-6

Current Intakes: Ages 9 Through 13

Average Daily Food Group Intakes Compared to Recommended Intake Ranges



Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium

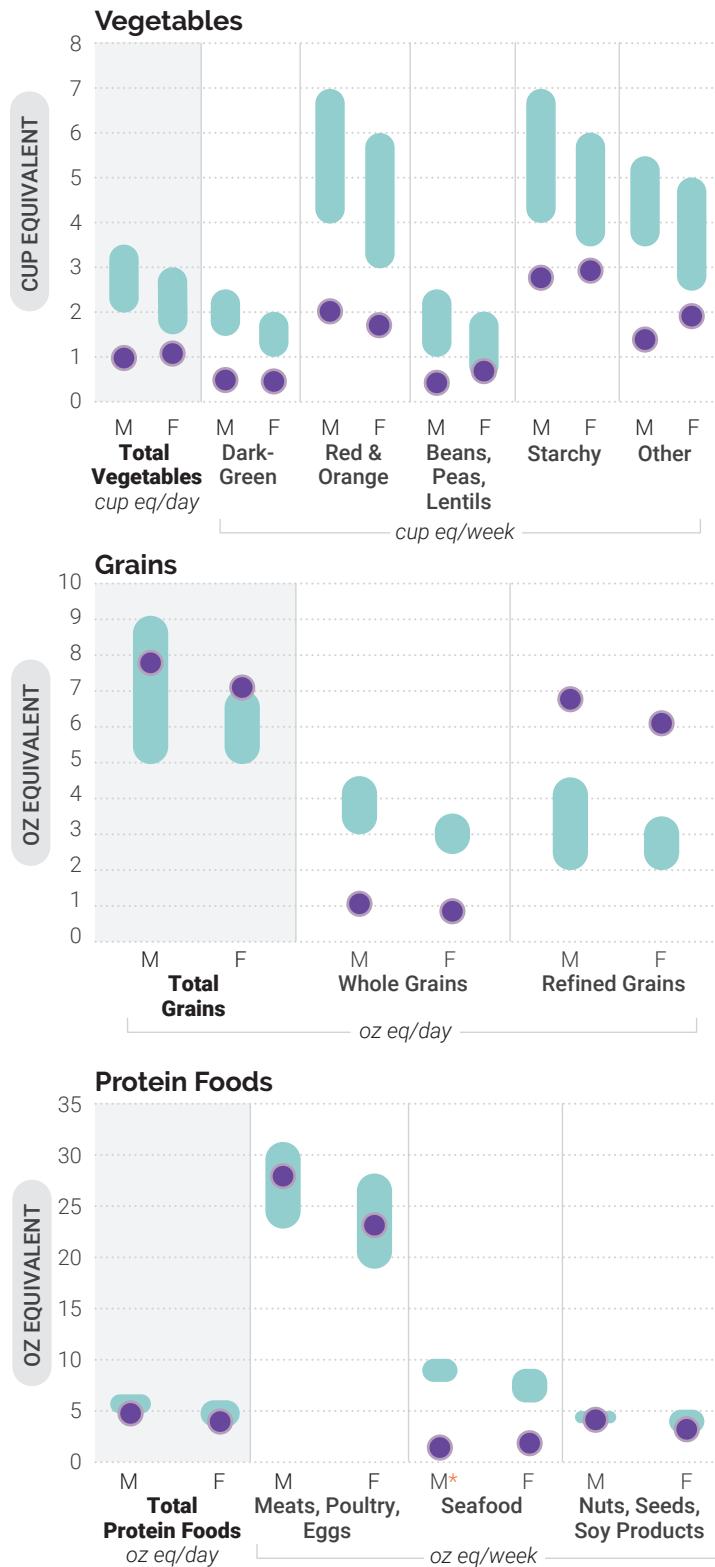


Data Sources: Average Intake and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

Figure 3-7

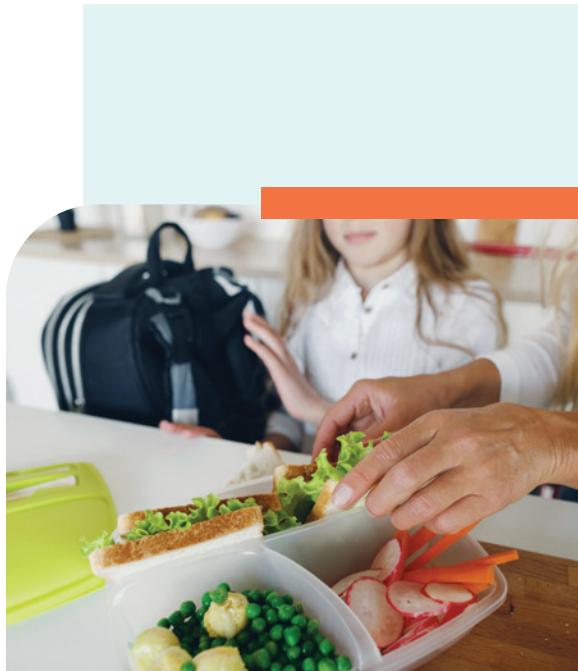
Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 9 Through 13

● Recommended Intake Ranges ● Average Intakes



*NOTE: Estimates may be less precise than others due to small sample size and/or large relative standard error.

Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).



Adolescents Ages 14 Through 18

Adolescent females require about 1,800 to 2,400 calories per day and males require about 2,000 to 3,200 calories per day.

Table 3-3

Healthy U.S.-Style Dietary Pattern for Adolescents Ages 14 Through 18, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
FOOD GROUP OR SUBGROUP ^b	Daily Amount of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)							
Vegetables (cup eq/day)	2 ½	2 ½	3	3	3 ½	3 ½	4	4
Vegetable Subgroups in Weekly Amounts								
Dark-Green Vegetables (cup eq/wk)	1 ½	1 ½	2	2	2 ½	2 ½	2 ½	2 ½
Red and Orange Vegetables (cup eq/wk)	5 ½	5 ½	6	6	7	7	7 ½	7 ½
Beans, Peas, Lentils (cup eq/wk)	1 ½	1 ½	2	2	2 ½	2 ½	3	3
Starchy Vegetables (cup eq/wk)	5	5	6	6	7	7	8	8
Other Vegetables (cup eq/wk)	4	4	5	5	5 ½	5 ½	7	7
Fruits (cup eq/day)	1 ½	2	2	2	2	2 ½	2 ½	2 ½
Grains (ounce eq/day)	6	6	7	8	9	10	10	10
Whole Grains (ounce eq/day)	3	3	3 ½	4	4 ½	5	5	5
Refined Grains (ounce eq/day)	3	3	3 ½	4	4 ½	5	5	5
Dairy (cup eq/day)	3	3	3	3	3	3	3	3
Protein Foods (ounce eq/day)	5	5 ½	6	6 ½	6 ½	7	7	7
Protein Foods Subgroups in Weekly Amounts								
Meats, Poultry, Eggs (ounce eq/wk)	23	26	28	31	31	33	33	33
Seafood (ounce eq/wk)	8	8	9	10	10	10	10	10
Nuts, Seeds, Soy Products (ounce eq/wk)	4	5	5	5	5	6	6	6
Oils (grams/day)	24	27	29	31	34	36	44	51
Limit on Calories for Other Uses (kcal/day)^c	140	240	250	320	350	370	440	580
Limit on Calories for Other Uses (%/day)	8%	12%	11%	13%	13%	13%	15%	18%

^a Calorie level ranges: Females: 1,800-2,400 calories; Males: 2,000-3,200 calories. Energy levels are calculated based on reference height (median) and reference weight (healthy) corresponding with a healthy body mass index (BMI). Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals, available at [nl.usda.gov/fnic/dri-calculator](https://www.ncbi.nlm.nih.gov/dri-calculator/), can be used to estimate calorie needs based on age, sex, height, weight, activity level.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Appendix 3](#).

^c All foods are assumed to be in nutrient-dense forms; lean or low-fat; and prepared with minimal added sugars, saturated fat,

refined starches, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The number of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars and/or saturated fat, or to eat more than the recommended amount of food in a food group.

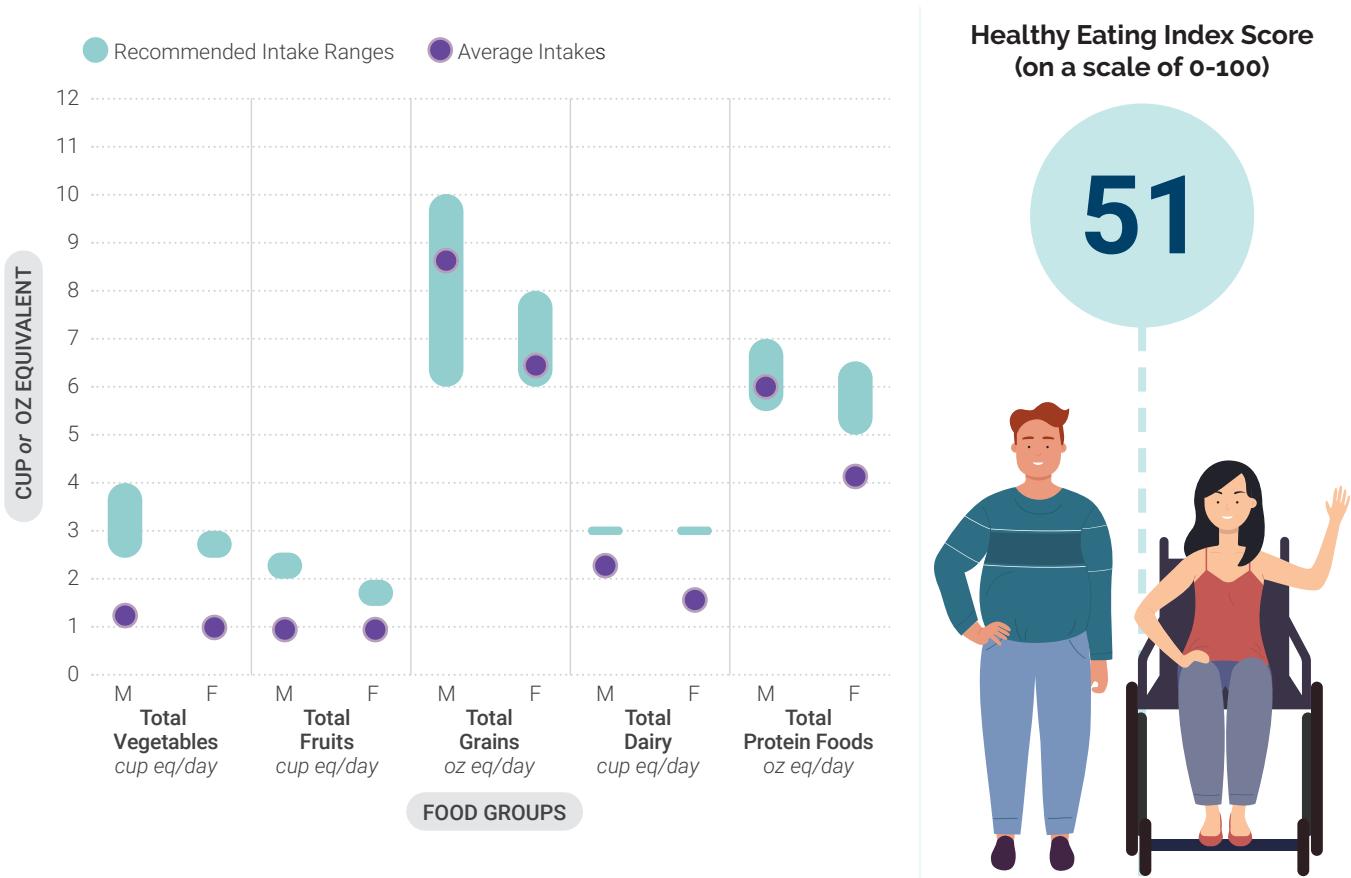
NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars and saturated fat; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded. See [Appendix 3](#) for all calorie levels of the pattern.

Current Intakes

Figure 3-8

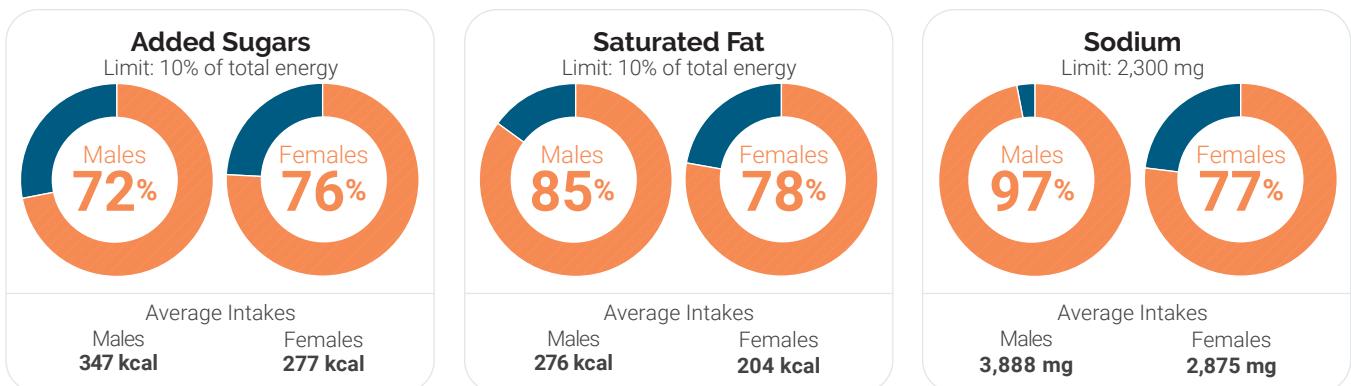
Current Intakes: Ages 14 Through 18

Average Daily Food Group Intakes Compared to Recommended Intake Ranges



Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium

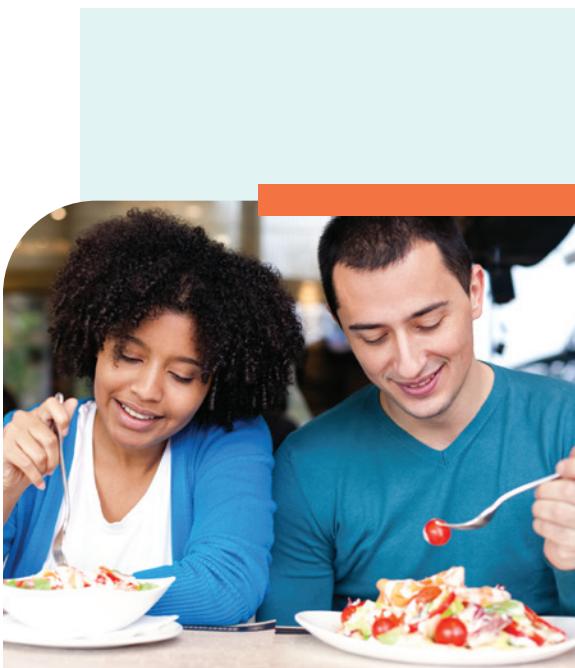
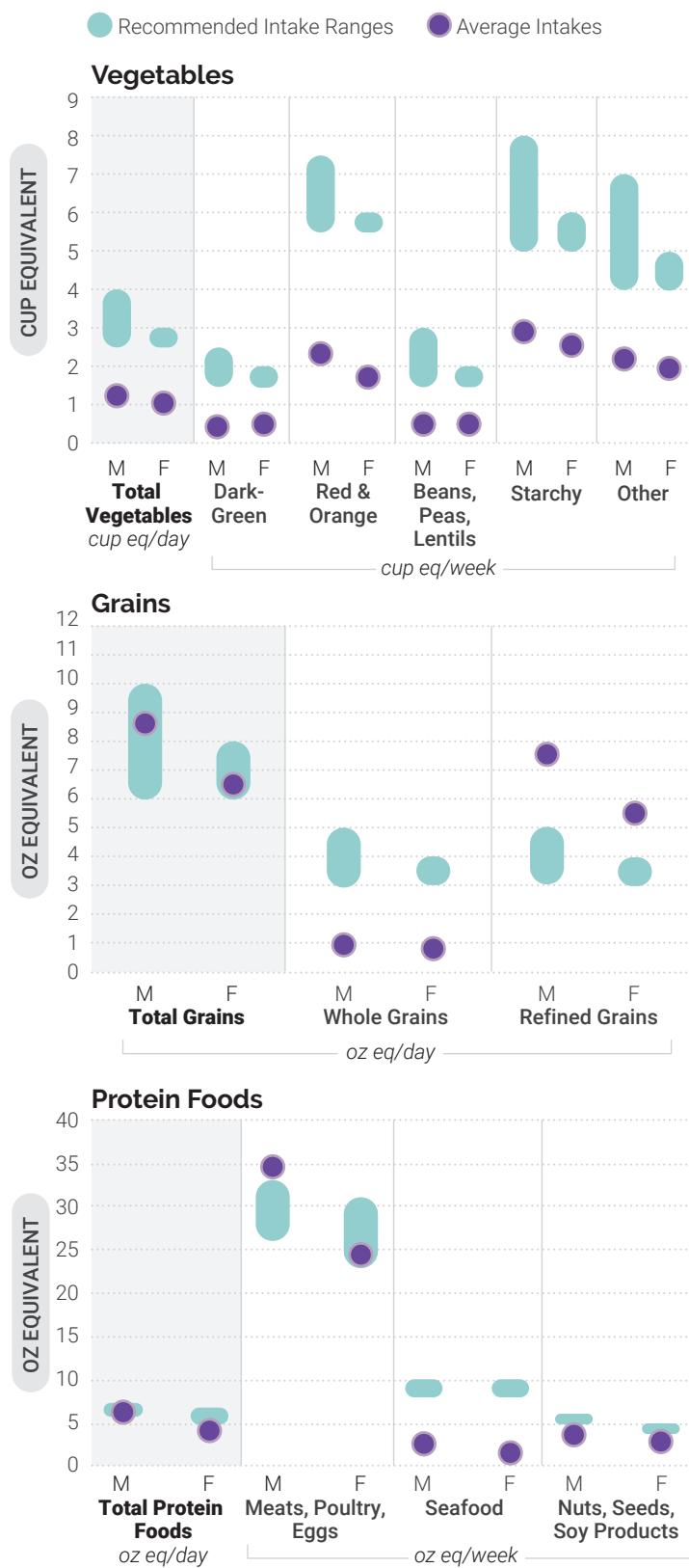
● Exceeding Limit ● Within Recommended Limit



Data Sources: Average Intake and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

Figure 3-9

Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 14 Through 18



Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

Special Considerations

The nutrition considerations for the general U.S. population described in [Chapter 1](#) apply to children and adolescents. For example, due to low intakes of food groups as described above, the nutrients of public health concern—calcium, vitamin D, potassium, and dietary fiber—apply to these life stages as well. Although the nutritional needs of youth are remarkably similar to their parents, guardians, and caregivers, these age groups do have some special nutrition considerations. Specifically, increasing intakes of sugar-sweetened beverages and decreasing intakes of dairy are dietary components with notable and concerning shifts in consumption throughout youth. Dietary intake patterns for adolescents, particularly females, also are an area of special consideration.

Accounting for the areas of dietary improvement that are important for all children and adolescents, as well as these special considerations, can improve diet quality during a time when food preferences and intake patterns are formed. When consistently followed, these healthy dietary patterns can provide the foundation for healthy dietary patterns in adulthood, promote health among youth, and help prevent the onset of chronic disease later in life.

Sugar-Sweetened Beverages

Sugar-sweetened beverages (e.g., soda, fruit drinks, sports and energy drinks) are not necessary in the child or adolescent diet nor are they a component of the USDA Dietary Patterns. Intake of added sugars

increases throughout childhood and adolescence, and sugar-sweetened beverages are a top contributor. As a percent of total daily energy intake, average intake of added sugars is 11 percent among young children and peaks at 15 percent during adolescence. Coinciding with this increase is the contribution of sugar-sweetened beverages to total intake of added sugars. In childhood, sugar-sweetened beverages make up about 15 to 25 percent of total added sugars intake. By adolescence, their contribution is 32 percent and even higher when considering coffee and tea beverages with added sugars (an additional 7 percent). Most sugar-sweetened beverages (e.g., soda, sports drinks) do not contribute to meeting food group goals and often contain a high number of calories.

Decreasing consumption of sugar-sweetened beverages to reduce added sugars intake will help youth achieve a healthy dietary pattern. Beverages that contain no added sugars should be the primary choice for children and adolescents. These include water and unsweetened fat-free or low-fat milk—including low-lactose or lactose-free options or fortified soy beverage—and 100% juice within recommended amounts. Consuming beverages with no added sugars is particularly important for young children ages 2 through 8, when only a small number of calories remains for other uses after meeting food group and nutrient needs with nutrient-dense choices ([Table 3-1](#)). The number of calories available for other uses increases slightly as energy needs increase throughout adolescence to support growth and development ([Tables 3-2](#) and [3-3](#)). However, most adolescents do not consume foods and beverages in their nutrient-dense forms, meaning they have few or no calories remaining for added sugars.





Juice

Many juice products, such as fruit drinks, contain minimal juice content and are considered sugar-sweetened beverages because they are primarily composed of water with added sugars. The percent of juice in a beverage may be found on the package label, such as “contains 25% juice” or “100% fruit juice.” The Nutrition Facts label identifies the amount of sugars in juice products that are not naturally occurring (i.e., added sugars). Although 100% fruit juice without added sugars can be part of a healthy dietary pattern, it is lower in dietary fiber than whole fruit. Dietary fiber is a dietary component of public health concern. With the recognition that fruit should mostly be consumed in whole forms, the amount of fruit juice in the USDA Food Patterns ranges from 4 fluid ounces at the lower calorie levels and no more than 10 fluid ounces at the highest calorie levels.

Dairy and Fortified Soy Alternatives

Throughout childhood and adolescence, the types of dairy foods consumed and their contribution to a healthy dietary pattern change. Milk consumption, particularly milk as a beverage, is lower and cheese intake, typically as part of mixed dishes such as sandwiches, pizza, or pasta, is higher among adolescents when compared to younger children. These differences in consumption occur alongside the widening gap between current and recommended intakes of dairy foods that occurs throughout youth. Nutrient-dense options within the dairy group are unsweetened fat-free and low-fat (1%) milk, yogurt, cheese, fortified soy beverages and yogurt, and low-lactose and lactose-free dairy products. Dairy and fortified soy alternatives provide protein and a variety of nutrients that are underconsumed during these life stages. These include three nutrients of public health concern discussed in [Chapter 1](#): potassium, calcium, and vitamin D. The nutrient composition of dairy foods highlights the importance of adequate consumption. This is especially relevant for calcium and vitamin D, given that adolescents have an increased need for consumption to support the accrual of bone mass.

Adolescent Nutrition

The difference between recommended food group amounts and current intakes is greater for adolescents ages 14 through 18 than for any other age group across the lifespan. As a result, adolescents are at greater risk of dietary inadequacy than are other age groups. For adolescent males and females, low intakes of nutrient-dense foods and beverages within the grains, dairy and alternatives, fruits, and vegetables food groups lead to low intakes of phosphorus, magnesium, and choline. Adolescent females also consume less meat, poultry, and eggs than do adolescent males, and in combination with low consumption of seafood and other protein subgroups, including beans, peas, and lentils, this results in the underconsumption of total protein. In addition, adolescent females have low dietary intakes of iron, folate, vitamin B₆, and vitamin B₁₂. The potential for nutrient deficiencies existing alongside underconsumption of nutrients of public health concern for all Americans creates a concerning constellation of nutritional risks at a time of rapid growth and development along with the onset of puberty, menarche, and hormonal changes.



Supporting Healthy Eating

The physical, mental, and emotional changes that occur as children transition from pre-school to school-age and into adolescence come with diverse and changing opportunities to support a healthy dietary pattern. Support and active engagement from the various people and places involved in the lives of children and adolescents is necessary to help establish and maintain healthy dietary patterns that support healthy weight and the prevention of chronic disease.

In early childhood, parents, guardians, and caregivers have a primary role in supporting healthy eating because they control the foods and beverages purchased, prepared, and served. Exposing young children to a variety of nutrient-dense foods within each food group helps build a healthy dietary pattern at an age when taste preferences are acquired. Introducing children to a variety of nutrient-dense foods can be challenging. As children grow, their search for a sense of autonomy and desire for independence often manifest through selective or "picky" eating, food neophobia, or food "jags" (eating only one or a few foods for periods of time). Offering the same type of food to children multiple times, in a variety of forms, or prepared in different ways can increase acceptance and intake of healthy foods within food groups. For example, children may show a

dislike for vegetables in the cooked form but accept the raw version. Or, children may only accept fruit when it is cut into small, bite-sized pieces. Even with these strategies, parents, guardians, and caregivers of young children should know it may take up to 8 to 10 exposures before a child will accept a new food.

Children's dietary patterns often resemble those of their household, highlighting the importance of their environment in the establishment of a healthy dietary pattern. Shared meals through shopping, cooking, and consumption provides parents, guardians, and caregivers with an opportunity to model healthy eating behaviors and dietary practices. By making nutrient-dense foods and beverages part of the normal household routine, children can observe and learn healthy behaviors that can extend throughout later life stages.

Ideally, children continue to be exposed to a healthy dietary pattern as they experience changes to their daily routines, such as spending time in child care or school settings. As at home, eating occasions in these settings can be used as opportunities to support a healthy dietary pattern. For example, snacks can be used as a way to promote intake of nutrient-dense fruits and vegetables, like carrot sticks and hummus or apple slices, instead of foods like chips or cookies. Using snacks as an opportunity to encourage nutrient-dense food group choices is especially relevant during early childhood when the total volume of food consumed at regular meals is lower and snacking is common.

When exposed to nutrient-dense foods and beverages at an early age and supported in making healthy choices across environments, a healthy dietary pattern can be established and maintained as children transition to the adolescence life stage. With this transition comes increasing autonomy, increased influence of peers, and decreased influence of parents, guardians, and caregivers on food choice. As a result, foods and beverages are more commonly consumed outside of the home, often with a preference for convenience foods that often are not nutrient-dense. Parents, guardians, and caregivers can continue to support healthy eating during this life stage by providing convenient access to nutrient-dense foods; involving children and adolescents in meal decisions, shopping, and cooking; and guiding adolescents' selection of food purchased and consumed outside the home. In schools and community settings, healthy eating can be encouraged by creating an environment that makes healthy choices the norm.





Accessing a Healthy Dietary Pattern

Many resources exist to support healthy growth and development during childhood and adolescence. The following Government programs play an essential role in providing access to healthy meals and educational resources to support healthy dietary patterns for all children and adolescents.

- The **Supplemental Nutrition Assistance Program (SNAP)** provides temporary benefits to families with qualifying incomes for the purchase of foods and beverages. About one-half of all SNAP participants are children.¹
- Households with young children may be eligible for the **Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)**. WIC can help families with limited resources meet their child's nutritional needs by providing nutritious foods to supplement diets. WIC serves children up to the age of 5 years who are at nutritional risk.
- In childcare and afterschool settings, the **Child and Adult Care Food Program (CACFP)** can support the development of healthy dietary patterns. CACFP is a nutrition program that provides reimbursements for meals and snacks that align with the *Dietary Guidelines* to eligible children enrolled at childcare centers, daycare homes, and in afterschool programs.
- School-age children can benefit from the **National School Lunch Program and School Breakfast Program**. The school meal programs can provide nearly two-thirds of daily calories, and therefore play an influential role in the development of a healthy dietary pattern.

- Outside of the school year, the **Summer Food Service Program (SFSP)** fills the gap by ensuring that children continue to receive nutritious meals when school is not in session. The SFSP operates at sites in a community where children can receive nutritious meals in a safe and supervised environment.

Professionals working with youth and their families can use these, and additional Government and non-Government resources that exist at the community, to support healthy eating during these life stages and to establish the foundation for a healthy dietary pattern that will promote health and support disease prevention in later years.

Looking Toward Chapter 4: Adults

This chapter focused on nutrition issues relevant to children and adolescents. These issues are particularly important because this life stage encompasses significant transitions, from young children who are still dependent on parents, guardians, and caregivers for all their food choices, to adolescents who are highly independent in their food choices. Diet quality tends to decrease as children mature into adolescence, with resulting concerns about underconsumption of nutrients of public health concern. Establishing and maintaining healthy food and beverages choices now can set a firm foundation for healthy dietary patterns that reduce the risk of diet-related chronic disease, an issue of increasing relevance to adults, who are considered in the next chapter.

¹**Source:** Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2018. Available at: www.fns.usda.gov/snap-characteristics-supplemental-nutrition-assistance-program-households-fiscal-year-2018.

ADULTS AGES 19-59





CHAPTER **4** **Adults**



Introduction

The adult life stage (ages 19 through 59) is characterized by independence, opportunity, and increased responsibility—from starting or completing education and training, to managing work and/or family, to planning for the transition to older adulthood. Balancing work or school responsibilities with personal, family, or other commitments can create real or perceived barriers to healthy eating. Constraints on available time and financial resources may make it challenging for adults to adopt and maintain a healthy dietary pattern. Support for healthy food and beverage choices across the multiple places where adults live, work, play, and gather is needed to improve dietary patterns among adults.



Many individuals enter the adult life stage with an unhealthy dietary pattern already established from the childhood and adolescent years. A concerted effort to change this trajectory and support adults in adopting a healthy dietary pattern is needed for better health and to promote the well-being of family and friends across life stages. Learned food and beverage preferences, and norms and values placed on diet, physical activity, and health, can positively or negatively influence health because they can determine an individual's willingness to change and maintain behaviors. These norms and values, including preferences toward certain types of food, attitudes about healthy eating, and beliefs about the importance of physical activity, can extend beyond the individual to larger social networks, influencing the behaviors of friends and older or younger family members. Among adults caring for children, role modeling healthy dietary choices is important because the food components of public health concern observed in earlier life stages are similar for adults.

Following a healthy dietary pattern, engaging in regular physical activity, and managing body weight are critical during this life stage. More than one-half of adults are living with one or more chronic disease—diseases that are often related to poor-quality diets and physical inactivity. Improving dietary patterns in adulthood can play a beneficial role in promoting health and preventing the onset or rate of progression of chronic disease. For adults with overweight or obesity, making healthful changes to dietary patterns and increasing physical activity will improve health and prevent additional weight gain and/or promote weight loss (see “[The Importance of Physical Activity](#)” and “[Overweight and Obesity](#)”).



The Importance of Physical Activity

Adults who are physically active are healthier, feel better, and are less likely to develop many chronic diseases than are adults who are inactive. For adults, regular physical activity can provide both immediate benefits (e.g., boost mood, reduce stress, improve sleep) and long-term benefits (e.g., improved bone health and reduced risk of many diseases, such as cardiovascular disease, type 2 diabetes, depression, dementia, and many types of cancer).

Adults should move more and sit less throughout the day. Some physical activity is better than none. To attain the most health benefits from physical activity, adults need at least 150 to 300 minutes of moderate-intensity aerobic activity, like brisk walking or fast dancing, each week. Adults also need muscle-strengthening activity, like lifting weights or doing push-ups, at least 2 days each week.

The U.S. Department of Health and Human Service's *Physical Activity Guidelines for Americans* and related Move Your Way® resources have more information about the benefits of physical activity and tips on how to get started. Available at [health.gov/paguidelines](https://www.health.gov/paguidelines).

Overweight and Obesity

In the United States, 74 percent of adults have overweight or obesity, creating an increased risk for the development of other chronic health conditions, including cardiovascular disease, type 2 diabetes, and certain types of cancer.

Losing weight and maintaining weight loss is not a simple task. It requires adults to reduce the number of calories they get from foods and beverages and increase the amount expended through physical activity. Weight loss and maintenance are not likely achieved using short-term solutions. They require a commitment to long-term lifestyle change and often need support from healthcare providers, family members, and social networks. Intensive behavioral interventions that use one or more strategies—like group sessions and changes in both diet and physical activity—can be effective for individuals trying to lose a significant amount of weight. In addressing obesity, professionals should be mindful of health problems stemming from obesity-related stigma and discrimination.

The Centers for Disease Control and Prevention's website provides resources to support preventing weight gain ([cdc.gov/healthyweight/prevention/index.html](https://www.cdc.gov/healthyweight/prevention/index.html)) and losing weight ([cdc.gov/healthyweight/losing_weight/index.html](https://www.cdc.gov/healthyweight/losing_weight/index.html)).



Healthy Dietary Patterns

Adults are encouraged to follow the recommendations on the types of foods and beverages that make up a healthy dietary pattern described in [Chapter 1. Nutrition and Health Across the Lifespan: The Guidelines and Key](#)

Recommendations. The USDA Dietary Patterns provide a framework of nutrient-dense foods and beverages that can be adapted to accommodate budget, culture, and personal preferences to help adults follow a healthy dietary pattern and meet the Guidelines and their Key Recommendations.

Table 4-1 displays the Healthy U.S.-Style Dietary Pattern at eight calorie levels that are appropriate for most adults ages 19 through 59 years to illustrate the specific amounts and limits for food groups and other dietary components that make up healthy dietary patterns. In general, calorie needs are lower for females compared to males. Calorie needs decline throughout adulthood due to changes in metabolism that accompany aging. Level of physical activity, body composition, and the presence of chronic disease are additional factors that affect calorie needs.

Females ages 19 through 30 require about 1,800 to 2,400 calories a day. Males in this age group have higher calorie needs of about 2,400 to 3,000 a day. Calorie needs for adults ages 31 through 59 are generally lower; most females require about 1,600 to 2,200 calories a day and males require about 2,200 to 3,000 calories a day. Additional information on these estimates is provided in [Table 4-1 \(footnote a\)](#) and in [Appendix 2. Estimated Calorie Needs](#). The USDA Dietary Patterns are discussed in greater detail in [Chapter 1](#) and [Appendix 3. USDA Dietary Patterns](#).



Nutrient-Dense Foods and Beverages

Nutrient-dense foods and beverages provide vitamins, minerals, and other health-promoting components and have little added sugars, saturated fat, and sodium. Vegetables, fruits, whole grains, seafood, eggs, beans, peas, and lentils, unsalted nuts and seeds, fat-free and low-fat dairy products, and lean meats and poultry—when prepared with no or little added sugars, saturated fat, and sodium—are nutrient-dense foods.



Table 4-1

Healthy U.S.-Style Dietary Pattern for Adults Ages 19 Through 59, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000
FOOD GROUP OR SUBGROUP ^b	Daily Amount of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)							
Vegetables (cup eq/day)	2	2 ½	2 ½	3	3	3 ½	3 ½	4
Vegetable Subgroups in Weekly Amounts								
Dark-Green Vegetables (cup eq/wk)	1 ½	1 ½	1 ½	2	2	2 ½	2 ½	2 ½
Red & Orange Vegetables (cup eq/wk)	4	5 ½	5 ½	6	6	7	7	7 ½
Beans, Peas, Lentils (cup eq/wk)	1	1 ½	1 ½	2	2	2 ½	2 ½	3
Starchy Vegetables (cup eq/wk)	4	5	5	6	6	7	7	8
Other Vegetables (cup eq/wk)	3 ½	4	4	5	5	5 ½	5 ½	7
Fruits (cup eq/day)	1 ½	1 ½	2	2	2	2	2 ½	2 ½
Grains (ounce eq/day)	5	6	6	7	8	9	10	10
Whole Grains (ounce eq/day)	3	3	3	3 ½	4	4 ½	5	5
Refined Grains (ounce eq/day)	2	3	3	3 ½	4	4 ½	5	5
Dairy (cup eq/day)	3	3	3	3	3	3	3	3
Protein Foods (ounce eq/day)	5	5	5 ½	6	6 ½	6 ½	7	7
Protein Foods Subgroups in Weekly Amounts								
Meats, Poultry, Eggs (ounce eq/wk)	23	23	26	28	31	31	33	33
Seafood (ounce eq/wk)	8	8	8	9	10	10	10	10
Nuts, Seeds, Soy Products (ounce eq/wk)	4	4	5	5	5	5	6	6
Oils (grams/day)	22	24	27	29	31	34	36	44
Limit on Calories for Other Uses (kcal/day)^c	100	140	240	250	320	350	370	440
Limit on Calories for Other Uses (%/day)	6%	8%	12%	11%	13%	13%	13%	15%

^a Calorie level ranges: Ages 19 through 30, Females: 1,800-2,400 calories; Males: 2,400-3,000 calories. Ages 31 through 59, Females: 1,600-2,200 calories; Males 2,200-3,000 calories. Energy levels are calculated based on median height and body weight for healthy body mass index (BMI) reference individuals. For adults, the reference man is 5 feet 10 inches tall and weighs 154 pounds. The reference woman is 5 feet 4 inches tall and weighs 126 pounds. Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals, available at nal.usda.gov/fnic/dri-calculator, can be used to estimate calorie needs based on age, sex, height, weight, and activity level.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Appendix 3](#).

^c All foods are assumed to be in nutrient-dense forms; lean or low-fat; and prepared with minimal added sugars, refined starches, saturated fat, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The number of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars, saturated fat, or alcohol, or to eat more than the recommended amount of food in a food group.

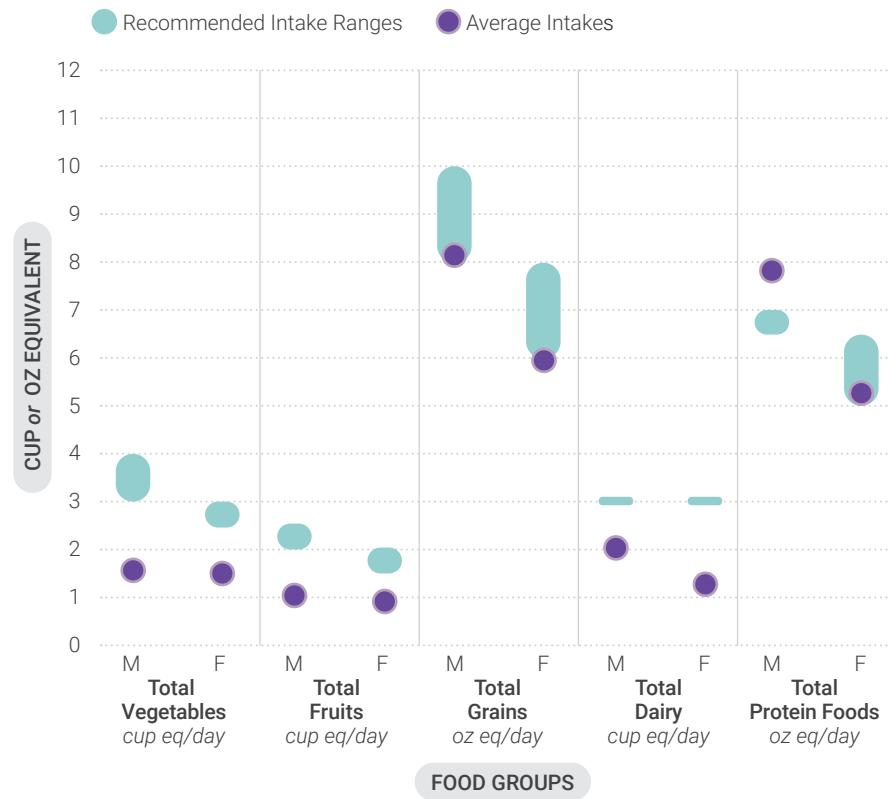
NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars, saturated fat, and alcohol; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded. See [Appendix 3](#) for all calorie levels of the pattern.

Current Intakes

Figure 4-1

Current Intakes: Ages 19 Through 30

Average Daily Food Group Intakes Compared to Recommended Intake Ranges

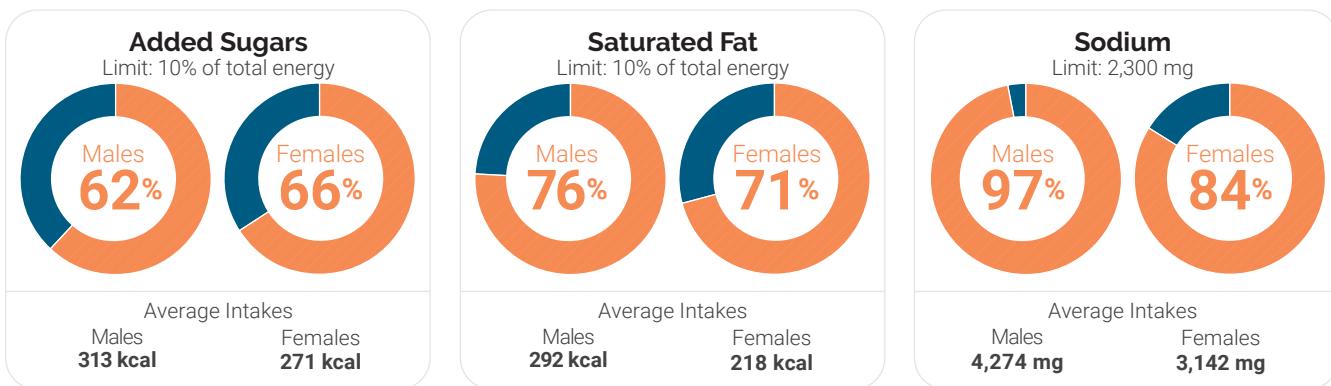


Healthy Eating Index Score (on a scale of 0-100)



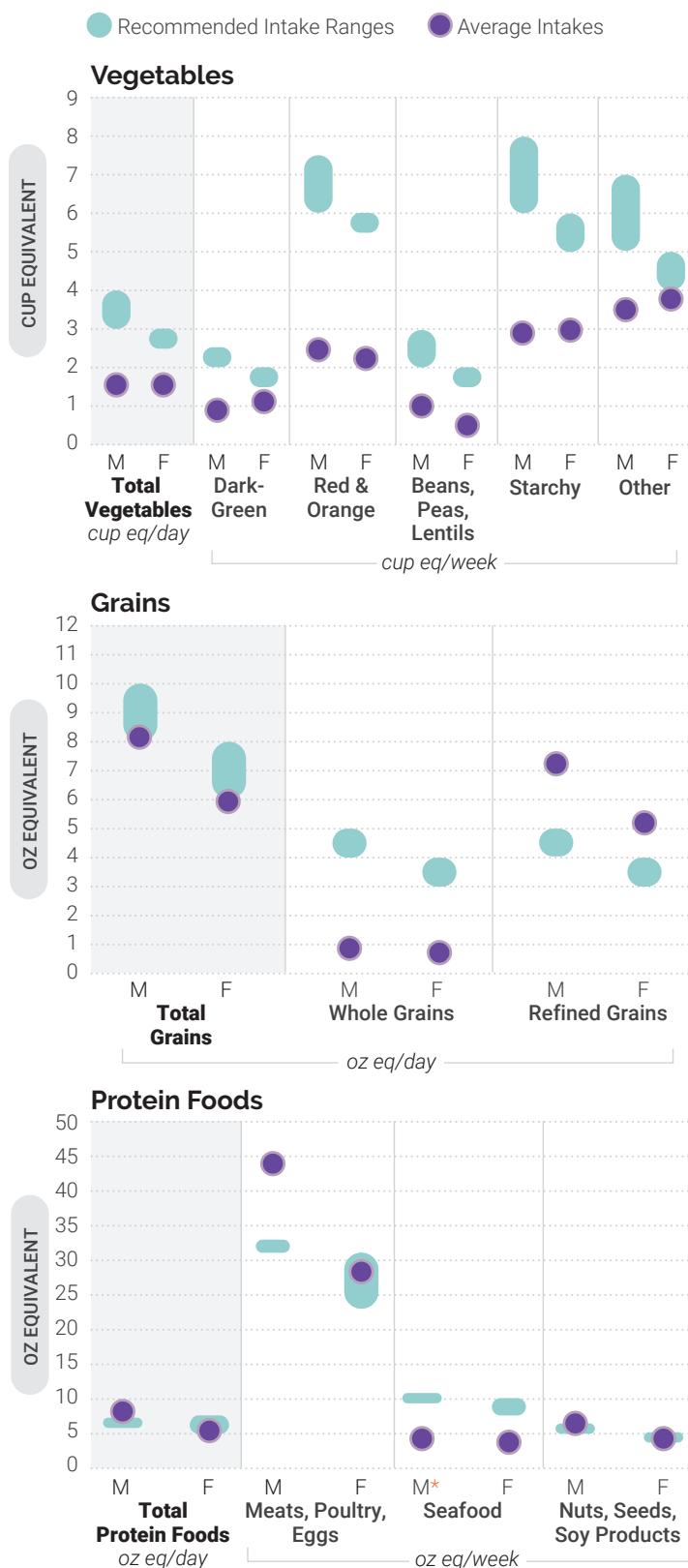
Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium

● Exceeding Limit ● Within Recommended Limit



Data Sources: Average Intakes and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

Figure 4-2
Average Intakes of Subgroups Compared to Recommended Intake Ranges: Ages 19 Through 30



*NOTE: Estimates may be less precise than others due to small sample size and/or large relative standard error.

Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

Figures 4-1 to 4-4 highlight the dietary intake of adults, including the Healthy Eating Index-2015 (HEI) score, which is an overall measure of how intakes align with the *Dietary Guidelines*, as well as information on the components of a healthy diet—specifically, the food groups. **Figures 4-1** and **4-3** display the average intakes of the food groups compared to the range of recommended intakes at the calorie levels most relevant to males and females in both adult age groups. Additionally, the percent of adults exceeding the limits for added sugars, saturated fat, and sodium is shown, along with average intakes of these components. Average intakes compared to recommended intake ranges of the subgroups for grains are represented in daily amounts; subgroups for vegetables and protein foods are represented in weekly amounts (see **Figures 4-2** and **4-4**).

The HEI scores in **Figures 4-1** and **4-3** show that adults across this life stage have diets that do not align with the recommendations for food group and nutrient intake as described in **Chapter 1**. Although intake patterns are generally not consistent with the *Dietary Guidelines*, adults ages 31 through 59 have a slightly higher HEI score (59 out of 100) compared to adults ages 19 through 30 (56 out of 100).

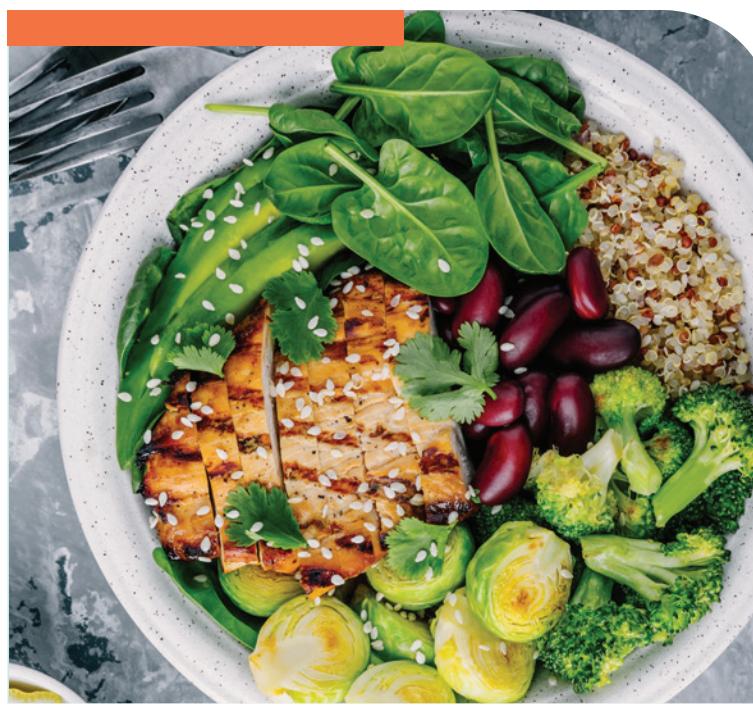
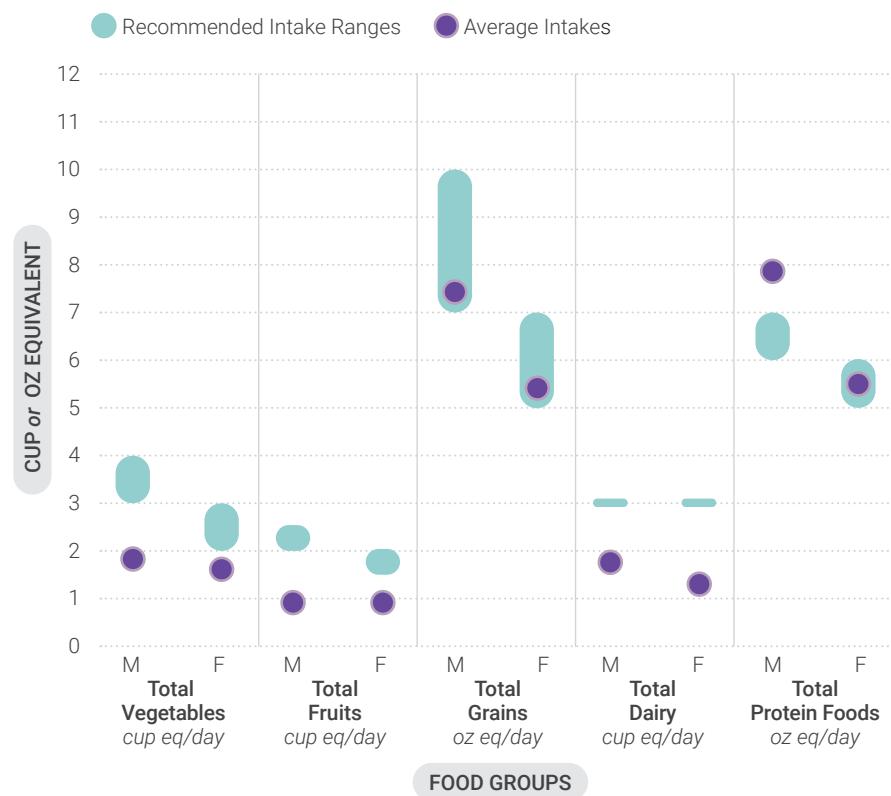
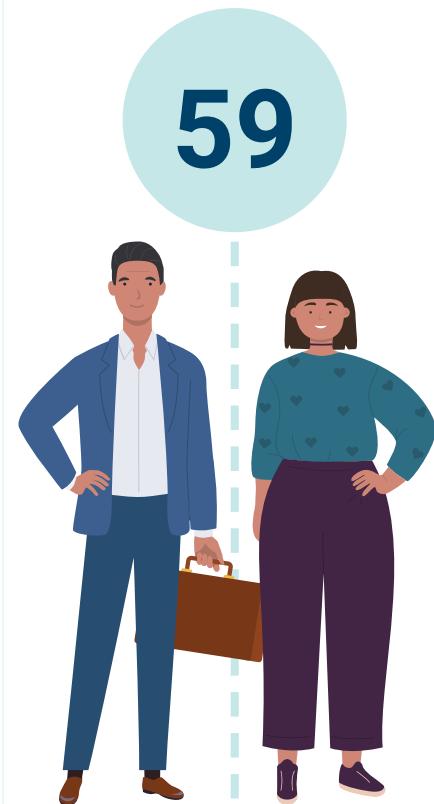
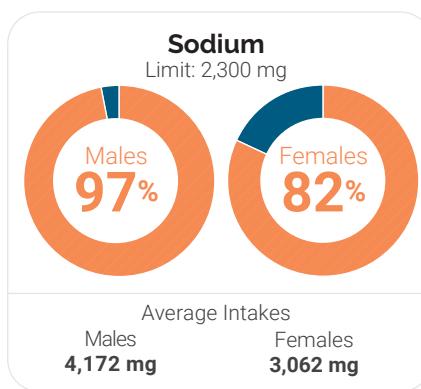
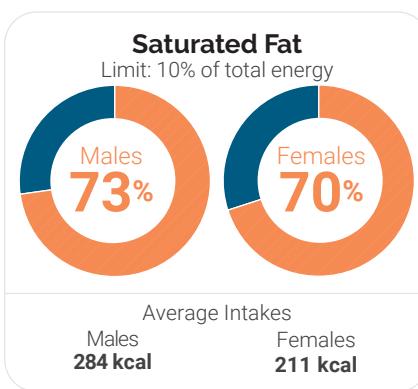
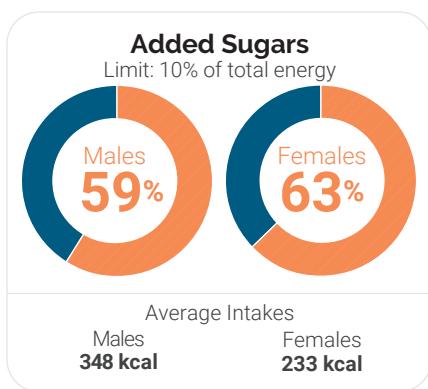


Figure 4-3

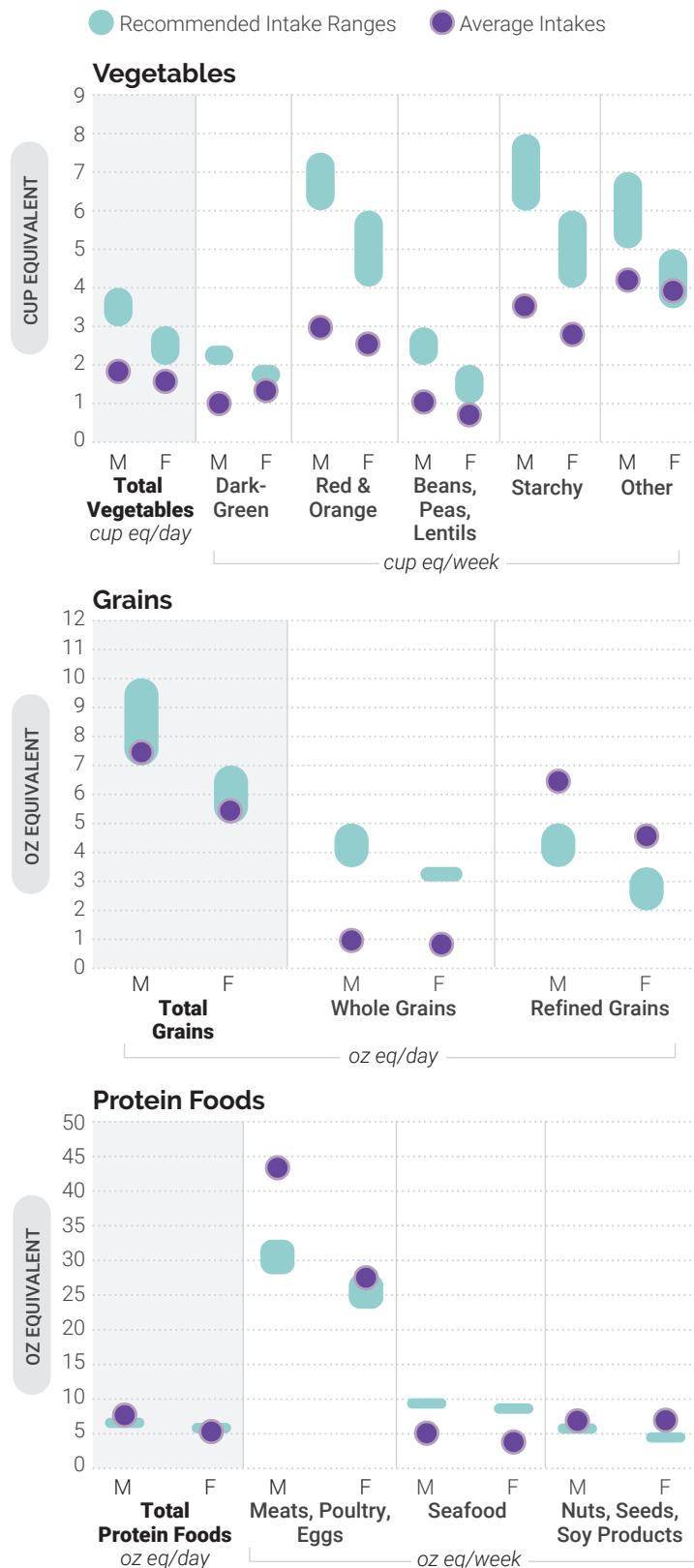
Current Intakes: Ages 31 Through 59**Average Daily Food Group Intakes Compared to Recommended Intake Ranges****Healthy Eating Index Score
(on a scale of 0-100)****Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium**

● Exceeding Limit ● Within Recommended Limit



Data Sources: Average Intakes and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

Figure 4-4
**Average Intakes of Subgroups
 Compared to Recommended Intake Ranges:
 Ages 31 Through 59**



Average intakes of fruits, vegetables, and dairy fall below the range of recommended intakes for all adults. Although average total grains intakes meets recommendations, **Figures 4-2** and **4-4** show that intake of whole grains is well below recommendations, and intakes of refined grains exceeds the upper end of the recommended intake range for adults in both age groups. Intakes of protein foods generally meets or exceeds recommended intake levels. Current patterns generally include meats, poultry, eggs, and nuts, seeds, and soy, while average intake of seafood falls well below recommendations. Beans, peas, and lentils—a subgroup of both the vegetable and protein foods groups—also are underconsumed by most adults.

Figures 4-1 and **4-3** show that adults are exceeding recommendations for added sugars, saturated fat, and sodium. About 60 percent of men and 65 percent of women exceed the limit for intakes of added sugars. This is an average daily intake of about 330 calories from added sugars for men and around 250 calories for women. More than 70 percent of adults are exceeding the recommendations for saturated fat. The average daily intakes of saturated fat is about 290 calories for men and 210 calories for women. The calorie levels relevant to most adults (1,600-3,000 calories) have about 100 to 400 calories remaining after food group recommendations are met through nutrient-dense choices. Combined, these average amounts of calories from added sugars and saturated fat exceed the amount most adults have available—and do not account for calories from alcoholic beverages. For sodium, nearly all men and about 80 percent of women consume too much on a given day. Men generally consume more than 4,000 mg of sodium per day and women more than 3,000 mg.

Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

Special Considerations

The dietary considerations for the general U.S. population, including adults, are described in [Chapter 1](#). The following sections of this chapter focus on several special considerations to support a healthy dietary pattern for adults that reflect adults' current intake patterns and the prevalence of overweight and obesity and diet-related chronic disease that become more apparent in this life stage. These considerations include a focus on dietary changes to increase intakes of dietary fiber, calcium, and vitamin D and to decrease intakes of added sugars, saturated fat, and sodium. Special considerations related to alcoholic beverages also are discussed.

Dietary Fiber

Dietary patterns that do not meet recommended intakes of fruits, vegetables, and whole grains contribute to low intakes of dietary fiber. More than 90 percent of women and 97 percent of men do not meet recommended intakes for dietary fiber. This aligns with intake patterns where fruits, vegetables, and whole grains are underconsumed by more than 85 percent of adults. [Appendix 1. Nutritional Goals for Age-Sex Groups](#) provides dietary fiber goals for men and women based on the Dietary Reference Intakes.

These recommendations are based on levels observed to reduce risk of coronary heart disease. Increasing intakes of fruits, vegetables, and replacing refined grains with whole grains to improve dietary fiber intakes is especially important during this life stage, as the impact of poor diet quality becomes apparent with the onset and/or progression of diet-related chronic diseases. [Chapter 1](#) provides strategies on how to increase intakes of these important food groups. A list of common food sources of dietary fiber is available at [DietaryGuidelines.gov](#).

Calcium and Vitamin D

Calcium and vitamin D are important at any age, and most adults do not consume adequate amounts. Close to 30 percent of men and 60 percent of women older than age 19 years do not consume enough calcium, and more than 90 percent do not consume enough vitamin D. Dietary patterns that do not meet recommended intake amounts for food groups and subgroups, which include sources of calcium and vitamin D—such as dairy foods and fortified soy alternatives and seafood—contribute to low intake of



these nutrients. Particular attention should be given to consuming adequate amounts of foods with these nutrients during adult years to promote optimal bone health and prevent the onset of osteoporosis. Adequate intake of calcium and vitamin D is particularly important for adults during the time period when peak bone mass is still actively accruing (ages 19 through about 30) and, for women, in the post-menopausal period when rapid bone remodeling occurs.

A healthy dietary pattern with nutrient-dense, calcium-rich foods, such as low-fat milk and yogurt and fortified soy alternatives and canned sardines and salmon, can help adults better meet intake recommendations. Vitamin D aids in the absorption of calcium. Consuming the recommended amount of seafood and choosing foods that are fortified with vitamin D, including milk, fortified soy beverages, and fortified soy yogurt, and some whole-grain cereals, can help adults meet their needs. In addition to dietary sources, the body can make vitamin D from the



sun. However, some individuals may have difficulty producing sufficient vitamin D from sunlight exposure or consuming enough vitamin D from foods and beverages, so a supplement may be recommended by a health professional. [Appendix 1](#) provides calcium and vitamin D goals for men and women based on the Dietary Reference Intakes. A list of common food sources of calcium and vitamin D is available at [DietaryGuidelines.gov](#).

Saturated Fat

[Chapter 1](#) explains the importance of limiting intakes of saturated fat to support healthy dietary patterns. Staying within saturated fat limits and replacing saturated fat with unsaturated fat is of particular importance during the adult life stage. The prevalence of coronary heart disease increases with age, and high LDL cholesterol peaks between the ages of 50 to 59 in men and 60 to 69 in women.

¹ Ostchega Y, Fryar CD, Nwankwo T, Nguyen DT. Hypertension prevalence among adults aged 18 and over: United States, 2017–2018. NCHS Data Brief, no 364. Hyattsville, MD: National Center for Health Statistics. 2020

About 70 to 75 percent of adults exceed the 10-percent limit on saturated fat as a result of selecting foods and beverages across food groups that are not in nutrient-dense forms. The top sources of saturated fat for adults are sandwiches (e.g., deli sandwiches, burgers, tacos, burritos, grilled cheese, hot dogs) and other grain-based mixed dishes (e.g. spaghetti and meatballs, casseroles, quesadillas) that typically contain ingredients from several food groups that are not in nutrient-dense forms, including grains, protein foods, and dairy. Making changes to the type of ingredients as well as amount and/or frequency of their consumption will help adults lower saturated fat intake without a need to eliminate these foods from the household diet. Strategies include using lean meats and low-fat cheese to prepare these foods or substituting beans in place of meats as the protein source. Saturated fat also can be reduced by substituting certain ingredients with sources of unsaturated fat (e.g., using avocado, nuts, or seeds in a dish instead of cheese). Cooking with oils higher in polyunsaturated and monounsaturated fat (e.g., canola, corn, olive, peanut, safflower, soybean, and sunflower) instead of butter also can reduce intakes of saturated fat.

Sodium

The number of adults exceeding the Chronic Disease Risk Reduction level for sodium (see [Chapter 1](#) or [Appendix 1](#)) during this life stage is concerning given that 45 percent of adults ages 18 and older are living with hypertension. During adulthood, prevalence of hypertension increases from about 22 percent of adults ages 18 through 39 to about 55 percent of adults ages 40 through 59.¹ Changing this trend is important because hypertension is a preventable risk factor for cardiovascular disease and stroke. Unlike other factors that cannot be changed, such as genetics and family history, reduced dietary intake of sodium is a modifiable risk factor that can help improve blood pressure control and reduce risk of hypertension.

Overconsumption of sodium occurs for several reasons, as discussed in [Chapter 1](#). Because sodium is found in foods and beverages across all food groups, with most coming from foods that have salt added during commercial processing rather than salt added to foods during or after preparation, reducing sodium consumption will require a joint effort by individuals, the food and beverage industry, and food service and retail establishments.

Added Sugars

Most adults exceed recommended limits for added sugars as a result of eating foods and drinking beverages higher in added sugars and selecting foods and beverages across food groups that are not in nutrient-dense forms. Added sugars are of particular concern for adults because exceeding limits contributes to excess calorie intake.

BEVERAGES AS A SOURCE OF ADDED SUGARS

Sugar-sweetened beverages (e.g., soda, sports drinks, energy drinks, fruit drinks) and sweetened coffees and teas (including ready-to-drink varieties) contribute over 40 percent of daily intake of added sugars. More than in earlier life stages, adults consume coffees and teas with additions, such as sugar and flavored syrup. Frequent consumption of these and other beverages containing added sugars can contribute to excess calorie intake. Some sugar-sweetened beverages, such as coffee and tea with milk, contribute to food group intake (e.g., dairy) and can be made without added sugars. Others, such as fruit drinks, can be replaced with nutrient-dense options such as 100% juice to help meet fruit group recommendations.

Most adults' diets include choices across multiple food groups that are not in nutrient-dense forms and therefore cannot accommodate excess calories from

sweetened beverages. Intake of sugar-sweetened beverages should be limited to small amounts and most often replaced with beverage options that contain no added sugars, such as water.

OTHER SOURCES OF ADDED SUGARS

A variety of foods and beverages contribute to the remaining added sugars consumed by adults. In addition to the contribution of sugar-sweetened beverages and sweetened coffees and teas, about 30 percent come from desserts and sweet snacks, candies, and sweetened breakfast cereals. The remaining 30 percent of added sugars is consumed in relatively small amounts across many food categories, as discussed in [Chapter 1](#). Many of these food categories have seen market expansion in recent years. For example, over the past decade, beverages, snacks, and bakery foods have continuously topped the list for the most new product introductions.² As these and other food categories continue to change and expand, it is vital for individuals to learn how to identify the amount of added sugars in a beverage or food product by reading the Nutrition Facts label (see [Chapter 1](#)). Understanding which food choices contribute to intakes of added sugars without contributing to nutrient needs can help individuals remove or replace these foods with better choices that meet food group and nutrient recommendations within calorie needs.

² Additional information is available at ers.usda.gov/topics/food-markets-prices/processing-marketing/new-products.aspx.



Alcoholic Beverages

Alcoholic beverages are not a component of the USDA Dietary Patterns and their calories are considered discretionary. Regular consumption of alcoholic beverages can make it challenging for adults to meet food group and nutrient needs while not consuming excess calories. The ingredients in certain mixed drinks, including soda, mixers, and heavy cream, also can contribute to intake of added sugars and saturated fat.

The majority of U.S. adults consume alcoholic beverages. About 66 percent of adults ages 21 through 59 report alcoholic beverage consumption in the past month, and of those, approximately half report binge drinking, sometimes multiple times per month. Among adults who choose to drink, average intakes of calories from alcoholic beverages exceed the remaining calorie limit that is available after food group recommendations are met.

There are some adults who should not drink alcoholic beverages at all, such as if they are pregnant or might be pregnant; younger than age 21; or recovering from an alcohol use disorder or if they are unable to control the amount they drink. For those who choose to drink, intakes should be limited to 1 drink or less in a day for women and 2 drinks or less in a day for men, on days when alcohol is consumed. More information is available in [Chapter 1](#) under Alcoholic Beverages.

Supporting Healthy Eating

Individuals need support in making healthy choices at home, work, and in the community to build healthy dietary patterns.

Food retail outlets (e.g., grocery stores, convenience stores, restaurants) provide adults with the option to purchase ingredients to prepare foods themselves or to purchase foods prepared by others. National food expenditures suggest the purchase of prepared foods is a regular habit for most adults, with expenditures outpacing those of foods purchased for household meal preparation.³ Estimates also suggest that the younger generation of American adults are spending an even larger proportion of their total food dollars on prepared foods than are older generations.⁴

³ Details are available at ers.usda.gov/webdocs/publications/96957/ap-083.pdf?v=5848.3.

⁴ Details are available at ers.usda.gov/amber-waves/2017/december/millennials-devote-larger-shares-of-their-grocery-spending-to-prepared-foods-pasta-and-sugar-and-sweets-than-other-generations.



When adults prepare meals themselves, they have more control over the types of food ingredients selected and can focus on choosing nutrient-dense options that contribute to food group goals with little or no added sugars and saturated fat and less sodium. The same is not always true when purchasing prepared foods, despite changes and innovation in the marketplace, such as menu and product labeling or reformulation.

For some adults, preparing and consuming healthy meals at home will mean adopting a new habit and/or learning new skills, such as meal planning. For others, it may entail small changes to current routines. Planning meals and snacks in advance with food groups and nutrient-dense foods and beverages in mind can support healthy eating at home and improve dietary patterns of individuals and families. Preparing meals with family and friends also presents an opportunity for greater connection and enjoyment around food. For adults who are parents, guardians, or caregivers of children or adolescents, preparing meals also provides an opportunity to teach valuable cooking skills and model behaviors that support the adoption of healthy dietary patterns across younger life stages.

It is not realistic or desirable to avoid the purchase and consumption of foods prepared by others. Limits on available time and the desire for convenience make restaurant and ready-to-eat meals a part of many household routines. Many of these settings also provide for social enjoyment of food with friends and family. However, foods prepared outside of the home can contribute to the overconsumption of calories as a result of large portion sizes and methods of preparation. Being mindful of the portion sizes and ingredients of prepared foods can help adults achieve a healthy dietary pattern while still enjoying foods prepared by others. Health promotion activities that center on increasing consumer knowledge and access to healthy options in the places where Americans purchase prepared foods are needed to provide support for adults in these efforts.

Health professionals play an important role in supporting adults' healthy eating behaviors. Helping adults become more aware of the foods and beverages that make up their typical dietary patterns and identifying areas for improvement can empower individuals to make changes to the types of foods they purchase or prepare. Teaching skills like cooking and meal planning and helping adults understand how to read labels or make healthy menu substitutions also will support the adoption of a healthy dietary pattern during this life stage.

In settings where adults spend their time, changing organizational practices, approaches, and/or policies to support improved dietary patterns also is needed. Strategies include offering healthy meals and snacks in workplace cafeterias and vending machines, or implementing educational programs tailored to working adults. Or, communities can support farmers markets, community gardens, and related educational programming efforts.

Learn More

The *Federal Foodservice Guidelines* is a resource that food service providers can use to help make healthy choices more available in food service establishments. The Guidelines are available at [cdc.gov/nutrition/healthy-food-environments/food-serv-guide.html](https://www.cdc.gov/nutrition/healthy-food-environments/food-serv-guide.html).

Accessing a Healthy Dietary Pattern

A healthy dietary pattern can only be achieved when adequate resources and supports exist in the places where adults live, work, and gather. Food access is crucial for adults to achieve a healthy dietary pattern and is influenced by diverse factors, as discussed in [Chapter 1](#). Food insecurity, which occurs when access to nutritionally adequate and safe food is limited or uncertain, is most prevalent in households with children and in single-parent households. Income is one of the primary characteristics associated with food insecurity. Government programs, such as the **Supplemental Nutrition Assistance Program (SNAP)** or the **Food Distribution Program on Indian Reservations (FDPIR)**, serve as a resource for low-income adults by supplementing food budgets to support healthy lifestyles. Adults with children or those caring for older family members also may benefit from resources discussed in [Chapters 2, 3, and 6](#).

Additional Government and non-Government resources, such as food banks or community meal sites and programming offered through **SNAP Education (SNAP-Ed)** and the **Expanded Food and Nutrition Education Program (EFNEP)**, play a role in providing food and educational resources to support adults in making healthy food choices within a limited budget. Innovative approaches to support health, such as incentive programs at farmers markets or healthy corner-store initiatives, continue to expand. Continued attention and creativity in approaches to expand food access are needed to support a healthy dietary pattern for adults and the larger social networks that they influence.



Looking Toward Chapter 5: Women Who Are Pregnant or Lactating and Chapter 6: Older Adults

This chapter has discussed the importance of a healthy dietary pattern and related special considerations during the adult life stage. The chapter recognizes that dietary patterns are generally well established by the time individuals reach adulthood and encourages adults to take advantage of the many opportunities available to make changes that support a healthy dietary pattern. Making these changes can have important benefits for achieving a healthy weight status, reducing chronic disease risk, and

promoting overall health. These considerations are especially important for the life stages discussed in the next two chapters. **Chapter 5** takes a closer look at a special time in the life of many adults—pregnancy and lactation. This chapter echoes the same guidance for adults on following a healthy dietary pattern and discusses several special considerations that arise during this life stage. **Chapter 6** then makes the transition from the Adults chapter to a focused look at healthy eating for older adults.







CHAPTER 5

Women Who Are Pregnant or Lactating

Introduction

Pregnancy and lactation are special stages of life for women, and nutrition plays a vital role before, during, and after these life stages to support the health of the mother and her child. Following a healthy dietary pattern is especially important for those who are pregnant or lactating for several reasons. Increased calorie and nutrient intakes are necessary to support the growth and development of the baby and to maintain the mother's health. Consuming a healthy dietary pattern before and during pregnancy also may improve pregnancy outcomes. In addition, following a healthy dietary pattern before and during pregnancy and lactation has the potential to affect health outcomes for both the mother and child in subsequent life stages.

This chapter addresses some important nutritional considerations for women before pregnancy and contains nutrition guidance for women during pregnancy and lactation. A healthy dietary pattern, along with changing calorie and nutrient needs during pregnancy and lactation, are described throughout the chapter. Special consideration is given to the importance of achieving and maintaining a healthy weight before pregnancy, gaining weight within gestational weight gain guidelines, and returning to a healthy weight during the postpartum period. A healthy weight status during these life stages has short- and long-term health benefits for the mother and her child. The chapter also discusses other considerations important to pregnancy and lactation, including those related to intake of seafood, alcohol, and caffeinated beverages. Finally, during pregnancy, nausea, vomiting, food aversions, and food cravings can make it difficult for some women to achieve optimal dietary intake. The chapter discusses how these can be considered when helping women who are pregnant or lactating make healthy food and beverage choices.



Healthy Dietary Patterns

Women who are pregnant or lactating are encouraged to follow the recommendations on the types of foods and beverages that make up a healthy dietary pattern described in [Chapter 1. Nutrition and Health Across the Lifespan: The Dietary Guidelines and Key Recommendations](#).

The core elements of a healthy diet for women during these life stages are similar to the recommendations for women who are not pregnant.

Table 5-1 shows the Healthy U.S.-Style Dietary Pattern to illustrate the specific amounts and limits for food groups and other dietary components that make up healthy dietary patterns at the six calorie levels most relevant to women who are pregnant or lactating. Following a healthy dietary pattern during these life stages can help women meet the Guidelines and its Key Recommendations. The USDA Dietary Patterns are discussed in greater detail in [Chapter 1](#) and [Appendix 3. USDA Dietary Patterns](#).

Table 5-2 summarizes estimated daily calorie needs during pregnancy and lactation compared to prepregnancy needs for women with a healthy prepregnancy weight. Additional information on estimates of prepregnancy calorie needs is provided in [Table 5-1 \(footnote a\)](#) and in [Appendix 2. Estimated Calorie Needs](#).

As shown in **Table 5-2**, calorie needs generally increase as pregnancy progresses and remain elevated during lactation. However, it is important to note that women with a prepregnancy weight that is considered overweight or obese have lower weight gain recommendations than do women with a healthy prepregnancy weight (see “[Weight Management](#)”). Women should follow their healthcare provider’s guidance regarding appropriate caloric intake during pregnancy and lactation, as many factors, including prepregnancy weight status, gestational weight gain, and multiple pregnancies, may affect calorie needs. In general, it is important for women who are pregnant to be under the care of a healthcare provider who can monitor their health status and the progress of their pregnancy.

The increased calorie and nutrient needs for these life stages should be met by consuming nutrient-dense food choices as part of a healthy dietary pattern. One way to achieve this is to follow the Healthy U.S.-Style Dietary Pattern throughout pregnancy and lactation, but adjust intake of food groups to reflect higher calorie patterns recommended during the second and third trimesters

of pregnancy and throughout lactation. In short, women should meet their increased calorie and nutrient needs with nutrient-dense foods instead of foods high in added sugars, saturated fat, and sodium.

The customizable components of the USDA Dietary Patterns provide flexibility that allows women—or professionals adapting these patterns—to choose from a variety of foods and beverages within each food group to suit individual preference, lifestyle, traditions, culture, and budget. This flexibility in being able to select among a variety of nutrient-dense options is particularly important for women who experience pregnancy-induced nausea, vomiting, or food aversions.

When making food and beverage choices, women should know that unless it’s medically indicated to avoid for her own health, women do *not* need to restrict their choices during pregnancy or lactation to prevent food allergy from developing in their child. However, women who are pregnant should pay attention to some important food safety considerations (see “[Food Safety During Pregnancy](#)”).

Nutrient-Dense Foods and Beverages

Nutrient-dense foods and beverages provide vitamins, minerals, and other health-promoting components and have little added sugars, saturated fat, and sodium. Vegetables, fruits, whole grains, seafood, eggs, beans, peas, and lentils, unsalted nuts and seeds, fat-free and low-fat dairy products, and lean meats and poultry—when prepared with no or little added sugars, saturated fat, and sodium—are nutrient-dense foods.

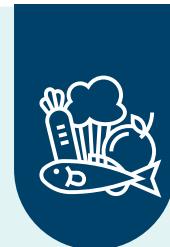


Table 5-1

Healthy U.S.-Style Dietary Pattern for Women Who Are Pregnant or Lactating, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,800	2,000	2,200	2,400	2,600	2,800
FOOD GROUP OR SUBGROUP ^b	Daily Amount of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)					
Vegetables (cup eq/day)	2 ½	2 ½	3	3	3 ½	3 ½
Vegetable Subgroups in Weekly Amounts						
Dark-Green Vegetables (cup eq/wk)	1 ½	1 ½	2	2	2 ½	2 ½
Red & Orange Vegetables (cup eq/wk)	5 ½	5 ½	6	6	7	7
Beans, Peas, Lentils (cup eq/wk)	1 ½	1 ½	2	2	2 ½	2 ½
Starchy Vegetables (cup eq/wk)	5	5	6	6	7	7
Other Vegetables (cup eq/wk)	4	4	5	5	5 ½	5 ½
Fruits (cup eq/day)	1 ½	2	2	2	2	2 ½
Grains (ounce eq/day)	6	6	7	8	9	10
Whole Grains (ounce eq/day)	3	3	3 ½	4	4 ½	5
Refined Grains (ounce eq/day)	3	3	3 ½	4	4 ½	5
Dairy (cup eq/day)	3	3	3	3	3	3
Protein Foods (ounce eq/day)	5	5 ½	6	6 ½	6 ½	7
Protein Foods Subgroups in Weekly Amounts						
Meats, Poultry, Eggs (ounce eq/wk)	23	26	28	31	31	33
Seafood (ounce eq/wk) ^c	8	8	9	10	10	10
Nuts, Seeds, Soy Products (ounce eq/wk)	4	5	5	5	5	6
Oils (grams/day)	24	27	29	31	34	36
Limit on Calories for Other Uses (kcal/day)^d	140	240	250	320	350	370
Limit on Calories for Other Uses (%/day)	8%	12%	11%	13%	13%	13%

^a Calorie level ranges: Prepregnancy energy levels are calculated based on median height and body weight for healthy body mass index (BMI) for a reference woman, who is 5 feet 4 inches tall and weighs 126 pounds. The calorie levels shown in this table include estimates for women during the first trimester of pregnancy, when calorie needs generally do not increase compared to prepregnancy needs, plus the additional calories needed for the later trimesters of pregnancy and during lactation. Calorie needs vary based on many factors. Women with overweight or obesity have lower recommended gestational weight gain during pregnancy, which may affect calorie needs. The DRI Calculator for Healthcare Professionals, available at nal.usda.gov/fnic/dri-calculator, can be used to estimate calorie needs based on age, sex, height, weight, activity level, and pregnancy or lactation status.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Appendix 3](#).

^c The U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) provide joint advice regarding seafood consumption to limit methylmercury exposure for women who might become or are pregnant or lactating. Depending on

body weight, some women should choose seafood lowest in methylmercury or eat less seafood than the amounts in the Healthy U.S.-Style Dietary Pattern. More information is available on the FDA and EPA websites at FDA.gov/fishadvice and EPA.gov/fishadvice.

^d All foods are assumed to be in nutrient-dense forms; lean or low-fat; and prepared with minimal added sugars, refined starches, saturated fat, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The number of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars and/or saturated fat, or to eat more than the recommended amount of food in a food group.

NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars and saturated fat; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded. See [Appendix 3](#) for all calorie levels of the pattern.

Table 5-2

Estimated Change in Calorie Needs During Pregnancy and Lactation for Women With a Healthy^a Prepregnancy Weight

Stage of Pregnancy or Lactation	Estimated Change in Daily Calorie Needs Compared to Prepregnancy Needs
Pregnancy: 1 st trimester	+ 0 calories
Pregnancy: 2 nd trimester	+ 340 calories
Pregnancy: 3 rd trimester	+ 452 calories
Lactation: 1 st 6 months	+ 330 calories ^b
Lactation: 2 nd 6 months	+ 400 calories ^c

^a These estimates apply to women with a healthy prepregnancy weight. Women with a prepregnancy weight that is considered overweight or obese should consult their healthcare provider for guidance regarding appropriate caloric intake during pregnancy and lactation.

^b The EER for the first 6 months of lactation is calculated by adding 500 calories/day to prepregnancy needs to account for the energy needed for milk production during this time period, then subtracting 170 calories/day to account for weight loss in the first 6 months postpartum.

^c The EER for the second 6 months of lactation is calculated by adding 400 calories/day to prepregnancy needs to account for the energy needed for milk production during this time period. Weight stability is assumed after 6 months postpartum.

NOTE: Estimates are based on Estimated Energy Requirements (EER) set by the Institute of Medicine. Source: Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington, DC: The National Academies Press; 2005.

Weight Management

Weight management is complex, so women should seek advice from a healthcare provider on the best way to achieve their goals. Women should be encouraged to achieve and maintain a healthy weight before becoming pregnant, as well as follow the gestational weight gain guidelines developed by the National Academies of Sciences, Engineering, and Medicine during pregnancy. These guidelines are outlined in **Table 5-3** and serve as a tool to help balance the benefits and risks associated with pregnancy weight change.

It is important to note that about half of women retain 10 pounds or more and nearly 1 in 4 women retain 20 pounds or more at 12 months postpartum. Postpartum weight retention results in about 1 in 7 women moving from a healthy weight classification before pregnancy to an overweight classification postpartum. Current estimates show that about half of women of childbearing age have a weight classification of overweight or obese. Women with overweight or obesity frequently exceed gestational weight gain recommendations during pregnancy, which increases the likelihood of excess postpartum weight retention.

Weight gain is a natural part of pregnancy, which is why it is important to have a plan. Meeting weight management goals may improve pregnancy outcomes, such as increasing the likelihood of delivering a healthy weight infant and improving the long-term health of both mother and child. Women are encouraged to partner with their healthcare provider and other medical professionals to achieve their goals and optimize health outcomes.

Table 5-3

Weight Gain Recommendations for Pregnancy^a

Pre-pregnancy Weight Category	Body Mass Index	Range of Total Weight Gain (lb)	Rates of Weekly Weight Gain ^b in the 2nd and 3rd Trimesters (mean [range], lbs)
Underweight	Less than 18.5	28-40	1 [1-1.3]
Healthy Weight	18.5-24.9	25-35	1 [0.8-1]
Overweight	25-29.9	15-25	0.6 [0.5-0.7]
Obese	30 and greater	11-20	0.5 [0.4-0.6]

^a Reference: Institute of Medicine and National Research Council. 2009. *Weight Gain During Pregnancy: Reexamining the Guidelines*. Washington, DC: The National Academies Press. doi.org/10.17226/12584.

^b Calculations assume a 1.1 to 4.4 lb weight gain in the first trimester.

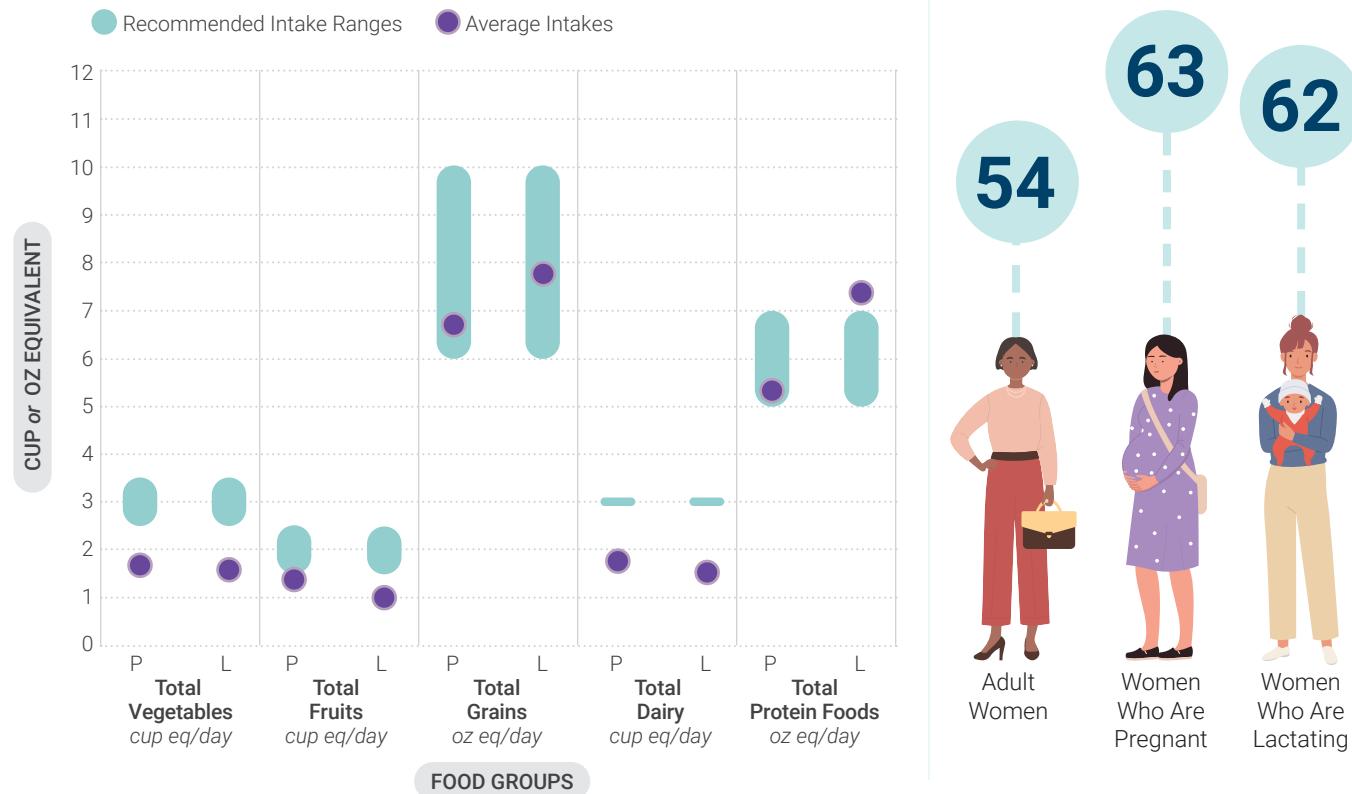
Current Intakes

Figures 5-1 and 5-2 highlight the dietary intakes of women who are pregnant or lactating, including the Healthy Eating Index-2015 score, which is an overall measure of how intakes align with the *Dietary Guidelines*, as well as information on the components of a healthy diet—specifically, the food groups. **Figure 5-1** displays the average intakes of the food groups compared to the range of recommended intakes at the calorie levels most relevant to these life stages.

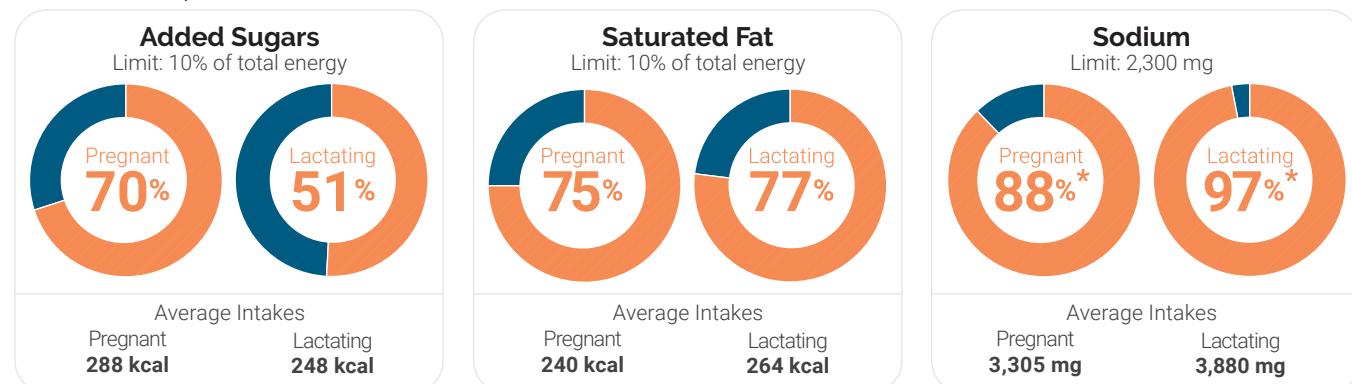
Figure 5-1

Current Intakes: Women Who Are Pregnant or Lactating

Average Daily Food Group Intakes Compared to Recommended Intake Ranges



Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium

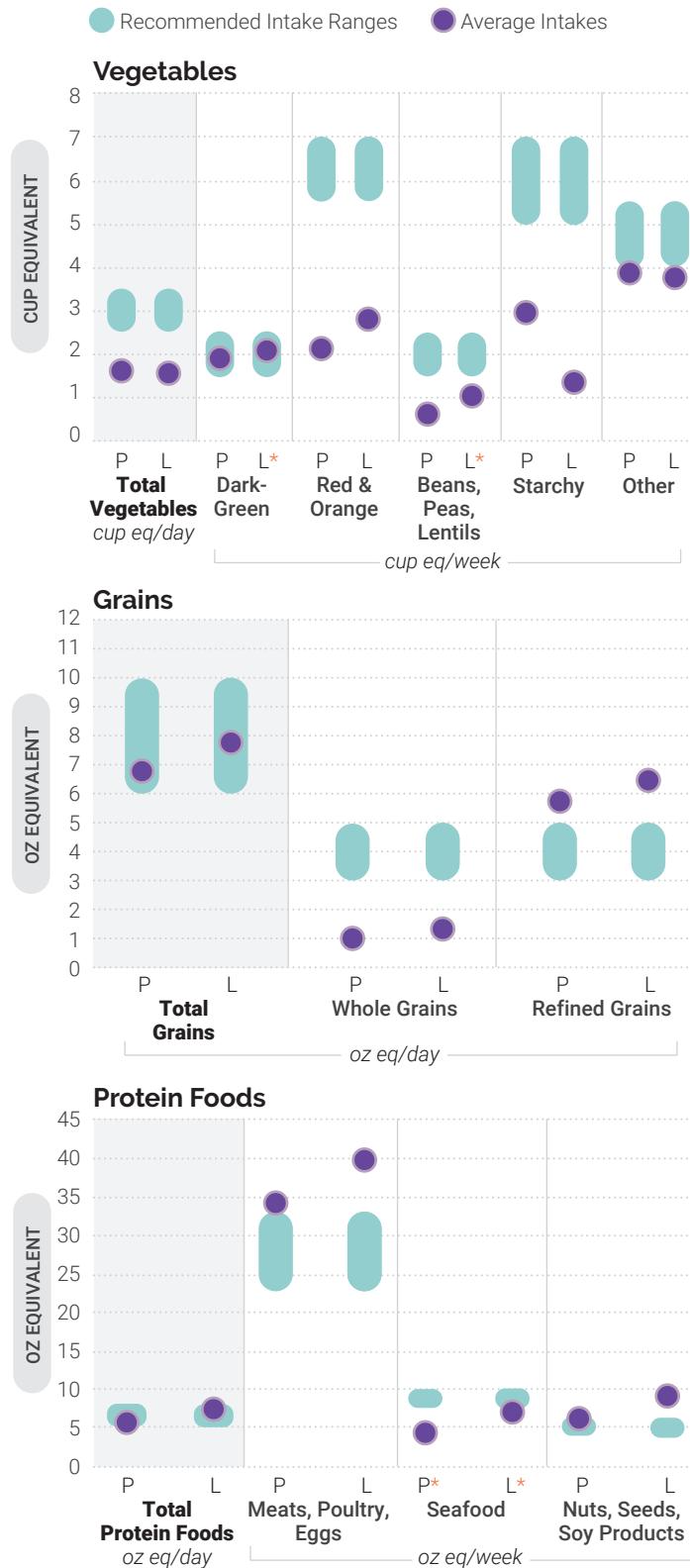


*NOTE: Estimates may be less precise than others due to small sample size and/or large relative standard error.

Data Sources: Average Intakes and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2013-2016, women ages 20-44, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

Figure 5-2

Average Intakes of Subgroups Compared to Recommended Intake Ranges: Women Who Are Pregnant or Lactating



*NOTE: Estimates may be less precise than others due to small sample size and/or large relative standard error.

Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2013–2016, women ages 20–44, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).



Additionally, the percent of women exceeding the limits for added sugars, saturated fat, and sodium are shown, along with average intakes of these components. Finally, average intakes compared to recommended intake ranges of the subgroups for grains in daily amounts and for vegetables and protein foods in weekly amounts are also provided in [Figure 5-2](#).

The Healthy Eating Index score is 63 for women who are pregnant and 62 for women who are lactating. Although diet quality is higher among women during these life stages compared to peers who are not pregnant or lactating (54), intakes are still not optimal. Women who are pregnant or lactating can benefit from making dietary changes to better align with healthy dietary patterns.

As described in [Chapter 1](#), consistent with the general U.S. population, women who are pregnant or lactating are not meeting recommendations for food group and nutrient intake. [Figures 5-1](#) and [5-2](#) show average intakes are generally below or in the lower range of recommendations for food groups and subgroups, while exceeding limits for added sugars, saturated fat, and sodium.

Special Considerations

The nutrition considerations for the general U.S. population described in [Chapter 1](#) apply to women who are pregnant or lactating. For example, the nutrients of public health concern—calcium, vitamin D, potassium, and dietary fiber—apply to these life stages as well. In addition, iron is a nutrient of public health concern for women who are pregnant. These life stages also have some special nutrient and dietary considerations regarding folate, iodine, choline, seafood, alcoholic beverages, and caffeinated beverages that are discussed in the following sections of this chapter.

Meeting Nutrient Needs

As discussed in [Chapter 1](#), nutritional needs should be met primarily through foods and beverages. However, this may be difficult for some women, especially those who are pregnant. Most healthcare providers recommend women who are pregnant or planning to become pregnant take a daily prenatal vitamin and mineral supplement in addition to consuming a healthy dietary pattern. This may be especially important to meet folate/folic acid, iron, iodine, and vitamin D needs during pregnancy (see [Appendix 1. Nutritional Goals for Age-Sex Groups](#)).

Nutrient needs for women who are lactating differ from those who are pregnant. Continued use of prenatal supplements by women who are lactating may exceed their needs for folic acid and iron. Women who are lactating should not exceed the Tolerable Upper Intake Level (UL) of 1,000 micrograms of folic acid and 45 milligrams of iron. Women should seek guidance from a healthcare provider on appropriate use of prenatal or other dietary supplements during lactation.

Folate/Folic Acid

The RDA for folate is higher during pregnancy and lactation than all other life stages (see [Appendix 1](#)). Adequate folic acid intake is particularly important prior to conception and during the first trimester to help prevent neural tube defects.

The United States Preventative Services Task Force (USPSTF) recommends that all women who are planning or capable of pregnancy take a daily supplement containing 400 to 800 mcg of folic acid. The critical period for supplementation starts at least 1 month before conception and continues through the first 2 to 3



months of pregnancy. Dietary supplements may contain either folic acid or 5-methyltetrahydrofolate (5-MTHF), but only folic acid has been shown to prevent neural tube defects. Most prenatal supplements sold in the United States contain folic acid.

The recommendation for folic acid supplementation is in addition to the amounts of food folate contained in a healthy eating pattern. Folate is found inherently in dark-green vegetables and beans, peas, and lentils. All enriched grains (i.e., bread, pasta, rice, and cereal) and some corn masa flours are fortified with folic acid.

Iron

Iron needs increase during pregnancy compared to prepregnancy. For women who are lactating, before menstruation returns, iron needs fall and then return to prepregnancy levels once menstruation resumes (see [Appendix 1](#)).

Iron is a key nutrient during pregnancy that supports fetal development. Iron deficiency affects about 1 in 10 women who are pregnant and 1 in 4 women during their third trimester. Heme iron, which is found in animal source foods (e.g., lean meats, poultry, and some seafood) is more readily absorbed by the body than the non-heme iron found in plant source foods (e.g., beans, peas, lentils, and dark-green vegetables). Additional iron sources include foods enriched or fortified with iron, such as many whole-wheat breads and ready-to-eat



cereals. Absorption of iron from non-heme sources is enhanced by consuming them along with vitamin C-rich foods. Food source lists for both heme and non-heme iron are available at [DietaryGuidelines.gov](#). Women who are pregnant or who are planning to become pregnant are advised to take a supplement containing iron when recommended by an obstetrician or other healthcare provider.



More than half of women continue to use prenatal supplements during lactation. Most prenatal supplements are designed to meet the higher iron needs of pregnancy. Depending on various factors—such as when menstruation returns—prenatal supplements may exceed the iron needs of women who are lactating. Women should seek guidance from a healthcare provider regarding the appropriate level of iron supplementation during lactation based on their unique needs.

Iodine

Iodine needs increase substantially during pregnancy and lactation (see [Appendix 1](#)). Adequate iodine intake during pregnancy is important for neurocognitive development of the fetus. Although women of reproductive age generally have adequate iodine intake, some women, particularly those who do not regularly consume dairy products, eggs, seafood, or use iodized table salt, may not consume enough iodine to meet increased needs during pregnancy and lactation.

Women who are pregnant or lactating should not be encouraged to start using table salt if they do not do so already. However, they should ensure that any table salt used in cooking or added to food at the table is iodized. Additionally, women who are pregnant or lactating may need a supplement containing iodine in order to achieve adequate intake. Many prenatal supplements do not contain iodine. Thus, it is important to read the label.

Vegetarian or Vegan Dietary Patterns During Pregnancy and Lactation

Women following a vegetarian or vegan dietary pattern during these life stages may need to take special care to ensure nutrient adequacy. Iron may be of particular concern because plant source foods only contain non-heme iron, which is less bioavailable than heme iron. Food source lists for both heme and non-heme iron are available at [DietaryGuidelines.gov](#). Vitamin B₁₂ also is of concern because it is present only in animal source foods. Women following a vegetarian or vegan dietary pattern should consult with a healthcare provider to determine whether supplementation of iron, vitamin B₁₂, and/or other nutrients such as choline, zinc, iodine, or EPA/DHA is necessary and if so, the appropriate levels to meet their unique needs.

Choline

Choline needs also increase during pregnancy and lactation (see [Appendix 1](#)). Adequate intake of choline during these life stages helps to both replenish maternal stores and support the growth and development of the child's brain and spinal cord.

Most women do not meet recommended intakes of choline during pregnancy and lactation. Women are encouraged to consume a variety of choline-containing foods during these life stages. Choline can be found throughout many food groups and subgroups. Meeting recommended intakes for the dairy and protein food groups—with eggs, meats, and some seafood being notable sources—as well as the beans, peas, and lentils subgroup can help meet choline needs. Meeting nutrient needs through foods and beverages is preferred, but women who are concerned about meeting recommendations should speak with their healthcare provider to determine whether choline supplementation is appropriate. Many prenatal supplements do not contain choline or only contain small amounts inadequate to meet recommendations.

Seafood

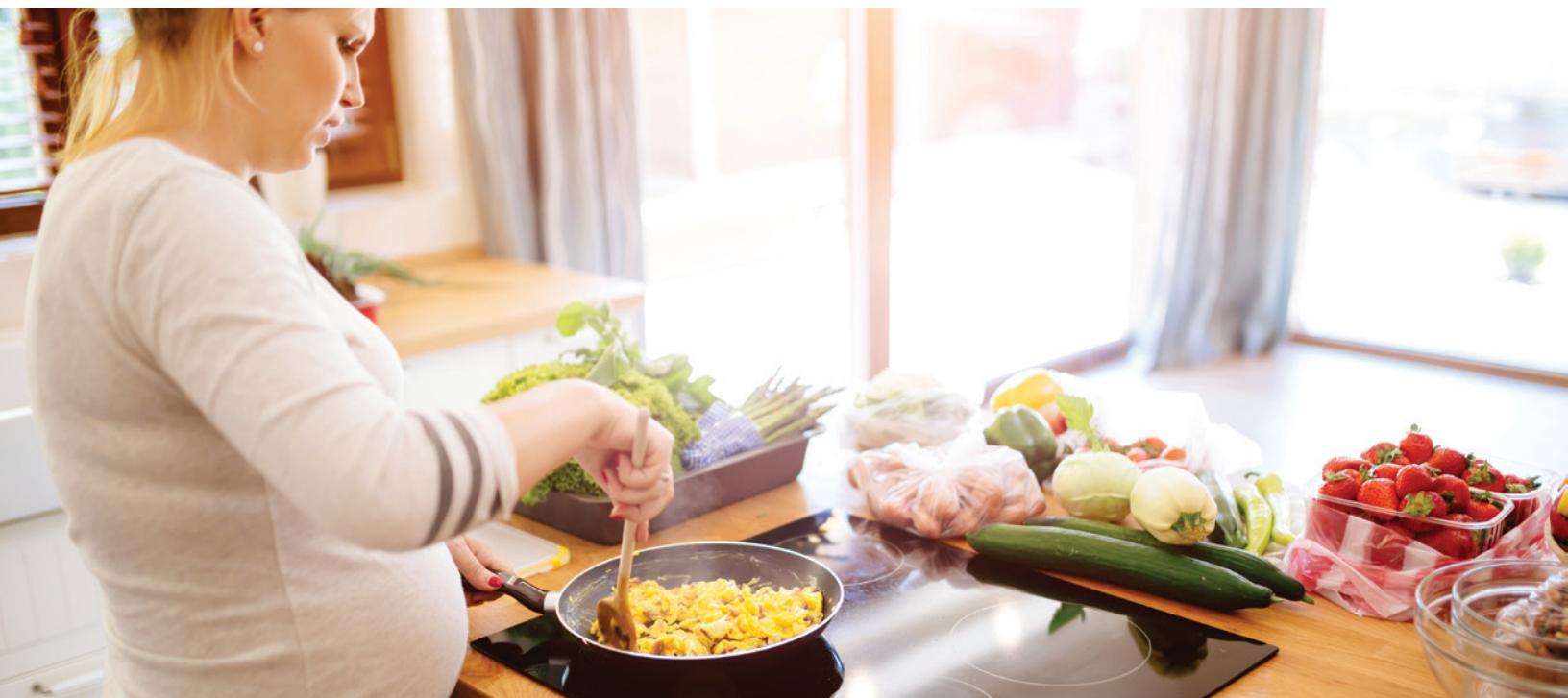
Seafood intake during pregnancy is recommended, as it is associated with favorable measures of cognitive development in young children. Women who are pregnant or lactating should consume at least 8 and up to 12 ounces of a variety of seafood per week, from choices lower in methylmercury. The U.S. Food and

Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) provide joint advice regarding seafood consumption to limit methylmercury exposure for women who might become or who are pregnant or lactating. Methylmercury can be harmful to the brain and nervous system if a person is exposed to too much of it over time; this is particularly important during pregnancy because eating too much of it can have negative effects on the developing fetus. Based on FDA and EPA's advice, depending on body weight, some women should choose seafood lowest in methylmercury or eat less seafood than the amounts in the Healthy U.S.-Style Dietary Pattern. Additionally, certain species of seafood (e.g., shark, swordfish, king mackerel) should be avoided during pregnancy. More information is available on the FDA or EPA websites at [FDA.gov/fishadvice](https://www.fda.gov/fishadvice) and [EPA.gov/fishadvice](https://www.epa.gov/fishadvice).

Alcoholic Beverages

Women who are or who may be pregnant should not drink alcohol. However, consumption of alcohol during pregnancy continues to be of concern in the United States. Among women who are pregnant, about 1 in 10 reported consuming alcohol during the past month, with an average intake of 2 or more drink equivalents on days alcohol is consumed.

It is not safe for women to drink any type or amount of alcohol during pregnancy. Women who drink alcohol and become pregnant should stop drinking immediately and women who are trying to become pregnant should





Food Safety During Pregnancy

Women who are pregnant and their unborn children are more susceptible than are the general population to the effects of foodborne illnesses, such as listeriosis. They need to take special care to keep foods safe and to not eat foods that increase the risk of foodborne illness. During pregnancy, women should only eat foods containing seafood, meats, poultry, or eggs that have been cooked to recommended safe minimum internal temperatures. They also should take special precautions not to consume unpasteurized (raw) juice or milk, raw sprouts, or some soft cheeses made from unpasteurized milk. Deli and luncheon meats and hot dogs should be reheated to steaming hot or 165°F to kill *Listeria*, the bacteria that causes listeriosis.

not drink at all. Alcohol can harm the baby at any time during pregnancy, even during the first or second month when a woman may not know she is pregnant.

Not drinking alcohol also is the safest option for women who are lactating. Generally, moderate consumption of alcoholic beverages by a woman who is lactating (up to 1 standard drink in a day) is not known to be harmful to the infant, especially if the woman waits at least 2 hours after a single drink before nursing or expressing breast milk. Additional information on breastfeeding and alcohol can be found at: [cdc.gov/breastfeeding/breastfeeding-special-circumstances/vaccinations-medications-drugs/alcohol.html](https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/vaccinations-medications-drugs/alcohol.html). Women considering consuming alcohol during lactation should talk to their healthcare provider.

Caffeine

Many women consume caffeine during pregnancy or lactation. As discussed in [Chapter 1](#), most intake of caffeine in the United States comes from coffee, tea, and soda. Caffeinated beverages vary widely in their caffeine content. Caffeine passes from the mother to infant in small amounts through breast milk, but usually does not adversely affect the infant when the mother consumes low to moderate amounts (about 300 milligrams or less per day, which is about 2 to 3 cups of coffee). More information is available at: [cdc.gov/breastfeeding/breastfeeding-special-circumstances/diet-and-micronutrients/maternal-diet.html](https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/diet-and-micronutrients/maternal-diet.html). Women who could be or who are pregnant should consult their healthcare providers for advice concerning caffeine consumption.

Additional food safety resources for pregnant women are available at [fda.gov/media/83740/download and foodsafety.gov/people-at-risk/pregnant-women](https://www.fda.gov/media/83740/download-and-foodsafety.gov/people-at-risk/pregnant-women), and specific answers to food safety questions are available at fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers.



Physical Activity During Pregnancy and Postpartum

PREGNANCY

Physical activity during pregnancy can benefit both the mother and the baby. Physical activity increases or maintains cardiorespiratory fitness and reduces the risk of excessive weight gain and gestational diabetes.

For many benefits, healthy women without contraindications should do at least 150 minutes of moderate-intensity aerobic activity a week, as they are able. Women who habitually did vigorous-intensity activity or a lot of aerobic or muscle-strengthening physical activity before pregnancy can continue to do so during pregnancy. Women can consult their healthcare provider about whether or how to adjust their physical activity during pregnancy.

POSTPARTUM

Physical activity following the birth of a child continues to benefit a woman's overall health. Physical activity during the postpartum period increases cardiorespiratory fitness, improves mood, and reduces the symptoms of postpartum depression. Additionally, physical activity can help achieve and maintain a healthy weight and, when combined with caloric restriction, helps promote weight loss.

Women should start slow and build back up to more activity over time. Women should aim for at least 150 minutes of moderate-intensity aerobic activity a week.

The U.S. Department of Health and Human Service's *Physical Activity Guidelines for Americans* and the Move Your Way® communications campaign have information about the benefits of physical activity and tips to get started. Available at health.gov/paguidelines.



Supporting Healthy Eating

Many women have increased interest in and motivation to make healthy lifestyle changes during pregnancy and lactation. Furthermore, the dietary choices made during these life stages can affect women's health and the health of their children. Supporting women in adopting healthy dietary patterns during this important time of life and sustaining them thereafter also enables them to serve as role models when their children begin transitioning to complementary foods.

Women who are pregnant or lactating face many real or perceived barriers when trying to meet the recommendations of the *Dietary Guidelines*. Constraints on time and financial resources, limited access to high-quality childcare and family leave policies, as well as inadequate breastfeeding support at home or at work are barriers women may face. These barriers should be considered by all those who support women in their efforts to follow a healthy dietary pattern.

Ensuring women have access to healthy, safe food is vital due to the critical role nutrition plays in health promotion during these life stages. This is particularly critical for families dealing with food insecurity, which is most prevalent in households with children and in single-parent households. Participation in Federal programs, such as the **Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)**, which serves low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and infants and children up to age 5, can help alleviate these challenges and improve dietary intake for many women and children facing economic hardship. The **Supplemental Nutrition Assistance Program (SNAP)** and the **Food Distribution Program on Indian Reservations (FDPIR)**

 For more information on meeting the *Dietary Guidelines* for children during their first 2 years of life, see [**Chapter 2. Infants and Toddlers**](#)

can also serve as resources for low-income women and their families by both supplementing food budgets to support health and by providing nutrition education through the **SNAP-Ed program**. Additionally, USDA's **Healthy Eating on A Budget**¹ can help women and families plan and prepare healthy, inexpensive meals. Other Government and non-Government resources, such as food banks or community meal programs, also provide food and educational resources that can support women in making healthy food choices for themselves and their families.

Support during lactation can help women meet their breastfeeding goals, despite significant demands on their time and energy during this life stage. Worksite programs and policies that allow women adequate time to pump breast milk when away from their child, as well as access to good quality childcare, can allow women who return to work to achieve breastfeeding goals. Access to breastfeeding peer counselors, such as those used in WIC, or free breastfeeding support groups through local hospitals also can support women during this life stage. Additionally, health professionals can promote the **USDA's WIC Breastfeeding Support**² and the U.S. Department of Health and Human Services Office of Women's Health (OWH) **Your Guide to Breastfeeding**³ and their **National Breastfeeding Helpline**⁴ (800-994-9662), which are freely accessible to all women.

Health professionals, policymakers, worksite administrators, community leaders, families, and friends should consider these barriers and opportunities when seeking to support women and families. Developing programs and resources that reduce barriers and create opportunities can help women meet their dietary needs and improve their overall health and the health of their children.



¹ Available at: MyPlate.gov/budget

² Available at: wicbreastfeeding.fns.usda.gov/

³ Available at: womenshealth.gov/files/your-guide-to-breastfeeding.pdf

⁴ Available at: womenshealth.gov/about-us/what-we-do/programs-and-activities/helpline

ADULTS AGES 60 AND OLDER





CHAPTER 6

Older Adults



Introduction

Older adults include individuals ages 60 and older—a life stage that includes a broad range of ages and is influenced by a number of health and social changes that affect this population's nutritional status. Compared to younger adults, older adults are at greater risk of chronic diseases, such as cardiovascular disease and cancer, as well as health conditions related to changes in bone and muscle mass, such as osteoporosis and sarcopenia, respectively. An increasing number of older adults start this life stage with excess body weight. Preventing additional weight gain and achieving a healthy weight by following a healthy dietary pattern and adopting an active lifestyle can support healthy aging.

Selecting healthy food and beverage choices is important for people throughout this life stage, regardless of their race or ethnicity or their current health status. It is never too late to make improvements. Older adults should follow a healthy dietary pattern because of the changing dietary needs and the heightened risk of malnutrition that occurs with age. Older adults generally have lower calorie needs but similar or even increased nutrient needs compared to younger adults. The overall nutrient density of dietary patterns is particularly important to this age group. Lower calorie needs result from less physical activity, changes in metabolism, and/or age-related loss in bone and muscle mass. Other factors may affect nutrient needs and absorption of nutrients in older adults, including chronic disease and conditions, use of multiple medications, and changes in body composition. The healthy dietary patterns described below take the unique needs of older adults into account and are further supported by special considerations and strategies for professionals to support healthy aging.

Nutrient-Dense Foods and Beverages

Nutrient-dense foods and beverages provide vitamins, minerals, and other health-promoting components and have little added sugars, saturated fat, and sodium. Vegetables, fruits, whole grains, seafood, eggs, beans, peas, and lentils, unsalted nuts and seeds, fat-free and low-fat dairy products, and lean meats and poultry—when prepared with no or little added sugars, saturated fat, and sodium—are nutrient-dense foods.





Healthy Dietary Patterns

Older adults are encouraged to follow the recommendations on the types of foods and beverages that make up a healthy dietary pattern described in [**Chapter 1. Nutrition and Health Across the Lifespan: The Guidelines and Key Recommendations.**](#) Table 6-1 displays the Healthy U.S.-Style Dietary Pattern to illustrate the specific food group amounts and limits for other dietary components that make up healthy dietary patterns at the six calorie levels most relevant to older adults.

Calorie needs are generally lower for females compared to males, and for those who are older, smaller, and less

physically active. Females ages 60 and older require about 1,600 to 2,200 calories per day and males ages 60 and older require about 2,000 to 2,600 calories per day. Additional information on these estimates is provided in [**Table 6-1 \(footnote a\)**](#) and in [**Appendix 1. Estimated Calorie Needs.**](#)

The USDA Food Patterns are discussed in greater detail in [**Chapter 1. Nutrition and Health Across the Lifespan: The Guidelines and Key Recommendations**](#) and [**Appendix 3. USDA Dietary Patterns.**](#) The USDA Dietary Patterns provide a framework to help older adults follow a healthy dietary pattern and meet the Guidelines and their Key Recommendations. The Patterns provide a variety of food and beverage choices that allow individuals to customize their choices within each food group based on lifestyle, traditions, culture, and/or other individual needs.

Table 6-1

Healthy U.S.-Style Dietary Pattern for Adults Ages 60 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,600	1,800	2,000	2,200	2,400	2,600
FOOD GROUP OR SUBGROUP ^b	Daily Amount of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)					
Vegetables (cup eq/day)	2	2 ½	2 ½	3	3	3 ½
Vegetable Subgroups in Weekly Amounts						
Dark-Green Vegetables (cup eq/wk)	1 ½	1 ½	1 ½	2	2	2 ½
Red & Orange Vegetables (cup eq/wk)	4	5 ½	5 ½	6	6	7
Beans, Peas, Lentils (cup eq/wk)	1	1 ½	1 ½	2	2	2 ½
Starchy Vegetables (cup eq/wk)	4	5	5	6	6	7
Other Vegetables (cup eq/wk)	3 ½	4	4	5	5	5 ½
Fruits (cup eq/day)	1 ½	1 ½	2	2	2	2
Grains (ounce eq/day)	5	6	6	7	8	9
Whole Grains (ounce eq/day)	3	3	3	3 ½	4	4 ½
Refined Grains (ounce eq/day)	2	3	3	3 ½	4	4 ½
Dairy (cup eq/day)	3	3	3	3	3	3
Protein Foods (ounce eq/day)	5	5	5 ½	6	6 ½	6 ½
Protein Foods Subgroups in Weekly Amounts						
Meats, Poultry, Eggs (ounce eq/wk)	23	23	26	28	31	31
Seafood (ounce eq/wk)	8	8	9	9	10	10
Nuts, Seeds, Soy Products (ounce eq/wk)	4	4	5	5	5	5
Oils (grams/day)	22	24	27	29	31	34
Limit on Calories for Other Uses (kcal/day)^c	100	140	240	250	320	350
Limit on Calories for Other Uses (%/day)	7%	8%	12%	12%	13%	5

^a Calorie level ranges: Females: 1,600-2,200 calories; Males: 2,000-2,600 calories. Energy levels are calculated based on median height and body weight for healthy body mass index (BMI) reference individuals. For adults, the reference man is 5 feet 10 inches tall and weighs 154 pounds. The reference woman is 5 feet 4 inches tall and weighs 126 pounds. Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals, available at nal.usda.gov/fnic/dri-calculator, can be used to estimate calorie needs based on age, sex, height, weight, and physical activity level.

^b Definitions for each food group and subgroup and quantity (e.g., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Appendix 3](#).

^c All foods are assumed to be in nutrient-dense forms; lean or low-fat and prepared with minimal added sugars; refined starches, saturated fat, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The number of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars, saturated fat, and/or alcohol, or to eat more than the recommended amount of food in a food group.

***NOTE:** The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars, saturated fat, and alcohol; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded. See [Appendix 3](#) for all calorie levels of the pattern.

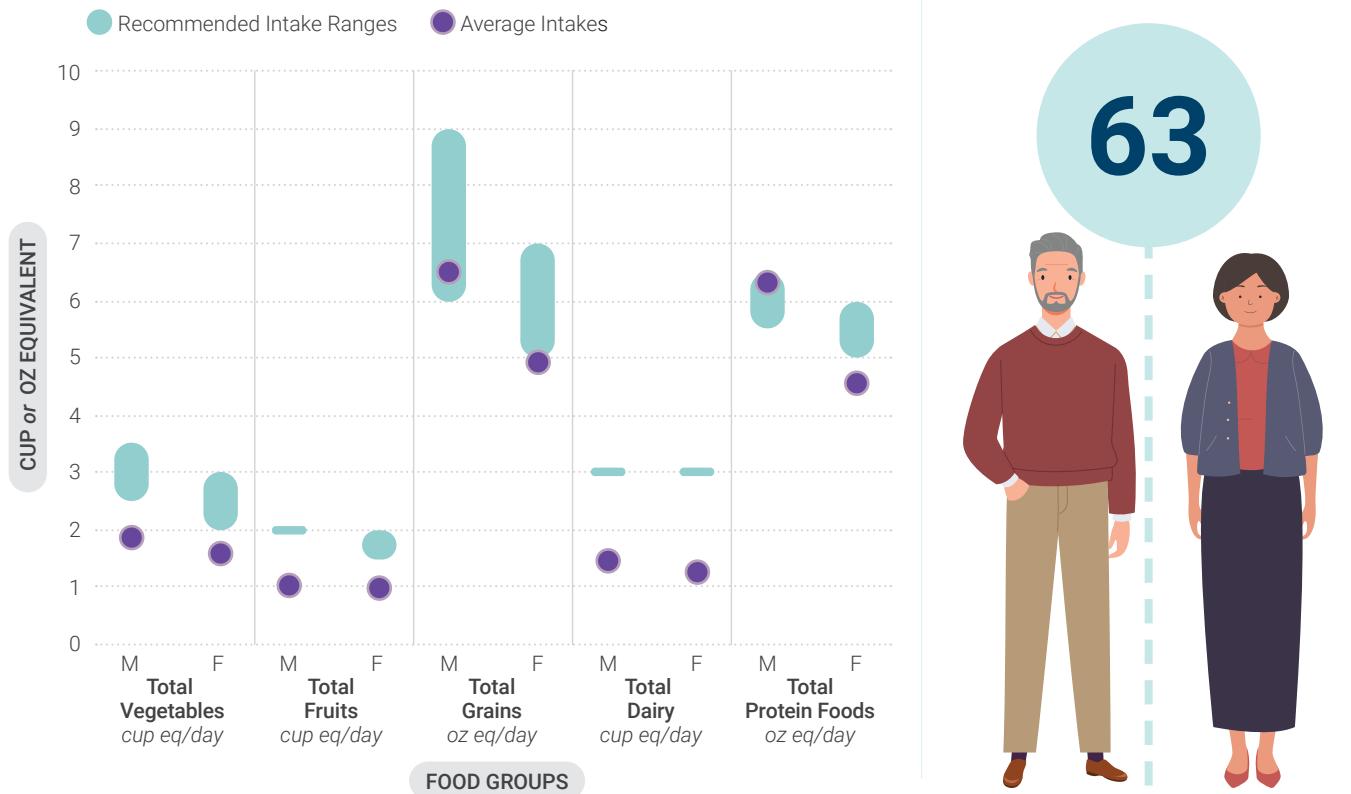
Current Intakes

Figures 6-1 and **6-2** highlight the dietary intakes of older adults, including the Healthy Eating Index-2015 score, which is an overall measure of how intakes align with the *Dietary Guidelines*, as well as information on the components of a healthy diet—specifically, the food groups. **Figure 6-1** displays the average intakes of the food groups compared to the range of recommended intakes at the calorie levels most relevant to males and females in this age group. Additionally, the percent of older adults exceeding the recommended limits for added sugars, saturated fat, and sodium are shown, along with average intakes of these components.

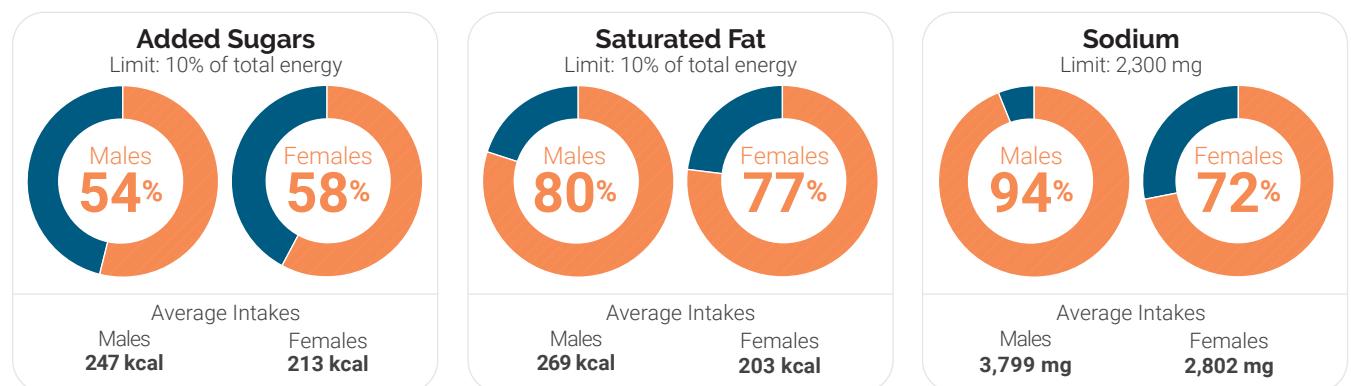
Figure 6-1

Current Intakes: Ages 60 and Older

Average Daily Food Group Intakes Compared to Recommended Intake Ranges



Percent Exceeding Limits of Added Sugars, Saturated Fat, and Sodium

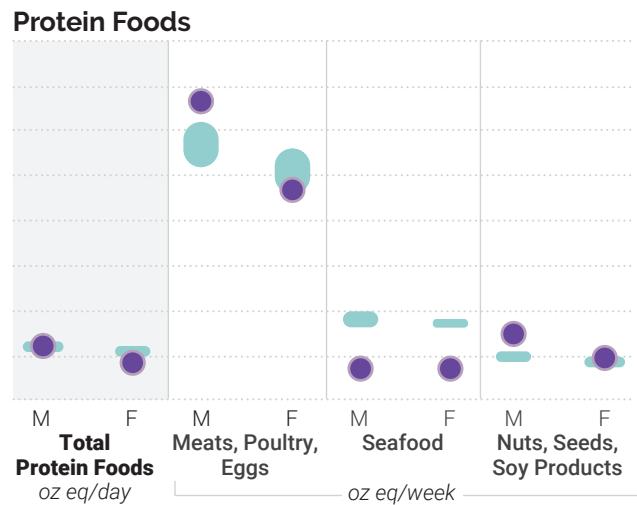
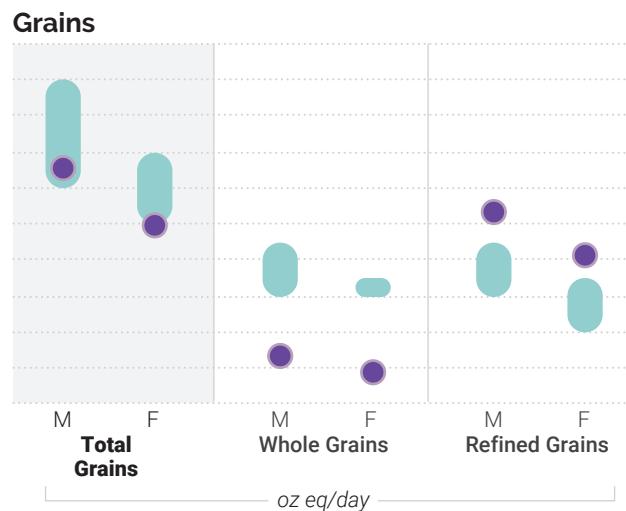
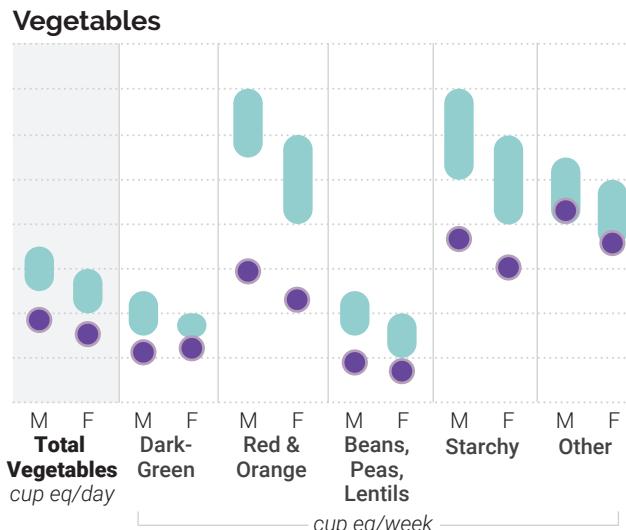


Data Sources: Average Intakes and HEI-2015 Scores: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)). Percent Exceeding Limits: What We Eat in America, NHANES 2013-2016, 2 days dietary intake data, weighted.

Figure 6-2

**Average Intakes of Subgroups
Compared to Recommended Intake Ranges:
Ages 60 and Older**

● Recommended Intake Ranges ● Average Intakes



Average intakes compared to recommended intake ranges of the subgroups for grains are represented in daily amounts; subgroups for vegetables and protein foods are represented in weekly amounts in **Figure 6-2**.

Diet quality is highest among older adults compared to other ages. Consistent with the general U.S. population, however, this age group is not meeting the recommendations for food group and nutrient intakes and has a Healthy Eating Index score of 63 out of 100. Older adults can improve dietary intake by increasing consumption of fruit, vegetables, whole grains, and dairy, while ensuring protein intake meets recommendations. Reducing intakes of added sugars, saturated fat, and sodium also will help older adults achieve recommendations and manage and avoid chronic conditions (**Figure 6-1**). Older adults should choose nutrient-dense options within each food group and consume appropriate portion sizes because calorie needs decline with age.



Data Sources: Average Intakes: Analysis of What We Eat in America, NHANES 2015-2016, day 1 dietary intake data, weighted. Recommended Intake Ranges: Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

Special Considerations

The nutrition considerations for the general U.S. population described in [Chapter 1](#) apply to older adults. For example, the nutrients of public concern—calcium, vitamin D, potassium, and dietary fiber—apply to this age group as well. However, this age group also has some special nutrition considerations that are discussed in the following sections of this chapter. For example, several additional nutrients are more likely to be underconsumed during this life stage. These include dietary protein and vitamin B₁₂. Beverage intake, particularly as it relates to hydration status, also is an area of special consideration.

Protein

Consuming enough protein is important to prevent the loss of lean muscle mass that occurs naturally with age. Monitoring protein intake is especially important as older adults transition through this life stage. Intake patterns show average intakes of protein foods is lower for individuals ages 71 and older compared to adults ages 60 through 70. About 50 percent of women and 30 percent of men 71 and older fall short of protein foods recommendations.

The majority of protein in the Healthy U.S.-Style Dietary Pattern is accounted for in the protein foods subgroups: seafood; meats, poultry and eggs; nuts, seeds, and soy products; and the vegetable subgroup of beans, peas, and lentils, which also is considered a protein foods subgroup. The dairy and fortified soy alternatives food group is another source of dietary protein. Most older adults are meeting or exceeding weekly recommendations for meats, poultry, and eggs, making

this subgroup a common source of protein foods for older adults ([Table 6-1](#)). However, seafood, dairy and fortified soy alternatives, and beans, peas, and lentils are underconsumed, yet provide important nutrients that support healthy dietary patterns. For example, the dairy food group provides calcium, vitamin D, and vitamin B₁₂ and the beans, peas, and lentils subgroup provides dietary fiber. Many choices within the seafood subgroup also provide vitamins D and B₁₂ and calcium (if eaten with bones), and beneficial fatty acids. Food sources of calcium, vitamin D, and dietary fiber are available at [DietaryGuidelines.gov](#).

Many older adults can improve their dietary pattern and better meet nutrient needs by choosing from a wider variety of protein sources. In some cases, this may mean using seafood more often in place of meats, poultry, or eggs or using beans, peas, and lentils in mixed dishes, such as soups, rice, or pasta dishes. For others, it may mean maintaining current intakes of protein and finding enjoyable ways to add protein foods from underconsumed food groups and subgroups in order to ensure that overall protein needs are met.

Vitamin B₁₂

Vitamin B₁₂ is of concern for some older adults because the ability to absorb this nutrient can decrease with age and use of certain medications can decrease absorption. Older adults are encouraged to meet the recommendations for protein foods, a common source of vitamin B₁₂, and include foods fortified with vitamin B₁₂, such as breakfast cereals. Some individuals also may require vitamin B₁₂ dietary supplements. Individuals are encouraged to speak with their healthcare provider to determine what, if any, supplementation is appropriate.

Dietary Supplements

Many adults in the United States take one or more dietary supplements either as a pill or drink. Popular supplements include some nutrients that are underconsumed among older adults, including calcium and vitamins D and B₁₂. All sources of a nutrient or food component—whether from food or a dietary supplement—should be considered when assessing an individual's dietary pattern, including any added sugars that may come from supplement drinks. Older adults should track and discuss all dietary supplement use with their healthcare provider. Beverage supplements should not replace regular food intake unless instructed by a health professional. The National Institutes of Health, Office of Dietary Supplements provides the [My Dietary Supplement and Medicine Record](#)¹, to help individuals track supplement and medicine use.



¹ Available at: ods.od.nih.gov/pubs/DietarySupplementandMedicineRecord.pdf

Beverages

Many older adults do not drink enough fluids to stay hydrated. One reason for this is that the sensation of thirst tends to decline with age. Concerns about bladder control or issues with mobility also may hinder intake of fluids among older adults. Mean intakes of beverages show adults ages 60 and older consume significantly fewer fluid ounces across all beverage types compared to adults ages 59 and under—about 2 fewer cups per day, most of which is due to drinking less water.

It is important that older adults drink plenty of water to prevent dehydration and aid in the digestion of food and absorption of nutrients. In addition to water, choosing unsweetened beverages such as 100% fruit or vegetable juice and low-fat or fat-free milk or fortified soy beverage can support fluid intake to prevent dehydration while helping to achieve food group recommendations. The water that is contained in foods, such as fruits, vegetables, and soups, contributes to hydration status and is a contributor to total fluid intake.

ALCOHOLIC BEVERAGES

The *Dietary Guidelines* do not recommend initiating alcohol consumption for any reason. To help older adults move toward a healthy dietary pattern and minimize risks associated with drinking, older adults can choose not to drink or drink in moderation—limiting intakes to 2 drinks or less in a day for men and 1 drink or less in a day for women, when alcohol is consumed. Older adults who choose to drink may experience the effects of alcohol more quickly than they did when they were younger. This puts older adults at higher risk of falls, car crashes, and other injuries that may result from drinking. In addition, older adults tend to have a greater number of comorbid health conditions than younger adults, and alcohol use or misuse may adversely affect the condition or interfere with management of the disease. Certain older adults should avoid drinking alcohol completely, including those who:

- Plan to drive or operate machinery, or participate in activities that require skill, coordination, and alertness.
- Take certain over-the-counter or prescription medications.
- Have certain medical conditions.
- Are recovering from alcohol use disorder or are unable to control the amount they drink.
- More information on alcoholic beverages and their relationship to health is provided in [Chapter 1](#).

Supporting Healthy Eating

Similar to other life stages, older adults can be supported by professionals, family, and friends to achieve a healthy dietary pattern that accounts for factors such as cost, preferences, traditions, and access. Additional factors to consider when supporting healthy eating for older adults include:

- **Enjoyment of food:** Sharing meals with friends and family can help increase food enjoyment and promote adequacy of dietary intake for older adults.
- **Ability to chew or swallow foods:** Experimenting with the preparation of foods from all food groups can help identify textures that are acceptable, appealing, and enjoyable for adults who have difficulties chewing or swallowing. Good dental health is critical to overall health, as well as the ability to chew foods properly.
- **Food safety:** Practicing safe food handling procedures is of particular importance for older adults due to a decline in immune system function that accompanies age and that increases the risk of foodborne illness. For more information: [Foodsafety.gov](#) for older adults: [foodsafety.gov/people-at-risk/older-adults](#) or FDA: [fda.gov/media/83744/download](#).

Older adults have access to a variety of Government resources to support a healthy dietary pattern as part of overall healthy aging. Professionals working with older Americans can use these resources to better support access to healthy, safe, and affordable food choices.

- **Congregate Nutrition Services:** The Older Americans Act authorizes meals and related services in congregate settings for any person age 60 and older and their spouse of any age. Program sites offer older individuals healthy meals and opportunities to socialize. Congregate meals are typically provided in senior centers, schools, churches, or other community settings.
- **Supplemental Nutrition Assistance Program (SNAP):** Older adults with limited income may qualify for SNAP, a Federal program that provides temporary benefits to help individuals purchase foods and beverages to support a healthy dietary pattern when resources are constrained.

Physical Activity and Older Adults

The benefits of regular physical activity occur throughout life and are essential for healthy aging. It is never too late to start being physically active. For older adults, regular physical activity supports a number of additional health benefits including improved cognition, balance, and bone strength. These benefits make it easier to perform activities of daily living, preserves function and mobility, and lowers the risk of falls and injuries from falls.



Adults should move more and sit less throughout the day. Some physical activity is better than none. To attain the most health benefits from physical activity, older adults need at least 150 to 300 minutes of moderate-intensity aerobic activity per week. The talk test is a good way to assess moderate intensity for older adults. A person doing moderate-intensity aerobic activity can talk, but not sing. Older adults also need muscle-strengthening activity at least 2 days each week. Older adults should incorporate multicomponent physical activity that includes balance training as well as aerobic and muscle-strengthening activities.

The U.S. Department of Health and Human Service's *Physical Activity Guidelines for Americans* and the related Move Your Way® resources have information about the benefits of physical activity and tips to get started. Available at health.gov/paguidelines.

- **Commodity Supplemental Food Program (CSFP):**

The CSFP supplements the diets of low-income older adults by providing nutritious USDA packaged food to support a healthy dietary pattern. The CSFP is federally funded, and private and nonprofit institutions facilitate the distribution of monthly CSFP packages to eligible older adults.

- **Home-Delivered Nutrition Services:** The Older Americans Act authorizes meals and related services in a person's home for individuals ages 60 and older and their spouse of any age. Older adults who experience difficulty leaving the home due to frailty, health concerns, or certain medical conditions may benefit from home-delivered meals offered under the Older Americans Act.

- **Child and Adult Care Food Program (CACFP):**

The CACFP is a Federal program that provides reimbursements for nutritious meals and snacks to older adults enrolled in daycare facilities. Older adults receiving care at nonresidential care centers may receive meals and snacks that meet nutrition standards of the CACFP.

Additional resources to support older adults exist at the community level. For example, the **Senior Farmers Market Nutrition Program (SFMNP)** provides many low-income seniors with access to fruits and vegetables grown in their local communities. **SNAP Education (SNAP-Ed)** programming may also be offered and

teach older adults cooking and shopping skills.

Individuals working within these settings must ensure the availability of nutrient-dense foods and assist older adults in choosing a healthy dietary pattern that fits in their cultural and food preferences.

Healthy Eating Through the Lifespan

This chapter has focused on the unique nutritional considerations of the older adult life stage. It also has reinforced the idea that the core elements of a healthy dietary pattern are remarkably consistent across the lifespan and across health outcomes. More than that, a healthy dietary pattern is flexible—people can customize the *Dietary Guidelines* recommendations to suit their personal preferences, cultural traditions, and budget considerations.

Beginning at the earliest life stage—infancy and toddlerhood—a healthy dietary pattern can help people achieve and maintain good health and reduce the risk of chronic diseases. However, it is never too late to make improvements. People at any stage of life can benefit by changing to nutrient-dense forms of foods and beverages across all food groups, in recommended amounts, and within calorie limits. **The bottom line: For lifelong good health, make every bite count with the *Dietary Guidelines for Americans*!**

Appendix 1:

Nutritional Goals^a for Age-Sex Groups

Table A1-1

Daily Nutritional Goals, Ages 6 Through 11 Months and 12 Through 23 Months

Nutrient	6 Through 11 Months		12 Through 23 Months	
	Goal	Source of Goal ^b	Goal	Source of Goal ^b
Macronutrients				
Protein (g)	11	RDA	13	RDA
Carbohydrate (g)	95	AI	130	RDA
Fiber, total dietary (g)	n/a ^d	n/a ^d	19	AI
Total lipid (% kcal)	n/a ^d	n/a ^d	30-40	AMDR
18:2 Linoleic acid (g)	4.6	AI	7	AI
18:3 Linolenic acid (g)	0.5	AI	0.7	AI
Minerals				
Calcium (mg)	260	AI	700	RDA
Iron (mg)	11	RDA	7	RDA
Magnesium (mg)	75	AI	80	RDA
Phosphorus (mg)	275	AI	460	RDA
Potassium (mg)	860	AI	2,000	AI
Sodium (mg)	370	AI	1,200	CDRR
Zinc (mg)	3	RDA	3	RDA
Vitamins				
Vitamin A (mcg RAE ^c)	500	AI	300	RDA
Vitamin E (mg AT ^c)	5	AI	6	RDA
Vitamin D (IU ^c)	400	AI	600	RDA
Vitamin C (mg)	50	AI	15	RDA
Thiamin (mg)	0.3	AI	0.5	RDA
Riboflavin (mg)	0.4	AI	0.5	RDA
Niacin (mg)	4	AI	6	RDA

Table A1-1 (continued)

Daily Nutritional Goals, Ages 6 Through 11 Months and 12 Through 23 Months

Nutrient	6 Through 11 Months		12 Through 23 Months	
	Goal	Source of Goal ^b	Goal	Source of Goal ^b
Vitamin B-6 (mg)	0.3	AI	0.5	RDA
Vitamin B-12 (mcg)	0.5	AI	0.9	RDA
Choline (mg)	150	AI	200	AI
Vitamin K (mcg)	2.5	AI	30	AI
Folate (mcg DFE ^c)	80	AI	150	RDA

^a Goals reflect Dietary Reference Intakes developed for 7 to 12 months or 6 to 12 months applied to ages 6 to 12 months and DRIs for 1 to 3 years applied to 12 to 24 months.

^b AI = Adequate Intake, CDRR = Chronic Disease Risk Reduction Level, RDA = Recommended Dietary Allowance.

^c AT = alpha-tocopherol, DFE = Dietary Folate Equivalent, IU = International Units, RAE = Retinol Activity Equivalents.

^d n/a = not applicable to this age group.

Sources: Institute of Medicine. *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. Washington, DC: The National Academies Press; 2006. Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: The National Academies Press; 2011. National Academies of Sciences, Engineering, and Medicine. *Dietary Reference Intakes for Sodium and Potassium*. Washington, DC: The National Academies Press; 2019.

Table A1-2

Daily Nutritional Goals, Ages 2 and Older

MACRONUTRIENTS, MINERALS & VITAMINS		Age-Sex Groups												
		M/F 2-3	F 4-8	F 9-13	F 14-18	F 19-30	F 31-50	F 51+	M 4-8	M 9-13	M 14-18	M 19-30	M 31-50	M 51+
Calorie Level Assessed	Source of Goal ^a	1,000	1,200	1,600	1,800	2,000	1,800	1,600	1,400	1,800	2,200	2,400	2,200	2,000
Macronutrients														
Protein (% kcal)	AMDR	5-20	10-30	10-30	10-30	10-35	10-35	10-35	10-30	10-30	10-30	10-35	10-35	10-35
Protein (g)	RDA	13	19	34	46	46	46	46	19	34	52	56	56	56
Carbohydrate (% kcal)	AMDR	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65
Carbohydrate (g)	RDA	130	130	130	130	130	130	130	130	130	130	130	130	130
Fiber (g)	14g/ 1,000 kcal	14	17	22	25	28	25	22	20	25	31	34	31	28
Added Sugars (% kcal)	DGA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total lipid (% kcal)	AMDR	30-40	25-35	25-35	25-35	20-35	20-35	20-35	25-35	25-35	25-35	20-35	20-35	20-35
Saturated Fatty Acids (% kcal)	DGA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
18:2 Linoleic acid (g)	AI	7	10	10	11	12	12	11	10	12	16	17	17	14
18:3 Linoleic acid (g)	AI	0.7	0.9	1.0	1.1	1.1	1.1	1.1	0.9	1.2	1.6	1.6	1.6	1.6
Minerals														
Calcium (mg)	RDA	700	1,000	1,300	1,300	1,000	1,000	1,200	1,000	1,300	1,300	1,000	1,000	1,000 ^b
Iron (mg)	RDA	7	10	8	15	18	18	8	10	8	11	8	8	8
Magnesium (mg)	RDA	80	130	240	360	310	320	320	130	240	410	400	420	420
Phosphorus (mg)	RDA	460	500	1,250	1,250	700	700	700	500	1,250	1,250	700	700	700
Potassium (mg)	AI	2,000	2,300	2,300	2,300	2,600	2,600	2,600	2,300	2,500	3,000	3,400	3,400	3,400
Sodium (mg)	CDRR	1,200	1,500	1,800	2,300	2,300	2,300	2,300	1,500	1,800	2,300	2,300	2,300	2,300
Zinc (mg)	RDA	3	5	8	9	8	8	8	5	8	11	11	11	11

Table A1-2 (continued)

Daily Nutritional Goals, Ages 2 and Older

MACRONUTRIENTS, MINERALS & VITAMINS		Age-Sex Groups												
		M/F 2-3	F 4-8	F 9-13	F 14-18	F 19-30	F 31-50	F 51+	M 4-8	M 9-13	M 14-18	M 19-30	M 31-50	M 51+
Calorie Level Assessed	Source of Goal ^a	1,000	1,200	1,600	1,800	2,000	1,800	1,600	1,400	1,800	2,200	2,400	2,200	2,000
Vitamins														
Vitamin A (mcg RAE^d)	RDA	300	400	600	700	700	700	700	400	600	900	900	900	900
Vitamin E (mg AT^d)	RDA	6	7	11	15	15	15	15	7	11	15	15	15	15
Vitamin D (IU^d)	RDA	600	600	600	600	600	600	600 ^c	600	600	600	600	600	600 ^c
Vitamin C (mg)	RDA	15	25	45	65	75	75	75	25	45	75	90	90	90
Thiamin (mg)	RDA	0.5	0.6	0.9	1.0	1.1	1.1	1.1	0.6	0.9	1.2	1.2	1.2	1.2
Riboflavin (mg)	RDA	0.5	0.6	0.9	1.0	1.1	1.1	1.1	0.6	0.9	1.3	1.3	1.3	1.3
Niacin (mg)	RDA	6	8	12	14	14	14	14	8	12	16	16	16	16
Vitamin B-6 (mg)	RDA	0.5	0.6	1.0	1.2	1.3	1.3	1.5	0.6	1.0	1.3	1.3	1.3	1.7
Vitamin B-12 (mcg)	RDA	0.9	1.2	1.8	2.4	2.4	2.4	2.4	1.2	1.8	2.4	2.4	2.4	2.4
Choline (mg)	AI	200	250	375	400	425	425	425	250	375	550	550	550	550
Vitamin K (mcg)	AI	30	55	60	75	90	90	90	55	60	75	120	120	120
Folate (mcg DFE^d)	RDA	150	200	300	400	400	400	400	200	300	400	400	400	400

^a AI = Adequate Intake, CDRR = Chronic Disease Risk Reduction Level, DGA = *Dietary Guidelines for Americans, 2020-2025*, RDA = Recommended Dietary Allowance.

^b Calcium RDA for males ages 71+ years is 1,200 mg.

^c Vitamin D RDA for males and females ages 71+ years is 800 IU.

^d AT = alpha-tocopherol, DFE = Dietary Folate Equivalent, IU = International Units, RAE = Retinol Activity Equivalents.

Sources: Institute of Medicine. *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. Washington, DC: The National Academies Press; 2006. Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: The National Academies Press; 2011. National Academies of Sciences, Engineering, and Medicine. *Dietary Reference Intakes for Sodium and Potassium*. Washington, DC: The National Academies Press; 2019.

Table A1-3

Daily Nutritional Goals for Women Who Are Pregnant, by Age Group and Trimester

MACRONUTRIENTS, MINERALS & VITAMINS		Age Group (Years)								
		14-18			19-30			31-50		
		Trimester								
Calorie Level Assessed	Source of Goal ^a	1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd
Macronutrients										
Protein (% kcal)	AMDR	10-30	10-30	10-30	10-35	10-35	10-35	10-35	10-35	10-35
Protein (g)	RDA	71	71	71	71	71	71	71	71	71
Carbohydrate (%kcal)	AMDR	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65	45-65
Carbohydrate (g)	RDA	175	175	175	175	175	175	175	175	175
Fiber (g)	14g/ 1,000 kcal	25	31	34	28	34	36	25	31	34
Added Sugars (% kcal)	DGA	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total lipid (% kcal)	AMDR	25-35	25-35	25-35	20-35	20-35	20-35	20-35	20-35	20-35
Saturated Fatty Acids (% kcal)	DGA	<10	<10	<10	<10	<10	<10	<10	<10	<10
18:2 Linoleic acid (g)	AI	13	13	13	13	13	13	13	13	13
18:3 Linolenic acid (g)	AI	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Minerals										
Calcium (mg)	RDA	1,300	1,300	1,300	1,000	1,000	1,000	1,000	1,000	1,000
Iron (mg)	RDA	27	27	27	27	27	27	27	27	27
Magnesium (mg)	RDA	400	400	400	350	350	350	360	360	360
Phosphorus (mg)	RDA	1,250	1,250	1,250	700	700	700	700	700	700
Potassium (mg)	AI	2,600	2,600	2,600	2,900	2,900	2,900	2,900	2,900	2,900
Sodium (mg)	CDRR	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Zinc (mg)	RDA	12	12	12	11	11	11	11	11	11
Iodine (mcg)	RDA	220	220	220	220	220	220	220	220	220
Vitamins										
Vitamin A (mcg RAE^b)	RDA	750	750	750	770	770	770	770	770	770
Vitamin E (mg AT^b)	RDA	15	15	15	15	15	15	15	15	15
Vitamin D (IU^b)	RDA	600	600	600	600	600	600	600	600	600

Table A1-3 (continued)

Daily Nutritional Goals for Women Who Are Pregnant, by Age Group and Trimester

MACRONUTRIENTS, MINERALS & VITAMINS		Age Group (Years)								
		14-18			19-30			31-50		
		Trimester								
Calorie Level Assessed	Source of Goal ^a	1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd
Vitamins										
Vitamin C (mg)	RDA	80	80	80	85	85	85	85	85	85
Thiamin (mg)	RDA	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Riboflavin (mg)	RDA	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Niacin (mg)	RDA	18	18	18	18	18	18	18	18	18
Vitamin B-6 (mg)	RDA	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Vitamin B-12 (mcg)	RDA	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Choline (mg)	AI	450	450	450	450	450	450	450	450	450
Vitamin K (mcg)	AI	75	75	75	90	90	90	90	90	90
Folate (mcg DFE^b)	RDA	600	600	600	600	600	600	600	600	600

^a AI = Adequate Intake, CDRR = Chronic Disease Risk Reduction Level, DGA = *Dietary Guidelines for Americans, 2020-2025*, RDA = Recommended Dietary Allowance.

^b AT = alpha-tocopherol, DFE = Dietary Folate Equivalent, IU= International Units, RAE = Retinol Activity Equivalents.

Sources: Institute of Medicine. *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. Washington, DC: The National Academies Press; 2006. Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: The National Academies Press; 2011. National Academies of Sciences, Engineering, and Medicine. *Dietary Reference Intakes for Sodium and Potassium*. Washington, DC: The National Academies Press; 2019.

Table A1-4

Daily Nutritional Goals for Women Who Are Lactating, by Age Group and Months Postpartum

MACRONUTRIENTS, MINERALS & VITAMINS		Age Group (Years)					
		14-18		19-30		31-50	
		Months Postpartum					
Calorie Level Assessed	Source of Goal ^a	0-6	7-12	0-6	7-12	0-6	7-12
Macronutrients							
Protein (% kcal)	AMDR	10-30	10-30	10-35	10-35	10-35	10-35
Protein (g)	RDA	71	71	71	71	71	71
Carbohydrate (% kcal)	AMDR	45-65	45-65	45-65	45-65	45-65	45-65
Carbohydrate (g)	RDA	210	210	210	210	210	210
Fiber (g)	14g/1,000kcal	31	31	34	34	31	31
Added sugars (% kcals)	DGA	<10	<10	<10	<10	<10	<10
Total lipid (% kcal)	AMDR	25-35	25-35	20-35	20-35	20-35	20-35
Saturated Fatty Acids (% kcal)	DGA	<10	<10	<10	<10	<10	<10
18:2 Linoleic acid (g)	AI	13	13	13	13	13	13
18:3 Linolenic acid (g)	AI	1.3	1.3	1.3	1.3	1.3	1.3
Minerals							
Calcium (mg)	RDA	1,300	1,300	1,000	1,000	1,000	1,000
Iron (mg)	RDA	10	10	9	9	9	9
Magnesium (mg)	RDA	360	360	310	310	320	320
Phosphorus (mg)	RDA	1,250	1,250	700	700	700	700
Potassium (mg)	AI	2,500	2,500	2,800	2,800	2,800	2,800
Sodium (mg)	CDRR	2,300	2,300	2,300	2,300	2,300	2,300
Zinc (mg)	RDA	13	13	12	12	12	12
Iodine (mcg)	RDA	290	290	290	290	290	290

Table A1-4 (continued)

Daily Nutritional Goals for Women Who Are Lactating, by Age Group and Months Postpartum

MACRONUTRIENTS, MINERALS & VITAMINS		Age Group (Years)					
		14-18		19-30		31-50	
		Months Postpartum					
Calorie Level Assessed	Source of Goal ^a	0-6	7-12	0-6	7-12	0-6	7-12
Vitamins							
Vitamin A (mcg RAE^b)	RDA	1,200	1,200	1,300	1,300	1,300	1,300
Vitamin E (mg AT^b)	RDA	19	19	19	19	19	19
Vitamin D (IU^b)	RDA	600	600	600	600	600	600
Vitamin C (mg)	RDA	115	115	120	120	120	120
Thiamin (mg)	RDA	1.4	1.4	1.4	1.4	1.4	1.4
Riboflavin (mg)	RDA	1.6	1.6	1.6	1.6	1.6	1.6
Niacin (mg)	RDA	17	17	17	17	17	17
Vitamin B-6 (mg)	RDA	2	2	2	2	2	2
Vitamin B-12 (mcg)	RDA	2.8	2.8	2.8	2.8	2.8	2.8
Choline (mg)	AI	550	550	550	550	550	550
Vitamin K (mcg)	AI	75	75	90	90	90	90
Folate (mcg DFE^b)	RDA	500	500	500	500	500	500

^a AI = Adequate Intake, CDRR = Chronic Disease Risk Reduction Level, DGA = *Dietary Guidelines for Americans, 2020-2025*, RDA = Recommended Dietary Allowance.

^b AT = alpha-tocopherol, DFE = Dietary Folate Equivalent, IU= International Units, RAE = Retinal Activity Equivalents.

Sources: Institute of Medicine. *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. Washington, DC: The National Academies Press; 2006. Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: The National Academies Press; 2011. National Academies of Sciences, Engineering, and Medicine. *Dietary Reference Intakes for Sodium and Potassium*. Washington, DC: The National Academies Press; 2019.

Appendix 2: Estimated Calorie Needs

The total number of calories a person needs each day varies depending on the person's age, sex, height, weight, and level of physical activity. In addition, a need to lose, maintain, or gain weight, and other factors affect how many calories should be consumed. Estimated amounts of calories needed to maintain energy balance for various age and sex groups at three different levels of physical activity are provided in **Table A2-1** for toddlers ages 12 through 23 months and **Table A2-2** for ages 2 and older. These estimates are based on the Estimated Energy Requirements (EER) equations, using reference heights (average) and reference weights (healthy) for each age-sex group. For toddlers, children, and adolescents, reference height and weight vary by age. For adults, the reference man is 5 feet 10 inches tall and weighs 154 pounds. The reference woman is 5 feet 4 inches tall and weighs 126 pounds.

Estimates range from 700 to 1,000 calories for toddlers ages 12 through 23 months. Estimated needs for young children ages 2 through 8 range from 1,000 to 2,000 calories. A wider range of 1,400 to 3,200 calories is estimated for older children and adolescents, with males generally having higher calorie needs than females.

Adult estimated calorie needs range from 1,600 to 2,400 calories per day for females and 2,000 to 3,000 calories per day for males. As shown, males generally require more calories than females. Due to reductions in basal metabolic rate that occur with aging, calorie needs generally decrease for adults as they age.

Estimated calorie needs during the first trimester of pregnancy generally do not increase compared to prepregnancy needs. Additional calories needed for the later trimesters of pregnancy and during lactation are outlined in **Table A2-3** and include approximately 300 to 400 additional calories. It is recommended that women follow their healthcare provider's guidance regarding appropriate caloric intake during pregnancy as many factors, including prepregnancy weight status, gestational weight gain, and multiple pregnancies, may affect calorie needs. Women with overweight or obesity have lower recommended gestational weight gain during pregnancy, which may affect calorie needs.

These calorie needs are only estimates, and approximations of individual calorie needs can be determined with online tools. The DRI Calculator for Healthcare Professionals, available at nal.usda.gov/fnic/dri-calculator, can be used to estimate calorie needs based on age, sex, height, weight, activity level, and pregnancy or lactation status.

Table A2-1

Estimated Calorie Needs per Day, by Age and Sex, Ages 12 Through 23 Months

AGE IN MONTHS	Males	Females
12	800	800
15	900	800
18	1,000	900
21 through 23	1,000	1,000

Source: Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington (DC): The National Academies Press; 2002.

Table A2-2

Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level, Ages 2 and Older

Age	Males			Females		
	Sedentary ^a	Moderately Active ^b	Active ^c	Sedentary ^a	Moderately Active ^b	Active ^c
2	1,000	1,000	1,000	1,000	1,000	1,000
3	1,000	1,400	1,400	1,000	1,200	1,400
4	1,200	1,400	1,600	1,200	1,400	1,400
5	1,200	1,400	1,600	1,200	1,400	1,600
6	1,400	1,600	1,800	1,200	1,400	1,600
7	1,400	1,600	1,800	1,200	1,600	1,800
8	1,400	1,600	2,000	1,400	1,600	1,800
9	1,600	1,800	2,000	1,400	1,600	1,800
10	1,600	1,800	2,200	1,400	1,800	2,000
11	1,800	2,000	2,200	1,600	1,800	2,000
12	1,800	2,200	2,400	1,600	2,000	2,200
13	2,000	2,200	2,600	1,600	2,000	2,200
14	2,000	2,400	2,800	1,800	2,000	2,400
15	2,200	2,600	3,000	1,800	2,000	2,400
16	2,400	2,800	3,200	1,800	2,000	2,400
17	2,400	2,800	3,200	1,800	2,000	2,400
18	2,400	2,800	3,200	1,800	2,000	2,400
19-20	2,600	2,800	3,000	2,000	2,200	2,400
21-25	2,400	2,800	3,000	2,000	2,200	2,400
26-30	2,400	2,600	3,000	1,800	2,000	2,400
31-35	2,400	2,600	3,000	1,800	2,000	2,200
36-40	2,400	2,600	2,800	1,800	2,000	2,200
41-45	2,200	2,600	2,800	1,800	2,000	2,200
46-50	2,200	2,400	2,800	1,800	2,000	2,200
51-55	2,200	2,400	2,800	1,600	1,800	2,200
56-60	2,200	2,400	2,600	1,600	1,800	2,200

Table A2-2 (continued)

Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level, Ages 2 and Older

AGE	Males			Females		
	Sedentary ^a	Moderately Active ^b	Active ^c	Sedentary ^a	Moderately Active ^b	Active ^c
61-65	2,000	2,400	2,600	1,600	1,800	2,000
66-70	2,000	2,200	2,600	1,600	1,800	2,000
71-75	2,000	2,200	2,600	1,600	1,800	2,000
76 and up	2,000	2,200	2,400	1,600	1,800	2,000

^a Sedentary means a lifestyle that includes only the physical activity of independent living.

^b Moderately Active means a lifestyle that includes physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the activities of independent living.

^c Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles per day at 3 to 4 miles per hour, in addition to the activities of independent living.

Source: Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington (DC): The National Academies Press; 2002.

Table A2-3

Estimated Change in Calorie Needs During Pregnancy and Lactation for Women With a Healthy^a Prepregnancy Weight

STAGE OF PREGNANCY OR LACTATION	Estimated Change in Daily Calorie Needs Compared to Prepregnancy Needs
Pregnancy: 1 st trimester	+ 0 calories
Pregnancy: 2 nd trimester	+ 340 calories
Pregnancy: 3 rd trimester	+ 452 calories
Lactation: 1 st 6 months	+ 330 calories ^b
Lactation: 2 nd 6 months	+ 400 calories ^c

^a These estimates apply to women with a healthy prepregnancy weight. Women with a prepregnancy weight that is considered overweight or obese should consult their healthcare provider for guidance regarding appropriate caloric intake during pregnancy and lactation.

^b The EER for the first 6 months of lactation is calculated by adding 500 calories/day to prepregnancy needs to account for the energy needed for milk production during this time period, then subtracting 170 calories/day to account for weight loss in the first 6 months postpartum.

^c The EER for the second 6 months of lactation is calculated by adding 400 calories/day to prepregnancy needs to account for the energy needed for milk production during this time period. Weight stability is assumed after 6 months postpartum.

Note: Estimates are based on Estimated Energy Requirements (EER) set by the Institute of Medicine. Source: Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington, DC: The National Academies Press; 2005.

Appendix 3: USDA Dietary Patterns

The Healthy U.S.-Style Dietary Pattern ([Tables A3-1](#) and [A3-2](#)) is based on the types and proportions of foods Americans typically consume but in nutrient-dense forms and appropriate amounts. The Healthy Vegetarian Dietary Pattern ([Tables A3-3](#) and [A3-4](#)) and the Healthy Mediterranean-Style Dietary Pattern ([Table A3-5](#)) are variations that also exemplify a healthy dietary pattern. For the first time, the Healthy U.S.-Style and Healthy Vegetarian Dietary Patterns are provided for toddlers ages 12 through 23 months who are no longer receiving human milk or infant formula. These patterns are designed to meet nutrient needs while not exceeding calorie requirements and while staying within limits for overconsumed dietary components, such as added sugars, saturated fat, and sodium.

The methodology used to develop and update these Patterns builds on the rich history USDA has in developing food guides. This methodology includes using current food consumption data to determine the mix and proportions of foods to include in each group. Food composition data is used to select a nutrient-dense representative for each food and calculate nutrient profiles for each food group. As would be expected, most foods in their nutrient-dense forms do contain some sodium and saturated fat. In a few cases, such as in the case of whole-wheat bread, the most appropriate representative in current Federal databases contains a small amount of added sugars. Detailed information about the representative foods, nutrient profiles, and patterns is available in the online appendix of the *Scientific Report of the 2020 Dietary Guidelines Advisory Committee*.¹

Amounts of each food group and subgroup within the patterns are based on nutrient and *Dietary Guidelines* standards (see [Appendix 1. Nutritional Goals for Age-Sex Groups](#)). Standards for nutrient adequacy aim to meet the Recommended Dietary Allowances (RDA), which are designed to cover the needs of 97 percent of the population, and Adequate Intakes (AI), which are used when an average nutrient requirement cannot be determined. The Patterns meet these standards for almost all nutrients. For a few nutrients (vitamin D and vitamin E for all ages, and choline for ages 2 and older), amounts in the Patterns are marginal or below the RDA or AI standard for many or all age/sex groups. In most cases, an intake of these nutrients below the RDA or AI is not considered to be of public health concern. For more information on dietary components of public health concern, see [Chapter 1](#).

The Patterns have 12 calorie levels to meet the needs of individuals across the lifespan ages 2 and older. For toddlers ages 12 through 23 months, who are no longer receiving either human milk or infant formula, the Patterns are provided at 4 calorie levels. [Chapters 2, 3, 4, 5, and 6](#) describe healthy dietary patterns and relevant calorie levels for each life stage. To follow these Patterns, identify the appropriate calorie level, choose a variety of foods in each group and subgroup over time in recommended amounts, and limit choices that are not in nutrient-dense forms so that the overall calorie limit is not exceeded.

¹ Available at: [dietaryguidelines.gov/2020-advisory-committee-report/food-pattern-modeling](https://www.dietaryguidelines.gov/2020-advisory-committee-report/food-pattern-modeling)

Table A3-1

Healthy U.S.-Style Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	700	800	900	1,000
FOOD GROUP OR SUBGROUP^{b,c}	Daily Amount of Food From Each Group^d (Vegetable and protein foods subgroup amounts are per week.)			
Vegetables (cup eq/day)	$\frac{2}{3}$	$\frac{3}{4}$	1	1
Vegetable Subgroups in Weekly Amounts				
Dark-Green Vegetables (cup eq/wk)	1	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{2}$
Red and Orange Vegetables (cup eq/wk)	1	$1\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$
Beans, Peas, Lentils (cup eq/wk)	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{2}$
Starchy Vegetables (cup eq/wk)	1	$1\frac{1}{2}$	2	2
Other Vegetables (cup eq/wk)	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Fruits (cup eq/day)	$\frac{1}{2}$	$\frac{3}{4}$	1	1
Grains (ounce eq/day)	$1\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	3
Whole Grains (ounce eq/day)	$1\frac{1}{2}$	2	2	2
Refined Grains (ounce eq/day)	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	1
Dairy (cup eq/day)	$1\frac{2}{3}$	$1\frac{3}{4}$	2	2
Protein Foods (ounce eq/day)	2	2	2	2
Protein Foods Subgroups in Weekly Amounts				
Meats, Poultry (ounce eq/wk)	$8\frac{3}{4}$	7	7	$7\frac{3}{4}$
Eggs (ounce eq/wk)	2	$2\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$
Seafood (ounce eq/wk) ^e	2-3	2-3	2-3	2-3
Nuts, Seeds, Soy Products (ounce eq/wk)	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$
Oils (grams/day)	9	9	8	13

^a Calorie level ranges: Energy levels are calculated based on median length and body weight reference individuals. Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals available at nal.usda.gov/fnic/dri-calculator/ can be used to estimate calorie needs based on age, sex, and weight.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce equivalents) are provided in [Chapter 1](#) and are compiled in [Table A3-2 \(footnote c\)](#).

^c All foods are assumed to be in nutrient-dense forms and prepared with minimal added sugars, refined starches (which are a source of calories but few or no other nutrients), or sodium. Foods are also lean or in low-fat forms with the exception of dairy, which includes whole-fat fluid milk, reduced-fat plain yogurts, and reduced-fat cheese. There are no calories

available for additional added sugars, saturated fat, or to eat more than the recommended amount of food in a food group.

^d In some cases, food subgroup amounts are greatest at the lower calorie levels to help achieve nutrient adequacy when relatively small number of calories are required.

^e If consuming up to 2 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list in the U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) joint "Advice About Eating Fish," available at FDA.gov/fishadvice and EPA.gov/fishadvice. If consuming up to 3 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list that contain even lower methylmercury: flatfish (e.g., flounder), salmon, tilapia, shrimp, catfish, crab, trout, haddock, oysters,

Table A3-1 Footnotes (continued)

sardines, squid, pollock, anchovies, crawfish, mullet, scallops, whiting, clams, shad, and Atlantic mackerel. If consuming up to 3 ounces of seafood per week, many commonly consumed varieties of seafood should be avoided because they cannot be consumed at 3 ounces per week by children without the potential of exceeding safe methylmercury limits; examples that should not be consumed include: canned light tuna or white (albacore) tuna, cod, perch, black sea bass. For a complete list please see: [FDA.gov/fishadvice](https://www.fda.gov/fishadvice) and [EPA.gov/fishadvice](https://www.epa.gov/fishadvice).

Table A3-2

Healthy U.S.-Style Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
FOOD GROUP OR SUBGROUP ^b	Daily Amount^c of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)											
Vegetables (cup eq/day)	1	1 ½	1 ½	2	2 ½	2 ½	3	3	3 ½	3 ½	4	4
Vegetable Subgroups in Weekly Amounts												
Dark-Green Vegetables (cup eq/wk)	½	1	1	1 ½	1 ½	1 ½	2	2	2 ½	2 ½	2 ½	2 ½
Red and Orange Vegetables (cup eq/wk)	2 ½	3	3	4	5 ½	5 ½	6	6	7	7	7 ½	7 ½
Beans, Peas, Lentils (cup eq/wk)	½	½	½	1	1 ½	1 ½	2	2	2 ½	2 ½	3	3
Starchy Vegetables (cup eq/wk)	2	3 ½	3 ½	4	5	5	6	6	7	7	8	8
Other Vegetables (cup eq/wk)	1 ½	2 ½	2 ½	3 ½	4	4	5	5	5 ½	5 ½	7	7
Fruits (cup eq/day)	1	1	1 ½	1 ½	1 ½	2	2	2	2	2 ½	2 ½	2 ½
Grains (ounce eq/day)	3	4	5	5	6	6	7	8	9	10	10	10
Whole Grains (ounce eq/day) ^d	1 ½	2	2 ½	3	3	3	3 ½	4	4 ½	5	5	5
Refined Grains (ounce eq/day)	1 ½	2	2 ½	2	3	3	3 ½	4	4 ½	5	5	5
Dairy (cup eq/day)	2	2 ½	2 ½	3								
Protein Foods (ounce eq/day)	2	3	4	5	5	5 ½	6	6 ½	6 ½	7	7	7
Protein Foods Subgroups in Weekly Amounts												
Meats, Poultry, Eggs (ounce eq/wk)	10	14	19	23	23	26	28	31	31	33	33	33
Seafood (ounce eq/wk) ^e	2-3 ^f	4	6	8	8	8	9	10	10	10	10	10
Nuts, Seeds, Soy Products (ounce eq/wk)	2	2	3	4	4	5	5	5	5	6	6	6
Oils (grams/day)	15	17	17	22	24	27	29	31	34	36	44	51
Limit on Calories for Other Uses (kcal/day)^g	130	80	90	100	140	240	250	320	350	370	440	580
Limit on Calories for Other Uses (%/day)	13%	7%	6%	6%	8%	12%	11%	13%	13%	13%	15%	18%

^a Patterns at 1,000, 1,200, and 1,400 kcal levels are designed to meet the nutritional needs of children ages 2 through 8 years. Patterns from 1,600 to 3,200 kcal are designed to meet the nutritional needs of children 9 years and older and adults. If a child 4 through 8 years of age needs more energy and, therefore, is following a pattern at 1,600 calories or more, his/her recommended amount from the dairy group should be 2½ cup eq per day. Amount of dairy for children ages 9 through 18 is 3 cup eq per day regardless of calorie level. The 1,000 and 1,200 kcal level patterns are not intended for children 9 and older or adults. The 1,400 kcal level is not intended for children ages 10 and older or adults.

Table A3-2 Footnotes (continued)

b Foods in each group and subgroup are:

Vegetables

Dark-Green Vegetables: All fresh, frozen, and canned dark-green leafy vegetables and broccoli, cooked or raw: for example, amaranth leaves, basil, beet greens, bitter melon leaves, bok choy, broccoli, chaynamul, chrysanthemum leaves, chard, cilantro, collards, cress, dandelion greens, kale, lambsquarters, mustard greens, poke greens, romaine lettuce, spinach, nettles, taro leaves, turnip greens, and watercress.

Red and Orange Vegetables: All fresh, frozen, and canned red and orange vegetables or juice, cooked or raw: for example, calabaza, carrots, red chili peppers, red or orange bell peppers, pimento/pimiento, sweet potatoes, tomatoes, 100% tomato juice, and winter squash such as acorn, butternut, kabocha, and pumpkin.

Beans, Peas, Lentils: All cooked from dry or canned beans, peas, chickpeas, and lentils: for example, black beans, black-eyed peas, bayo beans, brown beans, chickpeas (garbanzo beans), cowpeas, edamame, fava beans, kidney beans, lentils, lima beans, mung beans, navy beans, pigeon peas, pink beans, pinto beans, split peas, soybeans, and white beans. Does not include green beans or green peas.

Starchy Vegetables: All fresh, frozen, and canned starchy vegetables: for example, breadfruit, burdock root, cassava, corn, jicama, lotus root, lima beans, immature or raw (not dried) peas (e.g., cowpeas, black-eyed peas, green peas, pigeon peas), plantains, white potatoes, salsify, tapioca, taro root (dasheen or yautia), water chestnuts, yam, and yucca.

Other Vegetables: All other fresh, frozen, and canned vegetables, cooked or raw: for example, artichoke, asparagus, avocado, bamboo shoots, bean sprouts, beets, bitter melon (bitter gourd, balsam pear), broccoflower, Brussels sprouts, cabbage (green, red, napa, savoy), cactus pads (nopales), cauliflower, celeriac, celery, chayote (mirliton), chives, cucumber, eggplant, fennel bulb, garlic, ginger root, green beans, iceberg lettuce, kohlrabi, leeks, luffa (Chinese okra), mushrooms, okra, onions, peppers (chili and bell types that are not red or orange in color), radicchio, sprouted beans (e.g. sprouted mung beans), radish, rutabaga, seaweed, snow peas, summer squash, tomatillos, turnips, and winter melons.

Fruits

All fresh, frozen, canned, and dried fruits and 100% fruit juices: for example, apples, apricots, Asian pears, bananas, berries (e.g., blackberries, blueberries, cranberries, currants, dewberries, huckleberries, kiwifruit, loganberries, mulberries, raspberries, and strawberries); citrus fruit (e.g., calamondin, grapefruit, kumquats, lemons, limes, mandarin oranges, pomelos, tangerines, and tangelos); cherries, dates, figs, grapes, guava, jackfruit, lychee, mangoes, melons (e.g., cantaloupe, casaba, honeydew, and watermelon); nectarines, papaya, passion fruit, peaches, pears, persimmons, pineapple, plums, pomegranates, prunes, raisins, rhubarb, sapote, soursop, starfruit, and tamarind.

Grains

Whole Grains: All whole-grain products and whole grains used as ingredients: for example, amaranth, barley (not pearled), brown rice, buckwheat, bulgur, millet, oats, popcorn, quinoa, dark rye, triticale, whole-grain cornmeal, whole-wheat bread, whole-wheat chapati, whole-grain cereals and crackers, and wild rice.

Refined Grains: All refined-grain products and refined grains used as ingredients: for example, white breads, refined-grain cereals and crackers, corn grits, cream of rice, cream of wheat, barley (pearled), masa, pasta, and white rice. Refined-grain choices should be enriched.

Dairy

All fluid, dry, or evaporated milk, including lactose-free and lactose-reduced products and fortified soy beverages (soy milk), buttermilk, yogurt, kefir, frozen yogurt, dairy desserts, and cheeses (e.g., brie, camembert, cheddar, cottage cheese, colby, edam, feta, fontina, goat, gouda, gruyere, limburger, Mexican cheeses [queso anejo, queso asadero, queso chihuahua], monterey, mozzarella, muenster, parmesan, provolone, ricotta, and Swiss). Most choices should be fat-free or low-fat. Cream, sour cream, and cream cheese are not included due to their low calcium content.

Protein Foods

Meats, Poultry, Eggs: Meats include beef, goat, lamb, pork, and game meat (e.g., bear, bison, deer, elk, moose, opossum, rabbit, raccoon, squirrel). Poultry includes chicken, Cornish hens, dove, duck, game birds (e.g., ostrich, pheasant, and quail), goose, and turkey. Organ meats include brain, chitterlings, giblets, gizzard, heart, kidney, liver, stomach, sweetbreads, tongue, and tripe. Eggs include chicken eggs and other birds' eggs. Meats and poultry should be lean or low-fat.

Seafood: Seafood examples that are lower in methylmercury include: anchovy, black sea bass, catfish, clams, cod, crab, crawfish, flounder, haddock, hake, herring, lobster, mackerel, mullet, oyster, perch, pollock, salmon, sardine, scallop, shrimp, sole, squid, tilapia, freshwater trout, light tuna, and whiting.

Nuts, Seeds, Soy Products: Nuts and seeds include all nuts (tree nuts and peanuts), nut butters, seeds (e.g., chia, flax, pumpkin, sesame, and sunflower), and seed butters (e.g., sesame or tahini and sunflower). Soy includes tofu, tempeh, and products made from soy flour, soy protein isolate, and soy concentrate. Nuts should be unsalted.

Beans, Peas, Lentils: Can be considered part of the protein foods group as well as the vegetable group, but should be counted in one group only.

c Food group amounts shown in cup equivalents (cup eq) or ounce equivalents (ounce eq). Oils are shown in grams. Quantity equivalents for each food group are:

Vegetables, Fruits (1 cup eq): 1 cup raw or cooked vegetable or fruit; 1 cup vegetable or fruit juice; 2 cups leafy salad greens; $\frac{1}{2}$ cup dried fruit or vegetable.

Grains (1 ounce eq): $\frac{1}{2}$ cup cooked rice, pasta, or cereal; 1 ounce dry pasta or rice; 1 medium (1 ounce) slice bread, tortilla, or flatbread; 1 ounce of ready-to-eat cereal (about 1 cup of flaked cereal).

Dairy (1 cup eq): 1 cup milk, yogurt, or fortified soymilk; $1\frac{1}{2}$ ounces natural cheese such as cheddar cheese or 2 ounces of processed cheese.

Protein Foods (1 ounce eq): 1 ounce lean meats, poultry, or seafood; 1 egg; $\frac{1}{4}$ cup cooked beans or tofu; 1 tbsp nut or seed butter; $\frac{1}{2}$ ounce nuts or seeds.

d Amounts of whole grains in the Patterns for children are less than the minimum of 3 ounce-eq in all Patterns recommended for adults.

e The U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) provide joint advice regarding seafood consumption to limit methylmercury exposure for women who might become or are pregnant or breastfeeding, and children. Depending on body weight, some women and many children should choose seafood lowest in methylmercury or eat less seafood than the amounts in the Healthy US-Style Eating Pattern. For more information, see the FDA and EPA websites [FDA.gov/fishadvice](https://www.fda.gov/fishadvice); [EPA.gov/fishadvice](https://www.epa.gov/fishadvice).

f If consuming up to 2 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list in the FDA/EPA joint "Advice About Eating Fish," available at [FDA.gov/fishadvice](https://www.fda.gov/fishadvice) and [EPA.gov/fishadvice](https://www.epa.gov/fishadvice). If consuming up to 3 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list that contain even lower methylmercury: flatfish (e.g., flounder), salmon, tilapia, shrimp, catfish, crab, trout, haddock, oysters, sardines, squid, pollock, anchovies, crawfish, mullet, scallops, whiting, clams, shad, and Atlantic mackerel. If consuming up to 3 ounces of seafood per week, many commonly consumed varieties of seafood should be avoided because they cannot be consumed at 3 ounces per week by children without the potential of exceeding safe methylmercury limits; examples that should not be consumed include: canned light tuna or white (albacore) tuna, cod, perch, black sea bass. For a complete list please see: [FDA.gov/fishadvice](https://www.fda.gov/fishadvice) and [EPA.gov/fishadvice](https://www.epa.gov/fishadvice).

g Foods are assumed to be in nutrient-dense forms, lean or low-fat and prepared with minimal added saturated fat, added sugars, refined starches, or salt. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The amount of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars, added refined starches, saturated fat, alcohol, or to eat more than the recommended amount of food in a food group.

NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars, saturated fat, and alcohol; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded.

Table A3-3

Healthy Vegetarian Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	700	800	900	1,000
FOOD GROUP OR SUBGROUP^{b,c}	Daily Amount of Food From Each Group^d (Vegetable and protein foods subgroup amounts are per week.)			
Vegetables (cup eq/day)	1	1	1	1
Vegetable Subgroups in Weekly Amounts				
Dark-Green Vegetables (cup eq/wk)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Red and Orange Vegetables (cup eq/wk)	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$
Beans, Peas, Lentils (cup eq/wk)	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$
Starchy Vegetables (cup eq/wk)	2	2	2	2
Other Vegetables (cup eq/wk)	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Fruits (cup eq/day)	$\frac{1}{2}$	$\frac{3}{4}$	1	1
Grains (ounce eq/day)	$1\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{3}{4}$	3
Whole Grains (ounce eq/day)	$1\frac{1}{4}$	$1\frac{3}{4}$	2	2
Refined Grains (ounce eq/day)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Dairy (cup eq/day)	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{3}{4}$	2
Protein Foods (ounce eq/day)	1	1	1	1
Protein Foods Subgroups in Weekly Amounts				
Eggs (ounce eq/wk)	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$
Nuts, Seeds, Soy Products (ounce eq/wk)	4	4	4	4
Oils (grams/day)	9	$8\frac{1}{2}$	10	15

^a Calorie level ranges: Energy levels are calculated based on median length and body weight reference individuals. Calorie needs vary based on many factors. The DRI Calculator for Healthcare Professionals available at nsl.usda.gov/fnic/dri-calculator/ can be used to estimate calorie needs based on age, sex, and weight.

^b Definitions for each food group and subgroup and quantity (i.e., cup or ounce) equivalents are provided in [Chapter 1](#) and are compiled in [Table A3-2 \(footnote c\)](#).

^c All foods are assumed to be in nutrient-dense forms and prepared with minimal added sugars, refined starches (which are a source of calories but few or no other nutrients), or sodium. Foods are also lean or in low-fat forms with the exception of dairy which includes whole-fat fluid milk, reduced-fat plain yogurts, and reduced-fat cheese. There are no calories available for additional added sugars, saturated fat, or to eat more than the recommended amount of food in a food group.

^d In some cases, food subgroup amounts are greatest at the lower calorie levels to help achieve nutrient adequacy when relatively small number of calories are required.

Table A3-4

Healthy Vegetarian Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
FOOD GROUP OR SUBGROUP ^b	Daily Amount ^c of Food From Each Group (Vegetable and protein foods subgroup amounts ^b are per week.)											
Vegetables (cup eq/day)	1	1 ½	1 ½	2	2 ½	2 ½	3	3	3 ½	3 ½	4	4
Vegetable Subgroups in Weekly Amounts												
Dark-Green Vegetables (cup eq/wk)	½	1	1	1 ½	1 ½	1 ½	2	2	2 ½	2 ½	2 ½	2 ½
Red and Orange Vegetables (cup eq/wk)	2 ½	3	3	4	5 ½	5 ½	6	6	7	7	7 ½	7 ½
Beans, Peas, Lentils (cup eq/wk) ^d	½	½	½	1	1 ½	1 ½	2	2	2 ½	2 ½	3	3
Starchy Vegetables (cup eq/wk)	2	3 ½	3 ½	4	5	5	6	6	7	7	8	8
Other Vegetables (cup eq/wk)	1 ½	2 ½	2 ½	3 ½	4	4	5	5	5 ½	5 ½	7	7
Fruits (cup eq/day)	1	1	1 ½	1 ½	1 ½	2	2	2	2	2 ½	2 ½	2 ½
Grains (ounce eq/day)	3	4	5	5 ½	6 ½	6 ½	7 ½	8 ½	9 ½	10 ½	10 ½	10 ½
Whole Grains (ounce eq/day)	1 ½	2	2 ½	3	3 ½	3 ½	4	4 ½	5	5 ½	5 ½	5 ½
Refined Grains (ounce eq/day)	1 ½	2	2 ½	2 ½	3	3	3 ½	4	4 ½	5	5	5
Dairy (cup eq/day)	2	2 ½	2 ½	3	3	3	3	3	3	3	3	3
Protein Foods (ounce eq/day)	1	1 ½	2	2 ½	3	3 ½	3 ½	4	4 ½	5	5 ½	6
Protein Foods Subgroups in Weekly Amounts												
Eggs (ounce eq/wk)	2	3	3	3	3	3	3	3	3	4	4	4
Beans, Peas, Lentils (cup eq/wk) ^d	1	2	4	4	6	6	6	8	9	10	11	12
Soy Products (ounce eq/wk)	2	3	4	6	6	8	8	9	10	11	12	13
Nuts, Seeds (ounce eq/wk)	2	2	3	5	6	7	7	8	9	10	12	13
Oils (grams/day)	15	17	17	22	24	27	29	31	34	36	44	51
Limit on Calories for Other Uses (kcal/day) ^e	170	140	160	150	150	250	290	350	350	350	390	500
Limit on Calories for Other Uses (%/day)	17%	12%	11%	9%	8%	13%	13%	15%	13%	13%	13%	16%

^{a, b, c} See [Table A3-2 footnotes](#).

^d About half of beans, peas, lentils are shown as vegetables, in cup eq, and half as protein foods, in ounce eq. Beans, peas, lentils in the patterns, in cup eq, is the amount in the vegetable group plus the amount in protein foods group (in ounce eq) divided by four.

^e See [Table A3-2 footnotes](#).

NOTE: The total dietary pattern should not exceed *Dietary Guidelines* limits for added sugars, saturated fat, and alcohol; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded.

Table A3-5

Healthy Mediterranean-Style Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN ^a	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
FOOD GROUP OR SUBGROUP ^b	Daily Amount ^c of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)											
Vegetables (cup eq/day)	1	1 ½	1 ½	2	2 ½	2 ½	3	3	3 ½	3 ½	4	4
Vegetable Subgroups in Weekly Amounts												
Dark-Green Vegetables (cup eq/wk)	½	1	1	1 ½	1 ½	1 ½	2	2	2 ½	2 ½	2 ½	2 ½
Red and Orange Vegetables (cup eq/wk)	2 ½	3	3	4	5 ½	5 ½	6	6	7	7	7 ½	7 ½
Beans, Peas, Lentils (cup eq/wk)	½	½	½	1	1 ½	1 ½	2	2	2 ½	2 ½	3	3
Starchy Vegetables (cup eq/wk)	2	3 ½	3 ½	4	5	5	6	6	7	7	8	8
Other Vegetables (cup eq/wk)	1 ½	2 ½	2 ½	3 ½	4	4	5	5	5 ½	5 ½	7	7
Fruits (cup eq/day)	1	1	1 ½	2	2	2 ½	2 ½	2 ½	2 ½	3	3	3
Grains (ounce eq/day)	3	4	5	5	6	6	7	8	9	10	10	10
Whole Grains (ounce eq/day) ^d	1 ½	2	2 ½	3	3	3	3 ½	4	4 ½	5	5	5
Refined Grains (ounce eq/day)	1 ½	2	2 ½	2	3	3	3 ½	4	4 ½	5	5	5
Dairy (cup eq/day) ^d	2	2 ½	2 ½	2	2	2	2	2 ½	2 ½	2 ½	2 ½	2 ½
Protein Foods (ounce eq/day)	2	3	4	5 ½	6	6 ½	7	7 ½	7 ½	8	8	8
Protein Foods Subgroups in Weekly Amounts												
Meats, Poultry, Eggs (ounce eq/wk)	10	14	19	23	23	26	28	31	31	33	33	33
Seafood (ounce eq/wk) ^e	3	4	6	11	15	15	16	16	17	17	17	17
Nuts, Seeds, Soy Products (ounce eq/wk)	2	2	3	4	4	5	5	5	5	6	6	6
Oils (grams/day)	15	17	17	22	24	27	29	31	34	36	44	51
Limit on Calories for Other Uses (kcal/day) ^f	130	80	90	120	140	240	250	280	300	330	400	540
Limit on Calories for Other Uses (%/day)	13%	7%	6%	8%	8%	12%	11%	12%	12%	12%	13%	17%

^{a,b,c} See Table A3-2 footnotes.

^d Amounts of dairy recommended for children and adolescents are as follows, regardless of the calorie level of the pattern: for age 2 years, 2 cup-eq per day; for ages 3 through 8 years, 2 ½ cup-eq per day; for ages 9 through 18 years, 3 cup-eq per day.

^e The U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) provide joint advice regarding seafood consumption to limit methylmercury exposure for women who might become or are pregnant or lactating, and children. Depending on body weight, some women and children should choose seafood lowest in methylmercury or eat less seafood than the amounts in the Healthy U.S.-Style Dietary Pattern. For more information, see the FDA and EPA websites at [FDA.gov/fishadvice](https://www.fda.gov/fishadvice) and [EPA.gov/fishadvice](https://www.epa.gov/fishadvice).

^f Foods are assumed to be in nutrient-dense forms; lean or low-fat;

and prepared with minimal added sugars, refined starches (which are a source of calories but few or no other nutrients), saturated fat, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The amount of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added sugars, saturated fat, and/or alcohol (for nonpregnant adults of legal drinking age only) or to eat more than the recommended amount of food in a food group.

NOTE: The total dietary pattern should not *Dietary Guidelines* limits for added sugars, saturated fat, and alcohol; be within the Acceptable Macronutrient Distribution Ranges for protein, carbohydrate, and total fats; and stay within calorie limits. Values are rounded.



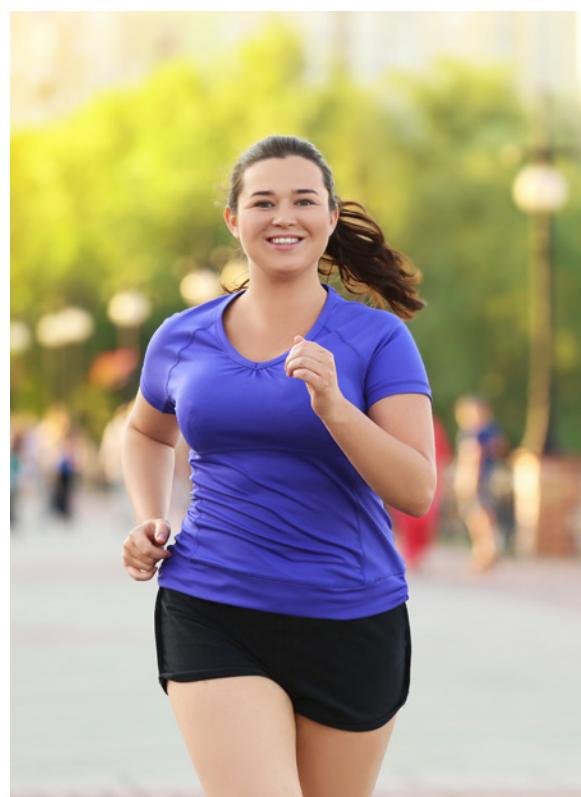
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Physical Activity Guidelines for Americans

2nd edition



MESSAGE FROM THE SECRETARY

Regular physical activity is one of the most important things people can do to improve their health. Moving more and sitting less have tremendous benefits for everyone, regardless of age, sex, race, ethnicity, or current fitness level. Individuals with a chronic disease or a disability benefit from regular physical activity, as do women who are pregnant. The scientific evidence continues to build—physical activity is linked with even more positive health outcomes than we previously thought. And, even better, benefits can start accumulating with small amounts of, and immediately after doing, physical activity.

Today, about half of all American adults—117 million people—have one or more preventable chronic diseases. Seven of the ten most common chronic diseases are favorably influenced by regular physical activity. Yet nearly 80 percent of adults are not meeting the key guidelines for both aerobic and muscle-strengthening activity, while only about half meet the key guidelines for aerobic physical activity. This lack of physical activity is linked to approximately \$117 billion in annual health care costs and about 10 percent of premature mortality.

This new edition of the *Physical Activity Guidelines for Americans* has the potential to change that situation. It is grounded in the most current scientific evidence and informed by the recommendations of the 2018 *Physical Activity Guidelines Advisory Committee*. This Federal advisory committee, which was composed of prestigious researchers in the fields of physical activity, health, and medicine, conducted a multifaceted, robust analysis of the available scientific literature. Their work culminated in the *2018 Physical Activity Guidelines Advisory Committee Scientific Report*, which provided recommendations to the Federal Government on physical activity, sedentary behavior, and health. Informed by this Scientific Report and by public and Federal agency comments, the new edition provides guidance on the amounts and types of physical activity necessary to maintain or improve overall health and reduce the risk of, or even prevent, chronic disease.

The *Physical Activity Guidelines for Americans* is an essential resource for health professionals and policymakers as they design and implement physical activity programs, policies, and promotion initiatives. It provides information that helps Americans make healthy choices for themselves and their families, and discusses evidence-based, community-level interventions that can make being physically active the easy choice in all the places where people live, learn, work, and play.

Progress to reverse the high rates of inactivity-related chronic diseases and low rates of physical activity will require comprehensive and coordinated strategies. The *Physical Activity Guidelines* is an important part of a complex and integrated solution to promote health and to reduce the burden of chronic disease in our country. We all have a role to play in this critical effort. I invite you to join me in helping our country be more physically active. If we all move more and sit less today and work toward meeting the *Physical Activity Guidelines* ourselves, we will be well on our way to creating a healthier Nation and ensuring everyone can live healthier and more active lives.

Alex M. Azar II
Secretary
U.S. Department of Health and Human Services

Table of Contents

Acknowledgments	4
Physical Activity Guidelines for Americans Summary.....	6
A Roadmap to the Physical Activity Guidelines for Americans	12
Chapter 1. Introducing the Physical Activity Guidelines for Americans	13
Chapter 2. Physical Activity and Health	27
Chapter 3. Active Children and Adolescents.....	46
Chapter 4. Active Adults.....	55
Chapter 5. Active Older Adults	66
Chapter 6. Additional Considerations for Some Adults	78
Chapter 7. Active and Safe.....	87
Chapter 8. Taking Action: Increasing Physical Activity Levels of Americans	94
Glossary.....	104
Appendix 1. Physical Activity Behaviors: Intensity, Bouts, and Steps	108
Appendix 2. Federal Physical Activity Resources	113

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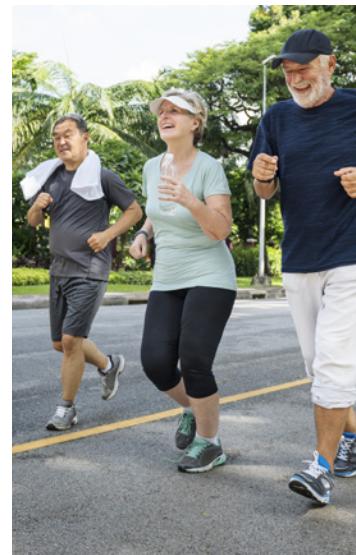
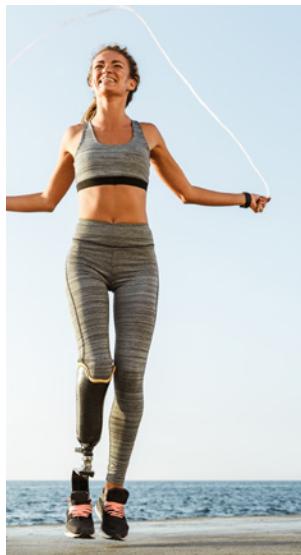
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Physical Activity Guidelines for Americans Summary

Being physically active is one of the most important actions that people of all ages can take to improve their health. The evidence reviewed for this second edition of the Physical Activity Guidelines for Americans is clear—physical activity fosters normal growth and development and can make people feel better, function better, sleep better, and reduce the risk of a large number of chronic diseases. Health benefits start immediately after exercising, and even short episodes of physical activity are beneficial. Even better, research shows that just about everyone gains benefits: men and women of all races and ethnicities, young children to older adults, women who are pregnant or postpartum (first year after delivery), people living with a chronic condition or a disability, and people who want to reduce their risk of chronic disease. The evidence about the health benefits of regular physical activity is well established, and research continues to provide insight into what works to get people moving, both at the individual and community level. Achieving the benefits of physical activity depends on our personal efforts to increase activity in ourselves, family, friends, patients, and colleagues. Action is also required at the school, workplace, and community levels.

What's New in This Edition?

This second edition of the Physical Activity Guidelines for Americans provides science-based guidance to help people ages 3 years and older improve their health through participation in regular physical activity. It reflects the extensive amount of new knowledge gained since the publication of the first Physical Activity Guidelines for Americans, released in 2008. This edition of the Guidelines discusses the proven benefits of physical activity and outlines the amounts and types of physical activity recommended for different ages and populations. For example, new aspects include discussions of:

- Additional health benefits related to brain health, additional cancer sites, and fall-related injuries;
- Immediate and longer term benefits for how people feel, function, and sleep;
- Further benefits among older adults and people with additional chronic conditions;
- Risks of sedentary behavior and their relationship with physical activity;
- Guidance for preschool children (ages 3 through 5 years);
- Elimination of the requirement for physical activity of adults to occur in bouts of at least 10 minutes; and
- Tested strategies that can be used to get the population more active.

Developing the Physical Activity Guidelines

The Physical Activity Guidelines for Americans is issued by the U.S. Department of Health and Human Services (HHS). It complements the Dietary Guidelines for Americans, a joint effort of HHS and the U.S. Department of Agriculture (USDA). Together, the two documents provide guidance for the public on the importance of being physically active and eating a healthy diet to promote good health and reduce the risk of chronic diseases.

The primary audience for the Physical Activity Guidelines for Americans is policy makers and health professionals, though it may also be useful to interested members of the public. The main idea behind the Guidelines is that regular physical activity over months and years can produce long-term health benefits.



Learn More

For more information on the terms used in this document, see [Glossary](#).

The development of this edition of the Physical Activity Guidelines for Americans started in 2016 when former HHS Secretary Sylvia Mathews Burwell appointed an external scientific advisory committee, the 2018 Physical Activity Guidelines Advisory Committee. The Committee conducted a series of systematic reviews of the scientific literature on physical activity and health and met periodically in public session to discuss their findings. The Committee's work was compiled into a scientific report summarizing the current evidence. The 2018 Physical Activity Guidelines Advisory Committee Scientific Report and summaries of the Committee's meetings are available at <https://odphp.health.gov/PAGuidelines/>.

When writing the Guidelines, HHS used the Advisory Committee's Scientific Report as its primary source but also considered comments from the public and government agencies. The Guidelines will be widely promoted through various communications strategies online and in print, such as the Move Your Way campaign materials for professionals and consumers, and partnerships with organizations that promote physical activity.



Key Guidelines

Below are the key guidelines included in the Physical Activity Guidelines for Americans. The later chapters provide context and additional information related to these summary statements.



Key Guidelines for Preschool-Aged Children

- Preschool-aged children (ages 3 through 5 years) should be physically active throughout the day to enhance growth and development.
- Adult caregivers of preschool-aged children should encourage active play that includes a variety of activity types.



Key Guidelines for Children and Adolescents

- It is important to provide young people opportunities and encouragement to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.
- Children and adolescents ages 6 through 17 years should do 60 minutes (1 hour) or more of moderate-to-vigorous physical activity daily:
 - **Aerobic:** Most of the 60 minutes or more per day should be either moderate- or vigorous-intensity aerobic physical activity and should include vigorous-intensity physical activity on at least 3 days a week.
 - **Muscle-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days a week.
 - **Bone-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days a week.



Key Guidelines for Adults

- Adults should move more and sit less throughout the day. Some physical activity is better than none. Adults who sit less and do any amount of moderate-to-vigorous physical activity gain some health benefits.
- For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
- Additional health benefits are gained by engaging in physical activity beyond the equivalent of 300 minutes (5 hours) of moderate-intensity physical activity a week.
- Adults should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.



Key Guidelines for Older Adults

The key guidelines for adults also apply to older adults. In addition, the following key guidelines are just for older adults:

- As part of their weekly physical activity, older adults should do multicomponent physical activity that includes balance training as well as aerobic and muscle-strengthening activities.
- Older adults should determine their level of effort for physical activity relative to their level of fitness.
- Older adults with chronic conditions should understand whether and how their conditions affect their ability to do regular physical activity safely.
- When older adults cannot do 150 minutes of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow.



Key Guidelines for Women During Pregnancy and the Postpartum Period

- Women should do at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity a week during pregnancy and the postpartum period. Preferably, aerobic activity should be spread throughout the week.
- Women who habitually engaged in vigorous-intensity aerobic activity or who were physically active before pregnancy can continue these activities during pregnancy and the postpartum period.
- Women who are pregnant should be under the care of a health care provider who can monitor the progress of the pregnancy. Women who are pregnant can consult their health care provider about whether or how to adjust their physical activity during pregnancy and after the baby is born.



Key Guidelines for Adults With Chronic Health Conditions and Adults With Disabilities

- Adults with chronic conditions or disabilities, who are able, should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
- Adults with chronic conditions or disabilities, who are able, should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.
- When adults with chronic conditions or disabilities are not able to meet the above key guidelines, they should engage in regular physical activity according to their abilities and should avoid inactivity.

- Adults with chronic conditions or symptoms should be under the care of a health care provider. People with chronic conditions can consult a health care professional or physical activity specialist about the types and amounts of activity appropriate for their abilities and chronic conditions.



Key Guidelines for Safe Physical Activity

To do physical activity safely and reduce risk of injuries and other adverse events, people should:

- Understand the risks, yet be confident that physical activity can be safe for almost everyone.
- Choose types of physical activity that are appropriate for their current fitness level and health goals, because some activities are safer than others.
- Increase physical activity gradually over time to meet key guidelines or health goals. Inactive people should “start low and go slow” by starting with lower intensity activities and gradually increasing how often and how long activities are done.
- Protect themselves by using appropriate gear and sports equipment, choosing safe environments, following rules and policies, and making sensible choices about when, where, and how to be active.
- Be under the care of a health care provider if they have chronic conditions or symptoms. People with chronic conditions and symptoms can consult a health care professional or physical activity specialist about the types and amounts of activity appropriate for them.



Implementation of the Physical Activity Guidelines Through Move Your Way

The Physical Activity Guidelines is written for professional audiences. Therefore, its translation into actionable consumer messages and resources helps individuals, families, and communities achieve the recommendations in the Guidelines. The Move Your Way campaign was created by the Office of Disease Prevention and Health Promotion within the U.S. Department of Health and Human Services to be used by communities, health professionals, educators, and others to communicate to consumers in plain language about the recommendations from the Guidelines, promote the health benefits of meeting the recommendations, and provide tips for how consumers can meet the recommendations.

Campaign resources, including interactive tools, fact sheets, videos, and graphics, are available at <https://odphp.health.gov/PAGuidelines/>.

Figure A-1. Move Your Way Adult Dosage



A Roadmap to the Physical Activity Guidelines for Americans

- For an overview of the development of the Physical Activity Guidelines for Americans and important background information about physical activity, read [Chapter 1. Introducing the Physical Activity Guidelines for Americans](#).
- To learn about the health benefits of physical activity, read [Chapter 2. Physical Activity and Health](#). This information may help motivate people to become regularly active.
- To understand how to do physical activity in a manner that meets the Guidelines:
 - For youth ages 3 through 17 years, including youth with disabilities, read [Chapter 3. Active Children and Adolescents](#).
 - For adults ages 18 through 64 years, read [Chapter 4. Active Adults](#).
 - For adults ages 65 years and older, read [Chapter 5. Active Older Adults](#). The Guidelines for older adults are similar to those for adults, but add specific guidance, such as the importance of doing multicomponent physical activities.
- For adults with chronic health conditions or disabilities, read [Chapter 4. Active Adults](#) or [Chapter 5. Active Older Adults](#) and [Chapter 6. Additional Considerations for Some Adults](#). Chapters 4 and 6 are also relevant for women who are pregnant or postpartum.
- To understand how to reduce the risks of activity-related injury, read [Chapter 7. Active and Safe](#).
- To learn about strategies to promote and support regular physical activity, read [Chapter 8. Taking Action: Increasing Physical Activity Levels of Americans](#).
- For definitions of key terms used in the Guidelines, consult the [Glossary](#).
- To find additional information and relevant resources, consult the Appendices.
 1. [Physical Activity Behaviors: Intensity, Bouts, and Steps](#)
 2. [Federal Physical Activity Resources](#)

Note

The Guidelines assume that many readers will not read all the chapters, but only what is relevant to them. Important information may therefore be repeated in several chapters.





Chapter 1. Introducing the Physical Activity Guidelines for Americans



Being physically active is one of the most important actions that people of all ages can take to improve their health. About \$117 billion in annual health care costs and about 10 percent of premature mortality are associated with inadequate physical activity (not meeting the aerobic key guidelines). This second edition of the Physical Activity Guidelines for Americans provides science-based guidance to help people ages 3 years and older improve their health through appropriate physical activity. It builds on the 2008 Guidelines by incorporating new evidence about even more health benefits, demonstrating greater flexibility about how to achieve those benefits, and showing the many proven ways to help people be more active and to encourage communities to be more conducive to physical activity.

The Physical Activity Guidelines for Americans is issued by the U.S. Department of Health and Human Services (HHS). It complements the Dietary Guidelines for Americans, a joint effort of HHS and the U.S. Department of Agriculture (USDA). Together, the two documents provide guidance for the U.S. population on the importance of being physically active and eating a healthy diet to promote good health and reduce the risk of chronic diseases.

This chapter provides background information about the rationale and process for developing the Guidelines. It then discusses several issues that provide the framework for understanding the Guidelines. The chapter also explains how the Guidelines fits in with other published physical activity recommendations and how it should be used in practice.



New Evidence of Physical Activity Benefits

Evidence for the benefits of physical activity has continued to grow since the 2008 Guidelines were published. Here are just a few of the recently identified benefits:

- ✓ Improved bone health and weight status for children ages 3 through 5 years.
- ✓ Improved cognitive function for youth ages 6 to 13 years.
- ✓ Reduced risk of cancer at a greater number of sites.
- ✓ Brain health benefits, including possible improved cognitive function, reduced anxiety and depression risk, and improved sleep and quality of life.
- ✓ For pregnant women, reduced risk of excessive weight gain, gestational diabetes, and postpartum depression.
- ✓ For older adults, reduced risk of fall-related injuries.
- ✓ For people with various chronic medical conditions, reduced risk of all-cause and disease-specific mortality, improved physical function, and improved quality of life.

Why and How the Physical Activity Guidelines for Americans Was Developed

The Rationale for Physical Activity Guidelines

Extensive scientific evidence supports the importance of recommending that all Americans should engage in regular physical activity to improve overall health and to reduce the risk of many health problems. Physical activity is a leading example of how lifestyle choices have a profound effect on health. The choices people make about other lifestyle factors, such as diet, smoking, and alcohol use, also have important and independent effects on their health.

The Physical Activity Guidelines for Americans is designed to provide information and guidance on the types and amounts of physical activity that provide substantial health benefits. The primary audience is policy makers and health professionals, though this information may also be useful to interested members of the public. The main idea behind the Guidelines is that regular physical activity over months and years can produce long-term health benefits.

The information in the Guidelines is necessary because of the importance of physical activity to the health of Americans, whose current inactivity puts them at unnecessary risk. Healthy People 2020 set objectives for increasing the level of physical activity in Americans over the decade from 2010 to 2020. Although the latest information shows some improvements in physical activity levels among American adults, only 26 percent of men, 19 percent of women, and 20 percent of adolescents report sufficient activity to meet the relevant aerobic and muscle-strengthening guidelines (see [Figures 1-1](#) and [1-2](#)).

Learn More



See [Chapter 2. Physical Activity and Health](#) for more information on the many health benefits of physical activity.

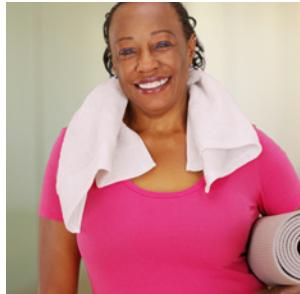
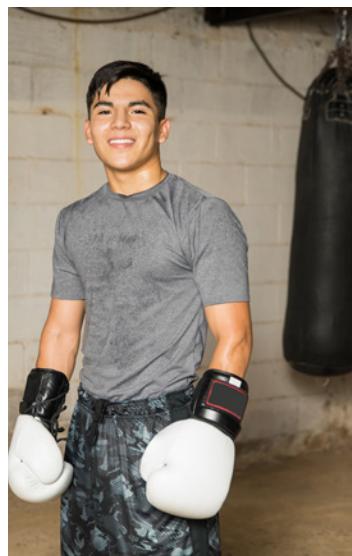
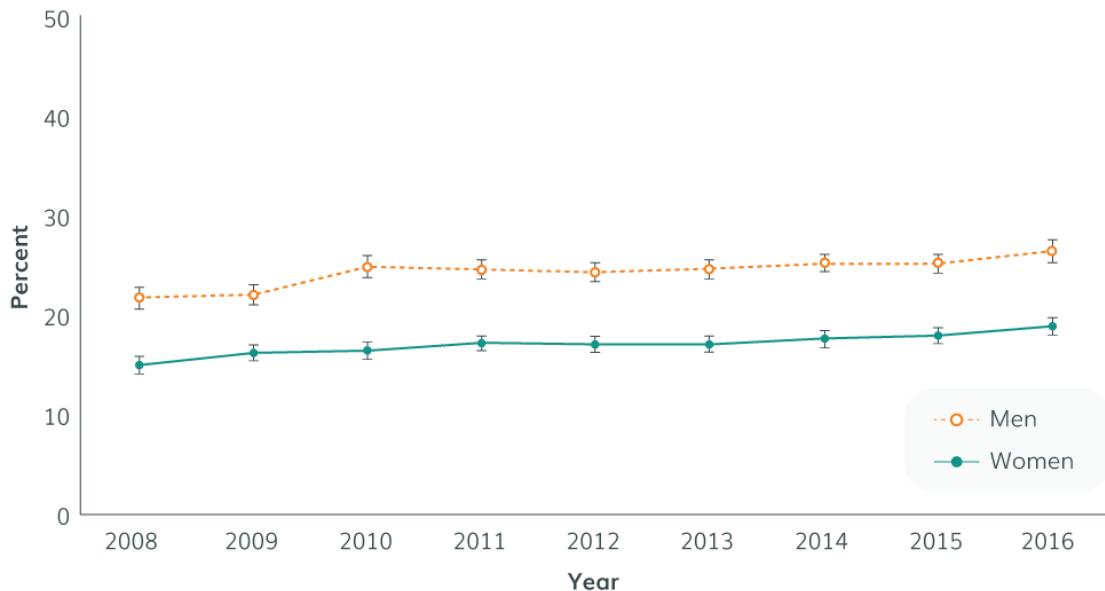


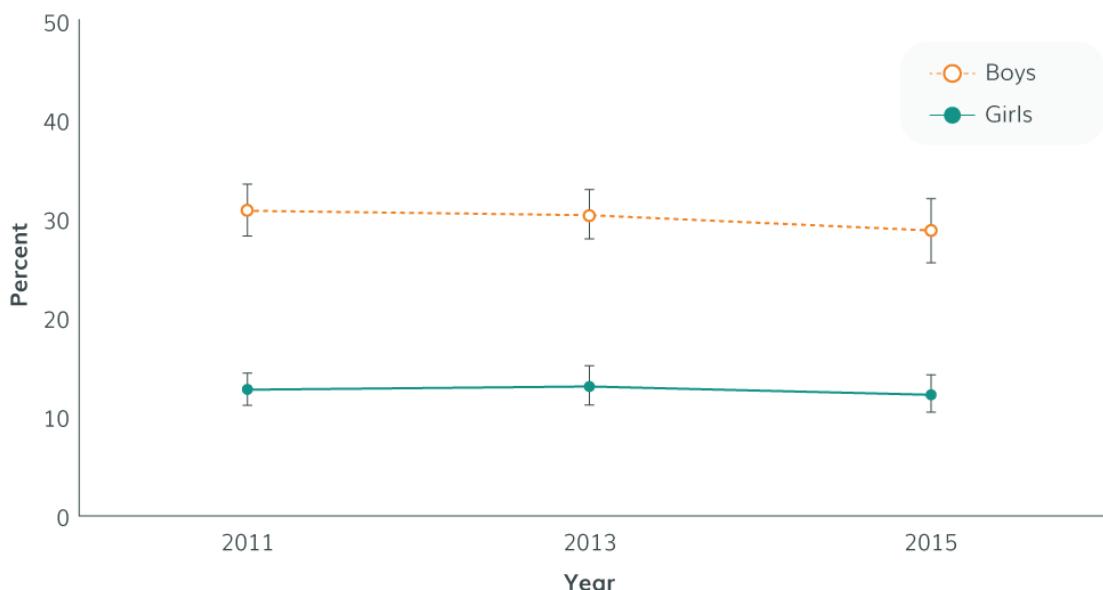
Figure 1-1. Percentage of U.S. Adults Ages 18 Years or Older Who Met the Aerobic and Muscle-Strengthening Guidelines, 2008–2016



Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey (NHIS).

Notes: Estimates are age-adjusted to the 2000 U.S. standard population using five age groups: 18–24 years, 25–34 years, 35–44 years, 45–64 years, and 65+ years. NHIS questions ask about frequency and duration of light-intensity to moderate-intensity and vigorous-intensity leisure-time physical activities, as well as the frequency of muscle-strengthening activities. Meeting the aerobic component of the 2008 Physical Activity Guidelines for Americans is defined as reporting at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity a week, or an equivalent combination. Meeting the muscle-strengthening component is defined as reporting muscle-strengthening activities at least 2 days per week. Error bars represent upper and lower bounds of the 95% confidence interval.

Figure 1-2. Percentage of U.S. High School Students Who Met the Aerobic Physical Activity and Muscle-Strengthening Guidelines, 2011–2015



Source: Centers for Disease Control and Prevention, Youth Risk Behavior Surveillance System.

Notes: Meeting the aerobic component of the 2008 Physical Activity Guidelines for Americans is defined as reporting at least 60 minutes of "any kind of physical activity that increases your heart rate and makes you breathe hard some of the time" on all days during the 7 days before the survey. Meeting the muscle-strengthening component is defined as reporting at least 3 days of "exercises to strengthen or tone your muscles" during the 7 days before the survey. Error bars represent upper and lower bounds of the 95% confidence interval.

The Development of the Physical Activity Guidelines

In 2008, HHS released the first edition of the Physical Activity Guidelines for Americans. It served as the first benchmark and primary, authoritative voice of the Federal Government for providing science-based guidance on physical activity, fitness, and health for Americans. The Guidelines provides a foundation for Federal recommendations and education for physical activity programs for Americans, including those at risk of chronic disease. Since 2008, HHS has reaffirmed the health benefits of physical activity in several publications.

In 2013, 5 years after the Guidelines was released, HHS developed the Physical Activity Guidelines for Americans Midcourse Report: Strategies to Increase Physical Activity Among Youth. This report built on the 2008 Guidelines for Americans by focusing on strategies to help youth achieve the recommended 60 minutes of daily physical activity in a variety of settings, including school, preschool and childcare, community, family and home, and primary care.

In 2015, HHS released Step It Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities. The Call to Action seeks to increase walking across the United States by calling for improved access to safe and convenient places to walk and wheelchair roll and to create a culture that supports these activities for people of all ages and abilities.

Because the evidence for the health benefits of a physically active lifestyle continued to grow rapidly, HHS began the process of developing a second edition of the Physical Activity Guidelines for Americans in December 2015. HHS called for nominations to the 2018 Physical Activity Guidelines Advisory Committee and followed a similar development process to those used for the 2008 Physical Activity Guidelines for Americans and the 2015-2020 Dietary Guidelines for Americans. In 2016, former HHS Secretary Sylvia Mathews Burwell appointed 17 members to the 2018 Physical Activity Guidelines Advisory Committee, an external scientific advisory committee chartered under the Federal Advisory Committee Act, as amended (Public Law 92-463, 5 U.S.C. App.). The Committee conducted an extensive analysis of the scientific information on physical activity and health and met periodically in public session to discuss their findings.

The Committee graded the evidence based on consistency and quality of the research literature. Evidence graded as strong or moderate was used as the basis for the Guidelines. The 2018 Physical Activity Guidelines Advisory Committee Scientific Report and summaries of the Committee's public meetings are available at <https://odphp.health.gov/PAGuidelines/>.

When writing the Guidelines, HHS used the Advisory Committee's Scientific Report as its primary source but also considered comments from the public and government agencies. The Guidelines will be widely promoted through various communications strategies online and in print, such as the Move Your Way campaign materials for professionals and consumers, and partnerships with organizations that promote physical activity.

The Framework for the Physical Activity Guidelines for Americans

The 2018 Physical Activity Guidelines Advisory Committee Scientific Report provided the content and conceptual underpinning for the Guidelines. Key elements of this framework are described in the following sections.

Disease Prevention and Health Promotion

The 2008 Advisory Committee Report and the 2008 Guidelines focused primarily on the disease prevention benefits of physical activity. The 2018 Scientific Report demonstrates that, in addition to disease prevention benefits, regular physical activity provides a variety of other benefits, including helping people sleep better, feel better, and perform daily tasks more easily. The 2018 Scientific Report also notes immediate benefits of physical activity in addition to those related to regular physical activity over months or years. This broader focus on both disease prevention and health promotion is embedded in the key guidelines for the amounts and types of physical activity that are provided for three age groups (children and adolescents, adults, and older adults), for women who are pregnant or postpartum, and for adults with chronic diseases or adults with disabilities.

Strong evidence demonstrates that moderate-to-vigorous physical activity improves the quality of sleep in adults. It does so by reducing the length of time it takes to go to sleep and reducing the time one is awake after going to sleep and before rising in the morning. It also can increase the time in deep sleep and reduce daytime sleepiness.

Strong evidence from adults demonstrates that perceived quality of life is improved by regular physical activity. The Guidelines focuses on selected aspects of health-related quality of life, including both physical and mental or emotional health. It does not include other aspects of quality of life, such as those related to finances, relationships, or occupations.

Physical activity improves physical function among individuals of all ages, enabling them to conduct their daily lives with energy and without undue fatigue. This is true for older adults, for whom improved physical function reduces risk of falls and fall-related injuries and contributes to their ability to maintain independence. It is also true for young and middle-aged adults, as improved physical function helps them more easily accomplish the tasks of daily living, such as climbing stairs or carrying groceries.

In addition to improving physical function, physical activity may improve cognitive function among youth and adults. Aspects of cognitive function that may be improved include memory, attention, executive function (the ability to plan and organize; monitor, inhibit, or facilitate behaviors; initiate tasks; and control emotions), and academic performance among youth.

Learn More



See [Chapter 2. Physical Activity and Health](#) for more information on the many health benefits of physical activity.

Timing of Benefits

A single session of moderate-to-vigorous physical activity can reduce blood pressure, improve insulin sensitivity, improve sleep, reduce anxiety symptoms, and improve some aspects of cognition on the day that it is performed. Most of these improvements become even larger with the regular performance of moderate-to-vigorous physical activity. Other benefits, such as disease risk reduction and improved physical function, accrue within days to weeks after consistently being more physically active.

Physical Activity Intensity

The Guidelines consider the intensity with which people do physical activity. Some activities are a higher intensity than others because they require more energy to do. For example, a person expends more energy walking briskly than slowly strolling.

Absolute rates of energy expenditure during physical activity are commonly described as light, moderate, or vigorous intensity. Energy expenditure is expressed by multiples of the metabolic equivalent of task (MET), where 1 MET is the rate of energy expenditure while sitting at rest.

- **Light-intensity activity** is non-sedentary waking behavior (see sidebar) that requires less than 3.0 METs; examples include walking at a slow or leisurely pace (2 mph or less), cooking activities, or light household chores.
- **Moderate-intensity activity** requires 3.0 to less than 6.0 METs; examples include walking briskly (2.5 to 4 mph), playing doubles tennis, or raking the yard.
- **Vigorous-intensity activity** requires 6.0 or more METs; examples include jogging, running, carrying heavy groceries or other loads upstairs, shoveling snow, or participating in a strenuous fitness class. Many adults do no vigorous-intensity physical activity.

Learn More

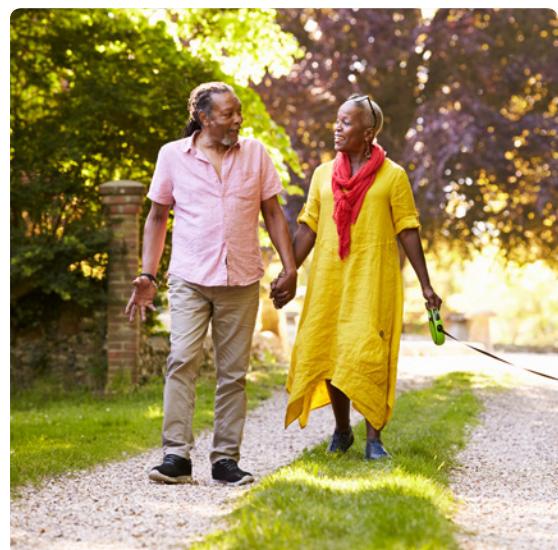


[Appendix 1](#) provides a detailed explanation of MET-minutes, a unit useful for describing the energy expenditure of a specific physical activity.

Levels of Physical Activity

Throughout the Guidelines, reference is made to four levels of aerobic physical activity: inactive, insufficiently active, active, and highly active. This classification for adults is useful because these categories are related to how much health benefit a person obtains at a given level and how to become more active. The focus on aerobic physical activity for the levels should not be interpreted to suggest that other types of activity, such as muscle strengthening, are less important.

- **Inactive** is not getting any moderate- or vigorous-intensity physical activity beyond basic movement from daily life activities.



- **Insufficiently active** is doing some moderate- or vigorous-intensity physical activity but less than 150 minutes of moderate-intensity physical activity a week or 75 minutes of vigorous-intensity physical activity or the equivalent combination. This level is less than the target range for meeting the key guidelines for adults.
- **Active** is doing the equivalent of 150 minutes to 300 minutes of moderate-intensity physical activity a week. This level meets the key guideline target range for adults.
- **Highly active** is doing the equivalent of more than 300 minutes of moderate-intensity physical activity a week. This level exceeds the key guideline target range for adults.

The Relationship Between Sedentary Behavior and Physical Activity

Research on the health effects of sedentary behavior is a relatively new area. Therefore, it was not addressed in 2008. Sedentary behavior has received an increasing amount of attention as a public health problem because it appears to have health risks, and it is a highly prevalent behavior in the U.S. population. Data collected by devices in the U.S. National Health and Nutrition Examination Survey (NHANES) indicate that children and adults spend approximately 7.7 hours per day (55% of their monitored waking time) being sedentary. Thus, the potential population health impact of sedentary behavior is substantial.

The 2018 Advisory Committee found a strong relationship between time in sedentary behavior and the risk of all-cause mortality and cardiovascular disease mortality in adults. However, the literature was insufficient to recommend a specific target for adults or youth for how many times during the day sedentary time should be interrupted with physical activity. Furthermore, a specific healthy target for total sedentary behavior time could not be determined. This was because the risk related to sedentary behavior was dependent upon the amount of moderate-to-vigorous physical activity performed. This relationship is illustrated in [Figure 1-3](#).

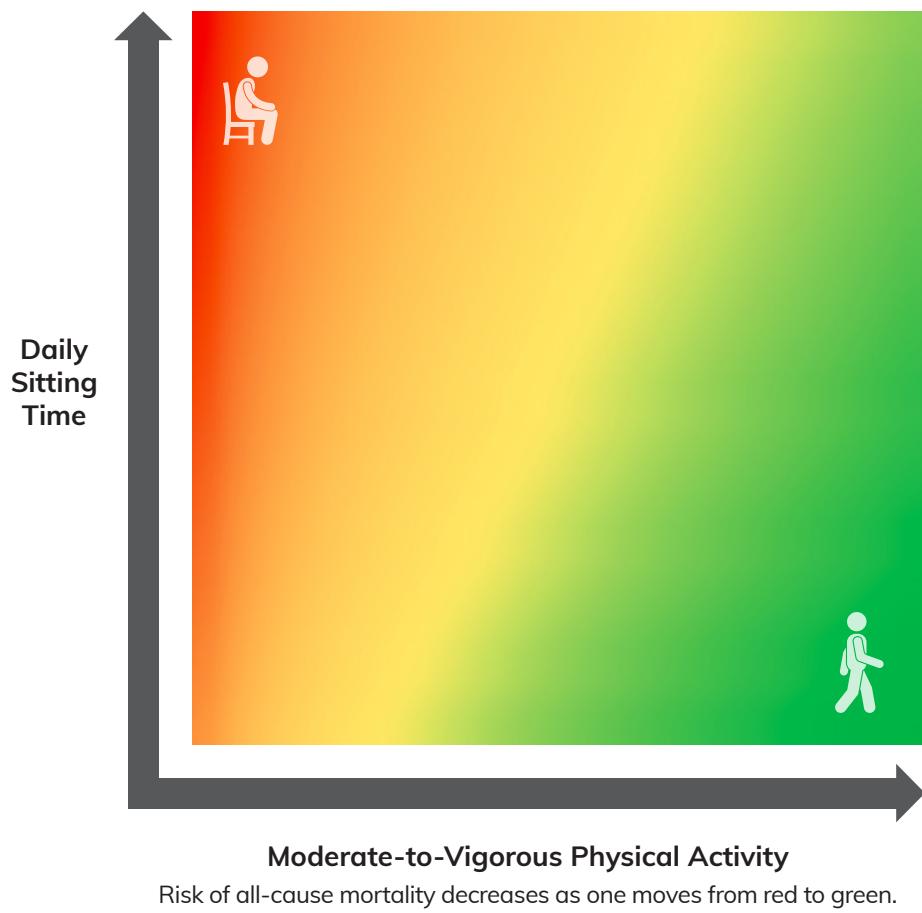
The figure shows moderate-to-vigorous physical activity in minutes on the horizontal axis and daily sitting time in hours on the vertical axis. Red represents higher risk of all-cause mortality, and green represents lower risk of all-cause mortality. Orange and yellow represent transitional decreases in risk of all-cause mortality.



What Is Sedentary Behavior?

In general, sedentary behavior refers to any waking behavior characterized by a low level of energy expenditure (less than or equal to 1.5 METs) while sitting, reclining, or lying. The Guidelines operationalizes the definition of sedentary behavior to include self-reported sitting (leisure-time, occupational, and total), television (TV) viewing or screen time, and low levels of movement measured by devices that assess movement or posture. Standing is another activity with low energy expenditure, but it is distinct from sedentary behavior in how it affects health.

Figure 1-3. Relationship Among Moderate-to-Vigorous Physical Activity, Sitting Time, and Risk of All-Cause Mortality in Adults



Source: This heat map is adapted from data found in Ekelund U, Steene-Johannessen J, Brown WJ. Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonized meta-analysis of data from more than 1 million men and women. Lancet. 2016;388:1302-1310. doi:10.1016/S0140-6736(16)30370-1.

At the greatest time spent sitting (the top), the risk of all-cause mortality begins to decrease (color becomes orange) even with small additions of moderate-to-vigorous physical activity. At the greatest volume of moderate-to-vigorous physical activity, the risk is low even for those who sit the most (upper right corner). The best currently available estimate of this volume is about 60 to 75 minutes per day of moderate-intensity activities, or 30 to 40 minutes per day of vigorous-intensity activities. This high volume of moderate-to-vigorous physical activity is achieved by a very small proportion of the population.

At the lowest volume of moderate-to-vigorous physical activity (the left side of the figure), the risk of all-cause mortality increases as time spent sitting increases. This suggests that for inactive adults, replacing sitting time with light-intensity physical activities reduces the risk of all-cause mortality. Although the risk of all-cause mortality is reduced as the time spent in sedentary behavior is reduced, even adults who sit the least have an

elevated risk if they perform no moderate-to-vigorous physical activity (lower left corner).

The figure illustrates three main conclusions:

- High volumes of moderate-to-vigorous physical activity appear to remove the excess risk of all-cause mortality that is associated with high volumes of sitting.
- Very low time spent sitting reduces, but does not eliminate, the risk of no moderate-to-vigorous physical activity.
- Given the high levels of sitting and low levels of physical activity in the population, most people would benefit from both increasing moderate-to-vigorous physical activity and reducing time spent sitting.



Progressing Toward and Beyond the Physical Activity Target

The 2008 Advisory Committee reported that inactive people can achieve substantial health gains by increasing their activity level even if they do not reach the target range. Since 2008, substantially more information documents the value of reducing inactivity even if youth or adults do not achieve the recommended target range.

Bouts, or episodes, of moderate-to-vigorous physical activity of any duration may be included in the daily accumulated total volume of physical activity. The 2008 Physical Activity Guidelines for Americans recommended accumulating moderate-to-vigorous physical activity in bouts of 10 minutes or more because not enough evidence was available to support the value of bouts less than 10 minutes in duration. The 2018 Advisory Committee concluded that bouts of any length contribute to the health benefits associated with the accumulated volume of physical activity. Even a brief episode of physical activity like climbing up a few flights of stairs counts.

Bouts of any length contribute to the health benefits associated with the accumulated volume of physical activity.

What Does “Progressing Toward Targets” Mean for People’s Daily Lives?

The risk of injury to bones, muscles, and joints is directly related to the gap between a person’s usual level of activity and a new level of activity. When amounts of physical activity need to be increased to meet the key guidelines or personal goals, physical activity should be increased gradually over time, no matter what the person’s current level of physical activity. This concept is addressed more fully in [Chapter 7. Active and Safe](#).

For people who are inactive, that is, people who do not do any moderate- or vigorous-intensity physical activity beyond basic movement from daily life activities:

- Reducing sedentary behavior has health benefits. It reduces the risk of all-cause mortality, cardiovascular disease incidence and mortality, and the incidence of type 2 diabetes and some cancers. A good first step is to replace sedentary behavior with light-intensity physical activity. Previously, evidence that light-intensity physical activity could provide health benefits was not sufficient to support a recommendation.
- No matter how much time they spend in sedentary behavior or light-intensity activity, inactive people can reduce their health risks by gradually increasing their moderate-intensity physical activity.

For people who are insufficiently active, that is, people who do some moderate- or vigorous-intensity physical activity, but who do not yet meet the key guidelines target range (150 to 300 minutes a week of moderate-intensity physical activity for adults):

- Even small increases in moderate-intensity physical activity provide health benefits. There is no threshold that must be exceeded before benefits begin to occur.
- Greater benefits can be achieved by reducing sedentary behavior, increasing moderate-intensity physical activity, or a combination of both.
- For any given increase in moderate-to-vigorous physical activity, the relative gain in benefits is greater for insufficiently active people than for people who are already meeting the key guidelines.

For people who are active, that is, people who already meet the key guidelines (150 to 300 minutes a week of moderate-intensity physical activity for adults):

- Although those within the target range already have substantial benefits from their current volume of physical activity, more benefits can be gained by doing additional moderate-to-vigorous physical activity or reducing sedentary behavior.

For people who are highly active, that is, people who do more than the equivalent of 300 minutes a week of moderate-intensity physical activity:

- These people should maintain or increase their activity level by doing a variety of activities.

Health Benefits Versus Other Reasons to Be Physically Active

Although the Guidelines focuses on the health benefits of physical activity, these benefits are not the only reason why people are active. Physical activity gives people a chance to have fun, be with friends and family, enjoy the outdoors, and improve fitness so they can more easily participate in additional physical activity or sporting events. Some people are active because it helps them feel more energetic and healthier.

Nothing in the Guidelines is intended to mean that health benefits are the only reason to do physical activity. People should be physically active for any and all reasons that are meaningful for them.

Health-Related Versus Performance-Related Fitness

Promoting health, reducing risk of chronic disease, and promoting health-related fitness—particularly cardiovascular and muscular fitness—are the primary focus of the Guidelines. People can gain this kind of fitness by doing the amounts and types of activities recommended in the key guidelines for each age group and population.

The types and amounts of activity necessary to improve performance-related fitness are not addressed in the Guidelines. Athletes need this kind of fitness when they compete. Medical screening issues for competitive athletes also are outside the scope of the Guidelines.

People who are interested in training programs to increase performance-related fitness should seek advice from other sources. Generally, these people do much more activity than required to meet the targets in the key guidelines.

Lifespan Approach

The best way to be physically active is to be active for life. Therefore, the Guidelines takes a lifespan approach and provides recommendations for three broad age groups—children and adolescents, adults, and older adults.

The 2008 Guidelines provided recommendations for children, adolescents, and adults, covering individuals ages 6 years and older. Recent research has provided support for recommendations for children ages 3 through 5 years, and so the 2018 Guidelines are designed for those ages 3 years and older. Physical activity is necessary for healthy growth and development of infants and young children of all ages.

Putting the Guidelines Into Practice

Assessing Whether Physical Activity Programs Are Consistent With the Guidelines

Programs that provide opportunities for physical activity, such as classes or community activities, can help people meet the key guidelines. These programs do not have to provide all, or even most, of the recommended weekly activity. For example, a mall walking program for older adults may meet only once a week yet provide useful amounts of activity, as long as people get the rest of their weekly recommended activity on other days.

Programs that are consistent with the Physical Activity Guidelines for Americans:

- Provide advice and education consistent with the Guidelines;
- Add episodes of activity that count toward meeting the key guidelines; and
- May also include activities, such as stretching or warming up and cooling down, whose health benefits are not yet proven but that are often used in effective physical activity programs.

The Importance of Understandable Guidelines

HHS has tried to keep the Physical Activity Guidelines for Americans straightforward and understandable, while remaining consistent with complex scientific information. In each chapter, the key guidelines are set apart from the text to identify the most important information to disseminate to the public. The messages contained in the Guidelines should be communicated to the public and to anyone involved in promoting physical activity.

Taking Action: Increasing Physical Activity Levels of Americans

Action is needed at individual, community, and societal levels to help Americans become physically active. Regular physical activity needs to be made the safe and easy choice for Americans. To most effectively increase physical activity levels, evidence-based strategies should be used. This means that researchers or practitioners have tested the strategy and shown that it can increase physical activity.

A review of the science by the 2018 Physical Activity Guidelines Advisory Committee shows that many evidence-based strategies can be used to promote and support physical activity. Some strategies involve working with people one-on-one or in small groups to change their physical activity. Other strategies can be implemented more broadly at the community level through programs, practices, and policies that make physical activity an easy choice.

[Chapter 8. Taking Action: Increasing Physical Activity Levels of Americans](#) highlights several evidence-based strategies that focus on individuals and on communities. Because improving physical activity across the country will require the efforts of individuals and many sectors of society, the chapter closes with some potential steps individuals and groups can take to increase physical activity levels.





Chapter 2. Physical Activity and Health



All Americans should engage in regular physical activity to improve overall health and fitness and to prevent negative health outcomes. The benefits of physical activity occur in generally healthy people of all ages, in people at risk of developing chronic diseases, and in people with chronic conditions or disabilities. This chapter describes an overview of research findings on physical activity and health. The accompanying box provides a summary of these benefits.

Physical activity affects many health conditions, and the specific amounts and types of activity that benefit each condition vary. In developing public health guidelines, the challenge is to integrate scientific information across all health benefits and identify a critical range of physical activity that appears to have an effect across the health benefits. One consistent finding from research studies is that once the health benefits from physical activity begin to accumulate, additional amounts of activity provide additional benefits.

Some health benefits occur immediately after an episode of physical activity. Other benefits begin with as little as 60 minutes a week. Research shows that a total amount of at least 150 minutes a week of moderate-intensity aerobic activity, such as brisk walking, consistently reduces the risk of many chronic diseases and other adverse health outcomes.

The Health Benefits of Physical Activity—Major Research Findings

- Regular moderate-to-vigorous physical activity reduces the risk of many adverse health outcomes.
- Some physical activity is better than none.
- For most health outcomes, additional benefits occur as the amount of physical activity increases through higher intensity, greater frequency, and/or longer duration.
- Substantial health benefits for adults occur with 150 to 300 minutes a week of moderate-intensity physical activity, such as brisk walking. Additional benefits occur with more physical activity.
- Both aerobic and muscle-strengthening physical activity are beneficial.
- Health benefits occur for children and adolescents, young and middle-aged adults, older adults, and those in every studied racial and ethnic group.
- The health benefits of physical activity occur for people with chronic conditions or disabilities.
- The benefits of physical activity generally outweigh the risk of adverse outcomes or injury.

Examining the Relationship Between Physical Activity and Health

In many studies covering a wide range of issues, researchers have focused on exercise as well as on the more broadly defined concept of physical activity.

Studies have examined the role of physical activity in many groups—men and women, children, adolescents, adults, older adults, people with chronic conditions and disabilities, and women during pregnancy and the postpartum period. These studies have focused on the role that physical activity plays in many health outcomes, including:

- All-cause mortality;
- Diseases such as coronary heart disease, stroke, cancer at multiple sites, type 2 diabetes, obesity, hypertension, and osteoporosis;
- Risk factors for disease, such as overweight or obesity, hypertension, and high blood cholesterol;
- Physical fitness, such as aerobic capacity and muscle strength and endurance;
- Functional capacity, or the ability to engage in activities needed for daily living;
- Brain health and conditions that affect cognition, such as depression and anxiety, and Alzheimer’s disease; and
- Falls or injuries from falls.

These studies have also prompted questions as to what type of physical activity and how much is needed for various health benefits. To answer this question, investigators have studied three main kinds of physical activity—aerobic, muscle strengthening, and bone strengthening. Investigators have also studied balance and flexibility activities.

Aerobic Activity

In this kind of physical activity (also called an endurance activity or cardio activity), the body’s large muscles move in a rhythmic manner for a sustained period of time. Brisk walking, running, bicycling, jumping rope, and swimming are all examples. Aerobic activity causes a person’s heart to beat faster, and they will breathe harder than normal.



Physical Activity, Exercise, and Health

Physical activity refers to any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level. In the Guidelines, physical activity generally refers to the subset of physical activity that enhances health. Exercise is a form of physical activity that is planned, structured, repetitive, and performed with the goal of improving health or fitness. Although all exercise is physical activity, not all physical activity is exercise.

Health is a human condition with physical, social, and psychological dimensions, each characterized on a continuum with positive and negative poles. Positive health is associated with a capacity to enjoy life and to withstand challenges; it is not merely the absence of disease. Negative health is associated with illness, and in the extreme, with premature death.

Learn More



See [Chapter 3. Active Children and Adolescents](#), [Chapter 4. Active Adults](#), and [Chapter 5. Active Older Adults](#) for more information about the types and amounts of physical activity needed for various health benefits.

Aerobic physical activity has three components:

- **Intensity**, or how hard a person works to do the activity. The intensities most often studied are moderate (equivalent in effort to brisk walking) and vigorous (equivalent in effort to running or jogging);
- **Frequency**, or how often a person does aerobic activity; and
- **Duration**, or how long a person does an activity in any one session.

Although these components make up an aerobic physical activity profile, research has shown that the total amount of physical activity (minutes of moderate-intensity physical activity in a week, for example) is more important for achieving health benefits than is any one component (frequency, intensity, or duration). All time spent in moderate- or vigorous-intensity physical activity counts toward meeting the key guidelines.

Muscle-Strengthening Activity

This kind of activity, which includes resistance training and weight lifting, causes the body's muscles to work or hold against an applied force or weight. These activities often involve lifting relatively heavy objects, such as weights, multiple times to strengthen various muscle groups. Muscle-strengthening activity can also be done by using elastic bands or body weight for resistance (climbing a tree or doing push-ups, for example).

Muscle-strengthening activity has three components:

- **Intensity**, or how much weight or force is used relative to how much a person is able to lift;
- **Frequency**, or how often a person does muscle-strengthening activity; and
- **Sets and repetitions**, or how many times a person does the muscle-strengthening activity, like lifting a weight or doing a push-up (comparable to duration for aerobic activity).

The effects of muscle-strengthening activity are limited to the muscles doing the work. It is important to work all the major muscle groups of the body—the legs, hips, back, abdomen, chest, shoulders, and arms.

Bone-Strengthening Activity

This kind of activity (sometimes called weight-bearing or weight-loading activity) produces a force on the bones of the body that promotes bone growth and strength. This force is commonly produced by impact with the ground. Examples of bone-strengthening activity include jumping jacks, running, brisk walking, and weight-lifting exercises. As these examples illustrate, bone-strengthening activities can also be aerobic and muscle strengthening.

Balance Activities

These kinds of activities can improve the ability to resist forces within or outside of the body that cause falls while a person is stationary or moving. Walking backward, standing on one leg, or using a wobble board are examples of balance activities. Strengthening muscles of the back, abdomen, and legs also improves balance.

Flexibility Activities

These kinds of activities enhance the ability of a joint to move through the full range of motion. Stretching exercises are effective in increasing flexibility, and thereby can allow people to more easily do activities that require greater flexibility.

The Health Benefits of Physical Activity

Research demonstrates that participating in regular moderate-to-vigorous physical activity provides many health benefits. These benefits are summarized in [Table 2-1](#). Some benefits of physical activity can be achieved immediately, such as reduced feelings of anxiety, reduced blood pressure, and improvements in sleep, some aspects of cognitive function, and insulin sensitivity. Other benefits, such as increased cardiorespiratory fitness, increased muscular strength, decreases in depressive symptoms, and sustained reduction in blood pressure, require a few weeks or months of participation in physical activity. Physical activity can also slow or delay the progression of chronic diseases, such as hypertension and type 2 diabetes. Benefits persist with continued physical activity.

The health benefits of physical activity are seen in children and adolescents, young and middle-aged adults, older adults, women and men, people of different races and ethnicities, and people with chronic conditions or disabilities. The health benefits of physical activity are generally independent of body weight. Adults of all sizes and shapes gain health and fitness benefits by being habitually physically active. The benefits of physical activity also outweigh the risk of injury and heart attacks, two concerns that may prevent people from becoming physically active.



Table 2-1. Health Benefits Associated With Regular Physical Activity

Children and Adolescents
<ul style="list-style-type: none">■ Improved bone health (ages 3 through 17 years)■ Improved weight status (ages 3 through 17 years)■ Improved cardiorespiratory and muscular fitness (ages 6 through 17 years)■ Improved cardiometabolic health (ages 6 through 17 years)■ Improved cognition (ages 6 to 13 years)*■ Reduced risk of depression (ages 6 to 13 years)
Adults and Older Adults
<ul style="list-style-type: none">■ Lower risk of all-cause mortality■ Lower risk of cardiovascular disease mortality■ Lower risk of cardiovascular disease (including heart disease and stroke)■ Lower risk of hypertension■ Lower risk of type 2 diabetes■ Lower risk of adverse blood lipid profile■ Lower risk of cancers of the bladder, breast, colon, endometrium, esophagus, kidney, lung, and stomach■ Improved cognition*■ Reduced risk of dementia (including Alzheimer's disease)■ Improved quality of life■ Reduced anxiety■ Reduced risk of depression■ Improved sleep■ Slowed or reduced weight gain■ Weight loss, particularly when combined with reduced calorie intake■ Prevention of weight regain following initial weight loss■ Improved bone health■ Improved physical function■ Lower risk of falls (older adults)■ Lower risk of fall-related injuries (older adults)

Note: The Advisory Committee rated the evidence of health benefits of physical activity as strong, moderate, limited, or grade not assignable. Only outcomes with strong or moderate evidence of effect are included in this table.

*See [Table 2-3](#) for additional components of cognition and brain health.

The Role of Fitness in Health

Physical fitness is an important factor in the ability of people to perform routine daily activities and an important issue from a public health perspective. Physical fitness has been defined as “the ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and respond to emergencies.”

Physical fitness has multiple components, including cardiorespiratory fitness (endurance or aerobic power), musculoskeletal fitness, flexibility, balance, and speed of movement (see [Table 2-2](#)).

Table 2-2. Components of Physical Fitness

Cardiorespiratory Fitness	The ability to perform large-muscle, whole-body exercise at moderate-to-vigorous intensities for extended periods of time.
Musculoskeletal Fitness	The integrated function of muscle strength, muscle endurance, and muscle power to enable performance of work.
Flexibility	The range of motion available at a joint or group of joints.
Balance	The ability to maintain equilibrium while moving or while stationary.
Speed	The ability to move the body quickly.

A substantial body of research has examined the relationship between physical fitness—cardiorespiratory fitness and, in some cases, musculoskeletal fitness—and health outcomes. The findings show that greater physical fitness is associated with reduced all-cause mortality and cardiovascular disease mortality and reduced risk of developing a wide range of chronic diseases, such as type 2 diabetes and hypertension. To date, most studies were done in men, but new data indicate these relationships also exist in women.

Physical activity and physical fitness are related to each other, and both provide important health benefits. Increases in the amount and intensity of physical activity typically produce increases in physical fitness, particularly in those who are less physically active. The available evidence suggests that physical activity and physical fitness interact in their effects on a variety of health outcomes.

Some possible ways that fitness and health outcomes may relate to physical activity are:

- Physical activity leads to improvements in physical fitness, and physical fitness causes improvements in health outcomes;
- Physical fitness may modify the amount of the effect that physical activity has on health outcomes; or
- Physical activity can lead to improved physical fitness as a health outcome.



The Beneficial Effects of Increasing Physical Activity: It Is About Overload, Progression, and Specificity

Overload is the physical stress placed on the body when physical activity is greater in amount or intensity than usual. The body's structures and functions respond and adapt to these stresses. For example, aerobic physical activity places a stress on the cardiorespiratory system and muscles, requiring the lungs to move more air and the heart to pump more blood and deliver it to the working muscles. This increase in demand increases the efficiency and capacity of the lungs, heart, circulatory system, and exercising muscles. In the same way, muscle-strengthening and bone-strengthening activities overload muscles and bones, making them stronger.

Progression is closely tied to overload. Once a person reaches a certain fitness level, he or she is able to progress to higher levels of physical activity by continued overload and adaptation. Small, progressive changes in overload help the body adapt to the additional stresses while minimizing the risk of injury.

Specificity means that the benefits of physical activity are specific to the body systems that are doing the work. For example, the physiologic benefits of walking are largely specific to the lower body and the cardiovascular system. Push-ups primarily benefit the muscles of the chest, shoulders, and upper arms.

The following sections provide more detail on what is known from research studies about the specific health benefits of physical activity.

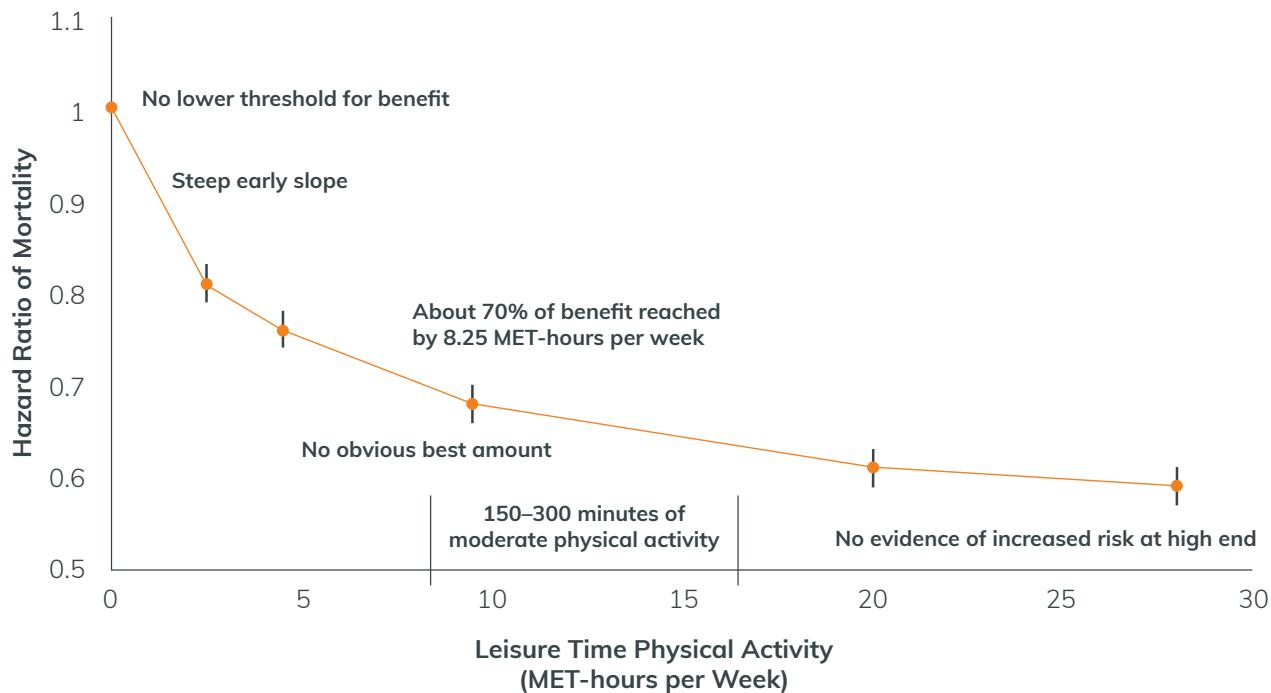
All-Cause Mortality

Strong scientific evidence shows that physical activity delays death from all causes. This includes the leading causes of death, such as heart disease and some cancers, as well as other causes of death. This effect is remarkable in two ways:

- First, only a few lifestyle choices have as large an effect on mortality as physical activity. It has been estimated that people who are physically active for approximately 150 minutes a week have a 33 percent lower risk of all-cause mortality than those who are not physically active.
- Second, it is not necessary to do large amounts of activity or vigorous-intensity activity to reduce the risk of all-cause mortality. Benefits start to accumulate with any amount of moderate- or vigorous-intensity physical activity.

Research clearly demonstrates the importance of avoiding inactivity. Even low amounts of moderate-to-vigorous intensity physical activity reduce the risk of all-cause mortality. As [Figure 2-1](#) shows, a large benefit occurs when a person moves from being inactive to being insufficiently active. The relative risk of all-cause mortality continues to decline as people become even more physically active. Even at very high levels of physical activity (3 to 5 times the key guidelines), there is no evidence of increased risk.

Figure 2-1. Relationship of Moderate-to-Vigorous Physical Activity to All-Cause Mortality



Source: Adapted from data found in Moore SC, Patel AV, Matthews CE. Leisure time physical activity of moderate to vigorous intensity and mortality: a large pooled cohort analysis. PLoS Med. 2012;9(11):e1001335. doi:10.1371/journal.pmed.1001335.

All adults can gain this health benefit of physical activity, no matter their age, sex, race, or ethnicity. Physically active people with all body weights (normal weight, overweight, obesity) also have lower risk of all-cause mortality than do inactive people.

Cardiorespiratory Health

The benefits of physical activity on cardiorespiratory health are some of the most extensively documented of all the health benefits. Cardiorespiratory health involves the health of the heart, lungs, and blood vessels.

Heart disease and stroke are two of the leading causes of death in the United States. Risk factors that increase the likelihood of cardiovascular diseases include smoking, hypertension, type 2 diabetes, and high levels of certain blood lipids (such as low-density lipoprotein [LDL] cholesterol). Low cardiorespiratory fitness also is a risk factor for heart disease.

Physical activity strongly reduces both the risk of dying from cardiovascular disease and the risk of developing cardiovascular disease, including heart attack, stroke, and heart failure. Regularly active adults have lower rates of heart disease and stroke and have lower blood pressure, better blood lipid profiles, and better physical fitness. Significant reductions in risk of cardiovascular disease occur at activity levels equivalent to 150 minutes a week of moderate-intensity physical activity. As with all-cause mortality, benefits begin with less than 150 minutes a week, and strong evidence shows that greater amounts of physical activity result in even further reductions in risk of cardiovascular disease.

Regular physical activity can greatly affect blood pressure, and effects can be immediate. People who have normal blood pressure benefit because the risk of developing hypertension is reduced. People who have hypertension also benefit because systolic and diastolic blood pressure are lowered. Both aerobic and muscle-strengthening physical activity are recommended to improve blood pressure. Even physical activity at levels below the key guidelines tends to benefit blood pressure, and engaging in more physical activity can have even greater benefits.

Everyone, including children and adolescents, can gain the cardiovascular health benefits of physical activity. The amount of physical activity that provides favorable cardiorespiratory health and fitness outcomes is similar for men and women of all ages, including older people, as well as for adults of various races and ethnicities. Aerobic exercise also improves cardiorespiratory fitness in people with disabilities, including people who have lost the use of one or both legs and those with multiple sclerosis, stroke, and spinal cord injury.



Cardiometabolic Health and Weight Management

Cardiometabolic health is a term that encompasses cardiovascular diseases and metabolic diseases, such as type 2 diabetes. Cardiovascular disease and metabolic disease share a number of risk factors, and reducing risk of one can reduce risk for the other. Cardiometabolic health and weight status are also closely related issues and are often considered together.

Type 2 Diabetes and Cardiometabolic Health

Regular physical activity strongly reduces the risk of developing type 2 diabetes in people of all body sizes. Physical activity can have an additive benefit for reducing risk of type 2 diabetes because physical activity reduces the risk of excessive weight gain, an independent risk factor for type 2 diabetes. Adults who regularly engage in aerobic activity of at least moderate intensity have a significantly lower risk of developing type 2 diabetes than do inactive adults. These benefits begin to accrue at levels of physical activity below the key guideline of 150 to 300 minutes a week, and additional amounts of moderate- or vigorous-intensity physical activity seem to lower risk even further. Insulin sensitivity can be improved with just a single bout of physical activity. In addition, physical activity helps control blood glucose in people who already have type 2 diabetes.

Physical activity improves cardiometabolic health in children and adolescents, as well as in adults. Specifically, regular physical activity contributes to lower plasma triglycerides and insulin levels and may also play a role in improving high-density lipoprotein (HDL) cholesterol and blood pressure.



Can High-Intensity Interval Training Be Helpful for Cardiovascular Health?

Most of the benefits of physical activity have been studied with moderate- or vigorous-intensity aerobic activity. Recent research has examined high-intensity interval training (HIIT), which may provide similar reductions in cardiovascular disease risk factors as those observed with continuous moderate-intensity physical activity. HIIT is a form of interval training that consists of alternating short periods of maximal-effort exercise with less intense recovery periods. This type of exercise can improve insulin sensitivity, blood pressure, and body composition in adults. Interestingly, adults with overweight or obesity and those at higher risk of cardiovascular disease and type 2 diabetes tend to have greater cardiovascular benefits when doing HIIT compared to normal-weight or healthy adults.

Weight Management

Physical activity and caloric intake both must be considered when trying to control body weight. Because of its role in energy balance, physical activity is a critical factor in determining whether a person can maintain a healthy body weight, lose excess body weight, or maintain successful weight loss.

Strong scientific evidence shows that physical activity helps people maintain a stable weight over time and can reduce the risk of excessive weight gain and the incidence of obesity. People vary a great deal in how much physical activity they need to achieve and maintain a healthy weight. Some need more physical activity than others to maintain a healthy body weight, to lose weight, or to keep weight off once it has been lost. Many people need more than the equivalent of 150 minutes of moderate-intensity activity a week to maintain their weight. The relationship between physical activity and prevention of weight gain is most often observed with moderate- or vigorous-intensity aerobic physical activity. Muscle-strengthening activities help promote weight maintenance, although not to the same degree as aerobic activity.

People who want to lose a substantial amount of weight (more than 5 percent of body weight) and people who are trying to keep a significant amount of weight off once it has been lost may need to do more than 300 minutes of moderate-intensity activity a week to meet weight-control goals. Muscle-strengthening activities can also help maintain lean body mass during weight loss. Combining both caloric restriction and physical activity tend to be most beneficial for weight loss rather than just caloric restriction or just physical activity.

People with overweight or obesity tend to experience the same benefits of physical activity as those with normal weight. However, there are specific exceptions. Compared to women with normal weight, women with overweight or obesity see a greater risk reduction for developing endometrial cancer and a greater risk reduction of breast cancer-specific mortality as a result of being more physically active.

Regular physical activity also helps control body weight or reduce body fat in children and adolescents ages 3 through 17 years. Throughout childhood and adolescence, higher levels of physical activity are associated with smaller increases in body weight and adiposity.

Bone and Musculoskeletal Health

Bones, muscles, and joints support the body and help it move. Healthy bones, joints, and muscles are critical to the ability to do daily activities without physical limitations such as climbing stairs, working in the garden, or carrying a small child.

Progressive muscle-strengthening activities preserve or increase muscle mass, strength, and power. Greater amounts (through higher frequency, heavier weights, or more resistance) improve muscle function to a greater degree. Improvements occur in children and adolescents as well as in younger and older adults. Resistance exercises also improve muscular strength in persons with conditions such as stroke, multiple sclerosis, cerebral palsy, and spinal cord injury. Though aerobic activity does not increase muscle mass in the same way that muscle-strengthening activities do, it may also help slow the loss of muscle with aging.

Preserving bone, joint, and muscle health is essential with increasing age. Studies show that the frequent decline in bone density that happens during aging can be slowed with regular physical activity. These effects are seen in people who participate in aerobic, muscle-strengthening, and bone-strengthening physical activity programs of moderate or vigorous intensity. The range of total physical activity for these benefits varies widely. Important changes seem to begin at 90 minutes a week.

Building strong, healthy bones is also important for children and adolescents. Along with having a healthy diet that includes adequate calcium and vitamin D, physical activity is critical for bone development in youth. Children and adolescents ages 3 through 17 years who are physically active (such as by running, jumping, and doing other bone-strengthening activities) have higher bone mass, improved bone structure, and greater bone strength.

Regular physical activity also helps people with osteoarthritis or other rheumatic conditions affecting the joints. Participation in 150 minutes a week of moderate-intensity aerobic physical activity plus muscle-strengthening activity improves pain management, function, and quality of life. Up to 10,000 steps per day does not appear to worsen the progression of osteoarthritis. Very high levels of physical activity, however, may have extra risks. People who participate in very high levels of high-impact physical activity—such as elite or professional athletes—have a higher risk of hip and knee osteoarthritis, mostly due to the risk of injury involved in competing in some sports.

Functional Ability and Fall Prevention

Physical function, or functional ability, is the capacity of a person to perform tasks or behaviors that enable him or her to carry out everyday activities, such as climbing stairs, or to fulfill basic life roles, such as personal care, grocery shopping, or playing with grandchildren. Loss of functional ability is referred to as *functional limitation*. Middle-aged and older adults who are physically active have lower risk of functional limitations than do inactive adults. Physical activity can prevent or delay the onset of substantial functional or role limitations. Older adults who already have functional limitations also benefit from regular physical activity.

Hip fracture is a serious health condition that can have life-changing negative effects for many older people. Physically active people, especially women, appear to have a lower risk of hip fracture than do inactive people. Among older adults, physical activity reduces the risk of falling and injuries from falls. Research demonstrates that multicomponent physical activity programs are most successful at reducing falls and injuries. These programs commonly include muscle-strengthening activities and balance training and may also include gait and coordination training, physical function training, and moderate-intensity activities, such as walking. It is important to note that doing only low-intensity walking does not seem to reduce the risk of fall-related injuries.

and fractures. Older adults, including those with a variety of health conditions such as Parkinson's disease, stroke, and hip fracture, and those with frailty obtain benefits from multicomponent physical activities.

Brain Health

Brain health can be defined in many ways, but the Guidelines focuses on the following areas:

- Youth—brain maturation and development and academic achievement;
- Older adults—dementia and cognitive impairment; and
- Across the lifespan—cognition, anxiety and depression, quality of life, and sleep.

Some of the benefits of physical activity on brain health occur immediately after a session of moderate-to-vigorous physical activity (acute effect), such as reduced feelings of state anxiety (short-term anxiety), improved sleep, and improved aspects of cognitive function. With regular physical activity (habitual effect), improvements are seen in trait anxiety (long-term anxiety), deep sleep, and components of executive function (including the ability to plan and organize; monitor, inhibit, or facilitate behaviors; initiate tasks; and control emotions). [Table 2-3](#) describes the benefits of physical activity for brain health.

Learn More



See [Chapter 6. Additional Considerations for Some Adults](#) for a discussion of physical activity and brain health in conditions such as Parkinson's disease, stroke, and spinal cord injury.



Table 2-3. The Benefits of Physical Activity for Brain Health

Outcome	Population	Benefit	Acute	Habitual
Cognition	Children ages 6 to 13 years	Improved cognition (performance on academic achievement tests, executive function, processing speed, memory)	●	●
	Adults	Reduced risk of dementia (including Alzheimer's disease)	●	
	Adults older than age 50 years	Improved cognition (executive function, attention, memory, crystallized intelligence,* processing speed)	●	
Quality of life	Adults	Improved quality of life	●	
Depressed mood and depression	Children ages 6 to 17 years and adults	Reduced risk of depression Reduced depressed mood		●
Anxiety	Adults	Reduced short-term feelings of anxiety (state anxiety)	●	
	Adults	Reduced long-term feelings and signs of anxiety (trait anxiety) for people with and without anxiety disorders	●	
Sleep	Adults	Improved sleep outcomes (increased sleep efficiency, sleep quality, deep sleep; reduced daytime sleepiness, frequency of use of medication to aid sleep)		●
	Adults	Improved sleep outcomes that increase with duration of acute episode	●	

Note: The Advisory Committee rated the evidence of health benefits of physical activity as strong, moderate, limited, or grade not assignable. Only outcomes with strong or moderate evidence of effect are included in this table.

*Crystallized intelligence is the ability to retrieve and use information that has been acquired over time. It is different from fluid intelligence, which is the ability to store and manipulate new information.

Cognition

Compared to inactive people, people who do greater amounts of moderate- or vigorous-intensity physical activity may experience improvements in cognition, including performance on academic achievement tests, and performance on neuropsychological tests, such as those involving mental processing speed, memory, and executive function.

Physical activity also lowers the risk of developing cognitive impairment, such as dementia, including Alzheimer's disease. These improvements from physical activity are present for people who have normal as well as impaired cognitive health, including conditions such as attention deficit hyperactivity disorder (ADHD), schizophrenia, multiple sclerosis, Parkinson's disease, and stroke.

Healthy older adults, even in the absence of dementia, often show evidence of cognitive decline, especially on measures of processing speed, memory, and executive function. Physical activity may be an effective approach for improving cognitive function in older adults.



Quality of Life

Physically active adults and older adults are likely to report having a better quality of life. Being physically active also improves the sense of a better quality of life among people who have schizophrenia and related disorders.

Anxiety and Depression

Anxiety and anxiety disorders are the most prevalent mental disorders. Participating in moderate-to-vigorous physical activity over longer durations (weeks or months of regular physical activity) reduces symptoms of anxiety in adults and older adults.

Major depression is one of the most common mental disorders in the United States and is a leading cause of disability for middle-aged adults in the United States. The prevalence of depressive episodes is higher among females, both adolescents and adults, than among males. Engaging in regular physical activity reduces the risk of developing depression in children and adults and can improve many of the symptoms experienced by people with depression.

Sleep

In addition to feeling better, adults who are more physically active sleep better. Greater volumes of moderate-to-vigorous physical activity are associated with reduced sleep latency (taking less time to fall asleep), improved sleep efficiency (higher percentage of time in bed actually sleeping), improved sleep quality, and more deep sleep. Greater volumes of moderate-to-vigorous physical activity are also associated with significantly less daytime sleepiness, better sleep quality, and reduced frequency of use of sleep-aid medications. The improvements in sleep with regular physical activity are also reported by people with insomnia and obstructive sleep apnea.

The evidence that habitual moderate-to-vigorous physical activity reduces the risk of excessive weight gain, an important risk factor for obstructive sleep apnea, suggests that physical activity could have a favorable impact on the incidence of obstructive sleep apnea.

The number of hours before bedtime at which the activity is performed does not matter. Benefits are similar for physical activity performed more than 8 hours before bedtime, 3 to 8 hours before, and less than 3 hours before bedtime.

Cancer

Physically active adults have a significantly lower risk of developing several commonly occurring cancers, as well as lower risk of several other cancers. Research shows that adults who participate in greater amounts of physical activity have reduced risks of developing cancers of the:

- Bladder;
- Breast;
- Colon (proximal and distal);
- Endometrium;
- Esophagus (adenocarcinoma);
- Kidney;
- Lung; and
- Stomach (cardia and non-cardia adenocarcinoma).

These effects appear to apply to both men and women, regardless of weight status. Benefits for cancer survivors are shown in [Table 2-4](#).

People With Chronic Health Conditions and Disabilities

Regular physical activity provides important health benefits for adults with chronic health conditions. As seen in [Table 2-4](#), benefits exist for cancer survivors and people with osteoarthritis, hypertension, type 2 diabetes, dementia, multiple sclerosis, spinal cord injury, and other cognitive disorders.

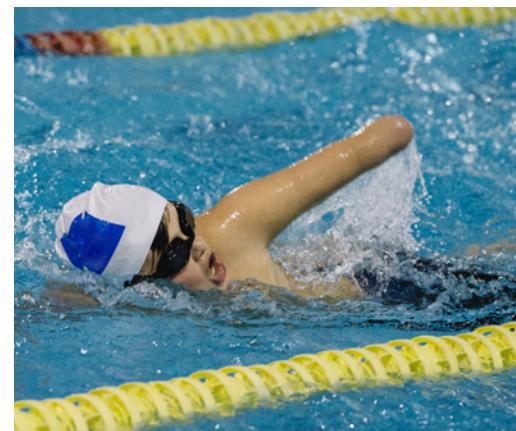


Table 2-4. Health Benefits Associated With Regular Physical Activity for People With Chronic Health Conditions and Disabilities

Cancer Survivors
■ Improved health-related quality of life
■ Improved fitness
Breast Cancer Survivors
■ Lower risk of dying from breast cancer
■ Lower risk of all-cause mortality
Colorectal Cancer Survivors
■ Lower risk of dying from colorectal cancer
■ Lower risk of all-cause mortality
Prostate Cancer Survivors
■ Lower risk of dying from prostate cancer
People with Osteoarthritis (knee and hip)
■ Decreased pain
■ Improved physical function
■ Improved health-related quality of life
■ No effect on disease progression at recommended physical activity levels
People with Hypertension
■ Lower risk of cardiovascular disease mortality
■ Reduced cardiovascular disease progression
■ Lower risk of increased blood pressure over time
People with Type 2 Diabetes
■ Lower risk of cardiovascular disease mortality
■ Reduced progression of disease indicators: hemoglobin A1c, blood pressure, body mass index, and lipids
People with Dementia
■ Improved cognition

People with Multiple Sclerosis

- Improved physical function, including walking speed and endurance
- Improved cognition

People with Spinal Cord Injury

- Improved walking function, muscular strength, and upper extremity function

People with diseases or disorders that impair cognitive function (including ADHD, schizophrenia, Parkinson's disease, and stroke)

- Improved cognition

Note: The Advisory Committee rated the evidence of health benefits of physical activity as strong, moderate, limited, or grade not assignable. Only outcomes with strong or moderate evidence of effect are included in this table.

Women During Pregnancy and the Postpartum Period

Moderate-intensity physical activity is safe for generally healthy women during pregnancy. Physical activity reduces the risk of excessive weight gain and gestational diabetes during pregnancy. Physical activity increases cardiorespiratory fitness without increasing the risk of negative pregnancy outcomes, such as low birth weight, preterm delivery, or early pregnancy loss. Physical activity during the postpartum period (first year after delivery) also improves the mother's cardiorespiratory fitness, decreases symptoms of postpartum depression, and, when combined with caloric restriction, can help her return to her pre-pregnancy body weight after delivery.

Adverse Events

Some people hesitate to become active or increase their level of physical activity because they fear getting injured or having a heart attack. Studies in generally healthy people clearly show that moderate-intensity physical activity, such as brisk walking, has a low risk of such adverse events.

The risk of musculoskeletal injury increases with the total amount of physical activity. For example, a person who regularly runs 40 miles a week has a higher risk of injury than a person who runs 10 miles each week. Participation in contact or collision sports, such as soccer or football, has a higher risk of injury than non-contact physical activity, such as swimming or walking. However, when performing the same activity, people who are less fit are more likely to be injured than people who are more fit.



Cardiac events, such as a heart attack or sudden death during physical activity, are rare. However, the risk of such cardiac events does increase when a person suddenly becomes much more active than usual. The greatest risk occurs when an adult who is usually inactive engages in vigorous-intensity activity (such as shoveling heavy snow). People who are regularly physically active have the lowest risk of cardiac events both while being active and overall.

The bottom line is that the health benefits of physical activity far outweigh the risks of adverse events for almost everyone.

Risks of Sedentary Behavior

In general, sedentary behavior refers to any waking behavior characterized by a low level of energy expenditure (less than or equal to 1.5 METs) while sitting, reclining, or lying. The Guidelines operationalizes the definition of sedentary behavior to include self-reported sitting (leisure-time, occupational, and total), television (TV) viewing or screen time, and low levels of movement measured by devices that assess movement or posture.

More time spent in sedentary behavior increases risk of:

- All-cause mortality;
- Cardiovascular disease mortality;
- Cardiovascular disease;
- Type 2 diabetes; and
- Cancer of the colon, endometrium, and lung.

For inactive adults, replacing sedentary behavior with light-intensity physical activity is likely to produce some health benefits. Among all adults, replacing sedentary behavior with moderate- or vigorous-intensity physical activity may produce even greater benefits.

Learn More



See [Appendix 1. Physical Activity Behavior: Intensity, Bouts, and Steps](#) for more information about METs.

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See [Chapter 1. Introducing the Physical Activity Guidelines for Americans](#) for a more detailed discussion of the relationships of sedentary behavior and health.



Chapter 3. Active Children and Adolescents



Childhood and adolescence are critical periods for developing movement skills, learning healthy habits, and establishing a firm foundation for lifelong health and well-being. Regular physical activity in children and adolescents promotes health and fitness. Compared to those who are inactive, physically active youth have higher levels of cardiorespiratory fitness and stronger muscles. They also typically have lower body fat and stronger bones. Physical activity also has brain health benefits for school-aged children, including improved cognition and reduced symptoms of depression. Evidence indicates that both acute bouts and regular moderate-to-vigorous physical activity improve the cognitive functions of memory, executive function, processing speed, attention, and academic performance for these children.



Youth who are regularly active also have a better chance of a healthy adulthood. Children and adolescents do not usually develop chronic diseases, such as heart disease, hypertension, type 2 diabetes, or osteoporosis. However, current evidence shows that obesity and other risk factors for these diseases, such as elevated insulin, blood lipids, and blood pressure, are increasingly appearing in children and adolescents. Exercise training in youth with overweight or obesity can improve body composition by reducing overall levels of body fat as well as abdominal fat. Regular physical activity also makes it less likely that these risk factors will develop and more likely that children remain healthy when they become adults.

This chapter provides physical activity guidance for children and adolescents 3 through 17 years old. The Advisory Committee did not review evidence for children younger than age 3 years.

Preschool-aged children (ages 3 through 5 years) should be encouraged to move and engage in active play as well as in structured activities, such as throwing games and bicycle or tricycle riding. To strengthen bones, young children should do activities that involve hopping, skipping, jumping, and tumbling. Although the specific amount of activity needed to improve bone health and avoid excess fat in young children is not well defined, a reasonable target may be 3 hours per day of activity of all intensities: light, moderate, or vigorous intensity. This is the average amount of activity observed among children of this age and is consistent with guidelines from Canada, the United Kingdom, and the Commonwealth of Australia.



Key Guidelines for Preschool-Aged Children

- ✓ Preschool-aged children (ages 3 through 5 years) should be physically active throughout the day to enhance growth and development.
- ✓ Adult caregivers of preschool-aged children should encourage active play that includes a variety of activity types.

School-aged youth (ages 6 through 17 years) can achieve substantial health benefits by doing moderate- and vigorous-intensity physical activity for periods of time that add up to 60 minutes or more each day. This activity should include aerobic activity as well as age-appropriate muscle- and bone-strengthening activities. It appears that, as in adults, the total amount of physical activity is more important for achieving health benefits than is any one component (frequency, intensity, or duration) or specific mix of activities (aerobic, muscle strengthening, bone strengthening). Even so, bone-strengthening activities remain especially important for children and young adolescents because the greatest gains in bone mass occur during the years just before and during puberty. In addition, the majority of peak bone mass is obtained by the end of adolescence.

Parents and other adults who work with or care for youth should be familiar with the key guidelines in this chapter. Adults play an important role in providing age-appropriate opportunities for physical activity. In doing so, they help lay an important foundation for lifelong, health-promoting physical activity. Adults need to encourage active play in children and encourage sustained and structured activity as children grow older. As children become adolescents, they typically reduce their physical activity, making it all the more important for adults to provide age-appropriate, enjoyable opportunities for physical activity and to encourage youth to participate.



Key Guidelines for School-Aged Children and Adolescents

- ✓ It is important to provide young people opportunities and encouragement to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.
- ✓ Children and adolescents ages 6 through 17 years should do 60 minutes (1 hour) or more of moderate-to-vigorous physical activity daily:
 - **Aerobic:** Most of the 60 minutes or more per day should be either moderate- or vigorous-intensity aerobic physical activity and should include vigorous-intensity physical activity on at least 3 days a week.
 - **Muscle-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days a week.
 - **Bone-strengthening:** As part of their 60 minutes or more of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days a week.

Explaining the Guidelines

Types of Activity

The key guidelines for school-aged children and adolescents focus on three types of activity— aerobic, muscle strengthening, and bone strengthening. Each has important health benefits. Certain activities can be aerobic as well as muscle or bone strengthening. Illustrations of these activities can be found in the real-life examples at the end of this chapter.

Aerobic activities are those in which young people rhythmically move their large muscles for a sustained period of time. Running, hopping, skipping, jumping rope, swimming, dancing, and bicycling are all examples of aerobic activities. Aerobic activities increase cardiorespiratory fitness. Children often do activities in short bursts, which may not technically be aerobic. However, the Guidelines uses the term aerobic to refer to these types of activities, even if they are done only briefly.

Muscle-strengthening activities make muscles do more work than usual during activities of daily life. This is called overload, and strengthens the muscles. Muscle-strengthening activities can be unstructured and part of play, such as playing on playground equipment, climbing trees, and playing tug-of-war. Or they can be structured, such as lifting weights or working with resistance bands.

Bone-strengthening activities produce a force on the bones of the body that promotes bone growth and strength. This force is commonly produced by impact with the ground. Running, jumping rope, basketball, tennis, and hopscotch are all examples of bone-strengthening activities. As these examples illustrate, bone-strengthening activities can also be aerobic and muscle strengthening.

How Age Influences Physical Activity in Children and Adolescents

Children and adolescents should meet the key guidelines by doing activity that is appropriate for their age. Their natural patterns of movement differ from those of adults. For example, children are naturally active in an intermittent way, particularly when they do unstructured active play. During recess and in their free play and games, children use basic aerobic and bone-strengthening activities, such as running, hopping, skipping, and jumping, to develop movement patterns and skills. They alternate brief periods of moderate- and vigorous-intensity activity with periods of light-intensity physical activity or rest. Any episode of moderate- or vigorous-intensity physical activity, however brief, counts toward the key guidelines for children and adolescents ages 6 through 17 years. For preschool-aged children, activity of any intensity counts, including light intensity.

Children also commonly increase muscle strength through unstructured activities that involve lifting or moving their body weight or working against resistance. Children do not usually do or need formal muscle-strengthening programs, such as lifting weights. However, these programs are safe for children if they are properly prescribed and supervised.

Learn More



See [Chapter 2. Physical Activity and Health](#) for more on overload and related concepts.

As children grow into adolescents, their patterns of physical activity change. They are able to play organized games and sports and are able to sustain longer periods of activity. But they still commonly do intermittent activity, and any period of moderate- or vigorous-intensity activity can count toward the key guidelines.

During the transition to adolescence, sex differences in physical activity behavior appear. The amount of physical activity done by girls tends to decrease dramatically compared to that of boys, and the disparity persists into adulthood ([Figures 1-1](#) and [1-2](#)). Therefore, adolescent girls may need additional support and encouragement to maintain health-enhancing physical activity.

Adolescents may meet the key guidelines by doing free play, sports, or structured programs. Structured exercise programs can include muscle-strengthening activities, such as lifting weights, working with resistance bands, or using body weight for resistance (such as push-ups, pull-ups, and planks). Muscle-strengthening activities count if they involve a moderate or greater level of effort and work the major muscle groups of the body—legs, hips, back, abdomen, chest, shoulders, and arms.

Levels of Intensity for Aerobic Activity

Children and adolescents ages 6 and older can meet the key guidelines by doing a combination of moderate- and vigorous-intensity aerobic physical activities or by doing only vigorous-intensity aerobic physical activities. Youth should not do only moderate-intensity activity. It is important to include vigorous-intensity activities because they lead to greater improvement in cardiorespiratory fitness.

The intensity of aerobic physical activity can be defined on either an absolute or a relative scale. Either scale can be used to monitor the intensity of aerobic physical activity:

Absolute intensity is the amount of energy expended during the activity, without considering a person's cardiorespiratory fitness.

Relative intensity uses a person's level of cardiorespiratory fitness to assess level of effort.

Relative intensity describes a person's level of effort relative to his or her fitness. As a rule of thumb, on a scale of 0 to 10, where sitting is 0 and the highest level of effort possible is 10, moderate-intensity activity is a 5 or 6. Young people doing moderate-intensity activity will notice that their hearts are beating faster than normal and they are breathing harder than normal. Vigorous-intensity activity begins at a level of 7 or 8. Youth doing vigorous-intensity activity will feel their heart beating much faster than normal, and they will breathe much harder than normal.

When adults supervise children, they generally cannot ascertain a child's heart or breathing rate. However, they can observe whether a child is doing an activity which, based upon absolute energy expenditure, is considered to be either moderate or vigorous intensity. For example, a child walking to school is doing

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See [Appendix 1. Physical Activity Behavior: Intensity, Bouts, and Steps](#) for a more detailed discussion of intensity and how to measure it.

moderate-intensity activity. A child running on the playground is doing vigorous-intensity activity. However, children with low fitness may experience activities that are moderate intensity on the absolute scale as being vigorous intensity. [Table 3-1](#) includes examples of activities classified by absolute intensity. It shows that some activities, such as bicycling, can be moderate or vigorous intensity, depending upon level of effort.

Table 3-1. Examples of Aerobic, Muscle-, and Bone-Strengthening Physical Activities for Children and Adolescents

Type of Physical Activity	Preschool-Aged Children	School-Aged Children	Adolescents
Moderate-intensity aerobic	<ul style="list-style-type: none"> ■ Games such as tag or follow the leader ■ Playing on a playground ■ Tricycle or bicycle riding ■ Walking, running, skipping, jumping, dancing ■ Swimming ■ Playing games that require catching, throwing, and kicking ■ Gymnastics or tumbling 	<ul style="list-style-type: none"> ■ Brisk walking ■ Bicycle riding ■ Active recreation, such as hiking, riding a scooter without a motor, swimming ■ Playing games that require catching and throwing, such as baseball and softball 	<ul style="list-style-type: none"> ■ Brisk walking ■ Bicycle riding ■ Active recreation, such as kayaking, hiking, swimming ■ Playing games that require catching and throwing, such as baseball and softball ■ House and yard work, such as sweeping or pushing a lawn mower ■ Some video games that include continuous movement
Vigorous-intensity aerobic	<ul style="list-style-type: none"> ■ Games such as tag or follow the leader ■ Playing on a playground ■ Tricycle or bicycle riding ■ Walking, running, skipping, jumping, dancing ■ Swimming ■ Playing games that require catching, throwing, and kicking ■ Gymnastics or tumbling 	<ul style="list-style-type: none"> ■ Running ■ Bicycle riding ■ Active games involving running and chasing, such as tag or flag football ■ Jumping rope ■ Cross-country skiing ■ Sports such as soccer, basketball, swimming, tennis ■ Martial arts ■ Vigorous dancing 	<ul style="list-style-type: none"> ■ Running ■ Bicycle riding ■ Active games involving running and chasing, such as flag football ■ Jumping rope ■ Cross-country skiing ■ Sports such as soccer, basketball, swimming, tennis ■ Martial arts ■ Vigorous dancing

Type of Physical Activity	Preschool-Aged Children	School-Aged Children	Adolescents
Muscle strengthening	<ul style="list-style-type: none"> ▪ Games such as tug of war ▪ Climbing on playground equipment ▪ Gymnastics 	<ul style="list-style-type: none"> ▪ Games such as tug of war ▪ Resistance exercises using body weight or resistance bands ▪ Rope or tree climbing ▪ Climbing on playground equipment ▪ Some forms of yoga 	<ul style="list-style-type: none"> ▪ Games such as tug of war ▪ Resistance exercises using body weight, resistance bands, weight machines, hand-held weights ▪ Some forms of yoga
Bone strengthening	<ul style="list-style-type: none"> ▪ Hopping, skipping, jumping ▪ Jumping rope ▪ Running ▪ Gymnastics 	<ul style="list-style-type: none"> ▪ Hopping, skipping, jumping ▪ Jumping rope ▪ Running ▪ Sports that involve jumping or rapid change in direction 	<ul style="list-style-type: none"> ▪ Jumping rope ▪ Running ▪ Sports that involve jumping or rapid change in direction

Note: Some activities, such as bicycling or swimming, can be moderate or vigorous intensity, depending upon level of effort. For preschool-aged children, aerobic activities listed can be either moderate or vigorous intensity.

Meeting the Key Guidelines

American youth vary in their physical activity participation. Some do not participate at all, others participate in enough activity to meet the key guidelines, and some exceed the key guidelines.

One practical strategy to promote activity in youth is to replace sedentary behavior with activity whenever possible. For example, where appropriate and safe, young people should walk or bicycle to school or the bus stop instead of riding in a car. Rather than only watching sporting events on television, young people should participate in age-appropriate sports or games.

- **Children and adolescents who do not meet the key guidelines** should slowly increase their moderate-to-vigorous physical activity in small steps and in ways that they enjoy. A gradual increase in the number of days and the time spent being active will help reduce the risk of injury.
- **Children and adolescents who meet the key guidelines** should continue doing moderate-to-vigorous physical activity every day and, if appropriate, become even more active. Evidence suggests that even more than 60 minutes of activity daily may provide additional health benefits for school-aged youth.
- **Children and adolescents who exceed the key guidelines** should maintain their activity level and vary the kinds of activities they do to reduce the risk of overtraining or injury.

Special Considerations

Children and Adolescents With Disabilities

Children and adolescents with disabilities are more likely to be inactive than those without disabilities. Youth with disabilities should work with a health care professional or physical activity specialist to understand the types and amounts of physical activity appropriate for them. When possible, children and adolescents with disabilities should meet the key guidelines. When young people are not able to participate in the appropriate types or amounts of physical activities needed to meet the key guidelines, they should be as active as possible and avoid being inactive.

Getting and Staying Active: Real-Life Examples

Children and adolescents can meet the key guidelines and become regularly physically active in many ways. The first example is for a preschool-aged child showing how light-, moderate-, and vigorous-intensity physical activity can be incorporated throughout the day. The next examples are for a child and for an adolescent who are meeting the 60 minutes-a-day key guideline.



Jake: A 4-Year-Old Child

At childcare, Jake goes outside twice a day and plays games like hide-and-seek or hopscotch, chases his friends, and enjoys climbing up and going down the slide. At home, Jake is always on the move, whether he is building a fort in the living room, running around with his older sister, or seeing how high he can jump. On the weekends, Jake takes swimming lessons at the community pool or does gymnastics at the local recreation center. His family also likes to go to the city park, where Jake enjoys riding his tricycle. At home, Jake's parents limit his screen time. All these activities ensure that Jake does at least 3 hours of movement a day.

Ebony: An 11-Year-Old Child

Ebony has a physical disability and uses a wheelchair to get around. Ebony does 60 or more minutes of daily physical activity that is at least moderate intensity, and she also includes vigorous-intensity, bone-strengthening, and muscle-strengthening activities. Here are the daily activities she participates in during a sample week:

- **Monday and Friday:** Wheels to and from school (20 minutes); races a friend during recess (10 minutes); plays basketball during an afterschool program (30 minutes)
- **Tuesday and Thursday:** Wheels to and from school (20 minutes); actively participates during physical education class (50 minutes); plays four square in her afterschool program (15 minutes)



- **Wednesday:** Wheels to and from school (20 minutes); plays tag during recess (20 minutes); participates in an adaptive swim program (45 minutes)
- **Saturday:** Participates in an adaptive swim program (45 minutes); wheels with her mom to and from the grocery store (25 minutes)
- **Sunday:** Goes on a family bike ride using her adaptive bike (60 minutes); plays catch with her sister (10 minutes)

Ebony is working toward meeting the key guidelines by doing vigorous-intensity aerobic activities, bone-strengthening, and muscle-strengthening activities several days a week:

- **Vigorous-intensity** activities on 5 days: basketball, tag or racing at recess, bicycling, and swimming
- **Bone-strengthening** activities on 2 days: physical education class
- **Muscle-strengthening** activities on 2 days: physical education class

Darius: A 16-Year-Old Adolescent

Darius does 60 or more minutes of daily physical activity that is at least moderate intensity. Here are the daily activities he participates in during a sample week when school is not in session:

- **Monday and Wednesday:** Walks dog (10 minutes); plays basketball at a nearby school gym that has a shared-use agreement for community physical activity during the summer (50 minutes)
- **Tuesday and Thursday:** Walks dog (10 minutes); plays doubles tennis (30 minutes); does planks and push-ups (5 minutes) with his dad in the evening; rides his bicycle to a friend's home (15 minutes)
- **Friday:** Plays Frisbee in the park with friends (60 minutes)
- **Saturday:** Vacuums his family's home and cleans the bathrooms (30 minutes); rides his bike on a local trail (30 minutes)
- **Sunday:** Plays an active video game with his family that involves continuous movement at a moderate intensity (30 minutes); does body-weight exercises in his room (30 minutes)



Darius meets the key guidelines by doing vigorous-intensity aerobic activities, bone-strengthening, and muscle-strengthening activities on at least 3 days a week:

- **Vigorous-intensity** activities on 4 days: basketball and bicycling
- **Bone-strengthening** activities on 4 days: basketball, tennis
- **Muscle-strengthening** activities on 3 days: body-weight exercises, including planks and push-ups



Chapter 4. Active Adults



Adults who are physically active are healthier, feel better, and are less likely to develop many chronic diseases, such as cardiovascular disease, type 2 diabetes, and several types of cancer than are adults who are inactive. Regular moderate-to-vigorous physical activity also reduces feelings of anxiety and depression and improves sleep and quality of life. Even a single episode of physical activity provides temporary improvements in cognitive function and state anxiety. Adults who are more physically active are better able to perform everyday tasks without undue fatigue. Increased amounts of moderate-to-vigorous physical activity are associated with improved cardiorespiratory and muscular fitness, including a healthier body weight and body composition. Adults who are more physically active can more easily carry out daily tasks like climbing stairs, carrying heavy packages, and performing household chores. These benefits are true for men and women of all ages, races, and ethnicities.

Adults gain most of these health benefits when they do the equivalent of 150 to 300 minutes (2 hours and 30 minutes to 5 hours) of moderate-intensity aerobic physical activity each week. Adults gain additional and more extensive health benefits with even more physical activity. Muscle-strengthening activities also provide health benefits and are an important part of an adult's overall physical activity plan. This chapter provides guidance for men and women ages 18 through 64 years.

Learn More



See [Chapter 6. Additional Considerations for Some Adults](#). It discusses key guidelines for women during pregnancy and the postpartum period and for adults with chronic conditions or disabilities.



Key Guidelines for Adults

- ✓ Adults should move more and sit less throughout the day. Some physical activity is better than none. Adults who sit less and do any amount of moderate-to-vigorous physical activity gain some health benefits.
- ✓ For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
- ✓ Additional health benefits are gained by engaging in physical activity beyond the equivalent of 300 minutes (5 hours) of moderate-intensity physical activity a week.
- ✓ Adults should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.

Explaining the Key Guidelines

The key guidelines for adults focus on two types of activity— aerobic and muscle strengthening. Each provides important health benefits, as explained in [Chapter 2. Physical Activity and Health](#).

Aerobic Activity

Aerobic activities, also called endurance or cardio activities, are physical activities in which people move their large muscles in a rhythmic manner for a sustained period of time. Running, brisk walking, bicycling, playing basketball, dancing, and swimming are all examples of aerobic activities. Aerobic activity makes a person's heart beat more rapidly and breathing rate increase to meet the demands of the body's movement. Over time, regular aerobic activity makes the cardiorespiratory system stronger and more fit.

The purpose of aerobic activity does not affect whether or not it counts toward meeting the key guidelines. For example, physically active occupations can count toward meeting the key guidelines, as can active transportation choices (walking or bicycling). All types of aerobic activities can count as long as they are of sufficient intensity. For health benefits, the total amount of moderate-to-vigorous physical activity is more important than the length of each physical activity episode.

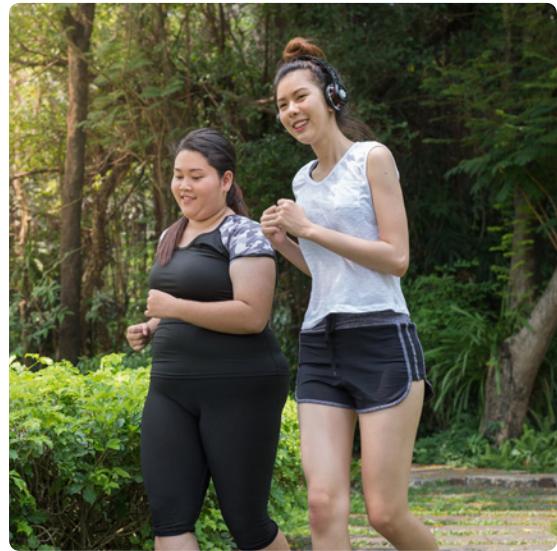
How Much Total Activity a Week?

When adults do the equivalent of at least 150 minutes of moderate-intensity aerobic activity each week, the benefits are substantial. These benefits include lower risk of all-cause mortality, coronary heart disease, stroke, hypertension, type 2 diabetes, some cancers, anxiety, depression, and Alzheimer's disease and other dementias. Physically active adults also sleep better, have improved cognition, and have better quality of life.

As a person moves from 150 minutes a week toward 300 minutes a week, the health benefits become more extensive. For example, a person who does 300 minutes a week has an even lower risk of heart disease or type 2 diabetes than a person who does 150 minutes a week.

Furthermore, adults who are regularly active at or near the higher end of the key guideline range—300 minutes a week—gain additional health benefits. These additional benefits include further risk reduction for several cancers and prevention of unhealthy weight gain (by physical activity alone).

The benefits continue to increase when a person does more than the equivalent of 300 minutes a week of moderate-intensity aerobic activity. Research has not identified an upper limit of total activity, above which additional health benefits cease to occur.



Learn More



See [Chapter 1. Introducing the Physical Activity Guidelines for Americans](#). It provides more information about the relationship between sitting time, physical activity, and risk of all-cause mortality.

How Many Days a Week and for How Long?

Aerobic physical activity preferably should be spread throughout the week. Research studies consistently show that activity performed on at least 3 days a week produces health benefits. Spreading physical activity across at least 3 days a week may also help reduce the risk of injury and prevent excessive fatigue.

All amounts of aerobic activity count toward meeting the key guidelines if they are performed at moderate or vigorous intensity. Episodes of physical activity can be divided throughout the day or week, depending on personal preference.

How Intense?

The key guidelines for adults focus on two levels of intensity—moderate and vigorous. To meet the key guidelines, adults can do either moderate-intensity or vigorous-intensity aerobic activities, or a combination of both. It takes less time to get the same benefit from vigorous-intensity activities than from moderate-intensity activities. A general rule of thumb is that 2 minutes of moderate-intensity activity counts the same as 1 minute of vigorous-intensity activity. For example, 30 minutes of moderate-intensity activity is roughly the same as 15 minutes of vigorous-intensity activity.

The intensity of aerobic activity can be tracked in two ways—absolute intensity and relative intensity.

Absolute intensity is the amount of energy expended during the activity, without considering a person's cardiorespiratory fitness. The energy expenditure of light-intensity activity is 1.6 to 2.9 times the amount of energy expended when a person is at rest. Moderate-intensity activities expend 3.0 to 5.9 times the amount of energy expended at rest. The energy expenditure of vigorous-intensity activities is 6.0 or more times the energy expended at rest.

Relative intensity is the level of effort required to do an activity. Less fit people generally require a higher level of effort than more fit people to do the same activity. Relative intensity can be estimated using a scale of 0 to 10, where sitting is 0 and the highest level of effort possible is 10. Moderate-intensity activity is a 5 or 6. Vigorous-intensity activity begins at a level of 7 or 8.

Offsetting the Risks of Too Much Sitting

People who sit a lot have an increased risk of all-cause and cardiovascular disease mortality, as well as an increased risk of developing cardiovascular disease, type 2 diabetes, and colon, endometrial, and lung cancers. The mortality risk related to sitting is not observed among people who do 60 to 75 minutes of moderate-intensity physical activity a day, but this amount of activity is far more than most people obtain. Therefore, both reducing sitting time and increasing physical activity will provide benefits.

Learn More



See [Appendix 1. Physical Activity Behaviors: Intensity, Bouts, and Steps](#) for more information on using either method to assess intensity.

Table 4-1 lists some examples of activities classified as moderate-intensity or vigorous-intensity based on absolute intensity. Either absolute or relative intensity can be used to monitor progress in meeting the key guidelines.

Table 4-1. Examples of Different Aerobic Physical Activities and Intensities, Based on Absolute Intensity

Moderate-Intensity Activities
<ul style="list-style-type: none">■ Walking briskly (2.5 miles per hour or faster)■ Recreational swimming■ Bicycling slower than 10 miles per hour on level terrain■ Tennis (doubles)■ Active forms of yoga (for example, Vinyasa or power yoga)■ Ballroom or line dancing■ General yard work and home repair work■ Exercise classes like water aerobics
Vigorous-Intensity Activities
<ul style="list-style-type: none">■ Jogging or running■ Swimming laps■ Tennis (singles)■ Vigorous dancing■ Bicycling faster than 10 miles per hour■ Jumping rope■ Heavy yard work (digging or shoveling, with heart rate increases)■ Hiking uphill or with a heavy backpack■ High-intensity interval training (HIIT)■ Exercise classes like vigorous step aerobics or kickboxing



Spotlight on Aerobic Activities: A Tried and True Favorite and Two Increasingly Popular Options

Walking

Walking is an easy physical activity to begin and maintain as part of a physically active lifestyle. It does not require special skills, facilities, or expensive equipment. Many studies show that walking has health benefits and a low risk of injury. It can be done year round and in many settings.

Yoga and Tai Chi

Many different forms of yoga exist, and they range in intensity level from more meditative Hatha yoga to power yoga. For this reason, yoga may include time that would be characterized as light-intensity physical activity or as moderate-intensity physical activity. Yoga may also be considered both aerobic and muscle strengthening, depending on the type and the postures practiced.

Tai chi is typically classified as a light-intensity physical activity but may be considered relatively moderate intensity for some adults. It includes balance activities, and some forms may be considered muscle strengthening.

High-Intensity Interval Training

High-intensity interval training (HIIT) is a form of interval training that consists of alternating short periods of maximal-effort exercise with less intense recovery periods. There are no universally accepted lengths for the maximal-effort period, the recovery period, or the ratio of the two; no universally accepted number of cycles per session or the entire duration of the session; and no precise relative intensity at which the maximal-effort component should be performed.

When using relative intensity, people pay attention to how physical activity affects their heart rate and breathing. As a rule of thumb, a person doing moderate-intensity aerobic activity can talk, but not sing, during the activity. A person doing vigorous-intensity activity cannot say more than a few words without pausing for a breath.

Older or less fit adults may find that activities in [Table 4-1](#) labeled as moderate intensity are experienced as vigorous intensity. These adults will gain health benefits from starting with activities that would be considered light intensity and, as they are able, to gradually build up to moderate- or vigorous-intensity activities. In contrast, younger or more fit adults may experience activities labeled as moderate intensity easy enough that they can sing while doing them. These adults may need to do more vigorous-intensity activities to gain certain health benefits.

Talk Test

As a rule of thumb, a person doing moderate-intensity aerobic activity can talk, but not sing, during the activity. A person doing vigorous-intensity activity cannot say more than a few words without pausing for a breath.

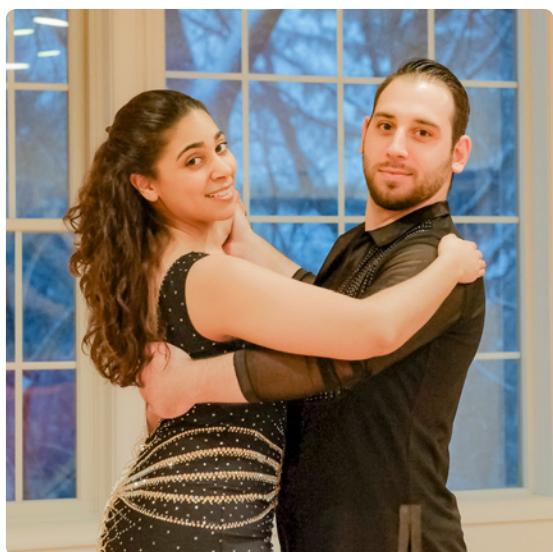
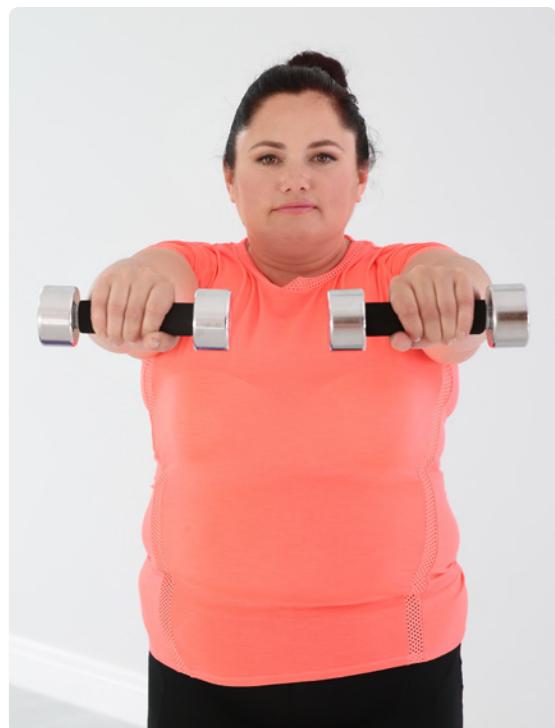
Muscle-Strengthening Activity

Muscle-strengthening activities provide additional benefits not found with aerobic activity. The benefits of muscle-strengthening activity include increased bone strength and muscular fitness. Muscle-strengthening activities can also help maintain muscle mass during weight loss.

Muscle-strengthening activities make muscles do more work than they are accustomed to doing. That is, they overload the muscles. Examples of muscle-strengthening activities include lifting weights, working with resistance bands, doing calisthenics that use body weight for resistance (such as push-ups, pull-ups, and planks), carrying heavy loads, and heavy gardening.

Muscle-strengthening activities count if they involve a moderate or greater level of intensity or effort and work the major muscle groups of the body—the legs, hips, back, chest, abdomen, shoulders, and arms. Muscle-strengthening activities for all the major muscle groups should be done at least 2 days a week. The improvement in, or maintenance of, muscle strength is specific to the muscles used during the activity, so a variety of activities is necessary to achieve balanced muscle strength.

No specific amount of time is recommended for muscle strengthening, but muscle-strengthening exercises should be performed to the point at which it would be difficult to do another repetition. When resistance training is used to enhance muscle strength, one set of 8 to 12 repetitions of each exercise is effective, although 2 or 3 sets may be more effective. Improvements in muscle strength and endurance are progressive over time. Increases in the amount of weight or the days a week of exercising will result in stronger muscles.



Flexibility Activities

Flexibility is an important part of physical fitness. Some types of physical activity, such as ballet or salsa dancing, require more flexibility than others. Flexibility activities enhance the ability of a joint to move through the full range of motion. Stretching exercises are effective in increasing flexibility, and thereby can allow people to more easily do activities that require greater flexibility. For these reasons, flexibility activities are an appropriate part of a physical activity program, even though their health benefits are unknown and it is unclear whether they reduce risk of injury. Time spent doing flexibility activities by themselves does not count toward meeting the aerobic or muscle-strengthening key guidelines.

Warm-Up and Cool-Down

Warm-up and cool-down activities are an acceptable part of a person's physical activity plan. Commonly, the warm-up and cool-down involve doing an activity at a slower speed or lower intensity. A warm-up before moderate- or vigorous-intensity aerobic activity allows a gradual increase in heart rate and breathing at the start of the episode of activity. A cool-down after activity allows a gradual decrease at the end of the episode. Time spent doing warm-up and cool-down may count toward meeting the aerobic key guidelines if the activity is at least moderate intensity (for example, walking briskly as a warm-up before jogging). A warm-up for muscle-strengthening activity commonly involves doing exercises with lighter weight.



Meeting the Key Guidelines

Adults have many options for becoming physically active, increasing their physical activity, and staying active throughout their lives. In all cases, adults should try to move more and sit less each day. In deciding how to meet the key guidelines, adults should think about how much physical activity they are already doing and how physically fit they are. Personal health and fitness goals are also important to consider. Examples of how to meet the key guidelines are provided later in this chapter.

In general, healthy men and women who plan gradual increases in their weekly amounts of physical activity do not need to consult a health care provider before becoming physically active. Women who are pregnant and adults with chronic conditions or disabilities are discussed in [Chapter 6. Additional Considerations for Some Adults](#).

Inactive or Insufficiently Active Adults

Adults who do not yet do the equivalent of 150 minutes of moderate-intensity physical activity a week (inactive or insufficiently active) should work gradually toward this goal. The initial amount of activity should be at a light or moderate intensity, for short periods of time, with the sessions spread throughout the week. People likely gain some health benefits even when they replace sitting time with light-intensity activity. Sitting less and doing moderate- or vigorous-intensity physical activity has even more benefits. The good news is that “some is better than none.” As shown in [Figure 2-1](#), which plots the benefits of increasing physical activity on all-cause mortality, the biggest gain in benefits occurs when going from no physical activity to being active for just 60 minutes a week.

To reduce risk of injury, it is important to increase the amount of physical activity gradually over a period of weeks to months. For example, an inactive person could start with a walking program consisting of 5 minutes of walking several times each day, 5 to 6 days a week. The length of time could then gradually be increased to 10 minutes per session, 3 times a day, and the walking speed could be increased slowly.

Learn More



See [Chapter 7. Active and Safe](#) for more information on how to increase physical activity gradually.

Muscle-strengthening activities should also be gradually increased over time. Initially, these activities can be done just 1 day a week starting at a light or moderate level of effort. Over time, the number of days a week can be increased to 2, and then possibly to more than 2. Each week, the intensity can be increased slightly until it becomes moderate or greater.

Active Adults

Adults who are already active and meet the minimum key guidelines (the equivalent of 150 minutes of moderate-intensity aerobic activity and 2 days of muscle-strengthening activity every week) can gain additional and more extensive health benefits by reducing sedentary behavior and increasing physical activity above this amount. Most adults should increase their aerobic activity to exceed the minimum level and move toward 300 minutes a week. Adults should also do muscle-strengthening activities on at least 2 days each week.

One time-efficient way to achieve greater fitness and health goals is to substitute vigorous-intensity aerobic activity for some moderate-intensity activity. Using the 2-to-1 rule of thumb, doing 150 minutes of vigorous-intensity aerobic activity a week provides about the same benefits as 300 minutes of moderate-intensity activity.

Adults are encouraged to do a variety of activities to reduce the risk of injury often caused by doing too much of one kind of activity (this is called an overuse injury).

Highly Active Adults

Adults who are highly active—doing more than the equivalent of 300 minutes of moderate-intensity physical activity and at least 2 days of muscle-strengthening activity each week—should maintain or continue to increase their activity level. These adults are also encouraged to do a variety of activities.

Special Considerations

Maintaining a Healthy Body Weight

The health benefits of physical activity are generally independent of body weight. The good news for people needing to lose weight is that regular physical activity provides major health benefits, no matter how their weight changes over time. Physical activity, along with appropriate dietary intake, is an important part of maintaining a healthy weight because it helps in preventing weight gain, losing weight, and keeping extra weight off once it has been lost. Physical activity also helps reduce abdominal fat and preserve muscle during weight loss. Adults should aim for a healthy, stable body weight. The amount of physical activity necessary to achieve this weight varies greatly from person to person.

Physical Activity and Body Weight: What's the Relationship?

The health benefits of physical activity are generally independent of body weight. The good news for people needing to lose weight is that regular physical activity provides major health benefits, no matter how their weight changes over time.

The first step in achieving or maintaining a healthy weight is to meet the minimum level of physical activity in the Guidelines. For some people this will result in a stable and healthy body weight, but for many it may not.

People who are at a healthy body weight, but slowly gaining weight, can either gradually increase their level of physical activity (toward the equivalent of 300 minutes a week of moderate-intensity aerobic activity) or reduce caloric intake, or both, until their weight is stable. That is, by regularly checking body weight, people can find the amount of physical activity that works for them.

Many adults will need to do more than the 150 minutes a week of moderate-intensity aerobic physical activity to lose weight or keep it off. These adults should do more physical activity and/or further reduce their caloric intake. Some people will need to do the equivalent of 300 or more minutes of moderate-intensity physical activity a week to meet their body-weight goals. In addition to restricting caloric intake, these adults should gradually increase minutes or the intensity of aerobic physical activity, to the point at which the physical activity is effective in achieving a healthy weight.

It is important to remember that all activities, whether light, moderate, or vigorous intensity, “count” for energy balance. Active choices, such as taking the stairs rather than the elevator or adding short episodes of walking to the day, are examples of activities that can be helpful in weight control.

Getting and Staying Active: Real-Life Examples

Adults can meet the key guidelines in all sorts of ways and with many types of physical activity. The choices of types and amounts of physical activity depend upon personal health and fitness goals. Here are a few examples:



Madison: A 20-Year-Old Woman

Madison is an active 20-year-old who lives on campus at a small university. At the end of her first year, she realized she had become quite sedentary and had gained weight. She found that physical activity helped her feel less anxious and study more productively, so she made the commitment to build regular physical activity into her week. Now at the end of her second year, Madison does the equivalent of at least 420 minutes of moderate-intensity aerobic activity each week, plus muscle-strengthening activities 2 days a week. Below is a sample week of her activities.

- Madison walks briskly to class, the gym, the dining hall, and friends' dorms instead of taking the campus shuttle. Walking provides at least 30 minutes of moderate-intensity activity each day (150 minutes a week).

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See the [Dietary Guidelines for Americans](#) for additional information on weight management and how to determine a healthy weight.

- She attends a cardio exercise class at the university's fitness facility twice a week. The 45-minute class is mostly vigorous-intensity activity (equivalent of 180 minutes of moderate-intensity activity a week) and incorporates dance, calisthenics (e.g., jumping jacks, running in place), and step aerobics.
- Madison meets a friend twice a week to lift weights at the university's gym. They use dumbbells, weight machines, suspension trainers, and kettlebells to target all of their major muscle groups.
- As part of the Outdoor Adventure Club at school, Madison goes kayaking for 90 minutes at the nearby river on the weekend.

Miguel: A 40-Year-Old Man With Young Children

Between a demanding job, caring for his two children ages 5 and 7, and spending time with his wife and extended family, Miguel does not have much time to spare. But physical activity helps Miguel deal with the stress of his hectic life, and he squeezes it in wherever he can. Adding it up, he does the equivalent of 95 minutes a week of moderate-intensity physical activity and 1 day of muscle-strengthening activity each week. Miguel has downloaded a few HIIT workouts on his phone and squeezes in two 20-minute sessions a week (40 minutes of vigorous intensity, the equivalent of 80 minutes of moderate-intensity activity a week), often before his kids wake up or after they go to bed. On Saturdays he and his wife stroll to the park with their children. The leisurely walk counts as light-intensity activity, but Miguel typically spends at least 15 minutes running around and playing with the kids each time they visit the park. While at the park, Miguel and his wife take turns doing body-weight exercises like squats, push-ups, and crunches while the other parent keeps an eye on the kids. Miguel knows he has not quite met the key guidelines, so he plans to add another park outing each week this summer. He also talked to a coworker about increasing activity at work. He plans to start walking briskly up or down the stairs in his office rather than taking the elevator to attend various meetings to accumulate at least 10 minutes of moderate-to-vigorous physical activity each day. Once he makes these changes, he will be getting the equivalent of 160 minutes of moderate-intensity activity and 2 days of muscle-strengthening activity each week.





Chapter 5. Active Older Adults



The benefits of regular physical activity occur throughout life and are essential for healthy aging. Adults ages 65 years and older gain substantial health benefits from regular physical activity. However, it is never too late to start being physically active. Being physically active makes it easier to perform activities of daily living, including eating, bathing, toileting, dressing, getting into or out of a bed or chair, and moving around the house or neighborhood. Physically active older adults are less likely to experience falls, and if they do fall, they are less likely to be seriously injured. Physical activity can also preserve physical function and mobility, which may help maintain independence longer and delay the onset of major disability. Research shows that physical activity can improve physical function in adults of any age, adults with overweight or obesity, and even those who are frail. Promoting physical activity and reducing sedentary behavior for older adults is especially important because this population is the least physically active of any age group, and most older adults spend a significant proportion of their day being sedentary.

Older adults are a varied group. Most, but not all, have one or more chronic conditions, such as type 2 diabetes, cardiovascular disease, osteoarthritis, or cancer, and these conditions vary in type and severity. Nevertheless, being physically active has significant benefits for all older adults. Physical activity is key to preventing and managing chronic disease. Other benefits include a lower risk of dementia, better perceived quality of life, and reduced symptoms of anxiety and depression. Additionally, doing physical activity with others can provide opportunities for social engagement and interaction. All older adults experience a loss of physical fitness and function with age, but some experience this more than others. This diversity means that some older adults can run several miles, while others struggle to walk a few blocks.

This chapter provides guidance about physical activity for adults ages 65 years and older. The Guidelines seeks to help older adults select the types and amounts of physical activity appropriate for their own abilities.

For adults ages 65 years and older who have good fitness and no chronic conditions, the guidance in this chapter is essentially the same as that provided in [Chapter 4. Active Adults](#).

Learn More



See [Chapter 6. Additional Considerations for Some Adults](#) for a discussion of physical activity for older adults with chronic conditions.





Key Guidelines for Older Adults

These guidelines are the same for adults and older adults:

- ✓ Adults should move more and sit less throughout the day. Some physical activity is better than none. Adults who sit less and do any amount of moderate-to-vigorous physical activity gain some health benefits.
- ✓ For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
- ✓ Additional health benefits are gained by engaging in physical activity beyond the equivalent of 300 minutes (5 hours) of moderate-intensity physical activity a week.
- ✓ Adults should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.

Guidelines just for older adults:

- ✓ As part of their weekly physical activity, older adults should do multicomponent physical activity that includes balance training as well as aerobic and muscle-strengthening activities.
- ✓ Older adults should determine their level of effort for physical activity relative to their level of fitness.
- ✓ Older adults with chronic conditions should understand whether and how their conditions affect their ability to do regular physical activity safely.
- ✓ When older adults cannot do 150 minutes of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow.

Explaining the Key Guidelines

As with other adults, the key guidelines for older adults focus mainly on two types of activity— aerobic and muscle-strengthening. In addition, these key guidelines discuss the importance of multicomponent physical activity, which includes balance training along with aerobic and muscle-strengthening activity. Each provides important health benefits, especially to improve physical function, as explained in [Chapter 2. Physical Activity and Health](#).

Aerobic Activity

Aerobic activities, also called endurance or cardio activities, are physical activities in which people move their large muscles in a rhythmic manner for a sustained period of time. Brisk walking, jogging, biking, dancing, and swimming are all examples of aerobic activities. Aerobic activity makes a person's heart beat more rapidly and breathing rate increase to meet the demands of the body's movement. Over time, regular aerobic activity makes the cardiorespiratory system stronger and more fit.

No matter what the purpose—from walking the dog, to taking a dance or exercise class, to bicycling to the store—all types of aerobic activity count toward meeting the key guidelines. When putting the key guidelines into action, it is important to consider the total amount of activity, how often, and at what intensity. For health benefits, the total amount of moderate-to-vigorous physical activity is more important than the length of each physical activity episode. In general, muscle-strengthening activities do not count toward meeting the aerobic key guidelines. [Table 5-1](#) lists some examples of aerobic and muscle-strengthening activities for older adults.

How Much Total Activity a Week?

Older adults should aim to do at least 150 to 300 minutes of moderate-intensity physical activity a week, or an equivalent amount (75 to 150 minutes) of vigorous-intensity activity. They can also do an equivalent amount of activity by doing both moderate- and vigorous-intensity activity. As is true for people of all other ages, greater amounts of physical activity provide additional and more extensive health benefits. Older adults who do more aerobic physical activity have a reduced risk of age-related loss of function and reduced risk of physical function limitations compared to the general aging population.



Older adults should strongly consider walking as one good way to get aerobic activity. Walking has many health benefits, and it has a low risk of injury. It can be done year round and in many settings.

Table 5-1. Examples of Physical Activities for Older Adults

Aerobic Activities	Muscle-Strengthening Activities
<ul style="list-style-type: none">■ Walking or hiking■ Dancing■ Swimming■ Water aerobics■ Jogging or running■ Aerobic exercise classes■ Some forms of yoga■ Bicycle riding (stationary or outdoors)■ Some yard work, such as raking and pushing a lawn mower■ Sports like tennis or basketball■ Walking as part of golf	<ul style="list-style-type: none">■ Strengthening exercises using exercise bands, weight machines, or hand-held weights■ Body-weight exercises (push-ups, pull-ups, planks, squats, lunges)■ Digging, lifting, and carrying as part of gardening■ Carrying groceries■ Some yoga postures■ Some forms of tai chi

Note: The intensity of these activities can be either relatively moderate or relatively vigorous, depending upon an older adult's level of fitness.



Yoga and Tai Chi

Yoga and tai chi are increasingly popular forms of physical activity.

Many different forms of yoga exist, and they range in intensity level from more meditative Hatha yoga to power yoga. For this reason, yoga may include time that can be characterized as light-intensity physical activity or as moderate-intensity physical activity. Yoga may also be considered both aerobic and muscle strengthening, depending on the type and the postures practiced.

Tai chi is typically classified as a light-intensity physical activity but may be relatively moderate intensity for older adults. Some forms of tai chi may be muscle strengthening. Research is currently exploring the effects that tai chi may have on balance and physical function in older adults.

How Many Days a Week and for How Long?

Aerobic physical activity preferably should be spread throughout the week. Research studies consistently show that activity performed on at least 3 days a week produces health benefits. Spreading physical activity across at least 3 days a week may help to reduce the risk of injury and prevent excessive fatigue.

All amounts of aerobic activity count toward meeting the key guidelines if they are performed at moderate or vigorous intensity. Episodes of physical activity can be divided throughout the day or week, depending on personal preference.

How Intense?

The intensity of aerobic activity can be tracked in two ways—absolute intensity and relative intensity. Most studies on older adults use relative intensity to track aerobic physical activity.

- **Absolute intensity** is the amount of energy expended during the activity without considering a person's cardiorespiratory fitness. The energy expenditure of light-intensity activity, for example, is 1.6 to 2.9 times the amount of energy expended when a person is at rest. Moderate-intensity activities expend 3.0 to 5.9 times the amount of energy expended at rest. The energy expenditure of vigorous-intensity activities is 6.0 or more times the energy expended at rest.
- **Relative intensity** is the level of effort required to do an activity. Less fit people generally require a higher level of effort than more fit people to do the same activity. Relative intensity can be estimated using a scale of 0 to 10, where sitting is 0 and the highest level of effort possible is 10.



When using relative intensity, people pay attention to how physical activity affects their heart rate and breathing. As a rule of thumb, a person doing moderate-intensity aerobic activity can talk, but not sing, during the activity. A person doing vigorous-intensity activity cannot say more than a few words without pausing for a breath.

Either absolute or relative intensity can be used to monitor progress in meeting the key guidelines. Because older adults expend more energy than younger adults for the same task, such as walking, and because aerobic capacity declines with age, relative intensity is a better guide for older adults than absolute intensity. Certain activities, such as some types

of yoga or tai chi, that are considered light-intensity on an absolute scale for younger adults may be perceived as moderate or vigorous intensity for older adults. People who have been very inactive and are working to increase their physical activity levels can also use relative intensity to help determine their level of effort.

Older adults can meet the key guidelines by doing relatively moderate-intensity activity, relatively vigorous-intensity activity, or a combination of both. The relative intensity of aerobic activity is related to a person's level of cardiorespiratory fitness.

Moderate-intensity activity requires a medium level of effort. On a scale of 0 to 10, where sitting is 0 and the greatest effort possible is 10, moderate-intensity activity is a 5 or 6 and produces noticeable increases in breathing rate and heart rate.

Vigorous-intensity activity begins at a level of 7 or 8 on this scale and produces large increases in a person's breathing and heart rate.

A general rule of thumb is that 2 minutes of moderate-intensity activity counts the same as 1 minute of vigorous-intensity activity. For example, 30 minutes of moderate-intensity activity is roughly the same as 15 minutes of vigorous-intensity activity.

Muscle-Strengthening Activities

At least 2 days a week, older adults should do muscle-strengthening activities that involve all the major muscle groups. These are the muscles of the legs, hips, chest, back, abdomen, shoulders, and arms. The improvements in, or maintenance of, muscular strength are specific to the muscles used during the activity, so a variety of activities is necessary to achieve balanced muscle strength.

Muscle-strengthening activities make muscles do more work than they are accustomed to during activities of daily life. Examples of muscle-strengthening activities include lifting weights, working with resistance bands, doing calisthenics that use body weight for resistance (such as push-ups, pull-ups, and planks), climbing stairs, shoveling snow, and carrying heavy loads (such as groceries and heavy gardening).

Muscle-strengthening activities count if they involve a moderate or greater level of intensity or effort and work the major muscle groups of the body. Whatever the reason for doing it, any muscle-strengthening activity counts toward meeting the key guidelines. For example, muscle-strengthening activity done as part of a therapy or rehabilitation program can count.

No specific amount of time is recommended for muscle strengthening, but muscle-strengthening exercises should be performed to the point at which it would be difficult to do another repetition. When resistance training is used to enhance muscle strength, one set of 8 to 12 repetitions of each exercise is effective, although 2 or 3 sets may be more effective. Development of muscle strength and endurance is progressive over time. That means that gradual increases in the amount of weight, number of sets or repetitions, or the number of days a week of exercise will result in stronger muscles.



Balance Activities

These kinds of activities can improve the ability to resist forces within or outside of the body that cause falls. Fall prevention programs that include balance training and other exercises to improve activities of daily living can also significantly reduce the risk of injury, such as bone fractures, if a fall does occur. Studies of fall prevention programs generally include about three sessions a week. Balance training examples include walking heel-to-toe, practicing standing from a sitting position, and using a wobble board. Strengthening muscles of the back, abdomen, and legs also improves balance.

Multicomponent Physical Activity

Doing multicomponent physical activities can help reduce the risk of injury from falls and improve physical function. Multicomponent refers to physical activity that includes more than one type of physical activity, such as aerobic, muscle strengthening, and balance training. Multicomponent physical activity can be done at home or in a community setting as part of a structured program that includes a combination of balance, muscle-strengthening, and aerobic physical activity, and may include gait, coordination, and physical function training. Recreational activities such as dancing, yoga, tai chi, gardening, or sports can also be considered multicomponent because they often incorporate multiple types of physical activity. It is appropriate and recommended that all older adults do multicomponent physical activities.

Flexibility, Warm-Up, and Cool-Down

Older adults should maintain the flexibility necessary for regular physical activity and activities of daily life. Flexibility activities enhance the ability of a joint to move through the full range of motion. Stretching exercises are effective in increasing flexibility, and thereby can allow people to more easily do activities that require greater flexibility. Although the health benefits of these activities alone are not known and they have not been demonstrated to reduce risk of activity-related injuries, they are an appropriate component of a physical activity program. However, time spent doing flexibility activities by themselves does not count toward meeting the aerobic or muscle-strengthening key guidelines.

Research studies of effective exercise programs typically include warm-up and cool-down activities. A warm-up before moderate- or vigorous-intensity aerobic activity allows a gradual increase in heart rate and breathing at the start of the episode of activity. A cool-down after activity allows a gradual heart rate decrease at the end of the session. Time spent doing warm-up and cool-down activities may count toward meeting the aerobic activity guidelines if the activity is at least moderate intensity (for example, walking briskly to warm up for a jog). A warm-up for muscle-strengthening activity commonly involves doing exercises with less weight.

What Is Multicomponent Physical Activity?

For older adults, multicomponent physical activity is important to improve physical function and decrease the risk of falls or injury from a fall. These activities can be done at home or in a structured group setting. Many studied interventions combine all types of exercise (aerobic, muscle strengthening, and balance) into one session, and this has been shown to be effective.

An example of a multicomponent physical activity program could include walking (aerobic activity), lifting weights (muscle strengthening), and could incorporate balance by walking backwards or sideways or by standing on one foot while doing an upper body muscle-strengthening activity, such as bicep curls. Ballroom dancing also combines aerobic and balance components.

Meeting the Key Guidelines

Older adults have many options for how to live an active lifestyle that meets the key guidelines. Many factors influence decisions to be active, such as personal goals, current physical activity habits, and health and safety considerations. In all cases, older adults should try to move more and sit less each day. In working toward meeting the key guidelines, older adults are encouraged to do a variety of activities. This approach can make activity more enjoyable and may reduce the risk of overuse injury. Examples of how to meet the key guidelines are provided later in this chapter.

Healthy older adults who plan gradual increases in their weekly amounts of physical activity generally do not need to consult a health care professional before becoming physically active. However, health care professionals and physical activity specialists can help people attain and maintain regular physical activity by providing advice on appropriate types of activities and ways to progress at a safe and steady pace.

Older adults with chronic conditions should talk with their health care professional to determine whether their conditions limit, in any way, their ability to do regular physical activity. Such a conversation should also help people learn about appropriate types and amounts of physical activity.

Inactive and Insufficiently Active Older Adults

Some physical activity is better than none. Older adults who do not yet do the equivalent of 150 minutes of moderate-intensity physical activity a week can gain health benefits by doing small amounts of physical activity. In addition, swapping out sedentary behavior, such as sitting, for light-intensity physical activity, such as light housework, may produce some benefits. There are even more benefits to sitting less and doing moderate- or vigorous-intensity physical activity. As shown in [Figure 2-1](#), which plots the benefits of increasing physical activity on all-cause mortality, the biggest gain in benefits occurs when going from no physical activity to being active for just 60 minutes a week.

Older adults should increase their amount of physical activity gradually. It can take months for those with low fitness to gradually meet their activity goals. To reduce risk of injury, it is important to increase the amount of physical activity gradually over a period of weeks to months. For example, an inactive person could start with a walking program consisting of 5 minutes of slow walking several times each day, 5 to 6 days a week. The length of time could then gradually be increased to 10 minutes per session, 3 times a day, and the walking speed could be increased slowly.

Muscle-strengthening activities should also be gradually increased over time. Initially, these activities can be done just 1 day a week starting at a light or moderate intensity. Over time, the number of days a week can be increased to 2, and then possibly to more than 2. Each week, the intensity can be increased slightly until it becomes moderate or greater.

Learn More



See [Chapter 7. Active and Safe](#) for details on consulting a health care provider.

Learn More



See [Chapter 7. Active and Safe](#) for more information on how to increase physical activity gradually.

Active Older Adults

Older adults who are already active and meet or exceed the key guidelines range—150 to 300 minutes a week—can gain additional and more extensive health benefits by reducing sedentary behavior and increasing relatively moderate-intensity aerobic activity to 300 or more minutes a week. Muscle-strengthening activities should also be done at least 2 days a week.

Special Considerations

Maintaining a Healthy Body Weight

The amount of physical activity necessary to successfully maintain a healthy body weight depends upon caloric intake and varies considerably among older adults. To help achieve and maintain a healthy body weight, older adults should do the equivalent of 150 minutes of moderate-intensity aerobic activity each week. If necessary, they should increase their weekly minutes of aerobic physical activity gradually over time and decrease caloric intake to a point where they can achieve energy balance and a healthy weight.

Some older adults will need a higher level of physical activity to maintain a healthy body weight or prevent weight regain. Some may need more than the equivalent of 300 minutes a week of moderate-intensity activity. It is possible to achieve this level of activity by gradually increasing activity over time.

Older adults who are capable of relatively vigorous-intensity activity and need a high level of physical activity to maintain a healthy weight should consider some relatively vigorous-intensity activity as a means of weight control. This approach is more time-efficient than doing only moderate-intensity activity. However, high levels of activity are not feasible for many older adults. These adults should achieve a level of physical activity that is sustainable and safe. If further weight loss is needed, these older adults should achieve energy balance by reducing caloric intake.

It is important to remember that all activities, whether light, moderate, or vigorous intensity, “count” for energy balance. Active choices, such as taking the stairs rather than the elevator or adding short episodes of walking to the day, are examples of activities that can be helpful in maintaining a healthy body weight.



Being Active in the Presence of Health Challenges

Older adults who have chronic conditions or other health challenges that prevent them from doing the equivalent of 150 to 300 minutes of moderate-intensity aerobic activity a week should set physical activity goals that meet their abilities. They should talk with their health care professional about setting physical activity goals. They should avoid an inactive lifestyle. Physical inactivity is among the strongest predictors of physical disability in older people. Even small amounts of moderate-intensity aerobic activity provide some health benefits. Older adults with frailty and those who have had a hip fracture are discussed below.

Frailty

In frail older adults, strong evidence demonstrates that physical function can be improved with regular physical activity. Physical activity can contribute to improved walking and gait, balance, strength, self-reported measures of activities of daily living, and quality of life. Multicomponent physical activity of at least moderate intensity that is performed 3 or more times a week for a duration of 30 to 45 minutes per session, over at least 3 to 5 months, appears most effective to increase functional ability in frail older adults. Multicomponent physical activity programs are more effective than doing just a single type of physical activity.

After a Hip Fracture

Regular physical activity can reduce the risk of falls and the extent of an injury from a fall. Physical activity is also important to improve physical function following a hip fracture. Much of the research has been on extended exercise programs beginning after the fracture and has documented improved walking and performance-based measures of gait, balance, strength, and activities of daily living, or self-reported mobility.

Being Active With a Functional Limitation

When a person has lost some ability to do a task of everyday life, such as climbing stairs, the person has a functional limitation. In older adults with existing functional limitations, scientific evidence indicates that regular physical activity is safe and has a beneficial effect on functional ability, thus making it easier to do activities of daily living.

Resuming Activity After an Illness

An older adult may have to take a break from regular physical activity because of an illness, such as the flu. If these interruptions occur, older adults should resume activity at a lower level and gradually work back up to their usual level of activity.

Getting and Staying Active: Real-Life Examples

These examples show how different people with different living circumstances and levels of fitness can meet the key guidelines for older adults.

Learn More



See [Chapter 6. Additional Considerations for Some Adults](#) for information on some conditions.

Barbara: An Active, 65-Year-Old Woman

Barbara is recently retired and enjoys spending time being active with friends and family and at the local recreation center. Barbara does the equivalent of approximately 220 minutes of moderate-intensity aerobic activity each week, plus muscle-strengthening activities 2 days a week. Some of her active time is spent doing multicomponent physical activity.

- Twice a week, Barbara takes a 45-minute aqua aerobics class at the local recreation center with her husband. The class incorporates aerobic and muscle-strengthening activities, and it helps her work on her balance.
- Many of Barbara's friends have begun to take dance classes at the local recreation center in the afternoons. Barbara now joins them; she dances for 45 minutes and typically goes twice a week.
- In addition to her traditional activities, Barbara makes sure to park farther away when running errands, and she tries to take the stairs whenever possible. These shorter bouts contribute an average of 40 minutes of relatively moderate-intensity activity to her total weekly amount.



Rumi: A 79-Year-Old Woman in an Assisted-Living Community

Rumi struggles to stay active. She lives in an assisted-living community and no longer drives. She is worried about falling and heard from her doctor that staying active can improve her physical function and reduce her risk of falls and fall-related injuries.

Her goals and current activity pattern: Currently, Rumi walks 5 times a week in a loop around her assisted-living complex; this takes her about 10 minutes (50 minutes of moderate-intensity activity each week). Her goal is to increase the number of walks each week and also increase the length

of some of her walks. In addition to her walks, Rumi goes with a friend to do bird watching with a group once a week at the local park. These outings usually involve at least 20 minutes of walking.

Starting out: Rumi slowly adds to her walks by taking a slightly longer route. After a few weeks, she is able to walk about 15 minutes 3 times a week. She continues to go to the bird-watching group.

Reaching her goal: Within a few months, Rumi is consistently walking the 10-minute loop around her assisted-living complex every day. She extends to a longer 15-minute loop at least 4 times a week. She continues to attend the bird-watching group, and she feels more comfortable walking on uneven terrain; she has extended these walks to about 40 minutes a week. Rumi has also started going to an exercise class for older adults twice a week. The leader teaches different exercises that focus on aerobic activity, muscle-strengthening activity, and balance training. Rumi is now meeting the key guideline of 150 minutes of moderate-intensity aerobic activity. This class has helped Rumi to meet the twice-weekly guideline for muscle-strengthening activities and adds multicomponent activities to her routine.



Chapter 6. Additional Considerations for Some Adults



All Americans should be physically active to improve overall health and fitness and to prevent many adverse health outcomes. However, some people have conditions that raise special issues about recommended types and amounts of physical activity. These people include healthy women during pregnancy and the postpartum period (first year after delivery), people with chronic health conditions, and people with disabilities. Often, these people avoid physical activity because of concern that the risks outweigh the benefits. However, for most people, the benefits of being physically active outweigh any potential risks.

This chapter provides guidance on physical activity for healthy women who are pregnant or postpartum. This chapter also provides guidance on physical activity for adults with selected chronic conditions or disabilities, including the following:

- Adults with osteoarthritis;
- Adults with type 2 diabetes;
- Adults with hypertension;
- Adults who are cancer survivors; and
- Adults with physical disabilities.

For the groups discussed in this chapter, either absolute or relative intensity can be used to monitor progress in meeting the key guidelines. This chapter complements guidance provided in [Chapter 4. Active Adults](#) and [Chapter 5. Active Older Adults](#), which discuss how to use relative intensity.

Physical Activity in Women During Pregnancy and the Postpartum Period

Physical activity during pregnancy benefits a woman's overall health. Moderate-intensity physical activity by healthy women during pregnancy increases or maintains cardiorespiratory fitness, reduces the risk of excessive weight gain and gestational diabetes, and reduces symptoms of postpartum depression. Reduced risk of excessive weight gain during pregnancy can also reduce the risk of excessive postpartum weight retention, future obesity, and an infant born with high birth weight. Strong scientific evidence shows that the risks of moderate-intensity activity done by healthy women during pregnancy are very low, and do not increase risk of low birth weight, preterm delivery, or early pregnancy loss. Some evidence suggests that physical activity may reduce the risk of pregnancy complications, such as preeclampsia, reduce the length of labor and postpartum recovery, and reduce the risk of having a Cesarean section.

During a normal postpartum period, regular physical activity continues to benefit a woman's overall health. Studies show that moderate-intensity physical activity during the period following the birth of a child increases a woman's cardiorespiratory fitness and improves her mood. Such activity does not appear to have adverse effects on breast milk volume, breast milk composition, or infant growth.

Physical activity also helps women achieve and maintain a healthy weight during the postpartum period and, when combined with caloric restriction, helps promote weight loss.

Learn More



See [Chapter 3. Active Children and Adolescents](#) for a discussion on physical activity in children and adolescents with disabilities.



Key Guidelines for Women During Pregnancy and the Postpartum Period

- ✓ Women should do at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity a week during pregnancy and the postpartum period. Preferably, aerobic activity should be spread throughout the week.
- ✓ Women who habitually engaged in vigorous-intensity aerobic activity or who were physically active before pregnancy can continue these activities during pregnancy and the postpartum period.
- ✓ Women who are pregnant should be under the care of a health care provider who can monitor the progress of the pregnancy. Women who are pregnant can consult their health care provider about whether or how to adjust their physical activity during pregnancy and after the baby is born.

Explaining the Key Guidelines

Women who are pregnant should be under the care of a health care provider with whom they can discuss whether or how to adjust their physical activity during pregnancy and after the baby is born. Unless a woman has medical reasons to avoid physical activity during pregnancy or the postpartum period, she can begin or continue light- to moderate-intensity aerobic and muscle-strengthening physical activity. When beginning physical activity during pregnancy, women should increase the amount of physical activity gradually over time.

Women who habitually did vigorous-intensity activity or a lot of aerobic or muscle-strengthening physical activity before pregnancy can continue to be physically active during pregnancy and after giving birth. They generally do not need to drastically reduce their activity levels, provided that they remain healthy and discuss with their health care provider whether and how to adjust activity levels during this time.

During pregnancy, perceived exertion is often a better indicator of intensity than heart rate or estimated absolute energy requirements of specific activities. On a rating-of-perceived-exertion scale of 0 to 10, where 0 is sitting and 10 is the greatest effort possible, moderate-intensity activity would be an effort of 5 to 6. Another way to gauge moderate intensity is with a talk test, where carrying on a conversation (but not singing) is still possible.

Women should avoid doing exercises that involve lying on their back after the first trimester of pregnancy because this position can restrict blood flow to the uterus and fetus. They should also avoid participating in contact or collision sports and activities with high risk of falling or abdominal trauma, such as soccer, basketball, horseback riding, or downhill skiing.

Physical Activity in People With Chronic Health Conditions or Disabilities

This section addresses both adults with chronic conditions and adults with disabilities. Some adults with chronic conditions may develop an acute or chronic disability as a result of their chronic condition. Some people

may be born with a disability, or it may result from trauma or illness. In either case, these adults may be at greater risk of developing chronic conditions. Although types and amounts of recommended physical activity may differ, adults with chronic conditions or disabilities benefit from physical activity.

Regular physical activity can help promote improved quality of life for people with chronic conditions and reduce the risk of developing new conditions. The type and amount of physical activity should be determined by a person's abilities and the severity of the chronic condition. For many chronic conditions, physical activity provides therapeutic benefits and is part of recommended treatment for the condition. However, the Guidelines does not discuss therapeutic exercise or rehabilitation, except in the context of how physical activity for disease prevention and general health benefits can be done by people with chronic conditions.

The benefits of physical activity for people with disabilities have been studied in diverse groups with disabilities related to traumatic events or to chronic health conditions. These groups include stroke survivors and people with spinal cord injury, multiple sclerosis, Parkinson's disease, muscular dystrophy, cerebral palsy, traumatic brain injury, limb amputations, mental illness, intellectual disability, and Alzheimer's disease and other dementias. Physical activity may improve some aspects of cognition in most diseases or disorders that impair cognitive function.

Overall, the evidence shows that regular physical activity provides important health benefits for people with disabilities. The benefits include improved cardiovascular and muscle fitness, improved brain health, and better ability to do tasks of daily life. Though much remains to be learned about the benefits of activity for specific types of disabilities, sufficient evidence exists to recommend that adults with disabilities should do regular physical activity.



Key Guidelines for Adults With Chronic Health Conditions and Adults With Disabilities

- ✓ Adults with chronic conditions or disabilities, who are able, should do at least 150 minutes a week (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
- ✓ Adults with chronic conditions or disabilities, who are able, should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.
- ✓ When adults with chronic conditions or disabilities are not able to meet the above key guidelines, they should engage in regular physical activity according to their abilities and should avoid inactivity.
- ✓ Adults with chronic conditions should be under the care of a health care provider. People with chronic conditions can consult a health care professional or physical activity specialist about the types and amounts of activity appropriate for their abilities and chronic conditions.

Explaining the Key Guidelines

The key guidelines affirm that adults with chronic conditions or disabilities should be physically active on a regular basis.

In consultation with a health care professional or physical activity specialist, people with chronic conditions or disabilities should understand how their disease or disability affects their ability to do physical activity. Some may be capable of doing substantial amounts of physical activity, and they should essentially follow the Guidelines for adults.

Some people with chronic conditions or disabilities are not able to follow the key guidelines for adults. These people should adapt their physical activity program to match their abilities, in consultation with a health care professional or physical activity specialist. Studies show that physical activity can be done safely when the program is matched to their ability.

Meeting the Key Guidelines

People with chronic conditions or disabilities are encouraged to create an individualized physical activity plan. It is a good idea to get advice from professionals with experience in physical activity and disability because matching activity to abilities can require modifying physical activity in many different ways. For example, a person with a disability or condition affecting leg function may get aerobic activity from an arm ergometer or from wheelchair walking.

Some people with disabilities also need supervised activity to help with an exercise program. For example, some people may need assistance when performing muscle-strengthening activities, such as lifting weights.

Special Considerations for Specific Chronic Conditions and Disabilities



Learn More



See [Chapter 4. Active Adults](#) for details on these key guidelines and how to meet them.

Physical Activity in Adults With Osteoarthritis

Osteoarthritis is a common condition in older adults, and people can live many years with osteoarthritis. People with osteoarthritis are commonly concerned that physical activity can make their condition worse. Osteoarthritis can be painful and cause fatigue, making it hard to begin or maintain regular physical activity. Yet, people with this condition should get regular physical activity to lower their risk of getting other chronic diseases, such as heart disease or type 2 diabetes, and to help maintain a healthy body weight.

Physical activity has both preventive health benefits and therapeutic benefits among people with osteoarthritis. Strong scientific evidence indicates that both aerobic activity and

muscle-strengthening activity provide therapeutic benefits. Adults with osteoarthritis can expect improvements in pain, physical function, quality of life, and mental health with regular physical activity. When done safely, physical activity does not make the disease or the pain worse. And evidence shows that the benefits of physical activity can continue even after stopping a physical activity program.

People with osteoarthritis should match the type and amount of physical activity to their abilities and the severity of their condition. Most people can usually tolerate doing moderate-intensity activity for 150 minutes a week or more, such as being active 3 to 5 days a week for 30 to 60 minutes per episode. Walking up to 10,000 steps per day does not appear to worsen osteoarthritis of the knee. Some people with osteoarthritis can safely do more than 150 minutes of moderate-intensity activity each week and may be able to tolerate vigorous-intensity activity. Health care professionals typically counsel people with osteoarthritis to do activities that are low impact, not painful, and have low risk of joint injury. Swimming, walking, tai chi, and many muscle-strengthening exercises are good examples of this type of activity.

Physical Activity in Adults With Type 2 Diabetes

Physical activity in adults with type 2 diabetes shows how important it can be for people with a chronic disease to be active. Physical activity has therapeutic effects, can reduce comorbidities, and can prevent risk factors that contribute to the progression of type 2 diabetes. Therefore, in addition to benefits specific to type 2 diabetes, physical activity is routinely recommended to reduce risk of other diseases and help promote a healthy body weight. Physical activity may also benefit adults with type 1 diabetes, but this condition was not addressed for the development of the Guidelines.

Strong scientific evidence shows that physical activity protects against heart disease, the leading cause of death in people with type 2 diabetes, and can reduce risk of death by 30 to 40 percent. Physical activity helps protect against heart disease and factors related to the progression of type 2 diabetes by helping to reduce the risk factors of high blood pressure, body weight, blood lipids (cholesterol), and elevated hemoglobin A1c in people with type 2 diabetes. The beneficial effects on blood glucose (indicated by hemoglobin A1c) may also reduce other complications of type 2 diabetes. Moderate-intensity activity for at least 150 minutes a week plus 2 days a week of muscle-strengthening activities help to substantially lower the risk of heart disease. A person who moves toward 300 minutes or more of moderate-intensity activity a week gets even greater benefit.

Adults with a chronic condition should work with a health care professional or physical activity specialist to adapt physical activity so it is appropriate for their condition. For example, people with diabetes must be especially careful about monitoring their blood glucose, choosing appropriate footwear, and avoiding injury to their feet.

Physical Activity in Adults With Hypertension

Hypertension is one of the most common, costly, and preventable cardiovascular disease risk factors. It is the most prevalent chronic condition among adults. Physical activity has therapeutic benefits for people with hypertension by helping to reduce blood pressure. It also lowers their risk of cardiovascular disease mortality.

Both aerobic and muscle-strengthening activities are beneficial for people with hypertension. Because the benefits of physical activity are actually greater in people with hypertension than in those with normal blood pressure, moderate-intensity activity for about 90 minutes a week or the equivalent amount of vigorous-intensity activity helps to substantially lower the risk of heart disease. A person who moves toward greater amounts of physical activity a week gets even greater benefit. People with hypertension should work with their health care provider as they increase their physical activity, as adjustments to medication may be needed.

Physical Activity in Adult Cancer Survivors

Earlier detection of cancer and modern improved treatments mean that more than 15.5 million cancer survivors are living in the United States today. This growing population faces unique challenges, including risk of recurrent cancer, death from their cancer or other causes, development of other chronic diseases, worsening of physical functioning and quality of life, and other adverse effects from their disease and treatments.

Cancer survivors should engage in regular physical activity for its many health benefits. For adults with breast, colorectal, or prostate cancer, greater amounts of physical activity after diagnosis help to substantially lower the risk of dying from their cancer. For adults with breast and colorectal cancer, greater amounts of physical activity after diagnosis also help to substantially lower the risk of dying from any cause. Cancer survivors who are physically active have a better quality of life, improved fitness and physical function, and less fatigue. Physical activity also plays a role in reducing the adverse effects of cancer treatment. As a result of cancer and its treatment, some cancer survivors are at increased risk of heart disease, and physical activity can help reduce this risk.

As with other adults with chronic conditions, cancer survivors can consult with a health care professional or physical activity specialist to match a physical activity plan to their abilities, health status, and any treatment toxicities.

Physical Activity in Adults With Selected Physical Disabilities

For many types of physical disabilities, physical activity reduces pain, improves fitness, improves physical function, and improves quality of life. People with disabilities that affect their ability to walk or move about benefit from physical activity. Physically active people who have Parkinson's disease, multiple sclerosis, a spinal cord injury, or a stroke have better physical function, including walking ability, than less active adults with the same condition. These improvements have been shown with multicomponent physical activity programs that included aerobic activity (commonly walking), muscle-strengthening, and balance-training activities.

Potential specific benefits include:

- Parkinson's disease—Improved physical function, including walking, balance, muscle strength, and disease-specific motor scores.
- Multiple sclerosis—Improved physical function, including walking speed and endurance, and fitness. Physical activity does not appear to exacerbate multiple sclerosis.
- Spinal cord injury—Improved walking function, wheelchair skills, muscular strength, and upper extremity function. Benefits can be seen with recent or older injuries and across severities of spinal cord injury.
- Stroke—Improved walking function, such as walking velocity or endurance.

Adults with physical disabilities can consult with a health care professional or physical activity specialist to match a physical activity plan to their abilities.

Getting and Staying Active: Real-Life Examples

These examples show how people with various health conditions can meet the key guidelines.



Jessica: A 28-Year-Old Woman Who Is Pregnant

Jessica is 16 weeks pregnant, and her pregnancy is progressing normally. Before she became pregnant, Jessica did some light- and moderate-intensity physical activity, but she did not meet the key guidelines. Jessica's pregnancy motivates her to be more physically active. She discusses her plans with her doctor, who tells her it is safe for her to increase her activity level as long as she keeps him informed throughout her pregnancy. Jessica joins a prenatal yoga class at her local hospital, which meets once a week. She also starts walking during her lunch break for 30 minutes 3 days a week, for a total of 90 minutes of moderate-intensity activity. As she begins to gain strength and endurance, Jessica

adds a 60-minute walk and 30 minutes of muscle-strengthening activities with resistance bands each weekend, modifying exercises to avoid lying on her back. With these additions, Jessica has reached 150 minutes of moderate-intensity physical activity a week and participates in 1 day of muscle strengthening. As Jessica's pregnancy progresses, she notices lower back pain that intensifies on longer walks, so she replaces her longer walk with swimming. She continues using resistance bands and attending her prenatal yoga class until her baby is born.

Ines: An 83-Year-Old Woman With Osteoarthritis

Ines has been active all her life, but osteoarthritis in her hip and knee have started to slow her down. Ines communicates regularly with her doctor, who agrees that staying active can help to reduce her level of pain, as well as improve her physical function and health-related quality of life. Because of her age and ability level, Ines typically judges the intensity of her activity based on her own level of exertion.

Ines does the equivalent of at least 160 minutes of moderate-intensity aerobic activity each week, plus muscle-strengthening activities 2 days a week.



- Three days a week, Ines follows along with a fitness video at home. The video includes 20 minutes of moderate-intensity movements, including stepping, marching, and walking in place.
- Two days a week, Ines participates in a 30-minute chair yoga class at the senior center nearby, which incorporates muscle-strengthening, stretching, and balance exercises.
- On Saturday before the mall opens, Ines and her daughter walk for 40 minutes. The mall provides a safe, indoor place to walk with clear paths, even surfaces, and places to sit down if needed.



Chris: A 53-Year-Old Man With Multiple Sclerosis

His goals: Chris is a 53-year-old man with multiple sclerosis who sets a goal of doing 30 minutes of moderate-intensity aerobic activity on 4 days a week (a total of 120 minutes a week).

Starting out: Chris starts where he feels safe and comfortable, using a stationary bike at his gym. On the stationary bike, Chris does moderate-intensity physical activity for 20 minutes on 2 days each week. In order to track his progression, he takes note of his intensity level and tries to keep his level of effort at a 5 or 6 on a scale of 0 to 10.

Making good progress: Two months later, Chris is comfortably using a stationary bike at a moderate intensity for 30 minutes on 3 days a week. In addition to his time on the stationary bike, Chris has started to attend a water exercise class specifically for individuals with multiple sclerosis. The class focuses on multicomponent physical activity and meets one evening a week for 30 minutes.

Reaching his goal: Eventually, Chris surpasses his goal and works up to 160 minutes a week of moderate-intensity aerobic activity, including 30 minutes of stationary bicycling 4 times a week, a water fitness class for 30 minutes once a week, and a 10-minute brisk walk after work once a week.

Raymond: A 42-Year-Old Man With Type 2 Diabetes

Raymond is a 42-year-old man with type 2 diabetes. Recently, at the recommendation of his physician, he started paying more attention to his activity levels. He received a step counter for his birthday, and he uses it to track his daily activity and stay motivated.

After a few months of increasing his physical activity, Raymond now does the equivalent of at least 150 minutes of moderate-intensity aerobic activity each week, plus muscle-strengthening activities 3 days a week.

- Raymond walks briskly to and from the bus stop each weekday (10 minutes each day).
- He walks with a coworker during lunch 3 times a week (25 minutes each day).
- On the weekends, he and his wife ride their bikes to and from worship service (25 minutes).



Three nights a week, Raymond does body-weight exercises while watching TV after dinner. He does push-ups, lunges, planks, and squats.



Chapter 7. Active and Safe



Although physical activity has many health benefits, injuries and other adverse events do sometimes happen. The most common injuries affect the musculoskeletal system. Other adverse events can also occur during activity, such as overheating and dehydration. Rarely, people have heart attacks during activity.

The good news is that scientific evidence strongly shows that physical activity can be safe for almost everyone. Moreover, the health benefits of physical activity far outweigh the risks.

Still, people may hesitate to become physically active because of concern they will get hurt. For these people, there is even more good news: people can take steps that are proven to reduce their risk of injury and adverse events.

The key guidelines in this chapter provide advice to help people do physical activity safely. Most advice applies to people of all ages. Specific guidance for particular age groups and people with certain conditions is also provided.



Key Guidelines for Safe Physical Activity

To do physical activity safely and reduce risk of injuries and other adverse events, people should:

- ✓ Understand the risks, yet be confident that physical activity can be safe for almost everyone.
- ✓ Choose types of physical activity that are appropriate for their current fitness level and health goals, because some activities are safer than others.
- ✓ Increase physical activity gradually over time to meet key guidelines or health goals. Inactive people should “start low and go slow” by starting with lower intensity activities and gradually increasing how often and how long activities are done.
- ✓ Protect themselves by using appropriate gear and sports equipment, choosing safe environments, following rules and policies, and making sensible choices about when, where, and how to be active.
- ✓ Be under the care of a health care provider if they have chronic conditions or symptoms. People with chronic conditions and symptoms can consult a health care professional or physical activity specialist about the types and amounts of activity appropriate for them.



Explaining the Guidelines

Be Confident That Physical Activity Is Safe for Almost Everyone

Most people are not likely to be injured when doing moderate-intensity activities in amounts that meet the key guidelines. However, injuries and other adverse events do sometimes happen. The most common problems are musculoskeletal injuries. Even so, studies show that only one such injury occurs for every 1,000 hours of walking for exercise, and fewer than four injuries occur for every 1,000 hours of running.

Both physical fitness and total amount of physical activity affect risk of musculoskeletal injuries. People who are

physically fit have a lower risk of injury than people who are not. People who do more activity generally have a higher risk of injury. So, what should people do if they want to be active and safe? The best strategies are to:

- Be regularly physically active to increase physical fitness; and
- Follow the other guidance in this chapter (especially increasing physical activity gradually over time) to minimize the risk of injury.

Choose Appropriate Types and Amounts of Activity

People can reduce their risk of injury by choosing appropriate types of activity. The safest activities are moderate intensity, low impact, and do not involve purposeful collision or contact.

Walking for exercise, gardening or yard work, bicycling or riding a stationary bike, dancing, swimming, and golf are activities with the lowest injury rates. In the amounts commonly done by adults, walking (a moderate-intensity and low-impact activity) has a third or less of the injury risk of running (a vigorous-intensity and higher impact activity). Sports that involve collision or contact, such as football, hockey, and soccer, have a higher risk of injuries, including concussion.

The risk of injury for a type of physical activity can also differ by the purpose of the activity. For example, recreational bicycling or bicycling for transportation leads to fewer injuries than training for and competing in bicycle races.

People who have had a past injury are at risk of re-injuring that body part. The risk of injury can be reduced by performing appropriate amounts of activity and setting appropriate personal goals. Performing a variety of different physical activities may also reduce the risk of overuse injury.

Increase Physical Activity Gradually Over Time

Scientific studies indicate that the risk of injury to bones, muscles, and joints is directly related to the gap between a person's usual level of activity and a new level of activity. The size of this gap is called the amount of overload. Creating a small overload and waiting for the body to adapt and recover reduces the risk of injury. When amounts of physical activity need to be increased to meet the key guidelines or personal goals, physical activity should be increased gradually over time, no matter what the person's current level of physical activity. Here is general guidance for inactive people and those with low levels of physical activity on how to increase physical activity:

- Use relative intensity (intensity of the activity relative to a person's fitness) to guide the level of effort for aerobic or muscle-strengthening physical activity.
- Generally, start with relatively moderate-intensity activity. Avoid relatively vigorous-intensity activity, such as shoveling heavy snow or running. Adults with low fitness may need to start with light activity, or a mix of light- to moderate-intensity activity.
- First, increase the number of minutes per session (duration) and the number of days a week (frequency) of moderate-intensity activity. Later, if desired, increase the intensity.
- Pay attention to the relative size of the increase in physical activity each week, as this is related to injury risk. For example, a 20-minute increase each week is safer for a person who already does 200 minutes a week of jogging (a 10% increase) than in a person who does 40 minutes a week (a 50% increase).

The available scientific evidence suggests that adding a small and comfortable amount of light- to moderate-intensity activity, such as walking 5 to 15 minutes per session, 2 to 3 times a week, to one's usual activities results in a low risk of musculoskeletal injury and no known risk of severe cardiac events. Because this range is rather wide, people should consider three factors when individualizing their rate of increase—age, level of fitness, and level of experience.

Age

The amount of time required to adapt to a new level of activity probably depends upon age. Youth and young adults probably can safely increase activity by small amounts every week or two. Older adults appear to require more time to adapt to a new level of activity, in the range of 2 to 4 weeks.

Level of Fitness

Less fit adults are at higher risk of injury when doing a given amount of activity, compared to more fit adults. Slower rates of increase over time may reduce injury risk. This guidance applies particularly to adults with overweight or obesity, as they are commonly less physically fit.

Learn More



See [Chapter 2. Physical Activity and Health](#) for a discussion of overload, progression, and specificity and how they relate to physical fitness.

Prior Experience

People may use their experience to learn ways to increase physical activity over time that minimize their risk of overuse injury. Generally, if an overuse injury occurred in the past with a certain rate of progression, a person should increase activity more slowly the next time.

Warming up before and cooling down after exercise are commonly recommended to prevent injuries and adverse cardiac events. A warm-up before moderate- or vigorous-intensity aerobic activity allows a gradual increase in heart rate and breathing at the start of the episode of activity. A warm-up for muscle-strengthening activity commonly involves doing exercises with lighter weight. A cool-down after activity allows a gradual decrease at the end of the episode.

Take Appropriate Precautions

Taking appropriate precautions means using the right gear and equipment, choosing safe environments in which to be active, following rules and policies, and making sensible choices about how, when, and where to be active.

Use Protective Gear and Appropriate Equipment

Using personal protective gear can reduce the frequency of injury. Personal protective gear is something worn by a person to protect a specific body part. Examples include helmets, eyewear and goggles, shin guards, elbow and knee pads, and mouth guards.

Using appropriate sports equipment can also reduce risk of injury. Sports equipment refers to sport- or activity-specific tools, such as balls, bats, sticks, and shoes.

For the most benefit, protective equipment and gear should be:

- The right equipment for the activity;
- Appropriately fitted;
- Appropriately maintained; and
- Used consistently and correctly.



Be Active in Safe Environments

People can reduce their injury risks by paying attention to the places where they choose to be active. To help them stay safe, people can look for:

- Physical separation from motor vehicles, such as sidewalks, walking paths, or bike lanes;
- Neighborhoods with traffic-calming measures that slow traffic;
- Places to be active that are well lit, where other people are present, and that are well maintained;
- Shock-absorbing surfaces on playgrounds;
- Well-maintained playing fields and courts without holes or obstacles;
- Breakaway bases at baseball and softball fields; and
- Padded and anchored goals and goal posts at soccer and football fields.

Follow Rules and Policies That Promote Safety

Rules, policies, and laws are potentially the most effective and wide-reaching way to reduce activity-related injuries. To get the benefit, people should look for and follow these rules, policies, and laws. For example, policies that promote the use of bicycle helmets reduce the risk of head injury among bicyclists. Rules against diving into shallow water at swimming pools prevent head and neck injuries.

Make Sensible Choices About When and How to Be Active

A person's choices can obviously influence the risk of adverse events. By making sensible choices, injuries and adverse events can be prevented. For example, wearing reflective clothing and lights when doing outdoor activities (walking, running, or bicycling) in the early morning or evening can help increase visibility. Consider weather conditions such as extremes of heat and cold, and apply sunscreen as appropriate. For example, during very hot and humid weather, people lessen the chances of dehydration and heat stress by:

- Exercising in the cool of early morning as opposed to mid-day heat;
- Switching to indoor activities (playing basketball in the gym rather than on the playground);
- Changing the type of activity (swimming rather than playing soccer);
- Lowering the intensity of activity (walking rather than running); and
- Paying close attention to resting, seeking shade, drinking enough fluids, and finding other ways to minimize effects of heat.

Consider Air Quality When Planning to Be Active

Exposure to air pollution is associated with several adverse health outcomes, including asthma attacks and cardiovascular disease-related events. People who can modify the location or time of exercise may wish to reduce these risks by exercising away from heavy traffic and industrial sites, especially during rush hour or times when pollution is known to be high. The Environmental Protection Agency Air Quality Index (AQI) provides information about when air conditions are unhealthy. The AQI can be found at <https://www.airnow.gov/>.

Advice From Health Care Providers

No evidence is available to indicate that people who consult with their health care provider receive more benefits and suffer fewer adverse events than people who do not. People without diagnosed chronic conditions (such as diabetes, heart disease, or osteoarthritis) and who do not have symptoms (such as chest pain or pressure, dizziness, or joint pain) most likely do not need to consult with a health care provider about physical activity.

Inactive people who gradually progress over time to relatively moderate-intensity activity have no known risk of sudden cardiac events and very low risk of bone, muscle, or joint injuries. A person who is habitually active with moderate-intensity activity can gradually increase to vigorous intensity without needing to consult a health care provider. People who develop new symptoms when increasing their levels of activity should consult a health care provider.

Health care professionals and physical activity specialists can provide useful, personalized advice on how to reduce risk of injuries. For people who wish to seek the advice of a health care professional, it is particularly appropriate to do so when contemplating vigorous-intensity activity, because the risks of this activity are higher than the risks of moderate-intensity activities.

The choice of appropriate types and amounts of physical activity can be affected by chronic conditions. People with symptoms or known chronic conditions should be under the regular care of a health care provider. In consultation with a health care professional or physical activity specialist, they can develop a physical activity plan that is appropriate for them. People with chronic conditions typically find that moderate-intensity activity is safe and beneficial. However, they may need to take special precautions. For example, people with diabetes need to pay special attention to blood glucose control and proper footwear during activity.

Light- and moderate-intensity physical activity are generally safe and are recommended for women with uncomplicated pregnancies, but women should talk with their providers about how to adjust their activity while they are pregnant and after the baby's birth.

During pregnancy, women should avoid:

- Doing activities that involve lying on their back after the first trimester of pregnancy; and
- Doing contact or collision sports and activities with high risk of falling or abdominal trauma, such as soccer, basketball, horseback riding, or downhill skiing.

Learn More



See [Chapter 4. Active Adults](#) for guidance and examples of how to gradually increase activity levels.

Learn More



See [Chapter 6. Additional Considerations for Some Adults](#) for more details about physical activity during pregnancy and the postpartum period.



Chapter 8. Taking Action: Increasing Physical Activity Levels of Americans



Being physically active is one of the most important steps Americans of all ages and abilities can take to improve their overall health. When people are physically active, they receive a wide array of health benefits—from reducing feelings of anxiety and depression and improving sleep and quality of life to lowering the risk of developing type 2 diabetes, heart disease, and many cancers.

Based upon a careful review of the science, the second edition of the Physical Activity Guidelines for Americans provides guidance on how much physical activity is needed to obtain health benefits. However, providing guidance by itself is rarely sufficient to produce change. In 2015, only about 20 percent of high school students and adults reported getting enough physical activity to meet the aerobic and muscle-strengthening key guidelines. To make progress, action is necessary.

For those who are not yet physically active, the news is good—a number of proven strategies can help increase levels of physical activity. This chapter highlights several evidence-based strategies individuals and communities can take. Because improving physical activity across the country will require the efforts of individuals, families, and many sectors of society, the chapter closes with steps everyone can take.

Learn More



See [Appendix 2](#) for Federal resources with information on how to increase physical activity, including:

- [Physical Activity Guidelines for Americans Midcourse Report: Strategies to Increase Physical Activity Among Youth](#)
- [Step it Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities](#)
- [Guide to Community Preventive Services](#)

Evidence-Based Strategies

To most effectively increase physical activity levels, evidence-based strategies should be used. This means that researchers or practitioners have tested the strategy and shown that it can increase physical activity.

A review of the science shows that many evidence-based strategies can be used to promote and support physical activity. Some strategies involve working with people one-on-one or in small groups to change their physical activity. Other strategies can be implemented more broadly at the community level through programs, practices, and policies that make physical activity an easy choice. These evidence-based strategies show that making physical activity the safe and easy choice does help people become more active.

For Individuals or Small Groups

Strategies targeting individuals can benefit all age groups, including children, adolescents, adults, and older adults. Many ways exist to deliver information and guidance to these groups to motivate their participation in physical activity.

Studies with individuals or small groups show that interventions based on theories of behavior change are successful in helping people achieve an active lifestyle. Theory-based approaches apply knowledge about how people change behaviors to teach people skills that help them incorporate physical activity into their daily routines. Below are three evidence-based strategies that can be applied to help individuals change their behaviors and attain a physically active lifestyle.

Guidance From Professionals or Peers

Groups led by professionals or peers can help improve physical activity levels. These groups usually incorporate some form of counseling or guidance from a health professional or trainer to help participants set physical activity goals, monitor their progress toward these goals, seek social support to maintain physical activity, and use self-reward and positive self-talk to reinforce progress. They also use structured problem-solving to prevent relapse to an inactive or low active lifestyle. To reduce staff burden and costs, groups can also be led by trained peers who deliver the intervention in full or in part and often share similar characteristics or experiences as group members. Youth, adults, and older adults can benefit from using these strategies to achieve an active lifestyle.

Support From Others

Participation in physical activity in a community setting with others, such as friends and family, can increase physical activity levels. Adults are more likely to participate in physical activity when they are supported by others. Buddy systems, contracts with others to complete specified levels of physical activity, and walking groups are ways to provide individuals with friendship and support for physical activity.

Technology

Technology-based approaches can take many forms. They can be used to provide virtual coaching to help people set and monitor physical activity goals. They can be used alone or combined with other strategies. Step counters (pedometers) and other wearable activity monitors combined with behavioral strategies, such as goal-setting and coaching, increase physical activity by providing physical activity feedback directly to the user.

Technology can also be used to provide guidance remotely to individuals through text messaging, by telephone, or through the Internet. Telephone and Internet delivery strategies offer guidance to individuals from trained peers or through interactive voice-response systems. For those with lower computer or technology literacy or living in remote areas, computer-tailored mailings can increase physical activity. Use of smartphone applications can increase regular physical activity in children and adolescents.

For Communities

Although individuals make the final choice about whether to be physically active, they can face challenges that make this choice more difficult. For example, they may not know about or have access to safe places to be physically active, may live in communities not designed for activity, or may have chronic conditions or physical limitations that create additional barriers. Through programs, practices, and policies, communities can help individuals overcome these challenges and make physical activity the easy choice.

Strategies at the community level generally have greater reach and can result in longer lasting change than strategies focused on individual behavior. Actions can be taken across an entire community or within settings in the community, such as schools. The following are five proven strategies to show how this can work.

Point-of-Decision Prompts

These interventions provide signs or other prompts that encourage people to make an active choice, such as taking the stairs instead of elevators or escalators. They can be done in a variety of places, including worksites or public venues, such as transportation hubs and shopping malls. Wayfinding signs placed at strategic points can make people aware of walkable destinations, including parks, recreational facilities, and other attractions.

School Policies and Practices

Schools can use a variety of effective interventions to increase physical activity before, during, and after school. Evidence-based strategies include improving physical education (PE); providing classroom physical activity breaks; providing programs, space, or equipment for physical activity before and after school; and building behavioral skills related to physical activity participation.

Physical education class policies are one vehicle for these interventions. Strategies that schools can use to increase physical activity during PE include employing a well-designed curriculum, changing instructional practices to better incorporate more time for moderate-to-vigorous physical activity, and providing teachers with appropriate training.



Access to Indoor or Outdoor Recreation Facilities or Outlets

These interventions provide or improve places to be active in the community. The places can be indoors, such as gyms or on-site fitness rooms at worksites, or outdoors, such as parks, trails, or other green spaces. Interventions to improve access can be more effective if they also include outreach efforts that make people aware of the place or facilities and the physical activity opportunities available there.

Community-Wide Campaigns

Community-wide campaigns are intensive interventions that involve groups across the community working together. They are designed to be visible, sustainable, and reach large numbers of people in the community and often involve many groups in the community. The interventions generally combine physical activity messaging with community activities focused on physical activity. The messages are often delivered through multiple channels, including television, radio, and written materials. Associated community activities can include efforts that focus on individuals, such as providing counseling or support groups, or that focus on the community environment, such as developing and promoting walking trails.

Community Design

These interventions design the built environment of communities in ways that make it easier for people to be active, particularly for transportation. This includes locating destinations such as schools, stores, or public transportation near homes or workplaces so that people can easily walk, bike, or wheelchair walk there. It includes making routes to these places more accommodating for walkers, bicyclists, or wheelchair users by making them safer and more seamlessly connected. For example, sidewalks and paths can be added and kept well maintained and well lit, streets can be designed to reduce speeds or separate bicyclists from motor vehicles, and street networks can have shorter blocks and more intersections with crosswalks or traffic signals.

Everyone Has a Role to Play to Increase Physical Activity

Everyone has a role to play to increase physical activity levels of Americans. Individuals can take steps to increase their own physical activity. Families and caregivers can help youth be active. Community groups, such as faith groups, businesses, civic organizations, parent-teacher associations, health groups, and public safety agencies, can provide opportunities and encouragement for physical activity. This section illustrates ways that individuals, families and caregivers, and community groups can take action to make physical activity safe, easy, and enjoyable.



What Can Individuals Do to Get Enough Physical Activity?

Individuals can take a variety of steps to adopt an active lifestyle.

Personalize the Benefits of Regular Physical Activity

Adults need to identify benefits of personal value to them. For some people, the health benefits, which are the focus of the Physical Activity Guidelines for Americans, are compelling enough to motivate them to be active. For others, different reasons are key motivators to be active. For example, physical activity:

- Provides opportunities to enjoy recreational activities, often in a social setting;
- Improves personal appearance and feelings of energy and well-being;
- Provides a chance to help a family member or friend be active; and
- Gives older adults a greater opportunity to live independently in the community.

Set Personal Goals for Physical Activity

Individuals should set goals for activity that allow them to achieve the benefits they value. In setting goals, people can consider doing a variety of activities and try both indoor and outdoor activities. Simple goals are fine. For example, a brisk walk in the neighborhood with friends for 45 minutes on 3 days a week and walking to lunch twice a week may be just the right approach for someone who wants to increase both physical activity

and social opportunities. More ambitious goals are fine, too. For example, a person may create a physical activity plan that is aimed at training for a 10-kilometer community run. Activities that are multipurpose are another way for people to incorporate physical activity into their busy lives. For example, people can use active transportation—walking, biking, or wheelchair walking—to get to school, work, or a store.

Develop Knowledge and Skills to Attain Goals

It is important to learn about the types and amounts of activity needed to attain personal goals. For example, if weight loss is a goal, it is useful to know that vigorous-intensity activity can be more time-efficient in burning calories than moderate-intensity activity. If running is a goal, it is important to learn how to reduce risk of running injuries by selecting an appropriate training program and proper shoes. If regular walking is a goal, learning about neighborhood walking trails can help a person attain this goal.

What Can Families and Caregivers Do to Help Youth Get Enough Physical Activity?

Children and adolescents are naturally physically active, and they need opportunities to be active and to learn skills. They benefit from encouragement from parents and other adults. Adults can promote age-appropriate activity in children and adolescents through these steps:

- **Start early.** Young children love to play and be active. Encouraging lots of safe and unstructured movement and play at home and in the neighborhood can help build a strong foundation in which children understand that being physically active can and should be a healthy habit throughout their lives.
- **Provide time for both structured and unstructured physical activity during school and outside of school.** School-aged children need time for active play. Through recess, physical activity breaks, physical education classes, team and individual sports and other after-school programs, and active time with family and friends, youth can learn about physical activity and spend time doing it.
- **Provide youth with positive feedback and good role models.** Parents, caregivers, and teachers should model and encourage an active lifestyle for children. Praise, rewards, and encouragement help children to be active. Being active as a family is a great way to model and encourage physical activity.
- **Help young people learn skills required to do physical activity safely.** As appropriate for their age, youth need to understand how to regulate the intensity of activity, increase physical activity gradually over time, set goals, use protective gear and proper equipment, follow rules, and avoid injuries.
- **Promote activities that set the basis for a lifetime of activity.** Children and adolescents should be exposed to a variety of activities, including active recreation, team sports, and individual sports. In this way, they can find activities they can do well and enjoy, including activities that adults commonly do, such as jogging, bicycling, hiking, swimming, exercise classes, and strength training. Young people should experience noncompetitive activities, and activities that do not require above-average athletic skills.

What Can Sectors of Society Do to Improve Physical Activity?

Many sectors of society have a role to play in improving physical activity across the United States.

Implementing population-level approaches to improve physical activity requires collaboration across sectors of society at local, state, and national levels. Although all groups can benefit from efforts to make physical activity easier, attention to underserved groups or those with barriers to physical activity is particularly needed.

The National Physical Activity Plan Alliance is a nonprofit organization that has a memorandum of understanding with HHS to help promote physical activity. The 2016 National Physical Activity Plan (<http://www.physicalactivityplan.org/index.html>) identified nine sectors of society that have a role to play in promoting physical activity. This section briefly illustrates some of the roles that each sector can play—and in some cases are already playing—in promoting physical activity.

- **Business and Industry.** Employers can encourage workers to be physically active. They can provide access to facilities and encourage their use through outreach activities. Businesses can consider access to opportunities for active transportation and public transit when selecting new locations.
- **Community Recreation, Fitness, and Parks.** This sector plays a leading role in providing access to places for active recreation, such as playgrounds, hiking and biking trails, senior centers, sports fields, and swimming pools. This sector can also provide access to exercise programs and equipment for a wide variety of people, including underserved populations and people with disabilities.
- **Education.** This sector can take a lead role in providing opportunities for age-appropriate physical activity in all educational settings. Opportunities include offering physical education, after-school sports, public access to school facilities during after-school hours, and expanded intramural sports and campus recreation opportunities.
- **Faith-Based Settings.** Faith-based organizations can be important partners in providing access to places for physical activity and promotion through outreach activities that can be tailored for diverse, faith-based groups.
- **Health Care.** Health care professionals can assess, counsel, and advise patients on physical activity and how to do it safely. Health care systems can partner with other sectors to promote access to community-based physical activity programs.
- **Mass Media.** Media outlets can provide easy-to-understand messages about the health benefits of physical activity as part of community promotion efforts. Messages can also provide information about facilities or outlets where individuals can be active.
- **Public Health.** Public health departments can monitor community progress in providing places and opportunities to be physically active and track changes in the proportion of the population meeting the Physical Activity Guidelines for Americans. They can also take the lead in setting objectives and coordinating activities among sectors. Public health departments and organizations can disseminate appropriate messages and information to the public about physical activity.
- **Sports.** This sector can provide organized opportunities for people to be active. Youth sports can expose children and adolescents to a variety of age-appropriate activities that can set the basis for a lifetime of activity. Sports organizations can also ensure that sports programs are conducted in a manner that minimizes risk of injuries.

- **Transportation, Land Use, and Community Design.** This sector plays a lead role in designing and implementing options that provide areas for safe walking, bicycling, and wheelchair walking. Public transit systems also promote walking, as people typically walk to and from transit stops. Community planners and designers can implement design principles to create communities with activity-friendly routes to everyday destinations for people of all ages and abilities. They can also help create or improve access to places for physical activity, such as parks and other green spaces.

Taking Action

Improving the physical activity levels of Americans will not be a small task. Many partners are already involved, but more engagement is needed to increase the reach, breadth, and impact of these efforts. Realizing a shared vision of a more physically active and healthy America will require the dedication, ingenuity, skill, and commitment from many partners working across many different sectors. Being physically active is one of the best investments individuals and communities can make in their health and welfare. Now is the time to take action and help more Americans attain the numerous benefits of physical activity.

Getting and Staying Active: Real-Life Examples

Jim: A 75-Year-Old Man Who Uses a Pedometer to Track His Increasing Activity

Establishing baseline: Jim does not yet meet the key guidelines, but he wants to increase his physical activity so he can continue to live independently in his own home. Jim spends 45 minutes each week taking care of his yard and garden. He also spends about 55 minutes cleaning the inside of his house, including vacuuming, cleaning bathrooms, and washing the floors. He is participating in 100 minutes of moderate-intensity physical activity each week.



Setting goals: Jim wants to add at least 60 additional minutes of moderate-intensity walking to each week. He purchases an inexpensive step counter to help set his physical activity goal and monitor his progress. Before starting to incorporate any extra walking, Jim wears his new step counter for one day and finds he gets 5,100 steps. He then wears his step counter on a 10-minute, moderate-intensity walk around his neighborhood and notes that this adds about 1,000 steps. Based on his initial activity, Jim sets a goal of adding 10 minutes of walking each day, which would add 6,000 extra steps a week with 60 minutes of moderate-intensity walking.

Reaching his goal: To reach his goal, Jim uses strategies like parking at the back of the parking lot when he goes shopping, walking to a nearby convenience store to pick up ingredients for dinner, or walking to a neighbor's house. Over time, he builds up to the equivalent of 160 minutes of moderate-intensity aerobic activity each week.



Anytown, USA: A Community Working Together to Increase Physical Activity for All

Recognizing the impact of physical activity on overall health, leaders of Anytown, USA, have dedicated themselves to helping residents become more physically active. Leaders wanted to ensure that the community made it safe and convenient for people of all ages and abilities to be physically active.

Officials began by forming a coalition of public health, transportation, local business, parks and recreation, city planning, and community residents to identify shared goals. The coalition also conducted a

baseline assessment to document physical activity levels of residents and to identify opportunities for improvement related to community supports to promote physical activity.

Based on this assessment, and available skills and resources, the coalition developed a 10-year action plan that included strategies organized by three areas of focus.

- Improve residents' access to places to be active in the community.
 - Offer free yoga classes for older adults at local senior centers.
 - Work with local schools to share gyms, playgrounds, or sports facilities with residents.
 - Convert an unused building to a community recreation center.
 - Develop a multi-use path from a residential area to the town retail center.
 - Construct wheelchair-accessible bus stops along transit routes to grocery stores.
- Improve pedestrian and cyclist safety.
 - Create safe crossings within one mile of all schools.
 - Construct protected bike lanes within the retail district and surrounding the city park.
- Increase the use of existing community resources for physical activity.
 - Increase awareness of safe routes to parks and trails by adding signage.
 - Add lights to local parks so they can be used at night.

The coalition then developed a plan to implement these strategies. The plan identified who would work on each project, what resources would be needed, and the timeline. For example:

- The Anytown School District agreed to pay for an adult safety guard at the three major street crossings within one mile of the local elementary school starting in the next school year.
- The Parks and Recreation Department will include money in their annual budget to add lights to one different community park each year for the next three years.
- The Mayor's Office will apply for a grant from a foundation next year to create the community center.

The coalition also worked with Anytown University to develop an evaluation plan prior to implementation. At the end of the 10-year period, the coalition hopes to see:

- A 10 percent decrease in the number of pedestrian and bicyclist traffic injuries;
- A 5 percent increase in the number of walkers and bicyclists in the retail center;
- A 10 percent increase in the use of local parks; and
- A 5 percent increase in the proportion of adults and children meeting the key guidelines.

Over the next 10 years, the coalition will meet twice a year to monitor progress, identify and address barriers to completing projects, and look for additional opportunities.



Glossary

This section provides definitions for many terms important to physical activity and health. It has been adapted from the glossary provided in the 2018 Physical Activity Guidelines Advisory Committee Scientific Report. It is not meant to be an exhaustive list, and definitions of additional terms can be found in the Scientific Report.

Absolute intensity. See **Intensity**.

Adaptation. The body's response to exercise or activity. Some of the body's structures and functions favorably adjust to the increase in demands placed on them whenever physical activity of a greater amount or higher intensity is performed than what is usual for the individual. These adaptations are the basis for much of the improved health and fitness associated with increases in physical activity.

Adverse event. In the context of physical activity, a negative health event. Examples of adverse events as a result of physical activity include musculoskeletal injuries (injury to bone, muscles, or joints), heat-related conditions (heat exhaustion), and cardiovascular events (heart attack or stroke).

Aerobic physical activity. Activity in which the body's large muscles move in a rhythmic manner for a sustained period of time. Aerobic activity, also called endurance or cardio activity, improves cardiorespiratory fitness. Examples include brisk walking, running, swimming, and bicycling. Aerobic activity has three components:

- **Intensity**, or how hard a person works to do the activity. The intensities most often studied are moderate (equivalent in effort to brisk walking) and vigorous (equivalent in effort to running or jogging);
- **Frequency**, or how often a person does aerobic activity; and
- **Duration**, or how long a person does an activity in any one session.

Balance. A component of physical fitness that involves maintaining the body's equilibrium while stationary or moving.

Balance training. Static and dynamic exercises that are designed to improve individuals' ability to resist forces within or outside of the body that cause falls while a person is stationary or moving. Walking backward, standing on one leg, or using a wobble board are examples of balance-training activities.

Body composition. A health-related component of physical fitness that applies to body weight and the relative amounts of muscle, fat, bone, and other vital tissues of the body. Most often, the components are limited to fat and lean body mass (or fat-free mass).

Bone-strengthening activity. Physical activity designed primarily to increase the strength of specific sites in bones that make up the skeletal system. Bone-strengthening activities produce an impact or tension force on the bones that promotes bone growth and strength. Running, jumping rope, and lifting weights are examples of bone-strengthening activities.

Cardiorespiratory fitness (endurance). The ability to perform large-muscle, whole-body exercise at moderate-to-vigorous intensities for extended periods of time.

Exercise. A form of physical activity that is planned, structured, repetitive, and performed with the goal of improving health or fitness. All exercise is physical activity, but not all physical activity is exercise.

Fitness. See **Physical fitness**.

Flexibility. A health- and performance-related component of physical fitness that is the range of motion possible at a joint. Flexibility is specific to each joint and depends on a number of specific variables, including but not limited to the tightness of specific muscles and tendons. Flexibility exercises enhance the ability of a joint to move through its full range of motion.

Functional limitation. Loss of functional ability, or the ability to carry out everyday tasks and life roles.

Health. A human condition with physical, social, and psychological dimensions, each characterized on a continuum with positive and negative poles. Positive health is associated with a capacity to enjoy life and to withstand challenges; it is not merely the absence of disease. Negative health is associated with illness, and in the extreme, with premature death.

Health-related fitness. A type of physical fitness aimed at promoting health and reducing risk of chronic disease and that includes cardiorespiratory fitness, muscular strength and endurance, body composition, flexibility, and balance.

Intensity. Intensity refers to how much work is being performed or the magnitude of the effort required to perform an activity or exercise. Intensity can be expressed either in absolute or relative terms.

- **Absolute.** The absolute intensity of an activity is determined by the rate of work being performed and does not consider the physiologic capacity of the individual. For aerobic activity, absolute intensity typically is expressed as the rate of energy expenditure (for example, milliliters per kilogram of body weight per minute of oxygen being consumed, kilocalories per minute, or METs; see MET definition below). For muscle-strengthening activities, intensity frequently is expressed as the amount of weight lifted or moved.
 - Light-intensity activity is non-sedentary waking behavior that requires less than 3.0 METs; examples include walking at a slow or leisurely pace (2 mph or less), cooking activities, or light household chores.
 - Moderate-intensity activity requires 3.0 to 5.9 METs; examples include walking briskly or with purpose (2.5 to 4 mph), mopping or vacuuming, or raking the yard.
 - Vigorous-intensity activity requires 6.0 or more METs; examples include walking very fast (4.5 to 5 mph), running, carrying heavy groceries or other loads upstairs, shoveling snow, or participating in a strenuous fitness class. Many adults do no vigorous-intensity activity.
- **Relative.** Relative intensity takes into account or adjusts for a person's cardiorespiratory fitness. For aerobic exercise, relative intensity is expressed as a percentage of a person's aerobic capacity (VO_2max) or VO_2 reserve, or as a percentage of a person's measured or estimated maximum heart rate or heart rate reserve. It also can be expressed as an index of how hard the person feels he or she is exercising (for example, on a 0 to 10 scale).

Levels of physical activity. A concept to describe how much regular aerobic physical activity a person gets. These categories are related to how many health benefits a person obtains at a given level.

- **Inactive** is not getting any moderate- or vigorous-intensity physical activity beyond basic movement from daily life activities.
- **Insufficiently active** is doing some moderate- or vigorous-intensity physical activity but less than 150 minutes of moderate-intensity physical activity a week or 75 minutes of vigorous-intensity activity or the equivalent combination. This level is less than the target range for meeting the key guidelines for adults.
- **Active** is doing the equivalent of 150 minutes to 300 minutes of moderate-intensity physical activity a week. This level meets the key guideline target range for adults.
- **Highly Active** is doing the equivalent of more than 300 minutes of moderate-intensity physical activity a week. This level exceeds the key guideline target range for adults.

Metabolic equivalent of task. Metabolic equivalent of task (MET) refers to the energy expenditure required to carry out a specific activity, and 1 MET is the rate of energy expenditure while sitting at rest. This generally corresponds to an oxygen uptake of 3.5 milliliters per kilogram of body weight per minute. Physical activities frequently are classified by their intensity using the MET value as a reference.

Moderate-intensity physical activity. On an absolute scale, physical activity that is done at 3.0 to 5.9 METs. On a scale relative to an individual's personal capacity, moderate-intensity physical activity is usually a 5 or 6 on a scale of 0 to 10.

Multicomponent physical activity. Physical activity that includes more than one type of physical activity, such as aerobic, muscle strengthening, and balance training. Multicomponent physical activity programs include a combination of balance, muscle-strengthening, and aerobic physical activity and may include gait, coordination, and physical function training.

Muscle-strengthening activity (strength training, resistance training, or muscular strength and endurance exercises). Physical activity, including exercise, that increases skeletal muscle strength, power, endurance, and mass. Muscle-strengthening activity has three components:

- **Intensity**, or how much weight or force is used relative to how much a person is able to lift;
- **Frequency**, or how often a person does muscle-strengthening activity; and
- **Sets and repetitions**, or how many times a person does the muscle-strengthening activity, like lifting a weight or doing a push-up (comparable to duration for aerobic activity).

Overload. The amount of new activity added to a person's usual level of activity. The risk of injury to bones, muscles, and joints is directly related to the size of the gap between these two levels. This gap is called the amount of overload.

Performance-related fitness. Those attributes that significantly contribute to athletic performance, including aerobic endurance or power, muscle strength and power, flexibility, speed of movement, and reaction time.

Physical activity. Any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level. In these Guidelines, physical activity generally refers to the subset of physical activity that enhances health.

Physical fitness. The ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and respond to emergencies. Physical fitness includes several components: cardiorespiratory fitness (endurance or aerobic power), musculoskeletal fitness, flexibility, balance, and speed of movement.

Physical function. The capacity of a person to perform tasks or behaviors of everyday life, such as climbing stairs, or to fulfill basic life roles, such as personal care or grocery shopping.

Progression. The process of increasing the intensity, duration, frequency, or amount of activity or exercise as the body adapts to a given activity pattern.

Relative intensity. See **Intensity**.

Resistance training. See **Muscle-strengthening activity**.

Sedentary behavior. Any waking behavior characterized by a low level of energy expenditure (less than or equal to 1.5 METs) while sitting, reclining, or lying.

Specificity. A principle of exercise physiology that indicates that physiologic changes in the human body in response to physical activity are highly dependent on the type of physical activity. For example, the physiologic effects of walking are largely specific to the lower body and the cardiovascular system.

Strength. A health and performance component of physical fitness that is the ability of a muscle or muscle group to exert force.

Strength training. See **Muscle-strengthening activity**.

Vigorous-intensity physical activity. On an absolute scale, physical activity that is done at 6.0 or more METs. On a scale relative to an individual's personal capacity, vigorous-intensity physical activity begins at a 7 or 8 on a scale of 0 to 10.



Appendix 1. Physical Activity Behaviors: Intensity, Bouts, and Steps

In developing this second edition of the Physical Activity Guidelines for Americans, the U.S. Department of Health and Human Services considered three issues of particular relevance to translating scientific evidence into physical activity guidance for the public:

- How to incorporate the two methods used to assess the intensity of aerobic physical activity—absolute intensity and relative intensity;
- How to describe the relationship between the duration of bouts of physical activity and health outcomes; and
- How to incorporate steps.

How Are Methods to Assess Intensity of Aerobic Physical Activity Incorporated Into the Guidelines?

A well-known physiologic effect of physical activity is that it expends energy. A metabolic equivalent of task, or MET, is a unit useful for describing the energy expenditure of a specific activity. A MET is the ratio of the rate of energy expended during an activity to the rate of energy expended at rest. For example, 1 MET is the rate of energy expenditure while at rest. A 4 MET activity expends 4 times the energy used by the body at rest. If a person does a 4 MET activity for 30 minutes, they have done $4 \times 30 = 120$ MET-minutes (or 2.0 MET-hours) of physical activity. A person could also achieve 120 MET-minutes by doing an 8 MET activity for 15 minutes.

Two Methods of Assessing Aerobic Intensity

The intensity of aerobic physical activity can be defined in absolute or relative terms.

Absolute Intensity

Absolute aerobic intensity is defined in terms of METs, as described above:

- Light-intensity activities are defined as waking non-sedentary behaviors of less than 3.0 METs. Walking at 2.0 miles per hour requires 2.5 METs of energy expenditure and is therefore considered a light-intensity activity.
- Moderate-intensity activities are defined as 3.0 to 5.9 METs. Walking at 3.0 miles per hour requires 3.5 METs of energy expenditure and is therefore considered a moderate-intensity activity.
- Vigorous-intensity activities are defined as 6.0 METs or more. Running a mile in 10 minutes (6.0 mph) is a 10 MET activity and is therefore classified as a vigorous-intensity activity.

Information on the absolute intensity of many activities for adults can be found in the Compendium of Physical Activities (<https://sites.google.com/site/compendiumofphysicalactivities/home>). Information for youth can be found in the Youth Compendium of Physical Activities (<https://www.nccor.org/tools-youthcompendium/>).

Relative Intensity

Intensity can also be defined relative to fitness, with the intensity expressed in terms of a percent of a person's maximal heart rate, heart rate reserve, or aerobic capacity reserve. For example, relative moderate intensity is defined as 40 percent to 59 percent of aerobic capacity reserve (where 0 percent of reserve is resting and 100 percent of reserve is maximal effort). Relative vigorous-intensity activity is 60 percent to 84 percent of reserve.

To better communicate the concept of relative intensity (or relative level of effort), a simpler definition is useful:

- Relatively moderate-intensity activity is a level of effort of 5 or 6 on a scale of 0 to 10, where 0 is the level of effort of sitting, and 10 is maximal effort.
- Relatively vigorous-intensity activity begins at a 7 or 8 on this scale.

Using Minutes of Moderate- and Vigorous-Intensity Activity to Reach a Goal

People can meet the key guidelines by doing either moderate- or vigorous-intensity physical activity or a combination of both. A simple rule of thumb is that 1 minute of vigorous-intensity activity counts the same as 2 minutes of moderate-intensity activity. The lower limit of vigorous-intensity physical activity (6.0 METs) is twice the lower limit of moderate-intensity activity (3.0 METs). Therefore, 75 minutes of vigorous-intensity activity a week is roughly equivalent to 150 minutes of moderate-intensity activity a week. The recommendation that adults do 150 to 300 minutes of moderate-intensity physical activity or 75 to 150 minutes of vigorous-intensity physical activity are both equivalent to doing about 500-1,000 MET-minutes a week. Because the MET range for vigorous-intensity physical activity has no upper limit, highly fit people can exceed 1,000 MET-minutes in 75 minutes if they do activities requiring 13.4 METs or more (running at approximately a 7.5 minute-per-mile pace or faster). This amount of activity will provide additional health benefits.

Using Relative Intensity to Meet Guidelines Expressed in Terms of Absolute Intensity

The aerobic key guideline uses METs (i.e., absolute intensity) of 3.0 to 5.9 METs for moderate-intensity activities and 6.0 METs or greater for vigorous-intensity activities. However, the key guidelines for adults indicate that relative intensity can also be used as a means of assessing the intensity of aerobic activities.

For many adults, activities will be similar, whether considering relative or absolute intensity. When reasonably fit adults do absolute moderate-intensity activities in the range of 3.0 to 5.9 METs, they generally are also doing relative moderate-intensity activity. Similarly, absolute vigorous-intensity and relative vigorous-intensity activities overlap a great deal.

For adults with greater levels of fitness, using relative intensity means they will do greater amounts of activity than the key guidelines. For example, a 3.5 MET activity can be relatively light intensity for these adults, and perhaps 6.0 MET activities are relatively moderate. Doing 150 minutes of a 6.0 MET activity will exceed the minimum amount of activity in the key guidelines. This is acceptable for two reasons. First, the key guidelines encourage people to do more activity to gain additional health benefits. Second, people with higher fitness are likely choosing to do greater amounts of activity to maintain that fitness.

The aerobic key guideline for older adults encourages the use of relative intensity because many have low levels of fitness. Therefore, activities in the range of 3.0 to 5.9 METs will be relatively vigorous or physiologically impossible. Thus, the level of effort should be guided by relative as opposed to absolute intensity. As fitness improves with physical activity, activities with greater absolute intensity will be possible.

Allowing the Use of Either Relative Intensity or Absolute Intensity in Children

The key guidelines for children and adolescents ages 6 through 17 years do not require careful tracking of the intensity of activity. The mix of moderate- and vigorous-intensity physical activity is flexible, if some vigorous-intensity activity is done on at least 3 days a week. Intensity can be measured on either the absolute or relative scale.

Relative intensity is appropriate because children and adolescents 6 through 17 years of age who follow the key guidelines should experience improvements in cardiorespiratory fitness, and the relative intensity of the activity is a major determinant of its fitness effects. Observing a youth's breathing can provide an indication of relative intensity. If a child breathes rapidly during physical activity, this indicates relatively vigorous-intensity activity.

However, it is often not feasible to observe children closely enough to determine their level of effort. In this case, absolute intensity can be used to judge whether the child is doing activity that counts toward meeting the key guidelines. Absolute intensity varies by the age and sex of the child. Information on the absolute intensity of various activities for children and adolescents ages 6 years and older is found in the Youth Compendium of Physical Activities (<https://www.nccor.org/tools-youthcompendium/>). In general, similar to adults, brisk walking (as opposed to slow walking) counts as a moderate-intensity physical activity and running counts as a vigorous-intensity activity.

The key guidelines for children ages 3 through 5 years do not require careful monitoring of intensity. All intensities and types of activities provide health benefits and count toward meeting the key guidelines.

What Is the Relationship Between Bout Duration of Physical Activity and Health Outcomes?

Historical Context

Physical activity recommendations have traditionally focused on moderate- to vigorous-intensity physical activity performed in a continuous manner, such as in exercise. In the 1990s, the focus shifted to accumulating physical activity throughout the day in bouts as short as 10 minutes. The 2008 Physical Activity Guidelines for Americans included the guidance that activity needed to last 10 minutes to count.

Evolving Evidence

Research continues to support the conclusion that physical activity accumulated in bouts of at least 10 minutes can improve a variety of health-related outcomes. In addition, new research indicates that bouts of any length of moderate-to-vigorous physical activity contribute to health benefits associated with the accumulated volume of physical activity. This new evidence justified the current guidance that moderate-to-vigorous physical activity of any duration counts toward meeting the key guidelines.

How Are Steps Considered in the Guidelines?

Steps are a basic unit of locomotion and provide an easy-to-understand metric of ambulation (anything that requires steps, such as walking, dancing, or running). Measuring step counts combined with goal setting and other behavioral approaches has been shown to increase physical activity levels. Step counts are generally measured with wearable activity monitors, including step counters (pedometers, which measure number of steps over a given time) and accelerometers (which can measure both number of steps over a given time and the level of intensity of movement over a given time). Step counters are frequently included in health-tracking smart phone applications.

Over the past 10 years, expanding research and advances in technological approaches for measuring physical activity have led to examinations of the association of step counts with health outcomes and effective approaches to promoting regular physical activity. The research evidence on the influence of incremental increases in the number of steps per day on health outcomes is limited but is expanding rapidly.

Monitoring Physical Activity With Steps

Most of the technological approaches for measuring step counts used within research have provided total step counts for all physical activity over a day. The baseline number of steps per day has varied across studies but the typical amount is about 5,000 steps a day. It is estimated that 80 percent of daily steps among less active people are light intensity. Most research studies designed to increase physical activity have focused on increasing both the amount and intensity of physical activity above basic movement from daily life activities. Studies that focus on steps often set targets of 10,000 steps a day or a percentage increase in steps a day to encourage people to increase their amount of moderate-to-vigorous physical activity.

Increases in physical activity of any duration and any intensity are captured with step counters. Therefore, all types of activities that increase the number of steps taken during the day, such as taking stairs, doing errands by walking, or breaking up sedentary behavior by standing and moving during the work day, are included in estimating total physical activity over a day. The key to using a step counter to monitor progress in meeting the key guidelines is to first set a time goal related to moderate- or vigorous-intensity physical activity (minutes per day of brisk walking or other types of ambulation) and then to calculate how many steps are needed each day to reach that goal. [Figure A1-1](#) explains how to use a pedometer to track walking to achieve the key guidelines goal.

Figure A1-1. Using a Pedometer or Fitness Tracker to Track Walking

Walking is a popular and easy way to meet the key guidelines, and pedometers or step counters are a useful way to track progress. Popular advice, such as walking 10,000 steps a day, is not a guideline per se, but a way people may choose to meet the key guidelines. The main idea in using a pedometer to meet the key guidelines is to first set a time goal (minutes of walking a day) and then calculate how many steps are needed each day to reach that goal.

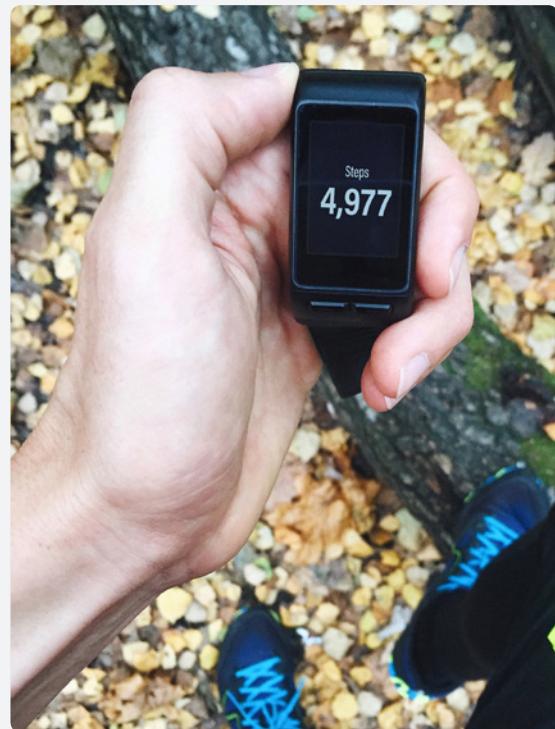
Moderate- or vigorous-intensity physical activity, such as a brisk walk, counts toward meeting the key guidelines. People generally need to plan episodes of walking if they want to use step goals to progress toward meeting key guidelines.

As a basis for setting step goals, it is preferable that people know how many steps they take per minute of a brisk walk. A person with a lower fitness level, who takes fewer steps per minute than a fit adult, will need fewer steps to achieve the same time of walking.

One way to set a step goal is the following:

1. To determine one's usual daily steps, a person uses a pedometer or fitness tracker to count the number of steps taken on several ordinary days with no episodes of walking for exercise. Suppose the average is about 5,000 steps a day. (Most of those steps are light-intensity activity.)
2. With the pedometer or fitness tracker, the person measures the number of steps taken during a 10-minute walk. Suppose this is 1,000 steps. For a goal of 20 minutes of walking, the goal would total 2,000 steps (1,000 times 2).
3. To calculate a daily step goal, add the usual daily steps (5,000) to the steps required for a 20-minute walk (2,000), to get the total steps per day ($5,000 + 2,000 = 7,000$).

Then, each week, the person gradually increases the number of total steps a day until the step goal is reached. Rate of progression should be individualized. Some people who start out at 5,000 steps a day can add 500 steps per day each week. Others, who are less fit and starting out at a lower number of steps, should add a smaller number of steps each week.



Appendix 2. Federal Physical Activity Resources

Centers for Disease Control and Prevention (CDC):

BAM! Body and Mind

<https://www.cdc.gov/bam/>

BAM! Body and Mind was specifically designed for children ages 9 to 12 years to promote age-appropriate nutrition, physical activity, stress management, and other healthy lifestyle habits.

Division of Cancer Prevention and Control (DCPC), Policies and Practices for Cancer Prevention and Survivorship: Physical Activity

https://www.cdc.gov/cancer/dcpc/prevention/policies_practices/physical_activity/index.htm

This DCPC resource highlights the benefits of physical activity for children, adults, and cancer survivors. It also outlines strategies for increasing physical activity in the community and provides guidance for how comprehensive cancer control programs can help promote physical activity for cancer prevention.

Division of Nutrition, Physical Activity, and Obesity (DNPAO)

<https://www.cdc.gov/nccdphp/dnpo/state-local-programs/physicalactivity.html>

The DNPAO physical activity website provides resources for state and local program planners, health professionals, and other community members to increase physical activity access through community design and programs in various settings.

<https://www.cdc.gov/nccdphp/dnpo/data-trends-maps/index.html>

Data, Trends, and Maps is an interactive database that provides information about the health status and behaviors of Americans, state-by-state, through clickable maps, charts, and tables. Data can be filtered by category (such as physical activity) and topic (such as behavior or environmental and policy supports).

<https://www.cdc.gov/physicalactivity/community-strategies/index.htm>

This CDC website offers resources that can help state and local health departments, public health professionals, and community organizations build activity-friendly communities.

Division of Population Health (DPH), Physical Activity for Arthritis

<https://www.cdc.gov/arthritis/basics/physical-activity-overview.html>

This DPH website provides resources and guidance on physical activity for individuals with arthritis.

Healthy Schools

<https://www.cdc.gov/healthyschools/physicalactivity/index.htm>

CDC Healthy Schools works to prevent chronic disease and promote the health and well-being of children and adolescents in schools. The physical activity section of the website provides resources on how to effectively implement physical education and physical activity in the school setting.

Million Hearts

<https://millionhearts.hhs.gov/tools-protocols/tools/physical-activity.html>

The Million Hearts Initiative was established to prevent a million cardiovascular events over a 5-year period by aligning national cardiovascular disease prevention efforts around a select set of evidence-based public health and clinical goals and strategies. This website provides information on community-based programs and resources that promote physical activity as a strategy for preventing cardiovascular disease for people with known cardiovascular disease risk factors.

National Center on Birth Defects and Developmental Disabilities, Increasing Physical Activity Among Adults With Disabilities

<https://www.cdc.gov/ncbddd/disabilityandhealth/pa.html>

The National Center on Birth Defects and Developmental Disabilities website provides data, resources, and guidance on increasing physical activity among adults with disabilities.

National Institute of Occupational Safety and Health Total Worker Health®

<https://www.cdc.gov/niosh/TWH/>

Total Worker Health® is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being. This website includes information on how to reduce the health risks from sedentary work.

Older Adult Falls Program

<https://www.cdc.gov/homeandrecreationsafety/falls/programs.html>

This collection of effective fall interventions is designed to help public health practitioners, senior service providers, clinicians, and others who want to address older adult falls in their community. The website also provides a program guide designed for community-based organizations that are interested in implementing their own evidence-based fall prevention programs.

Workplace Health Promotion

<https://www.cdc.gov/workplacehealthpromotion/index.html>

The CDC Workplace Health Program provides leadership to improve the health, safety, and well-being of employees through science-based workplace health promotion programs. Through the Workplace Health Program, CDC works with national employer groups and coalitions, state health agencies, academic institutions, employers, and other key groups to develop, set up, and promote effective strategies for improving the health in the work environment. This website provides health promotion program planners with information on a variety of health promotion programs, as well as how to design, implement, and evaluate effective workplace health programs.

Department of Transportation (DOT)

Federal Highway Administration's Bicycle and Pedestrian Program

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/index.cfm

The Bicycle and Pedestrian program provides resources to help promote bicycle and pedestrian transportation use, safety, and accessibility. Resources include a listing of State Pedestrian and Bicycle Coordinators, information on funding sources, and bicycle- and pedestrian-related legislation.

Federal Highway Administration's Small Town and Rural Multimodal Networks

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/page00.cfm

The DOT's Small Town and Rural Multimodal Networks guide is a design resource and idea book to help small towns and rural communities support safe, accessible, comfortable, and active travel for people of all ages and abilities.

Environmental Protection Agency (EPA)

Healthy Places for Healthy People

<https://www.epa.gov/smartergrowth/healthy-places-healthy-people>

Healthy Places for Healthy People engages with community leaders and health care partners to create walkable, healthy, and economically vibrant communities that can improve health, protect the environment, and support economic growth. One key focus of the program is creating physical activity programs and supporting sidewalks, bike paths, trails, and parks in the community to promote active living.

National Walkability Index

<https://www.epa.gov/smartergrowth/smart-location-mapping#walkability>

The EPA's National Walkability Index is a nationwide geographic data resource that ranks block groups according to their relative walkability. The national dataset includes walkability scores for all block groups as well as the underlying attributes that are used to rank the block groups.

National Institutes of Health (NIH)

National Heart, Lung, and Blood Institute (NHLBI), We Can!

<https://www.nhlbi.nih.gov/health/educational/wecan/>

We Can! (Ways to Enhance Children's Activity and Nutrition) provides resources for families and communities focused on helping youth improve food choices, increase physical activity, and reduce screen time. This website provides useful information and tips created specifically for individuals, parents, caregivers, and families. We Can! was jointly created by the NHLBI, the National Institute of Diabetes and Digestive and Kidney Diseases, the Eunice Kennedy Shriver National Institute for Child Health and Human Development, and the National Cancer Institute.

National Institutes on Aging (NIA), Go4Life

<https://go4life.nia.nih.gov/>

Go4Life is an exercise and physical activity campaign designed to help older Americans fit exercise and physical activity into daily life. Go4Life offers exercises, motivational tips, and free resources to help older Americans get ready, start exercising, and keep going. The Go4Life campaign includes an evidence-based exercise guide in both English and Spanish, an exercise video, an interactive website, and a national outreach campaign.

National Park Service (NPS)

Healthy Parks Healthy People Program

https://www.nps.gov/public_health/hp/hphp/about.htm

The National Park Service's Healthy Parks Healthy People program connects people to parks through health promotion, fosters society's understanding and appreciation for the life-sustaining role of parks, and creates the next generation of park stewards. The program addresses health promotion in parks and communities, at local, state, national and international levels through five main programmatic areas, including healthy recreation.

Office of the Assistant Secretary for Health (OASH)

Office of Adolescent Health (OAH), Think, Act, and Grow (TAG)

<https://www.hhs.gov/ash/oah/tag/index.html>

TAG is a national call to action to improve adolescent health in the United States. This website provides information about how professionals, parents, and adolescents can take action as well as resources and success stories to engage and empower teens and young people to be physically active and improve their overall health.

Office of Disease Prevention and Health Promotion (ODPHP)

<https://odphp.health.gov/paguidelines/>

The ODPHP website includes information on the science base used to develop the Physical Activity Guidelines for Americans, as well as the Move Your Way campaign resources for health professionals and consumers. This website also offers an online tool to help consumers determine what physical activities they can fit into their daily life and make a plan to help them meet the Guidelines.

<https://healthypeople.gov>

Healthy People provides science-based, 10-year national objectives for improving the health of all Americans. It has a physical activity topic area, which includes objectives used to track the progress of populations meeting the Physical Activity Guidelines for Americans as well as other physical activity areas.

Office of the Surgeon General, Step it Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities

<https://www.surgeongeneral.gov/library/calls/walking-and-walkable-communities/index.html>

This Call to Action is intended to increase walking across the United States by calling for improved access to safe and convenient places to walk and wheelchair roll, as well as for a culture that supports these activities for people of all ages and abilities. This publication presents five goals and supporting implementation strategies that are grounded in scientific and practice-based evidence. These goals call for action by multiple sectors of society, as well as families and individuals.

President's Council on Sports, Fitness & Nutrition (PCSFN)

<https://www.hhs.gov/fitness/index.html>

PCSFN engages, educates, and empowers all Americans to adopt a healthy lifestyle. The "Be Active" page of the website provides useful information on how all individuals can engage in appropriate types and amounts physical activities.

The Guide to Community Preventive Services

The Community Guide

<https://www.thecommunityguide.org/topic/physical-activity>

The Community Guide is a collection of evidence-based findings of the Community Preventive Services Task Force. It is a resource to help select interventions to improve health and prevent disease in states, communities, community organizations, health care organizations, businesses, and schools.

U.S. Preventive Services Task Force (USPSTF)

<https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/healthful-diet-and-physical-activity-for-cardiovascular-disease-prevention-in-adults-without-known-risk-factors-behavioral-counseling>

<https://www.uspreventiveservicestaskforce.org/Page/Document/evidence-summary2/healthy-diet-and-physical-activity-counseling-adults-with-high-risk-of-cvd>

<https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/healthy-diet-and-physical-activity-counseling-adults-with-high-risk-of-cvd>

The USPSTF is an independent, volunteer panel of national experts in disease prevention and evidence-based medicine that makes evidence-based recommendations about clinical preventive services. The USPSTF recognizes that regular physical activity helps prevent chronic disease and decrease morbidity, and its counseling recommendations about promoting physical activity are focused on behavioral counseling services delivered in primary care practices.



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