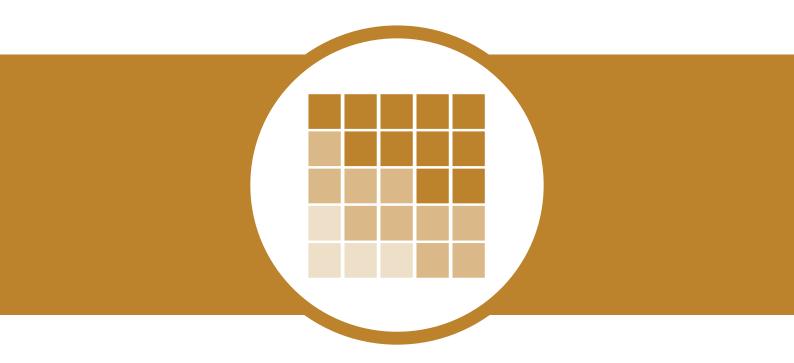


Technical package for cardiovascular disease management in primary health care



Risk-based CVD management





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Risk-based CVD management



HEARTS technical package for cardiovascular disease management in primary health care: risk based CVD management

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Risk-based CVD management module

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Abbreviations

BMI body mass index

CAD coronary artery disease CVD cardiovascular disease

DM diabetes mellitus

ESC European Society of Cardiology

GBD Global Burden of Disease

HTN hypertension

HDL-C high-density lipoprotein cholesterol

IHME Institute for Health Metrics and Evaluation

IHRMS INTERHEART Modifiable Risk Score
LMIC low- and middle-income countries

MI myocardial infarction

NCR-RisC NCD Risk Factor Collaboration

PEN Package of Essential Noncommunicable Disease Interventions

SBP systolic blood pressure

TC total cholesterol

WHO/ISH World Health Organization / International Society of Hypertension

- HEARTS Technical Package

More people die each year from cardiovascular diseases (CVDs) than from any other cause. Over three quarters of heart diseases and stroke-related deaths occur in low- and middle-income countries (1). The HEARTS technical package provides a strategic approach to improving cardiovascular health. It comprises six modules and an implementation guide. This package supports Ministries of Health to strengthen CVD management in primary care and aligns with World Health Organization's Package of Essential Non-communicable Disease Interventions (WHO PEN).

The WHO HEARTS modules are intended for use by policy-makers and programme managers at different levels within Ministries of Health who can influence CVD primary care delivery. Different sections of each module are aimed at different levels of the health system and different cadres of providers. All modules will require adaptation at country level.

The people who will find the modules most useful are:

- National level Ministry of Health noncommunicable disease (NCD) policymakers responsible for:
 - o Developing strategies, policies and plans related to service delivery for CVD
 - Setting national targets on CVD, and monitoring and reporting progress
- Subnational level Health/NCD programme managers responsible for:
 - o Planning, training, implementing and monitoring service delivery
- **Primary care level** Facility managers and primary health care providers and trainers responsible for:
 - Assigning tasks, organizing training and ensuring the facility is running smoothly
 - Collecting facility-level data on indicators of progress towards CVD targets.

Target users may vary, based on context, existing health systems and national priorities.

МО	DULES OF THE HEARTS TECHN	NICAL PAC	KAGE				
		Who a	Who are the target users?				
Module	What does it include?	National	Subnational	Primary care			
ealthy-lifestyle counselling	Information on the four behavioural risk factors for CVD is provided. Brief interventions are described as an approach to providing counselling on risk factors and encouraging people to have healthy lifestyles.		√	✓			
vidence-based protocols	A collection of protocols to standardize a clinical approach to the management of hypertension and diabetes.	√	✓	✓			
ccess to essential medicines and technology	Information on CVD medicine and technology procurement, quantification, distribution, management and handling of supplies at facility level.	√	✓	✓			
isk-based CVD management	Information on a total risk approach to the assessment and management of CVD, including country-specific risk charts.	✓	✓	✓			
Team-based care	Guidance and examples on team-based care and task shifting related to the care of CVD. Some training materials are also provided.		✓	✓			
ystems for monitoring	Information on how to monitor and report on the prevention and management of CVD. Contains standardized indicators and datacollection tools.	✓	✓	✓			

$\sqrt[]{-}$ Introduction

Development of cardiovascular disease (CVD) is influenced by risk factors such as: tobacco use, an unhealthy diet, physical inactivity, obesity (which can result from a combination of unhealthy diet, physical inactivity, and other factors), elevated blood pressure (hypertension), abnormal blood lipids (dyslipidaemia) and elevated blood glucose (diabetes mellitus). Continuing exposure to these risk factors leads to further progression of atherosclerosis, resulting in clinical manifestations of these diseases, including angina pectoris, myocardial infarction, heart failure and stroke. Total CVD risk depends on the individual's overall risk-factor profile.

In 2007, the WHO published Guidelines for the assessment and management of cardiovascular risk (2) that provide guidance for reducing disability and premature deaths from CVD in people at high risk who have not yet experienced a cardiovascular event. These 2007 guidelines were used as a framework for the development of national guidance on CVD prevention, and provide the WHO and International Society of Hypertension (WHO/ISH) cardiovascular (CVD) risk prediction charts for regional CVD risk prediction. WHO updated the CVD risk charts in 2019 (3). This Risk-based CVD management module (HEARTS-R) will present the updated CVD risk charts for the assessment and management of CVD risk. Relevant information from the 2007 guidelines is reproduced.

Timely, affordable and sustained heathy-lifestyle interventions and, when needed, drug treatment will reduce the risk of heart attack and stroke in people with a high total risk of CVD, and hence will reduce premature morbidity, mortality and disability. Those who have their elevated blood pressure or cholesterol treated can reduce their risk by more than one-quarter to one-third (4) and have their risk reduced by half if both are treated (5). For many years we have had inexpensive medications for hypertension (HTN). More recently, generic statins have been added to the WHO Essential Medicines list and have become available in many more countries. Despite the increased availability of drugs, less than 10% of the global population has its blood pressure controlled (6).

Poor control of risk factors is in part a result of a lack of awareness among individuals of their risk status. The identification of risk level by health care providers is therefore a useful means of detecting those with high CVD risk and identifying who could benefit from treatment of high blood pressure, abnormal blood lipids and elevated blood glucose (7). Recommendations for assessment and management of CVD risk factors have evolved over time in CVD guidelines.

This evolution in CVD recommendations and guidelines is a response to:

- an improved ability to quantify and identify those at highest risk
- an increase in the population affected by these risk factors
- changes in generic therapies available
- a recognition that despite these changes we are failing globally to significantly prevent CVD mortality, particularly in low- and middle-income countries (LMICs).

One change in guidelines has been a greater use of overall CVD risk levels to determine intensity of treatments. The additional focus on overall risk has occurred for three main reasons. First, there was recognition that an individual who has multiple risk factors, even if each factor is only moderately elevated, may, when all risk factors are taken into account, be at an overall higher risk than someone with an elevated level for a single risk factor. For example, a middle-aged female with moderate levels of several risk factors could have a 5- to 10-fold increased risk of having CVD in the next 10 years, when compared to a young male with an isolated elevated risk factor.

Second, targeting of those individuals at highest risk was recognized to lead to greater efficiency in benefit in terms of number of events avoided, because the relative risk reduction would be applied to a higher baseline risk (8). Therefore, targeting patients with a high risk is the highest priority in a risk stratification approach (9).

Third, improved computing and statistical methods have allowed researchers to pool large global data sets to create more accurate risk prediction tools for various populations.

As the cost of medicines is a significant component of total preventive health care costs, it is particularly important to base drug treatment decisions principally on an individual's risk level rather than on criteria such as ability to pay, or on blanket preventive strategies. In addition, guidelines based on total CVD risk, which use risk scoring methods, have been shown to be both less expensive and more effective than guidelines based on single risk-factor levels to treat the same number of patients (10).

Drug therapy (including glycaemic control for diabetes mellitus, control of HTN and cholesterol, using a total risk approach) and counselling to individuals who have had a heart attack or stroke and to persons with high risk (≥20%) of a fatal and non-fatal cardiovascular event in the next 10 years is one of the "best buys" for tackling NCDs (11). For those with a pre-existing condition such as prior CVD, risk identification is simple. For others, the use of clinical algorithms or "risk charts" can be used to further stratify patients.

A risk stratification approach is particularly suitable to settings with limited resources, where saving the greatest number of lives at lowest cost becomes imperative. However, in most guidelines, the use of risk tools has not replaced the knowledge needed to treat individual risk factors but has rather been used to augment the decision of whom to treat, so that those at the highest level of risk are easily identified for treatment. This module helps to identify those who would benefit from lifestyle changes and basic medical treatment to lower blood pressure, cholesterol, and manage diabetes mellitus in an integrated manner. Guidance on HTN and diabetes management can be found in other HEARTS Modules, as well.

Application of an approach that considers the total CVD risk will be better informed through country-level implementation research. Many areas, including the level of the facility at which CVD risk can be assessed, thresholds for treatment, adaptation of protocols, follow-up intervals and other logistics are best defined in the local context.

1 Updated WHO cardiovascular risk charts

2007 WHO/ISH cardiovascular risk prediction charts

Many risk-prediction models have been developed over the years. However, most equations are derived, recalibrated and validated in limited settings. The majority are derived from or recalibrated on populations of European descent living in high-income countries. As a result, these models might not be directly translatable or valid in low-resource and non-European settings. The WHO/ISH cardiovascular risk prediction charts were developed in 2007 to estimate 10-year risk of a fatal or non-fatal major cardiovascular event (myocardial infarction or stroke), according to age, sex, smoking status, blood pressure, total blood cholesterol and presence or absence of diabetes mellitus for 14 WHO epidemiological sub-regions (12). There are two sets of charts. One set could be used in settings where blood cholesterol can be measured, and the other in settings where blood cholesterol cannot be measured. Both sets require the status of diabetes in the individual to be known (13).

2019 Updated WHO cardiovascular disease risk charts

The WHO updated the 2007 WHO/ISH cardiovascular risk prediction charts through the formation of a cross-sectorial collaboration of academics, policy-makers and end users of CVD risk scores. The model revision took place in three steps.

First, risk prediction algorithms were developed using individual-participant data from 85 prospective cohort studies with long-term follow-up in the Emerging Risk Factors Collaboration. Endpoint definitions of fatal and non-fatal CVD outcomes used for the model are described in Annex 4.

Second, to adjust the algorithms to the contemporary circumstances of different global regions, they were recalibrated using age-specific and gender-specific incidence rates and risk-factor values obtained from the Global Burden of Disease (GBD) Study (14) and the NCD Risk Factor Collaboration (NCD-RisC) (15).

Third, performance of the algorithms was assessed by external validation, using individual-participant data from a further 19 prospective cohort studies (i.e. studies distinct from those used in the algorithm derivation) (3).

The updated WHO CVD risk prediction charts were developed and presented for 21 global regions, defined by GBD to maximize between-region variability and minimize heterogeneity in mortality and major drivers of health outcomes within each region (3) (Annex 1). The charts are intended to allow the introduction of a total risk-stratification approach for management of CVD. They are presented as laboratory-based and non-laboratory-based charts. Laboratory-based algorithms include information on age, sex, smoking status, systolic blood pressure, history or evidence of diabetes mellitus, and the total cholesterol value. In the non-laboratory-based algorithms, body mass index (BMI) is included; information on diabetes mellitus and cholesterol is not necessary for these charts.

Countries can find the charts relevant to them according to the appropriate GBD regional groups (Annex 2 and Annex 3).

WHO CVD risk (laboratory-based) charts

These are CVD risk charts that include measurements of total cholesterol and information on diabetes mellitus (Annex 2). The laboratory-based CVD risk charts should be used for treatment decisions. This is the indicated risk chart in a setting where laboratory facilities, and human and financial resources are accessible. These charts will facilitate health providers to initiate an intervention and treatment regimen, and to implement an appropriate follow-up plan based on the patient's total risk status. As an example, Figure 1 presents the WHO CVD risk charts for North Africa and Middle East Region for use when information on total cholesterol and diabetes is available.

WHO CVD risk (non-laboratory-based) charts

Many low-resource settings have limited testing facilities or limited financial and physical capacity for biochemical measurements (e.g. blood sugar determination and cholesterol assays). WHO CVD risk (non-laboratory-based) charts can be used to predict total CVD risk without information on total cholesterol and diabetes (Annex 3). Only age, sex, smoking status, systolic blood pressure and body mass index (BMI) will be needed to predict cardiovascular risk. These non-laboratorybased WHO CVD risk charts are aimed at stratification in low-resource communities and office settings and can be used for decisions regarding referral. In population samples, there was moderate agreement between WHO CVD risk predictions using laboratory and non-laboratory algorithms. Of those at >20% risk using the laboratory-based algorithm, >97% of men and women were also identified at >10% by using the non-laboratory-based algorithm. However, when using a 20% threshold with non-laboratory-based algorithm, only approximately 65% of men and 35% of women were identified as at the same level of risk when compared to the laboratory-based algorithm. This discrepancy is largely due to the fact that the non-laboratory-based algorithm does not allow for the extra CVD risk associated with diabetes mellitus and substantially underestimates CVD risk in individuals with diabetes mellitus. For example, among individuals with diabetes classified as being at greater than 20% risk with the laboratory-based models, about 45% of men and 25% of women were classified as being at greater than 20% risk with the nonlaboratory-based models (whereas in individuals without diabetes, about 85% of men and 95% of women showed such agreement) (3). As an example, Figure 2 is the WHO CVD risk (non-laboratory-based) charts for North Africa and Middle East.

HEARTS: Risk-based CVD management

Figure 1: Example of WHO CVD risk (laboratory-based) chart

North Africa and Middle East

Afghanistan, Algeria, Bahrain, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, occupied Palestinian territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates, Yemen

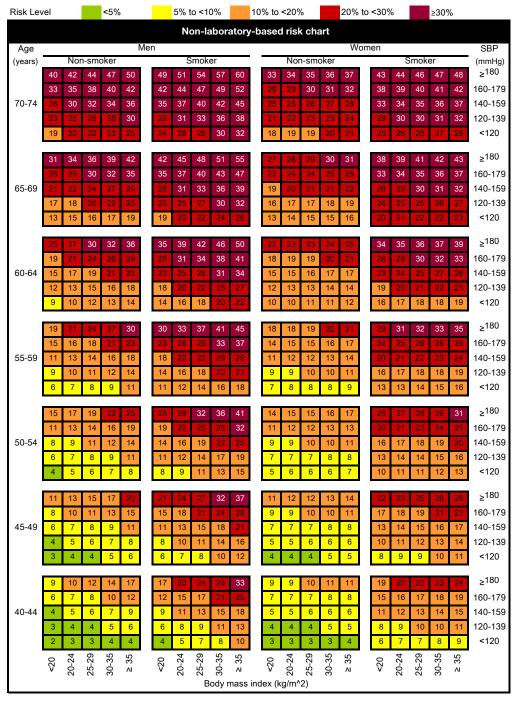
Risk Leve	el <5%	5% to <10%	0% to <20%	20 <30% ≥30%		Risk Level	<5%	5% to <10%	0% to <20%	o <30% ≥30%	
		People with						People with			
Age (years)	Non-smoker	en Smoker	Non-smoker	men Smoker	SBP (mmHg)	Age (years)	Me Non-smoker	Smoker	Non-smoker	men Smoker	SBP (mmHg)
	37 40 43 46 50 31 33 36 40 43 26 28 31 34 37 21 23 26 28 31 18 19 21 24 26	45 48 52 56 60 38 41 45 48 52 32 35 38 42 45 27 29 32 35 39 22 24 27 30 33	29 31 32 33 34 26 27 28 29 30 22 23 24 25 26 19 20 21 22 23 16 17 18 19 20	39 40 41 43 45 34 35 36 38 39 30 31 32 33 35 26 27 28 29 30 22 23 24 25 26	≥180 160-179 140-159 120-139 <120	70-74 34	51 55 59 63 0 44 48 52 56	57 61 65 69 73 49 53 57 61 66 42 46 50 54 58 36 39 43 47 51 30 33 36 40 44	41 42 44 45 47 36 37 39 40 42 31 33 34 35 37 27 28 30 31 32 24 25 26 27 28	52 54 55 57 59 46 48 50 51 53 41 42 44 46 47 36 37 39 40 42 31 33 34 35 37	≥180 160-179 140-159 120-139
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40-44	8 9 11 13 15 6 7 8 9 11 4 5 6 7 8 3 4 4 5 6 2 3 3 4 5 4 7 6 6 7 8	15 18 20 24 28 11 13 15 18 22 8 9 11 14 16 6 7 8 10 12 4 5 6 8 9 7 0 0 0 0	7 8 8 9 10 5 6 6 7 8 4 4 5 6 6 3 3 4 4 5 2 3 3 3 4 4 5 7 6 6 6 7 8	15 16 18 20 22 11 13 14 16 17 9 10 11 12 14 7 8 9 10 11 5 6 7 8 9 7 7 9 9 9 10	≥180 160-179 140-159 120-139 <120	40-44 9 6 5	10 12 14 17 7 9 10 13 5 6 8 10	30 34 39 44 51 16 19 22 27 32 12 14 17 20 25 9 10 13 15 19 1 2 3 0 0 0 0	15 16 18 19 21 11 12 14 15 17 9 10 11 12 13 7 7 8 9 10 5 6 6 7 8 7 7 9 0 0 0	29 32 35 39 42 23 26 28 31 35 18 20 23 25 28 11 1 13 14 16 19 7 7 0 0 0 0 0	
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		Total Gibles	(orth Africa and			i otal cholesi	()		

North Africa and Middle East

Figure 2: Example of WHO CVD risk (non-laboratory-based) chart

North Africa and Middle East

Afghanistan, Algeria, Bahrain, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, occupied Palestinian territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates, Yemen



North Africa and Middle East

Comparison between 2007 WHO/ISH risk prediction charts and 2019 WHO CVD risk charts

The updated CVD risk charts are presented in an analogous manner to the previous WHO/ISH risk charts to facilitate their continuity of use with some adaptation. However, there are several advantages of the updated WHO CVD risk charts over the previous WHO/ISH risk prediction charts and other global, regional and national CVD risk prediction models available (Table 1).

First, compared with the 2007 charts, the new risk charts use data with more scientific rigour, from diverse populations, which is much more globally relevant.

Second, the charts use more contemporary estimates of CVD incidence and risk factors. This, together with simple and generalizable methods, allows for recalibration of the models for many different populations. This means that the CVD risk estimate for an individual in a given country is likely to be much more accurate than in the older charts.

Third, the recalibration approach used allows for rapid revision of CVD models, enabling a flexible updating of models as new relevant epidemiological data for geographical areas arise.

Fourth, the new charts produce estimates for 21 Institute for Health Metrics and Evaluation (IHME) Global Burden of Disease (GBD) regions compared to the 14 WHO regions in the old charts.

The risk stratification for the updated WHO charts differs from those used in the 2007 WHO/ISH CVD risk prediction charts to recognize changes in reported GBD CVD incidence. Stratification is now as follows: <5% (green), 5% to <10% (yellow), 10% to <20% (orange), 20% to <30% (red), and ≥30% (dark red). The category >40% is not retained in the updated charts as fewer people in the new risk charts were in that group. This risk stratification is aligned to the WHO recommendations for management of CVD risk.

Annexes 5a, 5b and 6 present the comparison of different risk charts and an approach to identifying suitable risk charts.

Table 1: Comparison between 2007 WHO/ISH risk prediction charts with 2019 WHO CVD risk charts

Parameter	2007 WHO/ISH risk prediction charts For 14 WHO epidemiological				2019 WHO	CVD risk charts		
Presentation	For 14 WHO epidemiological subregions				21 IHME GBD regions with more homogenous grouping of countries			
Types of charts	where bl measure The othe	can be lood cho ed. er set is ood cho	used in settings blesterol can be for settings in blesterol cannot be	Lak	Two sets: Laboratory-based charts Non-laboratory-based charts			
Variables	• ag • se • sr • sy • pr di • to 2. Witho value: • ag • se • sr • sy • pr di • na	sex smoking systolic blood pressure presence or absence of diabetes total cholesterol Without individual cholesterol value:			1. Laboratory-based: age sex smoking systolic blood pressure presence or absence of diabetes total cholesterol 2. Non-laboratory-based: age sex smoking systolic blood pressure BMI			
Risk levels and colour code	200 Gre		<10%		2019 Green	<5%		
	Yell		10% to <20%		Yellow	5% to <10%		
	Ora	ınge	20% to <30%		Orange	10% to <20%		
	Re	d	30% to <40%		Red	20% to <30%		
	Dee	ep red	>40%		Deep red	≥30%		
Difference in interpretation of risk levels	Green w	as <109	%		een is <5% a anges in othe	nd corresponding er risk levels.		

2 Assessment and management of total CVD risk

This section is based on Protocol 1 in the WHO Package of Essential NCD interventions (16). This protocol remains current except for the change in the risk level in the updated WHO cardiovascular (CVD) risk charts. Assessment of total CVD risk can be used for routine management of hypertension (HTN) and diabetes mellitus (DM), and for targeting the following categories of people:

- age >40 years
- smokers
- obesity
- known to have HTN
- known to have DM
- history of premature CVD in first-degree relative
- history of DM or kidney disease in first-degree relative.

Instructions for using the WHO CVD risk (laboratory- based) charts

Table 2 and Figure 3 present a step-by-step guide to applying the WHO CVD (laboratory-based) risk charts. These charts are to be used only for individuals whose status regarding diabetes and total cholesterol is available. Tests for diabetes and cholesterol can be carried out at the time of assessment. If the information on diabetes and total cholesterol is not available, then refer to the instructions on use of non-laboratory-based risk charts.

Table 2: Using the WHO CVD risk (laboratory-based) charts

Action

Select the regional chart covering your country:

- · REGION NAME is printed at the top of the charts.
- · Countries included in each region can be found in Annex 1.

Have the following information ready:

- age
- sex
- · smoker* or non-smoker
- · presence or absence of diabetes†
- · systolic blood pressure
- · total blood cholesterol‡

Using the charts

STEP 1: Select the section of the chart as relevant for people with or without diabetes.

STEP 2: Select the table for men or women, as appropriate.

STEP 3: Select smoker or non-smoker column.

STEP 4: Select age-group.

STEP 5: Within the selected box find the cell where the person's systolic blood pressure and total blood cholesterol intersect.

STEP 6: The colour of the cell indicates the 10-year risk of a fatal or non-fatal CVD event. The value within the cell is the risk percentage. Colour coding is based on the grouping.

Green	<5%
Yellow	5% to <10%
Orange	10% to <20%
Red	20% to <30%
Deep red	≥30%

STEP 7: Record CVD risk percentage in person's chart.

STEP 8: Counsel, treat and refer according to risk level

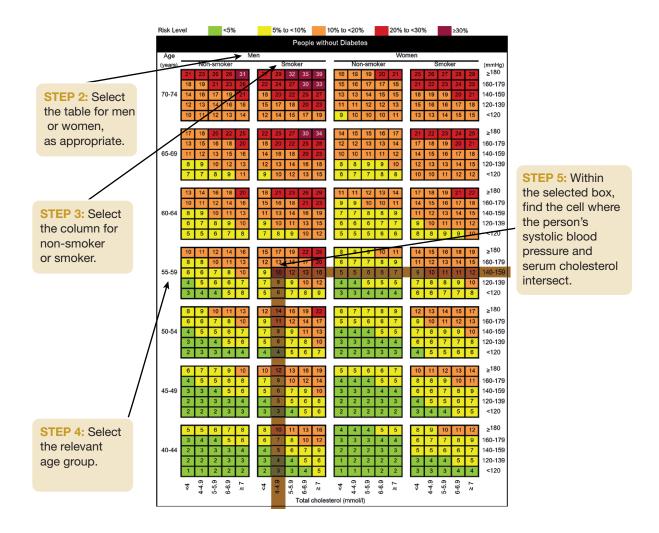
^{*} Current smoker

[†] Fasting plasma glucose ≥7.0 mmol/L (126 mg/dL), or 2-h plasma glucose ≥11.1 mmol/L (200 mg/dL), or HbA1c ≥6.5% or known diabetes

[‡] Cholesterol values are to be entered in the chart as mmol/L (To convert mg/dL to mmol/L, multiply by 0.02586. e.g 200 mg/dL x 0.02586 = 5.172 mmol/L.)

Figure 3: Illustration of how to use the WHO CVD risk (laboratory-based) chart

STEP 1: Select the section of the chart for people with or without diabetes.



Integrated management of total CVD risk

Management of total CVD risk in people with different risk thresholds is presented in Table 3. This is based on the WHO PEN Protocol (16) except for the change in risk levels, which are adjusted to the updated CVD risk charts. The purpose of management is to motivate and assist individuals with high risk levels to lower their total CVD risk. All individuals with blood pressure at or above 160/100 mmHg, or blood pressure raised to a lesser degree but with target organ damage should have drug treatment and specific lifestyle advice to lower their blood pressure and risk of CVD.

All patients should receive counselling on diet (which includes lipid-lowering diet and low sodium), physical activity, tobacco cessation (smoking and smokeless) and avoiding harmful use of alcohol (1). For further details on counselling please refer to the HEARTS Module "H" on Healthy-lifestyle counselling (17).

Table 3: Management guidance for total CVD risk

	Management of total CVD risk (adapted from WHO PEN Protocol 1)
Risk <10%	Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol. If risk <5%, follow up in 12 months. If risk 5% to <10%, follow up every 3 months until targets are met, then 6–9 months thereafter.
Risk 10% to <20%	Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol. Persistent BP ≥140/90 mmHg consider drugs (see below). Follow up every 3–6 months.
Risk >20%	Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol. Persistent BP ≥130/80, consider drugs (see below). Give a statin. Follow up every 3 months. If there is no reduction in cardiovascular risk after six months of follow-up refer to next level.
	 Management of hypertension and diabetes: For management of hypertension refer to HEARTS technical package E module (18): https://www.who.int/cardiovascular_diseases/hearts/en/ For management of diabetes mellitus type 2, refer to the HEARTS module Diagnosis and management of diabetes (19): https://www.who.int/publications-detail/who-ucn-ncd-20.1
Important practical points	 Consider drug treatment for following categories: All patients with established DM and CVD (coronary heart disease, myocardial infarction, transient ischaemic attacks, cerebrovascular disease or peripheral vascular disease), renal disease. If stable, should continue the treatment already prescribed and be considered as having risk >20%. People with albuminuria, retinopathy, left ventricular hypertrophy. All individuals with persistent raised BP ≥160/100 mmHg. All individuals with total cholesterol at or above 8 mmol/L (320 mg/dL).
<u>u</u>	 Follow-up visits: Ask about: new symptoms, adherence to advice on tobacco and alcohol use, physical activity, healthy diet, medications etc. Assess (physical exam). Estimate cardiovascular risk. Refer if necessary. Counsel all and treat as shown in protocol.

Countries may set different thresholds for initiating treatment, based on the distribution of CVD risk in the population (Annex 7). If, after a reasonable amount of time, the non-drug treatment alone is not able to meet the hypertension (HTN) control goals, consider drug treatment.

Follow-up

Follow-up frequency will depend on the capacity of the health system and will have to be decided based on the local context. National protocols are important for the management as they will help to standardize the treatment and bring about efficiencies. A schedule of follow-up based on WHO PEN Protocol 1 is provided. If risk is <5%, follow up in 12 months. If risk is 5%–10%, follow up every 3 months, then 6–9 months thereafter (16). For patients who are not at high enough risk for medical therapy, CVD risk should be reassessed every 12 months, or earlier if clinical symptoms develop.

Instructions for using WHO CVD risk (non-laboratory-based) charts

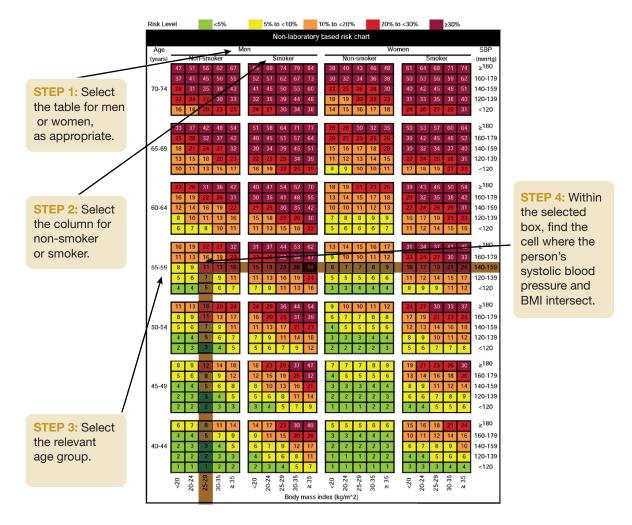
These charts are for the use of settings where diabetes and cholesterol cannot be measured. They can also be used to identify people at high risk who can be taken up for further investigations. Table 4 and Figure 4 present the steps to apply the non-laboratory WHO CVD risk charts.

Table 4: Using the WHO CVD risk (non-laboratory-based) charts

Action Select the regional chart covering your country: · REGION NAME is printed at the top of the charts. · Countries included in each region can be found in Annex 1. Have the following information ready: age sex · smoker* or non-smoker · systolic blood pressure • BMI (body mass index) = weight (kg) ÷ height (m)² Using the charts **STEP 1:** Select the table for men or women, as appropriate. STEP 2: Select smoker or non-smoker column. **STEP 3:** Select age-group. STEP 4: Within the selected box find the cell where the person's systolic blood pressure and body mass index (BMI) intersect. <5% Green **STEP 5:** The colour of the cell indicates the Yellow 5% to <10% 10-year risk of a fatal or non-fatal CVD event. The value within the cell is Orange 10% to <20% the risk percentage. Colour coding is based on the grouping. Red 20% to <30% Deep red ≥30% STEP 6: Record CVD risk percentage in person's chart. STEP 7: Counsel, treat and refer according to risk level

^{*} Current smoker

Figure 4: Illustration of how to use the WHO CVD risk (non-laboratory-based) chart



Use of WHO CVD risk (non-laboratory-based) charts

Currently, the WHO CVD risk (non-laboratory-based) charts can be considered for identifying a subset of the population who might benefit from laboratory-based risk assessment. Where laboratory testing may be available but extremely limited due to costs or distance, use of the non-laboratory charts could allow for a twostage process that reduces the number of people at lower levels of risk who are subjected to unwarranted testing. Additionally, the non-laboratory risk charts can be used for education and advocacy regarding total CVD risk in areas where lab testing remains currently unavailable. In these areas, health care providers and policy-makers can use the non-laboratory risk charts to assess the general risk of the population, and to advocate for more resources if risk appears high. Lastly, some studies have shown that use of the non-laboratory-based tool for determining future risk performs as well as laboratory-based tools and may even be costeffective for decisions regarding medical therapy (4, 5). As more data become available to confirm these findings, the WHO CVD risk (non-laboratory-based) charts may be recommended for use in treatment decisions as well. Individuals with a total CVD risk level of 10% and above should receive an assessment using laboratory-based charts after measurement for diabetes and cholesterol. Advice on lifestyle modification should be given as needed.

Annex 1: GBD regions

The first step when using the WHO CVD risk charts is to identify which Global Burden of Disease (GBD) region a country is in (Table 5).

Table 5: GBD regional groups

GBD region	Countries	Page numb	er of charts
		Lab-based	Non-lab- based
High-income North America	Canada, Greenland, United States of America	25	46
Caribbean	Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago	26	47
Central Latin America	Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Venezuela (Bolivarian Republic of)	27	48
Andean Latin America	Bolivia, Ecuador, Peru	28	49
Tropical Latin America	Brazil, Paraguay	29	50
Southern Latin America	Argentina, Chile, Uruguay	30	51
Western Europe	Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom	31	52
Central Europe	Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia	32	53
Eastern Europe	Belarus, Estonia, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine	33	54
North Africa and Middle East	Afghanistan, Algeria, Bahrain, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, occupied Palestinian territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates, Yemen	34	55

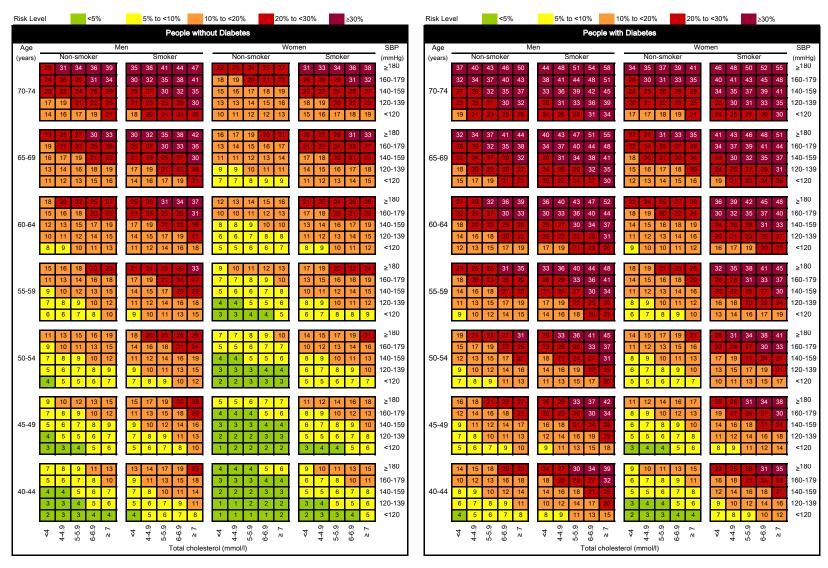
GBD region	Countries	Page numb	er of charts
		Lab-based	Non-lab- based
Western Sub-Saharan Africa	Benin, Burkina Faso, Cabo Verde, Cameroon, Chad, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea- Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo	35	56
Central Sub-Saharan Africa	Angola, Central African Republic, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon	36	57
Eastern Sub-Saharan Africa	Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, Uganda, United Republic of Tanzania, Zambia	37	58
Southern Sub-Saharan Africa	Botswana, Eswatini, Lesotho, Namibia, South Africa, Zimbabwe	38	59
Central Asia	Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan	39	60
East Asia	China, Democratic People's Republic of Korea	40	61
South Asia	Bangladesh, Bhutan, India, Nepal, Pakistan	41	62
South-East Asia	Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Maldives, Mauritius, Myanmar, Philippines, Seychelles, Sri Lanka, Thailand, Timor-Leste, Viet Nam	42	63
High-income Asia Pacific	Brunei Darussalam, Japan, Republic of Korea, Singapore	43	64
Australasia	Australia, New Zealand	44	65
Oceania	Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu	45	66

WHO CVD risk charts for a specific region can be downloaded from: https://www.who.int/news-room/detail/02-09-2019-who-updates-cardiovascular-risk-charts

Annex 2: WHO CVD risk (laboratory-based) charts

High-income North America

Canada, Greenland, United States of America



Caribbean

Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago

Risk Level <5%	5% to <10%	0% to <20%	o <30% ≥30%		Risk Level	<5%	5% to <10%	10% to <20%	% to <30% ≥30%	
	People with	out Diabetes						ith Diabetes		
J .	len		men	SBP	Age	M			/omen	SBP
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65-69 11 12 13 26 27 8 19 11 12 13 15 17 19 11 12 13 15 17 19 11 12 13 15 17 19 11 12 13 15 17 19 19 11 12 13 15 17 19 19 11 11 11 11 11 11 11 11 11 11 11	23 25 28 31 34 18 20 23 25 28 15 16 18 21 23 12 13 15 17 19 9 10 12 13 15	13 14 15 16 17 11 12 12 13 14 9 10 10 11 11 7 8 8 9 9 6 6 7 7 8	14 15 16 17 18	≥180 160-179 140-159 120-139 <120		27 30 33 37 22 24 27 31 18 20 22 25 14 16 18 20 11 13 14 16	32 36 40 44 49 26 29 33 37 41 22 24 27 30 34 17 19 22 25 28 14 16 18 20 23	21 22 24 25 27 18 19 20 21 23 15 16 17 18 19 12 13 14 15 16 10 11 11 12 13	32 33 35 38 40 27 28 30 32 3 22 24 25 27 21 19 20 21 23 24 15 16 18 19 20	
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Caribbean

Central Latin America

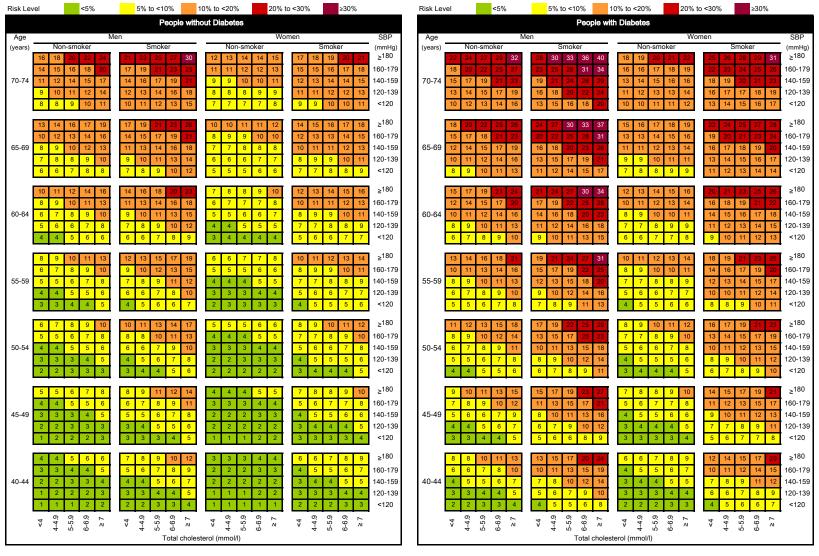
Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Venezuela (Bolivarian Republic of)

Risk Le	vel <5%	5% to <10%	10% to <20%	to <30% ≥30%	-	Risk Level	<5%	5% to <10%	10% to <20%	to <30% ≥30%	
Ago	M	People with	out Diabetes	men SBP		Age	M	People wi	th Diabetes	omen	SBP
Age (years)	Non-smoker	Smoker	Non-smoker	Smoker (mmHg	9)		on-smoker	Smoker	Non-smoker	Smoker	(mmHg)
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L		I Otal Choles	terol (mmol/l)		_ L			i otal choies	sterol (mmol/l)		

7

Andean Latin America

Bolivia, Ecuador, Peru



Tropical Latin America

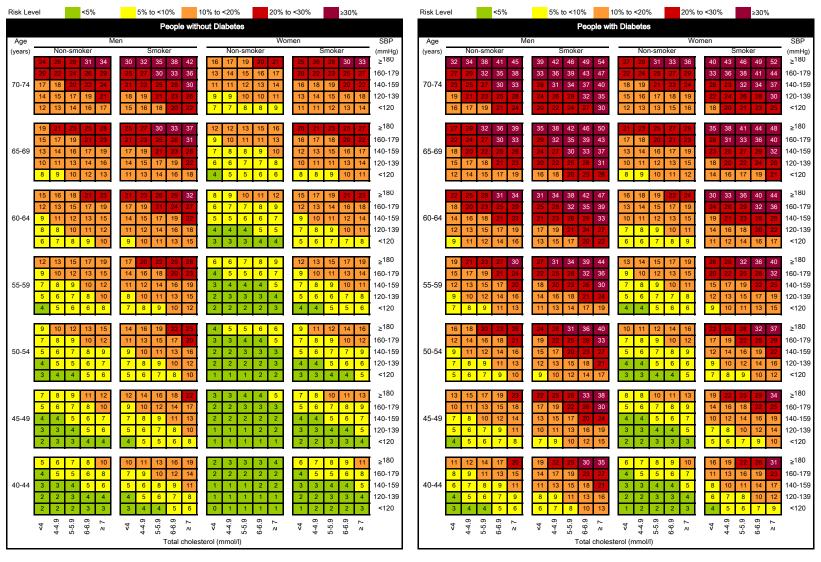
Brazil, Paraguay



Risk Level	<5%	5% to <10%	% to <20%	0% to <30% ≥30%				
People with Diabetes								
Age	M	en		Women SBF	P			
	lon-smoker	Smoker	Non-smoker	Smoker (mml-				
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60-64 11 1	2 13 15 16	15 17 19 21 23	9 9 10 10 1	1 14 14 15 17 18 140-1	159			
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45-49 6	7 7 8 9	10 11 12 14 16	4 5 5 6 6	9 9 10 12 13 140-1	159			
4 5	5 5 6 7	7 8 9 11 12	3 4 4 4 5	7 7 8 9 10 120-1	139			
3 4	4 4 5 5	5 6 7 8 10	3 3 3 3 4	5 6 6 7 8 <12	0'			
								
9 1	0 11 12 14	15 17 19 22 25	6 7 7 8 9	13 14 15 17 19 ≥ ¹⁸	0			
7	7 8 9 11	11 13 14 16 19	5 5 6 6 7	7 10 11 12 13 15 160-1	179			
40-44 5	5 6 7 8	8 9 11 12 14	4 4 4 5 5	7 8 9 10 12 140-1	159			
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3 3	3 3 4 4	5 5 6 7 8	2 2 2 3 3	3 4 5 5 6 7 <12	0.			
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4 4	5-5.9 6-6.9 > 7	<4 4-4.9 5-5.9 6-6.9 2 7	44-4.9 5-5.9 6-6.9	<44.455.566.97 ≤ 7				
		Total choleste	rol (mmol/l)					

Southern Latin America

Argentina, Chile, Uruguay



Western Europe

Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

140-159 120-139 <120

160-179 140-159 120-139 <120

160-179
140-159
120-139
<120
≥180
160-179
140-159
120-139
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160-179
140-159
120-139
<120
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160-179
140-159
120-139
<120
≥180
160-179
140-159
120-139
<120

Risk Lev	rel <5%	5% to <10%	10% to <20%	to <30% ≥30%		Risk Level	<5%	5% to <10%	10% to <20%	20% to		
		People without Diabetes						People with Diabetes				
Age	M Non-smoker	en Smoker	Non-smoker	omen Smoker	SBP (mmHg)	Age	M on-smoker	en Smoker	Non-smoke	Won		
(years) 70-74	27 29 33 36 40 22 24 27 30 33 8 20 22 25 28 5 16 18 20 23 12 13 15 17 19	34 37 41 45 49 28 31 34 38 42 23 26 29 32 35 19 21 24 26 29 15 17 19 22 24	20 21 23 25 27 16 17 18 20 21 12 13 14 15 17 10 10 11 12 13 8 8 9 10 10	31 34 36 39 42 25 27 29 32 34 20 22 23 25 27 16 17 18 20 22 12 13 15 16 17	≥180 160-179 140-159 120-139 <120	(years) N 36 4 30 3 3 70-74 25 2 21 2 17 1	0 44 48 53 4 37 41 45 8 31 34 38 3 26 29 32	45 50 54 59 64 38 42 46 51 56 32 35 39 43 48 27 30 33 37 41 22 24 27 31 34	34 37 40 43 28 30 32 33 22 24 26 20 18 19 21 22	3 46 5 38 8 30 2 24		
65-69	21 23 26 29 32 16 18 21 23 26 13 15 17 19 21 10 12 13 15 17 8 9 11 12 14	28 31 35 39 43 23 25 28 32 36 18 20 23 26 30 14 16 19 21 24 12 13 15 17 19	14 15 16 18 19 10 11 12 14 15 8 9 9 10 11 6 7 7 8 9 5 5 5 6 7	24 26 29 32 35 19 21 23 25 28 15 16 18 19 22 11 12 14 15 17 9 9 10 12 13	≥180 160-179 140-159 120-139 <120	30 3 24 2 65-69 20 2 16 1 12 1	7 31 34 39 2 25 28 32 8 20 23 26	40 44 49 54 60 33 37 41 46 51 27 30 34 38 43 22 25 28 32 36 18 20 23 26 30	20 22 25 2 16 17 19 2 12 13 15 16	7 30 1 23 6 18		
60-64	16 18 20 23 26 12 14 16 18 21 9 11 12 14 16 7 8 10 11 13 6 6 7 9 10	23 26 29 33 38 18 21 23 27 31 14 16 19 21 25 11 13 15 17 20 9 10 11 13 16	9 10 11 12 14 7 8 8 9 10 5 6 6 7 8 4 4 5 5 6 3 3 3 4 4	19 21 23 26 29 14 16 17 20 22 11 12 13 15 17 8 9 10 11 13 6 7 7 8 10	≥180 160-179 140-159 120-139 <120	25 2 19 2 60-64 15 1 12 1 9 1	4 16 18 21	35 40 44 50 56 28 32 36 41 47 23 26 29 34 39 18 21 24 27 31 14 16 19 22 25	15 17 18 2°	2 13		
55-59	12 13 15 18 21 9 10 12 14 16 7 8 9 11 12 5 6 7 8 10 4 4 5 6 7	19 21 25 28 33 14 17 19 22 26 11 13 15 17 20 8 10 11 13 16 6 7 9 10 12	6 7 8 9 10 5 5 6 6 7 3 4 4 5 5 2 3 3 3 4 2 2 2 2 3	14 16 18 21 24 10 12 13 15 18 8 9 10 11 13 5 6 7 8 10 4 5 5 6 7	≥180 160-179 140-159 120-139 <120	20 2 15 1 55-59 12 1 9 1 7 8	4 16 18 22 0 12 14 17	31 35 40 46 52 24 28 32 37 42 19 22 25 29 34 15 17 20 23 27 11 13 15 18 22	11 12 14 16	2 13		
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45-49	7 8 9 11 13 5 6 7 8 10 3 4 5 6 7 2 3 4 4 5 2 2 3 3 4	12 14 17 20 24 9 11 13 15 18 7 8 9 11 14 5 6 7 8 10 3 4 5 6 8	3 3 4 4 5 2 2 3 3 3 3 1 2 2 2 2 1 1 1 1 1 2 1 1 1 1 1 1	8 9 11 13 16 6 7 8 9 11 4 5 5 6 8 3 3 4 4 5 2 2 3 3 4	≥180 160-179 140-159 120-139 <120	13 1 10 1 45-49 7 8 5 6 4 4	1 13 16 19 3 10 12 14 5 7 9 11	24 28 32 38 44 18 21 25 29 35 13 15 18 22 27 10 11 14 17 21 7 8 10 13 16		9 11 6 7 4 5		
40-44	5 6 7 8 10 4 4 5 6 7 2 3 4 4 5 2 2 3 3 4 1 1 2 2 3	10 12 14 17 21 7 8 10 12 15 5 6 7 9 11 4 4 5 7 8 3 3 4 5 6	2 2 3 3 4 1 2 2 2 2 1 1 1 1 1 2 1 1 1 1 1 1 0 0 0 1 1 1	6 7 9 10 12 4 5 6 7 9 3 3 4 5 6 2 2 3 3 4 1 1 2 2 3	≥180 160-179 140-159 120-139 <120	40-44 5 6 4 5 3 5	11 13 16 6 8 9 12 6 6 7 9 8 4 5 6	21 24 29 34 41 15 18 21 26 31 11 13 16 19 24 8 9 12 14 18 6 7 8 11 13	3 3 4 5 2 2 3 3 1 1 2 2	7 8 6 6 8 4 2 3		
	44.9 5-5.9 6-6.9 7	Lotal choles 4 + 4 + 4 + 9 + 4 + 9 + 4 + 9 + 9 + 7 + 9 + 9 + 9 + 9 + 9 + 9 + 9	tetol (mmol/l) 4 4 4 6 6 6 9 7 4 7 7 7 9 9 9 9 7 7 7 9 9 9 9 9 7 7 7 9	<4 4-4.9 5-5.9 6-6.9		4 4 0	5-5.9 6-6.9	2-5.9 A Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	esterol (mmol/l) 4 4 7 7 6 2 6 6	2 2		
		i otal Citoles	toror (minori)			<u> </u>		i otal Cilo	Cotoror (mmo/n)			

Central Europe

Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia

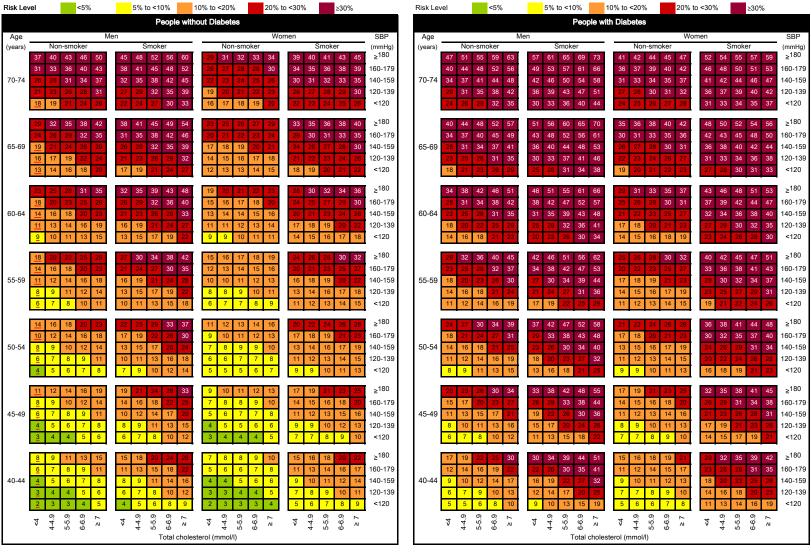
Risk Level	<5%	5% to <10%	10% to <20%	o <30% ≥30%		Risk Level	<5%	5% to <10%	10% to <20%	to <30% ≥30%	
		out Diabetes		000	People with Diabetes Age Men Women					000	
Age (years)	Me Non-smoker	Smoker	Non-smoker	men Smoker	SBP (mmHg)	Age (years) N	on-smoker	Smoker	Non-smoker	omen Smoker	SBP (mmHg)
70-74 22 2 17 1	37 40 44 49 30 33 37 40 24 27 30 33 19 21 24 27 15 17 19 22	43 47 51 55 60 35 38 42 47 51 28 31 35 38 43 23 25 28 31 35 18 20 23 25 29	29 30 32 35 37 22 24 26 27 30 17 19 20 21 23 14 14 15 17 18 10 11 12 13 14	45 48 51 54 56 36 38 41 44 47 29 31 33 35 36 22 24 26 28 30 17 19 20 22 24	7 160-179 140-159	70-74 45 50 37 44 70-74 30 34 25 21 20 22	45 50 55	56 61 66 71 76 47 52 57 62 67 39 43 48 53 58 32 36 40 44 49 26 29 33 36 41	49 52 55 59 63 40 42 45 48 52 32 34 36 39 42 25 27 29 31 34 19 21 22 24 26	49 53 56 60 40 43 46 49	84 ≥180 74 160-179 64 140-159 53 120-139 43 <120
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4 2	4-4.9 5-5.9 6-6.9 ≥ 7	Lotal choles	terol (mwol/I) 4 4.4.6.9 6.6.9 7	44-4.9 5-5.9 6-6.9 7 ≤		42 4.9	5-5.9 6-6.9 ≥ 7	Lotal choles	tetal (wwol/l)	<4 4-4.9 5-5.9 6-6.9	N
	4 10 0			4 10 0		4	w w			4 10 0	

Eastern EuropeBelarus, Estonia, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine

Risk Level <5%	_		to <30% ≥30%	Ris	Risk Level<5%5% to <10%10% to <20%20% to <30%≥30%					
Age	People without Diabetes Age Men SBP				People with Diabetes Age Men Women					
(years) Non-smoker	Smoker	Non-smoker	Smoker (mmH	g) (y	(years) Non-smoker	Smoker	Non-smoker	Smoker	SBP (mmHg)	
36 39 41 45 48 31 33 36 38 4		33 34 36 39 41 27 28 30 32 34	47 49 52 55 58 ≥180 39 42 44 47 50 160-13		45 49 52 56 59 39 42 45 49 52	54 57 61 65 68 47 50 54 58 61	50 53 56 59 62 42 45 48 50 53		≥180 160-179	
70-74 26 28 30 33 36		22 23 25 26 28	33 35 37 39 42 140-15		70-74 33 36 39 42 46	41 44 47 51 54	36 38 40 43 45		140-159	
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29 32 34 37 4· 24 26 29 31 34		24 25 27 29 32	38 41 44 47 50 ≥ ¹⁸⁰ 31 34 36 39 42 160-17		39 42 46 50 54 33 36 39 43 46	49 53 57 61 65 42 45 49 53 57	41 43 46 50 53 33 36 38 41 45	61 64 68 72 76 52 55 59 63 67	≥180	
65-69 20 22 24 26 29	31 34 37 40 44 26 28 31 34 37	19 21 22 24 26 15 16 18 19 21	31 34 36 39 42 160-17 25 27 29 32 34 140-18		33 36 39 43 46 65-69 28 30 33 36 40	42 45 49 53 57 36 39 42 46 50	33 36 38 41 45 27 29 31 34 37		160-179 140-159	
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7 8 9 10 12		4 4 4 5 6	8 9 10 12 14 120-13		12 13 15 17 20	18 21 24 27 31	8 9 11 12 14		120-139	
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12 13 15 17 19	19 22 24 28 32	7 7 8 9 10	16 18 20 23 26 ≥ ¹⁸⁰		21 23 26 29 33	33 37 41 46 51	16 18 20 23 26	37 41 47 53 59	≥180	
9 10 11 13 15 45-49 7 8 9 10 12	15 17 19 22 25	5 5 6 7 7 3 4 4 5 5	11 13 15 17 20 160-17 8 9 11 13 15 140-18		16 18 20 23 26 45-49 12 14 16 18 21	26 29 33 37 42 20 23 26 30 34	12 13 15 17 19 8 9 11 12 14		160-179 140-159	
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44.9 5-5.9 6-6.9	<4 4-4.9 5-5.9 6-6.9 2 7	<4 4-4.9 5-5.9 6-6.9	<4 4-4.9 5-5.9 6-6.9		<4 4-4.9 5-5.9 6-6.9	<4 4-4.9 5-5.9 6-6.9 2 7	<4 4-4.9 5-5.9 6-6.9 ≥ 7	<4 44.9 5-5.9 6-6.9		
		sterol (mmol/l)				Total choles				

North Africa and Middle East

Afghanistan, Algeria, Bahrain, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, occupied Palestinian territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates, Yemen



North Africa and Middle East

Western Sub-Saharan Africa

Benin, Burkina Faso, Cabo Verde, Cameroon, Chad, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea, Guinea, Guinea, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo

Risk Le	vel <5%	5% to <10%	0% to <20%	to <30% ≥30%	_	Risk Lev	vel <5%	5% to <10%	0% to <20%	0 <30% ≥30%	
			out Diabetes					People wit			
Age (years)		en Smoker	Non-smoker	Smoker SBP (mmHg	2)	Age (years)	Non-smoker	en Smoker	Non-smoker	men Smoker	SBP (mmHg)
()/	22 24 26 29 32	28 30 33 36 40	18 19 20 21 22	25 27 28 29 30 ≥180		())	30 32 36 39 43	37 41 44 48 53	27 28 30 31 33	37 39 41 42 44	≥180
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70-74	15 16 18 20 22 12 13 15 16 18	19 21 23 25 28 15 17 19 21 23	13 13 14 15 15 11 11 12 12 13	18 19 20 21 22 140-15 15 16 17 17 18 120-13		70-74	17 18 20 23 25 17 18 20 23 25	26 28 31 35 39 21 24 26 29 32	19 20 21 22 24 16 17 18 19 20	27 29 30 31 33 23 24 25 27 28	140-159 120-139
	10 11 12 13 15	13 14 15 17 19	9 9 10 10 11	13 13 14 15 15 <120			14 15 17 19 21	17 19 22 24 27	14 14 15 16 17	19 20 21 23 24	<120
	17 19 21 23 26	23 25 28 31 35	14 15 15 16 17	21 22 23 25 26 ≥ ¹⁸⁰			25 27 30 34 37	33 36 40 44 49	22 24 25 26 28	33 35 37 39 41	≥180
	14 15 17 19 21	18 21 23 26 29	11 12 13 13 14	17 18 19 21 22 160-17	9		20 22 25 28 31	27 30 33 37 41	18 19 21 22 23	28 29 31 33 35	160-179
65-69		15 17 18 21 23 12 13 15 17 19	9 10 10 11 12 8 8 8 9 10	14 15 16 17 18 140-15 12 12 13 14 15 120-13		65-69	16 18 20 22 25	22 24 27 31 34	15 16 17 18 19 12 13 14 15 16	23 25 26 28 30 19 20 22 23 25	140-159 120-139
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	13 15 16 18 21	19 21 24 27 30	10 11 12 13 14	17 18 20 21 23 ≥180			20 23 25 29 32	29 32 36 40 45	18 19 21 22 24	30 32 34 36 39	≥180
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	6 7 8 9 10 5 5 6 7 8	9 10 12 13 15 7 8 9 10 12	5 6 6 7 7 4 5 5 5 6	9 10 10 11 12 120-13 7 8 8 9 10 <120			10 11 13 14 17 8 9 10 11 13	14 16 19 21 25 11 13 15 17 20	9 10 11 12 13 8 8 9 9 10	16 17 19 20 22 13 14 15 16 18	120-139 <120
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	8 9 10 11 13	12 13 15 18 20	6 7 7 8 8	11 12 13 14 16 160-17			13 15 16 19 22	20 23 26 29 34	12 13 14 15 16	21 23 25 27 29	160-179
55-59		9 10 12 14 16	5 5 6 6 7	9 10 10 11 12 140-15		55-59	10 11 13 15 17	15 18 20 23 27	9 10 11 12 13	17 18 20 22 24	140-159
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50-54	4 5 5 6 7	7 8 9 11 13	3 4 4 4 5	7 8 8 9 10 140-15		50-54	8 9 10 12 14	13 15 17 20 24	7 8 8 9 10	14 16 17 19 21	140-159
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		Total choles	terol (mmol/l)					Total choles	erol (mmol/l)		

Central Sub-Saharan Africa

Angola, Central African Republic, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon

Risk Le	vel <5%			to <30% ≥30%		Risk Leve	<5%			o <30% ≥30%	
A==	M	en People With	out Diabetes	men	SBP	A = 0	M	People with		men	SBP
Age (years)	Non-smoker	Smoker	Non-smoker	Smoker	(mmHg)	Age (years)	Non-smoker	Smoker	Non-smoker	Smoker	(mmHg)
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Eastern Sub-Saharan Africa

Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, Uganda, United Republic of Tanzania, Zambia

Risk Lev	vel <5%	5% to <10%	0% to <20%	o <30% ≥30%		Risk Level	<5%	5% to <10%	0% to <20% 20% t	o <30% ≥30%	
		People with						People wit			
Age (years)	Non-smoker	en Smoker	Non-smoker	men SB Smoker (mm		Age (years)	Mon-smoker	en Smoker	Non-smoker	men Smoker	SBP (mmHg)
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Southern Sub-Saharan Africa

Botswana, Eswatini, Lesotho, Namibia, South Africa, Zimbabwe

Risk Leve	el <5%	5% to <10%	0% to <20%	20 <30% ≥30%		Risk Level	<5%	5% to <10%	0% to <20%	to <30% ≥30%	
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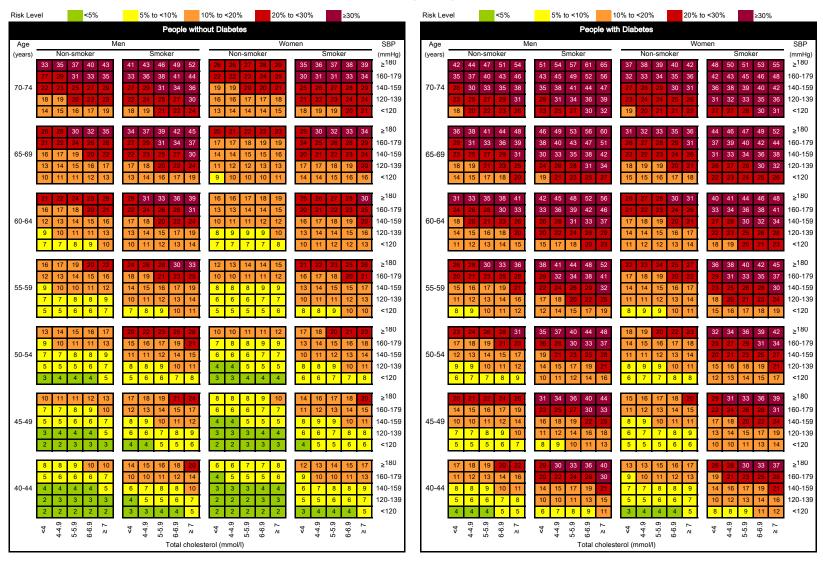
Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan

Risk Le	vel <5%	5% to <10%	10% to <20%	to <30% ≥30%		Risk Leve	<5%	5% to <10%	10% to <20%	to <30% ≥30%
		•	out Diabetes						ith Diabetes	
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			terol (mmol/l)						sterol (mmol/l)	

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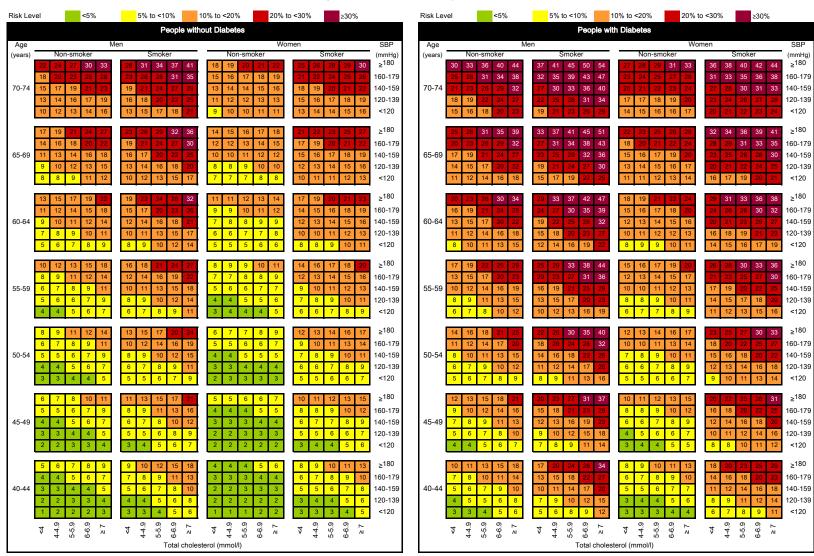
East Asia

China, Democratic People's Republic of Korea



South Asia

Bangladesh, Bhutan, India, Nepal, Pakistan



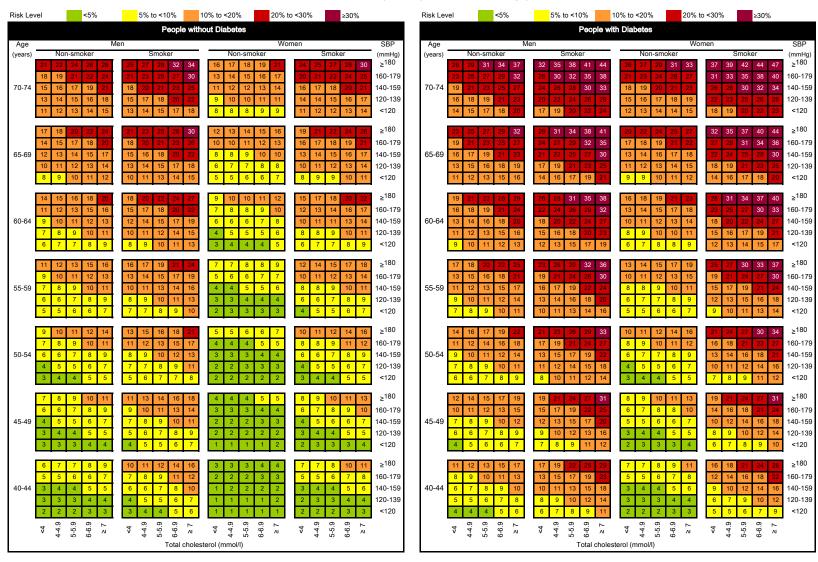
South-East Asia

Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Maldives, Mauritius, Myanmar, Philippines, Seychelles, Sri Lanka, Thailand, Timor-Leste, Viet Nam

Risk Le	evel <5%	5% to <10%	0% to <20%	o <30% ≥30%		Risk Level	<5%	5% to <10%	0% to <20%	to <30% ≥30%	
Ago	M	People with		men	SBP	Ago	M	People wit	th Diabetes	men	SBP
Age (years)		Smoker 30 33 36 40 44	Non-smoker 18 19 20 21 22	-	(mmHg) ≥180	0,	Non-smoker 36 39 43 47	Smoker 41 45 49 54 59	Non-smoker 28 29 30 32 33	Smoker 38 40 42 44 46	(mmHg) ≥180
70-74	19 21 23 26 29 16 17 19 21 23 13 14 15 17 19 10 11 12 14 15	25 27 30 33 37 20 22 25 27 30 16 18 20 22 25 13 15 16 18 20	16 16 17 18 18 13 14 14 15 15 11 11 12 12 13 9 9 10 10 11	18 19 20 21 22	160-179 140-159 120-139 <120		29 32 36 40 24 26 29 33 19 22 24 27 16 17 19 22	34 37 41 45 50 28 31 34 38 42 23 25 28 31 35 18 20 23 25 29	23 25 26 27 28 20 21 22 23 24 17 17 18 19 20 14 15 15 16 17	33 34 36 38 40 28 29 31 32 34 23 25 26 27 29 20 21 22 23 24	160-179 140-159 120-139 <120
65-69	19 20 22 25 28 15 16 18 20 22 11 13 14 16 18 9 10 11 12 14 7 8 9 10 11	25 28 31 34 38 20 22 25 27 31 16 18 20 22 25 12 14 15 17 20 10 11 12 14 16	14 15 16 16 17 12 12 13 13 14 9 10 10 11 12 8 8 9 9 10 6 7 7 7 8	15 15 16 17 18	≥180 160-179 140-159 120-139 <120	65-69 17	30 33 37 41 24 26 30 33 19 21 24 27 15 17 19 21 12 13 15 17	36 40 44 49 54 29 32 36 40 45 23 26 29 33 37 19 21 23 26 30 15 16 19 21 24	23 24 25 27 28 19 20 21 22 24 15 16 17 18 19 13 13 14 15 16 10 11 12 12 13	34 36 38 40 43 28 30 32 34 36 24 25 27 28 30 20 21 22 24 25 16 17 18 19 21	≥180 160-179 140-159 120-139 <120
60-64	14 16 17 19 22 11 12 13 15 17 8 9 10 12 13 6 7 8 9 10 5 5 6 7 8	21 23 26 29 33 16 18 20 23 26 12 14 15 18 20 9 11 12 14 16 7 8 9 10 12	11 11 12 13 14 9 9 10 10 11 7 7 8 8 9 5 6 6 7 7 4 5 5 5 6	11 12 13 14 15	≥180 160-179 140-159 120-139 <120	10	25 27 31 35 19 21 24 28 15 17 19 22 11 13 15 17 9 10 11 13	32 35 40 44 50 25 28 32 36 41 20 22 25 28 33 15 17 19 22 26 12 13 15 17 20	19 20 21 22 24 15 16 17 18 20 12 13 14 15 16 10 10 11 12 13 8 8 9 9 10	30 32 34 37 40 25 26 28 31 33 20 21 23 25 27 16 17 19 20 22 13 14 15 16 18	≥180 160-179 140-159 120-139 <120
55-59	11 12 13 15 17 8 9 10 11 13 6 7 8 9 10 5 5 6 6 7 3 4 4 5 5	17 19 21 24 28 13 14 16 18 21 10 11 12 14 16 7 8 9 11 12 5 6 7 8 9	8 9 9 10 11 6 7 7 8 8 5 5 6 6 7 4 4 4 5 5 3 3 3 4 4	9 10 10 11 12	≥180 160-179 140-159 120-139 <120	18 14 55-59 10 8 6	20 23 26 30 15 17 20 23 12 13 15 18 9 10 11 13 7 7 9 10	28 31 35 40 46 22 24 28 32 37 16 19 21 25 29 12 14 16 19 22 9 11 12 14 17	15 16 17 19 20 12 13 14 15 16 9 10 11 12 13 7 8 8 9 10 6 6 7 7 8	27 29 31 34 37 21 23 25 27 30 17 18 20 22 24 13 15 16 17 19 10 11 13 14 15	≥180 160-179 140-159 120-139 <120
50-54	9 9 10 12 13 6 7 8 9 10 4 5 6 6 7 3 4 4 5 5 2 3 3 3 3 4	14 15 18 20 23 10 11 13 15 18 7 8 10 11 13 5 6 7 8 10 4 4 5 6 7	6 7 7 8 8 8 5 5 5 6 6 6 4 4 4 5 5 5 3 3 3 3 4 2 2 2 3 3	9 10 11 12 13 1 7 8 8 9 10	≥180 160-179 140-159 120-139 <120	6	17 19 22 25 13 14 16 19 9 10 12 14 7 8 9 10 5 6 6 8	25 28 32 36 42 19 21 24 28 33 14 16 18 21 25 10 12 13 16 19 7 8 10 12 14	12 13 14 16 17 9 10 11 12 13 7 8 9 9 10 6 6 7 7 8 4 5 5 5 6	24 26 28 31 34 18 20 22 24 27 14 16 17 19 21 11 12 13 15 17 8 9 10 12 13	≥180 160-179 140-159 120-139 <120
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40-44	5 6 6 7 8 4 4 4 5 6 2 3 3 3 4 2 2 2 2 2 3 1 1 1 2 2	9 10 12 14 17 6 7 8 10 12 4 5 6 7 8 3 3 4 5 6 2 2 3 3 4	4 4 4 5 5 3 3 3 4 2 2 2 2 2 1 1 2 2 2 1 1 1 1 1	4 5 5 6 7 3 3 4 4 5 2 3 3 3 4	≥180 160-179 140-159 120-139 <120	40-44 5 4 2	12 13 15 18 8 9 11 13 6 6 8 9 4 4 5 6 3 3 4 4	19 22 25 29 35 14 16 18 21 26 10 11 13 15 19 7 8 9 11 14 5 5 6 8 10	8 9 10 11 12 6 7 7 8 9 4 5 5 6 7 3 3 4 4 5 2 3 3 3 4	18 20 23 26 29 14 15 17 19 22 10 11 13 15 17 7 8 10 11 13 5 6 7 8 9	≥180 160-179 140-159 120-139 <120
	<4 4-4.9 5-5.9 6-6.9	Lotal choles.	tecol (wwol/l)	44.95-5.96-6.9		4	6-6.9 7 × 7	Lotal choles	tetol (mmol/l) 4 4 6.6.9 6.6.9 V	44.955.966.9	
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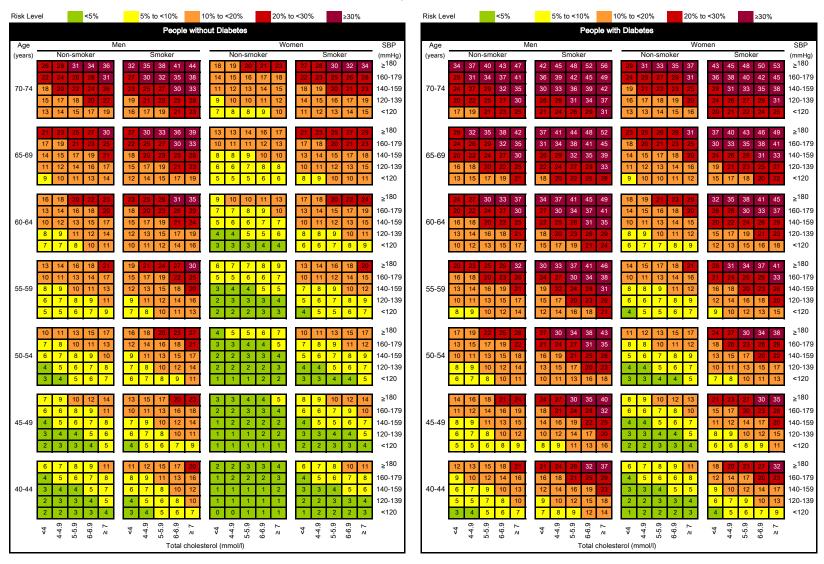
High-income Asia Pacific

Brunei Darussalam, Japan, Republic of Korea, Singapore



Australasia

Australia, New Zealand



Oceania

Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu

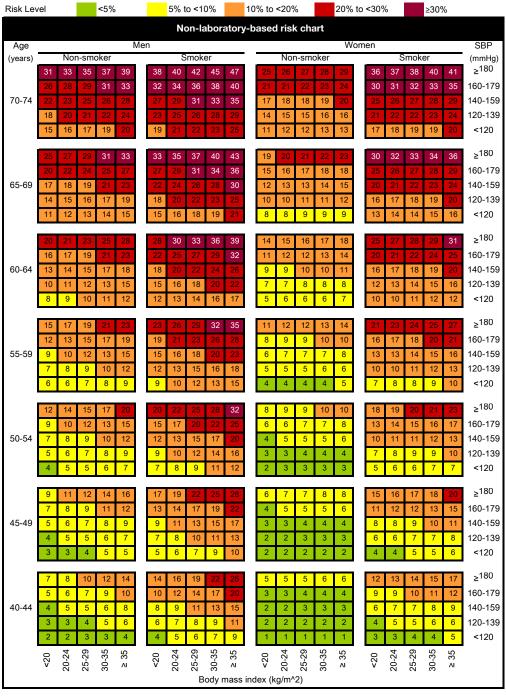
Risk Level <5%	5% to <10%	10% to <20%	to <30% ≥30%		Risk Level	<5%	5% to <10%	0% to <20%	to <30% ≥30%
		out Diabetes						th Diabetes	
Age (years) Non-smoker	Men Smoker	Non-smoker	men Smoker	SBP (mmHg)	Age (years)	Non-smoker	en Smoker	Non-smoker	Smoker SBP (mmHg)
70-74	29 31 33 35 38 25 26 28 30 32 21 22 24 26 27	20 20 21 22 22 17 17 18 18 19 14 15 15 16 16 12 13 13 13 14 10 11 11 11 12	26 27 28 29 30 23 23 24 25 26 19 20 21 21 22 17 17 18 18 19 14 15 15 16 16	≥180 160-179 140-159 120-139 <120	70-74 22 18	0 33 35 37 40 3 28 30 32 34 2 23 25 27 29	37 39 42 44 47 31 33 36 38 41 26 28 30 33 35 22 24 26 28 30 19 20 22 23 25	28 29 30 31 32 24 25 26 27 28 21 21 22 23 24 18 18 19 20 20 15 16 16 17 17	37 38 40 41 43 ≥180 32 33 34 36 37 160-179 28 29 30 31 32 140-159 24 25 26 27 28 120-139 20 21 22 23 24 <120
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16 17 18 20 22 13 14 15 16 17 60-64 10 11 12 13 14 8 9 9 10 11 6 7 7 8 9		12 13 13 14 15 10 10 11 11 12 8 8 9 9 10 7 7 7 8 8 5 6 6 6 6	19 20 21 22 23 15 16 17 18 19 13 13 14 15 16 10 11 11 12 13 8 9 9 10 11	≥180 160-179 140-159 120-139 <120	60-64 15 9	2 13 14 15 17	30 33 35 38 41 25 27 29 31 34 20 22 24 26 28 16 18 19 21 23 13 14 16 17 19	20 21 22 23 24 16 17 18 19 20 13 14 15 16 16 11 11 12 13 14 9 9 10 10 11	30 32 33 35 37 ≥180 25 26 28 30 31 160-179 21 22 23 25 26 140-159 17 18 19 20 22 120-139 14 15 16 17 18 <120
13 14 15 16 18 10 11 12 13 14 55-59 8 8 9 10 11 6 6 6 7 8 9 5 5 6 6 6 7	14 16 17 19 20 11 12 13 15 16	9 10 11 11 12 8 8 8 9 9 6 6 7 7 8 5 5 5 6 6 4 4 4 4 5	16 17 18 19 20 13 13 14 15 16 10 11 12 12 13 8 9 9 10 11 6 7 7 8 8	≥180 160-179 140-159 120-139 <120	55-59 12 9	0 21 23 25 27 5 17 18 20 22 2 13 14 16 17 10 11 12 14 8 9 10 11	28 30 32 35 38 22 24 26 28 31 17 19 21 23 25 14 15 17 18 20 11 12 13 15 16	16 17 18 20 21 13 14 15 16 17 11 11 12 13 14 8 9 10 10 11 7 7 8 8 9	27 29 31 33 35 ≥180 22 23 25 27 29 160-179 18 19 20 22 24 140-159 14 15 17 18 19 120-139 12 12 13 14 16 <120
10 11 12 13 14 8 8 9 10 11 50-54 6 6 7 8 9 4 5 5 6 7 3 4 4 5 5	12 13 14 16 17 9 10 11 12 14 7 8 8 9 11	7 8 8 9 10 6 6 7 7 7 4 5 5 5 6 3 4 4 4 5 3 3 3 3 4	13 14 15 16 18 10 11 12 13 14 8 9 9 10 11 6 7 7 8 9 5 6 6 7	≥180 160-179 140-159 120-139 <120	50-54 10 8	8 9 10 11	25 27 29 32 35 20 21 23 26 28 15 17 18 20 23 12 13 14 16 18 9 10 11 12 14	14 15 16 17 18 11 11 12 13 14 8 9 10 10 11 7 7 8 8 9 5 5 6 6 7	24 26 28 30 33 ≥180 19 21 22 24 26 160-179 15 17 18 19 21 140-159 12 13 14 15 17 120-139 9 10 11 12 13 <120
8 9 10 11 12 6 7 7 8 9 45-49 5 5 5 6 7 3 4 4 4 5 2 3 3 3 3 4	13 14 16 17 19 10 11 12 13 15 7 8 9 10 11 5 6 7 8 9 4 5 5 6 7	6 6 7 7 8 4 5 5 5 6 3 4 4 4 4 3 3 3 3 3 3 2 2 2 2 2 3	11 12 13 14 15 9 9 10 11 12 7 7 8 8 8 9 5 5 6 6 7 4 4 4 4 5 5	≥180 160-179 140-159 120-139 <120	45-49 8 6 4	- 12 11 12	23 25 27 30 33 17 19 21 23 26 13 14 16 18 20 10 11 12 14 16 7 8 9 10 12	12 12 13 14 16 9 9 10 11 12 7 7 8 8 8 9 5 5 6 6 7 4 4 5 5	22 24 26 28 30 ≥180 17 18 20 22 24 160-179 13 14 16 17 19 140-159 10 11 12 13 15 120-139 8 9 9 10 12 <120
40-44	8 9 10 11 13 6 7 7 8 9 4 5 5 6 7 3 3 4 5 5	5 5 5 6 6 6 3 4 4 4 5 5 2 3 3 3 3 3 2 2 2 2 2 3 3 1 1 1 2 2 2 2	9 10 11 12 13 7 8 8 9 10 5 6 6 7 8 4 4 5 5 6 3 3 3 4 4	≥180 160-179 140-159 120-139 <120	40-44 7 5	7 8 9 10 5 6 7 8 4 4 5 6	21 23 25 27 30 15 17 19 21 23 11 12 14 16 18 8 9 10 12 14 6 7 8 9 10	10 10 11 12 13 7 8 8 9 10 5 6 6 7 8 4 4 5 5 6 3 3 3 4 4	20 21 23 26 28 ≥180 15 16 18 20 22 160-179 11 12 14 15 17 140-159 8 9 10 12 13 120-139 6 7 8 9 10 <12 13 <120
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	i otal choies	steror (mmoi/i)					i otal choles	terol (mmol/l)	

Annex 3: WHO CVD risk (non-laboratory-based) charts

WHO cardiovascular disease risk non-laboratory-based charts

High-income North America

Canada, Greenland, United States of America



High-income North America

Caribbean

Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago

Risk Lev	/el			<5%)			5% t	o <10	0%		10	% to	<20%	6		20%	to <:	30%			≥30%	6	
								No	on-la	bor	ator	y-b	asec	l risk	cha	art								
Age					٨	Men											Wo	ome	1					SBP
(years)	22		n-smo		24		20		moke		20		10		n-smo		22		20		moke		22	(mmHg) ≥180
	23	25 20	27	29	31	H	30	32 26	34 28	37 30	39		19 16	20 17	21 17	18	19	-	28 23	29 24	30	31 26	32 27	160-179
70-74	15	17	18	19	21	H	20	22	23	25	27		14	14	15	15	16	-	20	20	21	22	23	140-159
	13	13	15	16	17	-	16	18	19	20	22		11	12	12	13	13		16	17	18	18	19	120-139
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65-69	14	15 12	17	18 15	16		20 16	17	19	26 21	28		12	13	13	14	15	-	19 16	2017	21 17	18	23	160-179 140-159
03-09	9	10	11	12	13	-	13	14	15	17	18		8	8	9	9	10	_	13	14	14	15	16	120-139
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	8	9	10	11	13		13	14	16	19	21		7	7	8	8	9		13	14	15	16	17	160-179
55-59	6	7	7	8	10	L	10	11	12	14	16		5	6	6	6	7	_	10	11	11	12	13	140-159
	4	5	6	6	7	L	7	8	9	11	12		4	4	5	5	5	L	8	8	9	10	10	120-139
	3	4	4	5	5	L	5	6	7	8	9		3	3	4	4	4	L	6	7	7	7	8	<120
	8	9	10	12	14		14	16	18	21	24	1 1	7	7	8	8	9		14	15	16	17	18	≥180
	6	7	8	9	10		10	12	13	16	18		5	6	6	6	7		11	11	12	13	14	160-179
50-54	4	5	6	6	7		7	9	10	12	14		4	4	4	5	5		8	9	9	10	11	140-159
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Caribbean

Central Latin America
Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Venezuela (Bolivarian Republic of)

Risk Lev	/el			<5%	D			5% t	o <1()%		10	% to	<20%	6		20%	to <	30%		≥	30%	, o	
								No	on-la	bora	atory	/-b	ased	l risk	cha	art								
Age					N	Иen											W	omei	1					SBP
(years)			n-smo						moke			1			n-smo						noker			(mmHg)
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70-74	13	14	15 12	16 13	18	-	17 14	19 15	20 16	18	19		11	12	12	13	13	_	_	-	-	19 16	19 16	140-159 120-139
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40-44	2	2	3	3	4		4	5	6	7	8		2	2	2	2	2	F	4 !	5	5	6	6	140-179
	1	2	2	2	3	ŀ	3	3	4	5	6		1	1	2	2	2		_	_	4	4	5	120-139
	1	1	1	2	2		2	2	3	3	4		1	1	1	1	1	F	_	-	3	3	3	<120
	o.	24	29				0.				35	ı	0	24	29	35	35	-					35	
	<20	20-24	25-29	30-35	> 35		<20	20-24	25-29	30-35	ΛI		<20	20-24	25-29	30-35	≥ 35	•	20.27	, i	25-29	30-35	> 35	
									В	ody r	nass	ind	lex (k	g/m^	2)									

Central Latin America

Andean Latin America Bolivia, Ecuador, Peru

Risk Lev	/el			<5%)			5% t	o <10	0%		10	% to	<20%	6		20%	to <	30%	, 0		≥30%	6	
								No	on-la	bor	atory	-b	asec	l risk	cha	art								
Age					M	1en											Wo	me	า					SBP
(years)	_		n-sm	oker					mok	er		1	_	Nor	n-smo	oker				S	moke			(mmHg)
	18	19	20	22	23		22	24	26	27	29		14	14	15	15	16	_	19	20	21	22	22	≥180
70.74	14	16	17	18	19		19	20	21	23	25		12	12	12	13	13	_	16	17	18	18	19	160-179
70-74	12	13	14	15	16		15	16	18	19	20		10	10	11	11	11	-	14	14	15	16	16	140-159 120-139
	10	10	9	12	13		13 10	14	15 12	16 13	17		8 7	9 7	9 7	9	10	_	12 10	12	13	13	14	<120-139
	0	9	9	10	11		10	-11	12	13	14		- /	'	'	O	0	L	10	10	-11	- 11	- 11	~120
	14	15	16	17	19	Г	19	20	22	24	26		11	11	12	12	13	ſ	17	17	18	19	20	≥180
	11	12	13	14	15	-	15	16	18	20	21		9	9	10	10	10		14	14	15	16	16	160-179
65-69	9	10	10	11	12		12	13	14	16	17		7	8	8	8	9	ı	11	12	12	13	13	140-159
	7	8	8	9	10		10	11	12	13	14		6	6	7	7	7		9	10	10	11	11	120-139
	6	6	7	7	8		8	9	9	10	11		5	5	5	6	6		8	8	8	9	9	<120
	44	40	40	44	40		10	47	40	04	00		_	0	0	40	40		44	45	45	40	47	≥180
	11	12 9	13	14	16		16 12	17 14	19 15	21 17	19		9	9 7	9 7	10	10	-	14 11	15	15 13	16 13	17	160-179
60-64	7	7	8	9	10		10	11	12	13	15		6	6	6	6	7	H	9	10	10	11	11	140-159
00 0 1	5	6	6	7	8		8	8	9	10	12		4	5	5	5	5	F	7	8	8	9	9	120-139
	4	4	5	5	6	_	6	7	7	8	9		4	4	4	4	4	ŀ	6	6	7	7	7	<120
						<u> </u>												<u> </u>	_					
	8	9	10	11	13		13	14	16	18	21		7	7	7	8	8		12	13	13	14	15	≥180
	6	7	8	9	10		10	11	13	14	16		5	6	6	6	6		10	10	11	11	12	160-179
55-59	5	5	6	7	8	_	8	9	10	11	12		4	4	5	5	5	L	8	8	8	9	9	140-159
	4	4	5	5	6	_	6	7	7	8	10		3	3	4	4	4	L	6	6	7	7	7	120-139
	3	3	3	4	4		4	5	6	6	7		3	3	3	3	3	L	5	5	5	6	6	<120
	6	7	8	9	10		11	12	14	16	18		5	6	6	6	6	Г	10	11	11	12	13	≥180
	5	5	6	7	8		8	9	10	12	14		4	4	4	5	5	F	8	8	9	9	10	160-179
50-54	4	4	5	5	6		6	7	8	9	11		3	3	3	4	4	f	6	6	7	7	8	140-159
	3	3	3	4	4		5	5	6	7	8		2	3	3	3	3	ı	5	5	5	6	6	120-139
	2	2	3	3	3		3	4	4	5	6		2	2	2	2	2		4	4	4	4	5	<120
	-	•	0	7	0		^	40	40	4.4	40			4	-	-	_	_	^	0	40	40	44	≥180
	5	6	6 5	7 5	9	_	9	10 7	12 9	14	16		3	3	5	5	5	H	9	9 7	10 7	10	9	160-179
45-49	3	3	3	4	5	_	5	5	6	8	12		2	2	3	3	3	F	5	5	6	6	6	140-159
45-45	2	2	3	3	3	_	3	4	5	6	7		2	2	2	2	2	ŀ	4	4	4	5	5	120-139
	1	2	2	2	2		3	3	3	4	5		1	1	1	2	2	H	3	3	3	3	4	<120
																		-						
	4	4	5	6	7		7	8	10	12	14		3	4	4	4	4		7	8	8	9	10	≥180
	3	3	4	4	5		5	6	7	9	10		2	3	3	3	3		5	6	6	7	7	160-179
40-44	2	2	3	3	4		4	4	5	6	7		2	2	2	2	2		4	4	5	5	5	140-159
	1	2	2	2	3		3	3	4	4	5		1	1	1	2	2	L	3	3	3	4	4	120-139
	1	1	1	2	2		2	2	3	3	4		1	1	1	1	1	L	2	2	3	3	3	<120
	<20	20-24	25-29	30-35	> 35	ç	~ 50	20-24	25-29	30-35	> 35		<20	20-24	25-29	30-35	> 35		07.5	20-24	25-29	30-35	> 35	
	•	Ŋ	Ö	ñ	/11		•	2			nass	ind				ઌૼ	74		•	Ñ	Ñ	ಹ	74	
										1			(11	٠	-,									

Andean Latin America

Tropical Latin AmericaBrazil, Paraguay

Risk Lev	/el			<5%	,			5% t	0 <10	0%		10	% to	<20%	6		20%	to •	<30%	, D		≥30%	6	
								No	on-la	bora	atory	/-b	ased	risk	cha	ırt								
Age					M	len											Wo	ome	en					SBP
(years)			n-smo	oker					mok					_	n-smo						moke			(mmHg) ≥180
	20	21	22	23	25	-	24	26	27	29	31		14	14	15	15	16	ı	19	20	21	21	22	
70-74	16	17	18 15	19 16	17	_	20 17	18	23 19	24	26		12	12	13	13	13	ŀ	16	17 14	18 15	18 15	19 16	160-179 140-159
70-74	11	12	12	13	14	-	14	15	16	17	18		8	9	9	9	10	ŀ	12	12	13	13	13	120-139
	9	10	10	11	12	_	12	12	13	14	15		7	7	8	8	8	ŀ	10	10	11	11	11	<120
						_																		
	15	17	18	19	21		21	22	24	26	28		11	11	12	12	13		17	17	18	19	19	≥180
	13	13	14	16	17	-	17	18	19	21	23		9	10	10	10	11	ı	14	14	15	15	16	160-179
65-69	10	11	12	13	14	-	14	15	16	17	18		8	8	8	8	9	ı	11	12	12	13	13	140-159
	7	9	9	10	11 9	-	11 9	12	13	14	15 12		6 5	6 5	7 6	7	7 6	ŀ	9	10	10	9	9	120-139 <120
	'	1	0	0	9	L	9	10	10	- 11	12		J	J	U	0	U	Ļ	0	0	0	9	9	120
	12	13	14	16	17		17	19	21	22	25		9	9	9	10	10	I	14	15	15	16	17	≥180
	10	10	11	12	14		14	15	16	18	20		7	7	8	8	8	ı	12	12	13	13	14	160-179
60-64	8	8	9	10	11		11	12	13	14	16		6	6	6	6	7		9	10	10	11	11	140-159
	6	6	7	8	8	_	9	9	10	11	12		5	5	5	5	5	l	8	8	8	9	9	120-139
	5	5	6	6	7	L	7	7	8	9	10		4	4	4	4	4	L	6	6	7	7	7	<120
	10	11	12	13	14		15	16	18	20	22		7	7	8	8	8	ı	12	13	13	14	15	≥180
	7	8	9	10	11		11	12	14	15	17		6	6	6	6	7	ŀ	10	10	11	11	12	160-179
55-59	6	6	7	8	8	ı	9	10	11	12	13		4	5	5	5	5	ı	8	8	8	9	9	140-159
	4	5	5	6	7		7	7	8	9	10		3	4	4	4	4	ı	6	6	7	7	7	120-139
	3	4	4	5	5		5	6	6	7	8		3	3	3	3	3		5	5	5	6	6	<120
	8	8	9	10	12		12	14	15	17	19	1 1	6	6	6	6	7	•	10	11	12	12	13	≥180
	6	6	7	8	9	_	9	10	12	13	15		4	5	5	5	5	ŀ	8	9	9	9	10	160-179
50-54	4	5	5	6	7	<u> </u>	7	8	9	10	11		3	3	4	4	4	ŀ	6	7	7	7	8	140-159
	3	4	4	4	5	f	5	6	7	8	9		3	3	3	3	3	ľ	5	5	5	6	6	120-139
	2	3	3	3	4	F	4	4	5	6	6		2	2	2	2	2	ı	4	4	4	4	5	<120
						_												•						≥180
	6 4	7 5	8	8	10 7	_	10	12 9	13	15	17		5 3	5 4	5	5	5	ı	9	7	10	11	9	
45-49	3	4	4	6 5	5	<u> </u>	6	6	10 7	11	13		3	3	3	3	3	ŀ	5	5	6	6	6	160-179 140-159
43-43	2	3	3	3	4	-	4	5	5	6	7		2	2	2	2	2	ŀ	4	4	4	5	5	120-139
	2	2	2	2	3		3	3	4	5	5		1	2	2	2	2	ŀ	3	3	3	3	4	<120
						_																		
	5	5	6	7	8		8	10	11	13	15		4	4	4	4	4	Į	8	8	9	9	10	≥180
	3	4	4	5	6	L	6	7	8	9	11		3	3	3	3	3	Į	6	6	6	7	7	160-179
40-44	2	3	3	4	4	L	4	5	6	7	8		2	2	2	2	2	ŀ	4	4	5	5	5	140-159
	2	2	2	2	2	_	2	3	3	5 4	6 4		1	1	2	2	1	ŀ	2	2	3	3	3	120-139 <120
	1					-										1 2		ı						~120
	<20	20-24	25-29	30-35	> 35	0	<20	20-24	25-29	30-35	≥ 35		<20	20-24	25-29	30-35	≥ 35		<20	20-24	25-29	30-35	≥ 35	J
		. 4	. 4	(-)				. 4				ind	lex (k			(-)				. 4	. 4	(-)		I

Tropical Latin America

Southern Latin America Argentina, Chile, Uruguay

Risk Lev	vel		<5%			5% t	o <1(0%		10	% to	<20%	, 0		20%	to <	30%		≥30°	%	
						No	on-la	bora	atory	/-b	ased	risk	cha	ırt							
Age				M	len										W	omer	1				SBP
(years)		on-sm		00	00		moke				10		n-smo		00			Smo		00	(mmHg) ≥180
	26 2	_	31	33	32	34	37	39	41		19	20	21	22	23		29 3	_		36	≥100 160-179
70-74	21 2 18 1	_	26	28	23	29	31 26	33 28	35 30		15	16	17	18 14	18 15		24 2 19 2	_	28	29	140-179
70-74	15 1		18	19	19	20	22	23	25		10	10	11	11	12	-	15 1	_	18	19	120-139
	12 1	4	15	16	16	17	18	19	21		8	8	8	9	9	_	12 1	-	+	15	<120
						- 11					-	=				_					.20
	20 2	2 24	26	28	27	29	32	34	37		14	14	15	16	17		24 2	5 27	28	30	≥180
	16 1	8 19	21	23	22	24	26	28	31		11	11	12	13	13		19 2	21	22	24	160-179
65-69	13 1	4 16	17	19	18	20	21	23	25		8	9	9	10	10		15 1	3 17	18	19	140-159
	11 1	_	14	15	15	16	18	19	21		6	7	7	8	8		11 1:	_	+	15	120-139
	8 9	10	11	12	12	13	14	16	17		5	5	5	6	6		9 9	10	11	11	<120
	16 1	7 19	21	23	23	25	28	30	33	H	10	11	11	12	13		19 2	1 22	24	25	≥180
	12 1	_	17	18	18	20	22	25	27		8	8	8	9	10		15 1	_	18	19	160-179
60-64	10 1	1 12	13	15	14	16	18	20	22		6	6	6	7	7		11 1:	2 13	14	15	140-159
	8 8	9	10	12	11	13	14	16	18		4	4	5	5	5		8 9	10	10	11	120-139
	6 7	7	8	9	9	10	11	13	14		3	3	4	4	4		6 7	7	8	8	<120
																-					≥180
	12 1 9 1	_	17	19	19	21	24	27	30		7 5	8	8	9	9	_	16 1	_	_	21	
55-59	9 1	_	13	15	15	17	19 15	17	19		4	6	6	6 5	7 5		9 9	_	+	16	160-179 140-159
33-39	5 6	_	8	9	9	10	11	13	15		3	3	3	3	4		6 7	_	8	9	120-139
	4 5	_	6	7	7	8	9	10	11		2	2	2	2	3	F	5 5	_	6	6	<120
																_					
	9 1	1 12	14	16	16	18	20	23	27		5	6	6	6	7		13 1	1 15	16	18	≥180
	7 8	4	10	12	12	14	16	18	21		4	4	4	5	5		9 1	_	_	13	160-179
50-54	5 6		8	9	9	10	12	14	16		3	3	3	3	4	L	6 7		8	9	140-159
	4 4	_	6	7	7	8	9	11	12		2	2	2	2	2	L	5 5	_	6	7	120-139
	3 3	3 4	4	5	5	6	7	8	9		1	1	2	2	2		3 4	4	4	5	<120
	7 8	10	11	13	13	15	18	20	24		4	4	4	5	5		10 1	1 12	13	15	≥180
	5 6	7	8	10	10	11	13	15	18		3	3	3	3	4	F	7 8	8	9	10	160-179
45-49	4 4	5	6	7	7	8	10	12	14		2	2	2	2	2		5 5	6	6	7	140-159
	3 3	3 4	4	5	5	6	7	9	10		1	1	1	2	2		3 4	4	4	5	120-139
	2 2	2 3	3	4	4	5	5	6	8		1	1	1	1	1		2 3	3	3	3	<120
	5 6	8	9	11	11	13	15	18	21	1 1	3	3	3	4	4		8 9	10	11	12	≥180
	4 4	5 5	9		8	9	11	13	21		2	2	2	2	3	H	6 6	7	7	_	
40-44	3 3	3 4	5	6	6	7	8	10	16		1	1	1	2	2	-	4 4	5	5	8	160-1 <i>7</i> 9 140-159
,	2 2	+	3	4	4	5	6	7	9		1	1	1	1	1		3 3	_	3	4	120-139
	1 2		2	3	3	4	4	5	6		1	1	1	1	1		2 2	—	2	3	<120
											0	24	59				24				
	<20	25-29	30-35	> 35	<20	20-24	25-29	30-35	≥ 35		<20	20-24	25-29	30-35	> 35	Ċ	20-24	25-29	30-35	≥ 35	
							В	ody r	nass	ind	lex (k	g/m^	2)								

Southern Latin America

Western Europe
Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

Risk Lev	/el			<5%)		5	% to	o <10)%		10	% to	<20%	6		20%	to <	30%	, o		≥30%	6	
								No	n-la	bor	atory	y-b	asec	l risk	cha	art								
Age					N	Лen											Wo	ome	en					SBP
(years)	00		n-smo		00	0	•		moke		10		0.1		n-smo		00		00		moke		10	(mmHg) ≥180
	30	32	34	36	39			41	43	46	49		24	25	26	28	29	ŀ	38	40	42	44	46	
70-74	24	26 21	28	30 25	32	2	-	34 28	36	39 32	41 35		19 15	20 15	21 16	17	23 18	ŀ	30	32 25	34 27	36 28	38	160-179 140-159
70-74	16	17	19	20	22	2	-	23	25	26	29		11	12	13	13	14	ŀ	19	20	21	22	24	120-139
	13	14	15	16	18	1	_	18	20	22	23		9	9	10	10	11	ŀ	15	16	17	18	19	<120
						_																		
	23	25	27	29	32	3	2	34	37	41	44		17	18	19	20	21		31	32	34	37	39	≥180
	18	20	22	24	26	2	5 2	28	30	33	36		13	13	14	15	16	ı	24	25	27	29	31	160-179
65-69	14	16	17	19	21	2		22	24	27	30		10	10	11	12	12	ŀ	18	19	21	22	24	140-159
	9	12	14	15 12	16		-	18	20	22	24		7 5	8	8	9	9 7	ŀ	10	15	16	17	18	120-139
	9	10	11	12	13		J	14	16	17	19		5	O	О	1	/	L	10	11	12	13	14	<120
	17	19	21	24	26	2	6 2	29	32	36	39	1 1	12	12	13	14	15	I	24	26	28	30	32	≥180
	13	15	16	18	21	2	0 :	23	25	28	32		9	9	10	10	11	ı	18	20	21	23	25	160-179
60-64	10	11	13	14	16	1	6	18	20	22	25		6	7	7	8	8		13	15	16	17	18	140-159
	8	9	10	11	12	1	2	14	15	17	20		4	5	5	6	6		10	11	12	13	14	120-139
	6	7	7	8	10	(9	11	12	14	15		3	3	4	4	4	L	7	8	8	9	10	<120
	13	15	17	19	21	2	1 1	24	27	31	35	1 1	8	9	9	10	11	ı	19	21	23	25	27	≥180
	10	11	12	14	16		_	18	21	24	27		6	6	7	7	8	ŀ	14	15	16	18	20	160-179
55-59	7	8	9	11	12	1	2	14	16	18	21		4	4	5	5	6	ŀ	10	11	12	13	14	140-159
	5	6	7	8	9	9	9	11	12	14	16		3	3	3	4	4	ľ	7	8	8	9	10	120-139
	4	5	5	6	7	7	7	8	9	11	12		2	2	2	3	3		5	5	6	7	7	<120
	40	44	40	45	47		7	00	00	07	04		0	0	7	7			45	47	40	00	00	≥180
	10 7	11	13	15	17	1	_	20 15	23 17	27	31 24		6 4	6 4	7 5	7 5	8 5	ŀ	15	17 12	18	20 14	16	160-179
50-54	5	6	7	8	9		4	11	13	15	18		3	3	3	3	4	ŀ	7	8	9	10	11	140-159
000.	4	4	5	6	7		-	8	10	11	13		2	2	2	2	3	ŀ	5	6	6	7	8	120-139
	3	3	4	4	5		5	6	7	8	10		1	1	1	2	2	ľ	3	4	4	5	5	<120
						_																		400
	7	8	10	12	14		_	17	20	23	27		4	4	5	5	6	ļ	12	13	15	16	18	≥180
45 40	5	6	7	8	10		+	12	14	17	20		3	3	3	3	4	ŀ	8	9	10	11	12	160-179
45-49	2	3	5 4	6 4	7 5	į	4	9	10 7	12 9	15 11		2	1	1	2	2	ŀ	5 4	6 4	7	7 5	8	140-159 120-139
	2	2	3	3	4		_	4	5	7	8		1	1	1	1	1	ŀ	2	3	3	3	4	<120-139
		_	Ů	Ů		_			ŭ	•	Ů						•	L	_	Ū	Ů	Ů	•	
	5	6	8	9	11	1	1	14	16	20	24		3	3	3	4	4	Ī	9	10	12	13	15	≥180
	4	4	5	6	8	8	3	10	12	14	18		2	2	2	2	3		6	7	8	9	10	160-179
40-44	2	3	4	4	5	_	_	7	8	10	13		1	1	1	1	2		4	4	5	6	6	140-159
	2	2	3	3	4	4	_	5	6	7	9		1	1	1	1	1	ļ	3	3	3	4	4	120-139
	1	1	2	2	3	- 3	_	3	4	5	6		0	0	1	1	1	L	2	2	2	2	3	<120
	<20	20-24	25-29	30-35	> 35	C >	3 6	20-24	25-29	30-35	≥ 35		<20	20-24	25-29	30-35	> 35		<20	20-24	25-29	30-35	≥ 35	
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													•	_										

Western Europe

Central Europe
Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia

Risk Lev	/el			<5%				5% t	o <10	0%		109	% to	<20%	6		20%	to <	30%	,)		≥30%	6	
								No	on-la	bor	atory	/-ba	asec	l risk	cha	art								
Age					M	1en											Wo	ome	1					SBP
(years)		Non	ı-smo	oker					moke						n-smo	ker				S	moke			(mmHg)
	35	38	41	44	47		46	49	52	56	59	Ш	33	35	36	38	40		52	55	57	60	62	≥180
	28	31	33	35	38		37	40	43	46	49	П	26	27	29	30	32	Ľ	42	44	47	49	51	160-179
70-74	23	24	26	28	31		30	32	35	38	41	П	20	21	22	23	25		33	35	37	39	41	140-159
	18	19	21	23	24		24	26	28	30	33		15	16	17	18	19		26	27	29	31	32	120-139
	14	15	16	18	19	L	19	20	22	24	26		12	12	13	14	14		20	21	22	24	25	<120
	27	29	32	35	38		38	41	45	49	53	ı	23	25	26	28	29		43	45	48	50	53	≥180
	21	23	25	27	30		30	33	36	39	43		17	18	19	21	22		33	35	37	39	42	160-179
65-69	16	17	19	21	23		23	25	28	31	34		13	13	14	15	16		25	26	28	30	32	140-159
	12	13	15	16	18		18	20	22	24	27		9	10	10	11	12		18	20	21	22	24	120-139
	9	10	11	12	14		13	15	17	19	21		7	7	8	8	9		14	14	16	17	18	<120
						_												_						
	20	22	25	27	31		31	34	38	42	47		16	17	18	19	21		34	36	39	42	44	≥180
	15	16	18	21	23		23	26	29	33	37		11	12	13	14	15		25	27	29	31	33	160-179
60-64	11	12	14	15	17		17	20	22	25	28		8	9	9	10	11	-	18	19	21	23	25	140-159
	8	9	10	11	13	_	13	15	17	19	21		6	6	6	7	7		13	14	15	16	18	120-139
	6	7	7	8	10		10	11	12	14	16		4	4	5	5	5	L	9	10	11	12	13	<120
	15	16	19	21	24		25	28	32	36	41	ı	11	12	13	14	15		27	29	31	34	37	≥180
	10	12	14	16	18		18	21	24	27	31		8	8	9	9	10		19	20	22	24	26	160-179
55-59	7	8	10	11	13		13	15	17	20	23		5	5	6	6	7		13	14	15	17	19	140-159
	5	6	7	8	9		9	11	13	15	17		3	4	4	4	5	F	9	10	11	12	13	120-139
	4	4	5	6	7		7	8	9	11	12		2	2	3	3	3	ı	6	7	7	8	9	<120
						_					•							_					•	≥180
	11	12	14	16	19		20	23	27	31	36		8	8	9	10	10		21	23	25	27	30	
50.54	7	9	10	12	14		14	16	19	22	27		5	5	6	6	7		14	15	17	19	21	160-179
50-54	5	6	7	8	10		10	11	14	16	19		3	3	4	4	4		9	10	11	13	14	140-159
	3	3	5 3	6	7 5	_	7 5	8	10 7	11 8	14		2	2	2	2	3	_	6 4	7	7 5	8 5	9	120-139 <120
		3	3	4	5	L	5	O	1	0	10	IJ	- 1	1				L	4	4	J	J	O	~120
	8	9	11	13	15		16	19	22	26	31	l	5	6	6	7	7		17	18	20	22	24	≥180
	5	6	7	9	10		11	13	15	18	22		3	4	4	4	5		11	12	13	14	16	160-179
45-49	3	4	5	6	7		7	9	11	13	16		2	2	2	3	3		7	7	8	9	10	140-159
	2	3	3	4	5		5	6	7	9	11		1	1	1	2	2		4	5	5	6	7	120-139
	2	2	2	3	3		3	4	5	6	7		1	1	1	1	1		3	3	3	4	4	<120
	6	7	C	10	10	_	12	15	10	22	27		1	Α	_	F		_	12	1.4	10	17	10	≥180
	6	7	8 5	10 6	12		12	15	18	15	19		2	2	3	5	5		13	9	16	17	19	
40.44		_	_	_		H	_							2	Ţ	_	Ť	<u> </u>	_	_	10		12	160-179
40-44	2	3	3	4	5		5	7	8	10	13		1	1	2	2	2	_	5	5	6	7	8	140-159 120-139
	2	1	2	3	2	_	2	3	5 4	7	9		0	0	1	1	1		2	2	2	3	5 3	<120-139
			<u>ი</u>	ίζ		-						ı I					5	_						-120
	<20	20-24	25-29	30-35	> 35	(<20	20-24	25-29	30-35	≥ 35		<20	20-24	25-29	30-35	> 35	ć	7. V	20-24	25-29	30-35	≥ 35	
		• •	. 1	.,				. 1			nass	ind	ex (k			.,					. 1	.,		

Central Europe

Eastern EuropeBelarus, Estonia, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine

Risk Lev	/el	<5%	6		5% to	o < 10	1%		10	% to	<20%	ó		20%	to <3	0%			≥30%	, D	
					No	n-la	bora	atory	-ba	ased	risk	cha	art								
Age			М	en										Wo	omen						SBP
(years)	-	-smoker			_	moke						n-smo					_	noke			(mmHg)
	38 40	42 44	46	46	48	51	53	56		37	38	40	42	43		_	5	57	59	62	≥180
70.74	32 34	36 38	40	39	41	44	46	49		30	32	33	34	36			7	49	51	53	160-179
70-74	27 29	30 32	34	33	35	37	40	42		25	26	27	28	29		_	9	41	42	44	140-159 120-139
	23 24 19 20	25 2721 23	29	28	30	32	34	36		16	17	18	18	19	,	_	2	33	35 29	37 30	<120-139
	19 20	21 23	24	24	25	27	29	30	ı	10	17	10	10	19		.J 2	26	27	23	30	1120
	30 33	35 37	40	40	42	45	48	51		28	29	30	32	34	4	5 4	7	49	52	54	≥180
	25 27	29 31	33	33	35	38	41	44		22	23	24	26	27	3	7 3	9	40	43	45	160-179
65-69	21 22	24 26	28	27	29	32	34	37		17	18	19	20	21	2	9 3	1	33	35	36	140-159
	17 18	20 21	23	23	24	26	28	31		14	14	15	16	17	2	3 2	25	26	28	29	120-139
	14 15	16 17	19	18	20	22	23	25		11	11	12	12	13	1	8 2	0	21	22	23	<120
	24 26	29 31	34	34	37	40	43	47	1	21	22	23	24	26	-	8 4	0	42	44	47	≥180
	19 21	23 25	28	28	30	33	36	39		16	17	18	19	20		_	1	33	35	38	160-179
60-64	15 17	19 20	22	22	24	27	29	32		12	13	13	14	15		_	4	26	28	30	140-159
	12 14	15 16		18	20	22	24	26		9	10	10	11	12		_	9	20	22	23	120-139
	10 11	12 13	14	14	16	17	19	21		7	7	8	8	9	1	4 1	4	15	17	18	<120
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	19 21	23 26	29	29	32	35	38	42		15	16	17	18	19	3	1 3	3	35	38	40	≥180
	15 17	18 20	23	23	25	28	31	34		11	12	13	14	15		_	25	27	29	31	160-179
55-59	12 13	14 16	18	18	20	22	25	28		8	9	9	10	11		_	9	21	22	24	140-159
	9 10	11 13 9 10	14	14	16	18	20	22		6	7 5	7 5	7 5	8		_	4	15	17	18	120-139
	7 8	9 10	11	11	12	14	16	18	ı	4	Э	5	Э	6		0 1	1	11	12	13	<120
	15 17	19 21	24	24	27	31	34	38		11	12	13	14	15	2	6 2	8	30	32	34	≥180
	11 13	15 16	19	19	21	24	27	31		8	9	9	10	11	1	9 2	0	22	24	26	160-179
50-54	9 10	11 13	14	14	16	19	21	24		6	6	7	7	8	1	4 1	5	16	18	19	140-159
	7 7	8 10	11	11	13	14	16	19		4	4	5	5	5	1	0 1	1	12	13	14	120-139
	5 6	6 7	8	8	10	11	13	15		3	3	3	4	4		7	8	8	9	10	<120
	12 13	15 17	20	20	23	27	30	35		8	9	10	10	11		1 2	23	25	27	29	≥180
	9 10	11 13	15	15	18	20	23	27		6	6	7	7	8		_	6	18	19	21	160-179
45-49	6 7	9 10	11	12	13	15	18	21		4	4	5	5	5		_	2	13	14	15	140-159
	5 5	6 7	9	9	10	12	14	16		3	3	3	3	4		7	8	9	10	11	120-139
	3 4	5 5	6	6	8	9	10	12		2	2	2	2	3		5 (6	6	7	8	<120
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	9 11	12 14	17	17	20	23	27	31		6	7	7	8	8	1	7 1	9	20	22	25	≥180
40.44	7 8	9 10	12	13	15	17	20	24		4	5	5	5	6		_	3	14	16	17	160-179
40-44	5 6	6 8	9	9	11	13	15	18		3	3	3	3	4	_	_	9	10	11	12	140-159 120-139
	3 4 2 3	5 6 3 4	7	7 5	8 6	9 7	11	13		1	1	1	2	2		_	6 4	7 5	7 5	6	<120-139
															<u> </u>		_				~120
	<20 20-24	25-29 30-35	> 35	<20	20-24	25-29	30-35	> 35		<20	20-24	25-29	30-35	> 35	ç	25.00	7 .0.	25-29	30-35	≥ 35	
	CV.	(4 (5)			.,				ind	ex (k			(.)			C	4	. 4	(.)		

Eastern Europe

North Africa and Middle East

Afghanistan, Algeria, Bahrain, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, occupied Palestinian territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates, Yemen

Risk Le	vel			<5%	ı		5%	to <1	0%		10% to	<209	%		20%	to <30	%		≥30%	%	
							N	on-la	bor	atory	-base	d ris	k cha	art							
Age					N	/len									Wo	men					SBP
(years)			n-smo					Smok					n-smo					Smok			(mmHg)
	40	42	44	47	50	49	51	54	57	60	33	34	35	36	37	43	44	46	47	48	≥180
	33	35	38	40	42	42	44	47	49	52	29	29	30	31	32	38	39	40	41	42	160-179
70-74	28	30	32	34	36	35	37	40	42	45	25	25	26	27	28	33	34	35	36	37	140-159
	23	25	26	28	30	29	31	33	36	38	21	22	23	23	24	29	30	30	31	32	120-139
	19	20	22	23	25	24	26	28	30	32	18	19	19	20	21	25	26	26	27	28	<120
	31	34	36	39	42	42	45	48	51	55	27	28	29	30	31	38	39	41	42	43	≥180
	26	28	30	32	35	35	37	40	43	47	23	24	24	25	26	33	34	35	36	37	160-179
65-69	21	22	24	27	29	28	31	33	36	39	19	20	21	21	22	28	29	30	31	32	140-159
	17	18	20	22	23	23	25	27	30	32	16	17	17	18	19	24	25	25	26	27	120-139
	13	15	16	17	19	19	20	22	24	26	13	14	15	15	16	20	21	22	22	23	<120
	_																				400
	25	27	30	32	36	35		42	46	50	22	23	23	24	25	34	35	36	37	39	≥180
00.04	19	21	24	26	29	28	31	34	38	41	18	19	19	20	21	28	29	30	32	33	160-179
60-64	15	17	19	21	23	23	25	28	31	34	15	15	16	17	17	23	24	25	27	28	140-159
	12 9	13	15 12	16	18	18	16	18	25	27	12	13	13	14	14	19	20 17	21 18	18	19	120-139 <120
	9	10	12	13	14	14	10	10	20	22	10	10	11	- 11	12	10	-17	10	10	19	\120
	19	21	24	27	30	30	33	37	41	45	18	18	19	20	21	29	31	32	33	35	≥180
	15	16	18	21	23	23	26	29	33	37	14	15	15	16	17	24	25	26	28	29	160-179
55-59	11	13	14	16	18	18	20	23	26	29	11	12	12	13	14	20	21	22	23	24	140-159
	9	10	11	12	14	14	16	18	20	23	9	9	10	10	11	16	17	18	18	19	120-139
	6	7	8	9	11	11	12	14	16	18	7	8	8	8	9	13	13	14	15	16	<120
	45	47	40	00	0.5	0.5	- 00	20	20	44	44	45	45	40	47	00	07	00	00	04	≥180
	15	17	19	22	25	25	28	32	36	41	14	15	15	16	17	26	27	28	29	31	_
50-54	11	13	14	16 12	19	19	16	25 19	28	32	11	12 9	12 10	13	13	16	21 17	23 18	19	25	160-179 140-159
30-34	6	7	8	9	11	11	12	14	17	19	7	7	7	8	8	13	14	14	15	16	120-139
	4	5	6	7	8	8	9	11	13	15	5	6	6	6	7	10	11	11	12	13	<120
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	11	13	15	17	20	21	24	27	32	37	11	12	12	13	14	22	23	25	26	28	≥180
	8	10	11	13	15	15	18	21	24	28	9	9	10	10	11	17	18	19	21	22	160-179
45-49	6	7	8	9	11	11	13	15	18	21	7	7	7	8	8	13	14	15	16	17	140-159
	4	5	6	7	8	8	10	11	14	16	5	5	6	6	6	10	11	12	13	14	120-139
	3	4	4	5	6	6	7	8	10	12	4	4	4	5	5	8	9	9	10	11	<120
	9	10	12	14	17	17	20	24	28	33	9	9	10	11	11	19	20	22	22	24	≥180
	6	7	8	10	12	17	15	24 17	21	25	7	7	7	8	11	15	16	17	18	19	160-179
40-44	4	5	6	7	9	9	11	13	15	18	5	5	6	6	6	11	12	13	14	15	140-179
10-44	3	4	4	5	6	6	8	9	11	13	4	4	4	5	5	8	9	10	10	11	120-139
	2	3	3	4	4	4	5	7	8	10	3	3	3	3	4	6	7	7	8	9	<120
				5	35					35										35	
	<20	20-24	25-29	30-35	ΛI	<20	20-24	25-29	30-35	۸I	<20	20-24	25-29	30-35	≥ 35	<20	20-24	25-29	30-35	ΛI	
		. 4	. 4							mass	index (.,				. 4	.,		

North Africa and Middle East

Western Sub-Saharan Africa

Benin, Burkina Faso, Cabo Verde, Cameroon, Chad, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo

Risk Lev	/el			<5%				5% t	o <10	0%		10	% to	<20%	6		20%	to <	30%)		≥30%	6	
								No	on-la	bora	atory	/-b	asec	l risk	cha	art								
Age					N	/len											Wo	ome	n					SBP
(years)	-00		n-smo		20		00		moke		20		00		n-smo		00		00		mok		20	(mmHg) ≥180
	19	24	26 21	28	30 25	ŀ	29 24	31 26	33 28	36 30	38		20 17	21 17	18	18	23 19	ŀ	29 24	30 25	31 26	32 27	33 28	160-179
70-74	15	16	17	19	20	ł	20	21	23	24	26		14	14	15	15	16	H	20	21	21	22	23	140-159
	12	13	14	15	16	ı	16	17	18	20	21		11	12	12	13	13	ı	17	17	18	18	19	120-139
	10	11	11	12	13	ľ	13	14	15	16	17		9	10	10	10	11	ľ	14	14	15	15	16	<120
	47	10	0.1	00	0.4		0.4	00	00	0.1	0.4		15	10	47	47	40		0.4	0.5	00	07	00	≥180
	17	19 15	21 16	18	24	ŀ	24 19	26 21	29	31 25	34 27		15 12	16 13	17 13	17	18 15	ŀ	24	25 21	26 21	27	29	160-179
65-69	11	12	13	14	16	ŀ	15	17	18	20	22		10	10	11	11	12	ı	16	17	17	18	19	140-159
	9	9	10	11	12	ŀ	12	13	15	16	18		8	8	9	9	9	ŀ	13	13	14	15	15	120-139
	7	7	8	9	10	ı	10	11	12	13	14		6	7	7	7	8	I	10	11	11	12	12	<120
	40	45	40	40	00	Ī	00	00	0.4	07	20		40	40	40	44	44	Ī	00	04	00	0.4	0.5	≥180
	13	15	16 13	18	16	ŀ	20 16	17	19	27	30 24		12 9	12	13	14	14	ŀ	20 16	17	18	19	25	160-179
60-64	8	9	10	11	12	ŀ	12	13	15	17	19		7	8	8	8	9	ŀ	13	13	14	15	16	140-159
	6	7	7	8	9	ľ	9	10	12	13	15		6	6	6	6	7	ŀ	10	11	11	12	12	120-139
	5	5	6	6	7	ı	7	8	9	10	11		4	5	5	5	5	ı	8	8	9	9	10	<120
	40	44	40	44	40	Ī	40	40	0.4	00	00		_	40	40	44	44	Ī	47	40	40	00	04	≥180
	10	11 9	13	14	16	ŀ	16 12	18 14	16	23 18	26		9	10 7	10	11	11 8	-	17 13	18	19 15	20 16	21 16	160-179
55-59	6	6	7	8	9	ŀ	9	11	12	14	16		5	5	6	6	6	ŀ	10	11	11	12	13	140-159
00 00	4	5	5	6	7	ŀ	7	8	9	10	12		4	4	4	5	5	ŀ	8	8	9	9	10	120-139
	3	4	4	5	5	ŀ	5	6	7	8	9		3	3	3	3	4	ľ	6	6	7	7	7	<120
						Ī																		≥180
	8	9	10 7	11	13	ŀ	13 10	15 11	18	20 15	23 18		7 5	7 5	8	8	9	ŀ	14	15 11	16 12	17	18	160-179
50-54	4	5	5	6	7	ŀ	7	8	10	11	13		4	4	4	4	5	ŀ	8	9	9	10	10	140-159
00 01	3	3	4	5	5	ŀ	5	6	7	8	10		3	3	3	3	3	ŀ	6	6	7	7	8	120-139
	2	2	3	3	4	ľ	4	5	5	6	7		2	2	2	2	3	ľ	4	5	5	5	6	<120
						Ī																		≥180
	6 4	7 5	8	9	11	ŀ	11	13	15	17	20		5 4	6	6	6 5	7 5	ŀ	12 9	13	14	15	16	160-179
45-49	3	3	4	5	5	ŀ	6	7	8	9	15 11		3	3	3	3	3	ŀ	6	7	7	11	8	140-159
10 10	2	2	3	3	4	ŀ	4	5	6	7	8		2	2	2	2	2	ŀ	5	5	5	6	6	120-139
	1	2	2	2	3	ı	3	3	4	5	6		1	1	2	2	2	ı	3	4	4	4	4	<120
																								190
	5	5	6	7	9	ļ	9	11	13	15	18		4	4	5	5	5	ļ	10 7	11	12	12	13	≥180
40-44	2	3	3	5 4	6	ŀ	6	7 5	9	11	13 9		3	3	3	3	3	ŀ	5	8 5	8	9	7	160-179 140-159
70-44	1	2	2	2	3	ŀ	3	4	4	5	6		1	1	2	2	2	ŀ	4	4	4	4	5	120-139
	1	1	1	2	2	ŀ	2	3	3	4	5		1	1	1	1	1	ŀ	2	3	3	3	3	<120
	0	24	59	35	35	_	0.	24	59	35	35	. !	0	24	59	35	35		0	24	59	35	35	
	<20	20-24	25-29	30-35	> 35		<20	20-24	25-29	. 30-35	ΛI		<20	20-24	25-29	30-35	ΛI		<20	20-24	25-29	30-35	ΛI	
									В	ody r	nass	ind	ex (k	g/m^:	2)									

Western Sub-Saharan Africa

Central Sub-Saharan Africa
Angola, Central African Republic, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon

Risk Lev	vel <5%	5% to <10%	0% to <20%	230% ≥30%	
		Non-laboratory-l	pased risk chart		
Age		en	Won		SBP
(years)	Non-smoker	Smoker	Non-smoker	Smoker	(mmHg)
	25 26 28 30 32	31 33 35 37 39	24 25 26 27 28	34 36 37 39 40	≥180
70-74	20 22 23 25 26	26 28 29 31 33	20 20 21 22 23	29 30 31 32 34	160-179
70-74	17 18 19 20 22 14 15 16 17 18	21 23 24 26 28 18 19 20 22 23	16 17 18 18 19 13 14 14 15 16	24 25 26 27 28 20 21 21 22 23	140-159 120-139
	11 12 13 14 15	14 15 17 18 19	11 11 12 12 13	16 17 18 18 19	<120
	11 12 10 14 10	14 10 17 10 10	11 11 12 12 10	10 11 10 10 10	1120
	19 21 22 24 26	26 28 30 33 35	18 19 20 21 22	29 30 32 33 35	≥180
	15 17 18 20 21	21 23 25 27 29	15 15 16 17 17	24 25 26 27 29	160-179
65-69	12 13 15 16 17	17 18 20 22 24	12 12 13 13 14	19 20 21 22 23	140-159
	10 11 12 13 14	14 15 16 18 19	9 10 10 11 11	15 16 17 18 19	120-139
	8 8 9 10 11	11 12 13 14 15	7 8 8 9 9	12 13 14 14 15	<120
	15 16 18 20 22	22 24 26 29 32	14 14 15 16 17	24 26 27 28 30	≥180
	12 13 14 16 17	22 24 26 29 32 17 19 21 23 25	11 11 12 12 13	19 20 21 23 24	160-179
60-64	9 10 11 12 13	13 15 16 18 20	8 9 9 10 10	15 16 17 18 19	140-159
00 0 .	7 8 9 9 11	11 12 13 14 16	6 7 7 8 8	12 13 13 14 15	120-139
	5 6 7 7 8	8 9 10 11 13	5 5 6 6 6	9 10 10 11 12	<120
	11 13 14 16 18	18 20 22 25 28	10 11 12 12 13	20 21 23 24 26	≥180
	9 10 11 12 14	14 16 17 20 22	8 8 9 9 10	16 17 18 19 20	160-179
55-59	7 7 8 9 11	11 12 13 15 17	6 6 7 7 7	12 13 14 14 15	140-159
	5 6 6 7 8	8 9 10 12 13	4 5 5 6	9 10 10 11 12	120-139
	4 4 5 5 6	6 7 8 9 10	3 4 4 4 4	7 7 8 8 9	<120
	9 10 11 13 15	15 17 19 22 25	8 8 9 9 10	17 18 19 21 22	≥180
	7 7 8 10 11	11 13 15 17 19	6 6 6 7 7	13 13 14 16 17	160-179
50-54	5 5 6 7 8	8 10 11 13 15	4 4 5 5 5	9 10 11 12 13	140-159
	4 4 5 5 6	6 7 8 9 11	3 3 3 4 4	7 7 8 9 9	120-139
	3 3 3 4 5	5 5 6 7 8	2 2 3 3 3	5 6 6 6 7	<120
	7 0 0 10 10	40 44 40 40 00	0 0 7 7 0	44 45 40 47 40	≥180
	7 8 9 10 12 5 6 6 7 9	12 14 16 19 22 9 10 12 14 17	6 6 7 7 8 4 5 5 5 5	14 15 16 17 19 10 11 12 13 14	160-179
45-49	5 6 6 7 9 4 4 5 5 6	7 8 9 10 12	3 3 3 4 4	10 11 12 13 14 7 8 9 9 10	140-159
45 45	3 3 3 4 5	5 6 6 8 9	2 2 2 3 3	5 6 6 7 7	120-139
	2 2 2 3 3	3 4 5 6 7	2 2 2 2 2	4 4 5 5 5	<120
	5 6 7 8 10	10 12 14 16 19	5 5 5 6	12 13 14 15 16	≥180
	4 4 5 6 7	7 8 10 12 14	3 3 4 4 4	8 9 10 10 11	160-179
40-44	3 3 3 4 5	5 6 7 9 10	2 2 2 3 3	6 6 7 7 8	140-159
	2 2 2 3 3	4 4 5 6 7	1 2 2 2 2	4 4 5 5 6	120-139
	1 1 2 2 2	3 3 4 4 5	1 1 1 1 1	3 3 3 4 4	<120
	<20 20-24 25-29 30-35 ≥ 35	<20 20-24 25-29 30-35 ≥ 35	<20 20-24 25-29 30-35 ≥ 35	<20 20-24 25-29 30-35 ≥ 35	
	* % % % %	ັ້ ດີ ດີ ອີ ⁷¹ Body mass in		, 8 8 8 4	
		200, 11000 111	(9 =)		

Central Sub-Saharan Africa

Eastern Sub-Saharan AfricaBurundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, Uganda, United Republic of Tanzania, Zambia

70-74	SBP (mmHg) ≥180 160-179
Non-smoker Smoker Non-smoker Smoker Sm	(mmHg) ≥180
24 25 27 29 30 30 32 34 36 38 18 19 20 20 25 26 26 27 28 28 27 29 30 31 31 31 31 31 31 31	≥180
70-74	
70-74	160-179
13 14 15 16 17 17 18 19 21 22 10 11 11 11 12 15 15 16 16 17 17 18 19 21 22 10 11 11 11 11 12 12 13 13 14 14 15 16 16 17 18 19 21 23 24 26 28 11 12 12 13 13 13 14 15 16 16 16 17 18 19 20 20 22 24 26 28 11 12 12 13 13 13 17 18 19 20 20 20 20 20 20 20 20 20 20 20 20 20	
11 11 12 13 14 14 15 16 17 18 9 9 9 9 10 10 12 13 13 14 14 14 15 16 16 17 18 9 9 9 9 10 10 10 12 13 13 14 14 14 15 16 16 16 17 19 20 20 22 24 26 28 11 12 12 13 13 13 14 15 16 16 16 18 19 21 23 9 10 10 10 11 14 15 15 16 17 18 8 8 8 8 9 10 11 10 11 12 14 15 16 6 6 7 7 7 7 10 10 10 11 11 11 11 12 14 15 16 16 17 18 19 20 20 21 11 12 14 15 16 16 17 18 19 20 20 21 11 12 14 15 16 16 17 18 20 22 24 9 9 9 9 10 10 10 11 15 15 16 16 17 16 17 17 18 19 10 11 11 11 11 11 11 11 11 11 11 11 11	140-159 120-139
65-69	<120-139
65-69	1120
65-69	≥180
9 10 11 12 13 13 14 15 17 18 8 8 8 8 9 12 12 13 13 14 15 17 18 6 6 6 7 7 7 7 10 10 10 11 11 11 11 11 11 11 12 14 15 16 6 6 6 7 7 7 7 8 9 10 10 11 12 14 15 5 6 6 6 6 6 6 9 10 10 11 11 11	160-179
8 8 9 10 11 10 11 12 14 15 6 6 7 7 7 7 10 10 10 11 11 14 16 17 19 21 21 23 25 28 30 11 11 12 12 13 18 19 20 20 21 11 12 14 15 16 17 18 20 22 24 9 9 9 10 10 15 15 16 16 17 60-64 9 10 11 12 14 15 5 6 6 6 9 10 11 11	140-159
60-64 9 10 11 12 13 13 14 16 17 19 10 11 12 14 15 16 10 11 12 14 15 16 16 17 18 20 22 24 15 16 16 17 18 20 22 24 15 16 16 17 18 20 22 24 15 16 16 17 17 18 20 22 24 15 16 16 17 17 18 20 20 20 21 18 19 20 20 21 18 19 20 20 21 19 19 10 10 10 11 12 14 15 15 16 16 16 17 19 10 10 11 11 11 11 11 11 11 11 11 11 11	120-139
60-64 9 10 11 12 13 13 14 15 16 17 18 20 22 24 9 9 9 10 10 15 15 16 16 17 17 18 10 10 10 10 11 12 13 13 14 15 16 16 17 19 10 10 11 12 14 15 15 16 16 17 19 10 10 11 11 11 11 11 11 11 11 11 11 11	<120
60-64 9 10 11 12 13 13 14 15 16 17 18 20 22 24 9 9 9 10 10 15 15 16 16 17 17 18 10 10 10 10 11 12 13 13 14 15 16 16 17 19 10 10 11 12 14 15 15 16 16 17 19 10 10 11 11 11 11 11 11 11 11 11 11 11	≥180
60-64 9 10 11 12 13 13 14 16 17 19 7 7 7 8 8 12 12 13 13 14 7 7 7 8 9 10 10 11 12 14 15 5 6 6 6 6 9 10 10 11 11	160-179
	140-159
5 6 6 7 8 8 9 10 11 12 4 4 5 5 5 7 8 8 8 9 9	120-139
	<120
	190
11 12 14 15 17 17 19 22 24 27 9 9 9 10 10 15 16 17 18 19	≥180
	160-179
	140-159 120-139
4 4 5 5 6 6 7 8 9 10 3 3 3 3 4 6 6 6 7 7	<120
	.20
9 10 11 12 14 16 18 21 24 7 7 7 8 8 13 14 14 15 16	≥180
6 7 8 9 11 11 12 14 16 18 5 5 5 6 6 10 10 11 12 12	160-179
	140-159
	120-139
3 3 3 4 4 5 6 7 8 2 2 2 2 3 4 5 5 5 6	<120
7 8 9 10 11 12 14 16 18 21 5 5 6 6 6 11 12 12 13 14	≥180
5 5 6 7 8 9 10 12 14 16 4 4 4 5 8 9 9 10 10	160-179
45-49 3 4 5 5 6 6 7 9 10 12 3 3 3 3 3 6 6 7 7 8	140-159
2 3 3 4 4 5 5 6 7 9 2 2 2 3 4 5 5 6	120-139
2 2 2 3 3 3 4 5 5 6 1 2 2 2 2 3 4 4 4 4	<120
	≥180
5 6 7 8 9 10 11 13 16 19 4 4 4 5 5 9 10 11 11 12 4 4 5 6 7 7 8 10 11 14 3 3 3 3 4 7 7 8 8 9	160-179
	140-179
	120-139
1 1 2 2 2 2 3 4 4 5 1 1 1 1 1 3 3 3 3 3	
	<120
 <20 <20 <20-24 <20 <20<td><120</td>	<120
Body mass index (kg/m^2)	<120

Eastern Sub-Saharan Africa

Southern Sub-Saharan AfricaBotswana, Eswatini, Lesotho, Namibia, South Africa, Zimbabwe

Risk Lev	vel		<5%			5% t	o <1(0%		10	% to	<20%	, 5		20%	to <	30%			≥30%	6	
						No	on-la	bora	atory	/-b	ased	risk	cha	art								
Age				M	len										W	ome	n					SBP
(years)		on-sm					moke						i-smo						moke			(mmHg) ≥180
	23 2	_	28	30	29	31	33	35	38		20	20	21	22	22		27	28	29	30	31	160-179
70-74	19 2	_	23 19	25	24	26	28	29	31 26		17	17	18 15	18 15	19	_	23 20	24	25	26	26	140-179
70-74	12 1	_	15	17	16	17	19	20	21		12	12	12	13	13	_	16	17	18	18	19	120-139
	10 1	4	12	13	13	14	15	16	18		10	10	10	11	11	-	14	14	15	15	16	<120
											- 1 2			- 1 1		_			1.5			.20
	18 1	9 21	23	25	24	26	29	31	34		15	16	17	17	18		24	24	25	26	27	≥180
	14 1	5 17	18	20	20	21	23	25	27		13	13	14	14	15		19	20	21	22	23	160-179
65-69	11 1:	2 13	14	16	16	17	19	20	22		10	11	11	11	12		16	17	17	18	19	140-159
	9 1	_	12	13	12	14	15	16	18		8	9	9	9	10	-	13	14	14	15	15	120-139
	7 8	8	9	10	10	11	12	13	14		7	7	7	8	8		11	11	11	12	12	<120
	14 1	5 16	18	20	20	22	24	27	30	ll	12	13	13	14	14		20	21	22	23	24	≥180
	11 1:	_	14	16	16	17	19	21	24		10	10	10	11	11		16	17	18	18	19	160-179
60-64	8 9	10	11	12	12	14	15	17	19		8	8	8	9	9		13	13	14	15	15	140-159
	6 7	7 8	9	10	10	11	12	13	15		6	6	7	7	7		10	11	11	12	12	120-139
	5 5	6	7	7	7	8	9	10	12		5	5	5	5	6		8	9	9	9	10	<120
	40 4	0 40	45	40	47	40	0.1	00	00		0	40	40	44	44		47	40	40	00	04	≥180
	10 1: 8 9	_	15 11	16	17	19 14	21 16	23 18	26		9	10	10	11	9		17 13	18	19 15	20 15	21 16	160-179
55-59	6 7	_	8	10	10	11	12	14	16		6	6	6	6	7		10	11	11	12	13	140-179
00-00	4 5		6	7	7	8	9	11	12		4	5	5	5	5	-	8	8	9	9	10	120-139
	3 4	_	5	5	5	6	7	8	9		3	3	4	4	4	F	6	7	7	7	8	<120
																_					-	
	8 9		12	13	14	16	18	20	23		7	8	8	8	9		14	15	16	17	18	≥180
	6 7	4	9	10	10	12	13	15	18		6	6	6	6	7		11	12	12	13	14	160-179
50-54	4 5	_	6	7	7	9	10	12	13		4	4	5	5	5	L	8	9	9	10	11	140-159
	3 4	+-	5	5	6 4	6 5	7	9	10		3	3	3	4	4	-	6 5	7	7	8	8	120-139
	2 3	3	3	4	4	Э	5	6	7		2	2	3	3	3	L	5	5	5	6	6	<120
	6 7	8	9	11	11	13	15	18	21		6	6	6	7	7		12	13	14	15	15	≥180
	4 5	6	7	8	8	9	11	13	15		4	4	5	5	5		9	10	10	11	12	160-179
45-49	3 4	4	5	6	6	7	8	9	11		3	3	3	4	4		7	7	8	8	9	140-159
	2 3	3	3	4	4	5	6	7	8		2	2	2	3	3		5	5	6	6	7	120-139
	2 2	2 2	3	3	3	4	4	5	6		2	2	2	2	2		4	4	4	5	5	<120
	5 5	6	7	9	9	11	13	15	18	l I	4	5	5	5	6		10	11	12	12	13	≥180
	3 4	1 4	5	6	6	8	9	11	13		3	3	4	4	4	-	7	8	9	9	10	160-179
40-44	2 3	3 3	4	4	5	5	6	8	9		2	2	2	3	3	H	5	6	6	7	7	140-159
	2 2	+	3	3	3	4	5	6	7		2	2	2	2	2		4	4	4	5	5	120-139
	1 1	_	2	2	2	3	3	4	5		1	1	1	1	1	ľ	3	3	3	4	4	<120
	24	29	35	> 35	Q.	24	.29	35	> 35		0.	24	29	35	> 35	-	0	-24	.29	35	≥ 35	
	<20	25-29	30-35	ΛΙ	<20	20-24	25-29	30-35			<20	20-24	25-29	30-35	ΛΙ		~ 50	20-24	25-29	30-35	ΛI	
							В	ody r	nass	ind	ex (k	g/m^:	2)									

Southern Sub-Saharan Africa

Central AsiaArmenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan

Risk Lev	vel		<5%)		5% t	o <10	0%		10% to	<20%	6		20% t	to <30°	%		≥30%	6	
						No	on-la	bora	atory	-base	l risl	cha	ırt							
Age				М	len									Wo	men					SBP
(years)	N	on-sm	oker			S	mok	er			Nor	n-smo	ker			S	moke	er		(mmHg)
	47 5	_	62	67	64	69	74	79	84	38	40	43	46	48	61	64	68	71	74	≥180
	37 4		50	55	52	57	62	67	73	30	32	34	36	38	50	53	56	59	62	160-179
70-74	28 3		39	43	41	45	50	55	60	23	25	26	28	30	40	42	45	48	51	140-159
	22 2		30	33	32	35	39	44	48	18	19	20	22	23	31	33	35	38	40	120-139
	16 1	3 20	23	25	24	21	30	34	38	14	15	16	17	18	24	26	27	29	31	<120
	33 3	7 42	48	54	51	58	64	71	77	26	28	30	32	35	50	53	57	60	64	≥180
	25 28	32	37	42	40	45	51	57	64	20	21	23	25	26	39	42	45	48	52	160-179
65-69	18 2	1 24	27	32	30	34	39	45	51	15	16	17	18	20	30	32	34	37	40	140-159
	13 1	5 18	20	23	22	25	29	34	39	11	12	13	14	15	22	24	26	28	31	120-139
	10 1	1 13	15	17	16	19	22	25	29	8	9	10	10	11	17	18	19	21	23	<120
	22 2	2.1	26	40	40	47	E4	60	70	40	40	24	22	25	20	42	46	FO	54	≥180
	23 20 16 19		36 26	42 31	40 30	47 35	54 41	62 48	70 55	18	19 14	21 15	23 17	25 18	39	43 32	46 35	50 38	42	160-179
60-64	12 14	_	19	22	21	25	30	35	42	10	10	11	12	13	22	24	26	28	31	140-159
000.	8 1	_	13	16	15	18	21	26	30	7	8	8	9	9	16	17	19	21	23	120-139
	6 7	8	10	11	11	13	15	18	22	5	6	6	6	7	11	12	14	15	16	<120
																				480
	16 1	_	27	32	31	37	44	53	62	13	14	15	16	17	31	34	37	41	45	≥180
	11 1	_	19	23	22	26	32	39	47	9	10	10	11	12	22	24	27	30	33	160-179
55-59	8 9	_	13	16	15	18	23	28	34	6	7	7	8	9	16	17	19	21	24	140-159
	5 6	_	9	11 7	11 7	13	16 11	19 13	16	5 3	5 3	5	6	6 4	11	12 9	14	15	17 12	120-139 <120
	4 4	. <u> </u>	0	/	1	9	-11	13	10	3	3	4	4	4	0	9	9	-11	12	<120
	11 1	3 16	20	24	24	29	36	44	54	9	10	10	11	12	24	27	30	33	37	≥180
	8 9	11	13	17	16	20	25	31	39	6	7	7	8	8	17	19	21	23	26	160-179
50-54	5 6	7	9	11	11	13	17	21	27	4	5	5	5	6	12	13	14	16	18	140-159
	4 4	5	6	7	7	9	11	14	18	3	3	3	4	4	8	9	10	11	12	120-139
	2 3	3	4	5	5	6	7	9	12	2	2	2	2	3	5	6	7	7	8	<120
	8 9	12	14	18	18	23	29	37	47	7	7	7	8	9	19	21	23	26	30	≥180
	5 6	_	9	12	12	15	19	25	32	4	5	5	5	6	13	14	16	18	20	160-179
45-49	4 4	- 5	6	8	8	10	13	16	21	3	3	3	4	4	8	9	11	12	14	140-159
	2 3	3	4	5	5	6	8	11	14	2	2	2	2	3	6	6	7	8	9	120-139
	2 2	2	3	3	3	4	5	7	9	1	1	1	2	2	4	4	5	5	6	<120
	6 7	8	11	14	14	17	23	30	40	5	5	5	6	6	15	16	18	21	24	≥180
	4 4	_	7	9	0	11	15	20	26	3	5	5	4	4	10	11	12	14	16	160-179
40-44	2 3	,	4	5	6	7	9	12	17	2	2	2	2	3	6	7	8	9	10	140-179
	2 2	-	3	3	4	5	6	8	11	1	1	1	2	2	4	4	5	6	6	120-139
	1 1	1	2	2	2	3	4	5	7	1	1	1	1	1	3	3	3	4	4	<120
	24	29	35	> 35	0.	24	29	35	35	0.	24	29	35	> 35	0.	24		35	≥ 35	
	<20	25-29	30-35	ΛI	<20	20-24	25-29	30-35	ΛI	4 20	20-24	25-29	30-35	٨	<20	20-24	25-29	30-35	ΛI	
							В	ody r	nass i	ndex (k	g/m^	2)								

Central Asia

East AsiaChina, Democratic People's Republic of Korea

Risk Lev	/el			<5%)			5% t	o <10	0%		10	% to	<20%	6		20%	to <	30%	1		≥30%	6	
								No	on-la	bora	atory	-b	asec	l risk	cha	art								
Age					N	/len											Wo	omei	n					SBP
(years)		Nor	n-smo	oker				S	moke	er				Nor	n-smo	oker				S	moke	er		(mmHg)
	34	36	38	40	42		42	45	47	49	52		28	29	30	31	32		39	40	41	42	43	≥180
	28	30	31	33	35		35	37	39	41	43		24	25	25	26	27		33	34	35	36	37	160-179
70-74	23	24	25	27	28		29	30	32	34	36		20	21	21	22	22		28	29	29	30	31	140-159
	18	19	20	22	23		23	24	26	27	29		17	17	18	18	19		23	24	25	26	26	120-139
	15	15	16	17	18		19	20	21	22	24		14	14	15	15	16		20	20	21	21	22	<120
	27	29	31	33	35		36	38	41	43	46	1	23	23	24	25	25		33	34	35	37	38	≥180
	21	23	24	26	28		29	31	33	35	37		19	19	20	20	21		28	29	29	30	31	160-179
65-69	17	18	19	20	22		23	24	26	28	30		15	16	16	17	17		23	24	24	25	26	140-159
	13	14	15	16	17	F	18	19	20	22	24		12	13	13	13	14		19	19	20	21	21	120-139
	10	11	12	12	13		14	15	16	17	19		10	10	11	11	11		15	16	16	17	17	<120
						_												_						
	21	23	25	27	29		30	32	35	38	41		18	19	19	20	21		29	30	31	32	33	≥180
	16	17	19	20	22		23	25	27	29	32		14	15	15	16	16		23	24	25	26	27	160-179
60-64	12	13	14	16	17		18	19	21	23	25		11	12	12	13	13		19	19	20	21	22	140-159
	9	10	11	12	13	_	13	15	16	17	19		9	9	10	10	10	_	15	15	16	16	17	120-139
	7	7	8	9	10	L	10	11	12	13	14		7	7	7	8	8		12	12	13	13	14	<120
	17	18	20	21	23		25	27	30	33	36	ı	14	15	15	16	16		25	26	27	28	29	≥180
	12	13	15	16	17		19	20	22	25	27		11	11	12	12	13		19	20	21	22	23	160-179
55-59	9	10	11	12	13		14	15	17	18	21		9	9	9	9	10	_	15	16	16	17	18	140-159
	7	7	8	9	9		10	11	12	14	15		7	7	7	7	7	_	12	12	13	13	14	120-139
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50-54	7	7	8	9	10		11	12	13	15	17		6	7	7	7	7		12	13	13	14	15	140-159
	5	5	6	6	7	L	8	8	10	11	12		5	5	5	5	5	L	9	9	10	10	11	120-139
	3	4	4	4	5		5	6	7	8	9		3	4	4	4	4	L	7	7	7	8	8	<120
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	7	8	9	10	11		12	13	15	17	20		7	7	7	7	8		13	14	15	15	16	160-179
45-49	5	5	6	7	7	F	8	9	11	12	14		5	5	5	5	6		10	10	11	11	12	140-159
	3	4	4	5	5	F	6	6	7	8	10		3	4	4	4	4	F	7	7	8	8	9	120-139
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East Asia

South Asia Bangladesh, Bhutan, India, Nepal, Pakistan

Risk Lev	/el			<5%				5% t	o <10	0%		10	% to	<20%	6		20%	to <3	80%		≥30°	%	
								No	on-la	bora	atory	/-b	asec	l risk	cha	art							
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South Asia

South-East Asia
Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Maldives, Mauritius, Myanmar, Philippines, Seychelles, Sri Lanka, Thailand, Timor-Leste, Viet Nam

70-74 70	Risk Lev	/el			<5%				5% t	o <10	0%		10	% to	<20%	6		20%	to <	30%)		≥30%	6	
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8	65-69	12	14	15	16	18		18	19	21	23	25		11	11	11	12	12		17	18	18	19	20	140-159
60-64 15		10	11	12	13	14		14	15	16	18	20		9	9	9	10	10		14	14	15	15	16	120-139
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South-East Asia

High-income Asia PacificBrunei Darussalam, Japan, Republic of Korea, Singapore

Risk Lev	/el			<5%)			5% t	o <10	0%		10	% to	<20%	6		20%	to <	<30%	6		≥30%	6	
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(years)		Nor	n-smo	oker				S		er		. 1		Nor	n-smo	oker				S	moke			(mmHg)
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High-income Asia Pacific

AustralasiaAustralia, New Zealand

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Australasia

Oceania

Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu

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Oceania

Annex 4: Endpoint definitions used for incidence rates

Myocardial infarction

Case definition

Acute myocardial infarction (MI) – definite and possible MI according to the third universal definition of myocardial infarction:

- When there is clinical evidence of myocardial necrosis in a clinical setting consistent with myocardial ischaemia OR
- Detection of a rise and/or fall of cardiac biomarker values and with at least one of the following: i) symptoms of ischaemia, ii) new or presumed new STsegment-T wave changes or new left bundle branch block, iii) development of pathological Q waves in the ECG, iv) imaging evidence of new loss of viable myocardium or new regional wall motion abnormality, or v) identification of an intracoronary thrombus by angiography or autopsy.
- Sudden (abrupt) unexplained cardiac death, involving cardiac arrest or no evidence of a noncoronary cause of death
- Prevalent MI is considered to last from the onset of the event to 28 days after the event and is divided into an acute phase (0–2 days) and subacute (3–28 days).

Stroke

Case definition

Stroke was defined according to WHO criteria – rapidly developing clinical signs of focal (at times global) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin (20). Data on transient ischaemic attack (TIA) were not included.

- Acute stroke: stroke cases are considered acute from the day of incidence of a first-ever stroke through day 28 following the event.
- *Ischaemic stroke:* an episode of neurological dysfunction caused by focal cerebral, spinal, or retinal infarction.
- Intracerebral haemorrhage: a focal collection of blood within the brain parenchyma or ventricular system that is not caused by trauma.

Definitions are taken from GBD 2017 Disease and Injury Incidence and Prevalence Collaborators, Supplement 1 (20).

Annex 5a: Guide for comparison of CVD risk tools

Checklis	st: Cardiovascular	disease risk prediction models in clinical practice
From model deriving implementation	ation to	Considerations
Derivation	Population	 Does the dataset used for model derivation contain information of a sufficient number of individuals (i.e. is the sample size large enough)? Are the characteristics of individuals in the derivation sample sufficiently aligned with those of the target screening population to allow transferability of estimated risk ratios (e.g. age range, prior disease status)?
	Risk factors	 Are the relevant risk factors included? Note: main CVD risk factors (e.g. smoking, blood pressure) are key for risk prediction. Are they accurately measured in sufficient numbers in the derivation sample? For example, use of sphygmomanometer for hypertension is more accurate than self-reported. Can the risk factors be accurately measured in the target population?
	End points	 Does the model predict the relevant endpoint (e.g. overall CVD, stroke, CHD)? Is endpoint collection in the derivation sample systematic and well-validated?
	Follow up	 Is the follow-up time in the derivation sample sufficient to allow risk estimation over the timeframe of interest (usually 10 years)?
	Statistical Model	 Are appropriate statistical models used for the type of risk estimation? Are relevant assumptions tested (e.g. proportional hazards assumption)?
	Internal validation	 Discrimination – is the model able to predict order of CVD event among individuals? Calibration – is there good agreement between predicted and observed incidence (absolute risk)? Has the model been checked for overfitting (relevant for smaller sample sizes and can be checked by crossvalidation)? Reclassification – is there appropriate movement of individuals through relevant risk categories when comparing alternative risk models?

Checklis	st: Cardiovascula	r disease risk prediction models in clinical practice
From model deriving implementation	ration to	Considerations
Recalibration	Recalibrated	 Has the model been recalibrated for use in different populations?
	Recalibration data	 Are the data used for recalibration appropriate? For example, do the recalibration data share the same characteristics as the target population?
	Recalibration methods	 Is there a methodological framework proposed / provided for future recalibration in response to changing trends with time as well as divergent CVD rates across regions / populations? For example, is a guide or statistical code provided for recalibration?
		What is the ease of recalibration?Are additional data needed for recalibration and is this available?
External validation		Is the model proven transferable to a new relevant setting / population other than used in the model derivation?
Usability	Format	 Is the format appropriate to be used in the population to which the model is applied (e.g. online risk calculator, colour-coded charts)?
	Risk-factor measurement	Can all risk factors be feasibly measured and are alternative formats available for resource constraint settings (e.g. models using risk factors that don't require laboratory measurements)?
	Country settings	Is the model available for different country settings?
Implementation	Guidelines	Has the model been recommended for use by relevant guidelines?
	Health gains*	 Has the model been evaluated for health gains when used to assess total CVD risk and guide interventions (such as using statins) in high-risk populations? Has use of the risk-prediction model resulted in significant health gains when used?
	Cost- effectiveness*	Has use of the risk-prediction model been shown to be cost-effective?

^{*} Cost-effectiveness and health gains of (different) CVD risk models in clinical practice are highly dependent on, for example, the target population and the clinical interventions for different thresholds (e.g. statin allocation).

Table based on Cooney et al. (21), Rosello et al. (22), 2016 European Guidelines on CVD (23) and the TRIPOD guidelines (24). If of interest, the TRIPOD guidelines can be used for a more detailed checklist for statistical risk-prediction modelling (24).

HEARTS: Risk-based CVD management

Annex 5b: Comparison of CVD risk charts

	WHO CVD risk	< 2019	WHO/ISH 2007	Globorisk 2015	IHMRS 2011	SCORE 2016
Derivation	Population	Study design: Prospective cohorts (85) with 376 177 individuals, 19 333 events Age range: 40–80 yrs Date of baseline survey: 1960–2013 Location: Europe, North America, Japan, Australia	Study design: No single derivation cohort. Risk-factor distribution, relative risks, CVD incidence from various sources combined. Date of baseline survey: Not applicable Location: Incidence, risk factors from 14 WHO regions	Study design: Prospective cohorts (8) with 50 129 individuals, 6042 events Age range: 40–84 yrs Date of baseline survey: 1948–1993 Location: North America	Study design: Case control study, 5349 cases 7423 controls Median age: 58 (49–67) yrs Date of baseline survey: 1999–2003 Location: 52 countries	Study design: Prospective cohorts (12) with 205 178 individuals, 7934 fatal events Age range: 40–65 yrs Date of baseline survey: 1967–1991 Location: Europe
	Risk factors (lab)	Age, sex, smoking, SBP, TC, DM	Age, sex, smoking, SBP, TC, DM	Age, sex, smoking, SBP, TC, DM	Age, sex, smoking, DM, HTN, Apolipoprotein B/A1 or TC/HDL-C ratios	Age, sex, smoking, SBP, TC or TC/HDL-C
	Risk factors (non-lab)	Age, sex, SBP, smoking, BMI	Sex, age, SBP, smoking, DM	Age, sex, smoking status, SBP, BMI	Age, sex, smoking, DM, HTN, family, diet, history, lifestyle, psychosocial factors	Not available
	Time horizon and outcomes	10-yr risk of fatal and nonfatal CVD (CHD or stroke)	10-yr risk of fatal and nonfatal CVD (CHD or stroke)	10-yr risk of fatal and nonfatal CVD (CHD or stroke)	Risk of fatal and nonfatal MI	10-yr risk of fatal CVD (CHD or stroke)
	Follow up	>10-yr follow-up in most cohorts	No actual follow-up, hypothetical 10-yr	>10-yr follow-up in 7 of 8 cohorts	No follow up, case- control design	>10-yr follow-up in all cohorts
	Statistical model	Cox survival models	Combination of several relative and absolute risks in 'Cox model type' structure	Cox survival model	Unconditional logistic regression	Weibull survival models
	Internal validation	Well-validated internally	Not applicable	Well-validated internally	Well-validated internally	Well-validated internally

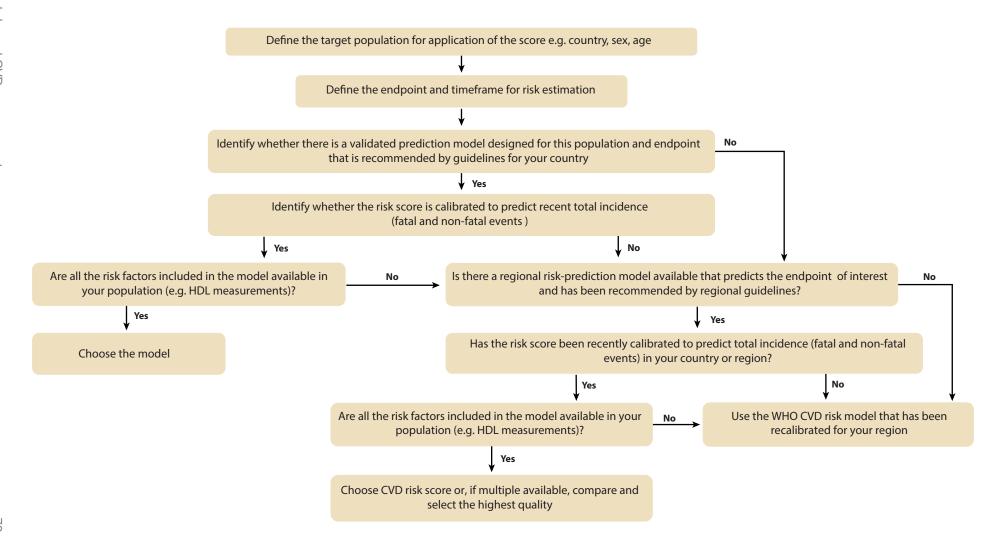
	WHO CVD risk	2019	WHO/ISH 2007	Globorisk 2015	IHMRS 2011	SCORE 2016
Recalibration	Recalibrated	Integral part of model development; calibrated to 21 global regions	Integral part of construction; calibrated for 14 global regions	Integral part model development; calibrated for 187 countries	Not recalibrated for different settings	High/low risk charts provided; recalibrated post hoc in several countries
	Recalibration data	Region-specific incidences from GBD and country-specific risk factors from NCD-RisC	Risk-factor distributions from WHO Comparative Risk Assessment study; Region-specific incidence from GBD	Used country-specific mortality rates and case-fatality to estimate incidence rates based on age trends in Swedish data; rates then modelled over past years and projected into future 10 years	Not applicable	Country-specific cohorts
	Recalibration methods	Simple framework and statistical code provided. Can be applied using routinely available data	No specific method provided	Intuitive framework provided. Can be applied with routinely available data. Requires modelling if future projections of rates desired as used in original score	Not applicable since model do not predict absolute risk	No standardized approach recommended
External validation	External validation	Well validated in several external cohorts	No adequate external validation	Well-validated in several external cohorts	Well-validated in several external cohorts	Well-validated in several external cohorts
Implementation	Format	Colour-coded charts and software code	Colour-coded charts	Colour-coded charts, online calculator	Calculation charts	Colour-coded charts and online calculator
	Low resource setting	Yes	Yes	Yes	Yes	No
	Website	WHO CVD risk	WHO/ISH	Globorisk		SCORE
	Country- specific versions available?	Different charts for 21 worldwide regions.	Different charts for 14 worldwide regions	Different charts available per country.	-	Low-risk charts and high-risk charts, for grouped European countries
	Guidelines	WHO on CVD prevention 2019	WHO guidelines for CVD prevention 2007	-	-	ESC Guidelines 2019

	WHO CVD ris	k 2019	WHO/ISH 2007	Globorisk 2015	IHMRS 2011	SCORE 2016
Advantages	Key advantages	Risk-prediction charts provided for different ethnic-geographic regions Simplicity of recalibration approach with code provided to allow efficient updating A non-laboratory variant is available Externally validated in numerous studies Risk distribution assessed in datasets representing 79 countries	Risk-prediction charts provided for different ethnic-geographic regions A non-laboratory variant is available	Risk-prediction charts provided for different ethnic-geographic regions Intuitive systematic recalibration approach A non-laboratory variant is available Externally validated in numerous studies	Included large number of women, youth and people from LMICs in derivation A non-laboratory variant is available Externally validated in numerous studies	Existence of low-risk and high-risk charts for European countries Externally validated in numerous studies
Limitations	Key limitations	Data used in model derivation were mostly from HICs	Absence of individual- level population data; models based on summary inputs No internal or external validation of the model in epidemiological cohorts	Rates used in recalibration rely on many modelling steps, assumptions and projections Only USA-based data in model derivation	Case-control rather than cohort design used; may induce bias in RR estimates, prevents estimation of absolute risk Not available for different settings	Only estimates risk of fatal CVD No non-laboratory variant available Model derived only in European cohorts

ESC: European Society of Cardiology; IHRMS; INTERHEART Modifiable Risk Score, WHO/ISH; World Health Organization / International Society of Hypertension; MI: myocardial infarction; TC: total cholesterol; SBP: systolic blood pressure; HTN: hypertension; DM: diabetes mellitus; BMI: body mass index; GBD study: Global Burden of Disease Study; CVD: cardiovascular disease; CAD: coronary artery disease; NCR-RisC: NCD Risk Factor Collaboration LMIC: Low and middle income countries

Based on: WHO, 2007 (2), Cooney et al, 2009 (21), Rossello et al, 2019 (22), 2016 European Guidelines on CVD (23), the TRIPOD guidelines (24), Mendis et al, 2007 (25), Hajifathalian et al, 2015 (26), McGorrian et al, 2011 (27), European Society of Cardiology, SCORE risk charts (28).

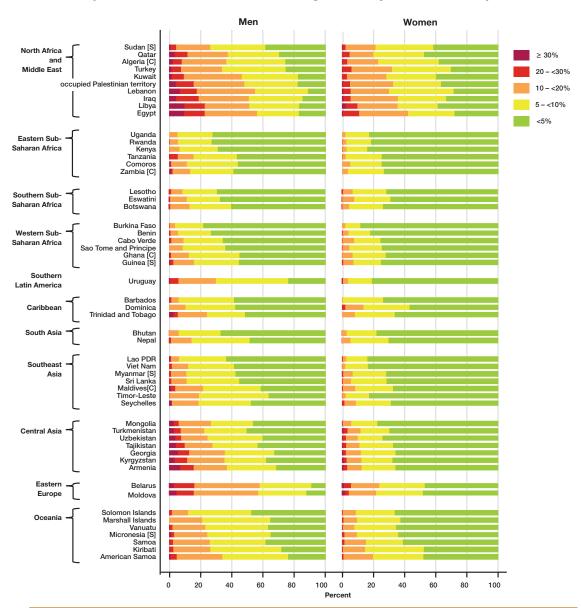
Annex 6: Identifying a CVD risk prediction model



Annex 7: Considerations for initiation of therapy

The appropriate threshold of an individual's total risk at which intensive lifestyle interventions and drug treatment are initiated depends on the availability of resources as well as the risk level. The percentage of patients from representative countries in each region who would be eligible for treatment based on each cut-off level is presented in Figure 5 (3). As an example, <5% of the population of Uganda is at 10% or greater CVD risk, whereas approximately 50% of Egypt's population is above 10% CVD risk.

Figure 5: Distribution of 10-year CVD risk according to recalibrated laboratory-based WHO risk prediction models for individuals aged 40–64 years from example countries



Data from all countries are from adults aged 40–64 years with total cholesterol concentrations of 2.6–10.3 mmol/L and from samples representative of the national population, unless otherwise specified as subnational (S) or community based (C).

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