RESEARCH
Original Research

Reported Knowledge of Typical Daily Calorie Requirements: Relationship to Demographic Characteristics in US Adults

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ABSTRACT

Background US obesity rates are at historically high levels, increasing the risk of negative health and economic outcomes at individual and population levels. Findings from earlier studies indicate that many consumers lack a clear understanding of calorie needs, potentially affecting their ability to manage caloric intake.

Objective Our aim was to determine the knowledge of typical daily calorie needs of US adults by demographic and other characteristics, using a nationally representative sample.

Design Data were analyzed from 6,267 respondents to the 2007-2008 and 2009-2010 National Health and Nutrition Examination Survey and its supplemental data source, the Flexible Consumer Behavior Survey, to assess reported knowledge of typical daily calorie requirements and associations with demographic and other characteristics of interest.

Statistical analyses performed Logistic regression for complex sample surveys was used to estimate associations between self-reported daily calorie needs for men and women aged 21 years and older and participant characteristics.

Results Most respondents accurately reported typical daily calorie needs for a person of their sex, age group, and physical activity level, however, distinct differences emerged between demographic groups. Women, non-Hispanic whites, and those with higher income and education levels were more likely to estimate typical daily calorie needs accurately; men were almost four times more likely than women to indicate a lack of knowledge of daily calorie needs.

Conclusions Knowledge of typical daily calorie requirements is a foundational concept of nutrition literacy. Educational efforts to increase awareness, knowledge, and use of calorie information for certain groups may be helpful to refine interventions and ultimately improve public health in the United States.

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US OBESITY RATES ARE AT HISTORICALLY HIGH levels,[1-3] increasing the risk of negative health and economic outcomes at individual and population levels.[4-9] The causes of this rise in obesity are complex and multifactorial, but at a basic level stem from greater energy input relative to output over time. Energy from food and beverages is typically measured in calories.

The updated US Food and Drug Administration Nutrition Facts label rules[10,11] and menu labeling requirements[12] increase availability and prominence of calorie information for American consumers on packaged and prepared foods. Updated requirements for Nutrition Facts labels enlarge the font size for calories, as well as the calculation and display of serving size information on packaged foods. The Nutrition Facts label regulations also require that packages containing fewer than 2 servings provide Nutrition Facts label information—including calories—for the entire container. Food packages that may be consumed in one or more sittings—with between two and three times the serving size—must provide dual-column labeling, that is, information for both a single serving of the product, as well as the entire container, in effect "doing the math" for consumers for all nutrients, including calories. The menu labeling provision of the Federal Food, Drug, and Cosmetic Act mandates that covered establishments disclose the number of calories contained in standard menu items, post a succinct statement on menus and menu boards regarding daily caloric needs, and provide other nutrition information upon request.

The 2015-2020 Dietary Guidelines for Americans[13] (DGA) estimates healthy adult calorie needs at 1,600 to 2,400 calories/day for women and 2,000 to 3,000 calories/day for men, depending on age and activity level. The 2015-2020 DGA reports that many Americans over consume high-calorie foods containing refined grains, added sugars, and fats

(especially saturated fats), but under consume nutrient-dense foods, such as fruits, vegetables, whole grains, lean protein foods, and low-fat dairy products, resulting in an overall diet that tends to be high in calories without meeting food group recommendations.

Previous US research on knowledge of daily calorie needs is relatively sparse, but provides several insights. First, findings from earlier studies suggest that many consumers may lack a clear understanding of their personal calorie needs, potentially affecting their ability to manage caloric intake. Studies have reported that one-third[14-16] to more than two-thirds[17,18] of consumers correctly estimate the recommended calorie requirements for adults—in these studies, answers were coded as correct when consumer estimates fell between approximately 1,500 and 3,000 calories/day, and as incorrect when they fell above or below that range. Second, previous research indicates associations between certain sociodemographic variables and reported knowledge of daily calorie needs. Studies have found that participants who are black or Hispanic,[16,18] male,[17] or at lower education or income levels, are less likely to estimate daily calorie needs correctly[15,16,18] and, conversely, that those with higher education levels are more likely to estimate daily calorie needs accurately.[15,17] Third, previous studies have reported that participants were far more likely to underestimate (ie, to answer <1,500 calories/day) than to overestimate (ie, to answer >2,500 or 3,000 calories/day) their calorie requirements.[14-18]

The varied methods of these previous studies may help explain differences in some of the findings noted here. Most earlier studies provided wide calories per day ranges for participants to choose from, such as <1,500, 1,500 to 3,000, 3,001 to 4,500, or 4,500+, with the exceptions of Elbel,[14] who used narrower ranges similar to those used in the present analysis, and Gase and colleagues,[15,16] who asked open-ended questions about daily calorie requirements. Analytical samples were generally not nationally representative, except in the Bleich and Pollack study.[18]

In Canada, McCrory and colleagues[19] assessed a nationally representative sample using an open-ended question about daily caloric needs and found that just 24% of the Canadian population correctly reported average daily calorie requirements. They also observed associations between sociodemographic characteristics and knowledge of daily calorie needs similar to those indicated by US studies noted here.[14-18]

In addition, and relevant in light of the US Food and Drug Administration menu labeling requirements, other research suggested that providing a concise statement of daily caloric needs on food establishment menus, in combination with calorie information for each item, was associated with reductions in population-level body mass index (BMI; calculated as kg/m^2) over time.[20]

The present analysis examined consumer understanding, based on US population–representative data, of typical daily calorie requirements for a person of the same sex, age group, and physical activity level as the survey respondent, and identifies the sub-populations most and least likely to correctly estimate typical daily calorie needs. These results may help inform development of nutrition education activities and materials to assist consumers with putting calorie information into context, which could, in turn, help improve public health broadly and reduce health disparities.

RESEARCH SNAPSHOT

Research Question: What percentage of American adults know how many calories are typically needed each day for a person of their sex, age group, and physical activity level, and how does that knowledge differ by demographic and other characteristics?

Key Findings: In this analysis of data from 6,267 respondents to the 2007-2008 and 2009-2010 National Health and Nutrition Examination Survey—the most recent US population-representative data available on this topic—most respondents accurately reported general daily calorie needs for someone of their sex, age group, and physical activity level. However, distinct differences between demographic groups were observed. Women, non-Hispanic whites, and those with higher income and education levels tended to estimate daily calorie needs more accurately; men appeared less knowledgeable than women across all sociodemographic groups.

METHODS

Data were analyzed from the 2007-2008 and 2009-2010 National Health and Nutrition Examination Survey (NHANES) and its supplemental data source, the Flexible Consumer Behavior Survey (FCBS), to assess reported knowledge of typical daily calorie requirements and associations with demographic and other characteristics of interest. Specifically, responses to the following question were analyzed: "About how many calories do you think a [man/woman] of your age and physical activity needs to consume a day to maintain [your] current weight?" to which the following responses were captured: <500 calories, 500 to 1,000 calories, 1,001 to 1,500 calories, 1,501 to 2,000 calories, 2,001 to 2,500 calories, 2,501 to 3,000 calories, >3,000 calories, or don't know. Participants aged younger than 21 years were excluded from this analysis because of the wide variation in caloric requirements for different developmental stages. Responses were analyzed overall and by sex, given the different calorie needs and recommendations for women and men, using SAS software, version 9.4, procedures PROC HPGENSELECT and PROC SURVEYLOGISTIC.[21] The threshold for statistical significance was set at $P<0.05$. As exclusively de-identified publicly available data were used, this study was exempt from Institutional Review Board review.

Data Sources

NHANES is a nationally representative survey collecting data on the health and nutritional status of US adults and children, combining in-person interviews with physical examinations and laboratory tests of participants at mobile examination centers. The interview includes questions about demographics, socioeconomic status, health behaviors, and other health-related factors, while medical and physical examinations consist of physiologic measurements and other laboratory tests. NHANES is conducted in continuous 2-year cycles, using a cross-sectional study design and complex, multistage, stratified, clustered sampling of approximately 5,000 individuals from the US civilian non-institutionalized population for each cycle.[22]

The FCBS, a consumer behavior module conducted since 2007 as part of NHANES, assesses consumer knowledge, attitudes, and beliefs regarding food choices and nutrition via household and telephone interviews 3 to 10 days after the mobile examination center appointment.[23] Unlike household interview questions, FCBS telephone interview questions can change between NHANES cycles.[23] The FCBS fielded the question about daily calorie needs noted here as part of the 2007-2008 and 2009-2010 NHANES cycles.

Weighting

The NHANES sample data are weighted to allow estimates representative of the US civilian non-institutionalized population. Per NHANES recommendation, the dietary day 1 sample weight (WTDRD1) was used in the weighted analyses.[24] These day 1 weights were constructed by taking the mobile examination center sample weights and further adjusting for the additional non-response and the differential allocation by day of the week for the dietary intake data collection.

Statistical Methods

Logistic regression analysis for complex sample surveys was used to estimate the associations between participant characteristics of interest and response to the question regarding calories needed in a day. The following consumer characteristics/variables were of interest: sex (male, female); age group (21 to 30 years, 31 to 50 years, 51 to 60 years, and older than 60 years); race/ethnicity (Hispanic [Mexican-American and other Hispanic], Other [including multiracial], non-Hispanic white, non-Hispanic black); annual household income (<$20,000, $20,000 to $44,999, $45,000 to $74,999, $75,000 to $99,999, or $100,000 or more); education (less than high school [<9th grade, 9th to 11th grade], high school graduate/General Educational Development, some college or a college graduate); and BMI (underweight: BMI <18.5; normal:18.5 $\leq$ BMI <25; overweight: 25 $\leq$ BMI < 30; or obese: BMI $\geq$30).

In addition, a single variable was created for physical activity from responses to the following NHANES questions: 1) PAQ655, which asked, "In a typical week, on how many days [do you] do any vigorous-intensity sports, fitness, or recreational activities?" and 2) PAQ670, which asked, "In a typical week, on how many days [do you] do any moderate-intensity sports, fitness, or recreational activities?" If the response for either of these two questions was $\geq$3 days a week, then physical activity was assigned "$\geq$3 days." If both variables had values <3 days, then physical activity was assigned "<3 days." The analysis also considered data from responses to the question on diet quality, DBQ700, which asked, "In general, how healthy is [your/his/her] overall diet?" Response options, which included "Excellent," "Very Good," "Good," "Fair," "Poor," or "Don't know," were aggregated into the following categories: "Very good" ("Very Good" and "Excellent"), "Fair-Good" ("Fair" and "Good"), and "Poor."

Of the 11,029 eligible respondents, 6,267 had non-missing values for the response to the question regarding typical daily calories and were included in the logistic regression analyses. Because of the high percentage of missing values for the primary end point of interest (43% for 2007-2008 and 40% for 2009-2010), a sensitivity analysis was performed via a weighted χ^2 cross-tabulation analysis, which revealed significant associations between the pattern of missing values for the response variable and each of the following explanatory variables: age, race/ethnicity, annual household income, education level, BMI, physical activity, and diet quality. Imputation was therefore not valid due to the not Missing-at-Random pattern. Weights were adjusted for nonresponse using the propensity cell method.[25] Extremely large sampling weights were trimmed to 3.5 $\times$ median sampling weight by age, sex, race, and the responses to the question about daily calorie intake groups, and subsequent recalibrations were performed. Weight trimming was performed before the propensity cell weight adjustment.

Of particular interest were responses indicating a lack of knowledge of typical daily calorie intake. "Lack of knowledge" was operationalized for women as responses of "Don't know" or <1,000 calories/day, and for men as responses of "Don't know" or <1,500 calories/day. Although it is possible that <1,000 calories/day or <1,500 calories/day for women and men, respectively, represent adequate requirements, the number of individuals for whom this is so is likely to be extremely small. In addition, the DGA lists the typical daily caloric needs range at 1,600 to 3,000 calories/day. Answers in the higher ranges and above, that is, answers of $\geq$2,500 calories/day, were not included as indicating lack of calories knowledge, as it is conceivable that those respondents may have answered correctly if they were very active, and to be as conservative as possible in the analysis.

Collinearity was assessed via condition indices.[26] Independent variables and associated interaction terms with large condition indices (ie, >1,000) were excluded. The pared down list of explanatory variables was further reduced via LASSO (least absolute shrinkage and selection operator)-regularized logistic regression.[27] To avoid overfitting, the LASSO model fit on the training data (65%) was evaluated via the Bayesian information criterion computed from the validation data (35%).

The final reduced "lack of calorie knowledge" model was then entered into a logistic regression model to predict the odds of lacking calorie knowledge. The odds were compared across levels of each explanatory variable (also referred to as an "exposure," "characteristic," or "factor") using the odds ratio (OR), a measure of the association between an exposure and an outcome. An OR >1 indicates that a characteristic (eg, older age) is associated with higher odds of the outcome (in this case, lack of knowledge of typical daily energy requirements), whereas an OR <1 indicates that the characteristic is associated with lower odds of the outcome, and an OR=1 indicates the characteristic was not found to affect the outcome one way or the other. The adjusted odds ratio (AOR) takes into account the effect of all other exposures (characteristics) included in the model. The 95% CI, reported with the OR and AOR, estimates the precision or uncertainty associated with the estimate of the OR or AOR. A narrow CI indicates a higher level of precision, whereas a wider CI indicates a lower level of precision, which can result, for example, when data are sparse. Variances were estimated accounting for the stratification and clustering of NHANES. Model-adjusted ORs and their Bonferroni-adjusted Wald 95% CIs for the main explanatory variables, including the characteristics sex, age group, race/ethnicity, income, education, and BMI, were assessed. For plotting purposes, AORs and CIs

were truncated at 0.001 on the low end and 6.0 on the high end. The modeling also included multiplicative interaction terms to generate estimated AORs with CIs to test for effect modifiers, which occur when the effect of one exposure on an outcome is modified by the effect of another. Unweighted counts (n), weighted counts at the 95% CI, and AORs followed by their respective 95% CIs in parentheses were used to report results.

RESULTS

A total of 6,267 respondents (3,681 women and 2,586 men) aged ≥21 years provided valid answers to the question, "About how many calories do you think a [man/woman] of your age and physical activity needs to consume a day to maintain your current weight?" (Table 1). Some respondents who provided valid answers to the calorie question did not provide responses to questions about the other characteristics of interest, so the number of participants varied for each demographic or other characteristic considered. For example, among women, there were 3,681 responses regarding age, but only 3,614 responses regarding income.

A higher percentage of men (37.1%) provided responses indicating a lack of knowledge about typical calorie needs compared to women (16.5%), and black and Hispanic participants were more likely than other racial/ethnic groups to incorrectly estimate typical daily calorie needs (Table 2). Lower education attainment and lower annual household income were associated with increased percentages of responses indicating lack of knowledge regarding typical daily calorie intake. For example, 35.5% of women with less than a high school education indicated a lack knowledge of typical energy needs for a person of the same sex, age, and physical activity level compared to 5.5% of women with a college degree (Table 2). Reported diet quality was associated with lack of knowledge of typical daily calorie intake in women, but not in men. Tables 3 and 4 (available at www.jandonline.org) report on the responses for women and men, respectively, to the question regarding typical daily calorie intake, broken down by calorie ranges for the responses and by demographic and other characteristics of interest.

Males overall were 3.8 (95% CI 2.8 to 5.1) times more likely than females to indicate a lack of calorie knowledge (Table 5). Non-Hispanic blacks and Hispanics were both 3.1 (95% CI 2.2 to 4.5) times more likely to indicate a lack knowledge regarding typical calorie intake than whites. Respondents aged 60 years and older were 2.7 (95% CI 1.4 to 5.4) times more likely to lack calorie knowledge than respondents aged 31 to 50 years. Respondents with less than high school education were 1.7 (95% CI 1.1 to 2.5) times, 2.3 (95% CI 1.5 to 3.5) times, and 3.3 (95% CI 2.5 to 5.0) times more likely to indicate a lack calorie knowledge than high school graduates, respondents with some college education, and college graduates, respectively. In addition, high-school graduates were 2.3 (95% CI 1.7 to 3.1) times more likely to indicate a lack of calorie knowledge than college graduates. Very-low-income (<$20,000) and low-income ($20,000 to $44,999) respondents were more likely to indicate lacking calorie knowledge compared to respondents with higher incomes, respectively 1.8 (95% CI 1.1 to 3.0) and 1.5 (95% CI 1.0 to 2.3) times more likely than respondents with income $45,000 to $74,999; 1.9 (95% CI 1.2 to 3.0) and 1.6 (95% CI 1.1 to 2.4) times more likely than respondents with income $75,000 to $99,999; and 2.0 (95% CI 1.3 to 3.1) and 1.7 (95% CI 1.1 to 2.5) times more likely than respondents with income >$100,000.

The Figure presents the results of selected statistically significant ($P<0.05$) explanatory variables for "lack of knowledge" of typical daily calories, including sex ($P<0.0001$), race/ethnicity ($P<0.0001$), age ($P=0.003$), education ($P<0.0001$), and household annual income ($P<0.0001$), in addition to BMI. Self-reported physical activity, BMI, and self-reported diet quality were not significantly associated with lack of knowledge of typical daily energy needs.

Table 6 highlights the statistically significant effect of modifying characteristics from the logistic regression analysis, including age and BMI, education and age, race/ethnicity and age, sex and income, and sex and race/ethnicity, providing for more detailed interpretation of some of the associations provided in Table 5 and the Figure. For instance, BMI level alone was not associated with knowledge of daily calorie intake, but the interaction between BMI and age showed that overweight participants aged 21 to 30 years were significantly less likely to lack knowledge than overweight participants older than 60 years of age. The interaction between education and age indicated that the increased knowledge of daily calorie intake of those with a college education compared to those with less than high school education was reflected in many age groups, although college graduates older than 60 years appeared less knowledgeable of typical daily calorie intake than college graduates aged 31 to 50 years. The differences between racial/ethnic groups was also consistent, with black and Hispanic participants more likely to lack knowledge of daily calorie intake than whites across most age groups, and when comparing racial/ethnic groups of the same sex. Males were more likely to lack knowledge of typical daily calorie intake compared to female participants, and those with lower income were more likely to lack knowledge compared to those with higher incomes, but sex appeared to modify the income effect; differences in lack of knowledge among income levels were statistically significant for females only. In addition, at every income level males were more likely to lack calorie knowledge when compared with females of the same income. Moreover, the odds of male participants' reported lack of typical daily calorie knowledge, compared with females of the same income, increased at higher income levels. For example, males with annual household income <$20,000 were 2.3 (95% CI 1.0 to 5.0) times more likely than females of the same income level to lack calorie knowledge, whereas males with income $75,000 to $99,999 and $100,000+ were 5.2 (95% CI 1.7, 8.0) and 4.6 (95% CI 2.1, 8.0) times, respectively, more likely to lack calorie knowledge than females of the same income level (Table 6).

DISCUSSION

The results of our analysis of NHANES/FCBS 2007-2008 and 2009-2010 data reveal distinct differences by demographic characteristics in reported knowledge of typical daily calorie needs; specifically, the findings indicate that women, non-Hispanic whites, and higher-income groups are more likely than others to estimate daily calorie needs accurately. In contrast, the results show that lower education and income levels, as well as Hispanic and non-Hispanic black race/

Table 1. Sociodemographic characteristics of study population of adults aged 21 years and older: National US population estimates (n=6,267[a] from NHANES[b] 2007-2010)

	Women (n=3,681 [52.7%])			Men (n=2,586 [47.3%])		
Characteristic	**n**	**n, weighted**	**%[c]**	**n**	**n, weighted**	**%[c]**
Race/ethnicity						
Black	668	13,128,586	11.7	445	10,635,484	10.6
Hispanic	942	13,791,018	12.3	545	14,785,243	14.7
Other	127	6,418,404	5.7	88	4,966,773	4.9
White	1,944	78,758,636	70.3	1,508	70,237,179	69.8
Total	3,681	112,096,644	—	2,586	100,624,679	—
Age, y						
21 to 30	683	21,161,537	18.9	511	20,672,618	20.5
31 to 50	1,444	42,700,862	38.1	982	40,751,417	40.5
51 to 60	571	21,171,194	18.9	434	18,752,032	18.6
>60	983	27,063,051	24.1	659	20,448,610	20.3
Total	3,681	112,096,644	—	2,586	100,624,677	—
Education						
Less than high school	731	21,253,341	19.0	442	17,654,949	17.5
High school graduate/GED[d]	857	26,731,524	23.9	587	25,854,785	25.7
Some college	1,203	34,107,104	30.4	775	29,156,363	29.0
College graduate	885	29,924,931	26.7	781	27,930,079	27.8
Don't know[e]	3	48,391	0.0	1	28,502	0.0
Total	3,679	112,065,291	—	2,586	100,624,678	—
Annual household income, $						
<20,000	730	18,521,894	16.9	371	12,684,829	12.9
20,000 to 44,999	1,212	32,969,780	30.2	795	28,776,989	29.2
45,000 to 74,999	735	22,963,712	21.0	548	21,408,399	21.7
75,000 to 99,999	381	12,783,890	11.7	313	12,152,899	12.3
100,000+	510	20,648,582	18.9	482	22,282,463	22.6
Don't know[e]	46	1,448,181	1.3	30	1,300,900	1.3
Total	3,614	109,336,039	—	2,539	98,606,479	—
BMI[f]						
<18.5 (underweight)	63	2,240,130	2.0	20	960,065	1.0
18.5 to 24.9 (normal)	1,009	34,089,082	30.6	606	22,865,673	22.9
25 to 29.9 (overweight)	1,050	31,834,143	28.6	971	38,400,160	38.4
>30 (obese)	1,530	43,095,491	38.7	969	37,722,105	37.7
Total	3,652	111,258,846	—	2,566	99,948,003	—

[a]Study sample included only those participants who responded to the question, "About how many calories do you think a [man/woman] of your age and physical activity needs to consume a day to maintain [your] current weight?"
[b]NHANES=National Health and Nutrition Examination Survey.
[c]Weighted percentages rounded to nearest tenth.
[d]GED=General Educational Development tests passed/certification of US high school—level academic skills.
[e]Responses of "Don't know" to questions about education level attained or annual household income were not included in subsequent analyses when assessing education or income variable associations.
[f]BMI=body mass index; calculated as kg/m^2.

ethnicity, are associated with reduced knowledge of typical calorie needs, and men appeared less knowledgeable than women across all sociodemographic groups. BMI, self-reported physical activity levels, and self-reported diet quality were generally not associated with differences in knowledge of typical daily calorie requirements.

Table 2. Demographic and other characteristics of adults aged 21 years and older indicating lack of knowledge[a] of typical daily energy requirements: National US population estimates (n=6,267; NHANES[b] 2007-2010)

	Female (n=3,681)			Male (n=2,586)		
Characteristic	n	n weighted	%[c] (95% CI for percentages)	n	n weighted	%[c] (95% CI for percentages)
Overall	3,681	18,484,709	16.5 (14.6-18.4)	2,586	37,329,039	37.1 (35.2-39.0)
Race/ethnicity	3,681	—	—	2,586	—	—
Black	—	4,273,263	32.6 (27.6-37.5)	—	5,897,108	55.5 (49.1-61.9)
Hispanic	—	5,847,982	42.4 (38.9-45.9)	—	8,288,099	56.1 (52.1-60.0)
Other	—	841,287	13.1 (7.3-19.0)	—	1,989,058	40.1 (27.4-52.7)
White	—	7,522,177	9.6 (8.0-11.1)	—	21,154,774	30.1 (27.0-33.3)
Age, y	3,681			2,586		
21 to 30	—	4,337,050	20.5 (16.7-24.3)	—	7,448,148	36.0 (30.9-41.1)
31 to 50	—	6,528,763	15.3 (12.6-18)	—	14,708,672	36.1 (32.4-39.8)
51 to 60	—	3,085,219	14.6 (10.8-18.3)	—	7,162,185	38.2 (31.6-44.8)
>60	—	4,533,678	16.8 (13.8-19.7)	—	8,010,033	39.2 (35.4-43.0)
Education	3,679	—	—	2,586	—	—
Less than high school	—	7,748,585	36.5 (31.9-41.0)	—	9,819,801	55.6 (48.2-63.1)
High school graduate/GED[d]	—	4,934,556	18.5 (14.9-22.1)	—	10,466,392	40.5 (36.6-44.4)
Some college	—	4,091,948	12.0 (9.9-14.1)	—	10,370,537	35.6 (30.2-40.9)
College graduate	—	1,646,637	5.5 (3.9-7.1)	—	6,672,309	23.9 (20.5-27.3)
Annual household income, $	3,614	—	—	2,539	—	—
<20,000	—	5,826,581	31.5 (26.1-36.8)	—	5,987,656	47.2 (40.3-54.1)
20,000 to 44,999	—	6,567,688	19.9 (17.2-22.7)	—	13,123,0443	45.6 (41.0-50.3)
45,000 to 74,999	—	2,735,889	11.9 (8.7-15.1)	—	6,723,254	31.4 (26.4-36.5)
75,000 to 99,999	—	987,959	7.7 (4.9-10.6)	—	3,731,888	30.7 (24.5-37.0)
100,000+	—	1,294,403	6.3 (4.4-8.2)	—	6,055,360	27.2 (22.2-32.2)
BMI[e]	3,652	—	—	2,566	—	—
<18.5 (underweight)	—	296,320	13.2 (4.4-22.1)	—	628,707	65.5 (35.7-95.3)
18.5 to 24.9 (normal)	—	4,857,530	14.3 (11.8-16.7)	—	8,922,071	39.0 (33.6-44.5)
25 to 29.9 (overweight)	—	5,521,361	17.3 (14.6-20.1)	—	13,916,717	36.2 (32.6-39.9)
30+ (obese)	—	7,615,094	17.7 (14.9-20.5)	—	13,455,034	35.7 (31.4-40.0)
Self-reported diet quality	3,681	—	—	2,586	—	—
Poor	—	1,244,511	26.8 (18.6-35.1)	—	1,745,464	39.2 (26.5-51.9)
Fair to good	—	12,760,165	18.2 (15.9-20.5)	—	24,585,680	38.4 (35.7-41.1)
Very good	—	4,439,419	11.9 (9.3-14.4)	—	10,997,895	34.2 (29.8-38.7)
Self-reported moderate to vigorous physical activity	1,714	—	—	1,472	—	—
At least 3 d/wk		4,813,144	11.7 (9.4,14.0)		12,260,380	31.0 (27.7-34.3)
<3 d/wk		1,388,585	9.1 (7.0-11.2)		6,721,725	33.9 (29.0-38.7)

[a]Lack of knowledge operationalized as responses of "Don't know" or <1,000 calories/d for women, and "Don't know" or <1,500 calories/d for men, to the question, "About how many calories do you think a (man/woman) of your age and physical activity needs to consume a day to maintain (your) current weight?"
[b]NHANES=National Health and Nutrition Examination Survey.
[c]Weighted percentages rounded to nearest tenth.
[d]GED=General Educational Development tests passed/certification of American high school-level academic skills.
[e]BMI=body mass index; calculated as kg/m^2.

Table 5. Associations between demographic characteristics of adults aged 21 years and older and lack of knowledge[a] of typical daily energy requirements[b]: National US population estimates (n=6,267; NHANES[c] 2007-2010)

Characteristic	Category vs reference	Adjusted odds ratio (95% CI)
Sex	Male vs female	3.8 (2.8-5.1)***
Race/ethnicity	Black vs white	3.1 (2.2-4.5)***
	Black vs other	1.8 (0.9-3.8)
	Black vs Hispanic	1.0 (0.7-1.4)
	Hispanic vs white	3.1 (2.4-4.1)***
	Hispanic vs other	1.8 (0.9-3.6)
	Other vs white	1.7 (0.9-3.4)
Age, y	21 to 30 vs 31 to 50	1.5 (0.7-3.2)
	21 to 30 vs 51 to 60	0.9 (0.3-2.4)
	21 to 30 vs >60	0.6 (0.3-1.2)
	51 to 60 vs 31 to 50	1.8 (0.7-4.4)
	51 to 60 vs >60	0.7 (0.3-1.4)
	>60 vs 31 to 50	2.7 (1.4-5.4)**
Education	Less than high school vs some college	2.3 (1.5-3.5)***
	High school graduate/GED[d] vs less than high school	0.6 (0.4-0.9)*
	High school graduate/GED vs some college	1.4 (1.0-2.0)
	High school graduate/GED vs college graduate	2.3 (1.7-3.1)***
	College graduate vs less than high school	0.3 (0.2-0.4)***
	College graduate vs some college	0.6 (0.4-0.9)**
Annual household income, $	<20,000 vs 20,000 to 44,999	1.2 (0.8-1.7)
	<20,000 vs 45,000 to 74,999	1.8 (1.1-3.0)*
	<20,000 vs 75,000 to 99,999	1.9 (1.2-3.0)**
	<20,000 vs ≥100,000	2.0 (1.3-3.1)***
	20,000 to 44,999 vs 45,000 to 74,999	1.5 (1.0-2.3)*
	20,000 to 44,999 vs 75,000 to 99,999	1.6 (1.1-2.4)*
	20,000 to 44,999 vs ≥100,000	1.7 (1.1-2.5)**
	75,000 to 99,999 vs 45,000 to 74,999	0.9 (0.6-1.5)
	75,000 to 99,999 vs ≥100,000	1.0 (0.6-1.8)
	≥100,000 vs 45,000 to 74,999	0.9 (0.6-1.4)
BMI[e]	<18.5 (underweight) vs 18.5 to 24.9 (normal)	1.2 (0.5-2.8)
	25 to 29.9 (overweight) vs <18.5 (underweight)	0.7 (0.3-1.6)
	25 to 29.9 (overweight) vs 18.5 to 24.9 (normal)	0.8 (0.6-1.1)
	≥30 (obese) vs <18.5 (underweight)	0.6 (0.3-1.5)
	≥30 (obese) vs 18.5 to 24.9 (normal)	0.8 (0.6-1.1)
	≥30 (obese) vs 25 to 29.9 (overweight)	0.9 (0.7-1.3)

[a]Lack of knowledge operationalized as responses of "Don't know" or <1,000 calories/d for women and "Don't know" or <1,500 calories/d for men to the question: "About how many calories do you think a (man/woman) of your age and physical activity needs to consume a day to maintain (your) current weight?"

[b]The estimated adjusted odds ratios and 95% CIs were generated using logistic regression for complex sample surveys and Bonferroni adjustment for multiple comparisons. See also Table 6.

[c]NHANES=National Health and Nutrition Examination Survey.

[d]GED=General Educational Development tests passed/certification of US high school—level academic skills.

[e]BMI=body mass index; calculated as kg/m^2.

*$P<0.05$.

**$P<0.01$.

***$P<0.001$.

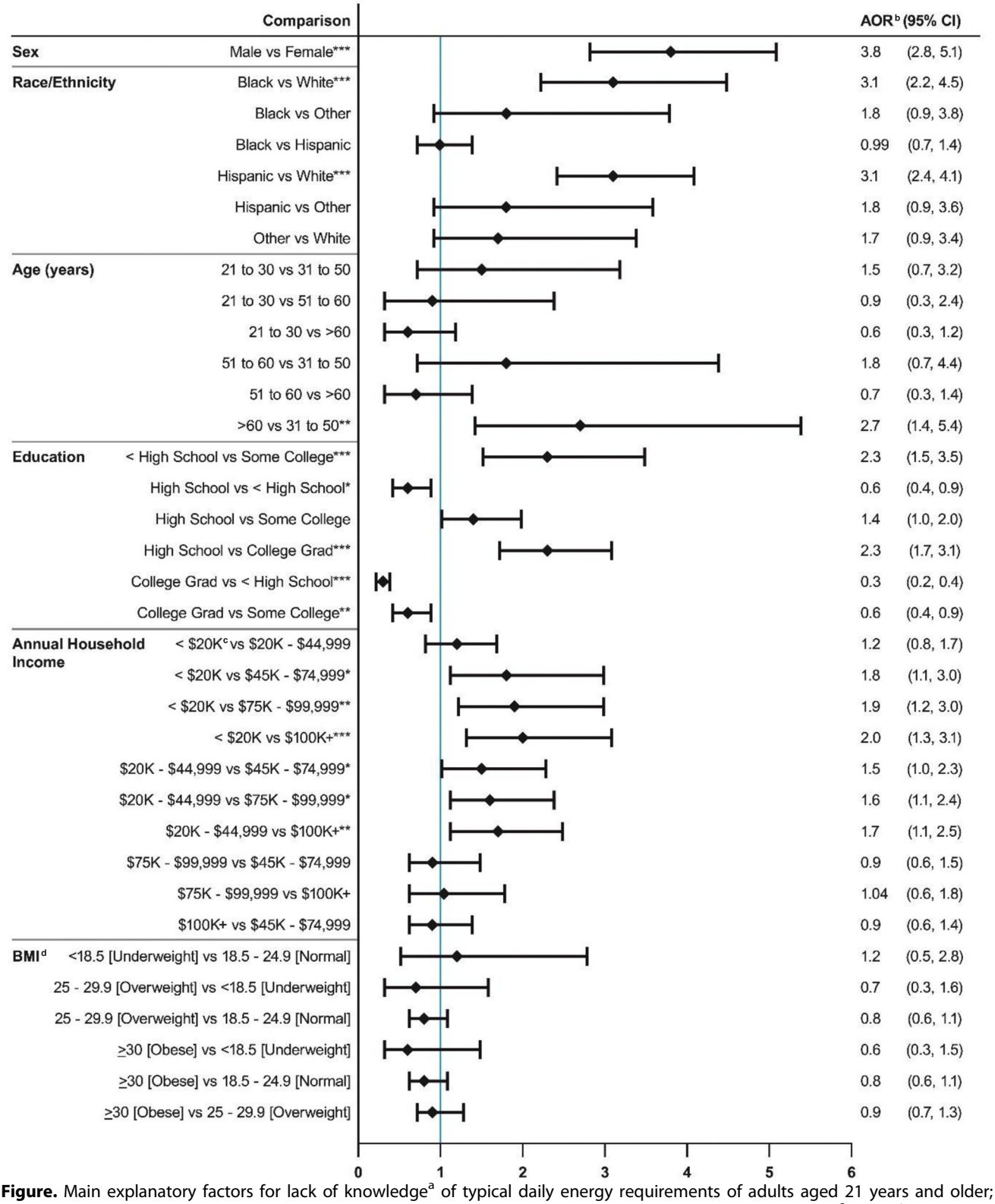

Figure. Main explanatory factors for lack of knowledge[a] of typical daily energy requirements of adults aged 21 years and older; National US population estimates (n=6,267; National Health and Nutrition Examination Survey 2007-2010). [a]Lack of knowledge operationalized as responses of "Don't know" or <1,000 calories/day for women, and "Don't know" or <1,500 calories/day for men, to the question: "About how many calories do you think a [man/woman] of your age and physical activity needs to consume a day to maintain [your] current weight?" [b]AOR=adjusted odds ratio; the estimated adjusted odds ratios and 95% CIs were generated using logistic regression for complex sample surveys and Bonferroni adjustment for multiple comparisons. [c]K=thousand. [d]BMI=body mass index; calculated as kg/m^2. *P<0.05. **P<0.01. ***P<0.001.

Table 6. Significant effect modifiers of associations between demographic characteristics of adults aged 21 years and older and lack of knowledge[a] of typical daily energy requirements[b]: National US population estimates (n=6,267; NHANES[c] 2007-2010)

Effect modifiers	Comparison categories and variable level modified	Adjusted odds ratio (95% CI)
Age (y) and BMI[d]	Age 21 to 30 vs >60 for BMI 25-29.9 (overweight)	0.4 (0.2-0.9)*
Education and age (y)	Less than high school vs some college for age 21 to 30	4.0 (1.6-8.0)***
	College graduate vs less than high school for age 21 to 30	0.2 (0.1-0.7)**
	College graduate vs less than high school for age 31 to 50	0.2 (0.1-0.6)***
	College graduate vs less than high school for age 51 to 60	0.2 (0.04-0.7)**
	Ages >60 vs 31 to 50 for college graduates	4.7 (1.2-8.0)**
Race/ethnicity and age (y)	Black vs white for age 21 to 30	4.8 (1.7-8.0)***
	Black vs white for age 31 to 50	2.8 (1.5-5.5)***
	Black vs white for age >60	2.8 (1.1-7.1)*
	Hispanic vs white for age 21 to 30	2.8 (1.4-5.7)***
	Hispanic vs white for age 31 to 50	3.6 (2.0-6.4)***
	Hispanic vs white for age >60	4.0 (1.9-8.0)***
	Other vs white for age >60	6.4 (1.3-8.0)**
Annual household	Income <20,000 vs 45,000 to 74,999 for females	2.3 (1.1-4.8)*
Income ($) and sex	Income <20,000 vs 75,000 to 99,999 for females	2.9 (1.3-6.8)**
	Income <20,000 vs ≥100,000 for females	2.9 (1.4-5.7)***
	Male vs female for income <20,000	2.3 (1.0-5.0)*
	Male vs female for income 20,000 to 44,999	3.9 (2.0-7.9)***
	Male vs female for income 45,000 to 74,999	3.5 (1.7-7.6)***
	Male vs female for income 75,000 to 99,999	5.2 (1.7-8.0)***
	Male vs female for Income ≥100,000	4.6 (2.1-8.0)***
Race/ethnicity and sex	Black vs white for females	3.8 (2.2-6.5)***
	Hispanic vs white for females	4.4 (2.9-6.7)***
	Black vs white for males	2.5 (1.5-4.5)***
	Hispanic vs white for males	2.2 (1.5-3.4)***
	Male vs female for race/ethnicity=black	3.0 (1.7-5.3)***
	Male vs female for race/ethnicity=Hispanic	2.3 (1.4-3.7)***
	Male vs female for race/ethnicity=other	6.6 (1.1-8.0)*
	Male vs female for race/ethnicity=white	4.5 (3.0-6.8)***

[a]Lack of knowledge operationalized as responses of "Don't know" or <1,000 calories/d for women, and "Don't know" or <1,500 calories/d for men, to the question: "About how many calories do you think a [man/woman] of your age and physical activity needs to consume a day to maintain [your] current weight?"

[b]The estimated adjusted odds ratios and 95% CIs were generated using logistic regression and Bonferroni adjustment for multiple comparisons. Effect modification was examined for each combination of the considered characteristics' categories; those found not to be statistically significant are not shown above. See also Table 5.

[c]NHANES=National Health and Nutrition Examination Survey.

[d]BMI=body mass index; calculated as kg/m^2.

*$P<0.05$.

**$P<0.01$.

***$P<0.001$.

The results reinforce previous research findings[14-18] and provide additional important details regarding perceptions of daily calorie needs between different demographic groups. Consistent with previous research results, study participants reported daily calorie needs that tended to underestimate daily requirements, with relatively few overestimating daily calorie needs.

The analysis was limited in several ways. First, ranges for calories were provided in the survey questionnaire, which may have steered respondents toward the acceptable range. Second, the small sample sizes of the study participants when broken down by sociodemographic groups may have resulted in a lack of precision. Third, individual daily calorie needs vary by age, sex, and physical activity level, and the present analysis did not assess individual daily calorie needs.

Nevertheless, the authors believe this analysis contributes to the literature in important ways. To the authors' knowledge, this is the first analysis of responses to the daily calorie needs questions in the nationally representative NHANES/FCBS supplement, establishing a baseline for future analyses. Narrower ranges of calorie requirements than used in most previous analyses reveal understanding of calorie knowledge among US adults at a finer level of detail. The sample size assessed is far larger than addressed by previous studies in

the United States on this topic. Finally, this analysis highlights disparities in knowledge of typical daily calorie requirements of those with different demographic characteristics.

The updated Nutrition Facts label and national menu labeling requirements increase availability of information about food and beverage calorie content for consumers. Public health educators may consider incorporating typical daily calorie requirements by sex, age, and physical activity level into their nutrition education efforts. This outreach would be especially important for the sociodemographic groups identified in the present analysis as most likely to lack calorie knowledge—those with educational attainment of high school or less, certain racial/ethnic groups, low-income populations, and men of all sociodemographic groups. In addition, future research might consider including open-ended questions about daily calorie requirements rather than providing ranges that may bias responses. Overall, the findings of the present analysis seem particularly useful and relevant, given the high rates of overweight and obesity in the United States, and the magnitude of health disparities, which disproportionately affect certain racial/ethnic groups and low-income populations.

Knowledge of typical daily calorie requirements is a foundational concept of nutrition literacy. Targeting education efforts aimed at increasing awareness, knowledge, and use of calorie information to improve dietary practices may help as complementary efforts within larger policy, systems, and environmental activities to address health disparities and to improve public health in the United States.

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AUTHOR CONTRIBUTIONS

R. A. McKinnon conceived of the study and led the writing and editing of the paper. T. Oladipo led the writing of sections of the manuscript and the development of several of the tables. M. S. Ferguson led the data analysis for the study and assisted with the development of the tables. O. E. Jones assisted with data analysis and development of the tables. M. E. Maroto led the writing of some sections of the manuscript, edited the document, and assisted with development of the Figure. B. Wolpert supervised the data analysis, led development of some of the tables, and edited the manuscript. All authors reviewed and edited the final manuscript.

Table 3. Reported knowledge of typical daily energy requirements[a] by demographic and other characteristics of adult women aged 21 years and older (n=3,681; NHANES[b] 2007-2010)

Characteristic	Total, n (%)[c]	<500 calories	500 to 1,000 calories	1,001 to 1,500 calories	1,501 to 2,000 calories	2,001 to 2,500 calories	2,501 to 3,000 calories	>3,000 calories	Don't know
		← *n (%)[c] [95% CI for percentages]* →							
All female participants (n=3,681)		203 (3.8) [2.9-4.6]	434 (9.3) [8.1-10.5]	1,290 (35.8) [34.0-37.5]	1,214 (36.7) [34.5-39.0]	293 (9.3) [8.0-10.6]	58 (1.2) [0.8-1.6]	24 (0.5) [0.2-0.8]	165 (3.4) [2.7-4.1]
Race/ethnicity (n=3,681)									
Black	668 (11.7)	63 (11.4) [8.9-14.0]	102 (17.6) [14.1-21.0]	235 (32.3) [27.9-36.6]	176 (26.0) [22.2-29.8]	42 (5.5) [3.8-7.1]	14 (1.7) [0.8-2.6]	13 (2.0) [0.3-3.7]	23 (3.6) [1.1-6.0]
Hispanic	942 (12.3)	113 (14.2) [10.8-17.7]	177 (18.2) [14.9-21.5]	279 (27.0) [23.4-30.6]	225 (23.8) [20.3-27.3]	47 (5.2) [3.1-7.3]	14 (1.1) [0.4-1.8]	5 (0.5) [0.0-1.0]	82 (10.0) [7.3-12.7]
Other	127 (5.7)	6 (1.9) [0.0-3.7]	11 (5.9) [2.0-9.9]	32 (32.2) [22.1-42.3]	54 (39.3) [32.3-46.3]	14 (13.9) [5.3-22.6]	0 (0.0) [0.0-0.0]	1 (1.5) [0.0-4.4]	9 (5.32) [2.2-8.4]
White	1,944 (70.3)	21 (0.8) [0.3-1.3]	144 (6.6) [5.3-8.0]	744 (38.2) [35.5-40.8]	759 (40.5) [37.8-43.3]	190 (10.3) [8.6-12.0]	30 (1.3) [0.8-1.8]	5 (0.2) [0.0-0.4]	51 (2.1) [1.4-2.8]
Age, y (n=3,681)									
21 to 30	683 (19.4)	56 (6.1) [3.6-8.7]	106 (12.4) [9.4-15.3]	184 (26.4) [22.6-30.2]	241 (41.3) [36.1-46.5]	52 (9.3) [6.0-12.7]	11 (1.2) [0.2-2.2]	12 (1.3) [0.4-2.2]	21 (2.02) [0.9-3.2]
31 to 50	1,444 (40.5)	99 (4.8) [3.5-6.0]	141 (7.6) [5.6-9.3]	480 (33.3) [30.3-36.4]	500 (37.6) [34.3-41.0]	141 (11.8) [10.0-13.4]	24 (1.5) [0.7-2.3]	6 (0.5) [0.0-1.1]	53 (2.9) [2.0-3.9]
51 to 60	571 (19.4)	26 (2.7) [1.3-4.1]	63 (8.8) [5.7-11.9]	215 (37.5) [33.1-41.9]	186 (38.3) [32.0-44.5]	44 (8.2) [5.1-11.3]	11 (1.3) [0.4-2.2]	4 (0.2) [0.0-0.4]	22 (3.1) [1.3-4.8]
>60	983 (20.7)	22 (1.2) [0.4-1.9]	124 (10.0) [7.6-12.4]	411 (45.6) [41.3-49.9]	287 (30.5) [26.7-34.2]	56 (6.3) [4.3-8.2]	12 (0.8) [0.2-1.3]	2 (0.2) [0.0-0.4]	69 (5.6) [4.1-7.2]
Education (n=3,679)									
Less than high school	731 (19.0)	105 (11.2) [8.2-14.1]	155 (17.5) [14.5-20.5]	206 (32.3) [27.9-36.6]	143 (24.8) [20.1-29.5]	33 (4.1) [2.5-5.7]	12 (1.2) [0.4-2.0]	6 (1.2) [0.2-2.2]	71 (7.8) [5.3-10.3]

(*continued on next page*)

Table 3. Reported knowledge of typical daily energy requirements[a] by demographic and other characteristics of adult women aged 21 years and older (n=3,681; NHANES[b] 2007-2010) (*continued*)

Characteristic	Total, n (%)[c]	<500 calories	500 to 1,000 calories	1,001 to 1,500 calories	1,501 to 2,000 calories	2,001 to 2,500 calories	2,501 to 3,000 calories	>3,000 calories	Don't know
High school graduate/ GED[d]	857 (23.9)	52 (3.6) [2.0-5.2]	122 (12.4) [9.9-15.1]	326 (39.1) [35.1-43.2]	247 (32.4) [29.8-35.9]	60 (8.7) [4.7-12.6]	8 (0.8) [0.2-1.3]	9 (0.7) [0.0-1.3]	33 (2.4) [1.2-3.5]
Some college	1,203 (30.4)	37 (2.1) [1.0-3.1]	118 (7.2) [5.7-8.7]	469 (39.4) [36.1-42.7]	409 (36.9) [33.4-40.4]	105 (9.7) [7.3-12.1]	25 (1.8) [0.9-2.6]	5 (0.2) [0.0-0.3]	35 (2.8) [1.6-4.0]
College graduate or above	885 (26.7)	8 (0.6) [0.0-1.2]	37 (3.0) [1.6-4.4]	289 (31.2) [27.2-35.2]	413 (48.8) [43.8-53.9]	95 (13.1) [10.9-15.3]	13 (1.1) [0.2-1.9]	4 (0.3) [0.0-0.6]	26 (2.0) [1.0-3.0]
Don't know	3 (0.0)	0 (0.0) [0.0-0.0]	2 (91.1) [79.9-100.0]	0 (0.0) [0.0-0.0]	1 (8.9) [0.0-20.2]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]
Annual household income, $ (n=3,614)									
<20,000	730 (16.9)	70 (8.5) [5.6-11.4]	128(15.5) [11.8-19.1]	228 (33.1) [29.3-36.9]	169 (24.6) [20.7-28.5]	49 (7.5) [4.8-10.1]	16 (1.8) [0.9-2.8]	9 (1.6) [0.5-2.7]	61 (7.5) [5.2-9.8]
20,000 to 44,999	1,212 (30.2)	91 (5.1) [3.7-6.6]	153 (11.4) [9.0-13.8]	446 (38.1) [35.0-41.2]	362 (32.8) [28.6-36.9]	84 (7.7) [5.5-10.0]	12 (0.9) [0.3-1.5]	10 (0.6) [0.0-1.1]	54 (3.4) [2.3-4.5]
45,000 to 74,999	735 (21.0)	20 (1.5) [0.8-2.3]	82 (7.9) [5.7-10.2]	262 (38.5) [34.1-43.0]	272 (40.3) [35.0-45.6]	58 (8.0) [5.7-10.3]	13 (1.1) [0.4-1.8]	2 (0.2) [0.0-0.5]	26 (2.5) [0.9-4.1]
75,000 to 99,999	381 (11.7)	8 (1.4) [0.0-3.0]	24 (5.3) [2.4-8.1]	138 (34.1) [28.9-39.4]	167 (46.3) [40.8-51.7]	31 (10.2) [6.6-13.9]	7 (1.6) [0.2-3.1]	0 (0.0) [0.0-0.0]	6 (1.1) [0.0-2.6]
100,000+	510 (18.9)	4 (0.7) [0.0-1.7]	30 (4.5) [2.5-6.5]	190 (34.6) [29.0-40.3]	210 (43.9) [37.9-49.9]	62 (14.0) [10.3-17.7]	8 (1.2) [0.2-2.1]	1 (0.1) [0.0-0.1]	5 (1.1) [0.0-2.1]
Don't know	46 (1.3)	2 (5.3) [0.0-15.1]	11 (16.3) [4.2-28.5]	7 (11.7) [0.0-23.8]	11 (26.8) [9.5-44.1]	3 (11.1) [0.0-27.3]	1 (1.9) [0.0-5.8]	2 (1.7) [0.0-4.1]	9 (25.3) [9.2-41.3]
BMI[e] (n=3,652)									
<18.5 (underweight)	63 (2.0)	3 (4.9) [0.0-10.8]	6 (5.6) [0.2-11.1]	22 (35.4) [21.8-49.0]	16 (35.5) [19.5-51.5]	10 (10.8) [3.5-18.1]	0 (0.0) [0.0-0.0]	2 (5.1) [0.0-12.5]	4 (2.7) [0.0-5.5]
18.5 to 24.9 (normal)	1,009 (30.6)	49 (3.2) [2.0-4.4]	104 (8.0) [5.9-10.2]	347 (34.5) [31.7-37.4]	342 (35.0) [33.0-40.9]	102 (12.3) [9.8-14.73]	11 (1.2) [0.5-2.0]	10 (0.8) [0.1-1.5]	44 (3.0) [1.8-4.3]

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Table 3. Reported knowledge of typical daily energy requirements[a] by demographic and other characteristics of adult women aged 21 years and older (n=3,681; NHANES[b] 2007-2010) (*continued*)

Characteristic	Total, n (%)[c]	<500 calories	500 to 1,000 calories	1,001 to 1,500 calories	1,501 to 2,000 calories	2,001 to 2,500 calories	2,501 to 3,000 calories	>3,000 calories	Don't know
25 to 29.9 (overweight)	1,050 (28.6)	66 (4.1) [2.7-5.6]	135 (9.1) [7.0-11.2]	384 (37.2) [32.6-41.7]	338 (37.3) [32.7-41.9]	55 (7.1) [4.5-9.6]	16 (1.0) [0.3-1.7]	3 (0.1) [0.0-0.3]	53 (4.1) [2.7-5.5]
>30 (obese)	1,530 (38.7)	83 (3.9) [2.8-5.1]	186 (10.6) [8.6-12.7]	530 (35.9) [33.4-38.5]	508 (36.1) [33.1-39.1]	125 (8.7) [6.2-11.1]	28 (1.3) [0.7-1.9]	9 (0.3) [0.1-0.6]	61 (3.1) [2.1-4.1]
Self-reported diet quality (n=3,681)									
Poor	179 (4.1)	13 (7.6) [2.9-12.3]	29 (11.7) [7.0-16.5]	58 (35.1) [23.5-46.6]	44 (28.6) [18.3-39.0]	14 (5.3) [2.1-8.6]	6 (1.8) [0.1-3.5]	5 (2.4) [0.0-4.8]	10 (7.5) [2.4-12.6]
Fair to good	2,359 (62.4)	148 (4.4) [3.3-5.4]	303 (10.4) [8.7-12.0]	818 (35.0) [33.0-37.0]	753 (36.2) [33.7-38.7]	184 (9.2) [7.5-11.0]	34 (0.9) [0.6-1.3]	12 (0.5) [0.1-0.8]	107 (3.5) [2.7-4.3]
Very good	1,141 (33.4)	41 (2.2) [1.1-3.2]	102 (7.0) [5.5-8.4]	414 (37.4) [33.7-41.0]	417 (38.8) [34.7-42.8]	95 (9.9) [8.5-11.4]	18 (1.7) [0.9-2.5]	7 (0.4) [0.0-0.7]	47 (2.7) [1.7-3.8]
Don't know	2 (0.0)	1 (25.3) [0.0-79.8]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	1 (74.7) [20.2-100.0]
Self-reported weekly physical activity (n=1,714)									
At least 3 d	1,268 (72.7)	43 (2.4) [1.2-3.5]	116 (7.2) [5.5-8.8]	458 (36.0) [33.0-39.0]	462 (38.9) [35.5-42.3]	127 (11.6) [9.7-13.4]	18 (1.3) [0.6-2.1]	7 (0.5) [0.0-1.0]	37 (2.2) [1.3-3.1]
<3 d	445 (27.0)	16 (1.6) [0.7-2.6]	41 (5.9) [4.5-7.4]	154 (33.9) [28.9-38.8]	171 (41.9) [35.8-47.9]	43 (13.5) [9.3-17.7]	8 (1.4) [0.3-2.5]	1 (0.3) [0.0-0.9]	11 (1.5) [0.3-2.8]
Don't know	1 (0.2)	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	1 (100.0) [100.0-100.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]

[a]Knowledge of typical daily energy requirements in response to the question, "About how many calories do you think a [man/woman] of your age and physical activity needs to consume a day to maintain [your] current weight?"
[b]NHANES=National Health and Nutrition Examination Survey.
[c]Weighted percentages rounded to nearest tenth.
[d]GED=General Educational Development tests passed/certification of US high school—level academic skills.
[e]BMI=body mass index; calculated as kg/m^2.

Table 4. Reported knowledge of typical daily energy requirements[a] by demographic and other characteristics of adult men aged 21 years and older (n=2,586; NHANES[b] 2007-2010)

Characteristic	Total, n (%)[c]	<500 calories	500 to 1,000 calories	1,001 to 1,500 calories	1,501 to 2,000 calories	2,001 to 2,500 calories	2,501 to 3,000 calories	>3,000 calories	Don't know
		n (%)[c] [95% CI for percentages]							
All male participants (n=2,586)	—	114 (3.3) [2.6-4.0]	281 (8.4) [7.3-9.5]	473 (19.4) [17.1-21.7]	836 (33.2) [31.2-36.1]	505 (20.4) [18.8-22.0]	156 (7.1) [5.7-8.5]	55 (2.2) [1.5-3.0]	166 (6.0) [4.9-7.2]
Race/ethnicity (n=2,586)									
Black	445 (10.6)	42 (10.4) [7.6-13.2]	71 (14.4) [11.5-17.2]	96 (23.1) [18.7-27.4]	120 (25.8) [20.6-31.0]	45 (10.1) [6.3-13.8]	27 (5.5) [2.8-8.2]	12 (3.2) [0.8-5.7]	32 (7.6) [3.6-11.6]
Hispanic	545 (14.7)	47 (9.2) [6.1-12.4]	101 (18.1) [13.3-22.8]	101 (17.2) [12.7-21.6]	127 (22.0) [18.3-25.8]	80 (14.2) [10.4-18.0]	24 (5.7) [3.5-8.0]	7 (2.0) [0.0-4.1]	58 (11.6) [7.7-15.6]
Other	88 (4.9)	3 (3.8) [0.0-9.1]	8 (8.7) [0.4-17.0]	20 (22.2) [10.8-33.5]	31 (35.0) [24.1-45.9]	18 (20.7) [10.1-31.3]	2 (4.0) [0.0-11.0]	1 (0.3) [0.0-0.9]	5 (5.4) [0.0-11.3]
White	1,508 (69.8)	22 (0.9) [0.5-1.3]	101 (5.4) [4.4-6.5]	256 (19.1) [16.0-22.2]	558 (36.5) [33.7-39.3]	362 (23.2) [21.1-25.4]	103 (7.9) [6.0-9.7]	35 (2.3) [1.3-3.2]	71 (4.7) [3.4-5.9]
Age, y (n=2,586)									
21 to 30	511 (20.5)	33 (5.2) [3.0-7.4]	69 (9.7) [7.0-12.4]	78 (15.9) [11.0-20.8]	142 (27.9) [23.4-32.4]	115 (22.9) [18.0-27.7]	36 (9.9) [4.9-14.8]	14 (3.4) [1.4-5.4]	24 (5.2) [2.6-7.9]
31 to 50	982 (40.5)	41 (3.0) [2.0-4.1]	97 (8.2) [6.0-10.4]	178 (19.2) [15.5-22.9]	306 (32,7) [29.0-36.4]	200 (21.5) [18.1-24.8]	77 (7.3) [5.3-9.4]	26 (2.5) [1.4-3.6]	57 (5.7) [3.8-7.6]
51 to 60	434 (18.6)	17 (2.2) [0.7-3.7]	51 (7.8) [5.4-10.2]	91 (22.3) [17.1-27.5]	132 (31.0) [25.6-36.3]	84 (22.2) [15.0-27.5]	23 (7.7) [5.0-10.5]	9 (1.9) [0.3-3.4]	27 (5.9) [2.5-9.2]
>60	659 (20.3)	23 (2.8) [1.4-4.2]	64 (8.0) [5.7-10.3]	126 (20.6) [17.2-24.1]	256 (41.5) [37.9-45.2]	106 (15.0) [12.0-18.0]	20 (3.3) [1.8-4.9]	6 (1.0) [0.0-1.9]	58 (7.7) [4.6-10.9]
Education (n=2,586)									
Less than high school	442 (17.5)	54 (10.5) [6.9-14.1]	74 (14.2) [10.8-17.7]	76 (19.2) [14.2-24.3]	111 (26.3) [19.5-33.2]	48 (12.0) [6.8-17.3]	13 (3.4) [1.2-5.7]	10 (2.6) [0.4-4.8]	56 (11.7) [7.0-16.4]
High school graduate/GED[d]	587 (25.7)	28 (2.8) [1.5-4.0]	100 (12.0) [9.4-14.6]	101 (18.4) [14.4-22.4]	169 (30.7) [26.8-34.6]	109 (21.2) [17.0-25.5]	31 (5.5) [3.4-7.5]	12 (2.1) [0.8-3.5]	37 (7.3) [3.5-11.0]

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Table 4. Reported knowledge of typical daily energy requirements[a] by demographic and other characteristics of adult men aged 21 years and older (n=2,586; NHANES[b] 2007-2010) (*continued*)

Characteristic	Total, n (%)[c]	<500 calories	500 to 1,000 calories	1,001 to 1,500 calories	1,501 to 2,000 calories	2,001 to 2,500 calories	2,501 to 3,000 calories	>3,000 calories	Don't know
Some college	775 (29.0)	30 (2.4) [1.3-3.5]	74 (6.6) [4.9-8.4]	155 (22.1) [17.2-27.0]	249 (33.6) [28.8-38.3]	159 (20.5) [17.0-24.0]	50 (8.1) [5.0-11.3]	19 (2.2) [0.5-4.0]	39 (4.5) [3.1-5.9]
College graduate or above	781 (27.8)	2 (0.1) [0.0-0.2]	33 (3.2) [1.6-4.8]	141 (17.7) [14.8-20.5]	307 (39.4) [36.0-42.9]	188 (24.7) [22.0-27.5]	62 (9.9) [7.0-12.8]	14 (2.1) [0.8-3.4]	34 (3.0) [1.7-4.2]
Don't know	1 (0.0)	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	1 (100.0) [100.0-100.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]
Annual household income, $ (n=2,539)									
<20,000	371 (12.9)	37 (9.5) [6.9-12.2]	54 (12.7) [7.7-17.7]	64 (18.3) [13.5-23.0]	104 (29.5) [22.2-36.9]	56 (14.7) [10.6-18.9]	21 (5.1) [2.0-8.1]	10 (3.5) [0.8-6.1]	25 (6.7) [2.9-10.6]
20,000 to 44,999	795 (29.2)	46 (4.7) [3.1-6.3]	112 (12.0) [9.7-14.3]	155 (22.4) [18.7-26.1]	224 (27.2) [23.2-31.1]	139 (18.6) [15.3-22.0]	38 (5.5) [3.1-7.8]	20 (3.2) [1.4-5.0]	61 (6.5) [4.3-8.7]
45,000 to 74,999	548 (21.7)	16 (2.0) [0.5-3.5]	59 (8.1) [5.9-10.4]	91 (17.0) [12.4-21.5]	185 (34.4) [29.2-39.6]	121 (23.7) [19.8-27.7]	37 (9.2) [4.1-14.4]	10 (1.2) [0.4-2.1]	29 (4.3) [2.6-6.0]
75,000 to 99,999	313 (12.3)	7 (1.2) [0.1-2.4]	28 (7.3) [4.2-10.3]	55 (16.4) [9.5-23.3]	123 (41.3) [34.9-47.7]	56 (18.0) [13.3-22.6]	20 (8.4) [3.9-12.9]	5 (1.6) [0.0-3.3]	19 (5.8) [2.3-9.4]
100,000+	482 (22.6)	2 (0.2) [0.0-0.4]	16(2.0) [0.5-3.6]	90 (19.8) [15.7-23.8]	184 (38.3) [32.4-44.2]	121 (24.5) [20.4-28.6]	39 (8.2) [4.5-11.8]	9 (1.9) [0.4-3.4]	21 (5.2) [2.0-8.5]
Don't know	30 (1.3)	2 (2.8) [0.0-6.9]	3 (9.4) [0.0-23.0]	9 (23.7) [6.4-41.0]	5 (20.2) [0.0-43.8]	5 (16.8) [0.0-35.1]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	6 (27.2) [6.4-48.0]
BMI[e] (n=2,566)									
<18.5 (underweight)	20 (1.0)	0 (0.0) [0.0-0.0]	5 (12.6) [0.0-28.0]	4 (20.6) [0.0-44.7]	4 (16.5) [0.0-37.8]	4 (18.0) [0.0-42.8]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	3 (32.4) [0.0-69.4]
18.5 to 24.9 (normal)	606 (22.9)	34 (3.7) [2.4-5.0]	78 (8.9) [6.4-11.5]	101 (18.0) [13.9-22.0]	175 (30.0) [25.0-35.0]	103 (18.0) [14.1-22.0]	46 (9.6) [6.4-12.7]	17 (3.4) [1.5-5.3]	52 (8.5) [6.1-10.9]
25 to 29.9 (overweight)	971 (38.4)	42 (3.1) [1.6-4.5]	108 (9.4) [7.2-11.6]	178 (18.9) [14.9-22.9]	320 (34.9) [30.6-39.2]	201 (21.7) [18.1-25.2]	49 (6.0) [3.7-8.4]	11 (1.2) [0.3-2.1]	62 (4.9) [3.6-6.2]
>30 (obese)	969 (37.7)	37 (3.3) [1.8-4.7]	85 (6.5) [5.1-8.0]	183 (20.7) [17.4-24.0]	334 (34.1) [29.2-39.0]	194 (20.6) [17.2-24.1]	61 (7.0) [5.1-9.0]	26 (2.6) [1.2-4.0]	49 (5.2) [3.2-7.1]

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Table 4. Reported knowledge of typical daily energy requirements[a] by demographic and other characteristics of adult men aged 21 years and older (n=2,586; NHANES[b] 2007-2010) (*continued*)

Characteristic	Total, n (%)[c]	<500 calories	500 to 1,000 calories	1,001 to 1,500 calories	1,501 to 2,000 calories	2,001 to 2,500 calories	2,501 to 3,000 calories	>3,000 calories	Don't know
Self-reported diet quality (n=2,586)									
Poor	115 (4.4)	4 (4.3) [0.0-10.3]	10 (3.4) [0.6-6.3]	30 (25.9) [15.9-35.9]	27 (28.0) [17.8-38.2]	22 (17.7) [9.1-26.4]	5 (6.5) [0.0-13.9]	9 (8.6) [1.4-15.9]	8 (5.7) [1.2-10.1]
Fair to good	1,635 (63.6)	86 (3.9) [3.0-4.9]	193 (9.0) [7.5-10.4]	289 (19.6) [16.5-22.6]	533 (32.3) [29.6-34.9]	310 (21.0) [18.4-23.6]	94 (6.5) [4.9-8.1]	29 (1.8) [1.0-2.6]	101 (6.0) [4.3-7.6]
Very good	836 (32.0)	24 (1.9) [0.9-2.8]	78 (7.9) [5.9-9.9]	154 (18.2) [14.4-22.0]	276 (35.7) [33.0-38.4]	173 (19.6) [16.2-22.9]	57 (8.4) [6.3-10.4]	17 (2.2) [1.0-3.0]	57 (6.3) [4.0-8.5]
Don't know	0 (0.0)	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]
Self-reported weekly physical activity (n=1,472)									
At least 3 d	964 (66.5)	31 (1.9) [1.1-2.7]	88 (7.7) [5.7-9.7]	164 (16.8) [14.2-19.4]	327 (34.3) [31.1-37.4]	204 (22.9) [20.0-25.8]	77 (9.4) [6.9-11.8]	21 (2.5) [1.2-3.8]	52 (4.6) [2.9-6.4]
<3 d	507 (33.4)	14 (1.8) [0.8-2.9]	52 (7.5) [5.1-10.0]	83 (18.9) [13.4-24.5]	173 (35.2) [29.6-40.9]	106 (20.5) [16.3-24.7]	37 (7.5) [5.1-10.0]	15 (2.9) [0.5-5.4]	27 (6.1) [3.9-8.3]
Don't know	1 (0.1)	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	0 (0.0) [0.0-0.0]	1 (100.0) [100.0-100.0]

[a]Knowledge of typical daily energy requirements in response to the question, "About how many calories do you think a [man/woman] of your age and physical activity needs to consume a day to maintain [your] current weight?"
[b]NHANES=National Health and Nutrition Examination Survey.
[c]Weighted percentages rounded to nearest tenth.
[d]GED=General Educational Development tests passed/certification of US high school-level academic skills.
[e]BMI=body mass index; calculated as kg/m^2.