Healthy Lifestyle Characteristics Among Adults in the United States, 2000

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Background: Many public health recommendations and clinical guidelines emphasize the importance of healthy lifestyles. Recent epidemiologic studies demonstrate that following a healthy lifestyle has substantial health benefits. The objectives of this study were to report on the prevalence of healthy lifestyle characteristics (HLCs) and to generate a single indicator of a healthy lifestyle.

Methods: National data for the year 2000 were obtained from the Behavioral Risk Factor Surveillance System, which consists of annual, statewide, random digit–dialed household telephone surveys. We defined the following 4 HLCs: nonsmoking, healthy weight (body mass index [calculated as weight in kilograms divided by the square of height in meters] of 18.5-25.0), consuming 5 or more fruits and vegetables per day, and regular physical activity (≥30 minutes for ≥5 times per week). The 4 HLCs were summed to create a healthy lifestyle index (range, 0-4), and the pattern of following all 4 HLCs was defined as a single healthy lifestyle indicator. We report prevalences of each HLC and the indicator by major demographic subgroups.

Results: By using data from more than 153 000 adults, the prevalence (95% confidence interval) of the individual HLCs was as follows: nonsmoking, 76.0% (75.6%-76.4%); healthy weight, 40.1% (39.7%-40.5%); 5 fruits and vegetables per day, 23.3% (22.9%-23.7%); and regular physical activity, 22.2% (21.8%-22.6%). The overall prevalence of the healthy lifestyle indicator (ie, having all 4 HLCs) was only 3.0% (95% confidence interval, 2.8%-3.2%), with little variation among subgroups (range, 0.8%-5.7%).

Conclusion: These data illustrate that a healthy lifestyle—defined as a combination of 4 HLCs—was undertaken by very few adults in the United States, and that no subgroup followed this combination to a level remotely consistent with clinical or public health recommendations.

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In the United States and worldwide, chronic diseases account for the greatest overall population disease burden in terms of mortality, morbidity, and decreased quality of life.[1] Most people with major chronic diseases share multiple common lifestyle characteristics or behaviors, particularly smoking, poor diet, physical inactivity, and obesity.[2] Tobacco, poor diet, and physical inactivity have been identified as leading contributors to overall mortality in the United States.[3] The public health importance of these lifestyle characteristics can also be gauged by their inclusion in major public health reports on smoking,[4,5] physical activity,[6] and diet,[7] and in clinical guidelines concerning blood pressure,[8] cholesterol,[9] and obesity,[10] which all emphasize lifestyle modification as a key element of prevention and control.

Recently, epidemiologic studies have provided clear evidence of the benefits of avoiding major cardiovascular risk factors[11-14] and following a healthy lifestyle.[15,16] For example, the Nurses' Health Study found that the risk of coronary heart disease[15] and type 2 diabetes mellitus[16] was reduced 5- and 10-fold, respectively, among those who engaged in 5 modifiable healthy behaviors. However, only 3% of the nurses actually engaged in this lifestyle.

We chose to estimate the prevalence of 4 healthy lifestyle characteristics (HLCs) (ie, nonsmoking, healthy weight, fruit and vegetable consumption, and leisure time physical activity [LTPA]) using a nationally representative sample of US adults, and to generate a single indicator of a healthy lifestyle defined by undertaking all 4 HLCs.

METHODS

The Behavioral Risk Factor Surveillance System (BRFSS) is composed of annual, statewide, random digit–dialed household telephone surveys of adults.[17,18] We pooled the 2000 BRFSS responses from all 50 states and the District of Columbia, and restricted the sample to respondents aged 18 to 74 years. The median

Table 1. Prevalence of Individual HLCs*

Variable	No. of Subjects	Nonsmoking*†	Healthy Weight*‡	Fruits and Vegetables*§	Regular LTPA*‖
Age, y					
18-24	14 853	69.9	57.5	22.0	26.8
25-34	29 617	74.2	44.2	19.8	21.5
35-44	37 423	73.7	38.5	21.5	20.1
45-54	32 266	75.7	34.3	23.3	20.9
55-64	21 713	80.5	32.0	26.5	22.6
65-74	17 933	87.9	34.8	31.1	24.2
Sex					
Male	66 806	74.7	32.3	19.2	22.6
Female	86 999	77.3	48.2	27.6	21.8
Race/ethnicity					
Non-Hispanic					
White, non-Hispanic	121 664	75.1	41.6	23.1	23.2
Black, non-Hispanic	12 584	77.3	31.0	21.7	19.6
Hispanic	10 831	79.5	34.5	24.3	18.6
Other	7985	78.1	50.2	27.6	23.0
Education					
<High school	15 604	66.6	32.3	20.1	13.6
High school graduate	48 264	69.8	37.4	20.0	19.2
Some college	43 343	75.5	41.3	23.8	24.1
College graduate	46 394	86.9	45.0	27.7	27.3
Household income, $					
<10 000	7160	68.3	38.3	23.3	18.3
10 000-19 999	17 946	68.1	37.7	21.9	17.4
20 000-34 999	36 755	71.2	38.9	21.7	19.9
35 000-49 999	26 929	74.9	37.8	21.7	22.7
50 000-74 999	23 666	79.3	39.9	22.7	24.8
≥75 000	23 165	85.1	43.0	26.6	27.4
General health					
Excellent	36 174	83.8	51.6	26.9	30.3
Very good	53 124	76.9	42.1	22.8	23.6
Good	43 345	72.0	34.2	21.8	18.2
Fair	15 173	69.6	28.8	21.3	14.9
Poor	5776	67.1	27.8	23.7	12.6
Total	153 805	76.0	40.1	23.3	22.2

Abbreviations: HLC, health lifestyle characteristic; LTPA, leisure time physical activity.
*Data are given as percentage of subjects.
†Not currently smoking cigarettes.
‡A body mass index (calculated as weight in kilograms divided by the square of height in meters) between 18.5 and 25.0.
§Consumes fruits and vegetables 5 or more times per day.
‖Obtains 30 minutes or more of LTPA at least 5 times per week.

cooperation rate of the state-specific surveys was 51.3% (range, 33.4%-75.5%).

All data were based on self-report. Healthy weight was defined as a body mass index (calculated as weight in kilograms divided by the square of height in meters) between 18.5 and 25.0.[10] Food frequency questions were used to measure the consumption of fruit juice, fruit, green salad, potatoes (excluding fried products), carrots, and other vegetables, and adequate consumption was defined as eating fruits and vegetables 5 or more times per day.[7] Leisure time physical activity was based on questions regarding the frequency and duration of up to 2 activities. Regular LTPA was defined as 30 minutes or more of at least moderate-intensity physical activity 5 or more times per week.[6]

We created an index of healthy lifestyle by summing the total number of HLCs for each respondent (range, 0-4), and then defined the pattern of following all 4 HLCs as a single indicator of healthy lifestyle (ie, index of healthy lifestyle = 4). We then estimated the prevalence of each individual HLC by age, sex, race, education, household income, and self-reported health status, and generated age-adjusted prevalence estimates for the indicator of healthy lifestyle by direct age standardization using the internal age distribution.[19] We chose not to report *P* values and limited the reporting of confidence intervals (CIs), because the large number of observations result in even minor differences being statistically significant. To account for weighting and complex sampling design, statistical software (SUDAAN) was used.[20]

RESULTS

The 2000 BRFSS included 164 940 respondents aged 18 to 74 years. We excluded respondents with missing information, resulting in a working sample size of 153 805. The prevalence estimates of each HLC by the 6 demographic and health-related variables are shown in **Table 1**. Seventy-six percent (95% CI, 75.6%-76.4%) of US adults did not currently smoke cigarettes. Nonsmoking showed strong positive trends with increasing age, education, household income, and health status. Only 40.1% (95% CI, 39.7-40.5%) of adults had healthy weight, which showed a strong inverse trend with age and positive trends with education and health status. Healthy weight was more

Table 2. Age-Adjusted Prevalence of the Healthy Lifestyle Indicator by Subgroup*

Variable	Prevalence, %
Age, y	
18-24	3.5
25-34	2.6
35-44	2.5
45-54	2.8
55-64	3.5
65-74	4.0
Sex	
Male	1.9
Female	4.2
Race/ethnicity	
Non-Hispanic	
White, non-Hispanic	3.3
Black, non-Hispanic	1.4
Hispanic	2.3
Other	4.7
Education	
<High school	0.8
High school graduate	1.9
Some college	3.2
College graduate	5.0
Household income, $	
<10 000	2.2
10 000-19 999	1.7
20 000-34 999	2.2
35 000-49 999	2.9
50 000-74 999	3.4
≥75 000	5.1
General health	
Excellent	5.7
Very good	3.2
Good	1.8
Fair	1.1
Poor	1.3
Total	3.0

*Indicator is defined as following all 4 health lifestyle characteristics: nonsmoking (not currently smoking), healthy weight (body mass index [calculated as weight in kilograms divided by the square of height in meters] of 18.5-25.0), regular fruit and vegetable consumption (≥5 per day), and regular physical activity (≥30 minutes at least 5 times per week). Prevalence estimates for sex, race/ethnicity, education, household income, and general health were age adjusted by direct standardization using the internal age distribution.

common in women and among whites. Only 23.3% (95% CI, 22.9%-23.7%) of persons consumed fruits and vegetables 5 or more times per day, while regular LTPA was undertaken by only 22.2% (95% CI, 21.8%-22.6%).

The healthy lifestyle index was distributed as follows: 9.4% (95% CI, 9.1%-9.7%) had 0 HLCs, 39.6% (95% CI, 39.2%-40.0%) had 1, 34.2% (95% CI, 33.8%-34.6%) had 2, 13.8% (95% CI, 13.5%-14.1%) had 3, and only 3.0% (95% CI, 2.8%-3.2%) followed all 4 HLCs (and, therefore, met the criteria for the healthy lifestyle indicator). There are 16 possible unique permutations or combinations of the 4 HLCs; however, only 2 were followed by more than 10% of the population (nonsmokers with no other HLCs made up 29.0%, and nonsmokers with a healthy weight represented 16.1%). The 9.4% of subjects who did not engage in any of the 4 HLCs was the next most common group.

The age-adjusted prevalence estimates of the healthy lifestyle indicator (ie, engaging in all 4 HLCs) by the 6 demographic and health-related variables are shown in **Table 2**. The overall prevalence was only 3.0%, and the absolute differences across subgroups were small, ranging from 0.8% (in persons with less than high school education) to only 5.7% (in persons in excellent health).

COMMENT

The results generated from this nationally representative database indicate that just 3.0% of US adults followed a combination of 4 modifiable lifestyle characteristics—nonsmoking, healthy weight, adequate fruit and vegetable consumption, and regular physical activity. No subgroup engaged in all 4 healthy lifestyles to any important degree— the highest prevalence being only 5.7%. These results illustrate the extraordinarily low prevalence of healthy lifestyles in the US adult population. While the overall prevalence of 3.0% was extremely low, it is identical to that reported in the Nurses' Health Study[15,16] and similar to reports generated from the Third National Health and Nutrition Examination Survey.[21,22]

The low prevalence of the healthy lifestyle indicator in our study is a function of the prevalences of the individual HLCs and how they aggregate or cluster together. While three quarters of US adults do not smoke, the prevalences of the other 3 lifestyles were quite low. Only two fifths of the population had a healthy weight, while only a quarter consumed adequate fruits and vegetables or engaged in regular LTPA. How these factors then combine together is dependent on the degree to which they are correlated. While it is commonly recognized that smoking and alcohol are associated with one another,[23] the degree of association between other lifestyle characteristics is less clear.[22,24-27] If the 4 HLCs were statistically independent, the expected prevalence of the indicator would be 1.5%, which indicates that the actual magnitude of association among these HLCs is small to nonexistent. This finding is in agreement with those of other studies that have found that while health behaviors are interrelated, the magnitude of the relationship is not large and the aggregation of factors beyond simple pairwise correlations is complex.[22,24-27]

There are several potential limitations to our study. First, these data are open to the limitations inherent in self-reported data.[28] Second, the BRFSS captures information on LTPA only, which may underestimate total activity, and BRFSS estimates of daily fruit and vegetable consumption are lower than those based on more extensive food frequency questionnaires.[29] Noncoverage and nonresponse biases typical of telephone surveys may affect our estimates. Specifically, comparisons made to the US census indicate that BRFSS respondents are slightly more likely to be older, female, white, and more educated. These facts, along with declining response rates, have led to concerns about response bias. However, recent work has found that such worries may be exaggerated, because in general household population random digit–dialed surveys, response rates ranging from 30% to 70% were not associated with significant bias.[30-32]

We also recognize that obesity is, in part, a consequence of dietary and physical activity behaviors. It is for this reason that some health behavior studies have not included body mass index[22]; however, we chose to include it because of its public health importance. Other studies[15,16,22] have included moderate alcohol consumption as a healthy lifestyle factor because of its overall benefits in reducing cardiovascular risk. However, we chose not to include alcohol consumption in our index because of the difficulty in developing a clear, unified, public health recommendation on this topic.[33] Finally, it could be argued that combining all 4 HLCs into a single indicator is too extreme, because the prevalence of the indicator is unlikely to change in response to public health interventions. However, we believe that our approach offers a single figure that can serve as a useful population-level indicator of healthy lifestyle behaviors for surveillance purposes, and a measure that could be useful when counseling individual patients about healthier lifestyles.

In summary, we found that only 3.0% of US adults followed 4 common modifiable HLCs. We believe that these findings serve to illustrate the health promotion crisis in the United States, characterized by excessive caloric intake, inadequate LTPA, increasing obesity, and high rates of cigarette use. These data, along with those that illustrate the benefit of following a healthy lifestyle,[15,16] support the need for comprehensive primary prevention activities to increase healthy lifestyles and to reduce the prevalence of chronic disease risk factors at the population level.[13,33,34]

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