

Prevalence of Healthy Sleep Duration among Adults — United States, 2014

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To promote optimal health and well-being, adults aged 18–60 years are recommended to sleep at least 7 hours each night (1). Sleeping <7 hours per night is associated with increased risk for obesity, diabetes, high blood pressure, coronary heart disease, stroke, frequent mental distress, and all-cause mortality (2–4). Insufficient sleep impairs cognitive performance, which can increase the likelihood of motor vehicle and other transportation accidents, industrial accidents, medical errors, and loss of work productivity that could affect the wider community (5). CDC analyzed data from the 2014 Behavioral Risk Factor Surveillance System (BRFSS) to determine the prevalence of a healthy sleep duration (≥ 7 hours) among 444,306 adult respondents in all 50 states and the District of Columbia. A total of 65.2% of respondents reported a healthy sleep duration; the age-adjusted prevalence of healthy sleep was lower among non-Hispanic blacks, American Indians/Alaska Natives, Native Hawaiians/Pacific Islanders, and multiracial respondents, compared with non-Hispanic whites, Hispanics, and Asians. State-based estimates of healthy sleep duration prevalence ranged from 56.1% in Hawaii to 71.6% in South Dakota. Geographic clustering of the lowest prevalence of healthy sleep duration was observed in the southeastern United States and in states along the Appalachian Mountains, and the highest prevalence was observed in the Great Plains states. More than one third of U.S. respondents reported typically sleeping <7 hours in a 24-hour period, suggesting an ongoing need for public awareness and public education about sleep health; worksite shift policies that ensure healthy sleep duration for shift workers, particularly medical professionals, emergency response personnel, and transportation industry personnel; and opportunities for health care providers to discuss the importance of healthy sleep duration with patients and address reasons for poor sleep health.

BRFSS* is a state-based, random-digit-dialed telephone survey of the noninstitutionalized U.S. population aged ≥ 18 years. BRFSS

is conducted collaboratively by state health departments and CDC (6) among both landline and cell phone respondents, and data are weighted to state population estimates. Response rates for BRFSS are calculated using standards set by the American Association of Public Opinion Research Response Rate Formula #4.[†] The response rate is defined as the number of respondents who completed the survey as a proportion of all eligible and likely eligible persons. The median response rate for all states and territories in 2014 was 47.0% and ranged from 25.1% to 60.1%.

Survey respondents in 2014 were asked, “On average, how many hours of sleep do you get in a 24-hour period?” Hours of

[†] [http://www.aapor.org/Standards-Ethics/Standard-Definitions-\(1\).aspx](http://www.aapor.org/Standards-Ethics/Standard-Definitions-(1).aspx).

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* 2014 BRFSS Summary Data Quality Report (http://www.cdc.gov/brfss/annual_data/2014/pdf/2014_DQR.pdf).



sleep were recorded in whole numbers by rounding 30 minutes or more up to the next whole hour and dropping 29 or fewer minutes. The age-adjusted prevalence and 95% confidence interval (CI) of the recommended healthy sleep duration (≥ 7 hours) was calculated by state and selected characteristics, and adjusted to the 2000 projected U.S. population aged ≥ 18 years. For comparisons of prevalence between subgroups, statistical significance ($p < 0.05$) was determined by *t*-tests. All indicated differences between subgroups are statistically significant. Statistical software programs that account for the complex sampling design of the BRFSS were used for the analysis.

Among 444,306 respondents, 11.8% reported a sleep duration ≤ 5 hours, 23.0% reported 6 hours, 29.5% reported 7 hours, 27.7% reported 8 hours, 4.4% reported 9 hours, and 3.6% reported ≥ 10 hours. Overall, 65.2% reported the recommended healthy sleep duration (age-adjusted prevalence = 64.9%) (Table 1). The age-specific prevalence of sleeping ≥ 7 hours was highest among respondents aged ≥ 65 years (73.7%) compared with other age groups. The age-adjusted prevalence of healthy sleep duration was lower among Native Hawaiians/Pacific Islanders (53.7%), non-Hispanic blacks (54.2%), multiracial non-Hispanics (53.6%), and American Indians/Alaska Natives (59.6%) compared with non-Hispanic whites (66.8%), Hispanics (65.5%), and Asians (62.5%). Respondents who indicated they were unable to work or unemployed had lower age-adjusted healthy sleep duration prevalences (51.0% and 60.2%, respectively) than did employed respondents (64.9%). The prevalence of healthy sleep duration was highest among respondents with a college degree or higher

(71.5%). The prevalence was higher among married respondents (67.4%) compared with those who were divorced, widowed, or separated (55.7%), or never married (62.3%).

Prevalence of healthy sleep duration varied among states and ranged from 56.1% in Hawaii to 71.6% in South Dakota (Table 2). Most of the Great Plains states were in the upper quintile for healthy sleep duration; states in the southeastern United States and along the Appalachian Mountains tended to be in the lower quintiles (Figure).

Discussion

This is the first published report to document state-based estimates of self-reported healthy sleep duration for all 50 states and the District of Columbia. On average, 65.2% of adult respondents reported a healthy sleep duration. The geographic distribution pattern of low healthy sleep duration prevalence is consistent with 2008 state prevalence patterns of perceived insufficient rest or sleep among U.S. adults (7). The lower healthy sleep duration prevalence in the BRFSS among non-Hispanic black adults relative to non-Hispanic whites is consistent with a previous nationwide 2007–2010 comparison from the National Health and Nutrition Examination Survey (NHANES) (8). The results also suggest that employment and higher education might be determinants of healthy sleep.

A lower prevalence of healthy sleep duration was observed in the southeastern United States and in states along the Appalachian Mountains. This distribution is similar to geographic variations in prevalence estimates for obesity (9) and diabetes (9) and death rates

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TABLE 1. Age-specific and age-adjusted* percentage of adults who reported ≥ 7 hours sleep per 24-hour period, by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2014

Characteristic	No. [†]	% (95% CI) [§]
Total	444,306	NA
Unadjusted	NA	65.2 (64.9–65.5)
Age-adjusted	NA	64.9 (64.6–65.2)
Age group (yrs)		
18–24	23,234	67.8 (66.8–68.7)
25–34	42,084	62.1 (61.3–62.9)
35–44	52,385	61.7 (60.9–62.5)
45–64	173,357	62.7 (62.2–63.1)
≥ 65	153,246	73.7 (73.2–74.2)
Sex*		
Male	185,796	64.6 (64.2–65.0)
Female	258,510	65.2 (64.8–65.7)
Race/Ethnicity*		
White, non-Hispanic	348,988	66.8 (66.4–67.1)
Black, non-Hispanic	33,535	54.2 (53.3–55.2)
Hispanic	29,044	65.5 (64.5–66.4)
American Indian/Alaska Native	6,862	59.6 (57.1–62.1)
Asian	8,313	62.5 (60.2–64.7)
Native Hawaiian/Pacific Islander	797	53.7 (47.2–60.0)
Multiracial, non-Hispanic	8,241	53.6 (51.5–55.7)
Other, non-Hispanic	1,943	62.0 (58.1–65.8)
Employment status*		
Employed	220,751	64.9 (64.4–65.3)
Unemployed	19,300	60.2 (58.8–61.6)
Retired	130,478	60.9 (54.4–67.1)
Unable to work	31,953	51.0 (49.4–52.5)
Homemaker/student	37,393	69.5 (68.5–70.5)
Education level*		
Less than high school diploma	33,833	62.5 (61.5–63.5)
High school diploma	125,462	62.4 (61.8–63.0)
Some college	120,814	62.4 (61.8–62.9)
College graduate or higher	161,088	71.5 (71.0–71.9)
Marital status*		
Married	238,262	67.4 (66.9–67.9)
Divorced, widowed, separated	126,519	55.7 (54.5–56.9)
Never married	65,232	62.3 (61.5–63.2)
Member of unmarried couple	11,152	65.2 (63.3–67.1)

Abbreviations: CI = confidence interval; NA = not applicable.

* Age-adjusted to the 2000 projected U.S. population aged ≥ 18 years, except for age groups.

[†] Unweighted sample of respondents. Categories might not sum to sample total because of missing responses.

[§] Weighted percentage and 95% CI.

from heart disease[§] and stroke.[¶] Short sleep duration (< 7 hours per night) and other indicators of poor sleep health are associated with greater insulin resistance, metabolic abnormalities, and weight gain (5), which might then result in diabetes and adverse cardiovascular outcomes. A sleep duration of ≥ 7 hours is associated with lower prevalence estimates of cigarette smoking, leisure-time physical inactivity, and obesity compared with a short sleep duration.** Although unhealthy adults with chronic conditions might sleep

[§] National map of heart disease death rates by county (http://www.cdc.gov/dhds/maps/national_maps/hd_all.htm).

[¶] National map of stroke death rates by county (http://www.cdc.gov/dhds/maps/national_maps/stroke_all.htm).

** <http://www.cdc.gov/nchs/data/hestat/sleep04-06/sleep04-06.htm>.

TABLE 2. Age-adjusted* percentage of adults who reported ≥ 7 hours sleep per 24-hour period, by state — Behavioral Risk Factor Surveillance System, United States, 2014

State	No. [†]	% (95% CI) [§]
Alabama	8,335	61.2 (59.6–62.8)
Alaska	4,286	65.0 (62.9–67.0)
Arizona	14,437	66.7 (65.3–68.0)
Arkansas	5,067	62.6 (60.3–64.9)
California	8,660	66.4 (65.1–67.7)
Colorado	13,043	71.5 (70.5–72.5)
Connecticut	7,707	64.8 (63.2–66.5)
Delaware	4,153	62.4 (60.0–64.6)
District of Columbia	3,866	67.8 (65.4–70.2)
Florida	9,565	64.2 (62.7–65.7)
Georgia	6,164	61.3 (59.5–63.0)
Hawaii	7,110	56.1 (54.3–57.8)
Idaho	5,380	69.4 (67.4–71.2)
Illinois	5,023	65.6 (63.7–67.4)
Indiana	11,239	61.5 (60.2–62.8)
Iowa	7,976	69.0 (67.5–70.4)
Kansas	13,442	69.1 (68.1–70.1)
Kentucky	10,890	60.3 (58.7–61.9)
Louisiana	6,608	63.7 (62.2–65.2)
Maine	8,980	67.1 (65.6–68.6)
Maryland	12,171	61.1 (59.4–62.8)
Massachusetts	15,072	65.5 (64.2–66.8)
Michigan	8,275	61.3 (59.8–62.8)
Minnesota	16,049	70.8 (69.9–71.7)
Mississippi	4,043	63.0 (60.8–65.2)
Missouri	6,888	66.0 (64.2–67.8)
Montana	7,306	69.3 (67.5–71.0)
Nebraska	22,007	69.6 (68.5–70.7)
Nevada	3,649	63.8 (61.3–66.3)
New Hampshire	6,022	67.5 (65.7–69.4)
New Jersey	12,617	62.8 (61.5–64.2)
New Mexico	8,737	68.0 (66.3–69.5)
New York	6,641	61.6 (60.1–63.2)
North Carolina	7,034	67.6 (66.2–68.9)
North Dakota	7,635	68.2 (66.4–70.0)
Ohio	10,712	62.1 (60.5–63.6)
Oklahoma	8,237	64.3 (62.9–65.7)
Oregon	5,099	68.3 (66.4–70.1)
Pennsylvania	10,707	62.5 (61.1–64.0)
Rhode Island	6,243	63.3 (61.4–65.1)
South Carolina	10,636	61.5 (60.2–62.9)
South Dakota	7,270	71.6 (69.6–73.5)
Tennessee	4,966	62.9 (60.7–65.0)
Texas	14,950	67.0 (65.7–68.3)
Utah	14,719	69.2 (68.3–70.1)
Vermont	6,357	69.0 (67.4–70.4)
Virginia	9,225	64.0 (62.6–65.3)
Washington	9,874	68.2 (66.8–69.6)
West Virginia	6,050	61.6 (60.0–63.2)
Wisconsin	6,955	67.8 (66.1–69.5)
Wyoming	6,229	68.7 (66.5–70.8)
Median (50 states and DC)	444,306	64.9 (64.6–65.2)

Abbreviations: CI = confidence interval; DC = District of Columbia.

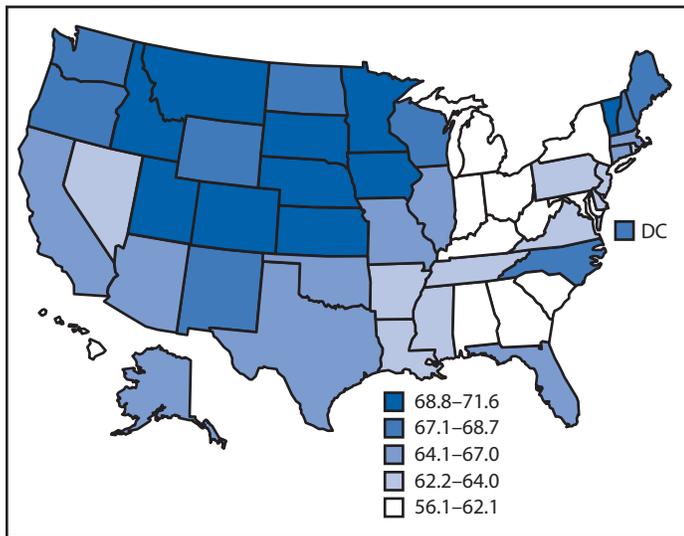
* Age-adjusted to the 2000 projected U.S. population aged ≥ 18 years.

[†] Unweighted sample of respondents.

[§] Weighted percentage and 95% CI.

longer (2,3), little empirical evidence exists to indicate that long sleep duration (≥ 9 hour per night) causes adverse conditions among healthy adults exists (1).

FIGURE. Age-adjusted percentage of adults who reported ≥ 7 hours of sleep per 24-hour period, by state — Behavioral Risk Factor Surveillance System, United States, 2014



The findings in this report are subject to at least two limitations. First, sleep duration was obtained by self-report and was not corroborated by actigraphy (sensor-measurement of motor activity), polysomnography (sleep study), other objective measures, or sleep journals. The overall estimate of 65.2% in the 2014 BRFSS adult population is slightly higher than the population estimate of 60.1% from the 2007–2008 NHANES (2) and slightly lower than the prevalence of 71.6% reported from the 2008–2010 National Health Interview Survey (NHIS).^{††} Some variation might be a result of the different wording used by the different surveys. Although BRFSS and NHIS both asked about typical sleep duration in a 24-hour period, NHANES asked how much sleep respondents typically get “at night on weekdays or workdays.” Finally, institutionalized respondents were not assessed in the present investigation, NHANES, or NHIS; if institutionalized persons are more likely to have shorter sleep durations because of chronic physical or mental conditions, then the prevalence of ≥ 7 hours might be overestimated in the BRFSS population. However, the relationships of healthy sleep with sociodemographic characteristics, risk factors, and outcomes are consistent with the other studies despite variations in definitions of healthy or optimal sleep.

Based on recent recommendations for healthy sleep duration (1), these findings suggest that, although almost two thirds of U.S. adults sleep ≥ 7 hours in a 24-hour period, an estimated 83.6 million U.S. adults sleep < 7 hours. Therefore, clinicians might find routine discussion of sleep health with their patients as well as pursuit of explanations for poor sleep health an important component of providing health care. Healthy sleep duration in

^{††} http://www.cdc.gov/nchs/data/series/sr_10/sr10_257.pdf.

Summary

What is already known about this topic?

Short sleep duration (< 7 hours per night) is associated with greater likelihoods of obesity, high blood pressure, diabetes, coronary heart disease, stroke, frequent mental distress, and death.

What is added by this report?

The first state-specific estimates of the prevalence of a ≥ 7 hour sleep duration in a 24-hour period show geographic clustering of lower prevalence estimates for this duration of sleep in the southeastern United States and in states along the Appalachian Mountains, which are regions with the highest burdens of obesity and other chronic conditions. Non-Hispanic black, American Indian/Alaska Native, and Native Hawaiian/Pacific Islander, and multiracial populations report a lower prevalence of ≥ 7 hours sleep compared with the rest of the U.S. adult population.

What are the implications for public health practice?

The determination that more than a third of U.S. adults report sleeping < 7 hours and findings of geographic and sociodemographic variations in low prevalence of healthy sleep duration suggest opportunities for promoting sleep health. These opportunities include sleep health education, reducing racial/ethnic and economic disparities, changes in work shift policies, and routine medical assessment of patients' sleep concerns in health care systems.

adults can be promoted by sleep health education and behavior changes, such as setting a pattern of going to bed at the same time each night and rising at the same time each morning; making sure that the bedroom environment is quiet, dark, relaxing, and neither too hot nor too cold; turning off or removing televisions, computers, mobile devices, and distracting or light-emitting electronic devices from the bedroom; and avoiding large meals, nicotine, alcohol, and caffeine before bedtime.^{§§} Insomnia symptoms, such as trouble falling or staying asleep can usually be resolved with improved sleep habits or psychological or behavioral therapies (10). At present, no professional sleep organizations have issued consensus statements or recommendations about the efficacy or safety of either over-the-counter or prescription sleep aids for improving sleep duration in the general adult population. In addition, strategies to reduce risks associated with shift work and long work hours include designing better work schedules.^{§§} Evaluation and monitoring of sleep might also be an important function of health care professionals, including sleep specialists (5). Keeping a 10-day sleep journal or diary about sleep times, napping, and behaviors that affect sleep, such as exercise, alcohol use, and caffeine consumption, might be helpful before discussing sleep problems with a physician.^{¶¶}

^{§§} National Institute of Occupational Safety and Health: review of the evidence about risks associated with shift work and long workhours and strategies to reduce these risks, including suggestions for designing better work schedules (<http://www.cdc.gov/niosh/docs/2015-115>).

^{¶¶} <http://www.cdc.gov/sleep>.

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