

Sunburn Prevalence Among Adults --- United States, 1999, 2003, and 2004

Episodic acute overexposure to ultraviolet (UV) radiation (i.e., sunburn) is an important risk factor for two types of skin cancer: basal cell carcinoma and melanoma. Melanoma is the most lethal type of skin cancer. In 2003, a total of 45,625 new cases of melanoma were diagnosed in the United States, and 7,818 persons died from the disease (1). A meta-analysis of 57 studies indicated that the relative risk for melanoma among persons with sunburn history compared with those without sunburn history was 2.03 (95% confidence interval [CI] = 1.73--2.37) (2). Monitoring sunburn prevalence with population-based surveys allows an estimate of compliance with sun-protection behaviors, assessments of risk for developing skin cancer, and measurement of the success of prevention programs (3). To evaluate trends in sunburn prevalence among U.S. adults, CDC analyzed cross-sectional data from the 1999, 2003, and 2004 Behavioral Risk Factor Surveillance System (BRFSS) surveys. This report describes the results of that analysis, which indicated that sunburn prevalence among all adults increased from 31.8% in 1999 to 33.7% in 2004. Further research is needed to determine which interventions will best improve sun-protection behaviors among the public.

BRFSS is a state-based, random-digit--dialed telephone survey of the noninstitutionalized, U.S. civilian population aged ≥18 years. Questions are administered in English and Spanish, as necessary. Two questions related to self-reported sunburn experiences were used in the core section (i.e., the survey questions administered in all states) of the 1999, 2003, and 2004 questionnaires. The first question was presented as follows: "The next question is about sunburns, including any time that even a small part of your skin was red for more than 12 hours. Have you had a sunburn within the past 12 months?" Persons who responded "yes" were then asked, "Including times when even a small part of your skin was red for more than 12 hours, how many sunburns have you had within the past 12 months?" Excluded from the analysis were respondents who had missing answers, refused to answer, or answered "don't know" on the questionnaire. In 1999, a total of 156,095 persons responded, of whom 2,778 (1.8%) were excluded; in 2003, a total of 256,457 persons responded, of whom 3,478 (1.4%) were excluded; and in 2004, a total of 296,027 persons responded, of whom 906 (0.3%) were excluded. The median state response rate, based on Council of American Survey and Research Organizations guidelines, was 55.2% in 1999, 53.2% in 2003, and 52.7% in 2004. Information on each respondent's age, race/ethnicity, and sex and other demographic data also were collected in BRFSS.

Weighted prevalence of sunburn by race/ethnicity, sex, and state was calculated for each year and for all survey years combined. Data were weighted to the sex, racial/ethnic, and age distribution of the adult population of each state using intercensal estimates. To allow comparison among survey years, stratified BRFSS data were age adjusted to the 2000 U.S. standard population using six age groups: 18--24 years, 25--34 years, 35--44 years, 45--54 years, 55--64 years, and \geq 65 years. Differences in prevalence were considered statistically significant if CIs did not overlap.

Estimated sunburn prevalence among all adults ranged from 31.8% in 1999 to 33.7% in 2004 (Table 1). Men had a higher prevalence of sunburn than women in all three survey years (35.8% versus 28.0% in 1999, 37.0% versus 30.2% in 2003, and 37.0% versus 30.3% in 2004). Sunburn prevalence increased from 1999 to 2004 among non-Hispanic white women (from 35.3% to 39.6%) and non-Hispanic white men (from 44.1% to 46.9%) (Table 1). Sunburn also was reported among racial/ethnic groups traditionally considered at lower risk for sunburn or skin cancer, such as Hispanic blacks (12.4% among men and 9.5% among women in

2004), Asians/Pacific Islanders (16.2% among men and 16.1% among women in 2004), and American Indians/Alaska Natives (30.4% among men and 21.5% among women in 2004). Non-Hispanic blacks had low prevalence of sunburn (5.8% among men and women in 2004) (Table 1).

Among adults who reported sunburn during the preceding year, 20.7% reported four or more sunburns (all survey years combined). Non-Hispanics whites and American Indians/Alaska Natives had the highest proportion of respondents with four or more sunburns during the preceding year (21.2% and 19.6%, respectively) (Table 2).

In 2004, a total of 20 states* reported a statistically significant increase in sunburn prevalence among whites, compared with 1999; four states (Indiana, Iowa, Kentucky, and Louisiana) reported a significant decrease in sunburn prevalence. The lowest reported sunburn prevalence among whites during any of the three survey years was 25.7% (Arizona, 1999), and the highest was 51.3% (Utah, 2003) (Table 3 and Figure).

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Editorial Note:

For all three survey years, approximately one third of the U.S. adult population had at least one sunburn during the preceding year. Of those who had at least one sunburn during the preceding year, two thirds had more than one sunburn. These findings are consistent with previous similar analyses and suggest that a substantial segment of the adult population is not consistently practicing sun-protection behaviors (*3*). CDC recommends the following sun-protection behaviors: wearing a wide-brimmed hat, covering up while in the sun, seeking shade, wearing wrap-around sunglasses, avoiding the sun during the hours of 10 a.m. to 4 p.m., and using sunscreen with a sun protection factor [SPF] of 15 or higher.[†]

Sunburn prevalence in racial/ethnic minority groups has not been well characterized previously. Skin-cancer prevention messages traditionally have been targeted toward white audiences because whites are at least 10 times more likely to develop melanoma than racial/ethnic minorities, although racial/ethnic minority populations are more likely to have more advanced disease diagnosed and to have lower 5-year survival rates (*4*,*5*). However, the findings in this report indicate that substantial portions of the Hispanic, Asian/Pacific Islander, and American Indian/Alaska Native populations acquired sunburns. Racial/ethnic groups with darker skin (higher melanin content) have a lower incidence of skin cancer, which is attributed, in part, to the inherent sun protection provided by melanin (*5*). However, race/ethnicity is a poor proxy for skin cancer risk because persons in racial/ethnic minority groups might have individual risk factors for skin cancer (e., g., lighter skin color; skin that burns, freckles, or reddens easily in the sun; or personal or family history of skin cancer) and might not benefit from the protective effects of melanin. In a study of adolescents aged 11--18 years, 21.7% of black respondents who reported having had a sunburn reported severe sunburn with blisters or peeling after 1 hour of exposure to sun during the summer (*6*).

The results of this analysis also indicated that men had a higher prevalence of sunburn than women in most of the racial/ethnic groups surveyed. This finding might be attributed to different sun-protection behaviors or different sun-exposure conditions between men and women, (e.g., differences in leisure or work activities). In addition, women might be more concerned about the cosmetic effect of long-term sun exposure (e.g., wrinkling of the skin and the appearance of age spots) and thus might be more likely to avoid sun exposure, use makeup with sunscreen, or practice sun-protection behaviors (7). In 2003, white men had a higher melanoma incidence and mortality than white women (22.7 versus 15.1 and 4.4 versus 2.0 per 100,000 population, respectively) (1).

None of the states with sunburn prevalence among whites greater than 45% were traditional "sunbelt" states. Persons living in the northern states might use fewer precautions during the first sunny days after winter or might travel to other locations where they acquire sunburns (*3*). Previous analyses have demonstrated that states with lower UV radiation (i.e., those in higher latitudes) have had more rapid increases in melanoma incidence than states with higher UV radiation (8).

The findings in this report are subject to at least six limitations. First, the BRFSS survey is a telephone survey, and results obtained might not be generalizable to U. S adults without landline telephones. Second, responses are self-reported and therefore subject to recall bias. Third, the BRFSS survey does not contain questions regarding skin type or sun-protection behaviors, so this information cannot be correlated to sunburns. Fourth, this analysis was a cross-sectional study, and individual sunburn patterns could not be followed over time. Fifth, the source of UV exposure (sun or artificial source) was not provided. Finally, the U.S. states in which respondents actually acquired their sunburns were unknown.

Sunburn prevalence among U.S. adults increased from 1999 to 2004. Several reasons might account for these increases. For example, the public might be receiving conflicting or confusing messages about what constitutes the best sun-protection behaviors. A review of 20 Internet sites about skin cancer prevention revealed inconsistent advice regarding a safe amount of sun exposure, times of day to avoid the sun, how many sunburns increase the risk for skin cancer, and the best types of clothing to use for sun protection (9). That review noted that only three recommendations were common to all 20 Internet sites: wearing broad-brimmed hats, wearing sunglasses, and using sunscreen with an SPF of 15 or higher (9). In addition, certain segments of the public might view the purported benefits of sun exposure (e.g., tanned skin or elevated mood) as outweighing the risk for skin cancer or might not be concerned about the risks of overexposure to the sun (9).

Further research is needed to determine which public health interventions will improve sun-protection behaviors. The *Guide to Community Preventive Services* review of interventions to prevent skin cancer found sufficient evidence to warrant recommending educational and policy interventions for children in primary schools and for adults in recreational and tourism settings. However, evidence to warrant recommending other interventions, such as mass media campaigns and interventions in secondary schools, was insufficient (*10*). Future research on interventions to improve sun-protection behaviors should assess 1) the incorporation of messages that emphasize that sun-protection behaviors are readily implemented, and 2) the standardization of messages to eliminate confusing or conflicting advice. Public health messages specific to various racial/ethnic groups, certain subgroups (e.g., persons with lighter skin and men), and other populations at high risk (e.g., those with a personal or family history of skin cancer) need to be developed to emphasize that these populations also are susceptible to the harmful effects of the sun. Greater knowledge of interventions that will increase the proportion of persons who practice sun-protection behaviors is important for reducing sunburn prevalence and ultimately reducing skin cancer incidence and mortality. Continued surveillance of sunburn prevalence is necessary for evaluating the effectiveness of both current and new interventions.

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* Alaska, Arizona, Connecticut, Florida, Idaho, Kansas, Maine, Massachusetts, Minnesota, Montana, Nebraska, New Jersey, New York, North Dakota, Oklahoma, Pennsylvania, South Carolina, Tennessee, Vermont, and Washington.

[†] Additional information available at http://www.cdc.gov/cancer/skin/basic_info/howto.htm.

Table 1

TABLE 1. Estimated percentage of respondents aged ≥18 years who reported having had at least one sunburn during the preceding
vear, by sex and race/ethnicity - Behavioral Risk Factor Surveillance System, United States, 1999, 2003, and 2004*

		1999		2003		2004	
Characteristic	%	(95% CI*)	%	(95% CI)	%	(95% CI)	
Men							
White, non-Hispanic	44.1	(43.5-44.8)	46.5	(45.9-47.1)	46.95	(46.4-47.5)	
White, Hispanic	21.6	(19.4-23.8)	24.8	(22.0-27.7)	20.1	(18.8-23.3)	
Black, non-Hispanic	5.3	(4.3-6.4)	4.6	(3.7 - 5.6)	5.8	(4.7-7.0)	
Black, Hispanic	14.3	(10.1-19.8)	12.3	(8.4-17.8)	12.4	(8.4-17.5)	
Asian/Pacific Islander	18.0	(14.5-22.1)	18.6	(15.5-22.1)	16.2	(13.6-19.2)	
American Indian/Alaska Native	27.4	(23.0-32.4)	25.9	(22.1-30.0)	30.4	(26.3-34.8)	
Total	35.8	(35.2-36.3)	37.05	(36.5-37.6)	37.05	(36.4-37.6)	
Women							
White, non-Hispanic	35.3	(34.8-35.8)	38.79	(38.3-39.2)	39.65	(39.1-40.0)	
White, Hispanic	17.2	(15.6-19.0)	19.7	(17.9-21.6)	17.2	(15.8-18.8)	
Black, non-Hispanic	5.1	(4.5-5.9)	5.7	(5.1-6.4)	5.8	(5.2-6.5)	
Black, Hispanic	8.3	(5.7-12.0)	13.5	(8.7-20.3)	9.5	(6.7-13.2)	
Asian/Pacific Islander	11.0	(8.9-13.6)	14.4	(12.3-16.8)	16.1	(12.9-19.9)	
American Indian/Alaska Native	23.5	(19.7-27.8)	23.3	(19.9-27.0)	21.5	(18.6-24.7)	
Total	28.0	(27.5-28.4)	30.35	(29.9-30.7)	30.3%	(29.9-30.7)	
Total	31.8	(31.4-32.2)	33.65	(33.2-33.9)	33.7§	(33.4-34.1)	

* Age adjusted to the 2000 U.S. standard population.

Statistically significant difference compared with 1999. Differences were considered statistically significant if CIs did not overlap.

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Figure

FIGURE. Estimated percentage of white* respondents aged ≥18 years who reported having had at least one sunburn during the preceding year, by state/area - Behavioral Risk Factor Surveillance System, 1999, 2003, and 2004[†]



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1 Includes Hispanic whites.

Age adjusted to the 2000 U.S. standard population.

Puerto Rico.

¹U.S. Virgin Islands.

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Table 2

TABLE 2. Estimated percentage of respondents aged \geq 18 years who reported having had at least one sunburn during the preceding year, by number of sunburns and race/ethnicity — Behavioral Risk Factor Surveillance System, United States, 1999, 2003, and 2004 (all survey years combined)*

		No. of sunburns									
		1		2		3		≥4			
Race/Ethnicity*	%	(95% Cl ⁵)	%	(95% Cl)	%	(95% Cl)	%	(95% CI)			
White, non-Hispanic	35.6	(35.2-36.2)	28.3	(27.9-28.7)	14.9	(14.6-15.2)	21.2	(20.8-21.5)			
White, Hispanic	45.6	(42.2-49.1)	23.4	(20.8-26.1)	11.9	(10.3-13.7)	19.1	(17.0-21.5)			
Black, non-Hispanic	50.4	(46.4-54.4)	25.5	(21.5-28.0)	11.8	(9.7 - 14.3)	12.3	(10.3-14.6)			
Asian/Pacific Islander	53.3	(48.1-58.5)	22.1	(18.6-25.9)	9.1	(7.2 - 11.4)	15.5	(12.0-19.8)			
American Indian/Alaska Native	44.2	(39.8-48.6)	22.5	(19.2-26.1)	13.8	(10.9-17.4)	19.6	(16.7-22.9)			
Total	36.9	(36.5-37.4)	27.8	(27.4-28.1)	14.6	(14.3-14.8)	20.7	(20.4-21.1)			

*Age adjusted to the 2000 U.S. standard population. *Hispanic blacks excluded from analysis because of small sample size. *Confidence interval.

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Table 3

TABLE 3. Estimated percentage of white* respondents aged ≥18 years who reported having had at least one sunburn during the preceding year, by state/area — Behavioral Risk Factor Surveillance System, United States, 1999, 2003, and 2004[†]

	1999 2003		2004		
State/Area	%	(95% CI ^{\$})	%	(95% CI)	% (95% Cl)
Alabama	39.6	(37.0-42.1)	39.7	(37.5-41.9)	39.6 (37.4-41.8)
Alaska	27.8	(24.7-30.9)	32.6	(29.6-35.5)	34.1 ¹ (31.1-37.0)
Arizona	25.7	(22.1-29.2)	39.51	(36.5-42.5)	42.11 (40.0-45.2)
Arkansas	42.0	(40.0-44.0)	41.8	(40.0-43.6)	42.9 (41.1-44.8)
California	34.1	(32.5-35.8)	36.8	(35.0-38.6)	34.8 (33.0-36.6)
Colorado	45.8	(43.4-48.1)	46.6	(44.9-48.4)	45.1 (43.3-46.8)
Connecticut	33.3	(30.1-35.6)	40.71	(39.1-42.3)	43.11 (41.4-44.7)
Delaware	43.6	(40.8-46.5)	33.5 1	(31.3-35.7)	41.4 (39.1-43.6)
District of Columbia	42.8	(37.5-48.1)	41.3	(38.1-44.5)	40.1 (37.4-42.8)
Florida	33.4	(31.7-35.1)	36.8	(34.4-39.2)	37.71 (35.7-39.6)
Georgia	36.3	(33.8-38.8)	40.71	(38.9-42.5)	39.2 (37.1-41.3)
Hawaii	44.8	(39.8-49.8)	42.3	(39.6-44.9)	_** _**
Idaho	45.4	(43.8-46.9)	49.31	(47.7-50.9)	48.51 (47.0-50.1)
Illinois	44.0	(40.1-47.1)	40.8	(38.5-43.1)	41.7 (39.8-43.7)
Indiana	48.1	(44.8-51.4)	44.9	(43.4-46.4)	43.31 (41.8-44.6)
lowa	49.0	(47.1-50.8)	43.5 ¹	(41.5-45.1)	43.6 ¹ (42.0–45.2)
Kansas	34.2	(32.5-35.9)	41.31	(39.6-43.0)	41.41 (40.2-42.6)
Kentucky	30.7	(29.2-32.2)	28.0	(26.3-29.7)	27.01 (25.2-28.8)
Louisiana	35.2	(32.3-38.1)	31.0	(29.2-32.7)	30.51 (29.1-31.9)
Maine	37.0	(34.3-39.5)	42.81	(40.6-44.9)	42.61 (40.6-44.5)
Mandand	A1 A	(20.2-49.6)	A1 A	(A 24-A 02)	49.0 (41.9-46.0)

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INIGE YIGE RA	11.1.1	(00.2-40.0)	11.01	(00.4-40.4)	40.0	(41.0-40.0)
Massachusetts	35.2	(33.4-36.9)	41.01	(39.5-42.6)	42.61	(41.1 - 44.2)
Michigan	47.6	(45.5-49.8)	47.9	(45.9-49.8)	45.6	(43.9-47.3)
Minnesota	40.0	(38.6-41.4)	49.21	(47.5-50.9)	48.7 ¹	(46.9-50.4)
Mississippi	39.9	(37.4-42.4)	42.4	(40.4-44.3)	40.5	(38.6-42.4)
Missouri	42.9	(40.8-45.0)	45.9	(43.7-48.1)	45.2	(43.2-47.2)
Montana	38.8	(36.3-41.2)	47.6 [¶]	(45.4-48.1)	44.11	(42.2-45.9)
Nebraska	43.1	(41.1-45.1)	46.3	(44.7-47.8)	46.91	(45.5-48.3)
Nevada	40.9	(37.8-44.1)	39.2	(36.6-41.2)	38.3	(35.4-41.4)
New Hampshire	41.7	(38.8-44.6)	42.8	(41.2-44.4)	43.8	(42.2-45.5)
New Jersey	32.8	(30.5-35.1)	39.0 [¶]	(37.8-40.3)	40.2 [¶]	(38.9-41.5)
New Mexico	38.6	(36.6-40.7)	38.8	(37.0-40.6)	41.3	(39.6-43.0)
New York	30.3	(28.1-32.5)	39.71	(38.0-41.4)	40.21	(38.5-42.0)
North Carolina	30.9	(28.5-33.4)	28.1	(26.4-29.8)	28.1	(27.0-29.3)
North Dakota	38.3	(36.0-40.6)	45.61	(43.6-47.6)	46.41	(44.5-48.3)
Ohio	39.1	(36.1-42.1)	42.4	(40.3-44.5)	43.4	(41.0-45.9)
Oklahoma	30.2	(28.2-32.3)	41.91	(40.4-43.3)	41.5 ¹	(40.0-43.0)
Oregon	41.3	(38.7-43.8)	42.1	(40.3-43.9)	43.6	(41.9-45.2)
Pennsylvania	36.5	(34.8-38.4)	43.81	(41.9-45.7)	42.71	(41.1-44.2)
Rhode Island	35.0	(33.4-36.8)	38.5	(36.6-40.5)	38.7	(36.7-40.7)
South Carolina	32.7	(30.7-34.7)	42.81	(41.2-44.4)	41.61	(40.1-43.2)
South Dakota	45.9	(44.2-47.5)	47.2	(45.7-48.8)	46.1	(44.6-47.7)
Tennessee	26.6	(24.7-28.5)	30.7	(28.4-33.0)	32.61	(30.4-34.7)
Texas	36.6	(34.8-38.3)	38.1	(36.6-39.7)	37.7	(36.0-39.3)
Utah	46.1	(43.9-48.3)	51.31	(49.3-53.1)	49.9	(48.3-51.5)
Vermont	39.1	(37.3-40.9)	45.71	(44.0-47.4)	47.11	(45.8-48.5)
Virginia	40.5	(37.8-43.2)	41.5	(39.5-43.4)	42.9	(40.8-44.9)
Washington	39.6	(37.6-41.6)	38.3	(37.3-39.2)	43.6 [¶]	(42.7-44.6)
West Virginia	34.8	(32.8-36.8)	41.51	(39.5-43.4)	38.0	(36.1-40.0)
Wisconsin	51.4	(49.1-53.7)	49.3	(47.5-51.2)	48.6	(46.9-50.4)
Wyoming	48.4	(46.4-50.5)	49.5	(47.8-51.2)	48.3	(46.6-50.0)
Guam		_**	50.6	(41.3-59.8)		
Puerto Rico	12.8	(11.2-14.7)	11.8	(10.0-13.6)	14.2	(12.4-16.0)
U.S. Virgin Islands		_"	46.5	(38.1-54.8)	50.1	(45.0-55.3)
United States	37.0	(36.5-37.4)	40.0 [¶]	(39.6-40.4)	39.9¶	(39.5-40.3)

* Includes Hispanic whites.

† Age adjusted to the 2000 U.S. standard population.

§ Confidence interval.

¹ Statistically significant difference compared with 1999. Differences were considered statistically significant if CIs did not overlap.

** Did not participate in survey.

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