U.S. Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 75 / No. 19
May 21, 2026

Klebsiella pneumoniae Carbapenemase–Producing Enterobacterales Infection and Colonization in a Long-Term Care Facility — Ontario, Canada, May 2024–January 2025

Mehdi Aloosh, MD[1,2]; Handreen Mohammed Saeed, MD[1,2]; Laura F. Mataseje, MSc[3]

Abstract

The emergence of antibiotic-resistant organisms is a substantial public health concern because these organisms can cause severe, difficult-to-treat infections and spread easily in congregate settings. In January 2025, an outbreak of carbapenemase-producing Enterobacterales (CPE) infection and colonization was identified in a long-term care facility (LTCF) in Ontario, Canada, after a resident's urine culture grew *Escherichia coli* carrying the *Klebsiella pneumoniae* carbapenemase (KPC) gene. An investigation by the local public health agency in Windsor, Ontario, revealed that the source of infection was likely another patient with KPC-producing *K. pneumoniae* infection who had been admitted to the LTCF 1 year earlier without appropriate infection prevention and control precautions. The epidemiologic link between the two patients triggered unitwide screening. Three additional asymptomatic carriers who had not previously received CPE testing were identified during point-prevalence screening. All five affected residents were older adults with multiple comorbidities (including patients with frequent antibiotic use or an indwelling device such as a urinary catheter) who lived in the same unit and shared multiple potential exposure sources that likely contributed to the spread. Potential sources included overlapping staff member assignments, use of a common-area bathroom, and shared dining facilities. Whole genome sequencing confirmed the outbreak. Public health responses included rapid implementation of contact precautions, staff member cohorting, enhanced environmental cleaning, ensuring compliance with enhanced infection prevention and control practices, and risk communication with facility staff members, which halted further spread; evidence does not support the use of antimicrobials or other methods to decolonize asymptomatic CPE carriers. The outbreak highlighted the need for risk-based admission screening of LTCF residents, consistent infection-prevention practices, and antibiotic stewardship. Strengthening these practices can help prevent prolonged undetected transmission and reduce the incidence of CPE infection in congregate care settings.

Introduction

In January 2025, the public health agency in Windsor, Ontario, received notification of a confirmed case of carbapenemase-producing Enterobacterales (CPE) infection in a patient with an unknown history of CPE colonization. The organism was detected in a urine culture from a long-term care facility (LTCF) resident (i.e., patient A, the index patient) who had a history of recurrent urinary tract infections and repeated antibiotic use. The isolate was *Escherichia coli* carrying the *Klebsiella pneumoniae* carbapenemase (KPC) gene. Further investigation determined that patient A had shared a room since May 2024 with patient B (i.e., the primary patient), whose urine culture at the time of hospital-to-LTCF transfer grew KPC-producing *K. pneumoniae.* However, contact precautions were not implemented for patient B on admission to the LTCF; this patient had multiple comorbidities, was restricted to the bed, used indwelling devices (including a gastrostomy tube and urinary catheter), and had received frequent treatment for urinary tract infections. An outbreak investigation was undertaken to identify the source of the infection and the extent of the outbreak.

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Investigations and Results

The LTCF included approximately 120 beds on two floors (approximately 60 beds per floor). Each floor was divided into two units, with approximately 30 beds per unit. Identification of the epidemiologic link between the two residents with CPE infection prompted an outbreak investigation, including point-prevalence screening. This outbreak investigation was conducted under the authority of Ontario's Health Protection and Promotion Act as part of the mandate of the Windsor-Essex County Health Unit. As such, it did not require review by the research ethics board. All data were de-identified before analysis and reporting.

Point-Prevalence Screening

Identification of additional residents with colonization. Four rounds of point-prevalence screening (collection of rectal swabs) were conducted in the LTCF during a 3-week period. The first round included all residents of the unit where the two residents with CPE infection lived and identified three additional residents in the same unit with colonization (i.e., patients C, D, and E), none of whom had previously received testing for CPE. None of these patients reported recent hospitalization or receipt of health care outside Canada. The point-prevalence testing also determined that patient B was colonized with KPC-producing *E. coli*. This patient initially received a diagnosis of KPC-producing *K. pneumoniae* infection in 2024.

Characteristics of residents colonized with CPE. All five persons colonized with CPE were aged ≥65 years and had multiple chronic conditions, including diabetes (three patients), dementia (three), cardiovascular disease (two), and renal disease (one), and all required substantial assistance for activities of daily living; three residents had recently used antimicrobials, and one had an indwelling device. The investigation revealed that four of the residents had socialized together in the LTCF for an extended period before the outbreak investigation. The organism colonizing all five persons was *E. coli* carrying the KPC gene. However, patient B's initial (2024) urine culture yielded *K. pneumoniae* carrying the KPC gene, suggesting potential plasmid-mediated gene transfer between the two bacterial species in patient B.

Whole genome sequencing. A total of six isolates collected from the five affected residents, including five *E. coli* and one *K. pneumoniae,* were sent to the National Microbiology Laboratory in Winnipeg, Manitoba, for whole genome sequencing using the Illumina NextSeq 2000 platform. Four *E. coli* isolates belonged to sequence type (ST) 131 and differed by a range of one through nine single nucleotide variants (SNVs)*; this finding supported clonal transmission within the LTCF unit. All six isolates carried the $bla_{\text{KPC-3}}$ gene on a closely related (approximately 62-kb) IncN1 plasmid. Plasmid

* SNVs are defined by single DNA variations in a genome; an SNV refers to any single nucleotide change, even if it occurs only once.

The *MMWR* series of publications is published by the Office of Science, U.S. Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30329-4027.

Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR Morb Mortal Wkly Rep 2026;75:[inclusive page numbers].

phylogeny showed tight clustering, consistent with plasmid-mediated transmission among residents and across species, even though only the four *E. coli* ST131 isolates clustered tightly at the chromosomal level. (Table).

Public Health Response

Infection prevention and control inspection. After identification of patient B as an asymptomatic carrier, the Windsor-Essex County Health Unit conducted an on-site inspection of the LTCF in January 2025. The infection prevention and control (IPC) assessment identified several areas for concern, including 1) failure to maintain contact precautions for patient B despite documented KPC infection at the time of the patient's May 2024 transfer to the LTCF, 2) the absence of a structured admission screening protocol for residents at increased risk for carrying antimicrobial-resistant organisms, and 3) lack of adherence to hand hygiene and personal protective equipment practices among staff members. Use of a common-area bathroom by residents in the affected unit was also noted and considered a plausible contributor to transmission.

Outbreak control measures. The LTCF implemented unitwide outbreak control measures, including contact precautions and private rooms with dedicated bathrooms for colonized residents, cohorting of staff members, restriction of visitors to essential visits, suspension of group dining, and suspension of group activities in the affected unit. Enhanced environmental cleaning with dedicated equipment was instituted, and a scheduled sink-drain cleaning protocol and plumbing modification were implemented to mitigate splash back after residents washed their hands, given concern about the plumbing-associated spread of organisms from patient B to patient A. Windsor-Essex County Health Unit staff members provided on-site training to LTCF staff members about CPE transmission, hand hygiene, personal protective equipment use, and other IPC practices and increased IPC audit frequency to ensure compliance.

Patients involved in this outbreak did not receive retesting. Evidence does not support the use of antimicrobials or other methods to decolonize asymptomatic CPE carriers (*1*) because 1) spontaneous clearance occurs in approximately 50%–55% of patients after 6–12 months (*2*); 2) administration of antibiotics to persons who are asymptomatic carriers could lead to proliferation of organisms with increased antibiotic resistance (*3*); 3) antibiotic treatment can disrupt the microbiome, which could paradoxically increase susceptibility to further colonization and infection; and 4) studies demonstrate a limited clinical benefit of decolonization (*3*). Therefore, management of this outbreak was limited to IPC measures, per Canadian provincial guidance (*4*).

TABLE. Characteristics of six carbapenemase-producing Enterobacterales isolates identified during an outbreak at a long-term care facility — Ontario, Canada, May 2024–January 2025

Patient	Test date	Bacteria isolated	Sequence type*	KPC allele†	Plasmid type§
B (Primary)	2024	*Klebsiella pneumoniae*	556	KPC-3	IncN1
B (Primary)	2025	*Escherichia coli*	131	KPC-3	IncN1
A (Index)	2025	*Escherichia coli*	131	KPC-3	IncN1
C	2025	*Escherichia coli*	69	KPC-3	IncN1
D	2025	*Escherichia coli*	131	KPC-3	IncN1
E	2025	*Escherichia coli*	131	KPC-3	IncN1

Abbreviation: KPC = *Klebsiella pneumoniae* carbapenemase.

* Multilocus sequence type assigned to each isolate based on allelic profiles of housekeeping genes using multilocus sequence typing analysis. Sequence type reflects the clonal lineage of the organism.

† Specific variant of the bla_{KPC} gene identified in each isolate (e.g., KPC-2 and KPC-3), indicating the carbapenemase allele responsible for carbapenem resistance.

§ Plasmid incompatibility group or plasmid type carrying the bla_{KPC} gene, as determined by plasmid typing analysis (e.g., IncF, IncN, and IncX3). The plasmid is the genetic vehicle responsible for horizontal transmission of the resistance gene.

Additional point-prevalence screenings. A second round of point-prevalence screening was performed 1 week after the first round of testing in the affected unit and the adjacent unit on the same floor. One additional resident received a positive test result, for a New Delhi metallo-β-lactamase–producing CPE infection. The patient was admitted to the LTCF with this diagnosis in 2024. This resident's care was managed with contact precautions in a private room, and the case was not considered part of the outbreak because the organism and timeline were unrelated. Two additional point-prevalence screening rounds were conducted at weekly intervals after the second round; no further transmission was identified. The weekly screening was discontinued, and the outbreak was declared over; IPC measures were continued.

Discussion

This investigation documented intrafacility transmission of KPC-producing Enterobacterales among residents of a single LTCF unit in Canada during approximately 8 months (May 2024–January 2025). Multiple converging factors likely facilitated the spread, including the presence of a person with documented colonization (i.e., patient B) admitted to the LTCF without implementation of contact precautions, overlapping staff member assignments, shared dining facilities, and use of a common-area bathroom. The residents were older adults with multiple comorbidities, indwelling devices, and frequent antimicrobial use. Previous research has identified a high prevalence of CPE among LTCF residents (*5*) linked to similar risk factors (*6*).

Genomic evidence strengthened the epidemiologic findings in this outbreak. Clustering of *E. coli* ST131 isolates differing by only one to nine SNVs is consistent with recent clonal

Summary

What is already known about this topic?

Carbapenemase-producing Enterobacterales (CPE), particularly *Escherichia coli* CPE, can spread in long-term care facilities (LTCFs) through asymptomatic persons who are carriers, staff members, shared spaces, and device use, causing difficult-to-treat infections among residents with underlying medical conditions and those with indwelling devices.

What is added by this report?

An 8-month outbreak of CPE in an Ontario, Canada, LTCF affected five residents; whole genome sequencing identified clonal spread of *E. coli* sequence type 131 and a closely related, approximately 62-kb IncN1 bla_{KPC-3} plasmid across *E. coli* and *Klebsiella pneumoniae*, indicating dual organism- and plasmid-mediated transmission.

What are the implications for public health practice?

Adoption of LTCF risk-based admission screening, clear interfacility transfer communication, prompt implementation of contact precautions for persons who are documented as asymptomatic carriers, routine hand hygiene, compliance with infection prevention and control practices, and focused environmental controls coupled with antimicrobial stewardship could help prevent future outbreaks.

transmission. Detection of bla_{KPC-3} on closely related IncN1 plasmids across *E. coli* and *K. pneumoniae* isolates supports plasmid-mediated spread, which can propagate resistance across species even when organism-to-organism transmission is limited. Together, these findings indicate dual transmission pathways (i.e., via the organism and the plasmid) that can sustain and amplify CPE within congregate care settings.

The public health response, including the rapid institution of contact precautions, staff member cohorting, activity restrictions, education, compliance with enhanced IPC practices, and environmental interventions, including sink-drain procedures, was temporally associated with the interruption of transmission, as evidenced by three subsequent negative screening rounds after identification of the residents with colonization. Although environmental sampling was not conducted, mitigation measures, such as plumbing modifications to reduce the risk for splash back after residents washed their hands, were reasonable.

Limitations

The findings in this report are subject to at least two limitations. First, point-prevalence screening was restricted to the affected unit and one adjacent unit, which might have resulted in an underestimate of the number of persons colonized within the LTCF. Conducting multiple rounds of facilitywide point-prevalence testing is resource-intensive; therefore, a stepwise approach was adopted, expanding testing to other units only when further positive results were reported in the tested unit. Once no additional cases were identified, testing was not expanded further. Second, environmental testing for CPE is not routinely performed by the Canadian provincial public health laboratory and was not conducted. In addition, the transmission pathway involved mobile patients, and enhanced cleaning protocols were already in place. These factors precluded direct assessment of surface or plumbing contamination.

Implications for Public Health Practice

This outbreak highlights four strategies for preventing introduction and spread of antibiotic-resistant organisms in LTCFs: 1) adoption of risk-based screening (e.g., recent hospitalization or interfacility transfer, previously identified patients who are carriers of antimicrobial-resistant organisms, and patients using indwelling devices) so that patients who are carriers can be identified when they are admitted to LTCFs and timely precautions can be implemented (*7*,*8*); 2) implementing contact precautions for known carriers when they are admitted or transferred from another facility, with clear signage, dedicated equipment when feasible, and prompt staff member education to help support adherence; 3) detailed cleaning protocols for shared bathroom facilities, attention to sink-to-patient splash zones, and, where feasible, provision of private bathrooms for carriers to help reduce risk for transmission; and 4) use of antibiotic stewardship programs, because frequent and prolonged antibiotic use is a recognized driver of acquisition and persistence of resistant organisms. Ensuring antibiotic stewardship programs that review indications and durations and consider the most narrow-spectrum antibiotics, particularly for recurrent urinary tract infections, can reduce transmission in LTCFs.

Acknowledgments

Windsor-Essex County Health Unit leadership and staff members.

Corresponding author: Mehdi Aloosh, alooshm@mcmaster.ca.

[1]Windsor-Essex County Health Unit, Windsor, Ontario, Canada; [2]Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario, Canada; [3]National Microbiology Laboratory, Winnipeg, Manitoba, Canada.

All authors have completed the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. Handreen Mohammed Saeed reports receipt of funding from McMaster University to support the development of research skills. No other potential conflicts of interest were disclosed.

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Prevalence and Context of Sunburn Among U.S. Adults — United States, 2024

Dawn M. Holman, MPH[1]; Michael A. Boring, MS[1]; Anne K. Julian, PhD[1]; Richard P. Moser, PhD[2]; Keegan T. Peterson, PhD[2]; Frank M. Perna, EdD, PhD[2]

Abstract

Sunburn is an important risk factor for skin cancer. Understanding sunburn prevalence and the contexts in which sunburn commonly occurs might help guide the development and implementation of sun safety interventions. Data from the 2024 National Health Interview Survey sample adult questionnaire were analyzed to describe the prevalence of one or more and four or more sunburns among U.S. adults during the previous 12 months and the percentages of U.S. adults who experienced their most recent sunburn while they were working at their job; intentionally tanning; exercising; spending time in, on, or near water; using sunscreen; or drinking alcohol. Overall, an estimated 88.1 million (35.1%) U.S. adults had at least one sunburn during the previous 12 months, and 18.8 million (7.5%) had four or more sunburns. Among adults who experienced sunburn during the previous year, spending time in, on, or near the water was the most frequently reported context of their most recent sunburn (60.6%); followed by exercising (24.7%); drinking alcohol (17.6%); intentionally tanning (15.9%); and working at their job (12.9%). Approximately one half (55.1%) of respondents reported that their most recent sunburn occurred despite using sunscreen. These findings can help guide research and activities to adapt, tailor, and expand evidence-based interventions to improve use of sun protection, prevent sunburn, and reduce skin cancer risk.

Introduction

Skin cancer is the most commonly diagnosed cancer in the United States, with approximately 6 million U.S. adults treated for skin cancer each year and annual treatment costs estimated at $8.9 billion (*1*). Sunburn is the primary modifiable risk factor for skin cancer (*2*,*3*). Even one sunburn at any age increases risk, and a dose-response relationship exists, with more sunburns leading to increasing risk for skin cancer (*2*,*3*). Because of the strong association between a history of sunburn and skin cancer risk, sunburn prevalence can serve as a useful intermediate measure of progress toward reducing skin cancer at a population level (*4*,*5*). Understanding the common contexts in which sunburn occurs is also important for guiding the development and implementation of effective prevention interventions. This report builds on previous research (*6*,*7*) as the first analysis of sunburn context data from a large, nationally representative surveillance survey. This report analyzes data from the 2024 National Health Interview Survey (NHIS) sample adult questionnaire to describe the prevalence of one or more and four or more sunburns among U.S. adults during the previous 12 months and the percentages of U.S. adults who were doing each of the following when they experienced their most recent sunburn: working at their job; intentionally tanning; exercising; spending time in, on, or near water; using sunscreen; or drinking alcohol.

Methods

Data Source

NHIS is a cross-sectional household interview survey of the noninstitutionalized U.S. civilian population. In 2024, NHIS conducted 32,629 sample adult interviews with a response rate of 47.9%.

Survey Measures

The 2024 NHIS sample adult questionnaire (administered to persons aged ≥18 years) included questions about sunburn during the previous 12 months. Respondents were first asked if they had a sunburn during the previous 12 months.* Those who answered affirmatively were asked how many times during the previous 12 months they had experienced sunburn. Respondents reporting four or more sunburns were categorized as having frequent sunburns. Respondents with at least one sunburn during the previous 12 months were also asked to recall their most recent sunburn and report if they were 1) working at their job; 2) trying to get a tan; 3) exercising; 4) spending time in, on, or near the water (e.g., a pool, lake, or ocean); 5) using sunscreen; or 6) drinking alcohol. Respondents could indicate multiple contexts during which sunburn occurred.

Sun sensitivity, an indicator of having skin that sunburns easily, was assessed by asking respondents what would happen to their skin after 1 hour of unprotected sun exposure (*8*). Responses were coded into three categories: sun sensitive,† not sun sensitive,§ and do not go out in the sun.¶

* Respondents were asked, "During the past 12 months, did you have a sunburn on even a small part of your skin?" If necessary, the interviewer read the following definition of sunburn: "By sunburn, we mean when even a small part of your skin turns red or hurts for 12 hours or more."

† Respondents were asked, "After several months of not being in the sun, if you then went out into the sun without sunscreen or protective clothing for one hour, which of these would happen to your skin?" Those who said they would "get a severe sunburn with blisters," "have a moderate sunburn with peeling," or "burn mildly with some or no darkening or tanning" were coded as sun sensitive.

§ Those who said they would "turn darker without sunburn" or "nothing would happen to my skin" were coded as not sun sensitive.

¶ Those who responded "do not go out in the sun" were coded as does not go out in the sun.

Data Analysis

Data were weighted to generate nationally representative estimates for all sample adults and to account for sampling probabilities and nonresponse. Variance estimates were calculated using Taylor series linearization. Unadjusted prevalence of having had at least one sunburn and frequent sunburns during the previous 12 months was calculated overall and among sun-sensitive adults by sex, age group, race and ethnicity, highest level of education attained, family income (quantified as a percentage of the federal poverty level), and U.S. Census Bureau region. NHIS imputed income files were used to create the family income variable. Percentages of adults who reported a context of their most recent sunburn during the previous 12 months were calculated overall and by demographic characteristics; the six contexts were not mutually exclusive. Subgroup percentages were compared with a referent group using design-based t-tests; all differences are significant (with $p<0.05$ as the level of significance). Because analyses focused on a priori comparisons of subgroups to a prespecified referent category, no adjustments for multiple comparisons were made. The data were analyzed using SAS-callable SUDAAN (version 11.0.3; RTI International) to account for the complex sampling design. This activity was reviewed by CDC, deemed not research, and conducted consistent with applicable federal law and CDC policy.**

Results

Sunburn Prevalence

In 2024, approximately 88.1 million (35.1%) U.S. adults, including 68.1 million (54.6%) sun-sensitive adults, reported having had at least one sunburn during the previous 12 months (Table 1). Approximately 18.8 million (7.5% of U.S. adults and 13.2% of sun-sensitive U.S. adults) reported frequent (four or more) sunburns during the previous 12 months (Table 2). Between-group comparisons highlighted differences in sunburn prevalence on the basis of sex, age, race and ethnicity, education, family income, and region (Table 1) (Table 2).

Sunburn Context

Among adults who experienced at least one sunburn during the previous 12 months, 55.1% reported that they experienced their most recent sunburn despite using sunscreen. The most frequently reported sunburn context was spending time in, on, or near water (60.6%), followed by exercising (24.7%), drinking alcohol (17.6%), intentionally tanning (15.9%), and working at their job (12.9%).

Sex. Women were significantly more likely than were men to report experiencing a sunburn while spending time in, on, or near water (65.0% versus 55.9%); using sunscreen (64.3% versus 45.3%); and intentionally tanning (21.3% versus 10.3%) (Figure). Men were more likely than were women to report experiencing a sunburn while exercising (27.2% versus 22.4%), drinking alcohol (20.0% versus 15.4%), and working at their job (19.4% versus 6.8%).

Age. Sunburn contexts reported by adults in different age groups were compared with those reported by adults aged 18–29 years. Compared with this group, all other age groups were less likely to report experiencing a sunburn while working at their job or intentionally tanning. Adults aged 30–44 years were less likely to report experiencing a sunburn while exercising (22.2% versus 28.9%) and more likely to report experiencing a sunburn while drinking alcohol (20.9% versus 17.2%) than were adults aged 18–29 years. Those aged 45–64 years were less likely to report experiencing a sunburn while exercising (23.0% versus 28.9%); spending time in, on, or near water (57.8% versus 65.7%); or using sunscreen (52.2% versus 58.9%). Adults aged ≥65 years were less likely to report experiencing a sunburn while spending time in, on, or near water (45.0% versus 65.7%); using sunscreen (46.0% versus 58.9%); or drinking alcohol (9.7% versus 17.2%).

Race and ethnicity. All sunburn contexts reported by persons of different racial and ethnic groups were compared with those reported by White adults who were not Hispanic or Latino (non-Hispanic). Non-Hispanic Black or African American adults were less likely to report experiencing a sunburn while intentionally tanning (8.7% versus 16.4%), exercising (16.8% versus 25.6%), and using sunscreen (40.6% versus 55.5%). Non-Hispanic Asian adults were more likely to report experiencing a sunburn while using sunscreen (63.1% versus 55.5%) and less likely to report experiencing a sunburn while intentionally tanning (6.9% versus 16.4%) and drinking alcohol (11.2% versus 18.0%). Non-Hispanic adults of other races†† were less likely to report experiencing a sunburn while using sunscreen (46.3% versus 55.5%). Hispanic or Latino (Hispanic) adults were more likely to report experiencing a sunburn while working at their job (18.6% versus 12.4%) and less likely to report experiencing a sunburn while exercising (20.0% versus 25.6%).

Sun sensitivity. Compared with sun-sensitive adults, adults who were not sun sensitive were more likely to report experiencing a sunburn while working at their job (15.0% versus 12.4%) and intentionally tanning (18.8% versus 15.3%) and less likely to report experiencing a sunburn while using

** 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

†† Includes non-Hispanic respondents who were American Indian or Alaska Native or multiple races.

TABLE 1. Prevalence of experiencing one or more sunburns during the previous 12 months among adults, by demographic characteristics and sun sensitivity* — National Health Interview Survey, United States, 2024

Characteristic	Total adults					Sun-sensitive adults				
	Sample size	Unweighted no.	Estimated no., millions†	% (95% CI)	p-value	Sample size	Unweighted no.	Estimated no., millions†	% (95% CI)	p-value
Total	**31,603**	**10,494**	**88.1**	**35.1 (34.1–36.0)**	—	**16,169**	**8,207**	**68.1**	**54.6 (53.6–55.7)**	—
Sex										
Men (Ref)	14,497	4,955	42.9	35.1 (34.0–36.3)	—	6,864	3,713	31.6	56.8 (55.3–58.3)	—
Women	17,101	5,535	45.1	35.0 (33.9–36.1)	0.79	9,302	4,491	36.4	52.9 (51.5–54.2)	0
Age group, yrs										
18–29 (Ref)	3,962	1,916	23.0	46.0 (44.0–48.1)	—	1,983	1,430	17.2	71.6 (69.0–74.1)	—
30–44	7,395	3,458	29.0	44.7 (43.2–46.3)	0.28	4,085	2,718	22.5	65.8 (64.0–67.6)	0
45–64	9,610	3,259	26.4	33.6 (32.3–34.9)	0	5,054	2,583	20.7	51.8 (50.1–53.6)	0
≥65	10,591	1,853	9.7	16.8 (16.0–17.7)	0	5,027	1,469	7.7	29.2 (27.7–30.7)	0
Race and ethnicity										
Asian, NH	1,803	320	2.5	16.3 (14.5–18.2)	0	454	196	1.5	42.4 (37.2–47.8)	0
Black or African American, NH	3,105	271	2.6	9.1 (7.9–10.4)	0	370	133	1.3	37.8 (31.9–43.9)	0
Hispanic or Latino	4,581	999	9.7	21.5 (20.1–23.0)	0	1,539	630	5.8	40.0 (37.0–43.1)	0
White, NH (Ref)	21,207	8,603	70.7	45.8 (44.7–46.8)	—	13,443	7,047	57.7	57.7 (56.5–58.8)	—
Other races, NH§	907	301	2.5	35.8 (31.7–40.1)	0	363	201	1.7	60.2 (53.5–66.4)	0.46
Highest education level attained										
Less than high school or GED certificate	2,555	410	4.6	18.2 (16.3–20.2)	0	864	298	3.4	38.8 (35.0–42.8)	0
High school graduate or GED certificate	8,095	2,250	20.1	29.8 (28.4–31.3)	0	3,728	1,725	15.4	51.1 (48.9–53.3)	0
Some college	8,785	3,017	27.4	37.8 (36.4–39.3)	0	4,561	2,295	20.4	56.2 (54.2–58.1)	0.04
College degree (Ref)	12,035	4,790	35.7	42.2 (41.0–43.4)	—	6,974	3,870	28.7	58.6 (57.2–60.0)	—
Family income (% of FPL)¶										
Poor or near poor (<125)	4,496	951	7.9	23.3 (21.4–25.3)	0	1,730	709	5.8	46.7 (43.2–50.3)	0
Low income (125 to <200)	4,383	1,070	8.6	25.2 (23.5–27.1)	0	1,933	804	6.3	45.6 (42.4–48.8)	0
Middle income (200 to <400)	9,423	3,055	24.8	33.0 (31.6–34.4)	0	4,775	2,370	19	52.7 (50.9–54.6)	0
High income (≥400) (Ref)	13,301	5,418	46.7	43.4 (42.2–44.6)	—	7,731	4,324	36.9	59.3 (58.0–60.7)	—
U.S. Census Bureau region**										
Northeast	4,936	1,613	14.8	34.5 (32.4–36.6)	0.005	2,555	1,288	11.6	54.5 (52.0–57.0)	0.05
Midwest	7,325	2,884	21.8	42.0 (40.0–43.9)	0	4,165	2,291	17.3	59.5 (57.3–61.6)	0
South (Ref)	11,453	3,257	29.8	30.7 (29.3–32.3)	—	5,243	2,481	22.6	51.4 (49.5–53.2)	—
West	7,889	2,740	21.6	36.6 (34.7–38.5)	0	4,206	2,147	16.6	54.9 (52.6–57.2)	0.02

Abbreviations: FPL = federal poverty level; GED = general educational development; NH = not Hispanic or Latino; Ref = referent group.

* Respondents were asked to describe what would happen if, after several months of not being in the sun, they went out into the sun without sunscreen or protective clothing for 1 hour. Those who said that they would "get a severe sunburn with blisters," "have a moderate sunburn with peeling," or "burn mildly with some or no darkening or tanning" were coded as sun sensitive; those who said they would "turn darker without sunburn" or "nothing would happen to my skin" were coded as not sun sensitive.

† The estimated number of U.S. adults who experienced one or more sunburns during the previous 12 months.

§ NH respondents who were American Indian or Alaska Native, or multiple races.

¶ Calculated using National Health Interview Survey imputed income files.

** U.S. Census Bureau regions and divisions

sunscreen (47.7% versus 57.2%). Adults who reported that they do not go out in the sun were less likely to report experiencing a sunburn while spending time in, on, or near water (43.1%) than were those who were sun sensitive (60.4%).

Discussion

Each year, approximately 88 million U.S. adults of all races and ethnicities experience at least one sunburn, with approximately 18 million experiencing four or more sunburns. Given the extensive evidence that sunburn increases risk for skin cancer (*2*,*3*), activities to decrease sunburn prevalence might help reduce skin cancer incidence rates over time.

Findings indicate a particularly high sunburn prevalence among adults who are younger, White, sun sensitive, and have a high family income. These demographic groups could be considered when identifying populations of focus for sun safety interventions. Findings regarding the contexts in which adults often experience sunburns can be used to guide future research and intervention approaches. For example, approximately one half of adults who experienced sunburn during the previous year reported that their most recent sunburn occurred while they were using sunscreen. This finding suggests a potential need for interventions to support effective sunscreen use (e.g., use of broad-spectrum§§ sunscreen

§§ Broad-spectrum sunscreens help protect against ultraviolet A and ultraviolet B radiation, both of which can increase skin cancer risk.

TABLE 2. Prevalence of experiencing four or more sunburns during the previous 12 months among adults, by demographic characteristics and sun sensitivity* — National Health Interview Survey, United States, 2024

Characteristic	Total adults					Sun-sensitive adults				
	Sample size	Unweighted no.	Estimated no., millions†	% (95% CI)	p-value	Sample size	Unweighted no.	Estimated no., millions†	% (95% CI)	p-value
Total	**31,476**	**2,117**	**18.8**	**7.5 (7.1–8.0)**	—	**16,076**	**1,826**	**16.3**	**13.2 (12.4–13.9)**	—
Sex										
Men (Ref)	14,413	1,075	9.7	8.0 (7.4–8.6)	—	6,801	897	8.2	14.8 (13.7–16.0)	—
Women	17,058	1,040	9.0	7.0 (6.5–7.6)	0.01	9,272	928	8.1	11.9 (11.0–12.8)	0
Age group, yrs										
18–29 (Ref)	3,942	566	6.9	13.9 (12.5–15.3)	—	1,967	488	6.1	25.5 (23.1–28.0)	—
30–44	7,361	763	6.2	9.7 (8.8–10.5)	0	4,058	668	5.4	15.8 (14.5–17.2)	0
45–64	9,578	520	4.3	5.5 (5.0–6.1)	0	5,033	444	3.7	9.4 (8.4–10.4)	0
≥65	10,551	265	1.3	2.3 (2.0–2.6)	0	4,998	223	1.1	4.4 (3.8–5.1)	0
Race and ethnicity										
Asian, NH	1,801	50	0.4	2.4 (1.7–3.4)	0	454	35	0.3	7.7 (5.4–10.9)	0
Black or African American, NH	3,098	29	0.3	0.9 (0.6–1.3)	0	367	19	0.2	4.8 (2.9–8.0)	0
Hispanic or Latino	4,567	156	1.5	3.4 (2.8–4.0)	0	1,531	107	1.0	6.7 (5.4–8.2)	0
White, NH (Ref)	21,106	1,825	16.2	10.5 (9.9–11.1)	—	13,363	1,618	14.5	14.6 (13.7–15.5)	—
Other races, NH§	904	57	0.5	7.0 (5.1–9.6)	0.003	361	47	0.4	14.4 (10.2–19.9)	0.95
Highest level of education attained										
Less than high school or GED certificate	2,544	78	1.0	4.0 (3.1–5.3)	0	858	61	0.8	9.1 (6.8–12.0)	0
High school graduate or GED certificate	8,046	430	4.1	6.1 (5.4–6.8)	0	3,696	364	3.5	11.9 (10.5–13.4)	0.005
Some college	8,755	571	5.7	7.9 (7.1–8.7)	0.002	4,538	490	4.9	13.6 (12.2–15.1)	0.34
College degree (Ref)	11,999	1,033	8.0	9.5 (8.8–10.2)	—	6,942	907	7.0	14.4 (13.4–15.5)	—
Family income (% of FPL)¶										
Poor or near poor (<125)	4,475	187	1.6	4.7 (3.9–5.7)	0	1,718	155	1.3	10.9 (8.9–13.2)	0.003
Low income (125 to <200)	4,367	219	1.9	5.7 (4.8–6.7)	0	1,922	177	1.6	11.5 (9.6–13.7)	0.01
Middle income (200 to <400)	9,385	603	5.1	6.8 (6.2–7.6)	0	4,748	519	4.4	12.3 (11.1–13.7)	0.01
High income (≥400) (Ref)	13,249	1,107	10.1	9.4 (8.7–10.2)	—	7,689	975	9.0	14.5 (13.4–15.6)	—
U.S. Census Bureau region**										
Northeast	4,911	288	2.9	6.7 (5.6–7.9)	0.70	2,537	259	2.6	12.2 (10.2–14.5)	0.78
Midwest	7,293	597	4.7	9.1 (8.3–10.1)	0	4,140	526	4.2	14.7 (13.3–16.1)	0.003
South (Ref)	11,410	639	6.2	6.4 (5.8–7.1)	—	5,212	532	5.2	11.8 (10.7–13.1)	—
West	7,862	593	5.0	8.5 (7.6–9.4)	0	4,187	509	4.3	14.3 (12.9–15.9)	0.01

Abbreviations: FPL = federal poverty level; GED = general educational development; NH = not Hispanic or Latino; Ref = referent group.

* Respondents were asked to describe what would happen if, after several months of not being in the sun, they went out into the sun without sunscreen or protective clothing for 1 hour. Those who said that they would "get a severe sunburn with blisters," "have a moderate sunburn with peeling," or "burn mildly with some or no darkening or tanning" were coded as sun sensitive; those who said they would "turn darker without sunburn" or "nothing would happen to my skin" were coded as not sun sensitive.

† The estimated number of U.S. adults who experienced four or more sunburns during the previous 12 months.

§ NH respondents who were American Indian or Alaska Native or multiple races.

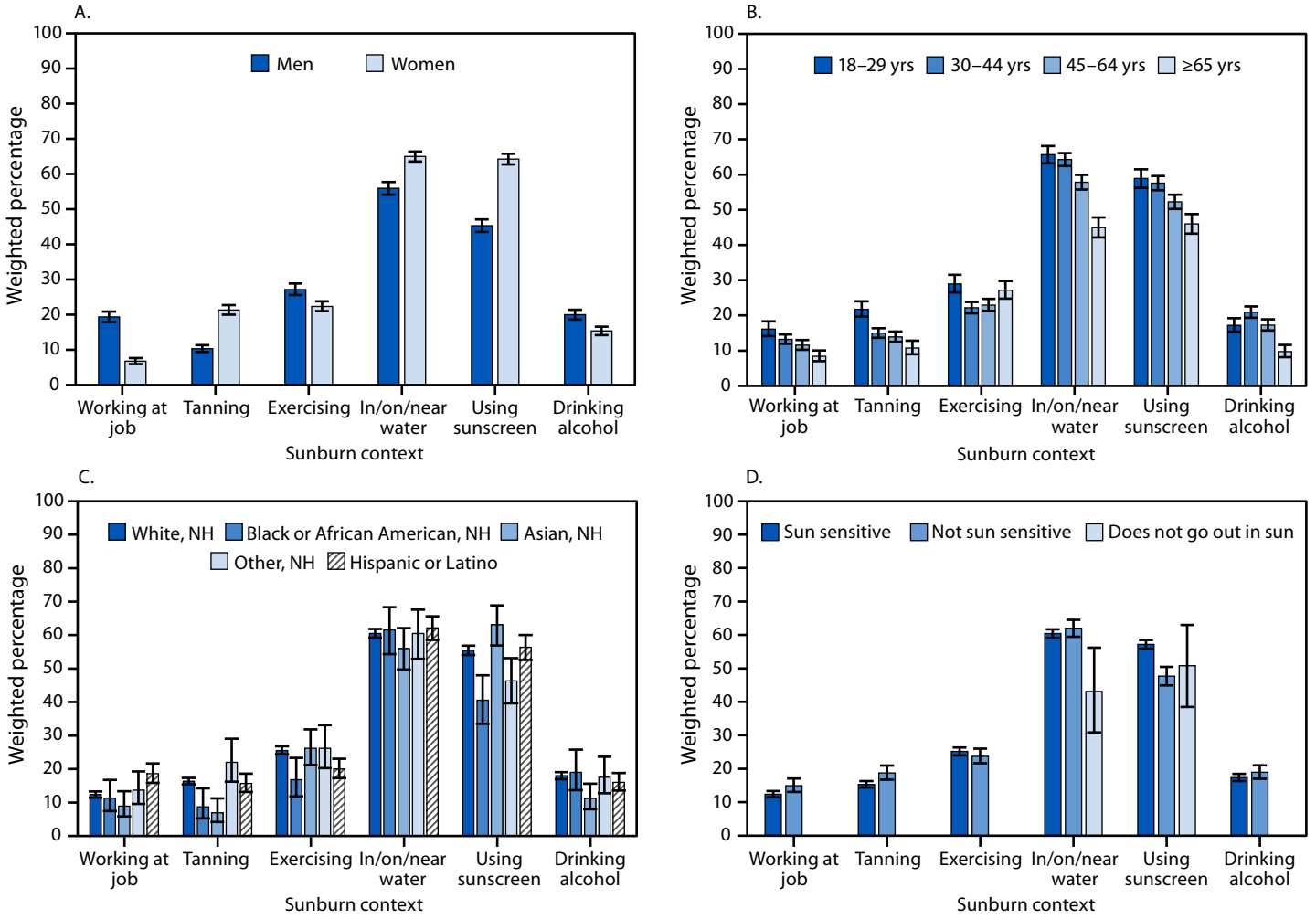
¶ Calculated using National Health Interview Survey imputed income files.

** U.S. Census Bureau regions and divisions

with a sun protection factor [SPF] of ≥15 in combination with protective clothing, applying a sufficient amount [before the application of insect repellent], and frequent reapplication, particularly after swimming or sweating).

Findings regarding specific settings that might pose a high sunburn risk (e.g., outdoor aquatic settings and work spaces) can help to guide the adaptation, tailoring, and expansion of evidence-based interventions designed to influence sun safety knowledge, attitudes, and behaviors while also using environmental approaches (e.g., adequate shade and availability of free sunscreen) to make sun safety easier, particularly in occupational, recreational, and tourism settings. For example, sun safety interventions designed for certain aquatic settings (e.g., the Pool Cool program, a sun safety program for outdoor swimming pools) could be adapted for beaches, lakes, and rivers. Interventions for outdoor workers (e.g., Go Sun Smart) could be expanded, particularly for men, young adults, and Hispanic adults. The results also suggest that adults often experience sunburns while they are engaging in outdoor exercise, tanning, or using alcohol. The high prevalence of sunburn while exercising highlights an opportunity to pair sun safety and physical activity messaging and to promote access to shade (*9*,*10*) in community spaces often used for physical activity (e.g., parks, playgrounds, and sidewalks). Future research could identify strategies to reduce

FIGURE. Percentage of adults* whose most recent sunburn occurred while working; tanning; exercising; in, on, or near water; using sunscreen; or drinking alcohol, by sex (A), age group (B), race and ethnicity† (C), and sun sensitivity§ (D) — National Health Interview Survey, United States, 2024¶



Abbreviation: NH = not Hispanic or Latino.

* Among persons who reported experiencing any sunburn during the previous 12 months; 95% CIs are shown by error bars.

† NH other includes all NH respondents who self-identified as a race other than Asian, Black or African American, or White or who identified as multiple races.

§ Respondents were asked to describe what would happen if, after several months of not being in the sun, they went out into the sun without sunscreen or protective clothing for 1 hour. Those who said that they would "get a severe sunburn with blisters," "have a moderate sunburn with peeling," or "burn mildly with some or no darkening or tanning" were coded as sun sensitive; those who said, "turn darker without sunburn" or "nothing would happen to my skin" were coded as not sun sensitive; those who responded to the sun sensitivity question by saying they "do not go out in the sun" were coded as does not go out in the sun. For sun sensitivity (working at their job, tanning, exercising, and drinking alcohol), estimates were suppressed if the minimum effective sample size was <30, the absolute CI width was ≥30 percentage points, or the absolute CI width was 5–30 percentage points, and the relative CI width was >130%. The 95% CIs were calculated using the Korn and Graubard method.

¶ Significant differences for subgroup testing: women versus men for all contexts ($p<0.001$ for each comparison); age 18–29 years versus 30–44 years for working ($p = 0.02$); 18–29 years versus 45–64 years and ≥65 years for working ($p<0.001$ for each comparison); 18–29 years versus all other age groups for tanning ($p<0.001$ for each comparison); 18–29 years versus 30–44 years and 45–64 years for exercising ($p<0.001$ for each comparison); 18–29 years versus 45–64 years and ≥65 years for water and for sunscreen ($p<0.001$ for each comparison); 18–29 years versus 30–44 years for alcohol ($p = 0.003$); 18–29 years versus ≥65 years for alcohol ($p<0.001$); NH White versus Hispanic or Latino for working ($p<0.001$); NH White versus NH Black or African American for tanning ($p = 0.001$); NH White versus NH Asian for tanning ($p<0.001$); NH White versus NH Black or African American for exercising ($p = 0.004$); NH White versus Hispanic or Latino for exercising ($p<0.001$); NH White versus NH Black or African American for sunscreen ($p<0.001$); NH White versus NH Asian for sunscreen ($p = 0.02$); NH White versus NH other races for sunscreen ($p = 0.009$); NH White versus NH Asian for alcohol ($p = 0.001$); sun sensitive versus not sun sensitive for working ($p = 0.02$); sun sensitive versus not sun sensitive for tanning ($p = 0.004$); sun sensitive versus do not go out in the sun for water ($p = 0.009$); and sun sensitive versus not sun sensitive for sunscreen ($p<0.001$).

intentional tanning, especially among women, approximately 20% of whom experienced their most recent sunburn while tanning. In addition, future research could examine the potential influence of alcohol use on sunburn risk.

Limitations

The findings in this report are subject to at least five limitations. First, because the data are cross-sectional, conclusions cannot be drawn regarding causality. Second, because the data

Summary

What is already known about this topic?

Sunburn is a risk factor for skin cancer.

What is added by this report?

The 2024 National Health Interview Survey found that an estimated 88.1 million (35.1%) U.S. adults experienced sunburn during the previous year, including 18.8 million (7.5%) who had four or more sunburns. Engaging in water-related activities was the most frequently reported sunburn context (60.6%), followed by exercising (24.7%), drinking alcohol (17.6%), intentional tanning (15.9%), and working at a job (12.9%). Approximately one half (55.1%) of respondents reported that their most recent sunburn occurred despite using sunscreen; education about proper sunscreen use is needed.

What are the implications for public health practice?

The findings in this report can guide public health activities to adapt, tailor, and expand existing evidence-based interventions to enhance sun protection, prevent sunburn, and reduce skin cancer risk.

are self-reported, they are subject to social desirability and recall bias and might have resulted in an underestimate of number of sunburns. Third, the sunburn context data are limited to respondents' most recent sunburn and the contexts included on the 2024 NHIS, which likely do not capture all potential contexts in which sunburns might have occurred and might not reflect respondents' usual sunburn contexts. Fourth, certain respondents selected multiple contexts; however, not enough information was available to determine whether one contextual factor had a larger influence on sunburn occurrence than others, and the different contexts might have influenced one another (e.g., using sunscreen and trying to get a tan while at the beach). Finally, the question about sunscreen use did not record factors that might have affected the effectiveness of the product, such as frequency of application and the type or amount used.

Implications for Public Health Practice

Each year, approximately one-third of U.S. adults experience at least one sunburn, thereby increasing their skin cancer risk. Several contexts, including outdoor aquatic and occupational settings, outdoor exercise, tanning, and alcohol use, might increase the likelihood of experiencing a sunburn. Sunscreen needs to be used properly and reapplied frequently to prevent sunburn. Measures to adapt, tailor, and expand existing evidence-based sun safety interventions might help prevent sunburns and reduce the risk for skin cancer.

Corresponding author: Dawn M. Holman, dholman@cdc.gov.

[1]Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC; [2]Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, Maryland.

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflicts of interest were disclosed.

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ISSN: 0149-2195 (Print)