Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 61 / No. 46
November 23, 2012

Suffocation Deaths Associated with Use of Infant Sleep Positioners — United States, 1997–2011

Unintentional suffocation is the leading cause of injury death among children aged <1 year in the United States, accounting for nearly 1,000 infant deaths annually. Since 1984, an estimated fourfold increase has been observed in accidental suffocation and strangulation in bed, with many of these deaths linked to unsafe sleep environments (*1,2*). Infant sleep positioners (ISPs) are devices intended to keep an infant in a specific position while sleeping, yet ISPs have been reported to have been present in the sleep environment in some cases of unintentional infant suffocation (*3,4*) (Figure). Some specific ISPs have been cleared by the Food and Drug Administration (FDA) for the management of gastroesophageal reflux or plagiocephaly (asymmetry of the skull) (*5*). However, many unapproved ISPs have been marketed to the general public with claims of preventing sudden infant death syndrome (SIDS), improving health, and enhancing sleep comfort (*5*). To characterize infant deaths associated with ISPs, FDA, the U.S. Consumer Product Safety Commission (CPSC), and CDC examined information reported to CPSC about 13 infant deaths in the past 13 years associated with the use of ISPs. In this case series, all infants but one were aged ≤3 months, and most were placed on their sides to sleep. Many were found prone (i.e., lying on their abdomens). Accompanying medical issues included prematurity and intercurrent respiratory illnesses. When providing guidance for parents of newborns, health-care providers need to emphasize the importance of placing infants to sleep on their backs in a safe sleep environment. This includes reminders about the American Academy of Pediatrics (AAP) recommendations against side sleep position, ISPs and pillows, comforters, and other soft bedding.

A case was defined as an infant death reported to CPSC during January 1997–March 2011 that occurred in the presence of an ISP in the sleep environment. Thirteen cases were identified. Information was abstracted from a CPSC In-Depth Investigation file,* which included medical examiner and police reports made available to CPSC. This report describes the circumstances of one case and summarizes all 13 cases of infant death.

Case Description

The male victim, aged 7 weeks, was one of twin infants born at 36 weeks' gestation but otherwise was physically and developmentally normal. Five days before his death, he had a well-baby visit that revealed no health concerns. He slept in an ISP in a crib separate from his twin brother. The morning of his death, the victim was fed, uneventfully, at approximately 1:00 a.m. and was placed to sleep on his side in the ISP. At about 4:00 a.m., a care provider prepared the infants for their next feeding and discovered the victim in the ISP, unresponsive, with his face close to one of the ISP's foam pads, which were used in conjunction with swaddling to keep a pacifier in the infant's mouth. The autopsy report listed the cause of death as asphyxia by obstruction of the nose and mouth by a "foam positioning device."

* Contains data from investigations on death or injury associated with a particular consumer product.

INSIDE

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

FIGURE. Simulated display using a doll in an infant sleep positioner with two bolsters, demonstrating how an infant's face can get trapped against the bolster, causing suffocation

The ISP was a flat mat with side bolsters, which the mother purchased to prevent SIDS. The device was advertised as helping "position your baby while sleeping or resting" and instructions stated, "This product is to be used if your pediatrician has recommended side sleeping for your baby."

Summary of 13 Cases

Among the 13 cases of infant death reported to CPSC in association with ISP use, the victims ranged in age from 21 days to 4 months (mean: 9.5 weeks, median: 3 months) (Table). Eight were male. Four victims had been born prematurely, and three of them were one of a pair of twins. One deceased twin had been diagnosed with bronchopulmonary dysplasia and gastroesophageal reflux. Of the 13 infants, four had recent respiratory symptoms and/or diagnoses of respiratory illness, including respiratory syncytial virus infection and colds.

Infants were most commonly placed on their sides to sleep (nine infants). One infant was placed prone. The position placement was not known for two cases; a discrepancy was noted between parental report and medical examiner assessment for the remaining case. Three families reported using the device in an effort to prevent SIDS. Other reported uses included preventing reflux (two cases), elevating the head (one case), preventing rolling over (three cases), and preventing plagiocephaly (one case). Instructions for use of involved ISPs were available for review for five cases; three indicated that side positioning an infant in the device was an acceptable use of the product. At least three cases involved ISPs with cautionary labeling "once your baby begins to move around during sleep, the sleep positioner should no longer be used."

Reported by

Brenda Lawrence, MD, Gail Gantt, MGA, Joy Samuels-Reid, MD, Victoria Wagman, MA, Center for Devices and Radiological Health, Susan Cummins, MD, Center for Drug Evaluation and Research, Food and Drug Administration. Suad Wanna-Nakamura, PhD, Div of Health Sciences, Consumer Product Safety Commission. Julie Gilchrist, MD, Div of Unintentional Injury Prevention, National Center for Injury Prevention and Control, CDC. ***Corresponding contributor:*** *Joy Samuels-Reid, joy.samuels-reid@fda.hhs.gov, 301-796-6266.*

The *MMWR* series of publications is published by the Office of Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30333.

Suggested citation: Centers for Disease Control and Prevention. [Article title]. MMWR 2012;61:[inclusive page numbers].

TABLE. Unexplained infant deaths associated with infant sleep positioners, by selected characteristics — United States, 1997–2011

Year	Age	Sex	Race (ethnicity, if noted)	Positioner type	Reported use or *Advertised use**	Placement position	Position when found	Medical issues	Comments
1997	2 mos	Male	Unknown	Flat mat with bolsters	"to prevent SIDS by placing infant on side when sleeping"	Side	Prone; after rolling forward, arm trapped between body and wedge	NA	NA
1998	2 mos	Female	White	Flat mat with bolsters	"*helps keep sleeping infant on its back*" with side position diagram and instructions	Supine	Prone with face in pillow part of positioner	NA	Similar device used with older sibling
1999	4 mos	Female	White	Incline with harness (12 in. incline)	"maintain them in semi-upright position" and "to reduce the incidence of SIDS"	Unknown	Prone; out of harness lying on crib mattress	30 wks gestation; twin; diagnosed with bronchopulmonary dysplasia (on no active medical therapy); gastroesophageal reflux disease	NA
2002	7 wks	Male	White	Flat mat with bolsters	"*helps position baby while sleeping or resting*" with side position diagram and instructions	Side	On side between bolsters; face close to bolsters	36 wks gestation, twin	Foam pad of device was used to brace pacifier
2004	15 wks	Female	White	Flat mat with bolsters	"to prop baby on left side"	Side	Prone	NA	NA
2006	3 mos	Male	White (Hispanic)	Flat mat with bolsters	*"lets baby sleep safer and cooler"* with *"Side Sleeping Position: (Alternative)"* instructions	Unknown	Supine	Recent upper respiratory infection; taking prescribed medication	NA
2006	3 mos	Male	White	Inclined with wedges	*"Designed to prevent flat head syndrome and common acid reflux"*	Side	Prone	Constipation during 24 hrs prior, vomited once 1–2 hours before bedtime	NA
2008	3 mos	Male	Black	Inclined with bolsters	"elevate head"	Side	Prone; head entrapped between positioner and bassinet	6 wks premature	NA
2009	1 mos	Female	Black	Flat mat with bolsters	*"Recommended for use in positioning baby to help reduce the risk of SIDS."*	Side	Prone; head on layers of added soft bedding	NA	NA
2009	3 mos	Male	White	Flat mat with pillow attached and side bolsters	"to keep him from rolling over"	Prone	Prone; face in pillow part of positioner	Cold 3 wks prior	NA
2010	7 wks	Male	White	Inclined with wedges	"to prevent the baby from getting a flat head … and prevent him from rolling over"	Side	Prone; wedged between sleep positioner and crib bumper	Recent viral illness; respiratory symptoms, vomiting, and treatment with antibiotic	Similar device used with an older sibling
2010	3 mos	Male	White	Contains two bolsters; unknown if flat mat or inclined	Not reported	Side	Prone; wrapped in swaddling blanket with arms inside between two bolsters	36 wks gestation; twin; diagnosed 6 wks prior with respiratory syncytial virus	NA
2010	21 days	Female	Black	Inclined with bolsters	*"elevates baby's head to help ease breathing and enhance digestion"* and *"eliminate over-heating"*	Side	Prone	NA	NA

Abbreviations: SIDS = sudden infant death syndrome; NA = not applicable or not available.
* Reported use includes information reported by parents on why they were using the device. In the absence of parental report, advertised use (in italics) is provided from the available product packaging or advertisement claim by manufacturer.

What is already known on this topic?

Infant suffocation is a common cause of infant death and often is associated with the sleep environment. The safest sleep environment for infants is in a crib, on their backs (not their sides), without soft objects, loose bedding, or an infant sleep positioner (ISP).

What is added by this report?

Thirteen cases of infant deaths that occurred in the presence of an ISP in the sleep environment were reported to the U.S. Consumer Product Safety Commission during January 1997–March 2011. In this case series, all but one infant were aged ≤3 months, and most were placed on their sides to sleep.

What are the implications for public health practice?

Parents should continue to be made aware of what is the safest sleep environment for infants and reminded that commercial devices are not necessary to keep infants on their backs to sleep.

Editorial Note

This case series summarizes characteristics of the 13 infant suffocation deaths related to ISP use reported to CPSC during January 1997–March 2011. In these cases, ISPs often were used to position infants on their sides. At least nine of the infants were placed on their sides (and one prone), raising the concern that the "back-to-sleep" message to position infants on their backs is either not being heard or not being followed. CDC data from the Pregnancy Risk Assessment Monitoring System CPONDER web-based query system provides an indicator of whether infants most often are positioned on their backs for sleep. Data from reporting states in 2008 suggest that approximately 25% of infants are not being placed supine for sleep (*6*).

Some infants are at increased risk for SIDS; risk factors include premature birth, twin birth, and male gender (*7*). This case series raises concerns about ISPs contributing to the risk for suffocation, in the absence of any evidence that ISPs are effective in reducing the risk for SIDS.

Although ISPs have been available since the 1980s, only a few ISP manufacturers have been cleared by the FDA to provide products, by prescription, to manage particular medical conditions (e.g., gastroesophageal reflux). Despite other manufacturers' claims regarding SIDS prevention or other health benefits, FDA has never cleared or approved an ISP for preventing or reducing the risk for SIDS. Cleared ISPs should only be used by prescription for treatment of specific medical conditions.

After reports of infant suffocation related to ISP use in 2010, CPSC and the FDA launched a joint effort; on September 29, 2010, FDA and CPSC released statements concerning the danger associated with the use of ISPs (*5,8*). The agencies urged families to discontinue use of unapproved ISPs, through media messages indicating that "back-to-sleep" is best and ISPs are not necessary to keep infants on their backs (*5,8*). In addition, they advised health-care providers to continue counseling families on safe sleep practices in accordance with AAP's recommendations (*7*). FDA has contacted all manufacturers requesting that all sales be halted until companies submit safety and effectiveness data that not only support the medical claims of their devices but also demonstrate that benefits from use of the product outweigh the risks for suffocation (*3*).

An additional concern is the "hand-me-down" availability of ISPs. Many products for children, some of which might have been recalled, are passed along by family and friends or purchased from second-hand stores. Public health education and health-care provider counseling are important ways to reduce the inappropriate use of ISPs.

In 2005, AAP definitively recommended against side positioning (*9*). In 2011, AAP released a comprehensive policy statement on safe sleep environments for infants to reduce the risk for SIDS and suffocation (*7*). FDA and CPSC also have issued recommendations consistent with the current AAP statements concerning ISPs. First, parents and caregivers should stop using ISPs unless specifically prescribed by their pediatricians. Supine sleeping is safest; use of a device is not necessary in this position and is potentially hazardous. Second, they should never put pillows, comforters, or unprescribed ISPs in an infant's sleep environment. Finally, they should place infants to sleep on their backs.

The findings in this report are subject to at least five limitations. First, as with many case series, the total number of cases is unknown because the data are from voluntary reporting. Second, because the number of ISPs in use is not known, the risk for suffocation when an ISP is present cannot be directly compared with the risk when no ISP is present. Third, only information on deaths was collected; nonfatal cases are not reported. Fourth, variability was observed in the type and detail of information in each report because no standardized system is implemented consistently. For example, one report used the more recently available Sudden Unexplained Infant Death Investigation reporting form.[†] Finally, this series includes cases reported during 1997–2011; products, instructions, and even recommendations have changed over this 13-year period, which might have influenced use of these devices and reporting of cases.

[†] Additional information available at http://www.cdc.gov/sids/suidrf.htm#1.

The need for a safe sleep environment for infants (i.e., in a crib, on their backs [not their sides], without soft objects, loose bedding, or an ISP) is still an important public health message. The original Back-to-Sleep campaign (launched in 1994 by the National Institute of Child Health and Human Development, the U.S. Department of Health and Human Services Child Care Bureau and Maternal and Child Health Bureau, and AAP) did not preclude side sleeping; consequently, manufacturers developed ISPs to keep babies in specific positions. However, ISPs are not necessary to keep a baby supine, and other positions increase the risk for SIDS and/or suffocation. Although some ISPs contained cautionary statements like "discontinue use once baby begins to move around," these statements are unclear, and caregivers cannot accurately predict when an infant will achieve milestones. Clear, consistent, and frequent reinforcement of the safe sleep messages by public health practitioners and health-care providers is needed to prevent further infant suffocations.

Additional information is available online from FDA at http://www.fda.gov/forconsumers/consumerupdates/ucm227575.htm, from CPSC at http://www.cpsc.gov/cpscpub/prerel/prhtml10/10358.html, and from CDC at http://www.cdc.gov/sids.

Acknowledgments

Michelle Gillice, JD. John Topping, Div of Hazard Analysis, Directorate for Epidemiology, Jonathan Midgett, PhD, Div of Human Factors, Consumer Product Safety Commission.

References

1. CDC. 10 leading causes of injury deaths by age group highlighting unintentional injury deaths—United States, 2007. Atlanta, GA: US Department of Health and Human Services, CDC; 2007. Available at http://www.cdc.gov/injury/wisqars/pdf/unintentional_2007_bw-a.pdf. Accessed November 19, 2012.
2. Shapiro-Mendoza CK, Kimball M, Tomashek KM, Anderson RN, Blanding S. US infant mortality trends attributable to accidental suffocation and strangulation in bed from 1984 through 2004: are rates increasing? Pediatrics 2009;123:533–9.
3. Mallack CT, Milch KS, Horn DF. A deadly anti-SIDS device. Am J Forensic Med Pathol 2000;21:79–82.
4. Wanna-Nakamura S. Infant sleep positioning products and wedges, 2009. Washington, DC: Consumer Product Safety Commission; 2009. Available at http://www.cpsc.gov/library/foia/foia09/os/positioners09.pdf. Accessed November 19, 2012.
5. Food and Drug Administration. Infant sleep positioners pose suffocation risk. Washington, DC: US Department of Health and Human Services, Food and Drug Administration; 2010. Available at http://www.fda.gov/downloads/forconsumers/consumerupdates/ucm227719.html. Accessed November 19, 2012.
6. CDC. Pregnancy Risk Assessment Monitoring System (PRAMS): CPONDER. Available at http://apps.nccd.cdc.gov/cponder/default.aspx?page=displayallstates&state=0&year=9&category=23&variable=28. Accessed November 19, 2012.
7. American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome; Moon RY. SIDS and other sleep-related infant deaths: expansion of recommendations for a safe infant sleeping environment. Pediatrics 2011;128:1030–9.
8. Consumer Product Safety Commission. Deaths prompt CPSC, FDA warning on infant sleep positioners. Washington, DC: Consumer Product Safety Commission; 2010. Available at http://www.cpsc.gov/cpscpub/prerel/prhtml10/10358.html. Accessed November 15, 2012.
9. American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome. The changing concept of sudden infant death syndrome: diagnostic coding shifts, controversies regarding the sleeping environment, and new variables to consider in reducing risk. Pediatrics 2005;116:1245–55.

Chronic Obstructive Pulmonary Disease Among Adults — United States, 2011

Chronic obstructive pulmonary disease (COPD) is a group of progressive, debilitating respiratory conditions, including emphysema and chronic bronchitis, characterized by difficulty breathing, lung airflow limitations, cough, and other symptoms. COPD often is associated with a history of cigarette smoking and is the primary contributor to mortality caused by chronic lower respiratory diseases, which became the third leading cause of death in the United States in 2008 (*1*). Despite this substantial disease burden, state-level data on the prevalence of COPD and associated health-care resource use in the United States have not been available for all states. To assess the state-level prevalence of COPD among adults, the impact of COPD on their quality of life, and the use of health-care resources by those with COPD, CDC analyzed data from the 2011 Behavioral Risk Factor Surveillance System (BRFSS). Among BRFSS respondents in all 50 states, the District of Columbia (DC), and Puerto Rico, 6.3% reported having been told by a physician or other health professional that they had COPD. In addition to the screening question asked of all respondents, 21 states, DC, and Puerto Rico elected to include an optional COPD module. Among persons who reported having COPD and completed the optional module, 76.0% reported that they had been given a diagnostic breathing test, 64.2% felt that shortness of breath impaired their quality of life, and 55.6% were taking at least one daily medication for their COPD. Approximately 43.2% of them reported visiting a physician for COPD-related symptoms in the previous 12 months, and 17.7% had either visited an emergency department or been admitted to a hospital for their COPD in the previous 12 months. Continued surveillance for COPD, particularly at state and local levels, is critical to 1) identify communities that likely will benefit most from awareness and outreach campaigns and 2) evaluate the effectiveness of public health efforts related to the prevention, treatment, and control of the disease.

BRFSS is a state-based, random-digit–dialed telephone survey of the noninstitutionalized, U.S. civilian adult population aged ≥18 years, which is administered annually to households with landline and cellular telephones by state health departments in collaboration with CDC. Response rates for BRFSS are calculated using standards set by the American Association of Public Health Opinion Research response rate formula no. 4.* The response rate is the number of persons who completed the survey as a proportion of all eligible and likely eligible persons. The median survey response rate for all states and DC was 49.7% and ranged from 33.8% to 64.1%. Cooperation rates† ranged from 52.7% to 84.3% (median: 74.2%).

All respondents were asked, "Have you ever been told by a doctor or health professional that you have COPD, emphysema, or chronic bronchitis?" Surveys administered in 21 states,§ DC, and Puerto Rico included additional questions for those who responded "yes." These persons were asked the following questions: "Have you ever been given a breathing test to diagnose your COPD, chronic bronchitis, or emphysema?" "Other than a routine visit, have you had to see a doctor in the past 12 months for symptoms related to shortness of breath, bronchitis, or other COPD, or emphysema flare?" "Did you have to visit an emergency room or be admitted to a hospital in the past 12 months because of your COPD, chronic bronchitis, or emphysema?" "How many different medications do you currently take each day to help with your COPD, chronic bronchitis, or emphysema?" and "Would you say that shortness of breath affects the quality of your life?" Age was standardized to the 2000 U.S. population, and prevalence estimates and 95% confidence intervals (CI) were calculated by state and by selected characteristics. Data were weighted using the new raking method (*2*). For comparisons of prevalence between subgroups, statistical significance ($p<0.05$) was determined using t-tests.

Overall, 6.3% of U.S. adults (an estimated 15 million) have been told by a health-care provider that they have COPD (age-adjusted prevalence: 6.0%) (Table 1). Prevalence of COPD increased, from 3.2% among those aged 18–44 years to >11.6% among those aged ≥65 years.

In age-adjusted comparisons, Hispanics were less likely to report COPD than non-Hispanic whites and blacks (4.0% compared with 6.3% and 6.1%, respectively). Women were more likely to report COPD than men (6.7% compared with 5.2%). Respondents who did not have a high school diploma reported a higher prevalence of COPD (9.5%) than those with a high school diploma (6.8%) or some college (4.6%). Respondents who were divorced, widowed, or separated were more likely to report COPD (9.4%) than married respondents (4.6%). Employment status also was related to a reported COPD diagnosis. COPD prevalence was higher among those who were unable to work (20.9%), unemployed (7.8%), or retired (7.6%) than among those who were homemakers or students (4.9%) or who were employed (3.8%). Reported COPD

* Additional information available at http://www.aapor.org/standard_definitions2.htm.

† The percentage of persons who completed interviews among all eligible persons who were contacted.

§ Arizona, California, Connecticut, Illinois, Iowa, Kansas, Kentucky, Maine, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, North Carolina, Ohio, Oregon, Tennessee, Utah, and West Virginia.

TABLE 1. Percentage of adults reporting having ever been told by a physician that they had chronic obstructive pulmonary disease (COPD),* by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2011†

Characteristic	Total no. of respondents§	No. with COPD	%	(95% CI)
Total (crude)	**498,225**	**39,038**	**6.3**	**(6.2–6.4)**
Total (age-adjusted)			**6.0**	**(5.9–6.1)**
Age group (not adjusted) (yrs)				
18–44	135,728	4,066	3.2	(3.0–3.4)
45–54	90,999	5,988	6.6	(6.3–6.9)
55–64	111,323	10,291	9.2	(8.9–9.5)
65–74	86,647	10,195	12.1	(11.7–12.6)
≥75	73,528	8,498	11.6	(11.1–12.0)
Race/Ethnicity				
White, non-Hispanic	386,984	31,406	6.3	(6.2–6.5)
Black, non-Hispanic	40,063	2,988	6.1	(5.7–6.6)
Hispanic	37,849	1,767	4.0	(3.6–4.3)
Other, non-Hispanic¶	27,969	2,394	5.8	(5.3–6.3)
Sex				
Men	195,831	13,249	5.2	(5.1–5.4)
Women	302,394	25,789	6.7	(6.5–6.9)
Employment status				
Employed	243,147	8,799	3.8	(3.6–4.0)
Unemployed	30,442	2,535	7.8	(7.2–8.4)
Homemaker/Student	45,980	2,320	4.9	(4.5–5.3)
Retired	140,295	15,643	7.6	(5.8–9.8)
Unable to work	36,005	9,583	20.9	(19.9–21.9)
Education level				
Less than high school diploma or GED	45,805	6,581	9.5	(9.0–10.0)
High school diploma or GED	147,260	14,350	6.8	(6.6–7.1)
At least some college	303,506	17,997	4.6	(4.5–4.7)
Annual household income				
<$25,000	132,876	18,265	9.9	(9.6–10.2)
$25,000–$49,999	114,830	8,698	5.7	(5.5–6.0)
$50,000–$74,999	66,889	3,193	4.2	(3.9–4.5)
≥$75,000	113,178	3,131	2.8	(2.6–3.0)
Unknown	70,452	5,751	6.1	(5.8–6.4)
Marital status				
Married	264,115	15,325	4.6	(4.5–4.8)
Divorced/Widowed/Separated	150,224	19,013	9.4	(9.0–9.8)
Never married	69,300	3,835	6.1	(5.7–6.5)
Member of unmarried couple	12,548	729	6.4	(5.5–7.5)
Smoking status				
Current	83,352	13,310	13.3	(12.9–13.7)
Former	145,924	16,369	6.8	(6.5–7.1)
Never	266,538	9,220	2.8	(2.7–3.0)
Ever had asthma				
Yes	64,319	16,534	20.3	(19.7–20.9)
No	433,906	22,504	3.8	(3.7–4.0)

prevalence decreased with increasing household income, from 9.9% among those reporting a household income <$25,000 annually to 2.8% among those reporting ≥$75,000. More current smokers reported having COPD (13.3%) than former smokers (6.8%) or never smokers (2.8%). Respondents with a history of asthma also were significantly more likely to have been diagnosed with COPD (20.3%) than those without asthma (3.8%).

TABLE 1. (*Continued*) Percentage of adults reporting having ever been told by a physician that they had chronic obstructive pulmonary disease (COPD),* by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2011†

Characteristic	Total no. of respondents§	No. with COPD	%	(95% CI)
State/Area				
Alabama	7,628	911	9.1	(8.2–10.0)
Alaska	3,508	215	5.9	(4.8–7.2)
Arizona	6,243	565	5.1	(4.4–5.9)
Arkansas	4,686	519	7.2	(6.3–8.2)
California	16,914	1,097	4.4	(4.1–4.9)
Colorado	13,440	884	4.6	(4.1–5.1)
Connecticut	6,724	434	5.7	(4.8–6.6)
Delaware	4,718	347	4.8	(4.1–5.6)
District of Columbia	4,476	244	4.6	(3.9–5.5)
Florida	12,241	1333	7.1	(6.5–7.9)
Georgia	9,859	859	6.9	(6.3–7.6)
Hawaii	7,547	396	4.2	(3.5–4.9)
Idaho	6,001	428	5.0	(4.4–5.8)
Illinois	5,452	414	5.9	(5.1–6.8)
Indiana	8,404	853	7.9	(7.2–8.6)
Iowa	7,272	443	4.6	(4.1–5.3)
Kansas	20,588	1,650	6.2	(5.8–6.7)
Kentucky	10,767	1,364	9.3	(8.5–10.2)
Louisiana	10,856	940	6.5	(5.9–7.3)
Maine	13,135	1,211	6.9	(6.3–7.4)
Maryland	9,951	675	5.8	(5.1–6.6)
Massachusetts	21,910	1,698	5.4	(5.0–5.9)
Michigan	10,943	1,042	7.4	(6.7–8.1)
Minnesota	15,234	724	3.9	(3.5–4.4)
Mississippi	8,856	854	7.9	(7.2–8.7)
Missouri	6,355	675	7.6	(6.8–8.4)
Montana	10,202	716	5.4	(4.8–6.1)
Nebraska	25,287	1,633	4.6	(4.3–5.0)
Nevada	5,397	473	6.9	(5.9–8.1)
New Hampshire	6,277	487	5.9	(5.2–6.7)
New Jersey	15,122	991	4.8	(4.4–5.3)
New Mexico	9,336	730	5.8	(5.2–6.4)
New York	7,603	503	5.6	(4.9–6.3)
North Carolina	11,406	1,023	6.5	(5.9–7.2)
North Dakota	5,246	293	4.4	(3.7–5.1)
Ohio	9,803	922	7.1	(6.4–7.8)
Oklahoma	8,506	934	8.0	(7.3–8.8)
Oregon	6,188	454	5.4	(4.8–6.2)
Pennsylvania	11,376	935	6.1	(5.5–6.7)
Rhode Island	6,426	492	5.9	(5.2–6.6)
South Carolina	12,845	1,208	7.1	(6.5–7.7)
South Dakota	8,209	553	4.9	(4.1–5.8)
Tennessee	5,859	653	8.7	(7.3–10.4)
Texas	14,834	1,215	5.5	(5.0–6.1)
Utah	12,540	595	4.2	(3.8–4.7)
Vermont	7,030	455	4.4	(3.9–5.0)
Virginia	6,518	502	5.8	(5.1–6.6)
Washington	14,630	842	3.9	(3.5–4.4)
West Virginia	5,246	529	8.0	(7.2–9.0)
Wisconsin	5,252	349	5.0	(4.1–6.1)
Wyoming	6,811	533	5.6	(5.0–6.4)
Puerto Rico	6,568	243	3.1	(2.7–3.6)
Median (range)			**5.8**	**(3.1–9.3)**

Abbreviations: CI = confidence interval; GED = General Education Development certificate.

* Includes emphysema and chronic bronchitis.

† Age-adjusted to the 2000 U.S. standard population aged ≥18 years.

§ Unweighted sample. Categories might not sum to survey total because of missing responses.

¶ Includes Asian, Native Hawaiian or other Pacific Islander, American Indian/Alaska Native, and multiracial.

What is already known on this topic?

Chronic obstructive pulmonary disease (COPD) is the primary contributor to mortality caused by chronic lower respiratory diseases, the third leading cause of death in the United States.

What is added by this report?

This report is the first analysis of COPD prevalence in all 50 states (plus the District of Columbia and Puerto Rico). The prevalence of COPD was 6.3% overall, but varied by state, age, race/ethnicity, and sex.

What are the implications for public health practice?

COPD is a leading cause of morbidity and mortality in the United States, and many U.S. residents are unaware they have it. States should heighten surveillance and target educational campaigns and other interventions in areas with a higher prevalence of COPD.

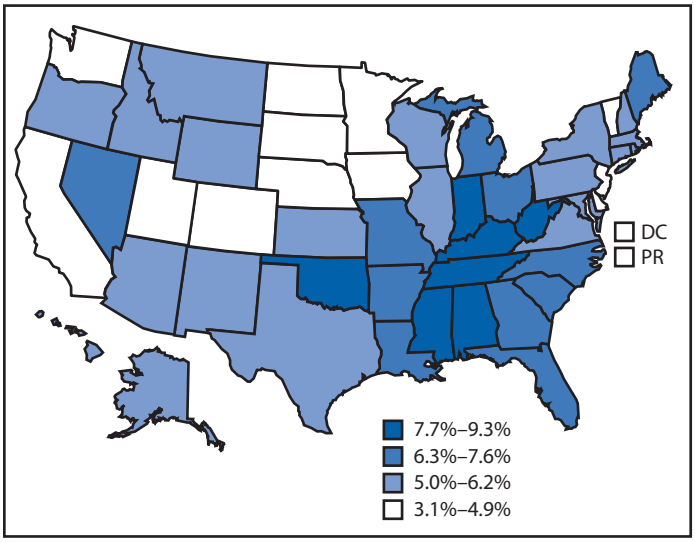
The prevalence of COPD varied considerably by state, from <4% in Puerto Rico, Washington, and Minnesota to >9% in Alabama and Kentucky. The median prevalence by state was 5.8% (range: 3.1%–9.3%). The states in the highest quartile for COPD prevalence clustered along the Ohio and lower Mississippi rivers (Figure). Among the 39,038 respondents with COPD in all states, 36.4% were former smokers, 38.7% were current smokers, and 43.7% had a history of asthma.

Among those 13,306 adults who reported having COPD and who answered the COPD module in 21 states, 76.0% (age-adjusted prevalence: 71.4%) reported having been diagnosed with COPD using a breathing test such as spirometry (Table 2). Among respondents with COPD, having a diagnosis with a breathing test increased with age. The age-adjusted percentage of COPD respondents reporting a breathing test was higher among non-Hispanic whites (71.7%) and non-Hispanic blacks (80.2%) than among Hispanics (58.5%), among those unable to work (82.2%) than among employed adults (67.2%), and among those with a history of asthma (81.4%) than among those without asthma (61.9%). Prevalence of having a breathing test did not differ between COPD respondents by sex, education level, household income, marital status, or smoking status. The age-adjusted percentage of COPD respondents reporting having had a breathing test ranged from 57.3% in Puerto Rico to 81.2% in Nevada, with a median percentage of 73.6%.

Among COPD module respondents, after age adjustment, an estimated 50.8% reported using at least one daily medication to manage their COPD-related symptoms, 41.5% reported seeing a physician for COPD symptoms in the past 12 months, and 18.6% reported a hospital or emergency department visit for their COPD in the previous 12 months (Table 2). Medication use for COPD increased among successive age groups, but no age-related patterns were observed in terms of physician or hospital visits for COPD symptoms. Among COPD module respondents, women were more likely to take daily COPD medications and to have had a physician visit related to COPD than men. Among COPD respondents, the age-adjusted percentages of those taking medication, having physician visits, and having hospital visits related to COPD were higher among those unable to work than for employed adults, were higher among persons also reporting an asthma history than among those without asthma, and declined among successively higher income groups. Taking COPD medications also declined with increasing education level, but visits to a physician or hospital for COPD did not differ by education level. Prevalence of medication use, physician visits, and hospital visits did not differ by race/ethnicity, marital status, or smoking status. The age-adjusted percentage of COPD respondents taking at least one daily COPD medication ranged from 41.4% in Oregon to 64.7% in DC. The percentage having seen a physician in the past 12 months for COPD ranged from 32.4% in Kansas to 50.9% in Utah. The percentage having visited a hospital or emergency department in the preceding 12 months for COPD ranged from 11.7% in Tennessee to 27.1% in Puerto Rico.

A majority (64.2%) of respondents to the COPD module felt that shortness of breath negatively impacted their quality of life (Table 2). No age-related trend was observed, but the age-adjusted percentages of COPD module respondents who reported a negative impact declined with increasing

FIGURE. Age-adjusted* prevalence of chronic obstructive pulmonary disease (COPD)† among adults — Behavioral Risk Factor Surveillance System, United States,§ 2011



* Age-adjusted to the 2000 U.S. standard population, using five age groups: 18–44 years, 45–54 years, 55–64 years, 65–74 years, and ≥75 years.

† Based on an affirmative response to the question, "Has a doctor, nurse, or other health professional ever told you that you have COPD, emphysema, or chronic bronchitis?"

§ Includes the 50 states, District of Columbia, and Puerto Rico.

TABLE 2. Percentage of selected chronic obstructive pulmonary disease (COPD)–related health-care behaviors among adults reporting COPD,* by selected characteristics — Behavioral Risk Factor Surveillance System, 21 states, District of Columbia, and Puerto Rico, 2011†

Characteristic	Total no. with COPD	Had breathing test to diagnose COPD (n = 13,306)		Use at least one daily COPD medication (n = 13,275)		Seen by physician about COPD symptoms in preceding 12 mos (n = 13,284)		Visited hospital/ED for COPD in preceding 12 mos (n = 13,279)		COPD symptoms affect quality of life (n = 13,290)§	
	No.¶	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Total (crude)	**13,306**	**76.0**	**(74.4–77.6)**	**55.6**	**(53.7–57.5)**	**43.2**	**(41.4–45.1)**	**17.7**	**(16.3–19.2)**	**64.2**	**(62.4–66.0)**
Total (age-adjusted)		**71.4**	**(68.6–74.0)**	**50.8**	**(47.9–53.8)**	**41.5**	**(38.7–44.3)**	**18.6**	**(16.5–20.9)**	**62.5**	**(59.6–65.3)**
Age group (not adjusted) (yrs)											
18–44	**1,176**	64.8	(59.8–69.6)	44.2	(39.0–49.5)	38.1	(33.3–43.2)	18.7	(15.1–22.8)	59.4	(54.2–64.4)
45–54	**1,981**	74.4	(70.8–77.8)	53.7	(49.2–58.2)	48.1	(43.6–52.5)	24.1	(20.2–28.6)	67.3	(62.8–71.5)
55–64	**3,582**	79.6	(77.1–81.9)	58.8	(55.6–61.8)	44.7	(41.6–47.9)	14.3	(12.5–16.3)	70.5	(67.5–73.3)
65–74	**3,636**	82.7	(80.0–85.0)	61.8	(58.9–64.7)	44.4	(41.5–47.4)	16.1	(13.9–18.6)	62.5	(59.6–65.4)
≥75	**2,931**	82.7	(80.2–85.0)	64.4	(61.4–67.4)	40.9	(37.8–44.1)	14.3	(12.3–16.5)	60.4	(57.1–63.5)
Race/Ethnicity											
White, non-Hispanic	**11,021**	71.6	(68.4–74.7)	50.1	(46.6–53.5)	41.1	(37.9–44.5)	17.8	(15.3–20.6)	62.1	(58.7–65.4)
Black, non-Hispanic	**865**	80.2	(71.7–86.6)	56.8	(47.5–65.7)	41.3	(32.9–50.2)	24.9	(17.8–33.8)	72.8	(65.1–79.3)
Hispanic	**581**	58.5	(50.3–66.3)	49.5	(41.3–57.8)	48.2	(40.4–56.0)	21.2	(15.9–27.7)	58.5	(50.3–66.2)
Other, non-Hispanic**	**730**	74.9	(64.3–83.2)	54.9	(43.2–66.1)	44.3	(33.1–56.2)	15.9	(10.9–22.6)	55.9	(44.1–67.0)
Sex											
Men	**4,398**	72.4	(67.7–76.7)	45.1	(40.4–49.8)	34.5	(30.3–38.9)	17.2	(13.8–21.2)	62.9	(58.0–67.5)
Women	**8,908**	70.6	(67.1–73.8)	55.2	(51.6–58.8)	46.8	(43.3–50.4)	19.7	(17.1–22.4)	62.3	(58.8–65.8)
Employment status											
Employed	**2,926**	67.2	(62.8–71.4)	40.9	(36.6–45.4)	34.8	(30.9–38.8)	12.1	(9.8–14.8)	52.4	(47.7–57.1)
Unemployed	**823**	67.9	(60.6–74.5)	46.2	(38.6–54.0)	44.1	(36.5–51.9)	21.2	(14.8–29.4)	64.8	(57.9–71.2)
Homemaker/Student	**780**	69.2	(61.2–76.2)	51.5	(43.2–59.8)	36.9	(29.6–45.0)	18.1	(12.6–25.3)	54.7	(46.2–62.9)
Retired	**5,569**	75.5	(51.1–90.1)	67.9	(45.4–84.3)	59.9	(37.6–78.8)	—††	—	74.4	(50.8–89.1)
Unable to work	**3,161**	82.2	(78.2–85.6)	68.0	(62.2–73.4)	54.1	(48.0–60.1)	29.1	(24.2–34.6)	83.1	(79.3–86.3)
Education level											
Less than high school diploma or GED	**2,167**	73.7	(67.1–79.5)	57.6	(50.5–64.3)	44.0	(37.5–50.8)	24.2	(19.3–29.8)	73.9	(66.7–80.0)
High school diploma or GED	**4,850**	72.9	(68.4–77.0)	54.3	(49.3–59.3)	40.6	(36.1–45.3)	17.4	(14.0–21.5)	66.2	(61.6–70.5)
At least some college	**6,262**	68.7	(64.4–72.6)	44.1	(40.3–48.1)	40.8	(36.9–44.9)	16.2	(13.4–19.4)	53.2	(49.0–57.4)
Annual household income											
<$25,000	**6,114**	72.5	(68.3–76.3)	59.1	(54.9–63.2)	46.9	(42.8–51.1)	25.5	(21.9–29.4)	73.0	(68.8–76.7)
$25,000–$49,999	**3,014**	71.1	(64.7–76.7)	48.7	(41.8–55.6)	39.1	(32.8–45.8)	14.4	(10.3–19.9)	58.4	(51.7–64.9)
$50,000–$74,999	**1,106**	68.8	(60.0–76.4)	41.3	(33.3–49.9)	32.3	(25.6–39.8)	7.3	(5.3–10.1)	41.4	(33.4–49.9)
≥$75,000	**1,097**	70.7	(61.8–78.3)	37.8	(31.0–45.1)	31.8	(25.7–38.7)	6.5	(4.0–10.2)	43.6	(35.7–51.8)
Unknown	**1,975**	70.7	(63.2–77.1)	47.7	(39.6–55.8)	44.0	(36.2–52.1)	20.4	(15.1–27.1)	66.8	(59.4–73.4)
Marital status											
Married	**5,223**	71.3	(67.5–74.9)	47.5	(43.4–51.5)	42.1	(38.2–46.1)	16.3	(13.4–19.7)	58.8	(54.7–62.9)
Divorced/Widowed/Separated	**6,557**	72.5	(66.7–77.7)	59.9	(54.1–65.4)	45.3	(39.8–51.0)	23.2	(18.8–28.2)	70.1	(64.2–75.3)
Never married	**1,244**	69.7	(64.0–74.9)	48.1	(42.1–54.2)	40.2	(34.4–46.3)	18.9	(14.5–24.2)	62.8	(56.8–68.4)
Member of unmarried couple	**237**	75.1	(62.4–84.6)	44.7	(33.4–56.5)	33.5	(24.2–44.4)	14.5	(8.9–22.8)	57.2	(44.7–68.9)
Smoking status											
Current	**4,452**	71.9	(68.1–75.5)	50.5	(46.3–54.6)	39.3	(35.3–43.4)	18.2	(15.0–21.8)	65.4	(61.4–69.2)
Former	**5,719**	76.4	(69.9–81.8)	55.2	(47.5–62.6)	43.3	(36.2–50.8)	19.9	(15.2–25.6)	68.8	(62.4–74.5)
Never	**3,092**	65.1	(59.8–70.0)	46.3	(41.2–51.4)	42.9	(38.4–47.5)	17.2	(14.1–20.9)	53.6	(48.6–58.6)
Ever had asthma											
Yes	**5,790**	81.4	(77.7–84.6)	67.1	(63.0–71.0)	50.7	(46.7–54.7)	24.0	(20.6–27.6)	71.4	(67.5–75.1)
No	**7,515**	61.8	(57.5–65.9)	35.8	(31.8–40.1)	33.0	(29.2–37.0)	13.5	(11.2–16.2)	53.9	(49.6–58.2)

See table footnotes on page 942.

levels of education and income. The percentage was higher among persons who reported being unable to work than among employed persons, was higher among adults who were divorced, widowed, or separated compared with married adults, was higher among those with a history of asthma than among those without asthma, and was higher among current smokers and former smokers than among those who had never smoked. The age-adjusted percentage of COPD respondents who reported a negative impact of shortness of breath on their quality of life did not differ between groups defined by race/ethnicity or sex. The percentage reporting a negative impact of shortness of breath on quality of life ranged from 48.4% in Connecticut to 76.4% in Ohio.

TABLE 2. (*Continued*) Percentage of selected chronic obstructive pulmonary disease (COPD)–related health-care behaviors among adults reporting COPD,* by selected characteristics — Behavioral Risk Factor Surveillance System, 21 states, District of Columbia, and Puerto Rico, 2011†

Characteristic	Total no. with COPD	Had breathing test to diagnose COPD (n = 13,306)		Use at least one daily COPD medication (n = 13,275)		Seen by physician about COPD symptoms in preceding 12 mos (n = 13,284)		Visited hospital/ED for COPD in preceding 12 mos (n = 13,279)		COPD symptoms affect quality of life (n = 13,290)§	
	No.¶	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
State/Area											
Arizona	**516**	66.0	(50.0–79.0)	41.6	(30.1–54.0)	42.8	(31.2–55.2)	17.1	(10.3–26.8)	66.0	(51.7–77.8)
California§§	**706**	65.5	(56.6–73.4)	49.3	(40.7–58.0)	38.7	(30.8–47.3)	16.1	(10.8–23.2)	56.2	(47.4–64.6)
Connecticut	**408**	79.7	(68.8–87.5)	58.2	(46.4–69.2)	40.1	(29.1–52.1)	21.4	(12.5–34.3)	48.4	(37.2–59.9)
District of Columbia§§	**193**	78.5	(54.4–91.8)	64.7	(44.6–80.6)	33.1	(21.4–47.4)	—††	—	65.5	(44.2–82.0)
Illinois	**386**	70.6	(59.6–79.7)	48.7	(38.1–59.5)	41.2	(31.8–51.4)	18.4	(11.1–29.1)	59.3	(48.2–69.5)
Iowa§§	**356**	79.3	(68.7–87.0)	60.4	(46.6–72.8)	46.8	(33.2–60.9)	—††	—	57.7	(43.6–70.8)
Kansas§§	**670**	70.3	(58.2–80.1)	46.9	(35.9–58.1)	32.4	(24.8–40.9)	13.1	(8.3–20.1)	68.7	(56.8–78.5)
Kentucky§§	**1,266**	74.7	(66.7–81.3)	54.5	(46.3–62.4)	46.9	(38.8–55.1)	24.6	(17.8–33.1)	71.8	(62.9–79.3)
Maine§§	**347**	79.2	(64.7–88.8)	61.2	(47.8–73.0)	49.9	(37.6–62.3)	18.4	(11.6–27.9)	68.5	(54.9–79.6)
Massachusetts§§	**1,402**	73.6	(65.9–80.1)	57.6	(49.8–65.1)	41.1	(33.7–49.0)	12.9	(10.0–16.5)	57.5	(49.6–65.1)
Michigan	**995**	60.1	(52.6–67.1)	44.5	(37.4–51.7)	39.2	(32.5–46.3)	19.2	(13.7–26.1)	54.8	(47.3–62.0)
Minnesota	**639**	65.9	(57.3–73.6)	44.3	(37.4–51.5)	38.1	(30.0–47.0)	20.1	(13.7–28.3)	49.7	(42.4–57.1)
Montana	**660**	65.1	(55.0–74.0)	46.7	(37.5–56.3)	41.2	(31.8–51.2)	15.4	(8.5–26.4)	59.9	(50.0–69.1)
Nebraska§§	**1,008**	61.8	(51.2–71.3)	45.8	(35.9–56.1)	46.1	(36.2–56.3)	16.6	(9.5–27.5)	49.9	(40.3–59.5)
Nevada§§	**358**	81.2	(70.0–88.8)	42.9	(28.8–58.2)	41.0	(27.7–55.9)	—††	—	67.5	(54.3–78.3)
New Jersey§§	**293**	74.9	(64.1–83.3)	54.8	(43.0–66.1)	48.9	(37.7–60.2)	20.9	(12.8–32.4)	50.5	(39.1–61.9)
North Carolina	**928**	78.4	(71.7–83.9)	53.9	(45.9–61.8)	48.7	(40.9–56.6)	17.6	(12.5–24.2)	68.2	(60.4–75.1)
Ohio§§	**483**	81.0	(72.0–87.6)	51.5	(40.4–62.4)	40.9	(30.5–52.3)	22.8	(15.6–32.2)	76.4	(69.2–82.3)
Oregon§§	**334**	69.2	(54.2–81.1)	41.4	(28.6–55.5)	43.1	(29.2–58.1)	—††	—	71.0	(58.9–80.7)
Tennessee	**563**	68.3	(52.4–80.8)	60.4	(45.5–73.6)	32.5	(23.0–43.6)	11.7	(7.3–18.3)	67.7	(52.4–79.9)
Utah§§	**97**	78.1	(58.2–90.1)	46.3	(28.7–64.7)	50.9	(32.4–69.1)	—††	—	70.3	(51.1–84.3)
West Virginia	**519**	75.6	(68.4–81.6)	55.1	(46.9–63.1)	44.3	(36.4–52.5)	25.7	(18.6–34.5)	70.7	(62.8–77.5)
Puerto Rico§§	**179**	57.3	(44.6–69.2)	47.8	(36.2–59.6)	43.0	(32.2–54.5)	27.1	(18.1–38.5)	76.0	(62.3–85.9)

Abbreviations: CI = confidence interval; GED = General Education Development certificate; ED = emergency department.

* Includes emphysema and chronic bronchitis.

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

§ Sample sizes for the module questions differ because of missing responses.

¶ Unweighted number of respondents with COPD who also were administered and responded to the module. (Numbers are for respondents to breathing test question.) Categories might not sum to survey total because of missing responses. State sample sizes are smaller than the number of COPD respondents in Table 1 because 1) some states administered module on landline telephone surveys only, 2) some states used split samples for optional modules, and 3) not all respondents who reported having COPD went on to answer the module questions.

** Includes Asian, Native Hawaiian or other Pacific Islander, American Indian/Alaska Native, and multiracial.

†† Relative standard error ≥0.3.

§§ COPD module administered to landline telephone respondents only.

Reported by

Nicole M. Kosacz, MPH, Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee. Antonello Punturieri, MD, Thomas L. Croxton, MD, Monique N. Ndenecho, MPH, James P. Kiley, PhD, Gail G. Weinmann, MD, Div of Lung Diseases, National Heart, Lung, and Blood Institute, National Institutes of Health. Anne G. Wheaton, PhD, Earl S. Ford, MD, Letitia R. Presley-Cantrell, PhD, Janet B. Croft, PhD, Wayne H. Giles, MD, Div of Population Health, National Center for Chronic Disease Prevention and Health Promotion, CDC. ***Corresponding contributor:*** *Nicole M. Kosacz, nkosacz@cdc.gov, 770-488-5454.*

Editorial Note

This is the first report of state-specific prevalence of COPD among adults in all 50 states, DC, and Puerto Rico and the first year in the history of BRFSS that a COPD module was included in the questionnaire. Additionally, this report provides state-level data regarding use of COPD-related health-care resources and COPD's impact on quality of life for selected states and territories. Nationally, 6.3% of adults reported physician-diagnosed COPD. This national average is consistent with results of previous research (*3*,*4*). State prevalences varied considerably, ranging from as low as 3.1% in Puerto Rico to as high as 9.3% in Kentucky. The southern states accounted for the highest prevalences of self-reported physician-diagnosed COPD, similar to geographic patterns

previously reported for COPD hospitalizations (*5*) but not for mortality rates (*6*). Additional research is needed to determine the underlying causes of geographic clusterings, which might be related to geographic variations in other factors, including diagnostic practices, cigarette smoking, access to health care, and occupational and environmental exposures.

The patterns observed with respect to sex, age, race/ethnicity, income, and education are similar to those noted for COPD prevalence, hospitalizations, office visits, and mortality in other reports (*4,6*). Consistent with the literature, histories of smoking and of asthma were strongly and significantly correlated with COPD. Smoking cessation is important in prevention and also is critical in the management of COPD, given that smoking cessation might slow the decline in lung function associated with COPD (*7*). Finally, protection for all persons from exposure to secondhand smoke reduces respiratory symptoms of COPD and asthma (*8*).

This analysis also examined the prevalence of self-reported diagnosis by spirometry (the current standard for diagnosis) on a state-by-state basis. Although spirometry can be performed in a trained physician's office, approximately 20% of those who reported having COPD were not diagnosed with a breathing test. Diagnosis is an important first step, particularly because approximately 63% of U.S. adults with spirometry measurements of poor lung function indicative of COPD have never been diagnosed with COPD (*9*). In addition, spirometry also can help to stage the severity of disease and help to inform decisions about types of treatment that are appropriate. COPD makes it difficult for persons to work and results in lost wages and work days (*10*). Symptoms can be severe, and the majority of respondents with COPD asserted that their condition negatively impacts their quality of life. Although no cure for COPD currently exists, COPD is manageable through the use of medication and other interventions (*10*), which can improve quality of life and decrease lost work time. Of those surveyed, nearly 51% reported using daily medication to manage their COPD symptoms. Further research will have to determine what barriers to diagnosis and treatment exist (e.g., cost of and/or access to health-care resources). Access to health care and insurance coverage are possible issues, given that wide geographic variation was observed in the reporting of spirometry and medication use in this study.

The findings in this report are subject to at least four limitations. First, BRFSS does not include persons from institutionalized settings, including those who are living in nursing or assisted-care facilities. Because COPD is associated with older age, this might result in underestimation of COPD prevalence. Second, COPD diagnosis was based on self-report as opposed to diagnosis using spirometry or review of medical records, possibly leading to underestimation or overestimation of prevalence. Similarly, self-reports of medical tests (e.g., spirometry) and medications also might be underreported or misclassified. Third, cooperation rates ranged from 52.7% to 84.3% (median: 74.2%). Finally, although all states conducted BRFSS surveys for households with cellular telephones only (in addition to the landline samples), not all states administered the optional COPD module as part of their cellular-only sample. However, a comparison of data from landline-only samples with the combined data for the nine states that did administer the module to users of cellular telephones revealed no significant differences in estimates.

The overall prevalence of COPD and its associations with health-care utilization and quality of life make it a serious public health burden that needs to be addressed, especially in areas where the prevalence remains well above the national average. This analysis provides an important starting point for states to quantify the burden of COPD locally and target their resources, as well as to evaluate the effectiveness of education and awareness programs such as the National Heart, Lung, and Blood Institute's "Learn More, Breathe Better" campaign¶ in those states.

¶ Additional information available at http://www.nhlbi.nih.gov/health/public/lung/copd/lmbb-campaign.

References

1. Kochanek KD, Xu J, Murphy SL, Miniño AM, Kung H. Deaths: final data for 2009. Natl Vital Stat Rep 2011;60(3).
2. CDC. Methodologic changes in the Behavioral Risk Factor Surveillance System in 2011 and potential effects on prevalence estimates. MMWR 2012;61:410–3.
3. Akinbami LJ, Liu X. Chronic obstructive pulmonary disease among adults aged 18 and over in the United States, 1998–2009. National Center for Health Statistics data brief no. 63. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2011.
4. CDC. Chronic obstructive pulmonary disease surveillance—United States, 1971–2000. MMWR 2002;51(No. SS-6).
5. Holt JB, Zhang X, Presley-Cantrell L, Croft J. Geographic disparities in chronic obstructive pulmonary disease (COPD) hospitalization among Medicare beneficiaries in the United States. Int J Chron Obstruct Pulmon Dis 2011;6:321–8.
6. CDC. Deaths from chronic obstructive pulmonary disease—United States, 2000–2005. MMWR 2008;57:1229–32.
7. Lee PN, Fry JS. Systematic review of the evidence relating FEV1 decline to giving up smoking. BMC Med 2010;8:84.
8. Eisner MD, Balmes J, Yelin EH, et al. Directly measured secondhand smoke exposure and COPD health outcomes. BMC Pulm Med 2006;6:12.
9. Mannino DM, Gagnon RC, Petty TL, Lydick E. Obstructive lung disease and low lung function in adults in the United States: data from the national health and nutrition examination survey, 1988–1994. Arch Intern Med 2000;160:1683–9.
10. Rennard S, Decramer M, Calverley PMA, et al. Impact of COPD in North America and Europe in 2000: subjects' perspective of Confronting COPD International Survey. Eur Respir J 2002;20:799–805.

Multistate Outbreak of *Salmonella* Serotype Bovismorbificans Infections Associated with Hummus and Tahini — United States, 2011

On September 27, 2011, three clinical isolates of *Salmonella enterica* serotype Bovismorbificans with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns were identified by the District of Columbia Public Health Laboratory (PHL). Human infection with *S.* Bovismorbificans is rare in the United States. Through query of PulseNet, the national molecular subtyping network for foodborne disease surveillance, six additional cases with indistinguishable PFGE patterns were identified in three states (Maryland, Michigan, and Virginia) during the prior 60 days. All nine patients had eaten at restaurants in the District of Columbia (DC) or northern Virginia <2 weeks before illness onset. This report summarizes the investigation led by the DC Department of Health (DOH), in which 23 cases of *S.* Bovismorbificans infections were identified among persons from seven states and DC, with illness onset during August 19–November 21, 2011. On May 30, 2012, traceback indicated that contaminated tahini (sesame seed paste) used in hummus prepared at a Mediterranean-style restaurant in DC was a plausible source of *Salmonella* infections. DOH restricted the sale of hummus and prohibited the use of hummus ingredients in other food items at implicated restaurants to prevent further illness. This investigation also illustrates challenges associated with ingredient-driven outbreaks and the value of PulseNet for identifying clusters of cases that are geographically dispersed.

Epidemiologic Investigation

PulseNet* was used throughout the investigation to monitor the outbreak PFGE pattern, a pattern new to PulseNet. Cases were defined as laboratory-confirmed *S.* Bovismorbificans infection with the PFGE pattern of the outbreak strain in a person anywhere in the United States with illness onset during August 2011–January 23, 2012.

State and local health departments, CDC, and the Food and Drug Administration (FDA) collaboratively investigated the outbreak. A total of 23 culture-confirmed cases with PFGE patterns indistinguishable from the outbreak strain were identified. Illness onsets occurred during August 19–November 21, 2011, and peaked during September 8–October 12 (Figure 1). The majority of cases were identified in the mid-Atlantic region of the United States: DC (eight), Maryland (seven), and Virginia (three). One case per state was identified in California, Delaware, Michigan, New Hampshire, and New Jersey (Figure 2). State health department staff members conducted open-ended interviews and obtained information about 22 patients. These interviews indicated that most of the patients had eaten at restaurants in the DC metropolitan area. A structured questionnaire was used to reinterview eight of the patients in three states and DC to assess exposures to approximately 500 types of restaurants, foods, and animals during the week before illness onset. Mediterranean-style food and restaurants commonly were mentioned. Three patients were reinterviewed with a targeted questionnaire that focused on Mediterranean-style restaurant and food exposures. Interview methodologies varied during the course of the investigation and among health departments (e.g., exposure data are missing for some patients who were not asked or did not report exposure to specific foods).

Among the 22 patients with exposure information, 20 (91%) reported eating at a restaurant in the DC metropolitan area (Table). Among 15 patients asked about Mediterranean-style restaurant exposure, 14 (93%) indicated that they had eaten at a Mediterranean-style restaurant in the DC metropolitan area, including six restaurants in DC and two in northern Virginia. Through either open-ended or targeted interviews, nine (69%) of 13 patients reported eating at restaurants A, B, or C, and three of eight reported eating at DC restaurants, before symptom onset. Sixteen (84%) of 19 patients reported eating Mediterranean-style food; 10 (67%) of 15 patients reported eating hummus. Other commonly reported foods eaten were lettuce (11 of 14; 79%), chicken (11 of 15; 73%), tomato (11 of 15; 73%), and cucumber (nine of 11; 82%).

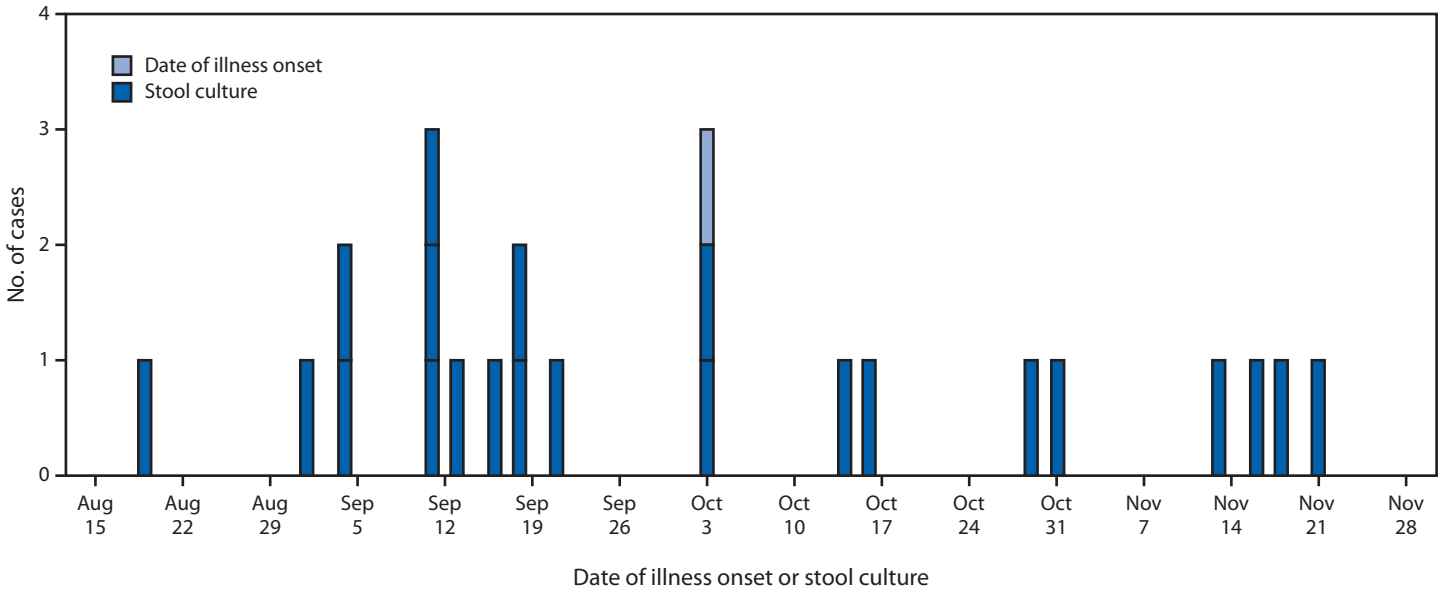
Median age of the 23 patients was 27 years (range: 20–87 years); 13 (57%) were female. One patient was asymptomatic. Among the 22 symptomatic patients, 21 (96%) had one or more symptoms consistent with *Salmonella* infection: 21 reported diarrhea (defined as three or more loose stools during 24 hours), 16 (73%) reported abdominal cramps, 16 (73%) reported nausea, 15 (68%) reported fatigue, 13 (59%) reported fever, seven (32%) reported bloody diarrhea, and four (18%) reported vomiting. All 23 patients received outpatient medical care. No hospitalizations or deaths were reported.

Environmental Investigation

During November 7–8, DOH visited restaurants A and B to collect food samples; 15 prepared foods, including hummus and hummus ingredients (e.g., tahini), were collected for laboratory testing. Investigators learned that restaurants A, B, and C had the same owner. Restaurant A performed all food

*Additional information available at http://www.cdc.gov/pulsenet.

FIGURE 1. Number of culture-confirmed cases (n = 23) with infections of outbreak strain of *Salmonella enterica* serotype Bovismorbificans, by date of illness onset or stool culture* — United States, August 19–November 21, 2011



* For one asymptomatic case.

FIGURE 2. Number and location of *Salmonella enterica* serotype Bovismorbificans case detections — United States, August–December 2011*

* A total of 23 persons infected with the outbreak strain of *S.* Bovismorbificans were reported from seven states and the District of Columbia, including eight in the District of Columbia, seven in Maryland, three in Virginia, and one each in Delaware, California, Michigan, New Hampshire, and New Jersey.

TABLE. Restaurant and food exposures reported by patients in *Salmonella enterica* serotype Bovismorbificans outbreak — United States, August–December 2011

Exposure	No. with exposure information	No. reporting exposure	(%)
Location			
District of Columbia metropolitan-area restaurant	22	20	(91)
Any Mediterranean-style restaurant	15	14	(93)
Restaurants A, B, or C	13	9	(69)
Type of food			
Mediterranean-style foods	19	16	(84)
Hummus	15	10	(67)
Other commonly reported foods			
Cucumber	11	9	(82)
Lettuce	14	11	(79)
Chicken	15	11	(73)
Tomato	15	11	(73)

preparation for restaurants B and C; specific food items, including hummus and tzatziki sauce, were prepared at restaurant A and delivered to restaurants B and C for sale to customers.

DC PHL isolated *S.* Bovismorbificans from the hummus sample collected from restaurant A. The two enzymes (*Xba*1 and *Bln*1) PFGE pattern of this isolate was indistinguishable from that of the cases (patterns TDFX.0108 and TDFA26.0006, respectively). All other food items tested negative for *Salmonella.* An additional 18 samples of ingredients and prepared foods were collected during inspections of restaurants A, B, and C during November 16–17. *S.* Bovismorbificans with a PFGE pattern indistinguishable from the outbreak strain was isolated from one sample of hummus collected from each of restaurants A and C; all other food samples tested negative for *Salmonella*. DOH also cited restaurants A, B, and C for multiple food safety violations, including inadequate food temperature control, insufficient hand washing, and the presence of insects and other pests.

What is already known on this topic?

Salmonella is the most commonly reported cause of bacterial enteric infections in the United States, but determining the cause of an ingredient-driven outbreak is challenging.

What is added by this report?

In September 2011, three clinical isolates of *Salmonella enterica* serotype Bovismorbificans with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns were identified in the District of Columbia (DC). Through PulseNet, the national molecular subtyping network for foodborne disease surveillance, six additional recent cases with indistinguishable PFGE patterns were identified. All nine patients had eaten at one of three restaurants in DC. Investigation led to 23 cases with the same PFGE pattern in seven states and DC. Imported tahini (sesame seed paste) used in hummus prepared at a Mediterranean-style restaurant in DC was a plausible source of the infections.

What are the implications for public health practice?

Public health officials and consumers should know that products made from imported sesame seed paste have been associated with *Salmonella* outbreaks and should be considered as possible sources for foodborne illness in the United States. For ingredient-driven outbreaks, public health officials should use PulseNet to link geographically dispersed cases and attempt to identify clusters to obtain information on specific exposures common to patients.

On November 18, DOH issued an embargo on hummus and hummus ingredients (tahini, chickpeas, garlic, lemon juice, salt, and olive oil) from restaurant A. DOH ordered the restaurants' owner to restrict the preparation of hummus and use of hummus ingredients in other foods (e.g., tahini used in falafel), the delivery of hummus to restaurants B and C, and the sale of hummus at all three restaurants until the source of contamination was identified. On November 14, the Virginia Department of Health visited the two northern Virginia Mediterranean-style restaurants specifically mentioned by patients to collect food samples and obtain food supplier information. Tracebacks performed for restaurants A and B and one Virginia restaurant revealed multiple food items purchased from a common distributor in northern Virginia that provided bulk food items for restaurants. The Virginia Department of Agriculture and Consumer Services visited the warehouse distributor to obtain lot numbers of hummus ingredients (tahini and chickpeas) and to collect food samples. All food samples collected from the northern Virginia restaurants and from the distributor tested negative for *Salmonella*.

On November 30, FDA and PHL conducted environmental sampling at restaurant A. Seven food handlers, including five kitchen staff members and two delivery drivers, worked at restaurant A; none reported gastrointestinal symptoms during the prior month. On December 7, stool specimens were collected from all five kitchen staff members, but not the two drivers who delivered prepared food from restaurant A to restaurants B and C; the drivers reportedly had limited contact with foods. *Salmonella* was not isolated from any of the restaurant A environmental samples or food handler stool specimens.

DOH lifted the embargo on hummus and hummus ingredients at restaurants A, B, and C during February 2012 because no additional cases had been reported and food safety violations had been corrected. Additional food samples were collected, including hummus; no *Salmonella* was isolated.

On May 30, 2012, traceback by FDA suggested that tahini (sesame seed paste) used in hummus was a plausible source for *Salmonella* infections. The traceback revealed tahini used at the different restaurants in the DC metropolitan area came from a common foreign manufacturer from Lebanon associated with recent *Salmonella* outbreaks in Canada. FDA issued a mandate that all products imported from this manufacturer undergo *Salmonella* testing before entry into the United States. At the time of this report, FDA recommended coordination with Canadian officials to conduct a foreign inspection of the tahini manufacturing plant.

Reported by

Reginald Blackwell, Morris Blaylock, PhD, Sosina Merid, District of Columbia Public Health Laboratory; John Davies-Cole, PhD, Arian Gibson, Daniella Herdman, MPH, Robert Sudler, MS, District of Columbia Dept of Health. Hannah Lee, MPH, Maryland Dept of Health and Mental Hygiene. Kate Corvese, MPH, Seth Levine, MPH, Virginia Dept of Health. Karen Blickenstaff, MS, Food and Drug Administration. Joanna Gaines, PhD, Leslie Hausman, MPH, Div of Foodborne, Waterborne, and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases; Tiana A. Garrett, PhD, EIS Officer, CDC. ***Corresponding contributor:*** *Tiana A. Garrett, vid6@cdc.gov, 202-442-9065.*

Editorial Note

Since 2001, *S.* Bovismorbificans has been identified in only five other foodborne outbreaks in the United States (*1*). These outbreaks have been linked to alfalfa sprouts, homemade cheese, pasta salad, striped bass, and one unknown source (*1*). During 2009, *S.* Bovismorbificans infections accounted for 62 (0.15%) of 40,828 *Salmonella* cases reported nationally (*2*). During the previous decade, *S.* Bovismorbificans outbreaks in Finland, Germany, and Australia have been linked to vegetables (*3–5*).

During this multistate outbreak, 23 cases of *S.* Bovismorbificans infection with matching PFGE patterns were identified. Tahini used in hummus prepared at

restaurant A, a Mediterranean-style restaurant in DC, was a plausible source of *S.* Bovismorbificans infection for at least 10 of the patients. The sale of this hummus by two additional DC restaurants (restaurants B and C) broadened the opportunity for exposure.

This outbreak illustrates the challenges associated with ingredient-driven outbreaks and the importance of PulseNet in reporting cases in different states. Only 10 of 15 patients with information about hummus exposure reported eating hummus before illness onset. However, patients who did not report eating hummus might have eaten Mediterranean-style foods prepared with tahini, even if they did not recall eating Mediterranean-style food. Other commonly reported foods, particularly lettuce, chicken, tomato, and cucumber, were consumed before illness onset, but consumption was not limited to Mediterranean-style restaurants.

This is the first report of *S.* Bovismorbificans associated with tahini in the United States. Sesame seeds used to make tahini are high in fats, similar to peanuts. *Salmonella* species can survive for long periods in high fat foods (e.g., peanut butter), and if seeds or nuts are improperly processed (e.g., roasted at inadequate temperatures). Recalls of tahini for possible *Salmonella* contamination have occurred in the United States, but an outbreak as a result of tahini consumption has never been reported (*6,7*). The brand of tahini implicated in this outbreak previously was recalled in Canada for contamination with *Salmonella* Cubana (September 2011) (*8*) and *Salmonella* Seftenberg (February 2012) (*9*). How this tahini brand was contaminated with three different *Salmonella* serotypes requires further investigation.

The findings in this report are subject to at least two limitations. For this study, interviewing methodology across jurisdictions was inconsistent. Not all patients were interviewed with the structured or targeted questionnaire, and several patients were not available for follow-up. Second, *Salmonella* was not detected in the samples of tahini tested, but was determined through traceback to be a plausible source.

Determining the source of any ingredient-driven outbreak is challenging. Public health officials should 1) routinely perform PFGE and report cases to PulseNet to identify cases outside of a geographic cluster, 2) identify frequently reported restaurants, or restaurant clusters, to obtain information on specific food items that are served at more than one restaurant, and 3) inquire about the shelf-life and turnover rates of products and ingredients used in restaurants to help to determine the product's exposure time window during the outbreak. In addition, public health officials and consumers should be informed that products made from imported sesame seed paste have been associated with *Salmonella* outbreaks and should be considered as possible sources for foodborne illness in the United States.

Acknowledgments

Alpha Diallo, PhD, District of Columbia Public Health Laboratory; Ivory Cooper, Denise Tyree, MS, District of Columbia Dept of Health. Jeffrey Higa, MPH, Akiko Kimura, MD, California Dept of Public Health. Stephanie Belinkse, Delaware Dept of Health and Social Svcs. Alvina Chu, MHS, Maryland Dept of Health and Mental Hygiene. Sally A. Bidol, MPH, Susan Bohms, MPH, Katherine Arends, MPH, Michigan Dept of Community Health. Allison Wellman, Virginia Dept of Health; Ato Atughonu, Christy Brennan, Matthew Ettinger, Virginia Dept of Agriculture and Consumer Svcs. Elizabeth Daly, MPH, New Hampshire Dept of Health and Human Svcs. Janice Gironda, New Providence Health Dept. Thomas Hill, MPH, Susan Lance, DVM, PhD, Christine Smith, Food and Drug Administration. Sheryl Lyss, MD, Scientific Education and Professional Development Program Office, CDC.

References

1. CDC. National Foodborne Disease Outbreak Surveillance System. Atlanta, GA: US Department of Health and Human Services, CDC. Available at http://wwwn.cdc.gov/foodborneoutbreaks/default.aspx. Accessed May 3, 2012.
2. CDC. National *Salmonella* surveillance annual summary 2009. Table 3. Atlanta, GA: US Department of Health and Human Services, CDC, 2009. Available at http://www.cdc.gov/ncezid/dfwed/pdfs/salmonellaannualsummarytables2009.pdf. Accessed May 3, 2012.
3. Rimhanen-Finn R, Niskanen T, Lienemann T, et al. A nationwide outbreak of *Salmonella* Bovismorbificans associated with sprouted alfalfa seeds in Finland, 2009. Zoonoses Public Health 2011;58:589–96.
4. Gilsdorf A, Jansen A, Alpers K, et al. A nationwide outbreak of *Salmonella* Bovismorbificans PT24, Germany, December 2004–March 2005. Euro Surveill 2005;10:pii=2667.
5. Stafford RJ, McCall BJ, Neill AS, et al. A statewide outbreak of *Salmonella* Bovismorbificans phage type 32 infection in Queensland. Commun Dis Intell 2002;26:568–73.
6. Food and Drug Administration. Premier Organics issues nationwide recall for Artisana raw tahini because of possible health risk. September 4, 2009. Silver Spring, MD: US Department of Health and Human Services, Food and Drug Administration; 2009. Available at http://www.fda.gov/safety/recalls/ucm181619.htm. Accessed May 3, 2012.
7. Food and Drug Administration. nSpired Natural Foods issues nationwide recall of Maranatha sesame tahini because of possible health risk. May 25, 2007. Silver Spring, MD: US Department of Health and Human Services, Food and Drug Administration; 2007. Available at http://www.fda.gov/Safety/Recalls/ArchiveRecalls/2007/ucm112209.htm. Accessed May 3, 2012.
8. Canadian Food Inspection Agency. Health hazard alert: certain Alkanater brand tahina may contain *Salmonella* bacteria. Ottawa, Ontario, Canada: Canadian Food Inspection Agency; 2011. Available at http://www.inspection.gc.ca/english/corpaffr/recarapp/2011/20110923e.shtml. Accessed November 15, 2012.
9. News Desk. *Salmonella* concern prompts tahini recall in Canada. Food Safety News. February 2, 2012. Available at http://www.foodsafetynews.com/2012/02/tahini-recalled-in-canada-for-salmonella. Accessed May 3, 2012.

Indoor Air Quality at Nine Large-Hub Airports With and Without Designated Smoking Areas — United States, October–November 2012

On November 20, 2012, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Secondhand smoke (SHS) exposure causes death and disease among nonsmoking adults and children (*1*). Adopting policies that completely prohibit smoking in all indoor areas is the only effective way to eliminate involuntary SHS exposure (*1*). Among the 29 large-hub U.S. airports, five currently allow smoking in specifically designated indoor areas accessible to the general public (*2*). In 2011, these five airports had a combined passenger boarding of approximately 110 million (*3*). To assess indoor air quality at the five large-hub U.S. airports with designated indoor smoking areas and compare it with the indoor air quality at four large-hub U.S. airports that prohibit smoking in all indoor areas, CDC measured the levels of respirable suspended particulates (RSPs), a marker for SHS. The results of this assessment determined that the average level of RSPs in the smoking-permitted areas of these five airports was 16 times the average level in nonsmoking areas (boarding gate seating sections) and 23 times the average level of RSPs in the smoke-free airports. The average RSP level in areas adjacent to the smoking-permitted areas was four times the average level in nonsmoking areas of the five airports with designated smoking areas and five times the average level in smoke-free airports. Smoke-free policies at the state, local, or airport authority levels can eliminate involuntary exposure to SHS inside airports and protect employees and travelers of all ages from SHS.

Large-hub airports are defined by the Federal Aviation Administration as airports that accounted for ≥1% of total passenger boarding in the United States during the previous year (*3*). This study included five large-hub U.S. airports with designated smoking areas accessible to the public*: Denver International, Hartsfield-Jackson Atlanta International, McCarran International in Las Vegas, Salt Lake City International, and Washington Dulles International (*2*). Four smoke-free (i.e., smoking prohibited in all indoor areas at all times) large-hub airports with similar passenger boarding totals in 2011 were selected for comparison: Chicago O'Hare International, Fort Lauderdale-Hollywood International, Orlando International, and Phoenix Sky Harbor International.

The specific class of RSPs monitored was particulate matter ≤2.5 microns in diameter ($PM_{2.5}$), a commonly used marker for SHS (*4,5*) Particles of this size are released in substantial amounts from burning cigarettes and easily inhaled deep into the lungs. The final sample consisted of 45 sites in airports with designated smoking areas and four sites in smoke-free airports. Overall, in the five airports with designated smoking areas, $PM_{2.5}$ levels were measured 1) inside 20 smoking-permitted areas, 2) approximately 1 meter (3.3 feet) adjacent to each of the 20 smoking-permitted areas, and 3) in the seating sections at five randomly selected boarding gates where smoking was not allowed. $PM_{2.5}$ levels were measured at one randomly selected gate in each of the four smoke-free airports. Adjacent areas were included in the study to assess whether SHS leaked from smoking-permitted areas. Smoking-permitted areas were subcategorized as smoking rooms, bars, or restaurants and also subcategorized as fully enclosed or partially enclosed.

Data were collected during October 19–November 1, 2012, by one person during 1 day at each airport between the hours of 7 a.m. and 11 p.m. The median time spent at each site was 30 minutes (range: 20–90 minutes). An air monitor† was used to log $PM_{2.5}$ at 1-minute intervals, using a calibration factor of 0.32 and a flow rate of 1.7 L/min (*4*). The first and last 1-minute measurements were discarded, and the remaining data points were averaged to compute the mean $PM_{2.5}$ level at each site. Data on 5-minute interval counts of the number of persons and the number of burning cigarettes in each smoking-permitted area also were collected. Sampling was conducted discreetly in order not to alter the occupants' smoking behavior. Smoker density was calculated by dividing the average number of burning cigarettes by the estimated room volume and expressed as the number of burning cigarettes per 100 m^3. Spearman's correlation coefficient (ρ) was calculated to assess the relationship between smoker density and $PM_{2.5}$ ($p<0.05$). A two-sample t-test was conducted to assess the statistical significance of differences between average $PM_{2.5}$ levels ($p<0.05$).

The overall average $PM_{2.5}$ level in smoking-permitted areas was 188.7 $\mu g/m^3$ (range: 29.1–555.3), and the average $PM_{2.5}$ level in areas adjacent to smoking-permitted areas was 43.7 $\mu g/m^3$ (range: 2.1–230.0). The average $PM_{2.5}$ level in nonsmoking areas of airports with designated smoking areas was 11.5$\mu g/m^3$ (range: 2.2–29.0), and the average $PM_{2.5}$ level in smoke-free airports was 8.0 $\mu g/m^3$ (range: 2.0–15.2). The difference between the average level in the nonsmoking areas of airports with designated smoking areas and the average level in smoke-free airports was not statistically significant (Table, Figure 1).

The average $PM_{2.5}$ level in the four smoking-permitted bars and restaurants was 276.9 $\mu g/m^3$ (range: 73.5–555.3),

* Two other large-hub airports, Dallas/Fort Worth International and Charlotte Douglas International, have designated smoking areas, but were excluded from this study because those areas are not accessible to the general public.

† The air monitor used was a TSI Sidepak AM510 Personal Aerosol Monitor (TSI, Inc., St. Paul, Minnesota). The Sidepak was calibrated against a SHS-calibrated nephelometer prior to use.

whereas the average $PM_{2.5}$ level in the 16 smoking rooms was 166.6 $\mu g/m^3$ (range: 29.1–382.3). The median of the average number of persons in smoking-permitted areas was 9.3 (range: 2.7–101.7). The median of the average number of burning cigarettes was 7.2 (range: 2.8–56.3) (Table).

The average $PM_{2.5}$ level in areas adjacent to partially enclosed smoking-permitted areas (82.5 $\mu g/m^{3)}$ was higher than the average $PM_{2.5}$ in areas adjacent to fully enclosed smoking-permitted areas (30.8 $\mu g/m^3$) ($p<0.05$). Smoker density was strongly correlated with $PM_{2.5}$ ($\rho=0.81$, $p<0.05$) (Figure 2).

Reported by

Brian King, PhD, Michael Tynan, Gabbi Promoff, MA, Steve Babb, MPH, Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion; Jonetta L. Johnson, PhD, Israel Agaku, DMD, EIS officers, CDC. ***Corresponding contributor:*** *Israel Agaku, iagaku@cdc.gov, 770-488-5138.*

Editorial Note

The findings in this report indicate that workers and travelers, including children and adults, are at risk for exposure to SHS in airports with designated smoking areas. These findings are consistent with previous research that found elevated $PM_{2.5}$ levels in areas adjacent to enclosed smoking-permitted areas in a medium-hub airport (*6*). There is no risk-free level of SHS exposure; even brief exposures can have immediate adverse effects on the cardiovascular and respiratory systems (*1,7*).

Although smoking was prohibited on all U.S. domestic and international commercial airline flights through a series of federal laws adopted from 1988 to 2000, no federal law or policy requires airports to be smoke-free. Certain tobacco product manufacturers have promoted and paid for separately enclosed and ventilated smoking areas in airports and have opposed efforts to implement smoke-free policies in airports (*8*). Most airports with designated smoking areas are explicitly exempted from state smoke-free laws or are located in states without comprehensive smoke-free laws. For example, although state laws in Colorado[§] and Utah[¶] prohibit smoking in indoor areas of workplaces and public places, they specifically allow designated smoking areas at airports.

Because the duration of air monitoring in each location was approximately 30 minutes, the observed $PM_{2.5}$ levels cannot be compared directly to current U.S. Environmental Protection Agency average 24-hour and annual $PM_{2.5}$ exposure standards (35 $\mu g/m^3$ and 15 $\mu g/m^3$, respectively) (*9*). However, given that the average $PM_{2.5}$ level in smoking-permitted bars and restaurants was 24 times the average level in nonsmoking areas of the same airports (276.9 $\mu g/m^3$ versus 11.5 $\mu g/m^3$), workers in smoking-permitted areas such as bars and restaurants might be at heightened risk for SHS exposure and related health problems (*9,10*).

The findings in this report are subject to at least three limitations. First, SHS is not the only source of $PM_{2.5}$, and $PM_{2.5}$ levels can vary from airport to airport because of differences in elevation above sea level. However, although ambient particle concentrations and cooking are additional sources of $PM_{2.5}$, SHS is the largest contributor to $PM_{2.5}$ levels in indoor settings where smoking is allowed (*5*). Second, $PM_{2.5}$ levels inside and adjacent to the smoking-permitted areas were not measured simultaneously, so it was not possible to assess SHS leakage into smoking-restricted areas in real time. Finally, in very large smoking-permitted areas, the inability to count the exact numbers of occupants and burning cigarettes might have resulted in imprecise estimates.

Both employees and travelers at airports with designated smoking areas could be at risk for SHS exposure. For example, travelers who do not enter smoking-permitted areas can be exposed to SHS in adjacent areas. Employees who work in smoking-permitted restaurants and bars, or who are required to enter smoking-permitted areas for cleaning, maintenance, or other reasons, also are at risk for SHS exposure. In addition, children who are allowed to enter or wait near smoking-permitted areas might be at risk for SHS exposure. Completely eliminating smoking inside airports is the only way to eliminate SHS exposure for nonsmoking workers and travelers of all ages (*1*).

What is already known on this topic?

Exposure to secondhand smoke (SHS) causes disease and death among nonsmokers, and there is no risk-free level of SHS exposure. Among the 29 large-hub airports in the United States, five currently have specifically designated indoor smoking areas accessible to the general public.

What is added by this report?

An assessment of air quality at the five large-hub airports with designated indoor smoking areas found that restriction of smoking to designated areas is not effective in eliminating SHS exposure. The average level of particulate matter ≤2.5 microns in diameter ($PM_{2.5}$) in smoking-permitted areas was 188.7 $\mu g/m^3$ (range: 29.1 $\mu g/m^3$ to 555.3 $\mu g/m^3$). The average $PM_{2.5}$ level in areas adjacent to smoking-permitted areas was 43.7 $\mu g/m^3$ (range: 2.1–230.0).

What are the implications for public health practice?

Employees and travelers of all ages face exposure to SHS both inside and adjacent to smoking-permitted rooms, restaurants, and bars in airports. Smoke-free policies that completely eliminate smoking inside airports are the only way to fully protect nonsmoking employees and travelers from SHS exposure.

[§] Colorado. Rev. Stat. Ann. § 25-14-205 (1) (f).
[¶] Utah Code Ann. § 26-38-3 (2) (c).

TABLE. Levels of $PM_{2.5}$ in nine large-hub airports with and without designated indoor smoking areas,* by sampled area (N = 49) — United States, October–November 2012

Area	Average no. of persons	Average no. of cigarettes	No. of burning cigarettes per 100 m^3	Mean $PM_{2.5}$ in smoking-permitted areas ($\mu g/m^3$)	Mean $PM_{2.5}$ in areas adjacent to smoking-permitted areas† ($\mu g/m^3$)	Mean $PM_{2.5}$ in nonsmoking areas§ ($\mu g/m^3$)
Five airports with designated smoking areas¶						
Airport A**						
Smoking-permitted areas (n = 3)						
Bar 1	6.2	2.3	0.8	73.5	44.9	n/a
Bar 2	101.7	56.3	7.8	555.3	60.2	n/a
Restaurant	26.5	13.0	9.9	322.0	41.1	n/a
Mean	44.8	23.9	6.2	316.9	48.7	n/a
Nonsmoking area (gate)	49.0	n/a	n/a	n/a	n/a	29.0
Airport B						
Smoking-permitted areas (n = 4)						
Smoking room 1	4.5	3.8	1.9	184.2	3.2	n/a
Smoking room 2	3.5	2.8	1.4	165.9	4.5	n/a
Smoking room 3	8.5	5.7	3.1	215.1	8.2	n/a
Smoking room 4	8.2	5.0	0.8	149.3	3.1	n/a
Mean	6.2	4.3	1.8	178.6	4.8	n/a
Nonsmoking area (gate)	38.7	n/a	n/a	n/a	n/a	3.0
Airport C						
Smoking-permitted areas (n = 3)						
Smoking room 1	4.5	1.8	0.3	29.1	2.1	n/a
Smoking room 2	5.0	2.5	0.3	38.2	2.8	n/a
Smoking room 3	6.7	4.0	0.8	79.4	7.3	n/a
Mean	5.4	2.8	0.5	48.9	4.1	n/a
Nonsmoking area (gate)	4.8	n/a	n/a	n/a	n/a	2.2
Airport D						
Smoking-permitted areas (n = 5)						
Smoking room 1††	10.0	7.3	1.9	171.7	81.1	n/a
Smoking room 2††	16.2	12.7	3.5	148.9	107.2	n/a
Smoking room 3††	9.5	6.7	2.0	103.4	70.1	n/a
Smoking room 4††	2.7	2.5	1.7	95.4	112.5	n/a
Smoking room 5	9.3	7.0	4.9	161.5	43.3	n/a
Mean	9.5	7.2	2.8	136.2	82.8	n/a
Nonsmoking area (gate)	18.3	n/a	n/a	n/a	n/a	19.2
Airport E						
Smoking-permitted areas (n = 5)						
Smoking room 1	4.8	3.9	1.4	224.0	5.0	n/a
Smoking room 2	17.1	9.3	3.4	245.3	2.3	n/a
Smoking room 3	19.3	14.7	5.4	271.6	3.2	n/a
Smoking room 4††	21.0	15.3	5.6	382.3	230.0	n/a
Bar 1	73.5	31.2	2.8	156.9	41.6	n/a
Mean	27.1	14.9	3.7	256.0	56.4	n/a
Nonsmoking area (gate)	37.0	n/a	n/a	n/a	n/a	4.2
Overall mean (all smoking-permitted areas, n = 20)	**17.9**	**10.4**	**3.0**	**188.7**	**43.7**	**n/a**
Overall mean (all nonsmoking areas [gates], n = 5)	**29.6**	**n/a**	**n/a**	**n/a**	**n/a**	**11.5**
Four smoke-free airports						
Airport F (gate)	52.0	n/a	n/a	n/a	n/a	15.2
Airport G (gate)	23.1	n/a	n/a	n/a	n/a	4.9
Airport H (gate)	6.0	n/a	n/a	n/a	n/a	2.0
Airport I (gate)	41.0	n/a	n/a	n/a	n/a	10.0
Overall mean (all smoke-free airports, n = 4)	**30.5**	**n/a**	**n/a**	**n/a**	**n/a**	**8.0**

Abbreviations: $PM_{2.5}$ = particulate matter ≤2.5 microns in diameter; n/a = not applicable; n = number of areas sampled.

* The five airports with smoking areas were Denver International, Hartsfield-Jackson Atlanta International, McCarran International in Las Vegas, Salt Lake City International, and Washington Dulles International. Four smoke-free airports were matched to the airports with designated smoking areas based on similar passenger boarding reported by the Federal Aviation Administration for 2011: Chicago O'Hare International, Fort Lauderdale-Hollywood International, Orlando International, and Phoenix Sky Harbor International.

† $PM_{2.5}$ in adjacent smoking-permitted areas was measured at approximately 1 meter (3.3 feet) from the entrance of the smoking permitted areas with the air monitor positioned around the breathing zone.

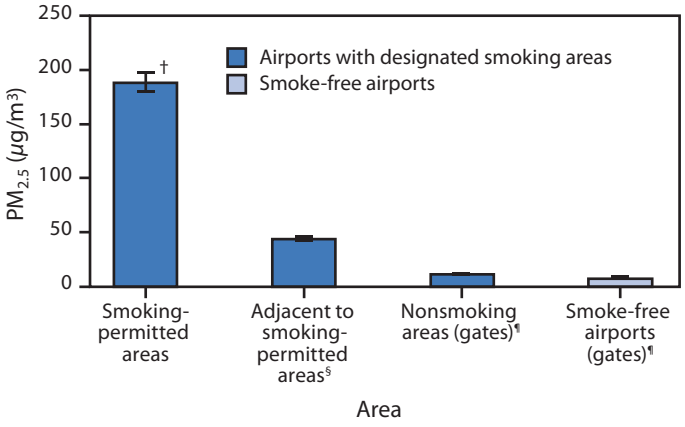
§ One gate was sampled for each of the nine airports. Gate measurements were taken in the seating section of a randomly selected boarding gate.

¶ Because one airport had a large number of designated smoking areas, a random sample of smoking areas was used. In the other four airports with designated smoking areas, data were collected in all smoking-permitted areas.

** Letters represent de-identified airports.

†† Partially enclosed smoking rooms (open entrances with no doors). All other smoking-permitted areas were fully enclosed.

FIGURE 1. Mean levels of $PM_{2.5}$ in nine large-hub airports with and without designated indoor smoking areas,* by area type — United States, October–November, 2012



Abbreviation: $PM_{2.5}$ = particulate matter ≤2.5 microns in diameter.

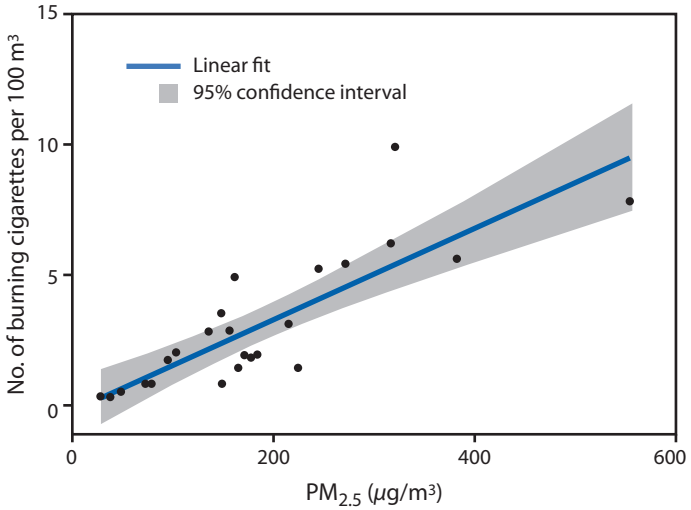
* The five airports with smoking areas were Denver International, Hartsfield-Jackson Atlanta International, McCarran International in Las Vegas, Salt Lake City International, and Washington Dulles International. Four smoke-free airports were matched to the airports with designated smoking areas based on similar passenger boarding reported by the Federal Aviation Administration for 2011: Chicago O'Hare International, Fort Lauderdale-Hollywood International, Orlando International, and Phoenix Sky Harbor International.

† 95% confidence interval.

§ $PM_{2.5}$ levels in adjacent smoking-permitted areas were measured at approximately 1 meter (3.3 feet) from the entrances of the smoking permitted areas with the air monitor positioned around the breathing zone.

¶ Measurements were taken in the seating sections of randomly selected boarding gates.

FIGURE 2. Correlation between mean $PM_{2.5}$ and smoker density* in five U.S. large-hub airports† with designated indoor smoking areas, October–November 2012



Abbreviation: $PM_{2.5}$ = particulate matter ≤2.5 microns in diameter.

* Smoker density was calculated by dividing the average number of cigarettes by the estimated volume of the smoking-permitted area. $PM_{2.5}$ concentration correlated with smoker density ($\rho = 0.81$, $p<0.05$). The average smoker density was 2.8 burning cigarettes per 100 m^3 (range = 0.3–9.9).

† The five airports with smoking areas were Denver International, Hartsfield-Jackson Atlanta International, McCarran International in Las Vegas, Salt Lake City International, and Washington Dulles International.

Acknowledgments

Kenneth Ray, MPH, Tobacco Use Prevention Program, Div of Public Health, Georgia Dept of Human Resources. Cherie Drenzek, DVM, Georgia Dept of Public Health. Courtney Ward, MPA, Bur of Tobacco and Chronic Disease; Kenneth Komatsu, MPH, Arizona Dept of Health Svcs. Jill Bednarek, MSW, Lisa Miller, MD, Colorado Dept of Public Health and Environment. Gregg Smith, Bur of Tobacco Free Florida; Carina Blackmore, DVM, PhD, Florida Dept of Health. Conny Moody, MBA, Gail De Vito, MPA, Office of Health Promotion, Illinois Dept of Public Health. Patricia Rowley, Office of Epidemiology, Southern Nevada Health District; Karla Bee, MPH, Tobacco Program; Ihsan Azzam, MD, PhD, Nevada Dept of Health and Human Svcs. Janae Duncan, MPA, Tobacco Prevention and Control Program; Robert Rolfs, MD, Utah Dept of Health. Myra Shook, MPH, Karen Ramley, MD, David Trump, MD, Virginia Dept of Health. Constantine Vardavas, MD, PhD, Harvard School of Public Health, Boston, Massachusetts. Joanna Watson, DPhil, EIS Officer, CDC.

References

1. US Department of Health and Human Services. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Available at http://www.surgeongeneral.gov/library/secondhandsmoke/report/fullreport.pdf. Accessed November 16, 2012.
2. CDC. Smoking restrictions in large-hub airports—United States, 2002 and 2010. MMWR 2010;59:1484–7.
3. Federal Aviation Administration. Passenger boarding (enplanement and all-cargo data for U.S. airports. Washington, DC: US Department of Transportation, Federal Aviation Administration; 2011. Available at http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm?year=2010. Accessed November 16, 2012.
4. Connolly GN, Carpenter CM, Travers MJ, et al. How smoke-free laws improve air quality: a global study of Irish pubs. Nicotine Tob Res 2009;11:600–5.
5. CDC. Indoor air quality in hospitality venues before and after implementation of a clean indoor air law—western New York, 2003. MMWR 2004;53:1038–41.
6. Lee K, Hahn EJ, Robertson L, Whitten L, Jones LK, Zahn B. Air quality in and around airport enclosed smoking rooms. Nicotine Tob Res 2010;12:665–8.
7. Institute of Medicine. Secondhand smoke exposure and cardiovascular effects: making sense of the evidence. Washington, DC: The National Academies Press; 2009. Available at http://www.iom.edu/reports/2009/secondhand-smoke-exposure-and-cardiovascular-effects-making-sense-of-the-evidence.aspx. Accessed November 16, 2012.
8. Legacy Tobacco Documents Library. Airport strategy plan, 1990. San Francisco, California: University of California, San Francisco. Available at http://legacy.library.ucsf.edu/tid/ajm30c00. Accessed November 16, 2012.
9. US Environmental Protection Agency. Area designations for 2006 24-hour fine particle (PM2.5) standards. Washington, DC: US Environmental Protection Agency; 2006. Available at http://www.epa.gov/pmdesignations/2006standards/index.htm. Accessed November 16, 2012.
10. Hahn EJ. Smokefree legislation: a review of health and economic outcomes research. Am J Prev Med 2010; 39(6 Suppl 1):S66–76.

Notes from the Field

Hantavirus Pulmonary Syndrome in Visitors to a National Park — Yosemite Valley, California, 2012

On August 16, 2012, the California Department of Public Health announced two confirmed cases of hantavirus pulmonary syndrome (HPS) in California residents who had stayed overnight in Yosemite National Park, launching an investigation by the National Park Service, California Department of Public Health, and CDC. On August 27, Yosemite National Park announced two additional cases, and by October 30, 10 cases had been confirmed.

For this outbreak, a confirmed case was defined as detection of 1) a febrile illness and hantavirus (Sin Nombre virus) specific antibodies in serum, or 2) virus antigen in postmortem tissue using immunohistochemistry, in a person who had stayed overnight in Yosemite National Park during June 1–August 28, 2012. CDC notified public health officials and clinical providers in the United States and internationally. The National Park Service notified by e-mail, telephone, or mail all registered overnight Yosemite National Park visitors (approximately 260,000 guests) who had stayed at the park during June 1–September 17, 2012.

The 10 confirmed patients came from three states: California (eight), West Virginia (one), and Pennsylvania (one). Ages ranged from 12 years to 56 years; four were female. Nine patients had typical symptoms of HPS, and one lacked respiratory symptoms; three died.

Nine patients stayed in Curry Village "signature" cabins, which have insulation between the canvas exterior and interior hard walls. Rodent infestations were detected in the insulation, and all 91 signature cabins were closed indefinitely on August 28. In addition, educational interventions were enhanced for staff members and visitors parkwide, and multifaceted rodent control measures, including trapping throughout Curry Village, were implemented.

HPS is a nationally notifiable disease caused in the United States most commonly by Sin Nombre virus. The deer mouse (*Peromyscus maniculatus*) is the reservoir. Infected mice shed virus in urine, feces, and saliva. Humans become infected through inhalation of aerosolized virus from rodent excreta and via direct contact from rodent bites. The incubation period ranges from 1 to 6 weeks. Early symptoms include fever, chills, myalgia, headache, and gastrointestinal symptoms for 1–7 days, progressing rapidly to respiratory distress and shock (*1*). Most patients require hospitalization, supplemental oxygen, and intubation. The case-fatality rate is approximately 36% (*2*). There is no specific treatment for HPS, but early supportive care can reduce mortality (*2*). Before this outbreak, 58 cases of HPS had been reported among California residents since 1994; two had been visitors to Yosemite National Park before 2012 (California Department of Public Health, unpublished data, 2012).

Clinicians are reminded to consider the diagnosis of hantavirus infection in all persons with febrile illness and sudden onset of respiratory symptoms with a history of rodent exposure. Because HPS is a reportable disease in the United States, clinicians suspecting HPS should notify and consult their state health department about confirmatory testing. More information is available from CDC regarding hantavirus clinical assessment, treatment and diagnostics (*3*). Park visitors and the public are advised to avoid contact with rodents and their urine, droppings, and nesting materials.

Reported by

California Dept of Public Health, Div of Communicable Disease Control. Pennsylvania State Health Dept. West Virginia Bur for Public Health. Office of Public Health, National Park Svc. Viral Special Pathogens Br, National Center for Emerging and Zoonotic Infectious Diseases, CDC. ***Corresponding contributor:*** *Lynda U. Osadebe, ckv2@cdc.gov. 404-718-4823.*

References

1. CDC. Hantavirus pulmonary syndrome—United States: updated recommendations for risk reduction. MMWR 2002;51(No. RR-9).
2. MacNeil A, Ksiazek TG, Rollin PE. Hantavirus pulmonary syndrome, United States, 1993–2009. Emerg Infect Dis 2011;17:1195–201.
3. CDC. Hantavirus. Atlanta, GA: US Department of Health and Human Services, CDC; 2012. Available at http://www.cdc.gov/hantavirus. Accessed November 14, 2012.

Announcements

National Chronic Obstructive Pulmonary Disease (COPD) Awareness Month — November 2012

Chronic obstructive pulmonary disease (COPD) is a collective term for respiratory diseases, such as emphysema and chronic bronchitis, that limit airflow into the lungs, making it hard to breathe. In 2008, chronic lower respiratory diseases (predominantly COPD) became the third leading cause of death in the United States. The rate of hospitalizations varies by geographic region (*1*,*2*).

November is National COPD Awareness Month. The observance is supported by the U.S. COPD Coalition to improve awareness and treatment of COPD through the efforts of health professionals, health-care providers, COPD advocacy groups, and the National Heart, Lung, and Blood Institute's COPD Learn More, Breathe Better campaign.

Tobacco smoke continues to be the leading cause of COPD, and current smokers should be encouraged to quit. Resources to aid in smoking cessation are available at http://www.smokefree.gov and http://www.cdc.gov/tobacco/quit_smoking. Other risk factors for COPD include exposure to secondhand smoke, occupational exposure to chemicals or fumes, asthma, air pollution, and respiratory infections.

Although no cure for COPD is available, it is treatable, and early detection is important. Persons at risk for COPD who experience cough, shortness of breath, and sputum production are encouraged to speak with their health-care provider and request a simple breathing test called spirometry to evaluate lung function. Additional information is available from CDC (http://www.cdc.gov/copd), the National Heart, Lung, and Blood Institute (http://www.nhlbi.nih.gov/health/public/lung/copd/lmbb-campaign), and the U.S. COPD Coalition (http://www.uscopdcoalition.org).

References

1. Murphy SL, Xu J, Kochanek KD. Deaths: preliminary data for 2010. Natl Vital Stat Rep 2012;60(4).
2. Holt JB, Zhang X, Presley-Cantrell L, Croft JB. Geographic disparities in chronic obstructive pulmonary disease (COPD) hospitalization among Medicare beneficiaries in the United States. Int J Chron Obstruct Pulmon Dis 2011;6:321–8.

Updated Asthma Surveillance Report Released

CDC has released an updated asthma surveillance report, *National Surveillance of Asthma: United States, 2001–2010*. The report provides new data and historical information on trends in asthma prevalence, health-care encounters (i.e., office visits, hospital outpatient visits, emergency department visits, and inpatient stays), and deaths from asthma. Compared with the three previous asthma surveillance reports, this update provides considerably more graphic representations. Data from tables included in the report can be used to create additional graphic representations for detailed demographic subgroups.

This asthma surveillance report is a valuable tool for public health professionals, researchers, community leaders, health-care providers, and others interested in monitoring asthma trends, setting research priorities, and planning patient services. It provides recent estimates for asthma surveillance indicators that are consistent with those in previous reports. The report is available at http://www.cdc.gov/nchs/data/series/sr_03/sr03_035.pdf.

Errata

Vol. 61, No. 32

In the Notice to Readers, "Final 2011 Reports of Nationally Notifiable Diseases," on page 631, in "Table 2. Reported cases of notifiable diseases, by geographic division and area — United States, 2011," in the United States row, under Measles, Total should read: "**220**" and Indigenous "**140**." In the Mountain row, under Measles, Total should read: "**20**" and Indigenous "**13**." In the Utah row, under Measles, Total should read: "**13**" and Indigenous "**12**."

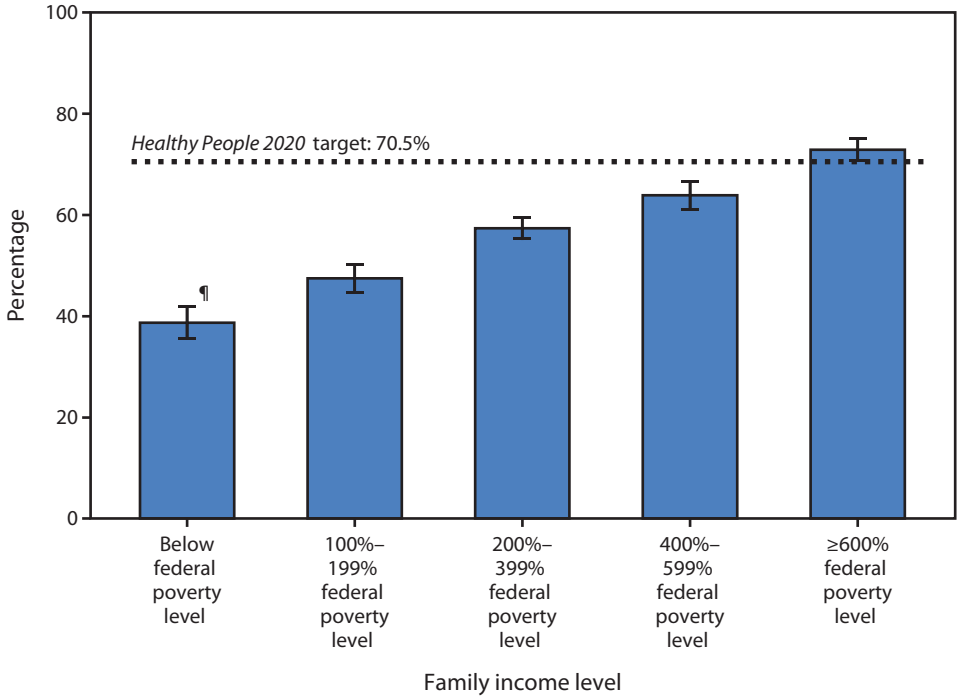
Vol. 61, No. 36

In the report, "Household Preparedness for Public Health Emergencies — 14 states, 2006–2010," errors occurred in two tables. In Table 1 and Table 2, the first heading in each of the six sections, should read: "**No.**" In Table 1, in the section, "Have a 3-day supply of food," in the White row, the value under "**No.**" should read: "**69,313**." In Table 2, in the section "Have a working battery-operated flashlight," in the Mississippi row, the value under "**No.**" should read: "**9,846**."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Adults Aged 50–75 Years Who Received Colorectal Cancer Screening,* by Family Income Level† — National Health Interview Survey, United States, 2010§



* Based on survey questions that asked respondents when they last had a blood stool test, sigmoidoscopy, or colonoscopy. "Unknowns" were not included in the denominators when calculating percentages. The U.S. Preventative Services Task Force recommends screening for colorectal cancer using fecal occult blood testing annually, sigmoidoscopy every 5 years with fecal occult blood testing every 3 years, or colonoscopy every 10 years for persons aged 50–75 years.

† Based on a U.S. Census Bureau definition of federal poverty level that includes information on family income, size, and composition.

§ Estimates were based on household interviews of a sample of the U.S. civilian, noninstitutionalized population. Denominators for each category excluded persons for whom data were missing. Estimates were age adjusted to year 2000 U.S. Census Bureau estimates using age groups: 50–64 years and 65–75 years.

¶ 95% confidence interval.

In 2010, the percentage of adults aged 50–75 years who received colorectal cancer screening as recommended by the most recent guidelines increased as income increased. Persons with family incomes 600% or more of the federal poverty level were nearly twice as likely (72.9%) to get a colorectal cancer screening than those with family incomes below the federal poverty level (38.7%) and were the only group to meet the *Healthy People 2020* target of 70.5%.

Sources: National Health Interview Survey, 2010 Cancer Control Module. Available at http://www.cdc.gov/nchs/nhis.htm.

US Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Healthy people 2020. Washington, DC: US Department of Health and Human Services; 2012. Available at http://www.healthypeople.gov.

Reported by: David T. Huang, PhD, dhuang@cdc.gov, 301-458-4213; Deepthi Kandi.

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format. To receive an electronic copy each week, visit *MMWR*'s free subscription page at *http://www.cdc.gov/mmwr/mmwrsubscribe.html*. Paper copy subscriptions are available through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone 202-512-1800.

Data presented by the Notifiable Disease Data Team and 122 Cities Mortality Data Team in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. Address all inquiries about the *MMWR* Series, including material to be considered for publication, to Editor, *MMWR* Series, Mailstop E-90, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30333 or to *mmwrq@cdc.gov.*

U.S. Government Printing Office: 2012-523-043/02039 Region IV ISSN: 0149-2195