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Prevalence of Smokefree Home Rules — United States, 1992–1993 and 2010–2011

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Exposure to secondhand smoke (SHS) from cigarettes causes an estimated 41,000 deaths among nonsmoking U.S. adults each year and an estimated $5.6 billion annually in lost productivity caused by premature death (*1,2*). In a 2006 report, the Surgeon General concluded that there is no risk-free level of exposure to SHS (*1*). Although an increasing proportion of the population is covered by state or local comprehensive smokefree laws that prohibit tobacco smoking in all indoor public places and worksites, including restaurants and bars (*3,4*), millions of nonsmokers continue to be exposed to SHS in areas not covered by smokefree laws or policies, including homes (*5*). The home is the primary source of SHS exposure for children and a major source of exposure for nonsmoking adults (*1*). To assess progress toward increasing the proportion of households with smokefree home rules, CDC analyzed the most recent data from the Tobacco Use Supplement to the Current Population Survey. Households were considered to have a smokefree home rule if all adult respondents aged ≥18 years in the household reported that no one was allowed to smoke anywhere inside the home at any time. The analysis found that the national prevalence of smokefree home rules increased from 43.0% during 1992–1993 to 83.0% during 2010–2011. Over the same period, the national prevalence of smokefree home rules increased from 56.7% to 91.4% among households with no adult cigarette smokers and from 9.6% to 46.1% among households with at least one adult smoker. Enhanced implementation of evidence-based interventions (e.g., comprehensive smokefree laws, voluntary smokefree home rules, smokefree multiunit housing policies, and initiatives to educate the public about the health effects of SHS) is warranted to further reduce SHS exposure in the United States (*1,2*).

The Current Population Survey is a household survey administered to the civilian, noninstitutionalized population by the U.S. Census Bureau.* Since 1992–1993, the Tobacco Use Supplement to the Current Population Survey (TUS-CPS) has collected national and state data regarding tobacco use and tobacco-related attitudes and policies, including home smoking rules. The TUS-CPS was conducted during 1992–1993 (293,543 respondents), 1995–1996 (247,088), 1998–1999 (239,652), 2000 (167,096), 2001–2002 (249,288), 2003 (249,620), 2006–2007 (237,119), and 2010–2011 (229,456). Eligible household members were interviewed by telephone or in their homes; the sample included persons aged ≥15 years until 2003, and those aged ≥18 years during 2006–2007 and 2010–2011. Response rates ranged from 62% (2006–2007 and 2010–2011) to 72% (1992–1993).†

Each household member aged ≥18 years was asked, "Which statement best describes the rules about smoking inside your home?" The response options were, "No one is allowed to smoke anywhere inside your home," "Smoking is allowed in

* Additional information available at http://www.census.gov/prod/2000pubs/tp63.pdf.
† Additional information available at http://riskfactor.cancer.gov/studies/tus-cps/info.html.

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What is already known on this topic?

The U.S. Surgeon General has concluded that there is no risk-free level of exposure to secondhand smoke. Although an increasing proportion of the population is protected by state or local comprehensive smokefree laws that prohibit smoking in all indoor areas of public places and worksites, millions of nonsmokers remain susceptible to secondhand smoke exposure in areas not covered by smokefree laws or policies, including homes.

What is added by this report?

The national prevalence of smokefree home rules increased significantly over the past 2 decades, from 43.0% during 1992–1993 to 83.0% during 2010–2011. During this period, the national prevalence of such rules increased from 56.7% to 91.4% among households with no adult smoker, and from 9.6% to 46.1% among households with at least one smoker.

What are the implications for public health practice?

Although the percentage of households with smokefree home rules has increased considerably since 1992–1993, by 2010–2011 fewer than half of households with a smoker had adopted such rules.

some places or at some times inside your home," and "Smoking is permitted anywhere inside your home." Households were considered to have a smokefree home rule if all adult respondents aged ≥18 years in the household reported that no one was allowed to smoke anywhere inside the home at any time. Households were considered to have one or more smokers if at least one respondent aged ≥18 years had smoked ≥100 cigarettes in their lifetime and now smoked "everyday" or "some days." Data were adjusted for nonresponse and weighted using the household supplement self-response weight. To ensure comparability across surveys, analyses were restricted to respondents aged ≥18 years. Households with discrepancies in responses (i.e., one respondent reported a smokefree home rule, and another did not) were excluded (range = 1.8% during 2010–2011 to 6.9% during 1992–1993). Point estimates and 95% confidence intervals were used to describe the prevalence of smokefree home rules overall and by state. Differences between groups were assessed using chi-square tests, and logistic regression was used to assess temporal trends (Wald test; $p<0.05$).

The national prevalence of smokefree home rules increased from 43.0% during 1992–1993 to 83.0% during 2010–2011 ($p<0.05$) (Table). Prevalence ranged from 25.6% in Kentucky to 69.4% in Utah during 1992–1993, and from 69.4% in Kentucky to 93.6% in Utah during 2010–2011 (Figure).

Among households with no adult smokers, the national prevalence of smokefree home rules increased from 56.7% during 1992–1993 to 91.4% during 2010–2011 ($p<0.05$). Prevalence ranged from 39.2% in Kentucky to 82.8% in Utah during 1992–1993, and from 82.9% in West Virginia to 97.3% in Utah during 2010–2011.

Among households with at least one adult smoker, the national prevalence of smokefree home rules increased from 9.6% during 1992–1993 to 46.1% during 2010–2011

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TABLE. Percentage of households with a smokefree home rule,* by state, and whether an adult smoker lives in the household† — Tobacco Use Supplement to the Current Population Survey, 1992–1993 and 2010–2011

	All households				Households with no adult smoker				Household with at least one adult smoker			
	1992–1993		2010–2011§		1992–1993		2010–2011§		1992–1993		2010–2011§	
State	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Alabama	38.7	(34.0–43.4)	80.9	(77.5–84.3)	54.1	(48.4–59.8)	91.3	(88.9–93.7)	6.7	(5.1–8.3)	38.4	(30.1–46.6)
Alaska	50.8	(46.9–54.7)	85.6	(82.3–88.8)	68.0	(63.8–72.1)	94.7	(93.1–96.3)	14.1	(8.3–19.8)	56.5	(48.9–64.0)
Arizona	54.1	(50.6–57.5)	91.0	(89.2–92.8)	68.2	(63.4–73.0)	96.4	(95.3–97.5)	17.2	(14.6–19.8)	64.8	(57.9–71.7)
Arkansas	33.1	(29.9–36.2)	73.1	(68.7–77.5)	46.7	(42.3–51.1)	85.5	(82.1–89.0)	5.3	(3.3–7.3)	35.9	(29.0–42.9)
California	59.0	(57.3–60.7)	91.5	(90.8–92.2)	71.6	(70.1–73.1)	94.9	(94.3–95.5)	19.0	(16.6–21.3)	67.9	(64.8–71.0)
Colorado	47.8	(44.8–50.8)	87.4	(85.4–89.4)	62.9	(59.3–66.6)	93.3	(91.8–94.7)	10.2	(6.6–13.8)	55.6	(49.8–61.4)
Connecticut	44.7	(42.2–47.2)	84.6	(82.8–86.3)	58.4	(54.6–62.3)	92.5	(91.1–93.8)	11.7	(8.8–14.7)	47.5	(41.9–53.0)
Delaware	40.0	(36.7–43.3)	80.4	(78.0–82.7)	52.2	(48.8–55.5)	90.2	(88.0–92.3)	9.9	(5.2–14.6)	39.1	(33.5–44.8)
DC	41.3	(37.6–43.3)	80.7	(78.4–83.0)	52.8	(48.5–57.0)	89.3	(87.3–91.2)	5.5	(1.6–9.5)	31.7	(25.7–37.7)
Florida	50.1	(48.2–51.9)	88.3	(87.1–89.4)	64.8	(62.8–66.7)	94.5	(93.7–95.4)	13.2	(10.6–15.7)	57.1	(53.3–60.9)
Georgia	41.4	(38.4–44.3)	84.9	(82.9–86.8)	55.1	(51.2–59.0)	91.5	(89.6–93.3)	7.9	(4.9–10.9)	51.9	(47.0–56.7)
Hawaii	51.2	(47.1–55.4)	85.1	(82.7–87.5)	64.6	(59.5–69.7)	89.9	(87.6–92.2)	12.7	(8.6–16.7)	57.3	(48.5–66.1)
Idaho	50.0	(45.1–54.9)	88.6	(87.0–90.2)	66.1	(60.5–71.7)	95.1	(93.7–96.4)	11.5	(8.9–14.1)	61.6	(55.8–67.3)
Illinois	38.5	(35.6–41.5)	79.2	(77.7–80.7)	51.3	(48.3–54.2)	89.0	(87.6–90.3)	7.2	(4.9–9.5)	38.1	(33.7–42.5)
Indiana	33.9	(30.9–36.9)	73.9	(71.0–76.9)	47.6	(43.4–51.8)	86.3	(83.9–88.7)	7.8	(4.5–11.1)	31.4	(25.6–37.2)
Iowa	35.9	(33.1–38.8)	78.4	(76.8–80.0)	48.0	(44.4–51.6)	89.4	(87.8–91.0)	5.6	(3.7–7.4)	41.4	(37.2–45.5)
Kansas	39.6	(36.0–43.2)	81.1	(78.1–84.1)	54.9	(51.6–58.2)	91.8	(90.1–93.5)	4.9	(3.2–6.7)	43.1	(37.7–48.4)
Kentucky	25.6	(21.4–29.8)	69.4	(66.9–71.8)	39.2	(33.3–45.0)	84.5	(82.5–86.6)	3.6	(2.3–5.0)	29.3	(24.8–33.8)
Louisiana	37.0	(33.3–40.7)	82.5	(79.7–85.2)	47.8	(44.1–51.5)	92.0	(90.1–93.9)	11.6	(7.1–16.1)	45.6	(39.6–51.6)
Maine	39.5	(34.6–44.4)	82.0	(79.8–84.1)	57.5	(51.7–63.4)	90.6	(89.0–92.2)	8.1	(5.1–11.1)	50.5	(45.7–55.3)
Maryland	42.4	(38.9–45.8)	84.3	(82.5–86.1)	56.7	(53.2–60.2)	90.6	(88.9–92.3)	6.3	(3.1–9.5)	48.9	(43.4–54.4)
Massachusetts	40.2	(38.1–42.3)	84.1	(81.9–86.3)	51.2	(49.1–53.2)	91.8	(90.2–93.5)	10.0	(7.8–12.2)	42.2	(35.5–49.0)
Michigan	35.0	(33.1–36.9)	76.3	(74.4–78.2)	49.1	(46.8–51.3)	87.2	(85.6–88.9)	6.1	(4.9–7.3)	36.0	(31.4–40.5)
Minnesota	39.6	(37.8–41.4)	84.2	(82.9–85.6)	53.8	(50.9–56.6)	92.8	(91.8–93.8)	7.8	(5.2–10.3)	48.9	(44.1–53.8)
Mississippi	40.9	(37.1–44.7)	80.2	(77.3–83.2)	53.9	(49.1–58.6)	88.8	(85.9–91.6)	9.1	(6.3–12.0)	47.4	(38.9–55.9)
Missouri	34.1	(30.1–38.1)	74.1	(71.1–77.0)	46.0	(41.7–50.4)	87.1	(84.8–89.4)	7.6	(4.4–10.8)	36.0	(30.3–41.7)
Montana	42.8	(38.8–46.7)	82.8	(79.9–85.7)	56.8	(53.1–60.5)	91.5	(88.8–94.2)	7.4	(5.3–9.4)	49.7	(42.7–56.7)
Nebraska	40.0	(36.3–43.7)	82.3	(79.9–85.7)	52.2	(47.6–56.8)	90.8	(89.2–92.3)	8.6	(6.7–10.6)	49.2	(43.6–54.9)
Nevada	45.5	(42.5–48.4)	86.5	(84.6–88.4)	62.5	(59.4–65.6)	94.3	(92.9–95.7)	10.3	(6.8–13.7)	55.1	(47.9–62.4)
New Hampshire	38.3	(34.7–42.0)	83.5	(81.7–85.4)	51.5	(47.4–55.6)	92.5	(91.0–93.9)	7.3	(3.9–10.8)	44.4	(39.1–49.8)
New Jersey	45.5	(43.2–47.7)	86.1	(84.3–88.0)	58.3	(56.3–60.3)	92.7	(91.4–94.0)	10.1	(8.5–11.7)	47.5	(40.8–54.2)
New Mexico	45.4	(40.8–50.0)	84.4	(82.2–86.6)	58.8	(53.1–64.6)	90.9	(88.7–93.2)	11.4	(5.3–17.5)	54.7	(45.0–64.5)
New York	41.4	(39.6–43.2)	81.2	(79.8–82.7)	53.7	(52.2–55.2)	89.8	(88.6–90.9)	8.1	(6.2–10.0)	36.5	(32.8–40.2)
North Carolina	34.1	(32.3–35.9)	79.4	(77.1–81.8)	46.2	(44.1–48.4)	90.2	(88.5–91.8)	8.6	(7.2–10.0)	36.7	(31.0–42.5)
North Dakota	40.9	(36.8–45.0)	81.2	(78.1–75.7)	53.0	(48.4–57.6)	90.6	(89.0–92.2)	8.3	(6.1–10.5)	47.7	(41.9–53.4)
Ohio	35.0	(33.5–36.5)	73.7	(71.8–75.7)	47.9	(46.0–49.8)	86.4	(84.8–88.1)	6.0	(4.7–7.2)	34.3	(30.3–38.3)
Oklahoma	39.1	(35.0–43.1)	76.4	(73.5–79.4)	55.2	(50.6–59.7)	90.3	(88.3–92.3)	6.0	(4.6–7.5)	40.5	(32.8–48.2)
Oregon	49.8	(45.8–53.8)	90.8	(88.9–92.8)	64.5	(60.3–68.6)	95.9	(94.5–97.2)	13.1	(7.9–18.4)	65.6	(58.4–72.9)
Pennsylvania	39.6	(37.9–41.3)	78.5	(77.0–80.0)	52.7	(50.8–54.5)	88.3	(86.9–89.8)	7.9	(6.3–9.6)	39.9	(36.0–43.9)
Rhode Island	38.9	(34.1–43.8)	79.4	(77.1–81.6)	52.6	(46.7–58.5)	90.1	(88.3–91.9)	6.6	(3.8–9.4)	37.5	(31.8–43.3)
South Carolina	39.9	(37.3–42.5)	78.0	(75.4–80.7)	54.3	(51.0–57.7)	88.7	(85.6–91.9)	7.4	(5.4–9.4)	33.1	(26.5–39.7)
South Dakota	36.7	(34.1–39.2)	80.8	(78.8–82.8)	50.0	(47.1–52.9)	89.8	(87.9–91.6)	5.2	(3.4–7.1)	52.5	(47.4–57.6)
Tennessee	33.9	(30.5–37.3)	75.0	(72.1–77.9)	48.8	(44.6–53.1)	87.7	(84.9–90.5)	4.6	(3.6–5.5)	35.8	(31.2–40.3)
Texas	46.3	(43.6–49.0)	85.1	(83.9–86.3)	60.3	(57.6–63.0)	92.5	(91.7–93.4)	10.6	(8.5–12.6)	51.7	(47.9–55.6)
Utah	69.4	(65.5–73.2)	93.6	(92.0–95.2)	82.8	(80.4–85.2)	97.3	(96.2–98.4)	20.9	(13.1–28.7)	68.4	(59.9–76.8)
Vermont	39.0	(35.3–42.7)	85.0	(83.1–86.9)	54.6	(50.3–58.9)	92.1	(90.6–93.6)	8.3	(4.6–11.9)	56.1	(50.1–62.0)
Virginia	39.0	(35.9–42.1)	85.6	(82.6–88.5)	53.8	(49.5–58.0)	93.2	(91.5–94.9)	7.4	(5.1–9.7)	46.1	(39.6–52.6)
Washington	54.3	(50.4–58.3)	90.7	(89.2–92.2)	69.5	(65.0–74.0)	95.2	(93.9–96.4)	16.9	(13.4–20.4)	70.2	(65.8–74.6)
West Virginia	27.9	(24.0–31.8)	69.0	(65.8–72.2)	41.8	(36.9–46.7)	82.9	(79.8–85.9)	4.0	(2.8–5.2)	27.2	(22.3–32.1)
Wisconsin	36.5	(33.3–39.6)	83.1	(80.7–85.5)	50.4	(47.4–53.3)	91.4	(90.0–92.8)	5.9	(4.3–7.6)	49.4	(42.9–55.9)
Wyoming	38.5	(34.5–42.4)	78.8	(75.3–82.2)	52.8	(48.6–57.1)	90.3	(87.9–92.6)	6.2	(4.1–8.2)	41.1	(34.4–47.9)
Overall	**43.0**	**(42.1–43.9)**	**83.0**	**(82.7–83.4)**	**56.7**	**(55.9–57.5)**	**91.4**	**(91.1–91.6)**	**9.6**	**(8.8–10.4)**	**46.1**	**(45.2–47.0)**

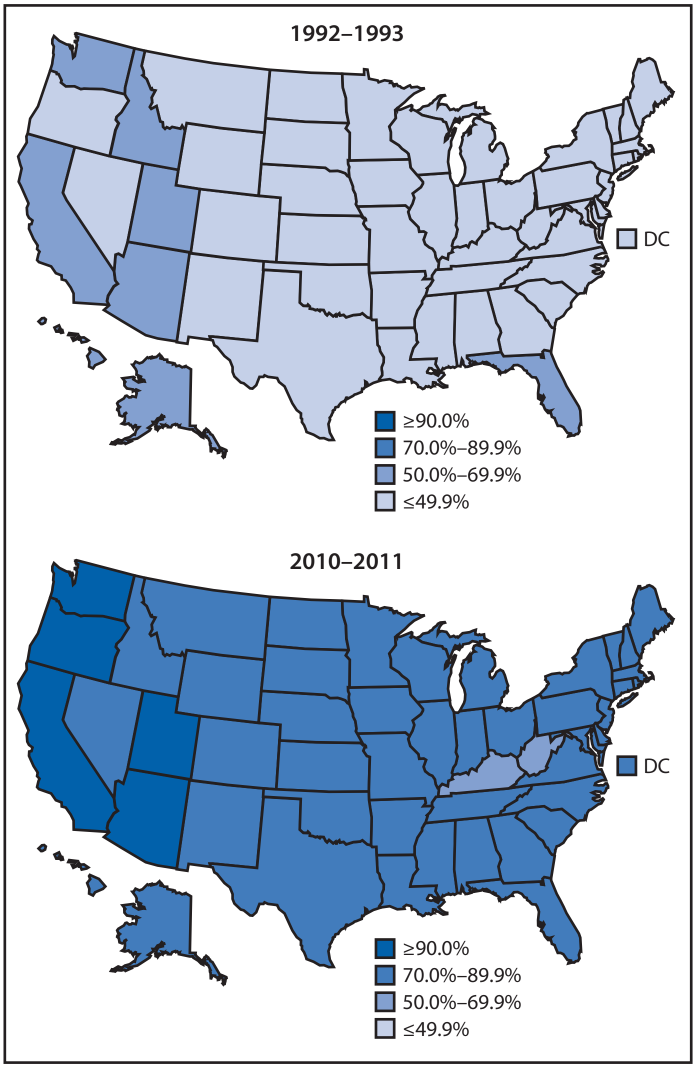
Abbreviations: CI = confidence interval; DC = District of Columbia.

* Households were considered to have a smokefree home rule if all adult respondents aged ≥18 years in the household reported that no one was allowed to smoke anywhere inside the home at any time.

† Households were considered to have at least one adult smoker if at least one adult resident aged ≥18 years reported that they had smoked ≥100 cigarettes in their lifetime and smoked "every day" or "some days" at the time of survey.

§ Statistically significant increases were observed from 1992–1993 to 2010–2011, overall and in all states (p<0.05).

FIGURE. Percentage of households with a smokefree home rule,* by state — Tobacco Use Supplement to the Current Population Survey, 1992–1993 and 2010–2011



* Households were considered to have a smokefree home rule if all adult respondents aged ≥18 years in the household reported that no one was allowed to smoke anywhere inside the home at any time.

(p<0.05). Prevalence ranged from 3.6% in Kentucky to 20.9% in Utah during 1992–1993, and from 27.2% in West Virginia to 68.4% in Utah during 2010–2011.

Discussion

The prevalence of smokefree home rules among U.S. households increased considerably over the past 2 decades, from 43.0% during 1992–1993 to 83.0% during 2010–2011. Making homes completely smokefree reduces SHS exposure among nonsmokers, particularly children, and can help adult smokers quit (*1*). Despite these benefits, millions of nonsmokers in the United States remain unprotected by smokefree home rules. To continue to increase the percentage of U.S. households that are smokefree, efforts are warranted to educate the public about the dangers of SHS exposure and to encourage adoption of smokefree home rules, particularly among persons living in states with lower prevalence of these rules. Additionally, efforts to implement smokefree policies in multiunit housing, where residents who have instituted smokefree home rules can still be exposed to SHS that enters their units from other units and shared areas where smoking occurs (*6*), would further protect nonsmokers from SHS exposure in their homes.

The increased prevalence of smokefree home rules observed nationally and across all states might be attributable to multiple factors, including the spread of state and local comprehensive smokefree laws covering public places and worksites, and declines in cigarette smoking prevalence (*1,2*). Additionally, the substantial increases in the prevalence of smokefree rules in households with at least one smoker and in households in states with high cigarette smoking rates might reflect changes in public attitudes about the social acceptability of smoking around nonsmokers (*1,2*). Comprehensive smokefree laws can stimulate the adoption of voluntary smokefree home rules and increase support for smokefree environments among both nonsmokers and smokers (*1,7*). As of April 2014, 26 states, the District of Columbia, and approximately 600 local municipalities had implemented comprehensive smokefree laws (*3,4*); almost half (49.2%) of U.S. residents are currently covered by comprehensive smokefree laws at the state or local level.[§] Despite this progress, during 2007–2008, approximately 88 million U.S. residents aged ≥3 years were exposed to SHS, and disparities in exposure exist across subpopulations (*5*).

The findings in this report are subject to at least five limitations. First, smokefree rules were self-reported and not validated by an objective measure. However, parental reporting of smokefree home rules strongly correlates with child cotinine levels, suggesting that self-reports of smokefree home rules are accurate (*8*). Second, because the 2006–2007 and 2010–2011 TUS-CPS cycles were only administered to respondents aged ≥18 years, respondents aged 15–17 years who completed the 1992–1993 through 2003 TUS-CPS were excluded. However, excluding these persons did not have a significant impact on the findings; for example, during 1992–1993, national prevalence of smokefree home rules among respondents aged ≥18 years was 43.0%, compared with 43.2% among those aged ≥15 years. Third, members of households with discrepant reports of smokefree home rules were excluded; however, the percentage of excluded respondents was small and declined over time. Fourth, the study only assessed the presence of cigarette smokers in the home and might not have captured

[§] Additional information available at http://www.no-smoke.org/pdf/SummaryUSPopList.pdf.

adults who smoked other tobacco products such as cigars. Finally, response rates for TUS-CPS have declined over time (from 72% during 1992–1993 to 62% during 2010–2011). Lower response rates can increase bias; however, the data were adjusted for nonresponse, and the estimates were comparable to other studies (*9*).

Although substantial progress has been made in increasing the prevalence of smokefree home rules, fewer than half of households with smokers have adopted such rules. This is concerning because nearly all nonsmokers who live with someone who smokes inside the home are exposed to SHS (*5*). Because 100% smokefree indoor environments are the only effective way to fully eliminate SHS exposure (*1*), efforts are warranted to educate the public about the dangers of SHS and to promote the adoption of smokefree home rules, particularly among subpopulations at greatest risk for exposure, such as those living in households with smokers, in states with lower prevalence of smokefree home rules, and in multiunit housing (*1,2,5,10*). Continued adoption of smokefree home rules, in concert with intensified implementation of comprehensive smokefree laws in indoor public places and worksites, can reduce nonsmokers' exposure to this preventable health hazard (*1,2,5*).

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Fatal Meningococcal Disease in a Laboratory Worker — California, 2012

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Occupationally acquired meningococcal disease is rare (*1*). Adherence to recommendations for safe handling of *Neisseria meningitidis* in the laboratory greatly reduces the risk for transmission to laboratory workers (*2*). A California microbiologist developed fatal serogroup B meningococcal disease after working with *N. meningitidis* patient isolates in a research laboratory (laboratory A). The California Department of Public Health (CDPH), the local health department, the California Division of Occupational Safety and Health (CalOSHA), and the federal Occupational Safety and Health Administration (OSHA) collaborated on an investigation of laboratory A, which revealed several breaches in recommended laboratory practice for safe handling of *N. meningitidis*, including manipulating cultures on the bench top. Additionally, laboratory workers had not been offered meningococcal vaccine in accordance with Advisory Committee on Immunization Practices (ACIP) recommendations and CalOSHA Aerosol Transmissible Diseases Standard requirements (*3,4*). In accordance with OSHA and CalOSHA regulations, laboratory staff members must receive laboratory biosafety training and use appropriate personal protective equipment, and those who routinely work with *N. meningitidis* isolates should receive meningococcal vaccine.

Case Report

On the evening of Friday, April 27, 2012, a microbiologist aged 25 years had onset of headache, fever, neck pain, and stiffness. The following morning, April 28, he was transported by automobile to the emergency department at hospital A, where he was employed in laboratory A as a researcher. While on the way to the hospital he lost consciousness. Upon arrival, the patient was noted to have a petechial rash, was suspected of having meningococcal disease, and was treated with ceftriaxone. He later had a respiratory arrest. Attempted resuscitation was unsuccessful, and he was declared dead approximately 3 hours after his arrival.

On the day of the patient's death, hospital A notified the local health department and CDPH of the case of suspected meningococcal disease. On April 29, hospital A notified OSHA, which notified CalOSHA that the deceased had worked in a laboratory conducting *N. meningitidis* vaccine research. Hospital A evaluated potentially exposed emergency department staff members and research laboratory employees; all persons found to have been exposed were immediately assessed for symptoms of meningococcal disease and offered postexposure chemoprophylaxis. Laboratory A voluntarily closed on April 30. No additional cases of meningococcal disease were identified among emergency department or laboratory staff members. The local health department identified other close contacts of the patient and ensured that they received postexposure chemoprophylaxis.

Blood and tissue specimens from the patient were sent to the CDPH Microbial Diseases Laboratory for isolation and serogroup identification. *N. meningitidis* serogroup B was identified in the clinical specimens by polymerase chain reaction. The patient had worked with *N. meningitidis* serogroup B isolates in the weeks and days before his death.

Investigation Findings

CalOSHA, OSHA, and CDPH initiated an investigation. Laboratory A was inspected, and employees were interviewed about their training as well as laboratory practices and protocols and were asked to demonstrate how procedures were performed. Multiple breaches in recommended laboratory safety practices were identified (Tables 1 and 2), including manipulation of *N. meningitidis* isolates on an open laboratory bench (*2,5*). The inspection team made recommendations for safe handling of *N. meningitidis* isolates and use of appropriate personal protective equipment. Laboratory A microbiologists working with *N. meningitidis* isolates had not been offered quadrivalent meningococcal vaccine, as recommended by ACIP (*4*). At the conclusion of the investigation, OSHA issued three citations classified as serious for failure to protect laboratory workers.

Discussion

Although occupationally acquired meningococcal disease is rare, it is a known risk among microbiologists who work with *N. meningitidis* isolates (*6–8*). Investigations of laboratory-acquired cases of meningococcal disease in the United States have demonstrated a many-fold higher attack rate for microbiologists compared with the U.S. general population aged 30–59 years and a case fatality rate of 50%, more than triple the 12%–15% case fatality rate associated with disease in the general population (*9*). In almost all cases, infected microbiologists had manipulated sterile-site isolates on an open laboratory bench outside of a biosafety cabinet (*2,6*). Manipulating *N. meningitidis* isolates outside a biosafety cabinet is known

TABLE 1. Selected breaches in recommended laboratory practices for *Neisseria meningitidis* that were observed by an inspection team after the death of a laboratory worker — California, 2012

Activity	Observed practice	Recommended practice
Flaming of Gram stain slide	Slide not allowed to completely air dry before flaming. This activity was conducted on the open bench.	Allow the slide to air dry before applying fixation. Use alternative methods (e.g., alcohol fixation) in the BSC.
Plate spreading	A disposable plate spreader was used to saturate the plate with the organism. The activity was conducted on the open bench.	A cotton-tipped swab could be used instead of a plastic spreader to reduce the amount of generated aerosol. If plate spreading is necessary, it should be conducted in the BSC.
Plate scraping	A disposable plastic plate scraper was used to harvest the bacteria on the plate. This activity was conducted on the open bench.	Plate scraping is not recommended, but if necessary should be performed in the BSC with appropriate PPE.
Flaming loops	Transfer loops used to inoculate media were flamed on the open bench.	Open flames are no longer universally recommended. Electric furnaces are an alternative. Disposable transfer loops used in the BSC are preferable.
Re-suspension of solution	A solution containing substantial concentrations of viable organism was inoculated with an inactivating enzyme. The solution was vigorously pipetted to create a homogenous solution. This activity occurred 10 minutes into the enzymatic reaction.	This activity should be performed in the BSC. Manufacturer recommends a 20–30 minute treatment time for the enzymatic reaction.
Opening discard bin	The biohazard discard bin lid was foot-pedal operated and opening can rapidly generate an aerosol.	Infectious material should be manipulated in the BSC. Discards should be disposed of in a biohazard bag in the BSC. Biohazard bags should be sealed and wiped down before they are transferred to the biohazard bin outside the BSC.
Discarding plate scraper and spreader	Microbiologists dropped contaminated scrapers and spreaders into an open discard bin located on the floor after working with them on the open bench, potentially generating aerosols.	Spreaders and scrapers should only be used in the BSC. Contaminated spreaders and scrapers should be placed in either a discard pan or biohazard bag. The bag or container should be sealed or covered with a lid and wiped down before removal from the BSC.

Abbreviations: BSC = biological safety cabinet; PPE = personal protective equipment.

TABLE 2. Selected breaches in recommended personnel protective equipment practices for *Neisseria meningitidis* that were observed by an inspection team after the death of a laboratory worker — California, 2012

Personal protective equipment	Observed practice	Recommended practice
Laboratory coat	Cloth laboratory coats were worn. Coats were not routinely decontaminated.	Disposable closed front laboratory coats are preferred. If reusable coats are used, they should be routinely decontaminated and then laundered.
Gloves	Microbiologists wore a single pair of latex gloves while working on the open bench and in the BSC.	BSL-2+ practices warrant using double gloves. The outer gloves should be removed and placed in the biohazard bag or pan in the BSC. Then inner gloves can be removed outside the BSC. Microbiologists should immediately wash their hands upon removing inner gloves.
Eye protection	Microbiologists wore their regular prescription eye glasses for eye protection.	Regular eye glasses are not considered eye protection. Wrap-around eye protection, goggles, or face shields are preferred.
Respiratory protection	Laboratory staff only wore N95 respirators while cleaning up spills.	BSL-2+ practices warrant the use of a respirator that is at least as protective as a fit-tested NIOSH-certified N95 filtering facepiece respirator particularly when culturing large volumes of *N. meningitidis*.

Abbreviations: BSC = biological safety cabinet; BSL = biosafety level; NIOSH = National Institute for Occupational Safety and Health.

to be associated with a high risk for contracting meningococcal disease (*7*).

To decrease the risk of transmission to laboratory workers handling invasive *N. meningitidis* strains (serogroups A, B, C, Y, and W), CDC recommends the use of enhanced biosafety level two (BSL-2) containment practices, where BSL-2 requirements are met and some BSL-3 practices also are adopted (*2*). Updated recommendations for microbiologists manipulating *N. meningitidis* strains were published in January 2012 as a supplement to the *Biosafety in Microbiological and Biomedical Laboratories* guide and include the use of a nonrecirculating biosafety cabinet and the following personal

What is already known on this topic?

Working with *Neisseria meningitidis* isolates without adequate protection on the open laboratory bench can result in aerosol transmission of the bacteria. Meningococcal disease is severe and can be fatal. Among laboratory-acquired meningococcal disease cases, the case fatality rate was 50% in one study, significantly higher than the case fatality rate in the general population. The Advisory Committee on Immunization Practices (ACIP) has published immunization guidelines for laboratory workers who are routinely exposed to isolates of *N. meningitidis*.

What is added by this report?

A laboratory researcher who worked with *N. meningitidis* died from serogroup B meningococcal disease. An investigation identified deficiencies in training and practices in laboratory A, including manipulating cultures outside of a biosafety cabinet. Additionally, laboratory workers who routinely worked with *N. meningitidis* had not been vaccinated in accordance with current ACIP recommendations.

What are the implications for public health practice?

Adequate safety training for laboratory personnel, adherence to recommendations for safe handling of *N. meningitidis* isolates, and vaccination (where indicated) are necessary to reduce the risk for disease among laboratory workers.

protective equipment: disposable closed front laboratory coat, double gloves, fit-tested N95 filtering facepiece or higher level respiratory protection, and eye protection (*2,5*). In California, personnel using respirators also must be enrolled in a respiratory protection program (*10*).

Although this fatal case of serogroup B meningococcal disease was not vaccine-preventable by meningococcal vaccines currently licensed in the United States, licensed vaccines to protect against serogroup A, C, Y, and W-135 disease are available. ACIP recommends meningococcal vaccination for microbiologists who are routinely exposed to isolates of *N. meningitidis* (*3,4*). The CalOSHA Aerosol Transmissible Diseases Standard also requires that California employers offer all vaccinations as recommended by applicable public health guidelines for specific laboratory operations (*1,4*). A serogroup B vaccine (Bexsero, Novartis) was licensed in Europe, Australia, and Canada in 2013 and has received a "breakthrough therapy" designation from the Food and Drug Administration.

Employers should be familiar with laboratory biosafety recommendations and ensure that a laboratory biosafety program is in place. Employers also should ensure that laboratory staff are trained, adhere to recommended biosafety practices and procedures, and are offered recommended vaccines.

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Notes from the Field

Reports of Expired Live Attenuated Influenza Vaccine Being Administered — United States, 2007–2014

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Annual influenza vaccination is recommended for all persons aged ≥6 months (*1*). Two vaccine types are approved in the United States, injectable inactivated influenza vaccine (IIV) and live attenuated influenza vaccine (LAIV), which is administered intranasally (*1*). Influenza vaccine typicaly becomes widely available beginning in late summer or early fall. IIV has a standard expiration date of June 30 for any given influenza season (July 1 through June 30 of the following year). In contrast, after release for distribution, LAIV generally has an 18-week shelf life (Christopher Ambrose, MedImmune, personal communication, 2014). Because of its relatively short shelf life, LAIV might be more likely than IIV to be administered after its expiration date. To assess that hypothesis, CDC analyzed reports to the Vaccine Adverse Event Reporting System (VAERS) (*2*) of expired LAIV administered during July 1, 2007, through June 30, 2014.

Of the 4,699 LAIV reports, 866 (18.4%) involved administration of expired vaccine; 97.5% of these reports did not document any adverse health event. In 95.1% of expired LAIV reports, vaccination occurred after the first week in November, which is approximately 18 weeks from July 1. Historically, by early November, most vaccine has been administered for the season (*3*). In contrast, of the 49,695 IIV reports, only 96 (0.02%) involved administration of expired vaccine. VAERS is a national, passive surveillance system that accepts reports from anyone (including vaccine recipients, providers, and manufacturers); because of this, it is not possible to definitively conclude that LAIV is more likely to be administered after its expiration date. However, the magnitude of disproportional reporting for this error in expired LAIV use compared with IIV supports the hypothesis.

As a passive surveillance system, VAERS likely captures only a small fraction of expired LAIV administered, so this error might be more common than VAERS data indicate. Most reports had a vaccination date in November or later. Health care providers need to be aware of the short shelf life of LAIV and implement measures to avoid administering expired LAIV, especially from November and onward, when this error appears to be more common. Although the data do not indicate that administration of expired LAIV poses a health risk, revaccination with a valid dose is advised (*4*). Replacement options for expired LAIV are available at http://www.flumistquadrivalent.com/hcp/ordering_and_returns.html.

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Announcements

National Preparedness Month — September 2014

Throughout September, approximately 3,000 organizations will participate in activities in support of National Preparedness Month. CDC supports this initiative by partnering with national, regional, state, and local government agencies, as well as private and public organizations, to encourage persons to take part in preparedness efforts at home, school, and throughout their communities.

For Preparedness Month 2014, CDC's Office of Public Health Preparedness and Response has focused its efforts on developing messages and products designed to meet the needs of vulnerable populations (*1*). Vulnerable populations, those populations defined by economic disadvantage, language and literacy differences, medical issues and disability (physical, mental, cognitive, or sensory), isolation (cultural, geographic, or social), and age, have unique needs in a disaster or public health emergency. Using various tools (*2*) and workbooks (*3*), CDC is working to educate and empower all populations to make the right choices for their health and safety.

The unpredictable nature of disasters makes personal preparedness a necessity. In the case of vulnerable populations, there are unique considerations that must be taken into account when preparing for emergencies (*4,5*). Additional information about emergency preparedness and response is available at http://www.cdc.gov/phpr.

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CDC's Model Aquatic Health Code, First Edition

The first edition of the Model Aquatic Health Code (MAHC) was released on August 29, 2014, and is now available from CDC online at http://www.cdc.gov/mahc. The MAHC is a guidance document that jurisdictions can use to update or implement codes, rules, regulations, guidance, laws, or standards governing swimming pools, spas, hot tubs, and other public, treated, recreational water venues to reduce infectious disease outbreaks, drowning, and chemical injuries.

In the United States, no federal agency regulates the design, construction, operation, and maintenance of public swimming pools and other public, treated, recreational water venues. All pool codes are independently written and enforced by state and/or local agencies. In 2005, local, state, and federal public health officials and representatives of the aquatic sector requested that CDC develop a model, evidence-based code. Since 2007, CDC has led a national collaborative effort with public health, industry, and academic representatives from across the United States to develop the MAHC.

CDC will work with national partners to periodically update the MAHC to ensure it stays current with the latest industry advances and public health findings. The Conference for the Model Aquatic Health Code (CMAHC) (http://www.cmahc.org) is a nonprofit organization created in 2013 to support and improve public health by promoting healthy and safe aquatic experiences for everyone. CMAHC members will suggest MAHC revisions for CDC's final determination.

Announcements

Recommendation Regarding Diabetes Prevention — Community Preventive Services Task Force

The Community Preventive Services Task Force recently posted new information on its website, “Diabetes Prevention and Control: Combined Diet and Physical Activity Promotion Programs to Prevent Type 2 Diabetes Among People at Increased Risk.” This information is available at http://www.thecommunityguide.org/diabetes/combineddietandpa.html.

Established in 1996 by the U.S. Department of Health and Human Services, the task force is an independent, nonfederal, uncompensated panel of public health and prevention experts whose members are appointed by the Director of CDC. The task force provides information for a wide range of decision makers on programs, services, and policies aimed at improving population health. Although CDC provides administrative, research, and technical support for the task force, the recommendations developed are those of the task force and do not undergo review or approval by CDC.

Erratum

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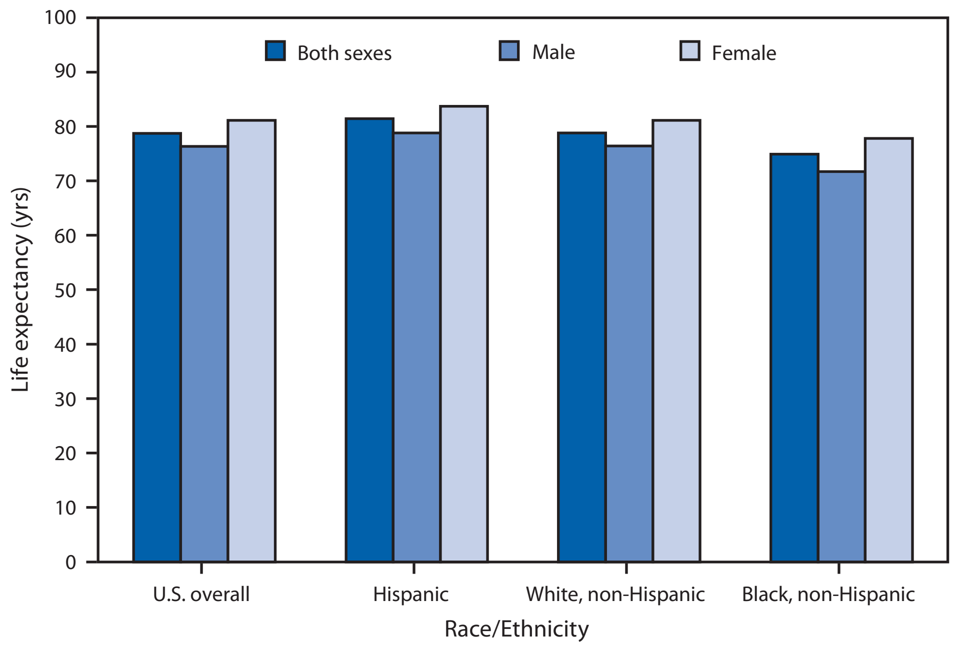
In the QuickStats, “Death Rates from Unintentional Drowning, by Age Group and Sex — United States, 2011,” an error occurred in the source line. That line should read, “Source: National Vital Statistics System. Mortality public use data file for 2011. Available at http://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.”

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Life Expectancy at Birth, by Sex and Race/Ethnicity — United States, 2011



In 2011, life expectancy at birth was 78.7 years for the total U.S. population, 76.3 years for males, and 81.1 years for females. Life expectancy was highest for Hispanics for both males and females. In each racial/ethnic group, females had higher life expectancies than males. Life expectancy ranged from 71.7 years for non-Hispanic black males to 83.7 years for Hispanic females.

Source: National Center for Health Statistics. Deaths: final data for 2011. Available at http://www.cdc.gov/nchs/data/nvsr/nvsr63/nvsr63_03.pdf.

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