



MMWR™

Morbidity and Mortality Weekly Report

www.cdc.gov/mmwr

Weekly

February 27, 2009 / Vol. 58 / No. 7

Motor Vehicle–Related Death Rates – United States, 1999–2005

In 2005, the most recent year for which data are available, 45,520 deaths in the United States were related to motor vehicles (1). A *Healthy People 2010* objective calls for reducing the rate of deaths related to motor vehicles to 9.2 per 100,000 population from a baseline of 15.6 in 1998 (2). To assess progress toward the *Healthy People* objective and to examine characteristics of motor vehicle–related death rates, CDC analyzed data from the National Vital Statistics System (NVSS) for the period 1999–2005. This report summarizes the results of that analysis, which determined that, during 1999–2005, although annual age-adjusted motor vehicle–related death rates overall were nearly unchanged (range: 15.2–15.7 per 100,000 population), substantial differences were observed by state, U.S. Census region,* sex, race, and age group. Among states, the average annual death rate ranged from 7.9 per 100,000 population in Massachusetts to 31.9 in Mississippi. Among regions, the rate ranged from 9.8 per 100,000 population in the Northeast to 19.5 in the South. The rate for men (21.7 per 100,000 population) was more than double the rate for women (9.4); the rate for American Indians/Alaska Natives (27.2) was nearly twice the rate for whites (15.7) and blacks (15.2), and the rate for persons aged 15–24 years (26.8) was 74% higher than the average annual rate overall (15.4). Additional analysis and research to determine the causes of geographic and demographic variations in motor vehicle–related deaths might result in more effective targeted interventions among the states, regions, and populations at greatest risk.

* *Northeast*: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *South*: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *Midwest*: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. *West*: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

NVSS data were obtained from CDC's Web-based Injury Statistics and Query System, an interactive surveillance system that provides customized reports of injury-related deaths based on death certificate records from state vital statistics offices (1). CDC analyzed data on motor vehicle–related deaths for the period 1999–2005, the most recent years for which data were available, using codes[†] from the *International Classification of Diseases, 10th Revision (ICD-10)* (3). Because the mortality coding system in the United States changed significantly from ICD-9 to ICD-10 in 1999, analysis was limited to data for the period 1999–2005 to ensure appropriate comparisons of data from year to year (4). Bridged-race population estimates from the U.S. Census were used to calculate death rates. Rates were age adjusted to the 2000 standard U.S. population. Negative binomial regression was used to determine the statistical significance ($p < 0.05$) of changes in rates from 1999 to 2005. Data were analyzed by state, census region, sex, race (regardless of Hispanic ethnicity), and age group.

During 1999–2005, a total of 311,356 motor vehicle–related deaths occurred in the United States. The overall average annual

[†] ICD-10 codes for motor vehicle–related deaths include those for unintentional, intentional, and undetermined deaths and are as follows: V02–V04, V09.0, V09.2, V12–V14, V19.0–V19.2, V19.4–V19.6, V20–V79, V80.3–V80.5, V81.0–V81.1, V82.0–V2.1, V83–V86, V87.0–V87.8, V88.0–V88.8, V89.0, V89.2, X82, Y03, and Y32.

INSIDE

- 165 Arthritis as a Potential Barrier to Physical Activity Among Adults With Heart Disease – United States, 2005 and 2007
- 169 Completeness and Timeliness of Reporting of Meningococcal Disease – Maine, 2001–2006
- 172 Notice to Readers
- 173 QuickStats

The *MMWR* series of publications is published by the Coordinating Center for Health Information and Service, 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* 2009;58:[inclusive page numbers].

Centers for Disease Control and Prevention

Richard E. Besser, MD
(Acting) Director

Tanja Popovic, MD, PhD
Chief Science Officer

James W. Stephens, PhD
Associate Director for Science

Steven L. Solomon, MD
Director, Coordinating Center for Health Information and Service

Jay M. Bernhardt, PhD, MPH
Director, National Center for Health Marketing

Katherine L. Daniel, PhD
Deputy Director, National Center for Health Marketing

Editorial and Production Staff

Frederic E. Shaw, MD, JD
Editor, MMWR Series

Susan F. Davis, MD
(Acting) Assistant Editor, MMWR Series

Robert A. Gunn, MD, MPH
Associate Editor, MMWR Series

Teresa F. Rutledge
Managing Editor, MMWR Series

Douglas W. Weatherwax
Lead Technical Writer-Editor

Donald G. Meadows, MA
Jude C. Rutledge

Writers-Editors

Martha F. Boyd
Lead Visual Information Specialist

Malbea A. LaPete

Stephen R. Spriggs

Visual Information Specialists

Kim L. Bright, MBA

Quang M. Doan, MBA

Phyllis H. King

Information Technology Specialists

Editorial Board

William L. Roper, MD, MPH, Chapel Hill, NC, Chairman

Virginia A. Caine, MD, Indianapolis, IN

David W. Fleming, MD, Seattle, WA

William E. Halperin, MD, DrPH, MPH, Newark, NJ

Margaret A. Hamburg, MD, Washington, DC

King K. Holmes, MD, PhD, Seattle, WA

Deborah Holtzman, PhD, Atlanta, GA

John K. Iglehart, Bethesda, MD

Dennis G. Maki, MD, Madison, WI

Sue Mallonee, MPH, Oklahoma City, OK

Patricia Quinlisk, MD, MPH, Des Moines, IA

Patrick L. Remington, MD, MPH, Madison, WI

Barbara K. Rimer, DrPH, Chapel Hill, NC

John V. Rullan, MD, MPH, San Juan, PR

William Schaffner, MD, Nashville, TN

Anne Schuchat, MD, Atlanta, GA

Dixie E. Snider, MD, MPH, Atlanta, GA

John W. Ward, MD, Atlanta, GA

age-adjusted rate for this period was 15.4 deaths per 100,000 population (range: 15.2–15.7 per 100,000 population); the annual death rate decreased by 1% from 15.3 in 1999 to 15.2 in 2005 (Table 1).

Of the motor vehicle–related deaths in the United States during 1999–2005, a total of 141,780 (46%) occurred in the South census region. The average annual death rate was highest in the South (19.5 per 100,000 population), followed by the Midwest (14.7), West (14.2), and Northeast (9.8). By state, the average annual death rate was highest in Mississippi (31.9 per 100,000 population), followed by Wyoming (27.7), Arkansas (25.6), Montana (25.6), and Alabama (25.1). In four states and the District of Columbia (DC), the average annual death rate was below the *Healthy People* target of 9.2 per 100,000 population: Massachusetts (7.9), New York (8.4), Rhode Island (8.5), DC (8.4), and New Jersey (9.0) (Table 1).

During 1999–2005, the average annual death rate for males (21.7 deaths per 100,000 population) in the United States was more than twice the rate for females (9.4) (Table 2). By race, the average annual death rate was highest among American Indians/Alaska Natives (27.2 deaths per 100,000 population), followed by whites (15.7), blacks (15.2), and Asians/Pacific Islanders (8.2) (Table 2).

By age group, the average annual motor vehicle–related death rate was highest among persons aged 15–24 years (26.8 deaths per 100,000 population) and persons aged ≥ 75 years (25.9) and lowest among persons aged ≤ 14 years (4.0) (Table 3). From 1999 to 2005, the annual rate was flat (26.3 versus 25.9) among persons aged 15–24 years and increased by 8% among persons aged 45–64 years and by 4% among persons aged 25–44 years. The annual rate decreased by 18% among persons aged ≤ 14 years and by 15% among persons aged ≥ 75 years.

Reported by: *N Adekoya, DrPH, National Center for Public Health Informatics; Motor Vehicle Injury Prevention Team, Div of Unintentional Injury Prevention, National Center for Injury Prevention and Control, CDC.*

Editorial Note: During 1999–2005, approximately 300,000 deaths in the United States were related to motor vehicle crashes; however, the overall annual death rate did not change substantially (range: 15.2–15.7 per 100,000 population). During an earlier period, from 1969 to 1992, the overall annual rate of motor vehicle–related deaths in the United States decreased 43%, from 27.7 per 100,000 population[§] to 15.8 (1), a rate only slightly higher than the rate observed during 1999–2005. Motor vehicle–related deaths are preventable, and numerous factors have been credited for the decrease in the death rate during 1969–1992, including adoption of the 0.08 g/dL blood alcohol concentration limit for drivers; vehicle

[§] National Safety Council, *Injury Facts*, 2002.

TABLE 1. Number of motor vehicle–related deaths* and death rates,† by state and U.S. Census region — National Vital Statistics System, United States, 1999–2005

Region/State	No.	Average annual rate	1999	2000	2001	2002	2003	2004	2005	Change from 1999 to 2005 (%)	p-value‡
Northeast	37,707	9.8	9.9	9.6	10.0	10.3	9.7	9.6	9.6	-3	0.496
Connecticut	2,229	9.3	9.2	10.1	9.5	10.2	8.3	9.7	8.3	-10	0.400
Maine	1,370	14.9	15.7	13.8	15.4	16.3	15.2	14.1	14.2	-10	0.757
Massachusetts	3,626	7.9	7.0	7.7	8.7	8.6	8.1	8.0	7.3	4	0.372
New Hampshire	987	11.2	10.9	11.2	11.0	10.0	10.2	12.6	12.3	13	0.024
New Jersey	5,378	9.0	8.8	9.3	9.0	9.2	9.2	8.9	8.7	-1	0.502
New York	11,413	8.4	9.3	8.1	8.7	8.8	8.1	8.1	7.8	-16	0.036
Pennsylvania	11,482	13.0	12.8	12.3	12.6	13.9	13.1	12.5	13.9	9	0.008
Rhode Island	654	8.5	8.3	7.5	8.9	8.5	9.4	8.9	7.9	-5	0.257
Vermont	568	13.1	13.7	12.5	14.6	12.6	11.8	13.0	13.1	-4	0.943
South	141,780	19.5	19.4	19.9	19.5	19.6	19.3	19.5	19.3	-1	0.054
Alabama	7,912	25.1	26.1	24.0	23.2	24.8	23.8	27.8	25.7	-2	0.148
Arkansas	4,889	25.6	24.5	25.3	24.4	25.4	26.2	28.4	24.7	1	0.023
Delaware	860	15.2	12.7	16.1	15.3	14.9	16.0	16.9	14.0	10	0.165
District of Columbia	354	8.4	6.3	9.6	9.0	9.2	10.4	7.6	6.7	6	0.934
Florida	22,356	18.8	17.9	19.0	18.6	18.9	18.8	18.6	19.6	9	<0.001
Georgia	10,860	18.4	19.3	19.2	19.7	18.1	16.7	17.1	18.7	-3	0.181
Kentucky	6,380	22.1	20.1	20.5	21.1	22.5	22.7	23.9	23.7	18	<0.001
Louisiana	6,968	22.2	22.0	22.7	22.2	21.5	21.4	22.7	22.7	3	0.084
Maryland	4,667	12.4	12.0	11.9	13.4	13.4	13.0	12.1	11.3	-6	0.772
Mississippi	6,391	31.9	33.9	32.9	29.1	30.8	31.4	31.5	33.4	-1	0.858
North Carolina	11,676	20.0	20.0	21.0	20.1	20.2	19.8	19.9	19.2	-4	0.056
Oklahoma	5,208	21.1	20.0	19.6	20.9	21.9	20.6	21.5	23.3	17	<0.001
South Carolina	7,118	24.6	25.1	25.8	24.5	24.9	22.8	24.4	25.1	0	0.838
Tennessee	9,302	22.8	23.4	24.5	22.5	21.6	22.3	23.4	21.8	-7	0.343
Texas	27,226	18.1	18.2	18.6	18.9	18.7	18.4	17.4	16.8	-8	0.077
Virginia	6,818	13.4	13.0	14.0	13.5	13.3	13.8	13.6	12.8	-2	0.488
West Virginia	2,795	21.7	21.0	21.7	20.7	22.4	21.8	22.5	22.1	5	0.003
Midwest	67,402	14.7	14.9	15.1	14.8	15.3	14.6	14.1	14.1	-5	0.117
Illinois	10,829	12.3	12.6	12.7	12.8	12.6	11.9	11.9	11.5	-9	0.003
Indiana	6,802	15.7	16.5	15.1	15.9	15.6	15.2	16.1	15.4	-7	0.814
Iowa	3,239	15.3	17.7	15.8	14.9	14.0	15.0	13.7	15.5	-12	0.080
Kansas	3,684	19.1	21.1	18.4	19.7	20.5	17.8	18.2	18.1	-14	0.065
Michigan	9,723	13.9	14.4	15.4	14.5	13.9	13.7	13.0	12.2	-15	<0.001
Minnesota	4,732	13.4	13.3	14.1	12.6	14.7	13.8	12.7	12.4	-7	0.688
Missouri	8,039	20.0	19.0	19.6	19.6	21.2	21.2	19.1	20.5	8	0.049
Nebraska	2,077	16.8	17.3	16.4	15.6	19.2	17.6	15.7	16.0	-8	0.973
North Dakota	838	18.1	19.9	16.1	17.6	17.1	18.1	17.9	19.7	-1	0.374
Ohio	10,155	12.6	12.6	12.9	13.0	14.0	11.7	12.0	12.2	-3	0.485
South Dakota	1,303	24.2	23.3	23.4	24.0	24.1	27.3	24.6	22.7	-3	0.424
Wisconsin	5,981	15.5	14.6	16.5	15.1	15.8	16.0	14.7	15.6	7	0.494
West	64,467	14.2	13.6	13.9	13.9	14.6	14.6	14.2	14.3	5	<0.001
Alaska	765	18.2	15.2	23.8	17.6	18.9	19.0	18.9	14.3	-6	0.891
Arizona	7,543	19.8	19.0	19.9	19.4	20.7	20.0	19.5	20.3	7	0.004
California	29,061	12.0	11.2	11.3	11.6	12.3	12.8	12.5	12.3	10	<0.001
Colorado	5,024	16.1	15.0	17.7	17.2	17.5	15.7	15.4	14.4	-4	0.389
Hawaii	897	10.2	7.4	10.6	10.5	9.7	11.2	11.2	11.0	49	0.002
Idaho	1,921	20.4	21.8	21.3	19.3	22.2	20.7	18.2	19.9	-9	0.133
Montana	1,655	25.6	23.3	26.5	23.3	27.9	27.5	25.7	25.1	8	0.181
Nevada	2,614	17.5	17.7	15.5	16.3	18.2	16.8	18.2	19.3	9	0.001
New Mexico	3,087	23.8	23.5	23.4	24.0	22.7	23.4	25.4	24.0	2	0.004
Oregon	3,460	13.9	12.8	14.0	14.6	13.0	15.2	13.8	13.9	9	0.112
Utah	2,312	14.8	17.1	17.3	13.8	14.8	13.5	13.9	13.6	-20	<0.001
Washington	5,145	12.1	12.7	12.2	12.5	12.6	12.0	10.8	12.1	-5	0.308
Wyoming	983	27.7	29.0	24.8	28.7	31.7	26.9	22.7	30.2	4	0.825
Total	311,356	15.4	15.3	15.5	15.4	15.7	15.3	15.2	15.2	-1	0.021

* *International Classification of Diseases, 10th Revision* codes for motor vehicle–related deaths include those for unintentional, intentional, and undetermined deaths and are as follows: V02–V04, V09.0, V09.2, V12–V14, V19.0–V19.2, V19.4–V19.6, V20–V79, V80.3–V80.5, V81.0–V81.1, V82.0–V2.1, V83–V86, V87.0–V87.8, V88.0–V88.8, V89.0, V89.2, X82, Y03, and Y32.

† Age adjusted, per 100,000 population.

‡ Statistical significance determined by negative binomial regression ($p < 0.05$).

TABLE 2. Number of motor vehicle–related deaths* and death rates,† by sex, race, and U.S. Census region§ — National Vital Statistics System, United States, 1999–2005

Characteristic	Northeast		South		Midwest		West		Total	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Average annual rate
Sex										
Male	25,889	14.3	97,530	27.7	45,501	20.5	44,289	19.6	213,209	21.7
Female	11,818	5.7	44,250	11.8	21,901	9.2	20,178	8.8	98,147	9.4
Race										
White	33,027	10.4	113,293	20.1	59,748	14.9	54,318	14.4	260,386	15.7
Black	3,764	8.0	25,829	19.0	5,877	12.7	3,066	12.7	38,536	15.2
AI/AN¶	71	4.3	1,166	19.6	1,055	31.9	3,343	34.2	5,635	27.2
Asian/Pacific Islander	845	5.3	1,492	9.6	722	8.1	3,740	8.8	6,799	8.2

* *International Classification of Diseases, 10th Revision* codes for motor vehicle–related deaths include those for unintentional, intentional, and undetermined deaths and are as follows: V02–V04, V09.0, V09.2, V12–V14, V19.0–V19.2, V19.4–V19.6, V20–V79, V80.3–V80.5, V81.0–V81.1, V82.0–V2.1, V83–V86, V87.0–V87.8, V88.0–V88.8, V89.0, V89.2, X82, Y03, and Y32.

† Age adjusted, per 100,000 population.

§ *Northeast*: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *South*: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *Midwest*: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. *West*: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

¶ American Indian/Alaska Native.

TABLE 3. Number of motor vehicle–related deaths* and death rates,† by age group — National Vital Statistics System, United States, 1999–2005

Age group (yrs)	No.	Average annual rate								Change from 1999 to 2005 (%)	p-value§
			1999	2000	2001	2002	2003	2004	2005		
≤14	17,100	4.0	4.4	4.3	4.1	3.9	4.0	4.0	3.6	-18	<0.001
15–24	76,054	26.8	26.3	27.1	26.8	28.2	26.7	26.4	25.9	-2	0.845
25–44	97,589	16.4	15.9	16.3	16.6	16.8	16.5	16.3	16.6	4	<0.001
45–64	67,511	14.5	13.9	14.4	14.1	14.7	14.7	14.8	15.0	8	<0.001
65–74	21,532	16.7	17.8	16.6	16.4	17.1	16.2	16.2	16.8	-6	0.300
≥75	31,397	25.9	27.6	27.0	26.7	26.3	25.8	24.8	23.5	-15	<0.001
Total	311,356	15.4	15.3	15.5	15.4	15.7	15.3	15.2	15.2	-1	0.021

* *International Classification of Diseases, 10th Revision* codes for motor vehicle–related deaths include those for unintentional, intentional, and undetermined deaths and are as follows: V02–V04, V09.0, V09.2, V12–V14, V19.0–V19.2, V19.4–V19.6, V20–V79, V80.3–V80.5, V81.0–V81.1, V82.0–V2.1, V83–V86, V87.0–V87.8, V88.0–V88.8, V89.0, V89.2, X82, Y03, and Y32.

† Age adjusted, per 100,000 population.

§ Statistical significance determined by negative binomial regression (p<0.05).

safety improvements, primary enforcement of seat belt and child restraint laws, an increased minimum legal drinking age, alcohol checkpoints, lower speed limits and increased enforcement, and increased availability of statewide trauma systems (5). Nonetheless, additional and vigorous measures are needed if the *Healthy People 2010* national objective of 9.2 deaths per 100,000 population is to be met.

The findings in this report revealed substantial variation in motor vehicle–related death rates among states during 1999–2005. Some of this variation is explained by the extent of population exposure to the road environment, which was not part of this population-based analysis. Similar calculations using a denominator such as vehicle miles traveled can yield different variations among states. Motor vehicle–related death rates also can vary for other reasons, including the types of road users. In this analysis, rates might be higher in states with greater percentages of more vulnerable road users (e.g.,

pedestrians, bicyclists, and motorcyclists) than in states with more passenger vehicle occupants.

The South accounted for 46% of the deaths during the period studied but only 36% of the population. Reasons for this disproportion are unclear. In addition to variations in exposure to the road environment and type of road user, rates might be affected by the proportion of the population living in rural versus urban locations and greater distances traveled, differences in population demographics (e.g., income and education), and differences in safety behaviors such as safety belt use (6–8). However, regional differences also mask substantial state variability. For example, in the South, Alabama and Arkansas had rates approximately twice as high as Maryland and Virginia. The differences in death rates by sex, race, and age group observed in this analysis are consistent with other reports and again underscore the importance of identifying populations at greatest risk for targeted interventions (e.g.,

males, American Indian/Alaska Natives, and young adults) (9,10). Further studies should address reasons for the higher motor vehicle–related death rates in certain states to enable creation of strategies that directly address this concern.

The findings in this report are subject to at least two limitations. First, death certificates and population estimates might not accurately record race, resulting in overreporting or underreporting of deaths and rates for certain racial populations. Second, the *Healthy People* objective was based on unintentional deaths only. However, this study examined all motor vehicle–related deaths, including homicides and suicides, which accounted for 1,400 deaths, or approximately 0.45% of all motor vehicle–related deaths during the study period.

Motor vehicle crashes continue to be a leading cause of death and injury in every U.S. region and state. States should reexamine their unique demographic, geographic, and cultural risk factors to determine the extent to which they are contributing to motor vehicle crashes and injuries. In addition, state and local highway safety and public health officials should reconsider additional strategies that have demonstrated effectiveness in reducing the number of motor vehicle–related deaths and injuries. For example, when properly used, lap/shoulder safety belts reduce by 45% the risk for dying in a crash and by 50% the risk for moderate to serious injury (6). Currently, 49 states and DC have safety belt laws; however, 23 states have only implemented laws with secondary enforcement (i.e., allowing police to ticket motorists for not using safety belts only if they are stopped for another violation). Secondary laws are less effective at increasing safety belt use and decreasing fatalities than primary laws (10). States should reexamine their motor vehicle safety policies to ensure that they are implementing and enforcing measures with the greatest effectiveness. Information on the effectiveness of strategies to increase use of safety belts and child safety seats and reduce alcohol-impaired driving is available at <http://www.thecommunityguide.org/mvoi/index.html>.

References

1. CDC. WISQARS (Web-based Injury Statistics Query and Reporting System). Available at <http://www.cdc.gov/ncipc/wisqars>.
2. US Department of Health and Human Services. Injury and violence protection: objective 15-15. In: *Healthy people 2010* (conference ed. in 2 vols). Washington, DC: US Department of Health and Human Services; 2000. Available at <http://www.healthypeople.gov/document/pdf/volume2/15injury.pdf>.
3. World Health Organization. International statistical classification of diseases and related health problems: 10th revision (ICD-10). 3 vols. Geneva, Switzerland: World Health Organization; 1992.
4. Anderson RN, Minino AM, Hoyert DL, Rosenberg HM. Comparability of cause of death between ICD-9 and ICD-10: preliminary estimates. *Natl Vital Stat Rep* 2001;49(2).
5. Dellinger AM, Sleet DA, Jones BH. Drivers, wheels, and roads: motor vehicle safety in the twentieth century [Chapter 16]. In: Ward JW, Warren C, eds. *Silent victories: the history and practice of public health in twentieth-century America*. New York, NY: Oxford; 2007:343–62.
6. National Highway Traffic Safety Administration. Traffic safety facts—2007 data. Occupant protection. Washington, DC: National Highway Traffic Safety Administration; 2008. DOT HS 810 991. Available at <http://www-nrd.nhtsa.dot.gov/pubs/810991.pdf>.
7. National Highway Traffic Safety Administration. Traffic safety facts, 2005. A compilation of motor vehicle crash data from the Fatality Analysis Reporting System and the General Estimates System. Washington, DC: National Highway Traffic Safety Administration; 2006. DOT HS 810 631.
8. O'Neill B, Kyrychenko SY. Use and misuse of motor-vehicle crash death rates in assessing highway-safety performance. *Traffic Inj Prev* 2006;7:307–18.
9. CDC. Injury mortality among American Indian and Alaska Native children and youth—United States, 1989–1998. *MMWR* 2003;52:697–701.
10. Shults RA, Nichols JL, Dinh-Zarr TB, Sleet DA, Elder RW. Effectiveness of primary enforcement safety belt laws and enhanced enforcement of safety belt laws: a summary of the Guide to Community Preventive Services systematic reviews. *J Safety Res* 2004;35:189–96.

Arthritis as a Potential Barrier to Physical Activity Among Adults With Heart Disease – United States, 2005 and 2007

Being physically active is an important component of heart disease (HD) management (1); however patients with HD are less likely to comply with physical activity recommendations than those without HD (2). Arthritis is a common comorbidity among persons with HD, and arthritis-associated joint pain and fear of further joint damage can be an unrecognized barrier to physical activity among persons with HD (CDC, unpublished data, 2008). To provide estimates of the magnitude of this problem at the state level, CDC combined 2005 and 2007 Behavioral Risk Factor Surveillance System (BRFSS) data to estimate overall and age- and sex-specific prevalence of self-reported doctor-diagnosed arthritis among adults aged ≥ 18 years with self-reported HD, and the prevalence of physical inactivity among adults with HD by arthritis status. The results indicated that, for these 2 years combined, arthritis affected 57.4% of adults with HD, compared with 27.4% of adults in the general population. Among adults with HD, the likelihood of physical inactivity was 30% greater compared with that of persons with HD but without arthritis, when adjusted for age, sex, race/ethnicity, education level, and body mass index (BMI) (odds ratio [OR] = 1.3). These results suggest that arthritis might be an additional barrier to increased physical activity among persons with HD. Health-care providers and public health agencies should consider addressing this barrier with arthritis-specific or general evidence-based self-management

education and exercise programs for their patients with arthritis and HD.

BRFSS is a state-based, random-digit-dialed telephone survey of the noninstitutionalized U.S. civilian population aged ≥ 18 years. Data were collected from the 50 states, District of Columbia (DC), Puerto Rico, and U.S. Virgin Islands. Response rates were calculated using Council of American Survey and Research Organizations (CASRO) guidelines; for 2005 and 2007,* respectively, median response rates were 51.1% and 50.6% and cooperation rates were 75.1% and 72.1%.† A total of 15,725 respondents with missing arthritis or HD data were excluded, resulting in a final sample of 757,959.

HD was defined as a “yes” response to at least one of two questions: “Has a doctor, nurse, or other health professional ever told you that you had... a heart attack, also called a myocardial infarction?” or “...angina or coronary heart disease?” Doctor-diagnosed arthritis was defined as a “yes” response to the question, “Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?” Physical activity level of respondents was determined from six questions‡ that asked about frequency and duration of participation in nonoccupational activities (i.e., lifestyle activities) of moderate and vigorous intensity; persons reporting no participation in such activities were classified as inactive. Physical activity guidelines in effect during 2005 and 2007 were used for classifying physical inactivity.§ Body mass index (BMI) was calculated from self-reported height and weight.

To generate nationwide estimates and 95% confidence intervals (CIs), data from 2005 and 2007 for the 50 states and DC were combined, and an annual average weighting was applied to account for multistage probability sampling. Data for arthritis and heart disease were not collected in all states in 2006, and so, were not included. To assess factors potentially confounding an association between doctor-diagnosed arthritis and physical inactivity among those with heart disease, data were combined across states, in unadjusted and adjusted (by

age, sex, race/ethnicity, education level, and BMI) logistic regression models. All other estimates in this report are unadjusted. Estimates were calculated for the 50 states, DC, and territories. Because states are most interested in the number of affected persons and unadjusted prevalence for use in planning and resource allocations, unadjusted state-specific estimates are provided in this report. Statistical significance was determined by the chi-square test ($p < 0.05$).

Average annual adult prevalence was 6.5% for HD and 26.9% for arthritis. Among all respondents, 3.7% reported HD and arthritis, 2.8% reported HD only, 23.2% reported arthritis only, and 70.4% reported neither condition (Table 1). By sex, males had a higher prevalence of HD only and a slightly higher prevalence of both conditions ($p < 0.01$); females had a higher prevalence of arthritis only ($p < 0.01$). The likelihood of having one or both conditions increased with increasing age. Whites were more likely than blacks to have one or both conditions ($p < 0.01$). Prevalence of physical inactivity was lowest among adults without arthritis or HD (11.0%; CI = 10.8%–11.2%), higher among adults with arthritis alone (17.6%; CI = 17.3%–18.0%) and HD alone (21.0%; CI = 20.0%–22.2%), and highest among adults with both conditions (29.3%; CI = 28.5%–30.2%) ($p < 0.01$) (Figure).

In logistic regression analyses of adults with HD, those with doctor-diagnosed arthritis were 60% more likely to be physically inactive (OR = 1.6; CI = 1.4–1.7; $p < 0.01$); when adjusted for age, sex, race/ethnicity, education level, and BMI, they were 30% more likely to be inactive (OR = 1.3; CI = 1.2–1.4; $p < 0.01$). The state median prevalence estimate for arthritis among adults with HD was 57.4% (range: 46.9% in Hawaii to 68.6% in Mississippi) (Table 2). The state median prevalence of physical inactivity among adults with HD and arthritis was 27.2% (range: 20.5% in Colorado to 50.3% in Kentucky); among adults who had HD only, the state median was 19.5% (range: 13.5% in Utah to 38.0% in Kentucky).

Reported by: J Bolen, PhD, L Murphy, PhD, K Greenlund, PhD, CG Helmick, MD, J Hootman, PhD, TJ Brady, PhD, G Langmaid, Div of Adult and Community Health; N Keenan, PhD, Div for Heart Disease and Stroke Prevention, National Center for Chronic Disease Prevention and Health Promotion, CDC.

Editorial Note: HD and arthritis are common chronic diseases among adults in the United States, affecting 14.1 million and 46.5 million adults in 2006, respectively (3). Each condition is responsible for substantial activity limitation among adults aged ≥ 45 years, and persons with both conditions are significantly more limited than those with just one condition (4). The results of this analysis indicate that, during 2005 and 2007, doctor-diagnosed arthritis affected more than half of persons with HD. In this group, the adjusted likelihood of physical inactivity was 30% higher compared with that of persons with

* BRFSS survey data are available at http://www.cdc.gov/brfss/technical_infodata/surveydata.htm.

† The response rate is the percentage of persons who completed interviews among all eligible persons, including those who were not successfully contacted. The cooperation rate is the percentage of persons who completed interviews among all eligible persons who were contacted.

‡ Available at <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2005brfss.pdf> and <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2007brfss.pdf>.

§ U.S. Department of Health and Human Services. 1999 Physical activity and health: a report of the surgeon general. Atlanta, GA: US Department of Health and Human Services, CDC; 1996. Available at <http://www.cdc.gov/nccdphp/sgr/sgr.htm>. New guidelines were released in October of 2008 (2008 Physical Activity Guideline for Americans, available at <http://www.health.gov/paguidelines>).

TABLE 1. Percentage of respondents aged ≥18 years who reported heart disease and arthritis, heart disease only, arthritis only, or neither condition, by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2005 and 2007

Characteristic	Unweighted No.	Heart disease and arthritis		Heart disease only		Arthritis only		Neither condition	
		%	(95% CI)*	%	(95% CI)	%	(95% CI)	%	(95% CI)
Sex									
Male	286,066	3.9	(3.8–4.0)	3.8	(3.7–3.9)	18.7	(18.4–19.0)	73.6	(73.3–73.9)
Female	471,893	3.5	(3.4–3.6)	1.8	(1.7–1.9)	27.4	(27.2–27.6)	67.3	(67.0–67.6)
Age group (yrs)									
18–44	246,910	0.4	(0.4–0.5)	1.1	(1.0–1.2)	10.6	(10.4–10.8)	87.9	(87.7–88.1)
45–64	303,213	4.2	(4.1–4.3)	3.2	(3.0–3.3)	32.2	(31.9–32.5)	60.4	(60.1–60.8)
≥65	202,201	12.5	(12.2–12.8)	7.1	(6.9–7.3)	43.7	(43.2–44.1)	36.7	(36.3–37.1)
Race/Ethnicity									
White, non-Hispanic	605,447	4.1	(4.0–4.2)	2.8	(2.7–2.9)	25.6	(25.4–25.8)	67.5	(67.3–67.7)
Black, non-Hispanic	56,139	3.4	(3.2–3.6)	2.3	(2.1–2.6)	23.1	(22.4–23.7)	71.3	(70.6–71.9)
Hispanic	47,050	1.8	(1.6–2.1)	3.0	(2.6–3.3)	13.0	(12.4–13.6)	82.2	(81.5–82.9)
Other, non-Hispanic	42,325	3.3	(3.0–3.6)	2.6	(2.2–2.9)	18.0	(17.3–18.9)	76.1	(75.2–77.0)
Education level (yrs)									
≤11	77,412	6.3	(6.0–6.6)	4.2	(3.9–4.5)	23.6	(22.9–24.2)	66.0	(65.3–66.7)
12	232,247	4.4	(4.2–4.5)	3.0	(2.9–3.2)	25.3	(25.0–25.7)	67.3	(66.9–67.7)
≥13	446,791	2.8	(2.8–2.9)	2.4	(2.3–2.5)	22.0	(21.8–22.3)	72.8	(72.5–73.0)
BMI†									
Underweight/Normal	273,708	2.5	(2.4–2.6)	2.3	(2.2–2.4)	18.1	(17.9–18.4)	77.1	(76.8–77.4)
Overweight	263,204	3.7	(3.6–3.8)	3.1	(3.0–3.3)	23.6	(23.3–23.9)	69.5	(69.2–69.9)
Obese	187,106	5.7	(5.6–5.9)	3	(2.8–3.1)	30.7	(30.3–31.1)	60.6	(60.1–61.0)
Total§	757,959	3.7	(3.6–3.8)	2.8	(2.7–2.9)	23.2	(23.0–23.4)	70.4	(70.2–70.6)

* Confidence interval.

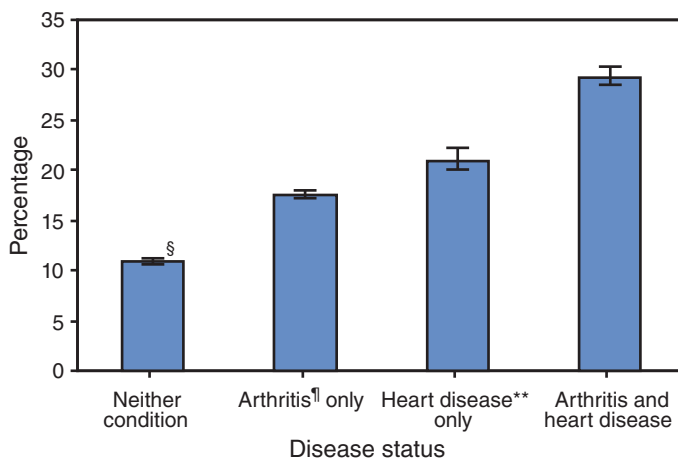
† Body mass index, calculated as weight (kg) / height (m)²; normal = 18.5–24.9, overweight = 25.0–29.9, and obese = ≥30.0.

§ Number of persons who provided a response for heart disease and for arthritis. Some categories might not add to total because of missing demographic data.

HD but without arthritis. State-specific estimates were generally consistent with the overall findings, with differences among states likely attributable to varying distributions of potential confounders (e.g., age, race, and education level). The analyses suggest that arthritis might be an additional barrier to being physically active among persons with HD.

The findings in this study are consistent with other research indicating that persons with both arthritis and HD might face additional barriers to increased physical activity (4). This study is the first to quantify the relationship using a population-based sample that provides both national and state-specific estimates of the prevalence and compares physical inactivity for persons with both conditions to those with HD alone.

Both HD and arthritis can interfere with physical functioning, ability to work, and ability to perform household tasks (4). These conditions also might interfere with efforts to become more physically active. Persons with arthritis face the same barriers to being more active as most adults, including lack of motivation and time, competing responsibilities, and difficulty finding an enjoyable activity (5). They also face additional barriers, such as concerns about aggravating arthritis pain and causing further joint damage, and they might be unsure about which types and amounts of activity are safe. Qualitative research suggests that persons with arthritis might experience short-term increases in pain when they initiate an

FIGURE. Physical inactivity among adults aged ≥18 years,* by disease status — Behavioral Risk Factor Surveillance System, United States,† 2005 and 2007

* Includes all respondents reporting no activity when asked six questions about frequency and duration of participation in nonoccupational activities of moderate and vigorous intensity (i.e., lifestyle activities). All other respondents were classified as active. Questions available at <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2005brfss.pdf> and <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2007brfss.pdf>.

† Includes all 50 states and the District of Columbia.

§ 95% confidence interval.

¶ Doctor-diagnosed arthritis was defined as a "yes" response to the question, "Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?"

** Heart disease was defined as a "yes" response to at least one of two questions: "Has a doctor, nurse, or other health professional ever told you that you had... a heart attack, also called a myocardial infarction?" or "...angina or coronary heart disease?"

TABLE 2. Prevalence of arthritis among adults aged ≥ 18 years with heart disease, and prevalence of physical inactivity* among adults with heart disease, with and without arthritis, by state/area — Behavioral Risk Factor Surveillance System, United States,[†] 2005 and 2007

State/Area	No. of respondents	Arthritis among adults with heart disease			Physical inactivity among adults with heart disease			
		Weighted no. (in 1,000s) [§]	%	(95% CI) [¶]	Without arthritis		With arthritis	
					%	(95% CI)	%	(95% CI)
Alabama	10,447	171	63.9	(59.7–67.8)	18.7	(13.8–24.8)	36.3	(31.6–41.2)
Alaska	5,365	12	63.0	(54.5–70.8)	20.2	(11.8–32.3)	23.4	(13.9–36.7)
Arizona	9,443	157	51.0	(44.4–57.5)	14.7	(8.6–24.0)	29.1	(22.6–36.5)
Arkansas	11,013	96	61.1	(57.7–64.4)	23.9	(19.1–29.5)	26.5	(22.9–30.5)
California	11,825	645	48.5	(43.8–53.3)	17.9	(12.9–24.3)	22.2	(16.8–28.8)
Colorado	17,887	79	54.6	(50.8–58.3)	17.7	(13.6–22.7)	20.5	(16.9–24.6)
Connecticut	12,777	79	53.9	(49.8–58.0)	17.5	(13.4–22.7)	22.9	(18.9–27.4)
Delaware	8,183	29	60.8	(56.1–65.3)	19.5	(14.2–26.3)	29.6	(24.4–35.4)
District of Columbia	7,700	12	61.5	(55.5–67.2)	16.3	(10.9–23.5)	31.2	(23.5–40.1)
Florida	47,739	591	55.5	(52.4–58.5)	24.7	(20.8–29.1)	29.1	(25.8–32.6)
Georgia	13,767	221	55.8	(51.7–59.8)	24.2	(18.9–30.4)	33.6	(29.3–38.2)
Hawaii	13,019	23	46.9	(42.1–51.7)	15.1	(11.1–20.1)	21.3	(16.3–27.3)
Idaho	11,049	38	55.7	(50.5–60.8)	16.6	(12.0–22.6)	24.8	(20.7–29.5)
Illinois	10,313	320	57.5	(52.9–61.9)	28.3	(21.9–35.6)	31.2	(26.6–36.2)
Indiana	11,626	211	61.9	(57.4–66.2)	17.3	(12.8–22.8)	25.6	(21.8–29.9)
Iowa	10,479	83	58.5	(54.5–62.4)	20.1	(15.6–25.4)	27.1	(22.8–31.8)
Kansas	17,121	75	56.6	(53.5–59.7)	18.0	(14.9–21.5)	34.6	(31.2–38.2)
Kentucky	13,536	151	56.1	(52.6–59.5)	38.0	(32.7–43.7)	50.3	(45.9–54.6)
Louisiana	9,620	126	55.4	(50.8–60.0)	36.4	(29.5–43.9)	40.8	(35.3–46.6)
Maine	10,790	44	61.4	(57.4–65.3)	20.0	(15.2–25.9)	27.2	(22.8–32.2)
Maryland	17,461	138	59.4	(55.4–63.3)	17.6	(13.5–22.7)	26.2	(22.3–30.5)
Massachusetts	30,413	164	56.8	(53.6–59.8)	26.1	(21.6–31.1)	29.3	(25.8–33.0)
Michigan	19,641	359	65.9	(63.2–68.5)	19.1	(15.5–23.2)	28.3	(25.3–31.6)
Minnesota	7,603	105	52.3	(47.5–57.1)	20.5	(15.5–26.6)	20.8	(16.3–26.3)
Mississippi	12,257	109	68.6	(65.2–71.9)	31.0	(25.2–37.4)	35.2	(31.2–39.4)
Missouri	10,427	201	62.8	(58.6–66.8)	17.2	(12.5–23.1)	24.3	(20.3–28.8)
Montana	10,978	23	57.2	(52.9–61.4)	21.6	(15.9–28.6)	22.8	(18.4–27.8)
Nebraska	19,276	45	61.2	(57.3–64.9)	24.3	(18.9–30.6)	27.1	(23.1–31.6)
Nevada	7,286	60	53.0	(46.7–59.2)	20.0	(12.8–29.8)	23.4	(17.0–31.2)
New Hampshire	12,028	37	58.8	(54.8–62.6)	17.1	(13.0–22.1)	24.1	(20.2–28.6)
New Jersey	20,899	225	53.5	(49.2–57.7)	22.0	(17.3–27.5)	32.4	(28.3–36.7)
New Mexico	12,191	40	52.1	(48.0–56.2)	19.2	(15.0–24.3)	24.5	(20.3–29.3)
New York	14,321	477	55.5	(51.4–59.4)	21.2	(16.6–26.7)	26.4	(22.5–30.8)
North Carolina	32,038	264	58.9	(56.4–61.3)	22.4	(19.1–26.1)	30.7	(28.1–33.4)
North Dakota	8,761	17	56.2	(51.8–60.4)	21.3	(16.1–27.7)	23.6	(18.9–29.0)
Ohio	18,727	377	62.2	(58.8–65.5)	17.1	(13.3–21.7)	28.6	(24.7–32.9)
Oklahoma	21,170	136	62.6	(59.5–65.5)	21.8	(18.0–26.2)	35.4	(31.8–39.1)
Oregon	16,966	84	56.6	(53.0–60.2)	14.8	(11.4–18.9)	22.9	(19.5–26.8)
Pennsylvania	26,609	422	63.0	(59.7–66.2)	19.6	(15.4–24.6)	27.5	(24.0–31.3)
Rhode Island	8,475	30	60.5	(55.9–64.8)	19.5	(14.2–26.1)	32.6	(27.2–38.4)
South Carolina	18,835	131	62.9	(59.9–65.9)	18.4	(14.6–22.9)	28.2	(24.8–31.8)
South Dakota	13,786	23	60.3	(56.9–63.5)	20.4	(16.6–25.0)	31.5	(27.9–35.5)
Tennessee	9,781	217	61.1	(55.7–66.2)	28.1	(20.9–36.7)	46.7	(41.5–52.0)
Texas	23,760	555	51.7	(48.2–55.1)	20.2	(16.1–25.0)	32.2	(28.3–36.3)
Utah	10,216	38	54.6	(49.4–59.7)	13.5	(8.2–21.5)	24.8	(19.3–31.3)
Vermont	13,699	18	60.3	(56.4–64.0)	15.3	(11.8–19.7)	26.0	(22.1–30.4)
Virginia	11,696	198	55.6	(50.7–60.4)	15.5	(11.0–21.3)	27.4	(22.9–32.4)
Washington	49,183	144	57.4	(55.2–59.6)	14.9	(12.6–17.6)	21.8	(19.7–24.2)
West Virginia	7,998	98	62.0	(58.6–65.3)	30.0	(24.8–35.8)	42.9	(38.7–47.2)
Wisconsin	12,335	140	61.0	(56.3–65.6)	16.1	(10.9–23.2)	24.3	(19.9–29.3)
Wyoming	11,169	12	57.1	(53.0–61.2)	22.7	(16.8–29.9)	23.7	(19.5–28.5)
Median**			57.4		19.5		27.2	
Puerto Rico	7,723	131	48.6	(44.6–52.6)	46.9	(40.8–53.0)	56.3	(51.1–61.4)
U.S. Virgin Islands	4,960	1	35.3	(27.4–44.1)	15.6	(8.4–27.2)	33.7	(20.9–49.3)

* Physical activity level of respondents was determined from six questions that asked about frequency and duration of participation in nonoccupational activities of moderate and vigorous intensity; those reporting no participation in such activities were classified as inactive (engaged in no nonoccupational physical activity); all others were classified as active.

[†] Includes all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

[§] Weighted annual average number of adults with heart disease who also have arthritis.

[¶] Confidence interval.

** Does not include Puerto Rico or the U.S. Virgin Islands.

exercise program, but that continued participation results in a long-term reduction in symptoms (5).

The findings in this report are subject to at least four limitations. First, arthritis, HD, and physical activity are self-reported and unconfirmed by a health-care provider or objective monitoring; however, such self-reports are considered valid for surveillance purposes (6). Second, BRFSS excludes persons without landline telephones, persons in the military, and those residing in institutions. Estimates are weighted to the population, thus partially correcting for this, but effects might be unpredictable. Third, state prevalence estimates were not adjusted for population characteristics (e.g., age); therefore, comparisons between states should be made with caution. Finally, BRFSS response rates were low; BRFSS weighting procedures partially correct for nonresponse, but the effect of low response rates is uncertain.

Specially tailored self-management education interventions, such as the Chronic Disease Self Management Program and the arthritis-specific Arthritis Foundation (AF) Self-Help Program, help adults learn to manage arthritis pain and discuss how to safely increase physical activity (7). Several exercise programs, including EnhanceFitness, the AF Exercise Program, and the AF Aquatics Program, are available in many communities and are appropriate for adults with HD and arthritis. Self-directed physical activities, including low-impact activities such as walking, swimming, and biking, also are appropriate for adults with both conditions.**

Greater integration of heart disease and arthritis intervention efforts by health-care providers, payers, and health departments might better address the effects of these co-occurring conditions. Increasing physical activity (e.g., through aerobic exercise and strength training) can benefit persons with arthritis, HD, or both conditions (8,9) by improving physical function and lowering blood pressure and low-density lipoprotein cholesterol levels. Health-care providers should consider whether arthritis-related barriers contribute to physical inactivity in their HD patients and should help those patients learn how to overcome arthritis-specific barriers by providing appropriate advice and referrals. HD patients with arthritis should be encouraged to reduce sedentary behavior; appropriate physical activity might include moderate-intensity aerobics and muscle-strengthening exercises (10).

References

1. Pearson TA, Blair SN, Daniels SR, et al. AHA guidelines for primary prevention of cardiovascular disease and stroke: 2002 update. Consensus panel guide to comprehensive risk reduction for adult patients without coronary or other atherosclerotic vascular diseases. *Circulation* 2002;106:388–91.

2. Zhao G, Ford ES, Li C, Mokdad A. Are United States adults with coronary heart disease meeting physical activity recommendations? *Am J Cardiol* 2008;101:557–61.
3. CDC. Summary health statistics for U.S. adults: National Health Interview Survey, 2006. *Vital Health Stat* 2007;10(235). Available at http://www.cdc.gov/nchs/data/series/sr_10/sr10_235.pdf.
4. Verbrugge LM, Juarez L. Arthritis disability and heart disease disability. *Arthritis Rheum* 2008;59:1445–57.
5. Wilcox S, Der Ananian C, Abbott J, et al. Perceived exercise barriers, enablers, and benefits among exercising and non exercising adults with arthritis: results from a qualitative study. *Arthritis Rheum* 2006;55:616–27.
6. Nelson DE, Holtzman D, Bolen J, Stanwyck CA, Mack KA. Reliability and validity of measures from the Behavioral Risk Factor Surveillance System (BRFSS). *Soz Praventivmed* 2001;46(Suppl 1):S3–42.
7. CDC. Arthritis intervention programs. Available at <http://www.cdc.gov/arthritis/intervention/index.htm>.
8. Smith SC Jr, Allen J, Blair SN, et al. AHA/ACC guidelines for secondary prevention for patients with coronary and other atherosclerotic vascular disease: 2006 update. *Circulation* 2006;113:2363–72.
9. US Department of Health and Human Services. 2008 physical activity guidelines for Americans. Hyattsville, MD: US Department of Health and Human Services; 2008. Available at <http://www.health.gov/paguidelines>.
10. Nelson ME, Rejeski WJ, Blair SN, et al. Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association. *Circulation* 2007;116:1094–105.

Completeness and Timeliness of Reporting of Meningococcal Disease – Maine, 2001–2006

Neisseria meningitidis is an important cause of invasive bacterial disease in the United States (1), with a total of 1,077 cases of meningococcal disease reported in 2007 (2). The case-fatality ratio is 10%–14%, and 11%–19% of survivors have long-term sequelae (1). In the United States, approximately 98% of cases of meningococcal disease occur sporadically; outbreaks are uncommon (1). Chemoprophylaxis is the primary means of preventing meningococcal disease among close contacts of patients in sporadic cases (1), and the ability of health departments to identify these contacts and provide treatment depends on the completeness and timeliness of disease reporting. To assess these attributes in meningococcal disease surveillance in Maine, the Maine Department of Health and Human Services (MDHHS) analyzed public health surveillance data from MDHHS and hospital discharge data from the Maine Health Data Organization (MHDO) for the period 2001–2006. This report describes the results of that analysis, which indicated that the completeness of reporting of meningococcal disease in Maine during this period was approximately 98%. Of cases reported to MDHHS, 56% were reported within 1 day of hospital admission. Passive disease surveillance efforts appear

** Additional information available at http://www.cdc.gov/arthritis/campaigns/physical_activity/index.htm.

to have achieved near complete reporting of meningococcal disease in Maine; however, timeliness of reporting was sometimes suboptimal. Evaluation of surveillance efforts should be repeated periodically to determine whether completeness of reporting remains high and timeliness improves.

Maine law requires that all health-care providers, laboratories, and health-care facilities report meningococcal disease (upon recognition or strong suspicion) immediately by telephone to MDHHS. Reports are assigned to epidemiologists for investigation. Reports meeting the Council of State and Territorial Epidemiologists (CSTE) and CDC case definition for meningococcal disease* are entered in the National Electronic Disease Surveillance System.† Beginning in 2006, the CSTE-CDC case definition was revised to include suspected cases of meningococcal disease; in previous years, the case definition only included categories for confirmed and probable cases.

MHDO maintains the state's hospital discharge dataset, which includes inpatient and outpatient visits for all nonfederal, acute-care hospitals in the state. *International Classification of Diseases, 9th Revision* (ICD-9) codes 036.0–036.9 (for meningococcal disease) were used to identify patients with meningococcal disease. The dataset did not contain patient names, so MHDO data were matched with MDHHS data for the period 2001–2006 using date of birth, admission date, and hospital. Persons who were in both datasets were considered to have verified cases of meningococcal disease. Hospital records were reviewed for patients who were in the MHDO dataset but who had not been reported to MDHHS.

The utility of various ICD-9 codes and clinical settings for identifying cases of meningococcal disease from the MHDO dataset was examined by calculating sensitivity and positive predictive value (PPV) (Table 1). The completeness of meningococcal disease reporting was estimated by the Sekar-Deming capture-recapture method (3)[§] (Table 2). The capture-recapture method provides an estimate of the actual total number of cases (reported or unreported) and the completeness of disease reporting using data from two independent surveillance systems (3). This technique requires being able to identify cases found in both surveillance systems, cases found only by the first surveillance system, and cases found only by

the second surveillance system (3). Cases that could not have been reported to both MDHHS and MHDO were excluded from the capture-recapture analysis. These cases included out-of-state residents hospitalized in Maine who would not have been included in MDHHS records and Maine residents hospitalized out of state or at a Veterans Health Administration (VHA) facility in the state who would not have been included in the MHDO dataset. Timeliness of reporting was assessed by determining the difference in days between hospital admission and notification to MDHHS.

A total of 52 cases of meningococcal disease were reported to MDHHS during 2001–2006. These cases included two that occurred in Maine residents hospitalized out-of-state and one in a person hospitalized at a VHA facility in Maine. A total of 107 patients were identified in the MHDO dataset. A total of 42 patients were in both the MHDO and MDHHS datasets and were considered to have verified cases of meningococcal disease. Hospital records were reviewed for the 65 patients who were in the MHDO dataset but not in the MDHHS dataset. Nine (14%) of these patients were determined to have had meningococcal disease using the CSTE-CDC case definition; these included eight cases in out-of-state residents hospitalized in Maine. The remaining 56 patients in the MHDO dataset did not meet the CSTE-CDC case definition. Of these 56, 19 (34%) had meningeal signs but neither clinical purpura fulminans nor laboratory evidence of *N. meningitidis*; 15 (27%) were coded incorrectly (e.g., with diagnoses other than meningococcal disease); 13 (23%) had noninvasive infections (e.g., a positive sputum culture for *N. meningitidis*); and nine (16%) had medical records that were missing or incomplete.

In the analysis of the utility of various ICD-9 codes for identifying cases of meningococcal disease using MHDO data, sensitivity (92%) and PPV (53%) were highest when a combination of code 036.0 (meningococcal meningitis) or 036.2 (meningococemia) was used (Table 1). Other ICD-9 codes for meningococcal disease (036.1 and 036.3–036.9) had poor sensitivity and PPV. Inpatient data were more sensitive and had higher PPV than outpatient data. The completeness of reporting for meningococcal disease to MDHHS was estimated at 97.6% (95% confidence interval = 95.9%–99.3%) (Table 2), based on MDHHS receiving reports on 49.0 of 50.2 total cases. Information was sufficient to assess timeliness of reporting for 43 (83%) of 52 cases reported to MDHHS. Reports were received in a median of 1 day (range: 0–11 days); 35% of cases were reported to MDHHS on the day of hospital admission, 56% were reported within 1 day, and 79% were reported within 2 days. No secondary cases of meningococcal disease among close contacts of patients with meningococcal disease were reported in Maine during the study period.

* Case definition available at http://www.cdc.gov/ncphi/diss/nndss/casedef/case_definitions.htm.

† Additional information available at <http://www.cdc.gov/ncdss>.

§ Completeness of reporting was calculated as R/N , and the 95% confidence interval was calculated as $R/N \pm 1.96 \sqrt{\text{Var}(N)^{1/2}}$ where $\text{Var}(N) = (R \times S \times N_1 \times N_2) / C^3$. R = number of cases identified in MDHHS dataset, N = estimated total number of cases of meningococcal disease in Maine during 2001–2006 calculated as $C + N_1 + N_2 + X$ where $X = (N_1 \times N_2) / C$, S = number of cases identified in MHDO dataset, N_1 = number of cases identified only in MDHHS dataset, N_2 = number of cases identified only in MHDO data, and C = number of cases identified in both MDHHS and MHDO datasets.

TABLE 1. Sensitivity and positive predictive value of hospital discharge data to identify meningococcal disease, by diagnostic code and clinical setting — Maine, 2001–2006

	Cases*	Noncases	Sensitivity (%)†	Positive predictive value (%)§
ICD-9¶ code				
036.0 (meningococcal meningitis)	19	31	37	38
036.2 (meningococemia)	28	11	55	72
036.0 or 036.2	47	42	92	53
036.1 or 036.3–036.9	4	14	8	22
Clinical setting				
Inpatient	49	20	96	71
Outpatient	2	36	4	5
Total	51	56	100	48

* Meeting the Council of State and Territorial Epidemiologists and CDC case definition for meningococcal disease, available at http://www.cdc.gov/ncphi/diss/nndss/casedef/case_definitions.htm. Cases included persons with meningococcal disease in both Maine Health Data Organization (MHDO) and Maine Department of Health and Human Services datasets (n = 42) and those reported only to MHDO (n = 9). Eight persons who were reported only to MHDO were out-of-state residents hospitalized in Maine.

† Calculated as follows: [(cases) / 51] x 100%.

§ Calculated as follows: [(cases) / (cases + noncases)] x 100%.

¶ *International Classification of Diseases, 9th Revision.*

TABLE 2. Estimated completeness* of reporting for meningococcal disease — Maine, 2001–2006

		Maine Department of Health and Human Services (MDHHS)		
		Cases† reported	Cases not reported	All cases
Maine Health Data Organization (MHDO)	Cases§ reported	(C) 42	(N ₂) 1	(S) 43
	Cases not reported	(N ₁) 7	(X) 0.2¶	7.2
	All cases	(R) 49	1.2	(N) 50.2**

* Calculated by using the Sekar-Deming capture-recapture method (3). Calculated estimates are in *italics*. Completeness of reporting was calculated as R / N, and the 95% confidence interval was calculated as $R / N \pm 1.96 \text{ Var } (N)^{1/2}$ where $\text{Var } (N) = (R \times S \times N_1 \times N_2) / C^3$. R = number of cases identified in MDHHS dataset, N = estimated total number of cases of meningococcal disease in Maine during 2001–2006, S = number of cases identified in MHDO dataset, N₁ = number of cases identified only in MDHHS dataset, N₂ = number of cases identified only in MHDO dataset, and C = number of cases identified in both MDHHS and MHDO datasets.

† Meeting the Council of State and Territorial Epidemiologists and CDC case definition for meningococcal disease, available at http://www.cdc.gov/ncphi/diss/nndss/casedef/case_definitions.htm. Cases excluded were those in Maine residents hospitalized out of state (n = 2) and in patients hospitalized at Veterans Health Administration facilities in Maine (n = 1).

§ Meeting the Council of State and Territorial Epidemiologists and CDC case definition for meningococcal disease. Cases excluded were in out-of-state residents who were hospitalized in Maine (n = 8).

¶ Estimated number of cases not reported to either MDHHS or MHDO. Calculated as follows: $X = (N_1 \times N_2) / C$.

** Estimated number if all cases were reported. Calculated as follows: $N = C + N_1 + N_2 + X$.

Reported by: V Rea, MPH, Maine Dept of Health and Human Svcs and Univ of Southern Maine. A Pelletier, MD, Coordinating Office for Terrorism Preparedness and Emergency Response, CDC.

Editorial Note: Because of the severity of meningococcal disease symptoms, nearly all patients are treated in a hospital or emergency department setting. This results in a dataset (i.e., hospital discharge data) that can be compared with

public health surveillance records to estimate the completeness of reporting to health departments using the capture-recapture technique (3). Most other nationally notifiable conditions either 1) do not result in routine hospitalization (e.g., salmonellosis) or 2) do not occur frequently enough at the state level (e.g., botulism) to allow use of the capture-recapture technique. Therefore, meningococcal disease provides an uncommon opportunity to assess completeness of reporting using hospital discharge data.

Six other studies using the capture-recapture technique to compare health department data with hospital discharge data have described the completeness of meningococcal disease reporting. The results have ranged from 64% to 95%, with a median value of 94% (4–9). The only published study from the United States was conducted in New York State in 1991 and reported 93% completeness (4). Completeness of reporting for meningococcal disease likely is considerably higher than for most other notifiable conditions because of the severity of the illness and the availability of a widely accepted public health intervention.

Although most cases of meningococcal disease were reported to MDHHS in a timely manner, 44% were reported more than 1 day after hospital admission. In the 1991 New York study, 34% of cases were reported more than 1 day after diagnosis (4). Timeliness of reporting is important for this disease because chemoprophylaxis of close contacts of an index patient is most effective when administered as soon as possible; ideally, chemoprophylaxis should be started within 24 hours after

identification of the index case, but not later than 14 days after illness onset (1).

During the attempt to identify cases of meningococcal disease in the MHDO dataset, certain diagnostic codes (i.e., 036.1 and 036.3–036.9) and outpatient data had poor sensitivity and PPV. Because each potential case required medical record

review for confirmation, considerable effort was required to identify a small number of actual cases. For example, of 38 reports of meningococcal disease among outpatients in the hospital discharge dataset, only two (5%) cases were verified after reviewing medical records.

The findings in this report are subject to at least two limitations. First, the two data systems used in this analysis might not have been completely independent because information from hospitals was included in both MHDO and MDHHS datasets. This type of dependence between data sources might result in an overestimate of the completeness of reporting (10). Second, some of the 19 patients in the MHDO dataset with meningeal signs, but neither clinical purpura fulminans nor laboratory evidence of *N. meningitides*, might have met the definition for a suspected case if such a category had existed before 2006. This might have affected the estimate for the completeness of reporting.

Passive disease surveillance efforts appear to have been adequate for achieving near complete reporting of meningococcal disease in Maine; however, timeliness of reporting was sometimes suboptimal. Evaluation of this surveillance system should be repeated periodically to determine whether completeness of reporting remains high and timeliness improves. Other attributes of surveillance systems (e.g., simplicity, representativeness, and acceptability) also should be assessed in future evaluations. In Maine, a delay of approximately 18 months after the end of a calendar year occurs before hospital discharge data for that year become available. This delay limits usage of the data for public health surveillance. When hospital discharge data become available on a real-time basis in Maine, MDHHS will need to determine how best to use this information, given the apparent limitations of ICD-9 codes in the MHDO dataset for identifying cases of meningococcal disease.

Acknowledgments

The findings in this report are based, in part, on contributions by E Bartlett, Houlton Regional Hospital; T Beaulier-Fuller, Aroostook Medical Center; C Bouley, Mercy Hospital; S Dirrigl, Southern Maine Medical Center; D Dunton, H Elliot, D Fenn, and D McKenney, Eastern Maine Medical Center; P Hadley, Franklin Memorial Hospital; E King, Maine General Hospital; B MacPike, Maine Coast Memorial Hospital; D Peabody, St. Joseph Healthcare; C Reeder, York Hospital; P Rybak, Mercy Hospital; D Skalina, Central Maine Medical Center; D Theriault, St. Mary's Hospital; B Wagner, Maine Medical Center; S Whiting, Reddington-Fairview Hospital; P Carson, D Guppy, L LaRochelle, L Parker, and A Robbins, Maine Dept of Health and Human Svcs; and D Baughman and A Cohn, Div of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, CDC.

References

1. CDC. Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005;54(No. RR-7).
2. CDC. Summary of notifiable diseases, United States, 2007. MMWR 2007;56(53) (in press).
3. Sekar CC, Deming WE. On a method of estimating birth and death rates and extent of registration. J Amer Stat Assoc 1949;44:101-15.
4. Ackman DM, Birkhead G, Flynn M. Assessment of surveillance for meningococcal disease in New York State, 1991. Am J Epidemiol 1996;144:78-82.
5. Rivest P, Sagot B, Bedard L. Evaluation of the completeness of reporting of invasive meningococcal disease. Can J Public Health 1999;90:250-2.
6. Robinson P. Meningococcal disease and the law: does non-notification really happen? Commun Dis Intell 1999;23:97-101.
7. Breen E, Ghebrehewet S, Regan M, Thomson AP. How complete and accurate is meningococcal disease notification? Commun Dis Public Health 2004;7:334-8.
8. de Greeff SC, Spanjaard L, Dankert J, Hoebe CJ, Nagelkerke N, de Melker HE. Underreporting of meningococcal disease incidence in the Netherlands: results from a capture-recapture analysis based on three registration sources with correction for false positive diagnoses. Eur J Epidemiol 2006;21:315-21.
9. Berghold C, Berghold A, Fülöp G, Heuberger S, Strauss R, Zenz W. Invasive meningococcal disease in Austria 2002: assessment of completeness of notification by comparison of two independent data sources. Wien Klin Wochenschr 2006;118:31-5.
10. Brenner H. Use and limitations of the capture-recapture method in disease monitoring with two dependent sources. Epidemiology 1995;6:42-8.

Notice to Readers

Public Health Law 101

CDC's Public Health Law Program has developed "Public Health Law 101," a new foundational course on public health law, as a learning resource for public health practitioners, students, and others. The course comprises nine slide lecture units for delivery to health departments by legal counsel and other persons trained in law. The slide units can be downloaded free of charge from the Public Health Law Program's website at <http://www2a.cdc.gov/phlp/phl101>.

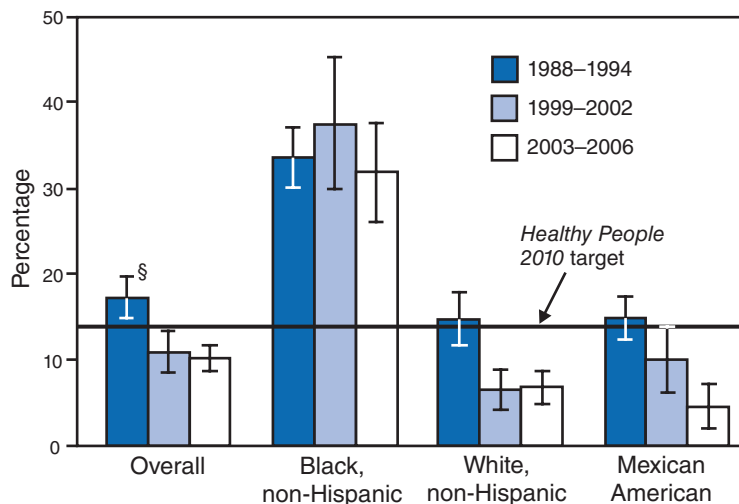
Erratum: Vol. 58, No. RR-1

In the *MMWR Recommendations and Reports* "Guidelines for Field Triage of Injured Patients: Recommendations of the National Expert Panel on Field Triage," an error occurred on page CE-4. The correct answer to question 6 is "D."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Adults Aged 20–29 Years with Genital Herpes* Infection, by Race/Ethnicity† — National Health and Nutrition Examination Survey, United States, 1988–1994, 1999–2002, and 2003–2006



* As determined by herpes simplex virus, type 2 (HSV-2) antibody.

† For all years, the categories black and white include persons who reported only one racial group and exclude persons of Hispanic ethnicity. Persons of Mexican-American ethnicity might be of any race.

§ 95% confidence interval.

The percentage of adults aged 20–29 years with genital herpes infection decreased from 17% during 1988–1994 to 10% during 2003–2006, below the *Healthy People 2010* target of 14% (objective 25-4). Rates of genital herpes infection among non-Hispanic blacks were significantly higher than rates among non-Hispanic whites and Mexican Americans.

SOURCES: National Health and Nutrition Examination Survey, 1988–2006. Available at <http://www.cdc.gov/nchs/nhanes.htm>.

Healthy People 2010 database. Available at <http://wonder.cdc.gov/data2010>.

Xu F, Sternberg MR, Kottiri BJ, et al. Trends in herpes simplex virus type 1 and type 2 seroprevalence in the United States. *JAMA* 2006;296:964–73.

US Department of Health and Human Services. *Healthy People 2010*. 2nd ed. With understanding and improving health and objectives for improving health. 2 vols. Washington, DC: US Government Printing Office; 2000. Available at <http://www.health.gov/healthypeople>.

TABLE I. Provisional cases of infrequently reported notifiable diseases (<1,000 cases reported during the preceding year) — United States, week ending February 21, 2009 (7th week)*

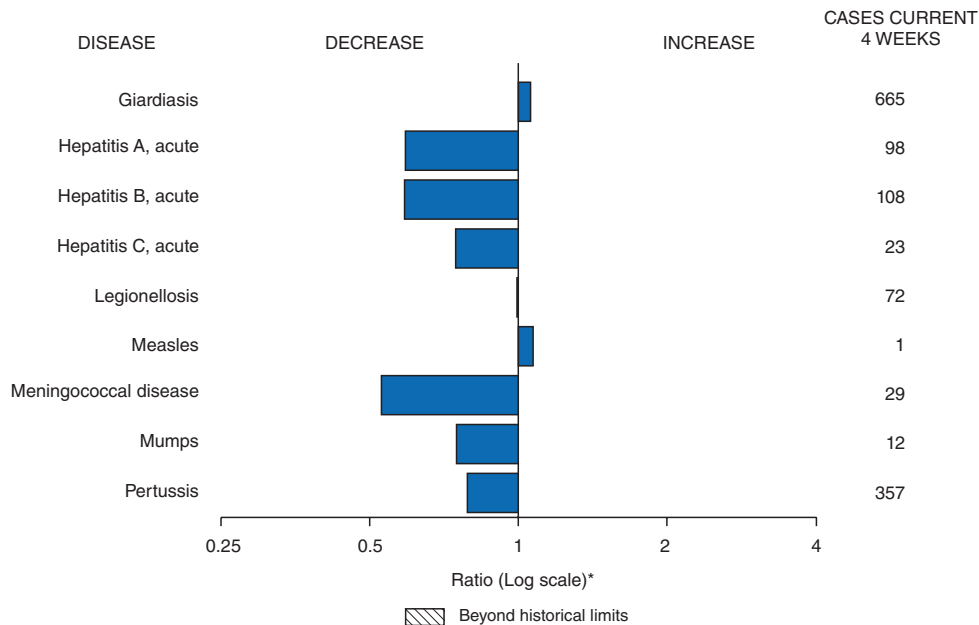
Disease	Current week	Cum 2009	5-year weekly average†	Total cases reported for previous years					States reporting cases during current week (No.)
				2008	2007	2006	2005	2004	
Anthrax	—	—	0	—	1	1	—	—	
Botulism:									
foodborne	—	3	—	14	32	20	19	16	
infant	1	4	2	100	85	97	85	87	FL (1)
other (wound and unspecified)	1	3	0	22	27	48	31	30	CA (1)
Brucellosis	1	3	2	83	131	121	120	114	CA (1)
Chancroid	—	4	1	29	23	33	17	30	
Cholera	—	—	0	3	7	9	8	6	
Cyclosporiasis§	—	13	2	132	93	137	543	160	
Diphtheria	—	—	—	—	—	—	—	—	
Domestic arboviral diseases§,¶:									
California serogroup	—	—	—	41	55	67	80	112	
eastern equine	—	—	—	3	4	8	21	6	
Powassan	—	—	—	1	7	1	1	1	
St. Louis	—	—	—	10	9	10	13	12	
western equine	—	—	—	—	—	—	—	—	
Ehrlichiosis/Anaplasmosis§,**:									
<i>Ehrlichia chaffeensis</i>	2	13	2	906	828	578	506	338	MN (1), GA (1)
<i>Ehrlichia ewingii</i>	—	—	—	9	—	—	—	—	
<i>Anaplasma phagocytophilum</i>	—	2	1	586	834	646	786	537	
undetermined	—	—	0	72	337	231	112	59	
<i>Haemophilus influenzae</i> ,††									
invasive disease (age <5 yrs):									
serotype b	—	2	0	29	22	29	9	19	
nonserotype b	—	23	4	183	199	175	135	135	
unknown serotype	2	26	4	187	180	179	217	177	MO (1), AZ (1)
Hansen disease§	1	9	1	73	101	66	87	105	CA (1)
Hantavirus pulmonary syndrome§	—	—	0	16	32	40	26	24	
Hemolytic uremic syndrome, postdiarrheal§	1	7	2	262	292	288	221	200	OH (1)
Hepatitis C viral, acute	7	75	16	860	845	766	652	720	NY (1), OH (3), NC (1), KY (1), OR (1)
HIV infection, pediatric (age <13 years)§§	—	—	4	—	—	—	380	436	
Influenza-associated pediatric mortality§,¶¶	8	18	3	88	77	43	45	—	AZ (1), CO (2), MA (1), TX (4)
Listeriosis	7	55	8	705	808	884	896	753	MI (1), CA (6)
Measles***	—	2	1	135	43	55	66	37	
Meningococcal disease, invasive†††:									
A, C, Y, and W-135	5	20	8	318	325	318	297	—	FL (3), ID (1), CO (1)
serogroup B	2	8	4	171	167	193	156	—	OH (2)
other serogroup	—	2	1	30	35	32	27	—	
unknown serogroup	5	48	18	597	550	651	765	—	PA (1), OH (1), FL (1), CA (2)
Mumps	2	31	15	408	800	6,584	314	258	KS (1), NC (1)
Novel influenza A virus infections	—	—	—	2	4	N	N	N	
Plague	—	—	0	1	7	17	8	3	
Poliomyelitis, paralytic	—	—	—	—	—	—	1	—	
Polio virus infection, nonparalytic§	—	—	—	—	—	N	N	N	
Psittacosis§	—	1	0	10	12	21	16	12	
Q fever total§,§§§:	—	4	2	103	171	169	136	70	
acute	—	3	1	91	—	—	—	—	
chronic	—	1	—	12	—	—	—	—	
Rabies, human	—	—	—	1	1	3	2	7	
Rubella¶¶¶	—	1	0	16	12	11	11	10	
Rubella, congenital syndrome	—	1	0	—	—	1	1	—	
SARS-CoV§,****	—	—	—	—	—	—	—	—	
Smallpox§	—	—	—	—	—	—	—	—	
Streptococcal toxic-shock syndrome§	—	4	3	137	132	125	129	132	
Syphilis, congenital (age <1 yr)	—	—	5	—	430	349	329	353	
Tetanus	—	1	0	16	28	41	27	34	
Toxic-shock syndrome (staphylococcal)§	—	6	2	69	92	101	90	95	
Trichinellosis	2	6	0	37	5	15	16	5	CA (2)
Tularemia	—	3	0	111	137	95	154	134	
Typhoid fever	6	39	6	420	434	353	324	322	PA (1), MN (1), FL (1), CA (3)
Vancomycin-intermediate <i>Staphylococcus aureus</i> §	—	3	0	44	37	6	2	—	
Vancomycin-resistant <i>Staphylococcus aureus</i> §	—	—	—	—	2	1	3	1	
Vibriosis (noncholera <i>Vibrio</i> species infections)§	—	15	1	467	549	N	N	N	
Yellow fever	—	—	—	—	—	—	—	—	

See Table I footnotes on next page.

TABLE I. (Continued) Provisional cases of infrequently reported notifiable diseases (<1,000 cases reported during the preceding year) — United States, week ending February 21, 2009 (7th week)*

—: No reported cases. N: Not notifiable. Cum: Cumulative year-to-date counts.
 * Incidence data for reporting year 2008 and 2009 are provisional, whereas data for 2004, 2005, 2006, and 2007 are finalized.
 † Calculated by summing the incidence counts for the current week, the 2 weeks preceding the current week, and the 2 weeks following the current week, for a total of 5 preceding years. Additional information is available at <http://www.cdc.gov/epo/dphsi/phs/files/5yearweeklyaverage.pdf>.
 § Not notifiable in all states. Data from states where the condition is not notifiable are excluded from this table, except starting in 2007 for the domestic arboviral diseases and influenza-associated pediatric mortality, and in 2003 for SARS-CoV. Reporting exceptions are available at <http://www.cdc.gov/epo/dphsi/phs/infdis.htm>.
 ¶ Includes both neuroinvasive and nonneuroinvasive. Updated weekly from reports to the Division of Vector-Borne Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases (ArboNET Surveillance). Data for West Nile virus are available in Table II.
 ** The names of the reporting categories changed in 2008 as a result of revisions to the case definitions. Cases reported prior to 2008 were reported in the categories: Ehrlichiosis, human monocytic (analogous to *E. chaffeensis*); Ehrlichiosis, human granulocytic (analogous to *Anaplasma phagocytophilum*), and Ehrlichiosis, unspecified, or other agent (which included cases unable to be clearly placed in other categories, as well as possible cases of *E. ewingii*).
 †† Data for *H. influenzae* (all ages, all serotypes) are available in Table II.
 §§ Updated monthly from reports to the Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Implementation of HIV reporting influences the number of cases reported. Updates of pediatric HIV data have been temporarily suspended until upgrading of the national HIV/AIDS surveillance data management system is completed. Data for HIV/AIDS, when available, are displayed in Table IV, which appears quarterly.
 ¶¶ Updated weekly from reports to the Influenza Division, National Center for Immunization and Respiratory Diseases. Seventeen influenza-associated pediatric deaths occurring during the 2008-09 influenza season have been reported.
 *** No measles cases were reported for the current week.
 ††† Data for meningococcal disease (all serogroups) are available in Table II.
 §§§ In 2008, Q fever acute and chronic reporting categories were recognized as a result of revisions to the Q fever case definition. Prior to that time, case counts were not differentiated with respect to acute and chronic Q fever cases.
 ¶¶¶ The one rubella case reported for the current week was unknown.
 **** Updated weekly from reports to the Division of Viral and Rickettsial Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases.

FIGURE I. Selected notifiable disease reports, United States, comparison of provisional 4-week totals February 21, 2009, with historical data



* Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where the hatched area begins is based on the mean and two standard deviations of these 4-week totals.

Notifiable Disease Data Team and 122 Cities Mortality Data Team
 Patsy A. Hall
 Deborah A. Adams Rosaline Dhara
 Willie J. Anderson Michael S. Wodajo
 Lenee Blanton Pearl C. Sharp

TABLE II. (Continued) Provisional cases of selected notifiable diseases, United States, weeks ending February 21, 2009, and February 16, 2008 (7th week)*

Table with columns: Reporting area, Pertussis (Current week, Previous 52 weeks (Med, Max), Cum 2009, Cum 2008), Rabies, animal (Current week, Previous 52 weeks (Med, Max), Cum 2009, Cum 2008), Rocky Mountain spotted fever (Current week, Previous 52 weeks (Med, Max), Cum 2009, Cum 2008). Rows list regions like United States, New England, Mid. Atlantic, E.N. Central, W.N. Central, S. Atlantic, E.S. Central, W.S. Central, Mountain, and Pacific with sub-rows for specific states and territories.

C.N.M.I.: Commonwealth of Northern Mariana Islands. U: Unavailable. —: No reported cases. N: Not notifiable. Cum: Cumulative year-to-date counts. Med: Median. Max: Maximum. * Incidence data for reporting year 2008 and 2009 are provisional. † Contains data reported through the National Electronic Disease Surveillance System (NEDSS).

TABLE II. (Continued) Provisional cases of selected notifiable diseases, United States, weeks ending February 21, 2009, and February 16, 2008 (7th week)*

Reporting area	Streptococcal diseases, invasive, group A				<i>Streptococcus pneumoniae</i> , invasive disease, nondrug resistant† Age <5 years					
	Current week	Previous 52 weeks		Cum 2009	Cum 2008	Current week	Previous 52 weeks		Cum 2009	Cum 2008
		Med	Max				Med	Max		
United States	60	88	182	622	833	26	33	53	198	304
New England	1	4	31	21	43	—	1	11	3	22
Connecticut	—	0	26	11	—	—	0	11	—	—
Maine§	—	0	3	2	4	—	0	1	—	1
Massachusetts	—	1	8	—	35	—	0	3	—	18
New Hampshire	—	0	2	3	3	—	0	1	2	3
Rhode Island§	—	0	8	1	—	—	0	2	—	—
Vermont§	1	0	3	4	1	—	0	1	1	—
Mid. Atlantic	11	17	43	113	167	3	3	19	16	43
New Jersey	—	2	11	1	38	—	1	4	2	11
New York (Upstate)	4	6	22	41	43	3	2	19	14	14
New York City	—	3	11	17	39	—	0	5	—	18
Pennsylvania	7	7	16	54	47	N	0	2	N	N
E.N. Central	7	16	42	122	167	3	6	11	35	63
Illinois	—	4	16	27	46	—	1	5	7	19
Indiana	—	2	19	12	16	—	0	5	2	7
Michigan	1	3	9	22	40	1	1	5	6	14
Ohio	6	5	14	53	46	2	1	4	17	12
Wisconsin	—	1	10	8	19	—	0	2	3	11
W.N. Central	5	5	39	41	61	—	2	11	13	22
Iowa	—	0	0	—	—	—	0	0	—	—
Kansas	1	0	5	8	9	—	0	3	2	2
Minnesota	—	0	35	—	20	—	0	9	3	6
Missouri	2	2	5	19	24	—	1	2	6	11
Nebraska§	—	1	3	8	6	—	0	1	1	2
North Dakota	—	0	3	—	—	—	0	2	—	—
South Dakota	2	0	2	6	2	—	0	1	1	1
S. Atlantic	16	21	36	161	179	5	6	16	55	55
Delaware	—	0	1	5	3	—	0	0	—	—
District of Columbia	—	0	4	—	3	—	0	1	—	—
Florida	7	5	10	42	47	1	1	4	12	5
Georgia	5	4	14	42	45	3	1	6	22	16
Maryland§	—	3	10	27	38	1	1	4	10	15
North Carolina	3	2	10	16	9	N	0	0	N	N
South Carolina§	1	1	5	12	10	—	1	6	9	10
Virginia§	—	3	9	13	19	—	0	6	—	8
West Virginia	—	0	3	4	5	—	0	2	2	1
E.S. Central	4	3	9	31	22	—	2	6	3	11
Alabama§	N	0	0	N	N	N	0	0	N	N
Kentucky	2	1	3	10	5	N	0	0	N	N
Mississippi	N	0	0	N	N	—	0	3	—	4
Tennessee§	2	3	6	21	17	—	1	5	3	7
W.S. Central	9	9	51	59	49	11	5	29	38	29
Arkansas§	2	0	2	2	—	1	0	3	7	3
Louisiana	—	0	2	3	4	—	0	3	5	1
Oklahoma	2	2	13	27	17	1	1	7	7	11
Texas§	5	6	38	27	28	9	3	20	19	14
Mountain	6	9	21	58	123	4	4	11	34	54
Arizona	2	3	8	19	34	2	2	9	23	31
Colorado	4	2	10	24	38	2	1	4	7	10
Idaho§	—	0	2	—	3	—	0	1	1	1
Montana§	N	0	0	N	N	—	0	1	—	—
Nevada§	—	0	1	1	2	N	0	0	N	N
New Mexico§	—	2	5	12	34	—	0	3	2	6
Utah	—	1	4	1	12	—	0	4	1	6
Wyoming§	—	0	2	1	—	—	0	1	—	—
Pacific	1	3	8	16	22	—	0	2	1	5
Alaska	—	0	4	2	4	N	0	0	N	N
California	—	0	0	—	—	N	0	0	N	N
Hawaii	1	2	8	14	18	—	0	2	1	5
Oregon§	N	0	0	N	N	N	0	0	N	N
Washington	N	0	0	N	N	N	0	0	N	N
American Samoa	—	0	12	—	—	N	0	0	N	N
C.N.M.I.	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	0	0	—	—
Puerto Rico	N	0	0	N	N	N	0	0	N	N
U.S. Virgin Islands	—	0	0	—	—	N	0	0	N	N

C.N.M.I.: Commonwealth of Northern Mariana Islands.

U: Unavailable. —: No reported cases. N: Not notifiable. Cum: Cumulative year-to-date counts. Med: Median. Max: Maximum.

* Incidence data for reporting year 2008 and 2009 are provisional.

† Includes cases of invasive pneumococcal disease, in children aged <5 years, caused by *S. pneumoniae*, which is susceptible or for which susceptibility testing is not available (NNDSS event code 11717).

§ Contains data reported through the National Electronic Disease Surveillance System (NEDSS).

TABLE III. Deaths in 122 U.S. cities,* week ending February 21, 2009 (7th week)

Reporting area	All causes, by age (years)							Reporting area	All causes, by age (years)						
	All Ages	≥65	45-64	25-44	1-24	<1	P&† Total		All Ages	≥65	45-64	25-44	1-24	<1	P&† Total
New England	513	348	121	26	5	12	49	S. Atlantic	1,129	716	296	70	25	22	78
Boston, MA	141	87	35	8	4	7	18	Atlanta, GA	131	74	39	13	1	4	8
Bridgeport, CT	35	21	10	3	—	1	3	Baltimore, MD	160	97	46	11	2	4	7
Cambridge, MA	16	12	3	—	—	—	3	Charlotte, NC	110	68	32	6	1	3	15
Fall River, MA	21	17	3	1	—	—	4	Jacksonville, FL	183	116	49	9	8	1	23
Hartford, CT	49	36	8	3	1	1	2	Miami, FL	97	60	21	10	4	2	4
Lowell, MA	23	18	5	—	—	—	4	Norfolk, VA	48	28	13	3	—	4	1
Lynn, MA	10	7	3	—	—	—	1	Richmond, VA	68	39	23	4	1	1	6
New Bedford, MA	26	19	5	2	—	—	2	Savannah, GA	44	30	14	—	—	—	4
New Haven, CT	U	U	U	U	U	U	U	St. Petersburg, FL	66	45	12	6	3	—	5
Providence, RI	53	37	14	1	—	1	4	Tampa, FL	176	133	30	5	5	3	4
Somerville, MA	3	3	—	—	—	—	—	Washington, D.C.	36	20	13	3	—	—	—
Springfield, MA	33	19	8	5	—	1	—	Wilmington, DE	10	6	4	—	—	—	1
Waterbury, CT	44	34	8	2	—	—	4	E.S. Central	862	562	216	54	12	18	70
Worcester, MA	59	38	19	1	—	1	4	Birmingham, AL	193	114	52	13	3	11	13
Mid. Atlantic	1,979	1,400	429	99	29	22	103	Chattanooga, TN	104	75	21	7	1	—	11
Albany, NY	46	32	12	—	1	1	2	Knoxville, TN	87	61	18	6	2	—	6
Allentown, PA	22	17	5	—	—	—	3	Lexington, KY	56	39	17	—	—	—	2
Buffalo, NY	92	64	24	3	—	1	3	Memphis, TN	174	110	45	12	4	3	18
Camden, NJ	9	6	1	1	1	—	—	Mobile, AL	55	37	13	5	—	—	2
Elizabeth, NJ	16	12	4	—	—	—	—	Montgomery, AL	50	38	10	1	1	—	4
Erie, PA	49	44	3	1	1	—	1	Nashville, TN	143	88	40	10	1	4	14
Jersey City, NJ	20	17	3	—	—	—	1	W.S. Central	1,455	956	332	94	43	30	85
New York City, NY	1,050	739	236	51	13	11	47	Austin, TX	81	52	19	7	1	2	9
Newark, NJ	42	21	12	7	1	1	2	Baton Rouge, LA	84	60	15	9	—	—	—
Paterson, NJ	14	6	7	—	1	—	1	Corpus Christi, TX	62	43	15	3	—	1	4
Philadelphia, PA	206	124	55	18	5	4	9	Dallas, TX	195	119	48	18	6	4	8
Pittsburgh, PA [§]	25	21	4	—	—	—	—	El Paso, TX	96	73	13	4	4	2	5
Reading, PA	41	31	5	1	2	2	1	Fort Worth, TX	U	U	U	U	U	U	U
Rochester, NY	136	102	26	5	1	2	14	Houston, TX	395	251	92	29	11	12	20
Schenectady, NY	25	21	4	—	—	—	2	Little Rock, AR	84	56	18	4	3	3	1
Scranton, PA	21	17	4	—	—	—	3	New Orleans, LA	U	U	U	U	U	U	U
Syracuse, NY	98	77	15	4	2	—	7	San Antonio, TX	280	175	70	16	14	5	28
Trenton, NJ	31	24	5	2	—	—	2	Shreveport, LA	52	41	9	2	—	—	3
Utica, NY	15	8	2	4	1	—	1	Tulsa, OK	126	86	33	2	4	1	7
Yonkers, NY	21	17	2	2	—	—	4	Mountain	819	556	177	48	18	20	48
E.N. Central	2,094	1,378	513	133	30	40	144	Albuquerque, NM	U	U	U	U	U	U	U
Akron, OH	56	34	13	2	—	7	1	Boise, ID	58	37	12	6	1	2	4
Canton, OH	40	32	5	3	—	—	2	Colorado Springs, CO	74	44	19	4	4	3	1
Chicago, IL	360	209	103	33	8	7	23	Denver, CO	95	68	15	9	1	2	7
Cincinnati, OH	97	67	20	3	1	6	11	Las Vegas, NV	269	181	62	13	5	8	15
Cleveland, OH	249	175	55	12	4	3	10	Ogden, UT	35	24	9	—	2	—	3
Columbus, OH	219	125	71	15	2	6	23	Phoenix, AZ	U	U	U	U	U	U	U
Dayton, OH	120	87	20	12	—	1	13	Pueblo, CO	27	19	8	—	—	—	2
Detroit, MI	158	83	57	16	2	—	8	Salt Lake City, UT	108	63	27	11	3	4	10
Evansville, IN	57	42	10	3	2	—	5	Tucson, AZ	153	120	25	5	2	1	6
Fort Wayne, IN	78	57	17	3	—	1	5	Pacific	1,691	1,177	370	82	34	27	198
Gary, IN	20	11	9	—	—	—	—	Berkeley, CA	18	12	5	—	—	1	4
Grand Rapids, MI	54	42	9	—	3	—	4	Fresno, CA	127	92	28	5	1	1	12
Indianapolis, IN	198	132	46	13	3	4	15	Glendale, CA	40	33	4	2	—	1	10
Lansing, MI	43	32	7	2	2	—	3	Honolulu, HI	56	38	13	2	1	2	5
Milwaukee, WI	102	68	25	6	1	2	7	Long Beach, CA	67	47	11	6	2	1	11
Peoria, IL	42	33	7	—	—	2	3	Los Angeles, CA	262	167	60	23	11	1	42
Rockford, IL	44	31	11	2	—	—	3	Pasadena, CA	22	15	4	1	2	—	4
South Bend, IN	45	35	8	1	—	1	2	Portland, OR	118	66	43	4	3	2	8
Toledo, OH	112	83	20	7	2	—	6	Sacramento, CA	218	155	46	12	2	3	25
Youngstown, OH	U	U	U	U	U	U	U	San Diego, CA	136	93	30	7	3	3	9
W.N. Central	727	482	166	41	22	16	61	San Francisco, CA	131	92	27	6	2	4	18
Des Moines, IA	105	76	19	7	1	2	7	San Jose, CA	185	147	32	3	2	1	18
Duluth, MN	27	19	6	—	1	1	2	Santa Cruz, CA	30	23	4	1	—	1	7
Kansas City, KS	28	18	6	3	1	—	1	Seattle, WA	117	78	27	7	1	4	11
Kansas City, MO	114	76	22	6	8	2	8	Spokane, WA	62	50	9	1	—	2	8
Lincoln, NE	49	38	7	1	—	3	2	Tacoma, WA	102	69	27	2	4	—	6
Minneapolis, MN	66	42	17	4	2	1	7	Total[¶]	11,269	7,575	2,620	647	218	207	836
Omaha, NE	88	68	17	1	—	2	12								
St. Louis, MO	109	57	41	6	3	2	16								
St. Paul, MN	45	32	9	2	1	1	1								
Wichita, KS	96	56	22	11	5	2	5								

U: Unavailable. —: No reported cases.

* Mortality data in this table are voluntarily reported from 122 cities in the United States, most of which have populations of >100,000. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

† Pneumonia and influenza.

§ Because of changes in reporting methods in this Pennsylvania city, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶ Total includes unknown ages.

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 in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the following Friday. Data are compiled in the National Center for Public Health Informatics, Division of Integrated Surveillance Systems and Services. 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.

All material in the *MMWR* Series is in the public domain and may be used and reprinted without permission; citation as to source, however, is appreciated.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of these sites. URL addresses listed in *MMWR* were current as of the date of publication.