



# MMWR<sup>TM</sup>

## Morbidity and Mortality Weekly Report

[www.cdc.gov/mmwr](http://www.cdc.gov/mmwr)

Weekly

February 15, 2008 / Vol. 57 / No. 6

### Unintentional Strangulation Deaths from the “Choking Game” Among Youths Aged 6–19 Years — United States, 1995–2007

The “choking game” is defined as self-strangulation or strangulation by another person with the hands or a noose to achieve a brief euphoric state caused by cerebral hypoxia. Participants in this activity typically are youths (1). Serious neurologic injury or death can result if strangulation is prolonged. In recent years, news media reports have described numerous deaths among youths attributed to the choking game. Because no traditional public health dataset collects mortality data on this practice, CDC used news media reports to estimate the incidence of deaths from the choking game. This report describes the results of that analysis, which identified 82 probable choking-game deaths among youths aged 6–19 years, during 1995–2007. Seventy-one (86.6%) of the decedents were male, and the mean age was 13.3 years. Parents, educators, and health-care providers should become familiar with warning signs that youths are playing the choking game (2).

Death certificates lack the detail necessary to distinguish choking-game deaths from other unintentional strangulation deaths. Therefore, CDC identified probable choking-game deaths from 1) a LexisNexis\* search in November 2007 of newspaper reports since the 1970s and 2) reports on two choking-game-awareness websites,† which were created in 2005 and 2006. Deaths of children listed on the two websites but not matched by LexisNexis newspaper reports were included in the assessment only if subsequent Internet searches located news media reports (e.g., from television stations) of the incidents confirming that the deaths met the case definition. For consistency, case characteristics were obtained only from news media reports.

A case was defined as a death, described in a news report, resulting from self-strangulation or strangulation by another person as part of an activity with elements of the choking game (also known as the “blackout game,” “pass-out game,” “scarf game,” “space monkey,” and by other names). Deaths were excluded if reports included any mention of autoerotic asphyxiation, a practice of choking oneself during sexual stimulation that is usually engaged in by teen-aged or adult males (1). Deaths also were excluded if reports noted that the medical examiner ruled the death was a suicide or of undetermined intent coupled with no mention of elements of the choking game, or if the age of the decedent was missing from news reports. Cases were restricted to youths aged <20 years who were residents of the United States. Following are two examples of cases of choking-game deaths.

**Case 1.** In February 2006, an adolescent boy aged 13 years came home from school in a good mood and had dinner with his family. He then went to his bedroom to do his homework. Approximately 1 hour later, his mother went to check on him and discovered him slumped in a corner with a belt around his neck. His face was blue. The mother began cardiopulmonary resuscitation while one of the other children called an ambulance. The boy died at a local

#### INSIDE

- 144 Invasive Pneumococcal Disease in Children 5 Years After Conjugate Vaccine Introduction — Eight States, 1998–2005
- 148 Progress Toward Introduction of *Haemophilus influenzae* type b Vaccine in Low-Income Countries — Worldwide, 2004–2007
- 151 Notices to Readers
- 153 QuickStats

\* Available at <http://www.lexisnexis.com>.

† Available at <http://www.chokinggame.net> and <http://www.stop-the-choking-game.com>.

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* 2008;57:[inclusive page numbers].

#### Centers for Disease Control and Prevention

Julie L. Gerberding, MD, MPH  
*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*

Suzanne M. Hewitt, MPA  
*Managing Editor, MMWR Series*

Douglas W. Weatherwax  
*Lead Technical Writer-Editor*

Catherine H. Bricker, MS  
Donald G. Meadows, MA

Jude C. Rutledge  
*Writers-Editors*

Beverly J. Holland  
*Lead Visual Information Specialist*

Lynda G. Cupell  
Malbea A. LaPete  
*Visual Information Specialists*

Quang M. Doan, MBA  
Erica R. Shaver  
*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

Stanley A. Plotkin, MD, Doylestown, PA

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

Anne Schuchat, MD, Atlanta, GA

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

John W. Ward, MD, Atlanta, GA

hospital 1 hour later. No suicide note was found. The county medical examiner ruled that the death resulted from accidental asphyxiation by hanging. In the weeks following his death, multiple teens told the director of a local counseling agency that the choking game had been played at local parties.

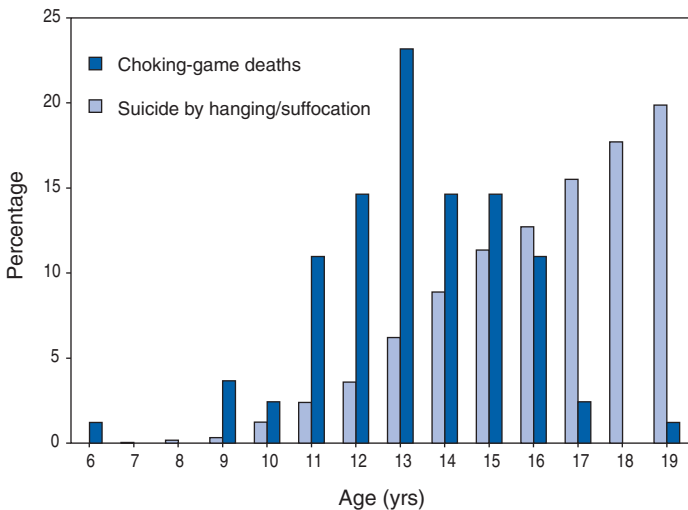
**Case 2.** In April 2005, an adolescent girl aged 13 years was found dead, hanging from a belt and shoelace made into a noose on the door of her bedroom closet, after her brother went to her room to see why she had not come down for breakfast. No suicide note was found. The medical examiner determined that the teen had died at 9:30 p.m. the previous night. After the teen's death, the family learned that the girl had confided in a cousin that she recently had played the choking game in the locker room at school and that a group of girls at her school had been suspended for playing the choking game.

The LexisNexis search and follow-up Internet searches for confirmatory news reports on deaths from the two choking-game websites produced 106 deaths that referred to the choking game. A total of 24 of the deaths were excluded: 20 because news reports either provided no evidence of the choking game or because the medical examiner ruled the death was of undetermined intent, three because the death circumstances had autoerotic elements, and one because no age of the decedent was reported. Among the remaining 82 deaths, 49 (59.8%) were identified via LexisNexis, and 72 (87.8%) were collected from the choking-game websites. LexisNexis was the sole source for 10 (12.2%) of the deaths, and the websites were the sole initial source for 33 (40.2%) of the deaths; 39 (47.6%) deaths were identified by both sources. The median period between the date of death and the news media report was 33.5 days (range: 2 days–6 years).

The earliest choking-game death was identified as occurring in 1995. Three or fewer deaths occurred annually during 1995–2004; however, 22 deaths occurred in 2005, 35 in 2006, and nine in 2007. Seventy-one (86.6%) of the 82 decedents were male, and the age range of decedents was 6–19 years, with a mean age of 13.3 years (standard deviation = 2.1) and a median age of 13 years. Age distribution of the 82 choking-game decedents during 1995–2007 differed from that of the 5,101 youths aged 6–19 years whose deaths were attributed to suicide by hanging/suffocation during 1999–2005<sup>§</sup> (Figure).

<sup>§</sup> National Vital Statistics System data obtained via the Web-based Injury Statistics Query and Reporting System at <http://www.cdc.gov/nncipc/wisqars/default.htm>. The 1999–2005 period was chosen because 2005 was the most recent year of data available and 1999 was the first year of mortality coding by the *International Classification of Diseases, Tenth Revision*.

**FIGURE.** Age distribution of youths aged 6–19 years whose deaths were attributed to the “choking game” (n = 82) during 1995–2007, compared with youths whose deaths were attributed to suicide by hanging/suffocation (n = 5,101) during 1999–2005 — United States



**SOURCES:** Choking-game deaths, news media reports; suicide by hanging/suffocation, National Vital Statistics System.

Among the 70 deaths for which sufficient detail was reported, 67 (95.7%) occurred while the decedent was alone. Among the 42 deaths for which sufficient detail was reported, 39 (92.9%) parents of decedents said they were not aware of the choking game until the death of their child.

Choking-game deaths occurred in 31 states; no geographic clustering was evident. Deaths did not vary significantly by season or by day of the week. No information regarding decedent drug use, race/ethnicity, or socioeconomic status was available.

**Reported by:** P Russell, MD, MultiCare Health System, Tacoma, Washington. L Paulozzi, MD, J Gilchrist, MD, Div of Unintentional Injury Prevention, National Center for Injury Prevention and Control; R Toblin, PhD, EIS Officer, CDC.

**Editorial Note:** This report describes the first attempt to assess the national incidence of deaths among youths resulting from the choking game. Although asphyxial games might have been played by youths for generations, the use of a ligature while playing alone appears to be a new practice that can be fatal (1). A search of medical literature produced no mention of the choking game until 2000. Information on the prevalence of this behavior is limited to the results of the 2006 Williams County (Ohio) Youth Health Risk Behavioral Survey, which included a question on the choking game. In that survey, 11% of youths aged 12–18 years, and 19% of youths aged 17–18 years reported ever playing the choking game (3).

In this analysis, most decedents were males aged 11–16 years. These demographics are consistent with greater risk-taking behavior among boys than girls, beginning before adolescence (4). The data also are consistent with previous case studies (2,5–7) and with the sex and age distribution for decedents aged 6–19 years whose deaths are attributed to all types of unintentional choking/suffocation. However, the age distribution differs from the distribution for suicides by hanging/suffocation. The age distribution for choking-game deaths among youths aged 6–19 years followed a normal distribution with a peak at age 13 years; deaths from suicide by hanging/suffocation among those aged 6–19 years increased steadily through age 19 years.

Whether choking-game incidence has changed in recent years is uncertain (1). The increases in news media reports of choking-game deaths from three or fewer reports during 1995–2004 to 22 in 2005 and 35 in 2006 might indicate an increase in choking-game activity; however, the increase in reports also might indicate greater interest by the news media after the choking game was featured on national television (1). Conversely, the decrease to nine news media reports of choking-game deaths in 2007 might indicate a decrease in choking-game activity or waning news media attention.

The findings in this report are subject to at least two limitations. First, the use of news media reports for mortality surveillance incurs the risk of low sensitivity and specificity. LexisNexis does not include all newspapers and does not include most (e.g., local) television news reports. In this assessment, a LexisNexis search identified only 59.8% of decedents, compared with 87.8% of decedents identified on the two choking-game awareness websites. Even when all newspapers in an area are examined, their sensitivity for unintentional injury surveillance has ranged from 59% for drowning deaths (8) to 96% for deaths from fires (9) and has been reported as low as 13% for homicides (10). Further, this approach cannot be used to assess or characterize nonfatal injuries resulting from the choking game (2,6,7). Additionally, newspaper reports might attribute deaths to causes or intents that differ from those recorded on death certificates (8). In the design used in this study, information from news media reports could not be subjected to independent verification. Second, news media reports usually did not provide information on characteristics such as race/ethnicity, education, income, or the role of influence by peers or the media/Internet; therefore, analysis of these characteristics was not possible.

In this study, few of the parents of children who died had been familiar with the choking game. Parents, educators, and health-care providers should learn about the choking game and be able to recognize any of the following warning signs in youths: mention of the choking game (or the game by its other names); bloodshot eyes; marks on the neck; frequent, severe headaches; disorientation after spending time alone; and ropes, scarves, and belts tied to bedroom furniture or doorknobs or found knotted on the floor (2). Medical examiners and coroners should be aware of the choking game as a possible explanation for deaths from self-inflicted strangulation in this age group that otherwise might be miscategorized as suicides (1,2). In addition, better mortality surveillance is needed, and more research should be conducted (e.g., questions on youth-behavior surveys regarding awareness of and involvement in the choking game) to determine prevalence, risk factors, and protective factors that will lead to effective interventions aimed at reducing or eliminating choking-game participation and deaths.

#### References

1. Andrew TA, Fallon KK. Asphyxial games in children and adolescents. *Am J Forensic Med Pathol* 2007;28:303–7.
2. Urkin J, Merrick J. The choking game or suffocation roulette in adolescence. *Int J Adolesc Med Health* 2006;18:207–8.
3. Williams County Partnerships for Success. Williams County Youth Health Risk Behavioral Survey, fall 2006. Bryan, OH: Williams County Partnerships for Success; 2007. Available at <http://www.co.williams.oh.us/family%20first/williams%20final%20report%202-6-07.pdf>.
4. Slovic P. Risk-taking in children: age and sex differences. *Child Dev* 1966;37:169–76.
5. Le D, Macnab AJ. Self strangulation by hanging from cloth towel dispensers in Canadian schools. *Inj Prev* 2001;7:231–3.
6. Gicquel JJ, Bouhamida K, Dighiero P. Ophthalmological complications of the asphyxiophilic “scarf game” in a 12-year-old child [French]. *J Fr Ophthalmol* 2004;27:1153–5.
7. Shlamovitz GZ, Assia A, Ben-Sira L, Rachmel A. “Suffocation roulette”: a case of recurrent syncope in an adolescent boy. *Ann Emerg Med* 2003;41:223–6.
8. Lunetta P, Tiirikainen K, Smith GS, Penttila A, Sajantila A. How well does a national newspaper reporting system profile drowning? *Int J Inj Contr Saf Promot* 2006;13:35–41.
9. Rainey DY, Runyan CW. Newspapers: a source for injury surveillance? *Am J Public Health* 1992;82:745–6.
10. Sorenson SB, Manz JG, Berk RA. News media coverage and the epidemiology of homicide. *Am J Public Health* 1998;88:1510–4.

## Invasive Pneumococcal Disease in Children 5 Years After Conjugate Vaccine Introduction — Eight States, 1998–2005

*Streptococcus pneumoniae* (pneumococcus) is a major cause of meningitis, pneumonia, and bacteremia, especially among young children and older adults (1). Before the 7-valent pneumococcal conjugate vaccine (PCV7) was introduced in the United States in 2000, the seven pneumococcal serotypes covered by the vaccine (4, 6B, 9V, 14, 18C, 19F, and 23F) caused 80% of invasive pneumococcal disease (IPD) cases among young children (1), and the incidence of IPD was relatively stable (2). In October 2000, the Advisory Committee on Immunization Practices recommended PCV7 for all children aged <2 years and for older children at increased risk for IPD (1). Introduction of PCV7 in the United States led to substantial reductions in the incidence of IPD among the target population of children aged <5 years. Use of the vaccine also reduced IPD among unvaccinated populations through reductions in nasopharyngeal colonization and transmission of vaccine-type pneumococci from vaccinated children (i.e., indirect, or herd, effects of PCV7) (2). To evaluate the effect of continued PCV7 use on IPD incidence among children aged <5 years in the United States, CDC analyzed population- and laboratory-based surveillance data. Results of that analysis indicated that in 2005, overall IPD rates among children aged <5 years were 77% lower, and an estimated 13,000 fewer cases of IPD occurred, compared with the years preceding vaccine introduction (1998–1999). Although IPD caused by PCV7 serotypes declined through 2005, overall IPD rates leveled off beginning in 2002, primarily because of increases in the incidence of IPD caused by non-PCV7 serotype 19A. Given these trends, use of expanded-valency conjugate vaccines might further reduce IPD incidence. Continued surveillance is needed to guide development of future formulations of conjugate vaccines and to monitor the effects of continued vaccine use.

Cases of IPD were defined as isolation of pneumococcus from normally sterile sites (e.g., blood, cerebrospinal fluid, or pleural fluid). Cases were identified through CDC’s

Active Bacterial Core surveillance (ABCs),\* a population- and laboratory-based system ongoing since 1995. During 1998–2005, ABCs continuously monitored IPD in California (one county); the state of Connecticut; Georgia (20 counties); Maryland (six counties); Minnesota (seven counties); New York (seven counties); Oregon (three counties); and Tennessee (four counties). The total population aged <5 years under surveillance in 2005 was 1.26 million persons. Surveillance personnel at each site maintain routine contact with all clinical laboratories in the surveillance area and conduct laboratory audits every 6 months to ensure completeness of reporting. Pneumococcal isolates were serotyped at reference laboratories (CDC and Minnesota Department of Health) by use of the Quellung reaction and grouped as PCV7 types (the seven serotypes in the PCV7 formulation) and non-PCV7 types (all other serotypes).

Annual IPD incidence rates per 100,000 population were calculated using population estimates from the U.S. Census Bureau for prevaccine years (1998–1999), and race-bridged, postcensal population estimates from the National Center for Health Statistics for postvaccine years (2001–2005). Changes in incidence rates between 1998–1999 and 2005 were assessed by calculating relative risks (RRs) reported as percentage changes in rates of disease (percentage change in IPD =  $[1 - \text{RR}] \times 100$ ). To assess statistical significance of a percentage change in the incidence of IPD, 95% confidence intervals were calculated. To estimate the annual number of IPD cases in the United States, race- and age-specific ABCs incidence rates were applied to the race and age distribution of the U.S. population. To estimate the number of IPD cases prevented in 2005, the estimated number of cases in 2005 was subtracted from the average estimated number of cases in 1998–1999. National estimates of IPD cases prevented through vaccination (direct effects of PCV7) in 2005 were calculated as the product of 1) the estimated mean number of PCV7-type cases among children aged <5 years during 1998–1999; 2) national estimates of PCV7 coverage (a range of  $\geq 1$  dose to  $\geq 3$  doses) for each birth cohort during 2001–2005 derived from the National Immunization Survey (3); and 3) 94%

vaccine efficacy against PCV7-type IPD (1). Among children born in 2001, 68% and 89% received  $\geq 1$  dose and  $\geq 3$  doses, respectively. Among children born in 2005, 84% and 95% received  $\geq 1$  dose and  $\geq 3$  doses, respectively. To estimate the number of PCV7-type cases prevented through indirect effects of PCV7 among children aged <5 years, the estimated number of cases prevented directly was subtracted from the difference between estimated PCV7-type cases among children aged <5 years during 1998–1999 and 2005.

The overall incidence of IPD among children aged <5 years declined from 98.7 cases per 100,000 during 1998–1999 to 23.4 cases per 100,000 in 2005 (Table). Overall IPD rates were significantly lower in 2005 compared with 1998–1999 for each age group of children aged <5 years (Figure 1). The largest percentage decline (82%) and the largest absolute rate reduction in overall IPD (175.8 cases per 100,000) were observed among children aged 1 year, the age group with the highest baseline rate (Table). The incidence of PCV7-type IPD decreased significantly among all children aged <5 years from 1998–1999 to 2005. The largest absolute rate reduction in PCV7-type disease was observed among children aged 1 year (175.7 cases per 100,000). Non-PCV7-type IPD increased significantly among children aged <1 year and 4 years (Table). The largest absolute rate increase in non-PCV7-type disease was observed among children aged <1 year (10.8 cases per 100,000). Among children aged <5 years, the incidence of serotype 19A IPD increased from 2.6 cases in 1998–1999 to 9.3 cases per 100,000 in 2005, the largest increase for any one serotype. In 2005, 40% of IPD among children aged <5 years was caused by serotype 19A. Although PCV7-type incidence rates continued to decline through 2005 for all children aged <5 years, overall IPD rates plateaued during 2002–2005.

An estimated 14,200 fewer PCV7-type IPD cases occurred in the United States among children aged <5 years in 2005 compared with 1998–1999 (Figure 2). Of these, 11,000 (using  $\geq 3$ -dose PCV7 coverage estimates) to 13,000 (using  $\geq 1$ -dose estimates) PCV7-type cases were prevented directly by vaccination. The remaining PCV7-type cases (1,200–3,200) were prevented through the indirect effects of PCV7. After accounting for an estimated 1,200 additional non-PCV7-type cases that occurred in 2005 compared with 1998–1999 (Figure 2), a total of 13,000 IPD cases (14,200 PCV7-type cases prevented minus 1,200 additional non-PCV7-type cases) were prevented in 2005

\* ABCs of CDC's Emerging Infections Programs Network is a collaborative surveillance system for invasive bacterial pathogens of public health importance conducted by CDC, state health departments, and universities. For each case of invasive disease in the surveillance population, a case report with basic demographic information is completed and bacterial isolates are sent to CDC and other reference laboratories for additional laboratory evaluation. Additional information is available at <http://www.cdc.gov/ncidod/dbmd/abc/index.htm>.

**TABLE. Changes in incidence rate\* of invasive pneumococcal disease (IPD) among children aged <5 years before and after introduction of 7-valent pneumococcal conjugate vaccine (PCV7), by age and serotype category — Active Bacterial Core surveillance, eight states,† 1998–1999 and 2005**

Age group (yrs)	Serotype category <sup>§</sup>	1998–1999 <sup>¶</sup>		2005		Change in incidence rate 2005 versus 1998–1999	
		Rate	(No.)	Rate	(No.)	Rate difference	Percentage change (95% CI <sup>**</sup> )
<1	PCV7 types	144.0	(332)	2.7	(7)	-141.3	-98 (-99 to -96)
	Non-PCV7 types	26.5	(60)	37.3	(91)	10.8	40 (7 to 84)
	Total	170.5	(392)	40.0	(98)	-130.5	-77 (-81 to -71)
1	PCV7 types	177.3	(403)	1.6	(4)	-175.7	-99 (-100 to -98)
	Non-PCV7 types	36.3	(83)	36.2	(94)	-0.1	0 (-23 to 29)
	Total	213.6	(486)	37.8	(98)	-175.8	-82 (-86 to -78)
2	PCV7 types	55.0	(125)	1.2	(3)	-53.8	-98 (-99 to -93)
	Non-PCV7 types	9.7	(22)	14.3	(36)	4.6	47 (-5 to 129)
	Total	64.7	(147)	15.5	(39)	-49.2	-76 (-83 to -67)
3	PCV7 types	21.6	(49)	1.2	(3)	-20.4	-94 (-98 to -82)
	Non-PCV7 types	7.1	(16)	10.1	(25)	3.0	43 (-15 to 141)
	Total	28.7	(65)	11.3	(28)	-17.4	-61 (-74 to -41)
4	PCV7 types	11.3	(26)	0.7	(2)	-10.6	-93 (-98 to -71)
	Non-PCV7 types	4.4	(10)	10.4	(26)	6.0	137 (32 to 324)
	Total	15.7	(36)	11.1	(28)	-4.6	-29 (-54 to 10)
Total <5	PCV7 types	81.9	(935)	1.7	(19)	-80.2	-98 (-99 to -97)
	Non-PCV7 types	16.8	(191)	21.7	(272)	4.9	29 (10 to 51)
	Total	98.7	(1126)	23.4	(291)	-75.5	-77 (-79 to -73)

\* Per 100,000 population.

† California (one county); the state of Connecticut; Georgia (20 counties); Maryland (six counties); Minnesota (seven counties); New York (seven counties); Oregon (three counties); and Tennessee (four counties).

§ Serotypes included in the 7-valent conjugate vaccine are grouped as PCV7 types (4, 6B, 9V, 14, 18C, 19F, and 23F). All other serotypes are grouped as non-PCV7 types.

¶ Average incidence rates and average number of IPD cases in 1998 and 1999.

\*\* Confidence interval.

among children aged <5 years. During 2001–2005, an estimated 62,000 cases of IPD were prevented among children aged <5 years, with 59% of these cases prevented through direct effects of PCV7 and the remainder prevented among unvaccinated children (i.e., herd effects).

**Reported by:** A Reingold, MD, California Emerging Infections Program, Oakland, California. J Hadler, MD, Emerging Infections Program, Connecticut Dept of Public Health. MM Farley, MD, Georgia Emerging Infections Program, Veterans Affairs Medical Center and Emory Univ School of Medicine, Atlanta, Georgia. L Harrison, MD, Maryland Emerging Infections Program, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland. R Lynfield, MD, C Lexau, PhD, Minnesota Dept of Health. N Bennett, MD, Monroe County Dept of Public Health, Rochester, New York. A Thomas, MD, Oregon Public Health Div, Dept of Human Svcs. AS Craig, MD, Tennessee Dept of Health. PJ Smith, Immunization Services Div; B Beall, PhD, CG Whitney, MD, M Moore, MD, T Pilishvili, MPH, Respiratory Diseases Br, Div of Bacterial Diseases, National Center for Immunization and Respiratory Diseases.

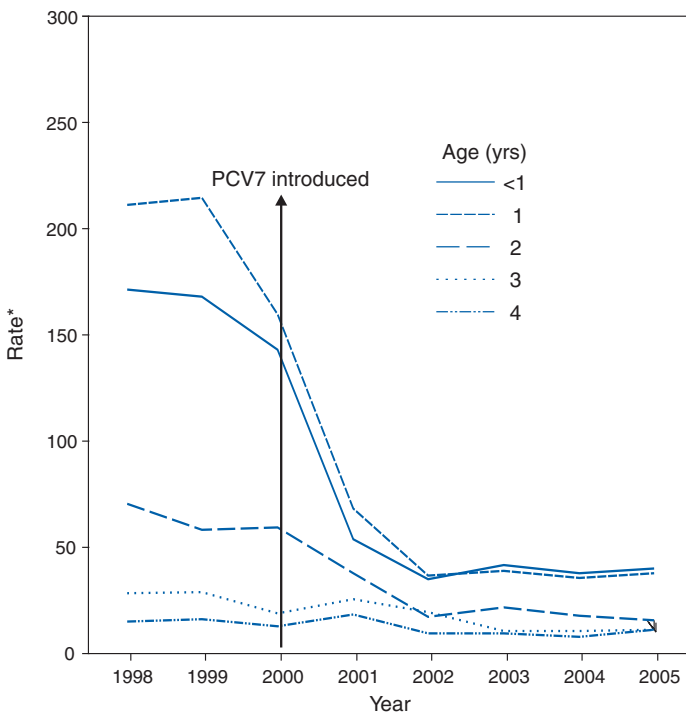
**Editorial Note:** The introduction of PCV7 in the United States led to substantial reductions in IPD among the target population (children aged <5 years), and the benefits of vaccination with PCV7 remain evident 5 years later. Overall IPD rates in 2005 were 77% lower for children aged <5 years compared with average rates in 1998–1999. Results of this report indicate that overall IPD rates in 2005

among children aged <5 years (23.2 per 100,000) remain below the *Healthy People 2010* objective (14-5a) of 46 per 100,000.† Findings in this report are supported by a growing body of evidence of the beneficial effects of PCV7 introduction on noninvasive pneumococcal disease; recent studies report dramatic declines in all-cause pneumonia and pneumococcal pneumonia in the PCV7 target population (4) and reductions in frequent otitis media (5).

Results of this analysis also demonstrate that, after reductions in IPD rates among children targeted for vaccination during the first 3 years after PCV7 introduction, further reductions were offset by increases in non-PCV7 serotypes. PCV7-type IPD rates continued to decline, but overall IPD rates leveled off during 2002–2005. Since the introduction of PCV7, a shift in the distribution of serotypes causing IPD in this age group has occurred; only 7% of cases were caused by PCV7 serotypes in 2005, compared with approximately 80% during 1998–1999. Serotype 19A was the most common serotype causing IPD among children in 2005, and changes in non-PCV7-type

† US Department of Health and Human Services. Healthy people 2010 (conference ed, in 2 vols). Washington, DC: US Department of Health and Human Services; 2000. Available at <http://www.healthypeople.gov>.

**FIGURE 1. Changes in incidence rate\* of invasive pneumococcal disease (IPD) among children aged <5 years before and after introduction of 7-valent pneumococcal conjugate vaccine (PCV7), by age and year — Active Bacterial Core surveillance, eight states,† 1998–2005**



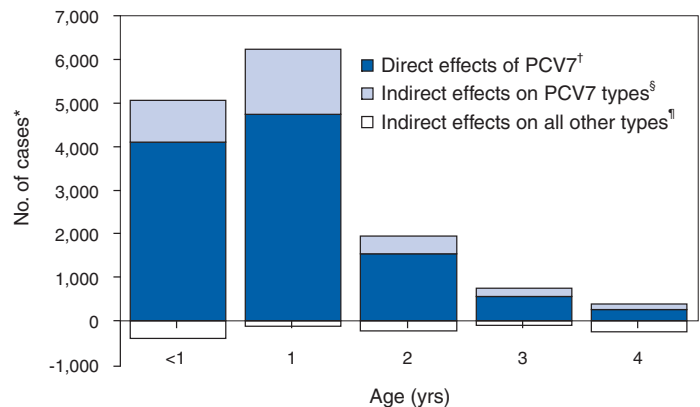
\* Per 100,000 population.

† California (one county); the state of Connecticut; Georgia (20 counties); Maryland (six counties); Minnesota (seven counties); New York (seven counties); Oregon (three counties); and Tennessee (four counties).

IPD were largely driven by increases in IPD caused by this serotype. Even though absolute increases in rates of non-PCV7-type IPD remain modest relative to reductions in PCV7-type IPD, an estimated 1,200 additional cases of IPD not preventable by PCV7 occurred among children aged <5 years in 2005, compared with prevaccine baseline. Increases in non-PCV7-type disease among vaccinated and unvaccinated populations have been reported since PCV7 introduction (2,6). The results of this analysis indicate that, in the general U.S. population, these increases have been small relative to declines in PCV7-type disease.

The findings in this report are subject to at least one limitation. The relationships between PCV7 coverage or numbers of PCV7 doses received and PCV7 effects could not be explored directly. Vaccination status was not available for persons with IPD, and PCV7 coverage estimates from a different data source were used to estimate PCV7 direct effects. Therefore, the level of PCV7 coverage needed to induce indirect (i.e., herd) effects is unknown. In this analysis, a range of PCV7 coverage estimates ( $\geq 3$  or  $\geq 1$

**FIGURE 2. Projected number of invasive pneumococcal disease (IPD) cases prevented among children aged <5 years by 7-valent pneumococcal conjugate vaccine (PCV7), by age and direct or indirect effects — United States, 2005**



\* National projections of IPD cases calculated applying ABCs age- and race-specific rates to the age and racial distribution of the U.S. population using U.S. Census 2000 data.

† Calculated as a product of national projections of PCV7-type IPD cases among children aged <5 years in 1998–1999, PCV7 coverage ( $\geq 3$  doses) for each birth cohort in 2001–2005, and PCV7 efficacy against PCV7-type IPD.

§ Calculated by subtracting national projections of PCV7-type cases in 2005 from average national projections of PCV7-type IPD cases in 1998–1999 and then subtracting PCV7-type IPD cases prevented directly.

¶ Calculated by subtracting national projections of non-PCV7-type cases in 2005 from average national projections of non-PCV7-type IPD cases in 1998–1999.

doses) for each birth cohort was used to obtain a range of estimates for the direct and indirect effects of PCV7.

Initial substantial declines in IPD after PCV7 introduction are strikingly similar to reductions in invasive disease caused by *Haemophilus influenzae* type b (Hib) after Hib conjugate vaccine introduction in the United States (7). Increases in disease caused by *H. influenzae* serotypes other than type b were a concern; however, the experience with Hib conjugate vaccine indicates that non-type b *H. influenzae* were not as successful as Hib in causing invasive disease (8). In contrast with the six serotypes of *H. influenzae*, approximately 90 pneumococcal serotypes have been described. Fortunately, different pneumococcal serotypes also vary in their ability to cause invasive disease (9). The findings in this report suggest that expanded-valency conjugate vaccines for children that also provide protection against serotype 19A would be useful to improve prevention of IPD. A 13-valent conjugate vaccine containing type 19A polysaccharide and a 10-valent conjugate vaccine, which might provide cross protection against type 19A (10), are currently in clinical trials. Continued surveillance for IPD is crucial to provide information on emerging pneumococcal serotypes and the optimal composition of future conjugate vaccines.

### Acknowledgments

This report is based, in part, on contributions by P Daily, MPH, G Rothrock, MPH, California Emerging Infections Program, Oakland, California; S Petit, MPH, Emerging Infections Program, Connecticut Dept of Public Health; W Baughman, MSPH, P Malpiedi, MPH, Georgia Emerging Infections Program, Veterans Affairs Medical Center and Emory Univ School of Medicine; KE Arnold, MD, Div of Public Health, Georgia Dept of Human Resources, Atlanta, Georgia. R Hollick, Maryland Emerging Infections Program, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland; J Besser, PhD, R Danila, PhD, B Juni, MS, G Kupferschmidt, Minnesota Dept of Health; C Long, Univ of Rochester, Rochester, New York; D Hoefler, New York State Dept of Health; Karen Stefonek, MPH, Oregon Dept of Human Svcs; B Barnes, W Schaffner, Vanderbilt Univ Medical Center, Nashville, Tennessee; TH Skoff, MS, E Weston, MPH, ER Zell, MStat, C Wright, Div of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, CDC.

### References

1. Advisory Committee on Immunization Practices. Preventing pneumococcal disease among infants and young children. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2000;49(No. RR-9).
2. Whitney CG, Farley MM, Hadler J, et al. Decline in invasive pneumococcal disease after the introduction of protein-polysaccharide conjugate vaccine. *N Engl J Med* 2003;348:1737–46.
3. Smith PJ, Nuorti JP, Singleton JA, Zhao Z, Wolter KM. Effect of vaccine shortages on timeliness of pneumococcal conjugate vaccination: results from the 2001–2005 National Immunization Survey. *Pediatrics* 2007;120:1165–73.
4. Grijalva CG, Nuorti JP, Arbogast PG, Martin SW, Edwards KM, Griffin MR. Decline in pneumonia admissions after routine childhood immunisation with pneumococcal conjugate vaccine in the USA: a time series analysis. *Lancet* 2007;369:1179–86.
5. Poehling KA, Szilagyi PG, Grijalva CG, et al. Reduction of frequent otitis media and pressure-equalizing tube insertion in children after introduction of pneumococcal conjugate vaccine. *Pediatrics* 2007;119:707–15.
6. Hicks LA, Harrison LH, Flannery B, et al. Incidence of pneumococcal disease due to non-pneumococcal conjugate vaccine (PCV7) serotypes in the United States during the era of widespread PCV7 vaccination, 1998–2004. *J Infect Dis* 2007;196:1346–54.
7. Bisgard KM, Kao A, Leake J, Strelbel PM, Perkins BA, Wharton M. *Haemophilus influenzae* disease in the United States, 1994–1995: near disappearance of a vaccine-preventable childhood disease. *Emerg Infect Dis* 1998;4:229–37.
8. CDC. Active Bacterial Core surveillance reports, Emerging Infections Program Network, *Haemophilus influenzae*, 1998–2006. Available at <http://www.cdc.gov/ncidod/dbmd/abcs/survreports.htm>.
9. Brueggemann AB, Griffiths DT, Meats E, Peto T, Crook DW, Spratt BG. Clonal relationships between invasive and carriage *Streptococcus pneumoniae* and serotype- and clone-specific differences in invasive disease potential. *J Infect Dis* 2003;187:1424–32.
10. Nurkka A, Lehtonen H, Vuorela A, Ekström N, Käyhty H. Functionality of antibodies against serotypes 6A and 19A induced by three different pneumococcal conjugate vaccines (PCV) in infants [Poster]. Presented at the 5th International Symposium on Pneumococci and Pneumococcal Diseases, Alice Springs, Australia, April 2–6, 2006.

## Progress Toward Introduction of *Haemophilus influenzae* type b Vaccine in Low-Income Countries — Worldwide, 2004–2007

*Haemophilus influenzae* type b (Hib) disease is estimated to cause 3 million cases of meningitis and severe pneumonia and approximately 386,000 deaths worldwide per year in children aged <5 years (1). Safe and effective Hib conjugate vaccines have been widely used in industrialized countries for nearly 20 years. However, primarily because of financial constraints and lack of awareness among both public health officials and the public regarding Hib disease burden and benefits of the vaccine, use of these vaccines has been low in developing countries, where most Hib disease and deaths occur.\* In 2000, the GAVI Alliance (formerly known as the Global Alliance for Vaccines and Immunizations) began providing financial support for Hib vaccine in 72 countries that had a gross national income of ≤\$1,000 (USD) per capita.† Despite this support, before 2005, adoption of Hib vaccine by these countries remained low. In response, in June 2005, the GAVI Alliance established the Hib Initiative‡ to accelerate evidence-informed decision making regarding use of Hib vaccine in GAVI-eligible countries. During 2004–2007, the number of GAVI-eligible countries using Hib vaccine or approved to use the vaccine increased from 13 (18%) to 47 (65%).

### Progress in Hib Vaccine Introduction

Countries apply to GAVI to request support for introduction of a vaccine. The application includes a financial plan, a vaccine introduction plan, and a 5-year national vaccine strategy. Applications are reviewed approximately four times per year by an independent committee, whose recommendations are later endorsed by the GAVI board. In 2004, 13 of 75 countries eligible for GAVI support for

\* Additional information available at [www.hibaction.org](http://www.hibaction.org).

† The GAVI Alliance is a group of public and private-sector organizations that provides financial support and vaccine supplies for the 72 poorest countries of the world. Eligibility is based on having a gross national income of ≤\$1,000 (USD) per capita in 2003. During 2000–2005, 75 countries were eligible for GAVI support. In 2006, four countries were no longer eligible and one became eligible; therefore, a total of 72 countries were eligible for support from 2006, and 72 countries is used as the denominator in this report. Additional information on the GAVI Alliance is available at <http://www.gavialliance.org>.

‡ The Hib Initiative is a consortium that includes the World Health Organization, Johns Hopkins Bloomberg School of Public Health, the London School of Hygiene and Tropical Medicine, and CDC.



Hib vaccine were using the vaccine. By the end of 2007, 24 of 72 eligible countries were using Hib vaccine. During 2007, 23 additional countries were approved for GAVI support to introduce the vaccine (Table).

The pace of vaccine introduction has varied by region. As of December 31, 2007, approximately 80% of GAVI-eligible countries in the WHO regions of Africa (30 of 36 countries) and the Americas (five of six) had introduced or been approved to introduce Hib vaccine. In addition, four of six countries in the Eastern Mediterranean region, four of seven countries in the Western Pacific region, and one of nine countries in the South-East Asia region had introduced or had been approved to introduce Hib vaccine. Among the eight countries of the European region, one country had introduced and two had applied to introduce Hib vaccine.

## Recent Worldwide Increase in Hib Vaccine Access

The estimated total number of children worldwide who received the third dose of Hib vaccine increased from 8%

of the world's birth cohort in 1999 to 22% in 2006.<sup>‡</sup> In 2007, 17% (14 million) of the GAVI-eligible countries' birth cohort of approximately 79 million children was in countries that were using Hib vaccine, compared with 8.5% (6.8 million) of the birth cohort in 2004 (Figure).\*\* Among the GAVI-eligible countries that had not yet applied for Hib vaccine, three (India, Nigeria, and Indonesia) constituted 34%, 8%, and 6%, respectively, of the birth cohort in GAVI-eligible countries. Indonesia has indicated intent to introduce Hib vaccine in 2009; Nigeria and India have not made a decision (Table).

**Reported by:** GAVI Secretariat, Geneva; Dept of Immunization, Vaccines, and Biologicals, World Health Organization, Geneva, Switzerland. The Hib Initiative, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland. UNICEF, New York. London School of Hygiene and Tropical Medicine, London, England. Global Immunization Div;

<sup>‡</sup> UNICEF and WHO estimates of coverage by country, year, and vaccine. Available at [http://www.who.int/immunization\\_monitoring/en/globalsummary/timeseries/tswucoveredtp3.htm](http://www.who.int/immunization_monitoring/en/globalsummary/timeseries/tswucoveredtp3.htm).

\*\* United Nations Population Division. World population prospects. 2006 revision. Available at <http://esa.un.org/unpp>.

**TABLE. Introduction status of *Haemophilus influenzae* type b (Hib) vaccine among GAVI\*-eligible countries, by World Health Organization (WHO) region — worldwide, 2004 and 2007**

WHO region	Countries using vaccine in 2004 <sup>†</sup>		Countries using vaccine in 2007 <sup>§</sup>		Countries approved in 2007 to introduce vaccine <sup>¶</sup>		Country decision made to introduce vaccine <sup>**</sup>		Country decision pending <sup>††</sup>	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
<b>Total GAVI eligible (N = 72<sup>§§</sup>)</b>	<b>13</b>	<b>(18)</b>	<b>24</b>	<b>(33)</b>	<b>23</b>	<b>(32)</b>	<b>17</b>	<b>(24)</b>	<b>8</b>	<b>(11)</b>
African (n = 36)	8	(22)	15	(42)	15	(42)	5	(14)	1	(3)
Americas (n = 6)	5	(83)	5	(83)	0	—	1	(17)	0	—
Eastern Mediterranean (n = 6)	0	—	2	(33)	2	(33)	1	(17)	1	(17)
European (n = 8)	0	—	1	(13)	2	(25)	4	(50)	1	(13)
South-East Asia (n = 9)	0	—	0	—	1	(11)	5	(56)	3	(33)
Western Pacific (n = 7)	0	—	1	(14)	3	(43)	1	(14)	2	(29)

\* The GAVI Alliance was formerly known as the Global Alliance for Vaccines and Immunizations.

<sup>†</sup> Countries and year introduced: *African*: Burundi (2004), Gambia (1997; introduced vaccine without GAVI support), Ghana (2002), Kenya (2001), Malawi (2002), Rwanda (2002), Uganda (2002), and Zambia (2004); *Americas* (introduced without GAVI support): Bolivia (2000), Cuba (1999), Guyana (2000), Honduras (1999), and Nicaragua (1999).

<sup>§</sup> Countries and year introduced: *African*: Burundi (2004), Gambia (1997), Ghana (2002), Kenya (2001), Malawi (2002), Rwanda (2002), Uganda (2002), Zambia (2004), Angola (2006), Benin (2005), Burkina Faso (2006), Ethiopia (2007), Senegal (2005), Sierra Leone (2007), and Mali (2007); *Americas*: Bolivia (2000), Cuba (1999), Guyana (2000), Honduras (1999), and Nicaragua (2000); *Eastern Mediterranean*: Djibouti (2007) and Yemen (2005); *European*: Ukraine (2006; introduced Hib vaccine without GAVI support); *Western Pacific*: Mongolia (2005).

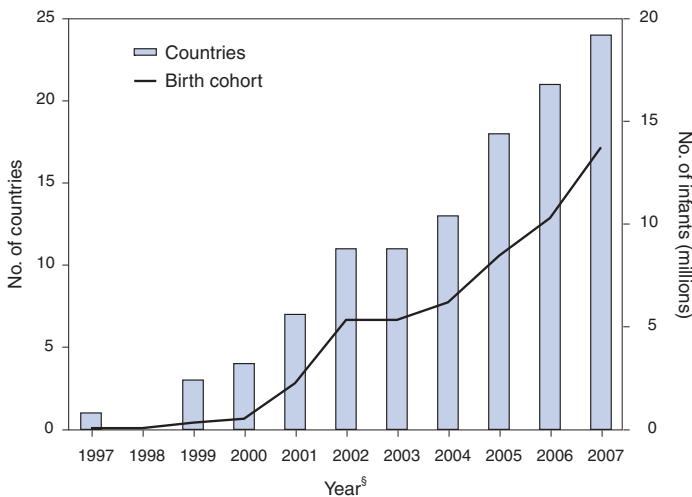
<sup>¶</sup> Countries: *African*: Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Eritrea, Guinea, Guinea Bissau, Lesotho, Liberia, Madagascar, Niger, Togo, and Zimbabwe; *Eastern Mediterranean*: Pakistan and Sudan (North Sudan only); *European*: Moldova and Tajikistan; *South-East Asia*: Sri Lanka; *Western Pacific*: Kiribati, Papua New Guinea, and Solomon Islands.

<sup>\*\*</sup> As of December 31, 2007. Hib vaccine is included in countries' 5-year comprehensive multiyear plans for vaccination. All plan to reapply or apply in 2008 except the Korea Democratic People's Republic and Indonesia: *African*: Tanzania, Mauritania, São Tomé and Príncipe, Comoros (conditional approval [i.e., applied in 2007 and required to resubmit application]), and Mozambique (conditional approval); *Americas*: Haiti; *Eastern Mediterranean*: Afghanistan (conditional approval); *European*: Azerbaijan, Georgia, Kyrgyzstan, and Uzbekistan; *South-East Asia*: Korea Democratic People's Republic, Indonesia, Bangladesh (conditional approval), Bhutan (conditional approval), and Nepal (conditional approval); *Western Pacific*: Vietnam.

<sup>††</sup> As of December 31, 2007. Countries: *African*: Nigeria; *Eastern Mediterranean*: Somalia (ineligible to apply for Hib vaccine funding through GAVI because coverage with the third dose of diphtheria-tetanus-pertussis vaccine was <50%, a requirement for GAVI funding); *European*: Armenia; *South-East Asia*: India, Myanmar, and Timor-Leste; *Western Pacific*: Cambodia and Lao People's Democratic Republic.

<sup>§§</sup> The number of GAVI-eligible countries decreased from 75 to 72 in 2006.

**FIGURE. Number of GAVI\*-eligible countries using *Haemophilus influenzae* type b (Hib) vaccine and number of infants† living in GAVI-eligible countries with access to Hib vaccine — worldwide, 1997–2007**



\*The GAVI Alliance was formerly known as the Global Alliance for Vaccines and Immunizations.

†Total birth cohort of GAVI-eligible countries was approximately 79 million in 2007.

§During 2000–2005, 75 countries were eligible for GAVI support. During 2006–2007, 72 countries were eligible.

*Div of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, CDC.*

**Editorial Note:** This report indicates that the number of GAVI-eligible countries that have introduced Hib vaccine has accelerated during the past 2 years. Two primary factors have contributed to this increase. First, in November 2006, WHO revised its position statement on Hib vaccine to make a stronger and clearer recommendation that Hib vaccine be included in routine vaccination programs in all countries (1). Second, the worldwide Hib vaccine supply increased with introduction of a second Hib pentavalent vaccine in 2006, alleviating certain concerns about vaccine shortages.

Because GAVI must negotiate prices with vaccine manufacturers and determine the cost at which to provide vaccines to countries, vaccine price is a major barrier to vaccine introduction. The price likely will decrease with upcoming Hib vaccine products, creating a competitive vaccine market. In certain countries, certain vaccines are available on the private market, and persons can pay for the vaccine themselves or using private insurance. However, government-funded vaccine programs help ensure availability for those who cannot pay.

The WHO-UNICEF Global Immunization Vision and Strategy focuses on helping countries develop the capacity to make informed, sustainable decisions regarding vaccine

introduction (2). Using this approach, the Hib Initiative conducts country visits and regional forums to assess barriers to decision making regarding Hib vaccine and to increase awareness of existing data on Hib disease and the potential impact of Hib vaccination. In addition, because limited Hib disease data have been a barrier to vaccine introduction in certain countries, the Hib Initiative developed a targeted research and surveillance agenda focused on collecting data needed to inform vaccine policy (e.g., data regarding Hib disease burden, the effect of Hib vaccine on disease in specific regions and populations [e.g., among HIV-positive children], booster doses, and cost-effectiveness).

In 2008, more countries are expected to begin using Hib vaccine. Countries have historically introduced vaccines 6–18 months after GAVI approval; of the 23 countries that are approved by GAVI to introduce Hib vaccine (20 in 2007 and three in 2005–2006), all are expected to introduce the vaccine during 2008. Vaccine introduction in these countries would increase the number of children with access to the vaccine to 35 million (44% of the GAVI-eligible countries' birth cohort). In addition, six countries that applied in 2007 must resubmit their application in 2008, and at least eight additional applications are expected.

Several steps are required for additional progress in Hib vaccine introduction and to sustain the gains achieved. First, coordination, education, and financial support to make evidence-informed decisions are required to help countries that have not yet decided to introduce Hib vaccine, particularly for GAVI-eligible countries with large birth cohorts such as India and Nigeria. GAVI's Hib Initiative is investing in a comprehensive strategy in India to raise awareness of Hib vaccine and assist with data interpretation. Second, strong disease surveillance systems are needed to continue to document vaccine effects on disease epidemiology. Several countries with active surveillance have demonstrated high vaccine effectiveness and reduced disease burden after vaccine introduction (3–5). Third, to achieve additional reductions in morbidity and mortality from Hib disease, routine infant vaccination coverage must be high, particularly among vulnerable populations. One study estimated that the use of Hib vaccine reduced mortality for children aged <5 years by 4% in the 42 countries where 90% of pediatric deaths occurred worldwide in 2000 (6). However, increasing routine infant vaccination coverage requires strengthening of health systems and substantial commitment from countries and donors. Fourth, the current disparity in the use of Hib vaccine between lower income and higher income countries in the world should

be addressed. Twenty-one of 41 (51%) lower middle-income (but not GAVI-eligible) countries, 32 of 37 (86%) upper middle-income countries, and 36 of 39 (92%) high-income countries are using Hib vaccine.<sup>††</sup> This disparity can be addressed through development of new financing strategies or other strategies.

The success with Hib vaccine introduction suggests that strategies used to accelerate introduction of underused vaccines in developing countries have been effective. With the availability of new vaccines such as rotavirus and pneumococcal vaccines, the approach used for Hib vaccine introduction provides a useful model to increase use of other vaccines.

#### References

1. World Health Organization. Strategic advisory group of experts on immunization. The WHO position paper on *Haemophilus influenzae* type b conjugate vaccines. *Wkly Epidemiol Rec* 2006;81:445–52.
2. World Health Organization; UNICEF. Global immunization vision and strategy 2006–2015. Geneva, Switzerland; 2005. Available at [http://www.who.int/vaccines-documents/docsPDF05/GIVS\\_final\\_en.pdf](http://www.who.int/vaccines-documents/docsPDF05/GIVS_final_en.pdf).
3. Baqui AH, Arifeen SE, Saha SK, et al. Effectiveness of *Haemophilus influenzae* type b conjugate vaccine on prevention of pneumonia and meningitis in Bangladeshi children a case-control study. *Ped Infect Dis J* 2007;26:565–71.
4. Daza P, Banda R, Misoya K, et al. The impact of routine infant immunization with *Haemophilus influenzae* type b conjugate vaccine in Malawi, a country with high human immunodeficiency virus prevalence. *Vaccine* 2006;24:6232–9.
5. Von Gottberg A, de Gouveia L, Madhi SA. Impact of conjugate *Haemophilus influenzae* type b (Hib) vaccine introduction in South Africa. *Bull World Health Organ* 2006; 84:811–8.
6. Jones G, Steketee RW, Black RE, et al. How many child deaths can we prevent this year? *Lancet* 2003;362:65–71.

#### Notice to Readers

### Publication of *Health, United States, 2007*

CDC's National Center for Health Statistics has published *Health, United States, 2007*, the 31st edition of the annual report on the nation's health. The report includes 151 detailed trend tables organized around four broad subject areas: health status and determinants, health-care use, health-care resources, and health-care expenditures. Many of the trend tables provide information on racial, ethnic, and socioeconomic disparities in health.

The report also includes the *2007 Chartbook on Trends in the Health of Americans*, which assesses the current state of the nation's health and how it is changing over time, both positively and negatively, by presenting trends and information on selected determinants and measures of

health status. Determinants of public health examined in the chartbook include demographic factors, health-insurance coverage, health behaviors, and preventive health care. Measures of health status and risk factors focus on trends in mortality and limitations of activity caused by chronic health conditions. The *2007 Chartbook* includes a special feature on access to needed or recommended health-care services. It also presents information on financial barriers to receipt of health-care services, including lack of health insurance and high out-of-pocket expenses, and non-financial barriers to care, including lack of transportation and limited supply of health services or providers.

*Health, United States, 2007* is available online at <http://www.cdc.gov/nchs/hs.htm>. Information about the report is available from the National Center for Health Statistics Data Dissemination Branch by telephone (1-866-441-6247) or e-mail ([nchsquery@cdc.gov](mailto:nchsquery@cdc.gov)).

#### Notice to Readers

### Revised Recommendations for Responding to Fecal Accidents in Disinfected Swimming Venues

The 2001 CDC recommendations (1) for responding to fecal accidents in disinfected swimming venues (e.g., swimming pools) have been revised. Recommendations for responding to diarrheal fecal accidents, which are thought to represent a higher infectious-disease transmission risk than formed-stool accidents, are based on the potential presence of the chlorine-resistant parasitic protozoa of the genus *Cryptosporidium*. New data indicate that the recommended CT inactivation value (or contact time)\* is higher than previously published (2), when inactivation is measured at a higher pH using an outbreak-associated *Cryptosporidium* isolate (3). Based on these data, the CT inactivation value used in CDC fecal accident recommendations for 99.9% inactivation of *Cryptosporidium* has been changed from 9,600 mg-min/L to 15,300 mg-min/L.<sup>†</sup> This change translates into longer swimming pool closures to ensure inactivation of *Cryptosporidium*.

Swimming pool operators should check existing guidelines from local or state regulatory agencies before using these recommendations, because CDC recommendations do not replace existing state or local regulations or guidelines. The CDC revised fecal accident response

<sup>††</sup> World Bank. Data & statistics: country groups. Available at <http://web.worldbank.org>. Four countries (Cook Islands, Nauru, Niue, and Tuvalu) were excluded because they did not have a World Bank classification.

\*The CT number refers to the concentration (C) of free chlorine in milligrams per liter (parts per million) multiplied by time (T) in minutes at a specific pH and temperature.

<sup>†</sup> At pH 7.2–7.5, 77°F (25°C).

recommendations are available at [http://www.cdc.gov/healthyswimming/pdf/fecal\\_accident\\_response\\_recommendations\\_for\\_pool\\_staff.pdf](http://www.cdc.gov/healthyswimming/pdf/fecal_accident_response_recommendations_for_pool_staff.pdf).

#### References

1. CDC. Responding to fecal accidents in disinfected swimming venues. *MMWR* 2001;50:416–7.
2. Korich DG, Mead JR, Madore MS, Sinclair NA, Sterling CR. Effects of ozone, chlorine dioxide, chlorine, and monochloramine on *Cryptosporidium parvum* oocyst viability. *Appl Environ Microbiol* 1990;56:1423–8.
3. Shields JM, Arrowood MJ, Hill VR, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. *J Water Health* 2008. In Press.

#### Notice to Readers

### **Medical Equipment Malfunctions Associated with Inappropriate Use of Cleaning and Disinfecting Liquids — United States, 2007**

On October 31, 2007, the Food and Drug Administration (FDA), in collaboration with CDC, the Environmental Protection Agency, and the Occupational Safety and Health Administration, issued a public health notification alerting health-care providers and the public about medical device malfunctions caused by improper use of cleaning and disinfecting liquids.\* Inappropriate use of cleaning and disinfecting liquids on certain electronic medical equipment can cause equipment damage and malfunctions, which might have serious, even life-threatening consequences. Under the Safe Medical Device Act, health-care facilities are required to report to FDA any medical device malfunctions that cause or could cause death or serious injury. This notice provides recommendations to help prevent medical device malfunctions attributed to improper cleaning and disinfection.

Cleaning and disinfection are important practices to ensure that medical equipment surfaces do not serve as reservoirs for infectious pathogens. Cleaning is designed to

remove infectious pathogens from inanimate objects, whereas disinfection is the process by which remaining pathogens are inactivated. Each of these two distinct processes usually involves the use of liquids (i.e., water and detergents for cleaning and chemical disinfectants for microbial inactivation). Because many types of equipment used in health-care settings have mated surfaces, moving parts, gaps, joints, and unsealed housings, improper cleaning and disinfection can create opportunities for fluids to enter the internal surface of medical equipment, resulting in damage that can cause or contribute to equipment malfunctions.

Health-care facilities, public health officials, and device manufacturers can take several measures to help improve device cleaning and disinfection and to prevent equipment malfunctions in the future. Facility staff should review equipment currently in use to determine which pieces of equipment have manufacturer instructions for cleaning but not for disinfection. Equipment that cannot be disinfected should be used in a way that minimizes the risk for contamination, for example, by positioning it far from contaminated areas or by covering it with a barrier that can be easily cleaned or replaced. If this is not possible, the facility should contact the manufacturer to discuss options for safe and effective disinfection. If the equipment is fluid-tight, and both cleaning and disinfection instructions are provided by the equipment manufacturer, the recommended cleaning agents and chemical disinfectants should be used and the conditions for their use followed. Finally, personnel responsible for cleaning and disinfection must be given appropriate training.

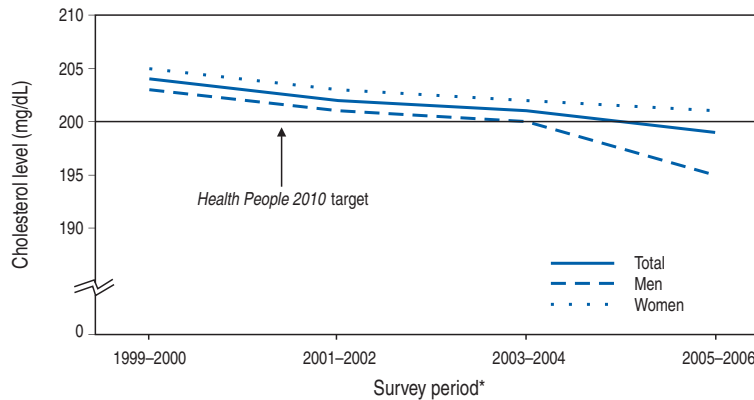
Reports of medical equipment malfunctions that cause or could cause death or serious injury should be made by using FDA's MedWatch 3500A form, available at <https://www.fda.gov/medwatch/getforms.htm>. Health-care facilities also are encouraged to report medical devices malfunctions that do not meet the mandatory reporting to MedWatch by telephone (1-800-332-1088); by fax (1-800-332-0178); by mail (MedWatch, Food and Drug Administration, 5600 Fishers Lane, Rockville, MD 20852-9787); or online (<https://www.fda.gov/medwatch/report.htm>).

\* Available at <http://www.fda.gov/cdrh/safety/103107-cleaners.html>.

# QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

## Mean Serum Total Cholesterol Level Among Adults Aged $\geq 20$ Years, by Sex — National Health and Nutrition Examination Survey (NHANES), United States, 1999–2000 to 2005–2006



\* 1999–2000: N = 4,118; 2001–2002: N = 4,691; 2003–2004: N = 4,476; 2005–2006: 4,481.

From 1999–2000 to 2005–2006, the mean age-adjusted serum total cholesterol level for all U.S. adults aged  $\geq 20$  years declined significantly from 204 mg/dL to 199 mg/dL. The level among men decreased from 203 mg/dL to 195 mg/dL and among women decreased from 205 to 201 mg/dL. The *Healthy People 2010* objective to reduce mean serum cholesterol levels among adults to  $< 200$  mg/dL (objective 12-14) was met in 2005–2006 for the overall adult population aged  $\geq 20$  years and for men but not for women.

**SOURCES:** National Health and Nutrition Examination Survey, 1999–2006. Available at <http://www.cdc.gov/nchs/nhanes.htm>.

US Department of Health and Human Services. *Healthy people 2010* (conference ed, in 2 vols). Washington, DC: US Department of Health and Human Services; 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 9, 2008 (6th Week)\***

Disease	Current week	Cum 2008	5-year weekly average†	Total cases reported for previous years					States reporting cases during current week (No.)
				2007	2006	2005	2004	2003	
Anthrax	—	—	0	—	1	—	—	—	
Botulism:									
foodborne	—	1	0	20	20	19	16	20	
infant	—	5	2	84	97	85	87	76	
other (wound & unspecified)	—	—	1	24	48	31	30	33	
Brucellosis	—	3	2	126	121	120	114	104	
Chancroid	—	3	1	31	33	17	30	54	
Cholera	—	—	0	7	9	8	6	2	
Cyclosporiasis§	—	2	1	99	137	543	160	75	
Diphtheria	—	—	—	—	—	—	—	1	
Domestic arboviral diseases§¶:									
California serogroup	—	—	—	44	67	80	112	108	
eastern equine	—	—	—	4	8	21	6	14	
Powassan	—	—	—	1	1	1	1	—	
St. Louis	—	—	—	7	10	13	12	41	
western equine	—	—	—	—	—	—	—	—	
Ehrlichiosis/Anaplasmosis§:									
<i>Ehrlichia chaffeensis</i>	—	—	—	N	N	N	N	N	
<i>Ehrlichia ewingii</i>	—	—	—	N	N	N	N	N	
<i>Anaplasma phagocytophilum</i>	—	—	—	N	N	N	N	N	
undetermined	—	—	—	N	N	N	N	N	
<i>Haemophilus influenzae</i> **									
invasive disease (age <5 yrs):									
serotype b	—	3	0	21	29	9	19	32	MN (1)
nonserotype b	—	14	3	167	175	135	135	117	
unknown serotype	3	21	5	188	179	217	177	227	PA (1), NC (1), AK (1)
Hansen disease§	—	5	1	65	66	87	105	95	
Hantavirus pulmonary syndrome§	—	—	0	32	40	26	24	26	
Hemolytic uremic syndrome, postdiarrheal§	—	3	2	253	288	221	200	178	
Hepatitis C viral, acute	9	51	16	759	766	652	720	1,102	PA (1), MO (1), NC (5), OK (1), TX (1)
HIV infection, pediatric (age <13 yrs)††	—	—	5	—	—	380	436	504	
Influenza-associated pediatric mortality§§§	9	9	1	76	43	45	—	N	MS (2), AK (1), TN (1), NY (2), TX (3)
Listeriosis	5	42	9	762	884	896	753	696	NY (2), PA (1), MO (1), CA (1)
Measles¶¶	1	1	1	35	55	66	37	56	PA (1)
Meningococcal disease, invasive***:									
A, C, Y, & W-135	2	3	6	276	318	297	—	—	MN (2)
serogroup B	2	5	3	138	193	156	—	—	MN (2)
other serogroup	1	2	1	29	32	27	—	—	MN (1)
unknown serogroup	2	5	17	585	651	765	—	—	MN (2)
Mumps	4	40	10	755	6,584	314	258	231	PA (1), FL (1), MT (1), CA (1)
Novel influenza A virus infections	—	—	—	4	N	N	N	N	
Plague	—	—	—	6	17	8	3	1	
Poliomyelitis, paralytic	—	—	—	—	—	1	—	—	
Poliovirus infection, nonparalytic§	—	—	—	—	N	N	N	N	
Psittacosis§	—	—	0	10	21	16	12	12	
Q fever§:									
acute	—	—	—	—	—	—	—	—	
chronic	—	—	—	—	—	—	—	—	
Rabies, human	—	—	0	—	3	2	7	2	
Rubella†††	—	—	0	11	11	11	10	7	
Rubella, congenital syndrome	—	—	0	—	1	1	—	1	
SARS-CoV§§§	—	—	—	—	—	—	—	8	
Smallpox§	—	—	—	—	—	—	—	—	
Streptococcal toxic-shock syndrome§	—	2	3	103	125	129	132	161	
Syphilis, congenital (age <1 yr)	—	19	8	614	349	329	353	413	
Tetanus	—	—	0	23	41	27	34	20	

—: No reported cases. N: Not notifiable. Cum: Cumulative year-to-date counts.

\* Incidence data for reporting years 2007 and 2008 are provisional, whereas data for 2003, 2004, 2005, and 2006 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 in 2007 and 2008 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.

\*\* 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. Ten cases occurring during the 2007–08 influenza season have been reported.

¶¶ The one measles case reported for the current week was indigenous.

\*\*\* Data for meningococcal disease (all serogroups) are available in Table II.

††† No rubella cases were reported for the current week.

§§§ Updated weekly from reports to the Division of Viral and Rickettsial Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases.

**TABLE I. (Continued) Provisional cases of infrequently reported notifiable diseases (<1,000 cases reported during the preceding year) — United States, week ending February 9, 2008 (6th Week)\***

Disease	Current week	Cum 2008	5-year weekly average†	Total cases reported for previous years					States reporting cases during current week (No.)
				2007	2006	2005	2004	2003	
Toxic-shock syndrome (staphylococcal)§	1	5	2	78	101	90	95	133	ID (1)
Trichinellosis	—	1	0	6	15	16	5	6	
Tularemia	—	—	0	113	95	154	134	129	
Typhoid fever	1	23	5	339	353	324	322	356	VA (1)
Vancomycin-intermediate <i>Staphylococcus aureus</i> §	—	—	—	28	6	2	—	N	
Vancomycin-resistant <i>Staphylococcus aureus</i> §	—	—	—	—	1	3	1	N	
Vibriosis (noncholera <i>Vibrio</i> species infections)§	1	11	1	358	N	N	N	N	AL (1)
Yellow fever	—	—	—	—	—	—	—	—	

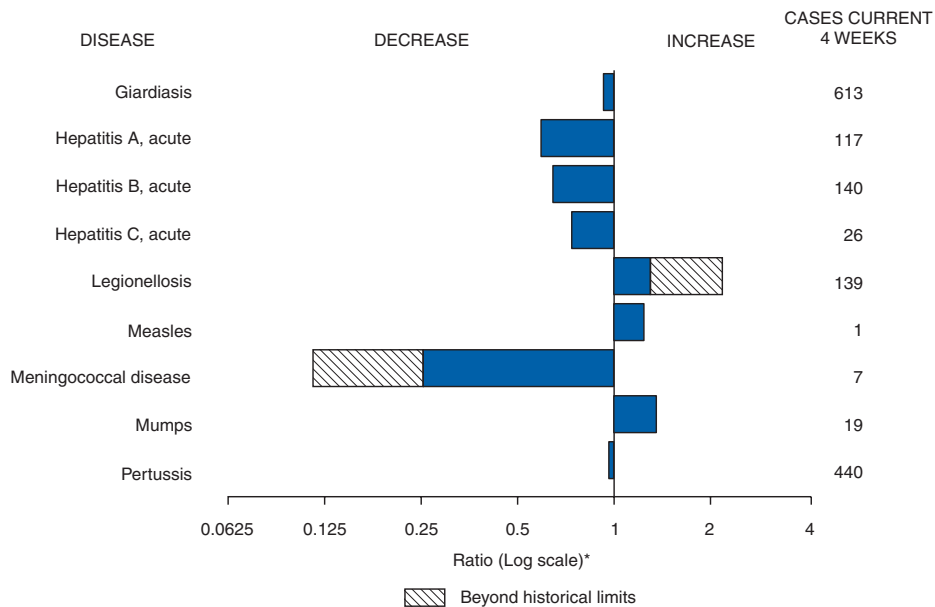
—: No reported cases. N: Not notifiable. Cum: Cumulative year-to-date counts.

\* Incidence data for reporting years 2007 and 2008 are provisional, whereas data for 2003, 2004, 2005, and 2006 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 in 2007 and 2008 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>.

**FIGURE I. Selected notifiable disease reports, United States, comparison of provisional 4-week totals February 9, 2008, 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      Carol Worsham  
 Lence Blanton      Pearl C. Sharp









TABLE II. (Continued) Provisional cases of selected notifiable diseases, United States, weeks ending February 9, 2008, and February 10, 2007 (6th Week)\*

Reporting area	Lyme disease					Malaria					Meningococcal disease, invasive† All serogroups				
	Current week	Previous 52 weeks		Cum 2008	Cum 2007	Current week	Previous 52 weeks		Cum 2008	Cum 2007	Current week	Previous 52 weeks		Cum 2008	Cum 2007
		Med	Max				Med	Max				Med	Max		
<b>United States</b>	255	314	1,301	529	827	10	24	77	73	115	7	17	40	15	127
<b>New England</b>	—	44	301	7	63	—	1	16	—	6	—	0	3	—	6
Connecticut	—	12	214	—	7	—	0	16	—	—	—	0	1	—	1
Maine§	—	5	61	—	1	—	0	2	—	1	—	0	1	—	1
Massachusetts	—	0	31	—	25	—	0	3	—	5	—	0	2	—	3
New Hampshire	—	8	88	5	26	—	0	4	—	—	—	0	1	—	—
Rhode Island§	—	0	74	—	—	—	0	0	—	—	—	0	1	—	—
Vermont§	—	1	13	2	4	—	0	2	—	—	—	0	1	—	1
<b>Mid. Atlantic</b>	200	154	664	341	483	2	7	18	13	25	—	2	8	—	15
New Jersey	—	36	177	19	146	—	0	4	—	2	—	0	2	—	3
New York (Upstate)	6	54	192	21	45	—	1	8	2	2	—	1	3	—	2
New York City	—	3	25	—	13	—	4	9	7	16	—	0	4	—	3
Pennsylvania	194	50	321	301	279	2	0	4	4	5	—	1	5	—	7
<b>E.N. Central</b>	1	12	168	9	32	—	2	7	13	21	—	2	9	—	19
Illinois	—	1	15	—	2	—	0	6	2	11	—	1	3	—	6
Indiana	—	0	7	—	1	—	0	2	—	—	—	0	4	—	2
Michigan	—	0	5	2	2	—	0	2	3	4	—	0	2	—	5
Ohio	—	0	4	1	2	—	0	3	7	3	—	0	2	—	3
Wisconsin	1	10	149	6	25	—	0	2	1	3	—	0	1	—	3
<b>W.N. Central</b>	—	5	483	1	10	—	0	8	1	8	7	1	5	7	9
Iowa	—	1	11	1	2	—	0	1	—	1	—	0	3	—	1
Kansas	—	0	2	—	1	—	0	1	—	—	—	0	1	—	1
Minnesota	—	1	483	—	7	—	0	8	—	4	7	0	4	7	—
Missouri	—	0	4	—	—	—	0	1	—	1	—	0	2	—	5
Nebraska§	—	0	2	—	—	—	0	1	1	2	—	0	2	—	—
North Dakota	—	0	2	—	—	—	0	1	—	—	—	0	1	—	1
South Dakota	—	0	0	—	—	—	0	1	—	—	—	0	1	—	1
<b>S. Atlantic</b>	49	69	213	147	222	7	4	14	26	25	—	3	11	4	20
Delaware	—	12	34	32	47	—	0	1	—	1	—	0	1	—	—
District of Columbia	—	0	7	—	—	—	0	1	—	—	—	0	0	—	—
Florida	—	1	11	7	3	2	1	7	11	8	—	1	7	—	7
Georgia	—	0	3	1	—	2	1	3	6	1	—	0	3	—	4
Maryland§	42	32	130	91	147	1	1	5	7	6	—	0	2	1	4
North Carolina	2	0	8	2	—	2	0	4	2	2	—	0	4	—	—
South Carolina§	—	0	4	1	1	—	0	1	—	—	—	0	2	3	2
Virginia§	5	17	62	13	24	—	1	7	—	7	—	0	2	—	3
West Virginia	—	0	9	—	—	—	0	1	—	—	—	0	1	—	—
<b>E.S. Central</b>	—	1	5	—	3	—	1	3	2	5	—	1	3	3	11
Alabama§	—	0	3	—	1	—	0	1	1	—	—	0	2	—	2
Kentucky	—	0	2	—	—	—	0	1	1	1	—	0	2	—	1
Mississippi	—	0	1	—	—	—	0	1	—	1	—	0	2	—	4
Tennessee§	—	0	4	—	2	—	0	2	—	3	—	0	2	3	4
<b>W.S. Central</b>	—	1	6	—	4	—	2	32	3	7	—	2	7	—	9
Arkansas§	—	0	1	—	—	—	0	1	—	—	—	0	2	—	—
Louisiana	—	0	1	—	1	—	0	2	—	2	—	0	3	—	5
Oklahoma	—	0	0	—	—	—	0	2	1	1	—	0	3	—	2
Texas§	—	1	6	—	3	—	1	32	2	4	—	1	4	—	2
<b>Mountain</b>	—	1	3	1	2	—	1	6	1	5	—	1	4	1	9
Arizona	—	0	1	—	—	—	0	3	—	—	—	0	2	—	2
Colorado	—	0	1	1	—	—	0	2	1	5	—	0	2	—	—
Idaho§	—	0	2	—	—	—	0	2	—	—	—	0	2	1	1
Montana§	—	0	2	—	1	—	0	1	—	—	—	0	1	—	1
Nevada§	—	0	2	—	1	—	0	1	—	—	—	0	1	—	1
New Mexico§	—	0	1	—	—	—	0	1	—	—	—	0	1	—	1
Utah	—	0	2	—	—	—	0	3	—	—	—	0	2	—	3
Wyoming§	—	0	1	—	—	—	0	0	—	—	—	0	1	—	—
<b>Pacific</b>	5	2	10	23	8	1	3	9	14	13	—	4	14	—	29
Alaska	—	0	2	—	—	—	0	0	—	2	—	0	1	—	—
California	5	2	9	23	8	—	2	8	10	7	—	3	9	—	26
Hawaii	N	0	0	N	N	—	0	0	—	—	—	0	1	—	—
Oregon§	—	0	1	—	—	—	0	2	3	3	—	0	3	—	3
Washington	—	0	7	—	—	1	0	3	1	1	—	0	6	—	—
American Samoa	N	0	0	N	N	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	0	2	—	—	—	0	0	—	—
Puerto Rico	N	0	0	N	N	—	0	1	—	1	—	0	1	—	1
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

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 years 2007 and 2008 are provisional.

† Data for meningococcal disease, invasive caused by serogroups A, C, Y, &amp; W-135; serogroup B; other serogroup; and unknown serogroup are available in Table I.

§ 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 9, 2008, and February 10, 2007 (6th Week)\*

Table with columns for Reporting area, Current week, Previous 52 weeks (Med, Max), Cum 2008, Cum 2007, Current week, Previous 52 weeks (Med, Max), Cum 2008, Cum 2007, Current week, Previous 52 weeks (Med, Max), Cum 2008, Cum 2007. Rows include United States, New England, Mid. Atlantic, E.N. Central, W.N. Central, S. Atlantic, E.S. Central, W.S. Central, Mountain, Pacific, and U.S. Virgin Islands.

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 years 2007 and 2008 are provisional.

† Includes E. coli O157:H7; Shiga toxin-positive, serogroup non-O157; and Shiga toxin-positive, not serogrouped.

§ 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 9, 2008, and February 10, 2007 (6th Week)\*

Reporting area	Streptococcal disease, invasive, group A					<i>Streptococcus pneumoniae</i> , invasive disease, nondrug resistant† Age <5 years				
	Current week	Previous 52 weeks		Cum 2008	Cum 2007	Current week	Previous 52 weeks		Cum 2008	Cum 2007
		Med	Max				Med	Max		
<b>United States</b>	71	83	168	443	554	21	35	104	133	196
<b>New England</b>	1	5	28	4	38	—	1	7	2	27
Connecticut	—	0	22	—	2	—	0	2	—	4
Maine <sup>§</sup>	—	0	3	1	3	—	0	1	—	—
Massachusetts	—	2	12	—	24	—	1	4	—	18
New Hampshire	—	0	4	2	4	—	0	2	2	2
Rhode Island <sup>§</sup>	—	0	1	—	—	—	0	1	—	2
Vermont <sup>§</sup>	1	0	1	1	5	—	0	1	—	1
<b>Mid. Atlantic</b>	16	16	40	93	107	2	5	38	13	32
New Jersey	—	2	12	3	20	—	1	5	1	8
New York (Upstate)	8	6	20	42	21	2	2	13	12	15
New York City	—	4	13	10	30	—	1	35	—	9
Pennsylvania	8	4	11	38	36	N	0	0	N	N
<b>E.N. Central</b>	10	15	34	82	139	1	4	17	22	35
Illinois	—	4	11	9	48	—	1	6	—	5
Indiana	—	2	10	12	10	—	0	11	2	2
Michigan	1	3	10	23	27	—	1	5	7	15
Ohio	9	4	14	38	47	—	1	5	12	9
Wisconsin	—	0	5	—	7	1	0	2	1	4
<b>W.N. Central</b>	4	5	32	25	28	6	3	15	16	7
Iowa	—	0	0	—	—	—	0	0	—	—
Kansas	2	0	3	8	7	—	0	1	2	—
Minnesota	—	0	29	—	—	6	1	14	6	—
Missouri	1	2	4	11	16	—	0	2	6	5
Nebraska <sup>§</sup>	1	0	3	4	1	—	0	3	2	1
North Dakota	—	0	3	—	2	—	0	1	—	1
South Dakota	—	0	2	2	2	—	0	0	—	—
<b>S. Atlantic</b>	25	23	49	133	108	2	6	14	21	35
Delaware	—	0	1	—	1	—	0	0	—	—
District of Columbia	—	0	3	—	—	—	0	0	—	—
Florida	6	6	16	40	25	—	1	5	4	2
Georgia	3	4	12	33	22	—	0	5	—	13
Maryland <sup>§</sup>	6	4	9	28	25	1	1	5	11	11
North Carolina	7	1	22	9	13	—	0	0	—	—
South Carolina <sup>§</sup>	1	1	7	9	10	1	1	4	6	2
Virginia <sup>§</sup>	2	3	12	13	10	—	0	3	—	7
West Virginia	—	0	3	1	2	—	0	1	—	—
<b>E.S. Central</b>	2	4	13	12	27	1	2	11	3	14
Alabama <sup>§</sup>	N	0	0	N	N	N	0	0	N	N
Kentucky	—	1	3	2	7	N	0	0	N	N
Mississippi	N	0	0	N	N	—	0	2	—	2
Tennessee <sup>§</sup>	2	3	13	10	20	1	2	9	3	12
<b>W.S. Central</b>	9	6	33	36	28	6	5	34	22	21
Arkansas <sup>§</sup>	—	0	2	—	4	1	0	1	2	2
Louisiana	—	0	4	1	3	—	0	4	—	8
Oklahoma	6	1	5	14	11	3	1	4	10	4
Texas <sup>§</sup>	3	5	28	21	10	2	2	30	10	7
<b>Mountain</b>	4	9	21	49	67	3	4	12	28	22
Arizona	3	4	10	31	29	3	2	8	22	15
Colorado	—	3	8	8	14	—	1	4	3	4
Idaho <sup>§</sup>	1	0	2	3	2	—	0	1	1	—
Montana <sup>§</sup>	N	0	0	N	N	N	0	0	N	N
Nevada <sup>§</sup>	—	0	1	—	1	—	0	1	1	—
New Mexico <sup>§</sup>	—	1	4	—	8	—	0	4	—	2
Utah	—	1	6	7	12	—	0	2	1	1
Wyoming <sup>§</sup>	—	0	1	—	1	—	0	0	—	—
<b>Pacific</b>	—	3	7	9	12	—	0	4	6	3
Alaska	—	0	3	1	2	—	0	4	6	3
California	N	0	0	N	N	N	0	0	N	N
Hawaii	—	2	5	8	10	—	0	1	—	—
Oregon <sup>§</sup>	N	0	0	N	N	N	0	0	N	N
Washington	N	0	0	N	N	N	0	0	N	N
American Samoa	—	0	4	—	—	N	0	0	N	N
C.N.M.I.	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	N	0	0	N	N
Puerto Rico	—	0	0	—	—	N	0	0	N	N
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—

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 years 2007 and 2008 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 (NNDS event code 11717).

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













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, send an e-mail message to [listserv@listserv.cdc.gov](mailto:listserv@listserv.cdc.gov). The body content should read *SUBscribe mmwr-toc*. Electronic copy also is available from CDC's Internet server at <http://www.cdc.gov/mmwr> or from CDC's file transfer protocol server at <ftp://ftp.cdc.gov/pub/publications/mmwr>. 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 [www.mmwrq@cdc.gov](mailto:www.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.