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# National and State Vaccination Coverage Among Adolescents Aged 13–17 Years — United States, 2012

At ages 11 through 12 years, the Advisory Committee on Immunization Practices (ACIP) recommends that preteens receive 1 dose of tetanus, diphtheria, and acellular pertussis (Tdap) vaccine, 1 dose of meningococcal conjugate (MenACWY) vaccine,* and 3 doses of human papillomavirus (HPV) vaccine (*1*–*3*). ACIP recommends administration of all age-appropriate vaccines during a single visit (*4*). ACIP also recommends that pre-teens and older adolescents receive an annual influenza vaccine as well as any overdue vaccines (e.g., varicella) (*1*). To monitor vaccination coverage among persons aged 13–17 years,† CDC analyzed data from the National Immunization Survey–Teen (NIS-Teen). This report highlights findings of that analysis. From 2011 to 2012, coverage increased for ≥1 Tdap vaccine dose§ (from 78.2% to 84.6%), ≥1 MenACWY vaccine dose (from 70.5% to 74.0%) and, among males, ≥1 HPV vaccine dose (from 8.3% to 20.8%). Among females, vaccination coverage estimates for each HPV vaccine series dose were similar in 2012 compared with 2011. Coverage varied substantially among states. Regarding *Healthy People 2020* targets for adolescents (*5*), 36 states achieved targets for Tdap, 12 for MenACWY, and nine for varicella vaccine coverage. Large and increasing coverage differences between Tdap and other vaccines recommended for adolescents indicate that substantial missed opportunities remain for vaccinating teens, especially against HPV infection (*6*). Health-care providers should administer recommended HPV and meningococcal vaccinations to boys and girls during the same visits when Tdap vaccine is given. In addition, whether for health problems or well-checks, providers, parents, and adolescents should use every health-care visit as an opportunity to review adolescents' immunization histories and ensure that every adolescent is fully vaccinated.

NIS-Teen identifies persons aged 13–17 years in the 50 states, the District of Columbia, selected areas,¶ and the U.S. Virgin Islands** using a random-digit–dialed sample of landline and, since 2011, cellular telephone numbers.†† Survey respondents are parents or guardians of teens aged

* Adolescents who receive their first MenACWY vaccine dose as routinely recommended at age 11–12 years should receive a booster dose at 16 years. Adolescents who receive their first dose at ages 13–15 years should receive a booster dose at ages 16–18 years, with a minimum interval of ≥8 weeks between doses. Adolescents who receive a MenACWY vaccine dose at age ≥16 years do not need a booster dose.

† Eligible participants were born during January 1994–February 2000. Except as noted, coverage for ≥1 and ≥2 varicella vaccine doses were obtained among persons with no history of varicella disease. HPV vaccination coverage represents receipt of any HPV vaccine and does not distinguish between bivalent or quadrivalent vaccines. Some adolescents, both males and females, might have received more than the 3 recommended HPV vaccine doses. Influenza vaccination coverage data are not included in this report.

§ Includes Tdap vaccines received on or after age 10 years.

¶ Six areas that received federal Section 317 immunization funds were sampled separately: District of Columbia; Chicago, Illinois; New York, New York; Philadelphia County, Pennsylvania; Bexar County, Texas; and Houston, Texas.

** Sampling was conducted based on landline telephone sampling frame only and included St. Croix, St. Thomas, St. John, and Water Island.

†† All identified cellular-telephone households were eligible for interview. Sampling weights were adjusted from dual-frame (landline and cellular telephone), nonresponse, noncoverage, and overlapping samples of mixed telephone users. A description of NIS-Teen dual-frame survey methodology and its effect on reported vaccination estimates is available at http://www.cdc.gov/vaccines/stats-surv/nis/dual-frame-sampling-08282012.htm.

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13–17 years who provide information about their children's sociodemographic characteristics and vaccination providers. After receiving consent from respondents, questionnaires are mailed to all identified providers to obtain data from medical records, so that composite, provider-reported immunization histories can be analyzed.[§§] In 2012, national estimates included 19,199 adolescents (9,058 females; 10,141 males).[¶¶] Details regarding NIS-Teen methodology, including methods for synthesizing provider-reported immunization histories and weighting, have been described.[***] T-tests were used to assess vaccination coverage differences by survey year, age, sex, race/ethnicity, and poverty status for all vaccines included in this report. Weighted linear regression was used to assess coverage trends for vaccines recommended routinely for adolescents since 2005–2006 (i.e., Tdap, MenACWY, and among females, HPV vaccine). Results were considered statistically significant at $p<0.05$.

## National Vaccination Coverage

Vaccination coverage trends differ substantially for the three vaccines routinely recommended for adolescents since 2005–2006 (Figure). During 2006–2012, coverage for ≥1 Tdap vaccine dose and ≥1 MenACWY vaccine dose increased steadily, with annual average increases of approximately 12.0 (95% confidence interval [CI] = 9.9–14.0) and 10.1 (CI = 7.5–12.6) percentage points, respectively. Since 2009, the national estimate for ≥1 MenACWY vaccine dose has been lower than the estimate for ≥1 Tdap vaccine dose, and the difference in coverage between the two vaccines is widening (Figure). From 2011 to 2012, while ≥1 Tdap vaccine dose coverage increased 6.4 percentage points, coverage for ≥1 MenACWY vaccine dose increased only 3.5 percentage points. During 2007–2011, coverage for ≥1 HPV vaccine dose among females lagged behind estimates for Tdap and MenACWY vaccines, increasing on average 6.1 (CI = 3.3–8.9) percentage points each year. However, in 2011 and 2012, HPV vaccination rates among females did not increase (Figure, Table 1).

[§§] In 2012, the Council of American Survey Research Organizations (CASRO) landline response rate was 55.1%. A total of 14,133 adolescents with vaccination provider-reported vaccination records were included, representing 62% of all adolescents from the landline sample with completed household interviews. The cellular-telephone sample CASRO response rate was 23.6%. A total of 5,066 adolescents with vaccination provider-reported vaccination records are included, representing 56.4% of all adolescents from the cellular-telephone sample with completed household interviews. The CASRO response rate is the product of three other rates: 1) the resolution rate (the proportion of telephone numbers that can be identified as either for a business or residence), 2) the screening rate (the proportion of qualified households that complete the screening process), and 3) the cooperation rate (the proportion of contacted eligible households for which a completed interview is obtained).

[¶¶] Adolescents from the U.S. Virgin Islands (262 females and 285 males) were excluded from the national estimates.

[***] Information available at ftp://ftp.cdc.gov/pub/health_statistics/nchs/dataset_documentation/nis/nisteenpuf11_dug.pdf.

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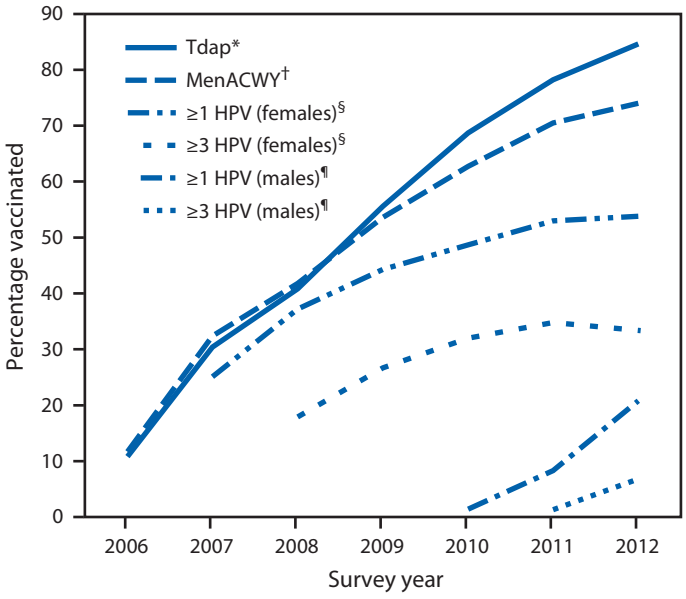
**FIGURE. Estimated vaccination coverage with selected vaccines and doses among adolescents aged 13–17 years, by survey year — National Immunization Survey–Teen, United States, 2006–2012**




**Abbreviations:** Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis; MenACWY = meningococcal conjugate; HPV = human papillomavirus; ACIP = Advisory Committee on Immunization Practices.

* ≥1 dose Tdap vaccine on or after age 10 years.

† ≥1 dose MenACWY vaccine.

§ HPV vaccine, either bivalent or quadrivalent, among females. ACIP recommends either bivalent or quadrivalent vaccine for females.

¶ HPV vaccine, either bivalent or quadrivalent, among males. ACIP recommends the quadrivalent vaccine for males; however, some males might have received bivalent vaccine.

Overall, HPV vaccination series completion among females was lower in 2012 compared with 2011.††† Compared with 2011 coverage rates, 2012 coverage estimates among males for HPV vaccine doses were higher (Figure, Table 1), but ≥1 dose coverage was lower ($p<0.05$) in 2012, the first survey year following the routine recommendation for males (*3*), than that achieved for females by 2007 (Figure) (*7*), the first survey year following licensure of the quadrivalent HPV vaccine for administration to females (*2*).

Among vaccines recommended for adolescents if not previously administered, coverage remained >90% for ≥2 MMR vaccine doses and ≥3 hepatitis B vaccine doses. Varicella vaccination coverage increased significantly for ≥1 and ≥2 doses (Table 1).

††† The completion rate for the 3-dose HPV vaccination series represents the percentage of adolescents who received 3 doses among those who had ≥1 HPV vaccine dose and ≥24 weeks between the first dose and the interview date. The calculation was limited to 4,548 females and 1,414 males who met the criteria of having received ≥1 HPV vaccine dose and having ≥24 weeks between the first dose and the interview date.

### What is already known on this topic?

At ages 11 through 12 years, the Advisory Committee on Immunization Practices (ACIP) recommends that preteens receive 1 dose of tetanus, diphtheria, and acellular pertussis (Tdap) vaccine, 1 dose of meningococcal conjugate (MenACWY) vaccine, and 3 doses of human papillomavirus (HPV) vaccine. ACIP recommends administration of all age-appropriate vaccine doses during a single visit. During 2006–2011, national coverage for ≥1 Tdap vaccine dose and ≥1 MenACWY vaccine dose increased steadily, with Tdap vaccine coverage in 2011 reaching national target levels for adolescents. During 2007–2011, coverage for ≥1 HPV vaccine dose among females lagged behind estimates for Tdap and MenACWY vaccination. In 2011, ACIP recommended routine HPV vaccination for males.

### What is added by this report?

From 2011 to 2012, vaccination coverage among U.S. adolescents increased to 84.6% for ≥1 dose of Tdap vaccine, 74.0% for ≥1 dose of MenACWY vaccine, and, among males, to 20.8% for ≥1 dose of HPV vaccine. At 53.8%, vaccination coverage for ≥1 dose of HPV vaccine among females in 2012 was statistically unchanged from 2011, and only one third of female teens received all 3 recommended doses of the HPV series. Vaccination coverage levels continued to vary widely among states. Although the difference in vaccination coverage between Tdap and MenACWY has been increasing since 2009, national progress toward achievement of *Healthy People 2020* targets continues for Tdap and MenACWY vaccines.

### What are the implications for public health practice?

Large and increasing coverage differences between Tdap and other vaccines recommended for adolescents show that many opportunities are being missed to vaccinate boys and girls, especially against HPV infection. Health-care providers should administer recommended HPV and meningococcal vaccinations to teens during the same visits when Tdap vaccine is given. Providers, parents, and adolescents also should use every health-care visit as an opportunity to review adolescents' immunization histories and ensure that every adolescent is fully vaccinated.

## Vaccination Coverage by Selected Characteristics

In 2012, vaccination coverage rates were similar across age groups for Tdap, MenACWY, HPV (among males), MMR, and hepatitis B vaccines (Table 1). Older teens had lower varicella ≥1 and ≥2 dose coverage than younger age groups. Among females, HPV vaccination coverage increased by an average of approximately 4–6 percentage points per year of age for ≥1, ≥2, ≥3 doses and series completion ($p<0.05$); however, even among females aged 17 years (the most highly vaccinated age group), only 44.5% had received ≥3 doses.

In 2012, with the exception of HPV vaccination (Table 1), estimates were similar for both sexes for Tdap, MenACWY, MMR, hepatitis B, and varicella vaccination coverage measures. Tdap (≥1 dose) vaccination coverage was similar across poverty

**TABLE 1. Estimated vaccination coverage with selected vaccines among adolescents aged 13–17* years, by age when interviewed — National Immunization Survey–Teen (NIS-Teen), United States, 2011–2012**

| | Age when interviewed (yrs) — 2012 | | | | | | | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 13 (n = 3,937) | | 14 (n = 3,961) | | 15 (n = 3,892) | | 16 (n = 3,825 ) | | 17 (n = 3,584) | | 2012 (N = 19,199) | | 2011 (N = 23,564) | |
| Vaccine | % | (95% CI)† | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) |
| **Tdap§ ≥1 dose** | 85.3 | (±2.1) | 85.7 | (±2.1) | 84.9 | (±2.0) | 83.8 | (±2.1) | 83.3 | (±2.0) | **84.6** | **(±0.9)¶** | **78.2** | **(±0.9)** |
| **MenACWY** ≥1 dose** | 72.5 | (±2.6) | 73.4 | (±2.6) | 75.3 | (±2.4) | 74.6 | (±2.7) | 74.2 | (±2.7) | **74.0** | **(±1.1)¶** | **70.5** | **(±1.0)** |
| **HPV†† vaccine coverage** | | | | | | | | | | | | | | |
| Females | | | | | | | | | | | | | | |
| ≥1 dose | 46.8 | (±4.0) | 49.4 | (±4.2) | 53.9 | (±3.9)§§ | 55.8 | (±4.4)§§ | 64.2 | (±4.3)§§ | **53.8** | **(±1.9)** | **53.0** | **(±1.7)** |
| ≥2 doses | 31.5 | (±3.5) | 36.8 | (±4.0) | 45.3 | (±3.8)§§ | 47.4 | (±4.3)§§ | 56.7 | (±4.6)§§ | **43.4** | **(±1.9)** | **43.9** | **(±1.7)** |
| ≥3 doses | 20.2 | (±3.0) | 28.7 | (±3.8)§§ | 35.3 | (±3.6)§§ | 39.1 | (±4.0)§§ | 44.5 | (±4.7)§§ | **33.4** | **(±1.7)** | **34.8** | **(±1.6)** |
| Males | | | | | | | | | | | | | | |
| ≥1 dose | 19.5 | (±3.1) | 22.2 | (±3.6) | 20.9 | (±3.3) | 21.2 | (±3.4) | 20.3 | (±3.6) | **20.8** | **(±1.5)¶** | **8.3** | **(±1.0)** |
| ≥2 doses | 12.4 | (±2.7) | 13.0 | (±2.8) | 13.2 | (±2.9) | 12.9 | (±2.9) | 12.0 | (±2.8) | **12.7** | **(±1.3)¶** | **3.8** | **(±0.7)** |
| ≥3 doses | 6.6 | (±1.8) | 5.9 | (±2.1) | 8.1 | (±2.5) | 6.0 | (±1.6) | 7.3 | (±2.5) | **6.8** | **(±1.0)¶** | **1.3** | **(±0.3)** |
| **HPV†† 3-dose series completion¶¶** | | | | | | | | | | | | | | |
| Females | 49.9 | (±6.4) | 64.4 | (±6.9)§§ | 68.9 | (±5.2)§§ | 73.1 | (±4.7)§§ | 72.4 | (±6.0)§§ | **66.7** | **(±2.6)¶** | **70.7** | **(±2.3)** |
| Males | 47.9 | (±11.0) | 40.2 | (±11.6) | 48.3 | (±10.3) | 38.5 | (±9.8) | 50.3 | (±11.8) | **45.1** | **(±5.0)¶** | **28.1** | **(±6.5)** |
| **MMR*** ≥2 doses** | 91.2 | (±1.8) | 91.9 | (±1.9) | 92.0 | (±1.5) | 90.7 | (±1.7) | 91.1 | (±1.5) | **91.4** | **(±0.8)** | **91.1** | **(±0.7)** |
| **Hepatitis B ≥3 doses** | 93.0 | (±1.6) | 93.6 | (±1.8) | 93.4 | (±1.4) | 91.6 | (±1.6) | 92.6 | (±1.4) | **92.8** | **(±0.7)** | **92.3** | **(±0.7)** |
| **Varicella** | | | | | | | | | | | | | | |
| History of varicella disease††† | 20.5 | (±2.4) | 22.0 | (±2.2) | 31.1 | (±2.6)§§ | 34.9 | (±2.7)§§ | 45.1 | (±3.1)§§ | **30.6** | **(±1.2)¶** | **36.6** | **(±1.1)** |
| Among adolescents with no history of disease | | | | | | | | | | | | | | |
| ≥1 dose | 97.2 | (±1.0) | 95.0 | (±2.1) | 95.3 | (±1.5)§§ | 93.3 | (±1.7)§§ | 91.3 | (±2.1)§§ | **94.7** | **(±0.8)¶** | **92.3** | **(±1.0)** |
| ≥2 doses | 78.9 | (±2.6) | 75.6 | (±3.1) | 75.8 | (±3.0) | 71.9 | (±3.4)§§ | 70.6 | (±3.7)§§ | **74.9** | **(±1.4)¶** | **68.3** | **(±1.4)** |
| History of disease or received ≥2 doses varicella vaccine | 83.2 | (±2.1) | 80.9 | (±2.5) | 83.3 | (±2.2) | 81.7 | (±2.3) | 83.9 | (±2.1) | **82.6** | **(±1.0)¶** | **79.9** | **(±1.0)** |

**Abbreviations:** CI = confidence interval; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis; MenACWY = meningococcal conjugate; HPV = human papillomavirus; MMR = measles, mumps, and rubella.

* Adolescents (N = 19,199) in the 2012 NIS-Teen were born during January 6, 1994–February 18, 2000.

† Estimates with 95% CI widths >20 might not be reliable.

§ Includes percentages receiving Tdap vaccine on or after age 10 years.

¶ Statistically significant difference (p<0.05) compared with 2011 NIS-Teen overall estimates.

** Includes percentages receiving MenACWY or meningococcal–unknown type vaccine.

†† HPV vaccine, either quadrivalent or bivalent. Percentage reported among females (n = 9,058) and males (n =10,141). Some adolescents might have received more than the recommended 3 doses of HPV vaccine.

§§ Statistically significant difference (p<0.05) in estimated vaccination coverage by age; reference group was adolescents aged 13 years.

¶¶ The completion rate for the 3-dose HPV vaccination series represents the percentage of adolescents who received 3 doses among those who had ≥1 HPV vaccine dose and ≥24 weeks between the first dose and the interview date. The calculation was limited to 4,548 females and 1,414 males who met the criteria of having received ≥1 HPV vaccine dose and having ≥24 weeks between the first dose and the interview date.

*** ≥2 doses of MMR vaccine.

††† By parent/guardian report or provider records.

levels§§§ and racial/ethnic groups (Table 2). MenACWY (≥1 dose) vaccination coverage was similar across poverty levels; however, whites had lower coverage than other racial/ethnic groups. HPV vaccination coverage was higher for those living below poverty level for ≥1 and ≥2 doses among females and ≥1, ≥2, ≥3 doses among males; however, among females, series completion was higher among those living at or above poverty level. Compared with whites, HPV vaccination coverage rates for Hispanics were higher for ≥1 and ≥2 doses of vaccine among females and ≥1, ≥2, ≥3 doses among males. Among males, coverage for ≥1 and ≥2 HPV vaccine doses was higher for blacks compared with whites, but 3-dose series completion was lower. Among females, HPV vaccine series completion was lower for Hispanics and blacks compared with whites. Coverage for ≥2 doses MMR vaccine and ≥3 doses hepatitis B vaccine differed by poverty level and was lower for Hispanics compared with whites. Varicella vaccine coverage (≥2 doses) was lower for those living below the federal poverty level.

## State Vaccination Coverage

Coverage estimates for Tdap, MenACWY, and HPV vaccines varied widely among states. Coverage for ≥1 Tdap vaccine dose ranged from 53.5% (Mississippi) to 96.3% (New Hampshire), and for ≥1 MenACWY vaccine dose, from 37.5% (Arkansas) to 94.3% (Rhode Island) (Table 3). Among females, coverage for ≥1 HPV vaccine dose varied from 39.4% (Florida) to 73.7% (Rhode Island), and for ≥3 HPV vaccine doses, from 12.1% (Mississippi) to 57.7% (Rhode Island). Among males, coverage for ≥1 HPV vaccine dose ranged from 11.2% (Wyoming)

§§§ Adolescents were classified as below federal poverty level if their total family income was less than the federal poverty level specified for the applicable family size and number of children aged <18 years. All others were classified as at or above the poverty level. Poverty status was unknown for 597 adolescents. Additional information available at: http://www. census.gov/hhes/www/poverty.

**TABLE 2. Estimated vaccination coverage among adolescents aged 13–17 years,* by race/ethnicity,† poverty level,§ and selected vaccines and doses — National Immunization Survey–Teen (NIS-Teen), United States, 2012**

| | Race/Ethnicity | | | | | | | | | | | | Poverty status | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | White (n = 12,930) | | Black (n = 1,928) | | Hispanic (n = 2,552) | | American Indian/ Alaska Native (n = 261) | | Asian (n = 622) | | Multiracial (n = 840) | | Below poverty level (n = 3,136) | | At or above poverty level (n = 15,466) | |
| Vaccine | % | (95% CI)¶ | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) |
| **Tdap** ≥1 dose** | 84.4 | (±1.0) | 83.7 | (±2.5) | 85.4 | (±2.5) | 89.5 | (±5.6) | 84.9 | (±5.4) | 85.5 | (±4.7) | 83.6 | (±2.1) | 85.1 | (±1.0) |
| **MenACWY†† ≥1 dose** | 71.3 | (±1.3) | 75.8 | (±3.2)§§ | 77.6 | (±3.2)§§ | 82.0 | (±7.9)§§ | 79.4 | (±6.4)§§ | 77.9 | (±4.7)§§ | 73.2 | (±2.7) | 74.1 | (±1.3) |
| **HPV¶¶ coverage by dose** | | | | | | | | | | | | | | | | |
| Females | | | | | | | | | | | | | | | | |
| ≥1 dose | 51.1 | (±2.1) | 50.1 | (±5.4) | 62.9 | (±4.9)§§ | 67.7 | (±15.5)§§ | 55.9 | (±10.9) | 49.9 | (±9.0) | 64.9 | (±4.2)§§ | 50.4 | (±2.0) |
| ≥2 doses | 41.8 | (±2.1) | 39.5 | (±5.1) | 49.3 | (±5.1)§§ | 43.2 | (±17.7) | 48.1 | (±11.1) | 41.3 | (±8.7) | 51.5 | (±4.4)§§ | 40.7 | (±2.0) |
| ≥3 doses | 33.7 | (±2.0) | 29.0 | (±4.7) | 35.5 | (±4.8) | 36.8 | (±16.5) | 33.8 | (±10.2) | 32.1 | (±8.1) | 36.2 | (±4.2) | 32.5 | (±1.9) |
| Males | | | | | | | | | | | | | | | | |
| ≥1 dose | 15.2 | (±1.4) | 25.9 | (±4.6)§§ | 31.7 | (±4.7)§§ | 24.9 | (±12.0) | 22.3 | (±8.7) | 20.7 | (±6.4) | 29.9 | (±3.9)§§ | 17.3 | (±1.5) |
| ≥2 doses | 9.0 | (±1.1) | 15.6 | (±3.8)§§ | 20.1 | (±4.1)§§ | NA | NA | 17.1 | (±7.8)§§ | 10.3 | (±4.0) | 18.8 | (±3.4)§§ | 10.2 | (±1.2) |
| ≥3 doses | 4.6 | (±0.8) | 5.4 | (±1.9) | 12.9 | (±3.5)§§ | NA | NA | NA | NA | 5.4 | (±3.0) | 10.7 | (±2.9)§§ | 5.5 | (±0.9) |
| **HPV¶¶ 3-dose series completion*** ** | | | | | | | | | | | | | | | | |
| Females | 71.8 | (±2.7) | 63.7 | (±7.1)§§ | 59.3 | (±6.8)§§ | 55.4 | (±27.4) | 61.8 | (±15.8) | 67.8 | (±11.3) | 59.3 | (±5.8)§§ | 69.9 | (±2.7) |
| Males | 45.2 | (±6.2) | 27.8 | (±9.2)§§ | 52.1 | (±10.3) | NA | NA | 62.7 | (±23.6) | 38.2 | (±19.2) | 43.6 | (±9.1) | 47.2 | (±5.6) |
| **MMR††† ≥2 doses** | 92.4 | (±0.8) | 91.4 | (±2.3) | 89.1 | (±2.2)§§ | 95.9 | (±4.2) | 90.4 | (±4.6) | 90.4 | (±3.7) | 89.7 | (±1.9)§§ | 92.0 | (±0.8) |
| **Hepatitis B ≥3 doses** | 93.7 | (±0.7) | 92.5 | (±2.1) | 91.1 | (±2.1)§§ | 94.1 | (±5.8) | 92.0 | (±3.8) | 92.0 | (±3.3) | 91.3 | (±1.7)§§ | 93.3 | (±0.8) |
| **Varicella** | | | | | | | | | | | | | | | | |
| History of varicella disease§§§ | 32.4 | (±1.3) | 27.2 | (±3.3)§§ | 29.1 | (±3.2) | 38.0 | (±10.8) | 25.9 | (±7.1) | 28.8 | (±5.2) | 30.7 | (±2.7) | 30.5 | (±1.3) |
| Among adolescents with no history of disease | | | | | | | | | | | | | | | | |
| ≥1 dose | 95.3 | (±0.8) | 93.3 | (±2.5) | 94.1 | (±2.1) | 95.2 | (±6.9) | 93.5 | (±4.4) | 95.5 | (±2.9) | 92.5 | (±2.0)§§ | 95.3 | (±0.8) |
| ≥2 doses | 74.0 | (±1.7) | 75.2 | (±3.9) | 76.3 | (±3.5) | 78.4 | (±11.8) | 79.4 | (±8.0) | 75.1 | (±6.3) | 72.0 | (±3.3)§§ | 75.8 | (±1.5) |
| History of disease or received ≥2 doses varicella vaccine | 82.4 | (±1.2) | 81.9 | (±3.0) | 83.2 | (±2.6) | 86.6 | (±7.2) | 84.7 | (±6.2) | 82.3 | (±4.6) | 80.6 | (±2.4) | 83.2 | (±1.1) |

**Abbreviations:** CI = confidence interval; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis; MenACWY = meningococcal conjugate; HPV = human papillomavirus; NA = not available (estimate not reported because unweighted sample size for the denominator was <30 or 95% CI half width/estimate >0.6); MMR = measles, mumps, and rubella.

* Adolescents (N = 19,199) in the 2012 NIS-Teen were born during January 6, 1994–February 18, 2000.

† Adolescent's race/ethnicity was reported by their parent or guardian. Adolescents identified in this report as white, black, Asian, American Indian/Alaska Native or multiracial were reported by the parent or guardian as non-Hispanic. Adolescents identified as multiracial had more than one race category selected. Adolescents identified as Hispanic might be of any race. Native Hawaiian or other Pacific Islanders were not included in the table because of small sample sizes.

§ Adolescents were classified as below poverty level if their total family income was less than the federal poverty level specified for the applicable family size and number of children aged <18 years. All others were classified as at or above the poverty level. Additional information available at http://www.census.gov/hhes/www/poverty.html. Poverty status was unknown for 597 adolescents.

¶ Estimates with 95% CI widths >20 might not be reliable.

** Includes percentages receiving Tdap vaccine on or after age 10 years.

†† Includes percentages receiving MenACWY and meningococcal–unknown type vaccine.

§§ Statistically significant difference (p<0.05) in estimated vaccination coverage by race/ethnicity or poverty level; referent groups were white, non-Hispanic adolescents and adolescents living at or above poverty level, respectively.

¶¶ HPV vaccine, either quadrivalent or bivalent. Percentage reported among females (n = 9,058) and males (n = 10,141). Some adolescents might have received more than the 3 recommended HPV vaccine doses.

*** The completion rate for the 3-dose HPV vaccination series represents the percentage of adolescents who received 3 doses among those who had ≥1 HPV vaccine dose and ≥24 weeks between the first dose and the interview date. The calculation was limited to 4,548 females and 1,414 males who met the criteria of having received ≥1 HPV vaccine dose and having ≥24 weeks between the first dose and the interview date.

††† Includes ≥2 doses of MMR vaccine.

§§§ By parent/guardian report or provider records.

to 55.2% (Rhode Island). Regionally, vaccination coverage was highest overall in the Northeast (Table 3). Among males, vaccination coverage estimates for each HPV vaccine series dose and HPV series completion were similar across regions.

## *Healthy People 2020* Targets

The *Healthy People 2020* national targets for vaccination coverage among adolescents by ages 13–15 years are 80.0% for ≥1 Tdap dose, ≥1 MenACWY dose, and ≥3 HPV doses (among females), and 90.0% for ≥2 varicella doses (*5*). Among adolescents aged 13–15 years, vaccination coverage in 2012 was 85.3% (CI = 84.1–86.5) for ≥1 Tdap dose, 73.8% (CI = 72.3–75.2) for ≥1 MenACWY dose, 28.1% (CI = 26.1–30.2) for ≥3 HPV doses (among females), and 76.8% (CI = 75.1–78.4) for ≥2 varicella doses. Measures for Tdap, MenACWY, and varicella vaccines increased by 2.3–5.0 percentage points from 2011 to 2012; HPV vaccine (≥3 doses) coverage remained unchanged. Based on point estimates, 36 states met or exceeded national Tdap vaccination coverage targets, 12 met or exceeded MenACWY targets, and nine met

**TABLE 3. Estimated vaccination coverage with selected vaccines and doses* among adolescents aged 13–17 years,† by state/area — National Immunization Survey–Teen (NIS-Teen), United States, 2012**

| | | | | | | | Females (N = 9,058) | | | | | | Males (N = 10,141) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ≥2 VAR§ | | ≥1 Tdap¶ | | ≥1 MenACWY** | | ≥1 HPV†† | | ≥2 HPV§§ | | ≥3 HPV¶¶ | | ≥1 HPV†† | | ≥2 HPV§§ | | ≥3 HPV¶¶ | |
| State/Area | % | (95% CI)*** | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) |
| **United States overall** | **74.9** | (±1.4)††† | **84.6** | (±0.9)††† | **74.0** | (±1.1)††† | **53.8** | (±1.9) | **43.4** | (±1.9) | **33.4** | (±1.7) | **20.8** | (±1.5)††† | **12.7** | (±1.3)††† | **6.8** | (±1.0)††† |
| **Northeast** | 82.0 | (±2.5)††† | 90.5 | (±1.5)††† | 85.3 | (±1.8)††† | 58.2 | (±3.7) | 51.4 | (±3.7) | 40.4 | (±3.7) | 21.2 | (±2.8)††† | 12.8 | (±2.3)††† | 6.4 | (±1.7)††† |
| Connecticut | 93.5 | (±4.3) | 89.3 | (±4.8) | 88.8 | (±3.7)††† | 57.6 | (±10.3) | 53.9 | (±10.4) | 43.6 | (±10.5) | 20.3 | (±6.7) | 14.6 | (±6.0) | 8.5 | (±4.6) |
| Maine | 75.6 | (±7.4) | 79.5 | (±5.9)††† | 73.7 | (±6.1)††† | 61.7 | (±9.4) | 53.4 | (±9.7) | 41.8 | (±9.6) | 25.3 | (±7.9) | 17.4 | (±7.0) | 12.1 | (±6.2) |
| Massachusetts | 88.8 | (±4.7) | 95.7 | (±2.4) | 89.2 | (±3.7) | 69.3 | (±7.9) | 58.9 | (±8.9) | 43.0 | (±9.1) | 25.5 | (±7.9) | 10.4 | (±5.0) | NA | NA |
| New Hampshire | 92.9 | (±3.9) | 96.3 | (±2.2) | 83.1 | (±5.6) | 52.2 | (±10.6)§§§ | 43.6 | (±10.4) | 34.5 | (±9.7) | 20.5 | (±7.3) | 12.2 | (±5.5) | NA | NA |
| New Jersey | 73.8 | (±7.2) | 90.9 | (±4.0)††† | 91.6 | (±3.9) | 54.6 | (±9.7) | 44.9 | (±9.7) | 31.6 | (±8.5) | 19.8 | (±7.9) | 10.7 | (±5.6) | NA | NA |
| New York | 74.4 | (±5.1) | 90.3 | (±2.9) | 78.5 | (±4.1) | 56.0 | (±7.1)††† | 50.5 | (±7.2) | 39.7 | (±7.2) | 17.9 | (±5.1)††† | 12.3 | (±4.6) | NA | NA |
| City of New York | 70.2 | (±7.5) | 86.4 | (±4.5) | 75.3 | (±5.8) | 53.6 | (±8.9) | 49.0 | (±9.0) | 37.3 | (±8.9) | 27.3 | (±9.5)††† | 19.2 | (±8.7) | NA | NA |
| Rest of state | 77.1 | (±6.9) | 92.7 | (±3.8) | 80.5 | (±5.5)††† | 57.5 | (±10.2)††† | 51.4 | (±10.3)††† | 41.3 | (±10.3) | 12.1 | (±5.5) | NA | NA | NA | NA |
| Pennsylvania | 90.4 | (±4.3) | 88.4 | (±3.4)††† | 89.4 | (±3.6)††† | 57.4 | (±8.0) | 52.1 | (±8.2) | 44.6 | (±8.2) | 21.9 | (±6.0)††† | 13.2 | (±4.8) | 5.3 | (±2.8) |
| Philadelphia County | 90.0 | (±4.7)††† | 87.2 | (±4.7) | 92.9 | (±3.7) | 76.2 | (±8.2) | 68.5 | (±9.3) | 51.9 | (±10.3) | 46.7 | (±9.8)††† | 27.5 | (±9.0)††† | NA | NA |
| Rest of state | 90.4 | (±4.8) | 88.6 | (±3.8)††† | 88.9 | (±4.0) | 55.0 | (±9.0) | 50.0 | (±9.2) | 43.6 | (±9.2) | 18.8 | (±6.6)††† | 11.4 | (±5.3) | NA | NA |
| Rhode Island | 93.3 | (±3.8)††† | 94.0 | (±2.9)††† | 94.3 | (±2.9)††† | 73.7 | (±9.4) | 67.8 | (±9.8) | 57.7 | (±10.0) | 55.2 | (±9.2)††† | 34.8 | (±8.7)††† | 17.7 | (±6.3) |
| Vermont | 92.4 | (±3.8)††† | 93.1 | (±3.6) | 72.6 | (±6.1) | 66.4 | (±9.0) | 58.0 | (±9.3) | 46.2 | (±9.6) | 25.7 | (±8.2) | 19.4 | (±7.8) | 10.6 | (±5.6) |
| **Midwest** | 72.9 | (±2.7) | 82.9 | (±2.0)††† | 71.9 | (±2.2) | 50.5 | (±3.5) | 39.4 | (±3.4) | 31.1 | (±3.2) | 18.1 | (±2.7)††† | 10.7 | (±2.1)††† | 5.4 | (±1.7)††† |
| Illinois | 63.4 | (±7.2) | 77.3 | (±5.4) | 67.7 | (±6.0) | 41.2 | (±8.5) | 28.5 | (±7.7)§§§ | 21.1 | (±6.3)§§§ | 24.3 | (±7.8)††† | 15.0 | (±6.8)††† | NA | NA |
| City of Chicago | 72.2 | (±8.2) | 78.5 | (±6.1)††† | 77.0 | (±6.2) | 61.4 | (±10.4)††† | 44.5 | (±11.0) | 37.8 | (±10.8) | 40.2 | (±10.5) | 27.8 | (±10.1) | 17.0 | (±9.3) |
| Rest of state | 60.9 | (±8.9) | 77.0 | (±6.5) | 65.4 | (±7.2) | 36.2 | (±10.1)§§§ | 24.5 | (±9.1)§§§ | 16.9 | (±7.3)§§§ | 20.5 | (±9.4) | NA | NA | NA | NA |
| Indiana | 84.8 | (±6.7) | 94.4 | (±3.0) | 92.0 | (±3.8) | 48.4 | (±9.9) | 42.7 | (±9.7) | 35.2 | (±9.1) | 17.2 | (±7.4) | 10.8 | (±5.9) | NA | NA |
| Iowa | 62.1 | (±8.5) | 77.8 | (±5.9) | 64.4 | (±6.7) | 57.5 | (±9.6) | 46.4 | (±9.8) | 35.6 | (±9.3) | 19.4 | (±7.8) | 13.5 | (±6.4) | NA | NA |
| Kansas | 78.7 | (±7.0)††† | 92.2 | (±3.3)††† | 55.9 | (±7.3) | 42.7 | (±10.5) | 32.8 | (±9.8) | 25.1 | (±9.3) | 13.5 | (±6.9) | 11.1 | (±6.5) | NA | NA |
| Michigan | 87.4 | (±5.0) | 84.2 | (±4.8)††† | 87.5 | (±4.2)††† | 48.1 | (±9.7) | 39.2 | (±9.6) | 32.2 | (±9.3) | 13.1 | (±6.9) | NA | NA | NA | NA |
| Minnesota | 82.9 | (±6.6) | 85.6 | (±6.1) | 66.6 | (±6.8) | 59.4 | (±10.3) | 46.0 | (±10.7) | 33.1 | (±9.9) | 15.2 | (±7.6) | NA | NA | NA | NA |
| Missouri | 53.6 | (±9.7) | 88.0 | (±4.8)††† | 58.3 | (±7.6) | 51.6 | (±10.5) | 40.4 | (±10.1) | 34.5 | (±9.7) | 21.7 | (±9.9) | NA | NA | NA | NA |
| Nebraska | 82.2 | (±6.4) | 81.4 | (±5.8) | 75.5 | (±6.1) | 67.5 | (±10.0) | 58.3 | (±10.7)††† | 37.3 | (±10.0) | 19.6 | (±6.9) | 11.6 | (±5.0) | 7.0 | (±3.7) |
| North Dakota | 68.6 | (±8.9) | 89.5 | (±5.0) | 88.1 | (±4.9) | 60.3 | (±9.8) | 49.7 | (±10.0) | 40.9 | (±9.6) | 18.6 | (±7.4) | 13.1 | (±6.8) | NA | NA |
| Ohio | 62.0 | (±8.8) | 73.8 | (±6.7) | 66.4 | (±6.9) | 56.4 | (±10.4) | 39.5 | (±10.7) | 31.9 | (±10.5) | 15.2 | (±6.7) | 6.9 | (±3.9) | NA | NA |
| South Dakota | 43.7 | (±9.0) | 65.9 | (±6.5) | 40.0 | (±6.8) | 51.0 | (±10.1) | 46.5 | (±10.1) | 31.8 | (±9.3)§§§ | 19.8 | (±8.2) | 10.7 | (±6.1) | NA | NA |
| Wisconsin | 87.9 | (±5.4) | 89.8 | (±4.4) | 74.4 | (±6.2) | 50.5 | (±10.8)§§§ | 45.0 | (±10.7)§§§ | 37.5 | (±10.5) | 19.3 | (±8.0) | 10.3 | (±5.8) | NA | NA |
| **South** | 73.3 | (±2.1)††† | 81.2 | (±1.5)††† | 71.0 | (±1.8)††† | 48.9 | (±2.9) | 39.5 | (±2.7) | 29.9 | (±2.5) | 20.1 | (±2.3)††† | 12.0 | (±1.9)††† | 6.2 | (±1.2)††† |
| Alabama | 68.1 | (±8.5)††† | 81.7 | (±6.0) | 60.5 | (±7.1) | 46.6 | (±10.4) | 36.9 | (±10.1) | 31.1 | (±9.9) | 17.8 | (±9.3) | NA | NA | NA | NA |
| Arkansas | 53.3 | (±8.4) | 64.4 | (±6.8)††† | 37.5 | (±7.0)††† | 41.2 | (±10.7) | 32.4 | (±10.0) | 18.3 | (±7.2) | 12.7 | (±6.6) | NA | NA | NA | NA |
| Delaware | 84.9 | (±6.3) | 77.8 | (±5.9) | 78.0 | (±6.2) | 67.2 | (±9.8) | 64.5 | (±9.9) | 50.4 | (±10.2) | 26.2 | (±7.5)††† | 17.9 | (±6.7)††† | 10.7 | (±4.9) |
| District of Columbia | 92.3 | (±5.0) | 84.5 | (±5.2) | 92.1 | (±3.3) | 57.8 | (±10.1) | 52.8 | (±10.1) | 38.5 | (±9.7) | 33.8 | (±9.7) | 12.3 | (±6.1) | 4.8 | (±2.5) |
| Florida | 73.3 | (±8.5) | 86.8 | (±5.1)††† | 68.6 | (±6.8) | 39.4 | (±10.1) | 33.4 | (±9.6) | 25.3 | (±8.8) | 21.4 | (±9.3) | 15.4 | (±8.2) | NA | NA |
| Georgia | 89.3 | (±5.2) | 80.5 | (±6.0)††† | 73.1 | (±6.8) | 52.3 | (±10.8) | 36.8 | (±9.8) | 29.0 | (±9.0) | 19.5 | (±8.5)††† | 8.7 | (±4.7) | NA | NA |
| Kentucky | 57.3 | (±8.4)††† | 80.0 | (±5.6)††† | 62.9 | (±6.8) | 51.2 | (±10.6) | 43.5 | (±10.5) | 34.9 | (±9.9) | NA | NA | NA | NA | NA | NA |
| Louisiana | 84.8 | (±5.2) | 89.8 | (±3.7) | 90.8 | (±3.6) | 62.1 | (±8.6) | 52.6 | (±9.1) | 40.5 | (±9.0) | 20.6 | (±8.2) | 12.6 | (±6.9) | NA | NA |
| Maryland | 80.4 | (±6.9)††† | 78.1 | (±6.6) | 74.9 | (±6.9) | 42.7 | (±10.9) | 39.3 | (±10.5) | 30.9 | (±9.4) | 20.2 | (±7.5) | 13.8 | (±6.4) | NA | NA |
| Mississippi | 48.1 | (±9.7)††† | 53.5 | (±7.3)††† | 40.7 | (±7.1) | 39.7 | (±10.6) | 22.3 | (±7.7) | 12.1 | (±5.9) | 20.9 | (±9.2) | 11.2 | (±6.4) | NA | NA |

See table footnotes on page 691.

or exceeded varicella targets. No state met the national target for HPV vaccination coverage among females.

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## Editorial Note

National progress toward achievement of *Healthy People 2020* targets for adolescents has been observed for Tdap, MenACWY, and varicella vaccines; however, at only 28.1%, national coverage for ≥3 HPV vaccine doses among females aged 13–15 years remains far short of the *Healthy People 2020* target of 80%. In contrast, in 2012, coverage estimates among teens aged 13–15 years for ≥1 Tdap vaccine dose and ≥1 MenACWY vaccine dose were 85.3% and 73.8%, respectively, demonstrating that 80% vaccination coverage is achievable among adolescents. Among teens aged 13–17 years, the gap widened between Tdap and MenACWY vaccination coverage. Although age-related disparities were not observed in 2012 for many vaccines, age-related disparities were present for older adolescents for varicella and, among younger females, for HPV

**TABLE 3. (*Continued*) Estimated vaccination coverage with selected vaccines and doses* among adolescents aged 13–17 years,† by state/area — National Immunization Survey–Teen (NIS-Teen), United States, 2012**

| | | | | | | | Females (N = 9,058) | | | | | | Males (N = 10,141) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ≥2 VAR§ | | ≥1 Tdap¶ | | ≥1 MenACWY** | | ≥1 HPV†† | | ≥2 HPV§§ | | ≥3 HPV¶¶ | | ≥1 HPV†† | | ≥2 HPV§§ | | ≥3 HPV¶¶ | |
| State/Area | % | (95% CI)*** | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) | % | (95% CI) |
| North Carolina | 66.7 | (±7.9) | 87.9 | (±4.5)††† | 68.2 | (±6.4) | 53.3 | (±9.7) | 46.5 | (±9.8) | 35.5 | (±9.5) | 18.8 | (±7.1) | 11.8 | (±5.7) | 8.6 | (±5.0) |
| Oklahoma | 65.1 | (±7.7)††† | 77.1 | (±5.6)††† | 63.8 | (±6.7) | 55.1 | (±9.5) | 49.5 | (±9.6) | 38.4 | (±9.4) | 24.4 | (±7.6)††† | 14.8 | (±6.0) | 10.6 | (±5.4) |
| South Carolina | 58.3 | (±8.6) | 64.9 | (±7.2) | 58.5 | (±7.3) | 41.9 | (±10.6) | 31.6 | (±9.8) | 26.6 | (±9.5) | 18.1 | (±8.8) | 15.9 | (±8.5) | NA | NA |
| Tennessee | 70.8 | (±8.7) | 77.4 | (±6.2)††† | 69.4 | (±6.7) | 54.3 | (±11.0) | 40.9 | (±10.7) | 28.6 | (±9.4) | 20.3 | (±8.8) | NA | NA | NA | NA |
| Texas | 79.1 | (±3.9) | 82.5 | (±3.3) | 84.6 | (±3.3)††† | 51.2 | (±5.8) | 41.2 | (±5.7) | 30.3 | (±5.3) | 24.0 | (±5.0)††† | 14.2 | (±4.1)††† | 7.0 | (±2.4)††† |
| Bexar County | 72.5 | (±8.5) | 78.6 | (±7.2) | 83.6 | (±6.0) | 43.0 | (±10.4) | 33.4 | (±9.8) | 26.3 | (±9.3) | 16.6 | (±8.3) | NA | NA | NA | NA |
| City of Houston | 77.6 | (±7.3) | 82.5 | (±5.7) | 87.6 | (±4.5) | 55.8 | (±9.4) | 46.0 | (±9.6) | 36.8 | (±9.5) | 38.0 | (±10.1)††† | 23.8 | (±9.0) | 15.1 | (±7.9) |
| Rest of state | 79.8 | (±4.5) | 82.9 | (±3.7) | 84.4 | (±3.8) | 51.5 | (±6.7) | 41.4 | (±6.6) | 30.1 | (±6.1) | 23.3 | (±5.7)††† | 13.8 | (±4.7) | 6.5 | (±2.7) |
| Virginia | 69.1 | (±7.7)††† | 88.7 | (±4.3)††† | 62.1 | (±7.4) | 50.9 | (±10.9) | 38.0 | (±10.3) | 27.9 | (±9.2) | 12.1 | (±5.8) | NA | NA | NA | NA |
| West Virginia | 61.5 | (±9.3)††† | 68.2 | (±7.1) | 64.1 | (±7.4) | 45.2 | (±10.6) | 41.2 | (±10.6) | 36.1 | (±10.2) | 18.3 | (±8.5)††† | NA | NA | NA | NA |
| **West** | 73.8 | (±3.6)††† | 87.4 | (±2.2)††† | 72.5 | (±3.1) | 61.4 | (±4.7) | 47.2 | (±4.9) | 36.2 | (±4.7) | 24.3 | (±4.1)††† | 15.6 | (±3.6)††† | 9.4 | (±2.9) |
| Alaska | 73.6 | (±7.5)††† | 77.1 | (±5.0)††† | 52.7 | (±6.2) | 56.1 | (±9.3) | 46.3 | (±9.6) | 31.4 | (±8.8) | 14.1 | (±5.6) | 7.5 | (±3.7) | NA | NA |
| Arizona | 73.8 | (±6.8)††† | 87.5 | (±4.5) | 85.5 | (±5.0) | 54.3 | (±9.5) | 43.4 | (±9.5) | 36.9 | (±9.3) | 19.7 | (±7.0)††† | 12.8 | (±5.8) | NA | NA |
| California | 75.3 | (±6.2)††† | 89.4 | (±3.8)††† | 76.0 | (±5.5) | 65.0 | (±8.3) | 48.4 | (±8.8) | 35.8 | (±8.4) | 29.4 | (±7.4)††† | 19.3 | (±6.4) | 11.7 | (±5.2) |
| Colorado | 81.6 | (±6.6) | 93.2 | (±3.5)††† | 73.2 | (±6.6) | 61.4 | (±10.8)††† | 44.9 | (±11.3) | 38.0 | (±11.2) | 31.3 | (±12.6)††† | NA | NA | NA | NA |
| Hawaii | 76.0 | (±6.6) | 74.1 | (±5.9) | 70.4 | (±6.3) | 64.6 | (±9.4) | 58.1 | (±9.8) | 43.4 | (±9.7) | 43.1 | (±9.7)††† | 27.5 | (±8.8) | 15.6 | (±7.6) |
| Idaho | 57.0 | (±8.7) | 64.5 | (±6.1) | 63.2 | (±6.3)††† | 51.3 | (±9.5) | 41.6 | (±9.6) | 27.8 | (±8.2) | 16.2 | (±7.5) | NA | NA | NA | NA |
| Montana | 61.3 | (±8.9) | 90.2 | (±3.8) | 58.6 | (±6.6)††† | 55.1 | (±9.8) | 46.5 | (±10.0) | 41.6 | (±10.1) | 16.8 | (±7.0) | 10.0 | (±5.9) | NA | NA |
| Nevada | 69.4 | (±7.8)††† | 86.3 | (±5.0) | 66.3 | (±6.3) | 62.5 | (±9.5) | 44.6 | (±10.2) | 37.2 | (±10.2) | 11.6 | (±5.5) | NA | NA | NA | NA |
| New Mexico | 60.5 | (±8.2) | 82.6 | (±5.6) | 54.2 | (±7.0)§§§ | 51.1 | (±10.1) | 38.7 | (±9.4) | 30.3 | (±8.7) | 20.2 | (±8.1) | 12.8 | (±7.0) | NA | NA |
| Oregon | 75.6 | (±6.2)††† | 86.0 | (±4.5) | 58.3 | (±6.3) | 58.5 | (±9.3) | 46.7 | (±9.5) | 38.6 | (±9.3) | 14.5 | (±5.9) | 7.2 | (±4.2) | NA | NA |
| Utah | 59.2 | (±8.7) | 81.5 | (±6.3) | 56.5 | (±7.0) | 44.3 | (±10.4) | 39.0 | (±10.0) | 24.1 | (±8.4) | NA | NA | NA | NA | NA | NA |
| Washington | 73.9 | (±8.4) | 86.0 | (±5.1)††† | 71.2 | (±6.6) | 64.5 | (±10.1) | 54.6 | (±10.1) | 43.5 | (±9.8) | 14.9 | (±6.2) | 9.6 | (±5.4) | NA | NA |
| Wyoming | 88.8 | (±5.6) | 85.4 | (±4.8) | 59.0 | (±6.6) | 53.9 | (±10.0) | 41.4 | (±9.6) | 30.3 | (±8.7) | 11.2 | (±4.9) | NA | NA | NA | NA |
| **Territory** | | | | | | | | | | | | | | | | | | |
| U.S. Virgin Islands | 75.6 | (±4.4)††† | 72.0 | (±4.5)††† | 38.1 | (±4.8) | 28.7 | (±6.5) | 16.4 | (±5.5) | 9.1 | (±4.4) | 10.5 | (±4.5) | NA | NA | NA | NA |

**Abbreviations:** CI = confidence interval; VAR = varicella; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis; MenACWY = meningococcal conjugate; HPV = human papillomavirus; NA = not available (estimate not reported because unweighted sample size for the denominator was <30 or 95% CI half width/estimate >0.6).

* Vaccination estimates for additional measures, including ≥2 doses MMR, ≥3 doses hepatitis B, and ≥1 dose varicella vaccines are available at http://www.cdc.gov/vaccines/stats-surv/nis/default.htm#nisteen.

† Adolescents (N = 19,199) in the 2012 NIS-Teen were born during January 6, 1994–February 18, 2000.

§ ≥2 doses of VAR vaccine among adolescents without a reported history of varicella disease.

¶ ≥1 dose Tdap vaccine on or after age 10 years.

** ≥1 dose of MenACWY or meningococcal–unknown type vaccine.

†† ≥1 dose of HPV vaccine, either quadrivalent or bivalent. For ≥1, ≥2, and ≥3 dose measures, separate percentages are reported among females only (N = 9,058) and among males only (N = 10,141).

§§ ≥2 doses of HPV vaccine, either quadrivalent or bivalent.

¶¶ ≥3 doses of HPV vaccine, either quadrivalent or bivalent. Some adolescents might have received more than the recommended 3 HPV vaccine doses.

*** Estimates with 95% CI half-widths >10 might not be reliable.

††† Statistically significant (p<0.05) percentage point increase from 2011.

§§§ Statistically significant (p<0.05) percentage point decrease from 2011.

vaccination coverage (e.g., coverage for ≥3 HPV vaccine doses was more than 24 percentage points lower among females aged 13 years compared with those aged 17 years). Since reporting of HPV vaccination estimates among females began in 2007 with an initial ≥1 HPV vaccine dose coverage estimate of 25.1% (*7*), coverage rates for ≥1 HPV vaccine dose have increased only modestly compared with estimates for ≥1 Tdap vaccine dose and ≥1 MenACWY vaccine dose. However, from 2011 to 2012, HPV dose-specific vaccination rates among females did not increase at all, and series completion actually decreased. Following routine recommendations for males in 2011 (*3*) and females in 2006 (*2*), respectively, the initial coverage in 2012 for ≥1 HPV vaccine dose for males was lower than initial coverage for females (*7*). Differences in vaccination coverage underscore that clinicians and parents are missing opportunities to administer HPV, MenACWY, and varicella vaccinations during visits when Tdap vaccine is given.

Vaccination coverage estimates remained widely variable by state and vaccine. Differing state school vaccination requirements for Tdap, MenACWY, and varicella vaccines, respectively, might have fostered increased coverage for these vaccines (*8*). For entry into nonresidential middle schools during the 2012–13 school year, 40 states required Tdap vaccination.¶¶¶ Increased Tdap vaccination coverage also might have been influenced by provider and parent awareness that, in 2012, most states reported increased pertussis cases or outbreaks.****

As with other vaccines recommended for the civilian population of the United States, ACIP recommends Tdap,

¶¶¶ Additional information available at http://www.immunize.org/laws.

**** Information available at http://www.cdc.gov/pertussis/outbreaks/trends.html.

MenACWY, and HPV vaccines for the youngest age group at risk for the vaccine-preventable diseases for whom safety and efficacy of the particular vaccines have been shown (*1,4*). ACIP recommends administration of all age-appropriate vaccines during a single visit (*4*). For example, during a single visit, a healthy child aged 11 years should routinely receive recommended doses of Tdap, MenACWY, and HPV vaccines; then, before leaving the provider's practice settings, two subsequent visits within 6 months should be scheduled for completion of the HPV vaccine series as recommended.

Other recommended strategies for increasing vaccination coverage, including HPV vaccination among females, have been well-described (*6,8,9*), but many have not been widely adopted. Clinicians should provide strong, clear, consistent vaccination recommendations to adolescents and their parents or guardians (*6*). Clinicians, public health agencies, and other stakeholders can also improve vaccination rates by reducing out-of-pocket vaccination costs for patients and their families (*8*). Through enrolled vaccination providers, the Vaccines for Children (VFC) program provides vaccines for uninsured, Medicaid-eligible, and other children through age 18 years whose families might not otherwise be able to afford vaccines.†††† HPV vaccination coverage was generally higher among teens living in poverty, which might reflect the VFC program's effectiveness at reaching these young persons; however, series completion rates were lower among teens living in poverty, suggesting that other barriers need to be identified and addressed for this vulnerable population.

Implementation of the Patient Protection and Affordable Care Act of 2010§§§§ also offers opportunities to improve vaccination coverage among children and adolescents. Under the law, nongrandfathered private health plans must offer, at no cost to beneficiaries, vaccines that are recommended by ACIP. Similarly, qualified health plans on the new health exchanges that go into effect starting in 2014 must offer ACIP-recommended vaccines at no cost to beneficiaries.

The findings in this report are subject to at least three limitations. First, household response rates were 23.6% (cellular phone households) and 55.1% (landline households), respectively. Only 56.4% (cellular telephone) and 62% (landline) of completed household interviews also had adequate provider-verified vaccination data. After weighting adjustments, bias from nonresponse and exclusion of households without telephones might have remained. Coverage estimate increases of approximately 3 percentage points for Tdap, 2 for MenACWY, and 6 among females for HPV vaccination initiation might have resulted, based on a total survey error model including comparison to provider-reported data collected from a sample of National Health Interview Survey participants. Estimates of bias do not include errors in vaccination status (e.g., under ascertainment from incomplete vaccination provider identification and unknown medical record completeness) and do not address potential differential noncoverage or nonresponse bias over time (*10*). Second, weighted linear regression analyses using national data did not account for methodologic changes in sampling frames. Although vaccination estimates from landline only (2006–2010) and dual sampling frames (2011–2012) might not be comparable, prior methodologic assessment suggests that the addition of cellular telephone numbers beginning in 2011 should have had limited effects on annual national coverage estimates. Finally, estimates for particular states and reporting areas and for racial/ethnic populations with sample sizes <1,000 might be unreliable. For HPV coverage analyses by state and sex, small sample sizes decrease the power to detect differences.

Achieving high vaccination coverage among adolescents is feasible, and progress is evident for most vaccines. Lack of progress with HPV vaccination among females warrants immediate action by health-care providers, parents, public health agencies, and other immunization stakeholders. Through the VFC program, eligible children and teens can receive recommended vaccines at no cost to their families for the vaccines. Additional efforts are needed to ensure that health-care providers administer recommended HPV and meningococcal vaccinations to boys and girls during the same visits when Tdap is given. Providers, parents, and adolescents should use every health-care visit, whether for health problems, well-checks, or physicals for sports, school, or camp, as an opportunity to review adolescents' immunization histories and ensure that every adolescent is fully vaccinated on time with every recommended vaccine (*1,4,6*).

†††† Children aged ≤18 years who are Medicaid-eligible, uninsured, or American Indian/Alaska Native (as defined by the Indian Health Care Improvement Act) are entitled to receive vaccines from providers through the VFC program. Children categorized as "underinsured" (because their health plans do not include coverage for recommended vaccinations) may receive VFC vaccines if they are served by a rural health clinic or federally qualified health center or under an approved deputization agreement. Additional information is available at http://www.cdc.gov/vaccines/programs/vfc/index.html.

§§§§ Patient Protection and Affordable Care Act of 2010. Pub. L. No. 114-48 (March 23, 2010), as amended through May 1, 2010. Available at http://www.healthcare.gov/law/full/index.html.

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# Multidrug-Resistant *Bacteroides fragilis* — Seattle, Washington, 2013

The *Bacteroides fragilis* group consists of species of obligate anaerobic bacteria that inhabit the human gut. They are among the leading pathogens isolated in the setting of intra-abdominal infections. *B. fragilis* strains, especially in the United States, are virtually always susceptible to metronidazole, carbapenems, and beta-lactam antibiotics (*1*). Although isolated cases of resistance to single agents have been reported, multidrug-resistant (MDR) *B. fragilis* strains are exceptionally rare (*1,2*). In May 2013, an MDR *B. fragilis* strain was isolated from the bloodstream and intra-abdominal abscesses of a patient who had recently received health care in India. This is only the second published case of MDR *B. fragilis* in the United States. This report summarizes the case and highlights the need for awareness of multidrug-resistant organisms (MDROs) in returning travelers who have received inpatient medical care outside the United States, both for timely implementation of proper infection control measures and to ensure administration of appropriate antimicrobials.

## Case Report

A U.S.-born man aged 70–79 years, with past medical history notable only for benign prostatic hyperplasia, traveled to India for pleasure, arriving November 7, 2012. After traveling in India for 1 month, he developed progressive abdominal pain and sought medical attention at a hospital in Jaipur on December 11, 2012. During a 4-day hospitalization, he underwent colonoscopy with biopsy of a suspicious mass and was found to have a well-differentiated adenocarcinoma of the colon. Computerized tomography (CT) of the abdomen demonstrated multiple large liver lesions as well as pericolonic lymphadenopathy suggesting metastatic cancer. During his admission, he received 1 unit of packed red blood cells and several doses of unspecified intravenous antibiotics. He was advised to undergo surgical resection of his cecal mass but decided to travel to New Delhi to seek a second medical opinion. There, he was hospitalized during January 5–9. Based on limited records from that admission, it does not appear that antibiotics were administered at that time. The patient then returned to the United States and was evaluated at a cancer center in Seattle, Washington, where he received five cycles of chemotherapy as an outpatient in early February 2013. He received 3 days of oral levofloxacin for a brief episode of neutropenia during chemotherapy.

In May 2013, after chemotherapy, the patient was admitted to the University of Washington Medical Center for a complex tumor resection. He received single doses of preoperative cefazolin and metronidazole. On postoperative day 4 he developed leukocytosis with a maximum white blood cell count of 25,000/$\mu$L. Blood cultures were obtained but yielded no growth. A CT scan of the abdomen revealed multiple fluid collections suggesting abscesses. Vancomycin and piperacillin/tazobactam were initiated, and the patient underwent radiographically guided percutaneous drainage. The fluid grew a pan-susceptible *Escherichia coli,* and antibiotics were narrowed to ceftriaxone. The leukocyte count improved initially, but then increased again several days later. Repeat blood cultures drawn through a central catheter showed anaerobic gram-negative rods, and piperacillin/tazobactam coverage was restarted. Follow-up blood cultures drawn 2 days later demonstrated no growth. A repeat CT scan for persistent fever, 10 days after drain placement, demonstrated a ring-enhancing fluid collection in the abdomen and right flank and pelvic fluid collections. Vancomycin was added to the patient's antimicrobial regimen, and an additional percutaneous drain was placed. Fluid was sent immediately for microbiologic testing. Gram stain of the fluid revealed 4+ polymorphonuclear cells and 3+ gram-negative bacilli, with a pure culture of anaerobic gram-negative rods isolated in culture.

Both blood culture and abdominal fluid culture isolates were identified as *B. fragilis*. Both isolates demonstrated high levels of resistance by epsilometer test (E-test) to multiple antibiotics, including metronidazole, imipenem, piperacillin/tazobactam, and clindamycin. Resistance to cefotetan, ampicillin/sulbactam, and moxifloxacin also was observed.

The patient was placed under contact precautions (*3*), and antimicrobials were changed temporarily to imipenem and metronidazole while additional susceptibilities were performed, including to tigecycline, minocycline, and linezolid. Cultures from additional percutaneous drains placed in the intra-abdominal fluid collections also grew MDR *B. fragilis*. Species identification was confirmed as *Bacteroides fragilis ssp. fragilis* by biochemical testing, mass spectrometry, and molecular sequencing. Microbiologic testing for the blood isolate demonstrated susceptibility to minocycline, linezolid, and tigecycline. Based on a published report of successful use of linezolid for the treatment of an intra-abdominal infection with MDR *B. fragilis* (*4*), the patient's regimen was changed to linezolid and ertapenem to treat this organism and other probable gram-negative rods associated with his intra-abdominal abscesses.

The patient remained afebrile with negative subsequent blood cultures. He was discharged from the hospital on an outpatient regimen of oral linezolid and parenteral ertapenem. His abdominal abscesses gradually resolved, and his antibiotics were discontinued after approximately 4 weeks of treatment.

He remains under strict contact precautions during all inpatient and outpatient health-care treatments.

### Reported by

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### Editorial Note

A national survey of the susceptibility of *B. fragilis* analyzed approximately 6,000 isolates from 13 medical centers during 1981–2007 for antimicrobial resistance. The survey noted <1% resistance in the *B. fragilis* group to imipenem/cilastin, and only three isolates demonstrated resistance to metronidazole (*1*). In Europe, resistance to imipenem/cilastin or metronidazole has been reported in only 1%–2% of isolates (*2*). There are different mechanisms of resistance to these antimicrobial agents. The *cfiA* gene, which is typically chromosomal, encodes for metallo-beta lactamases that confer carbapenem resistance (*5*). Metronidazole resistance, however, has been reported as typically caused by *nim* genes that are either located on plasmids or on the chromosome (*5*). *B. fragilis* isolates that simultaneously express multiple mechanisms of resistance to different antibiotic classes are exceedingly rare, with only a handful of case reports worldwide. Testing for molecular mechanisms of resistance to metronidazole and carbapenems in the described patient's isolate are under way.

In this report, the patient received short courses of six antibiotics during his admission to the University of Washington Medical Center, which might have played a role in the genesis of his MDR *B. fragilis*. However, before that admission, he had traveled to India, where he was hospitalized twice and underwent an invasive procedure. Recently, cases of carbapenem-resistant Enterobacteriaceae (CRE) have been associated with inpatient admissions in medical facilities outside of the United States, including in hospitals in India (*6*). Although metronidazole resistance in *B. fragilis* has been reported in India (*7*), it is extremely rare throughout the world. This is only the second case of MDR *B. fragilis* infection reported in a U.S. hospital with resistance to both carbapenems and metronidazole. The first U.S. case, reported in 2011, was in a U.S. Army soldier with MDR *B. fragilis* isolated from blood and tissue following an injury sustained in Afghanistan (*8*).

Recent interest in infection control measures surrounding MDROs focuses on CRE infections in returning travelers, especially those coming from the Indian subcontinent. The case described in this report, as well as the previous MDR *B. fragilis* case in the United States (*8*), suggests that other MDR bacteria that pose a potential public health threat could be associated with recent international travel. The most recent Clinical and Laboratory Standards Institute guidelines do not recommend routine susceptibility testing of anaerobes except in the case of serious infections or failure of standard antimicrobial therapies (*9*). Therefore, heightened vigilance is needed for the possibility of MDROs in patients who have received health care outside the United States. Most importantly, this case reinforces the importance of identifying patients at risk for MDROs and implementing early empiric contact precautions and other infection control measures for patients who received inpatient medical treatment outside of the United States (*3*).

Although *B. fragilis* has long been considered reliably susceptible to a number of broad-spectrum anti-anaerobic drugs (*1*), the case in this report and others like it (*10*) suggest clinicians should no longer rely on cumulative susceptibility data from surveys alone to direct treatment and should consider requesting susceptibility testing when treating serious infections caused by *B. fraglis*. Nonetheless, drainage of abscesses and surgical debridement of involved tissue remain the cornerstones for treating most anaerobic infections.

This case also suggests an expanding scope of multidrug resistance and the need for improved antibiotic stewardship. Similar to the Enterobacteriaceae, *B. fragilis* is a normal part of the human lower intestinal microbiota. Increasing clinical infections caused by MDRO strains of such disparate bacteria as Enterobacteriaceae and *B. fragilis* might be a sentinel for a larger expansion of resistance. Although antibiotics have

**What is already known on this topic?**

*Bacteroides fragilis* are anaerobic bacteria found in the human gastrointestinal tract and often cause intra-abdominal infections. They are typically susceptible to a variety of antimicrobials, including carbapenems and metronidazole. Resistance to these antibiotic classes, particularly in combination, is extremely rare.

**What is added by this report?**

A *B. fragilis* strain that was highly resistant to multiple antibiotics, including carbapenems and metronidazole, was isolated from a patient with an intra-abdominal abscess who had been hospitalized recently in India. This is the second reported case in the United States of a *B. fragilis* stain with this unusual resistance pattern.

**What are the implications for public health practice?**

Clinicians, who are becoming increasingly aware of carbapenem-resistant Enterobacteriaceae, should also be vigilant to the possibility of multidrug-resistant bacteria such as *B. fragilis* when caring for patients who have received inpatient medical care outside the United States. Such vigilance can be important for timely institution of infection control measures and selection of appropriate antibiotics.

saved countless lives and allowed modern medicine to advance rapidly, their use to treat infections is a global public health resource that needs to be carefully conserved, both in the United States and abroad.

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# CDC Grand Rounds: Public Health Practices to Include Persons with Disabilities

"Persons with disabilities" is a vague designation that might not always be understood (*1,2*). Persons with disabilities are persons with limitations in hearing, vision, mobility, or cognition, or with emotional or behavioral disorders. What they have in common is that they all experience a significant limitation in function that can make it harder to engage in some activity of daily living without accommodations or supports (*3–5*).

According to the World Health Organization, disability has three dimensions: 1) impairment in body function or structure, such as loss of a limb or loss of vision; 2) limitation in activity, such as difficulty seeing, hearing, walking, or problem solving; and 3) restriction in participating in normal daily activities, such as preparing a meal or driving a car. Any of these impairments, limitations, or restrictions is a disability if it is a result of a health condition in interaction with one's environment (*6*).

These limitations all relate to health conditions experienced within the environment in which persons live, as well as to other personal factors. Environmental barriers can be physical barriers, such as stairs; communication barriers, such as websites that can't be read by screen readers; discriminatory policies, such as restrictions on participation in physical activity programs; or societal attitudes, such as presumptions that persons with disabilities cannot be productive employees. Consequently, disability is not a health condition itself, but is the limitation viewed in the context of the community and society in which the person lives. Societal and environmental accommodations are therefore critical if persons with disabilities are to participate in public health programs that prevent disease and promote health (*7*).

## Disabilities in the United States

Based on U.S. Department of Health and Human Services disability data standards released in 2011 that consider only serious limitation, about 16% of U.S. adults, or 37.5 million, have a disability (*8*). Disability-associated health-care expenditures have been estimated at nearly $400 billion in 2006, more than a quarter of all national health expenditures for that year (*9*). Although persons with disabilities have similar needs for eating healthful foods, being active, managing stress, and having regular medical checkups as persons without disabilities, as a population they have higher rates of poverty, social isolation, and other social determinants that can make it more difficult to access health and public health services (*6,7*).

The estimated proportion of adults with disabilities increases with age, and more than one third of all adults with disabilities are aged 45–64 years (Figure 1). Persons experience different types of activity limitations, with the most often occurring limitations involving walking/climbing, problem-solving, hearing, seeing, and dependency on another individual (Figure 2). In addition, 43% of persons reporting disabilities report having more than one limitation. The health conditions that respondents identify most often as the main causes of their disability are arthritis and back problems, followed by heart problems, respiratory problems, emotional problems, diabetes, hearing problems, limb problems, vision problems, and stroke (Figure 3) (*3*).

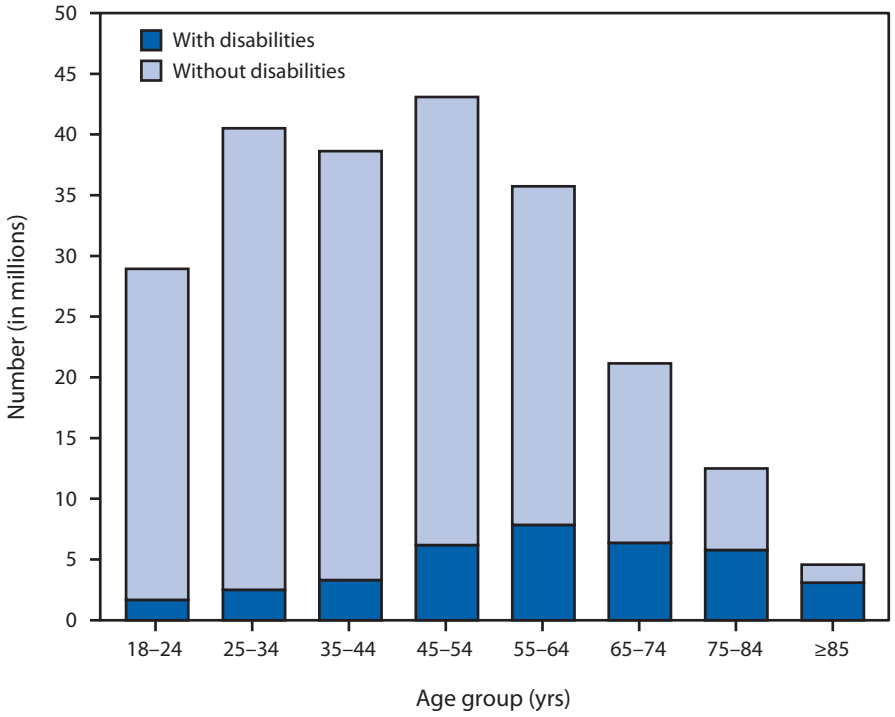
## Disparities in Health Among Persons with Disabilities

The Americans with Disabilities Act of 1990 was the first civil rights law in the United States that specifically addressed the needs of persons with disabilities (*10*). Eliminating disparities between persons with and without disabilities was given a focus in *Healthy People 2010* as a preventable outcome of disease or illness (*11*). However despite these efforts, persons with disabilities continue to face significant health disparities. Approximately 39% of adults with disabilities in the United States reported experiencing fair to poor health based on a 5-level health status question, compared with fewer than 9% of adults without disabilities (*12*). Obesity rates for children with disabilities in the United States are approximately 38% higher than for children without disabilities (*13*).

The example of Massachusetts illustrates the disparities gap at the state level. Persons with disabilities in Massachusetts and in the United States overall are more likely to report experiencing >14 days of poor mental health in the past month compared with those not reporting a disability. Almost 25% of adults with disabilities report poor mental health, compared with 6% of adults without disabilities. In Massachusetts, 22% of adults with disabilities report smoking, compared with 13% of adults without disabilities. Persons with disabilities are also much more likely to report not seeing a doctor because of expense, regardless of their education level (Figure 4). In addition, men and women with disabilities are at a heightened risk for lifetime and current sexual violence victimization, and women

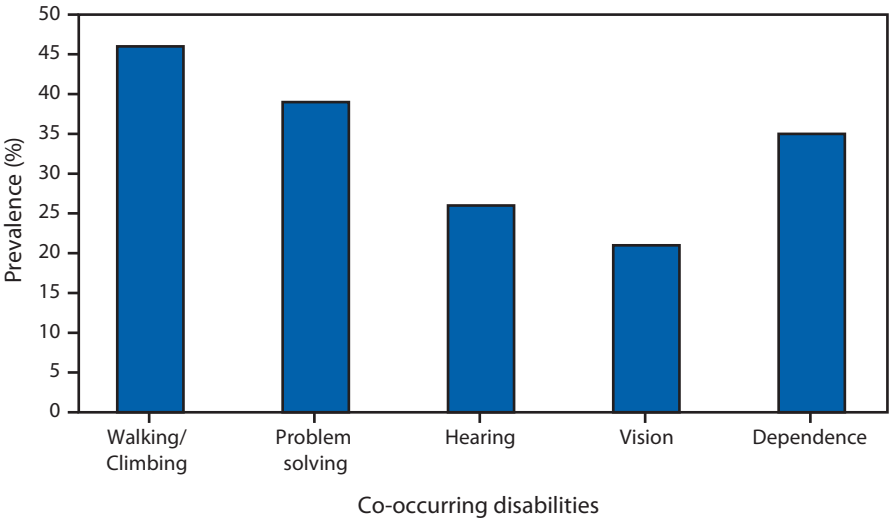
*This is another in a series of occasional* MMWR *reports titled CDC Grand Rounds. These reports are based on grand rounds presentations at CDC on high-profile issues in public health science, practice, and policy. Information about CDC Grand Rounds is available at http://www.cdc.gov/about/grand-rounds.*

**FIGURE 1. Number of adults with and without disabilities,* by age group — National Health Interview Survey, United States, 2010**




* Weighted population estimates.

**FIGURE 2. Prevalence of disability types among adults with co-occurring disabilities — National Health Interview Survey, United States, 2010–2011**




with disabilities are at a greater risk for lifetime sexual violence, lifetime completed and attempted rape, and sexual violence in the past year (*14–16*). Current research elsewhere suggests that persons with mental illness and intellectual disabilities are also at greater risk for violence victimization compared with those with other disabilities (*17–20*).

## Public Health Strategy: Making the Broadest Impact

Prevention of disabilities has been the focus of public health, and prevention remains its primary focus, but as disability is acknowledged as part of the normal human experience, a secondary focus of public health has become the promotion of the health of persons with disabilities by identifying and closing reducible gaps between the health of persons with and without disabilities (*7*).

CDC and other public health organizations can achieve the broadest impact by 1) including persons with disabilities in mainstream programs and services wherever possible; 2) using approaches that are common to all types of disabilities to address the unique health needs of persons with disabilities, such as physical barriers in their environment; and 3) using a condition-specific focus where that is essential because the problem is unique to persons with that condition (*21*).

CDC is including persons with disabilities in its surveys, programs, policies, and communications. It funds a network of 18 state disability and health programs that work within their states to improve health-care access, health promotion, and emergency preparedness, as well as five National Public Health Practice and Resource Center Programs to reach key populations with health communications and interventions (*22*). These centers address intellectual disabilities, limb loss, paralysis, select mental health disorders, and physical activity.

Five strategies are employed in this work: 1) promoting the inclusion of standardized disability identifiers in data collection instruments; 2) advancing research that increases understanding of health disparities associated with populations with disabilities; 3) identifying and helping to develop evidence-based interventions for persons with disabilities; 4) training health-care and public health professionals about the needs of persons with disabilities; and 5) helping to create barrier-free environments to ensure that health-care offices, medical and diagnostic equipment, health surveys, gyms, and the community at large are accessible. Inclusion and meaningful involvement of persons with

**FIGURE 3. Top 10 causes of disability among adults — Survey of Income and Program Participation, United States, 2005**

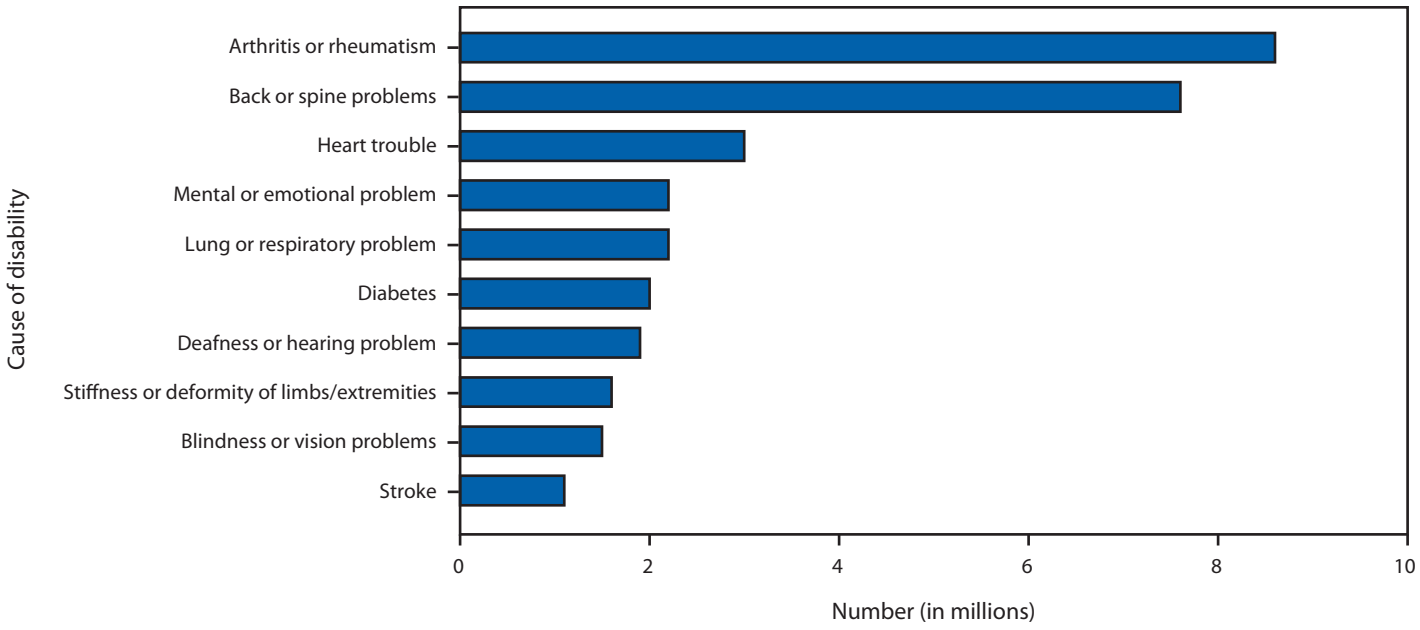
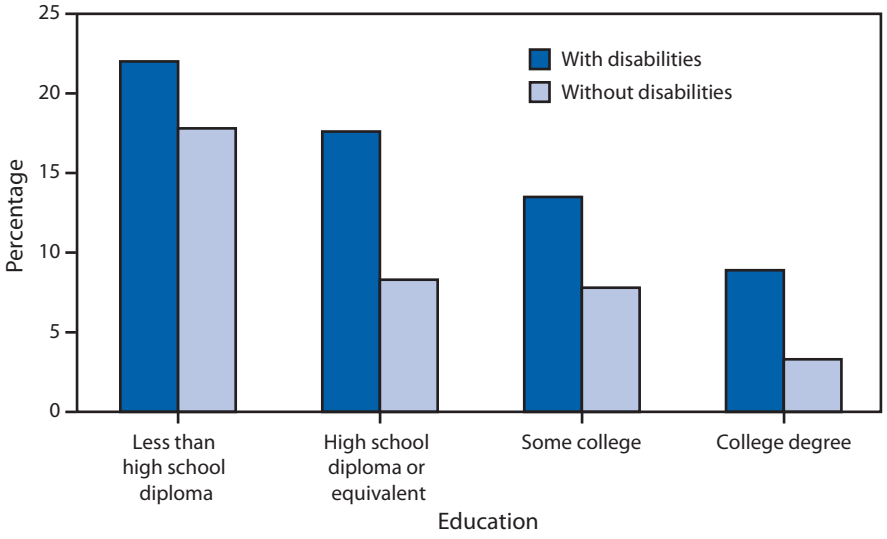



**FIGURE 4. Percentage of adults with and without disabilities reporting cost as a barrier to seeking health care, by education — Behavior Risk Factor Surveillance System, Massachusetts, 2010**




disabilities in the development and implementation of all public health programs underlies each approach (*21*).

Arthritis, the most frequent cause of disability, is one of the most common chronic diseases, affecting quality of life for about 50 million U.S. adults and 300,000 children. Forty percent of adults with arthritis are limited in their usual activities, 33% report severe pain, and 11% are restricted in valued social activities. These factors contribute to poor quality of life (*23*). By 2030, there will be 67 million adults with arthritis, and 25 million of them will be limited in their usual activities. These estimates are conservative because they only take into consideration the aging of the population and do not consider the current prevalence of obesity, which is expected to add to the prevalence of arthritis still further. CDC funds 12 state health departments to deliver physical activity and self-management education programs to adults with arthritis in local communities. These programs have been proven to help persons decrease pain, increase function and quality of life, and maintain independence (*24,25*).

Public health organizations should serve as exemplars regarding inclusion of persons with disabilities in all aspects of their activities. A good example is the American Public Health Association (APHA), the nation's oldest and largest organization of public health practitioners. APHA has a Disability Section, which has added disability issues to APHA's broader policy agenda. In addition, APHA has put in place activities that support access for persons with disabilities at their annual scientific meeting. Measures include accessible facilities at the meeting venues, accessible web pages, and provision of accessibility resources and services, sign language interpreters, Americans with Disabilities Act training for hotel staff and vendors, an accessibility desk in each meeting venue, an accessibility guide to each convention city, on-call accessible shuttle van and regular shuttle buses with lifts, reimbursement

for taxi service for registrants with mobility limitations, and assistive listening devices. Ultimately, the goal is to improve access to knowledge for APHA members and the broader public health community, decrease costs for preventable conditions among persons with disabilities, and improve quality of care and health outcomes for the entire public (*26*).

## Public Health Interventions at the State Level: South Carolina

Physical access to health-care services is a vexing problem for many persons with physical disabilities because they must overcome numerous obstacles even before they can receive care in a physician's office, such as parking, entering the building, going to an examination room, and using the restroom. The CDC-funded South Carolina Disability and Health Program (SCDHP) assessed this problem with the goal of improving accessibility of primary-care sites. Under SCDHP leadership, the health department's Best Chance Network breast and cervical screening program assisted in recruiting participant sites for assessments. The Office of Rural Health also recruited participant sites for assessments and offered low-interest loans to those sites for modifications. SCDHP assessed 150 sites with a patient load of over 750,000 and provided recommendations for changes, using additional funding from a state insurance provider to provide mini-grants to facilities to make accommodations. This led to almost one third of practices making changes related to parking areas, ramps, doors, restrooms, signage, equipment, and accessibility to the equipment.

SCDHP is involved in several aspects of work on obesity prevention (*27*). The state has utilized an evidence-based program called Steps to Your Health designed specifically for persons with disabilities. This 8-week participatory program covering healthy eating and physical activity has drawn over 5,200 participants using a train-the-trainer model. Results indicated that participants had a weight loss of ≥5 pounds (≥2.3 kg) and an increase in knowledge of healthy food choices (*28*). Beginning in 2012, SCDHP began collaborating with the Arthritis Foundation Exercise program to extend this approach further using state-sponsored senior centers and disability service providers.

Finally, emergency preparedness was considered especially critical because South Carolina is a coastal, hurricane-prone, rural state with a high level of poverty. An emergency planning committee for persons with functional needs was formed with diverse stakeholders, including SCDHP. The committee collaborated to 1) create an emergency shelter audiovisual presentation that is repeatedly played on a portable DVD player at hurricane shelters and includes sign language, written words, and pictograms (*29*); 2) create an assistive technology definition sheet to assist emergency shelter managers in understanding how equipment can help someone maintain their independence; 3) create functional needs kits for persons with disabilities in public shelters, which included a small magnifier as a vision aid, a picture communication sheet as an augmentative communication aid, and washcloths and rubber bands to enlarge handles of items used to perform activities of daily living, such as brushing teeth and hair, writing, and eating; and 4) gather accessibility data on emergency shelters. To assess the emergency preparedness of persons with disabilities, in 2013 SCDHP added two questions to the South Carolina Behavior Risk Factor Surveillance System survey, a state-level survey that is part of the national surveillance system for monitoring the prevalence of behavioral risk factors among the population (*30*). The questions were focused on whether a person had an emergency kit and a disaster evacuation plan.

## Conclusions

Persons with disabilities can benefit from preventive and acute-care services in ways similar to persons without disabilities, yet they experience significant barriers to this care and health disparities when compared with persons who do not have disabilities. Prevention of disabilities has been the focus of public health, and prevention remains its primary focus, but as disability is acknowledged as part of the normal human experience, a secondary focus of public health has become the promotion of the health of persons with disabilities by identifying and closing reducible gaps between the health of persons with and without disabilities. A multifaceted approach is required to eliminate health disparities and reduce the socioeconomic disadvantages and structural barriers to the health system faced by persons with disabilities. Experiences at the local and state levels suggest that the key ingredients for success are building strong and long-lasting collaborations with diverse stakeholders and partners, identifying common goals, and integrating persons with disabilities into all facets of public health activities, including planning, surveillance, programming, education, and evaluation. Sustained support, including a mandate for programs and their surveillance systems to identify persons with disabilities, is crucial.

### Reported by

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# Notes from the Field

## Recurrent Outbreak of *Campylobacter jejuni* Infections Associated with a Raw Milk Dairy — Pennsylvania, April–May 2013

During May 2013, the Pennsylvania Department of Health investigated an outbreak of campylobacteriosis among consumers of raw (unpasteurized) milk from a dairy certified by the Pennsylvania Department of Agriculture (PDA) to sell raw milk onsite, at retail stores, and at off-farm pick-up sites. Investigation by the Pennsylvania Department of Health and PDA identified six confirmed and two probable cases of campylobacteriosis associated with raw milk from the dairy. A confirmed case was defined as laboratory-confirmed campylobacteriosis in a person who drank the dairy's raw milk. A probable case was defined as diarrheal illness without laboratory confirmation in a person who had consumed the dairy's raw milk and was linked to a confirmed case. Four cases involved children aged ≤18 years. PDA identified *Campylobacter* in bulk tank and retail milk samples from the dairy. Available isolates from patient stool (n = 1), bulk tank milk (n = 1), and retail milk (n = 1) were identified by CDC as *Campylobacter jejuni* and were indistinguishable by pulsed-field gel electrophoresis (PFGE).

Although the dairy has consistently adhered to PDA requirements for raw milk dairies and conducted milk coliform and somatic cell testing more frequently than required, this was not the first outbreak associated with this dairy. During January–February 2012, the dairy was identified as the source of a multistate outbreak of campylobacteriosis (*1*). That outbreak was the largest raw milk–associated outbreak in Pennsylvania in the past 2 decades, with 148 associated cases identified. PFGE patterns from the *C. jejuni* strains isolated during the 2012 and 2013 outbreaks differed, consistent with the diversity of *C. jejuni* isolated from cattle on dairy farms (*2*). PDA also identified *Campylobacter* in bulk tank milk obtained from the dairy during January 2011; no associated human infections were reported.

Repeat outbreaks from raw milk producers are not uncommon and not limited to *Campylobacter*. During 2005–2013, Pennsylvania experienced 17 salmonellosis and campylobacteriosis outbreaks associated with retail raw milk. Five producers had more than one outbreak during that period. Bacterial contamination of raw milk can occur even under optimal conditions; seasonal changes in bovine bacterial shedding or inadequate quality control during milk collection might contribute to outbreak recurrence (*2*). Findings here and elsewhere indicate that compliance with state regulations and increased producer awareness after an outbreak are insufficient to prevent future outbreaks (*3*). Public health officials should be vigilant for outbreaks from previously implicated dairies, and public education should stress that avoiding consumption is the most effective way to prevent illness from raw milk products.

### Reported by

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# Notes from the Field

## Acetyl Fentanyl Overdose Fatalities — Rhode Island, March–May 2013

In May 2013, the Rhode Island State Health Laboratories noticed an unusual pattern of toxicology results among 10 overdose deaths of suspected illicit drug users that had occurred during March 7–April 11, 2013. An enzyme-linked immunosorbent assay (ELISA) for fentanyl in blood was positive for fentanyl in all 10 cases, but confirmatory gas chromatography/mass spectrometry (GC/MS) did not detect fentanyl. The mass spectrum was instead consistent with acetyl fentanyl, a fentanyl analog. Acetyl fentanyl, a synthetic opioid, has not been documented in illicit drug use or overdose deaths, and is not available as a prescription drug anywhere. Animal studies suggest that acetyl fentanyl is up to five times more potent than heroin as an analgesic (*1*).

During May 14–21, 2013, CDC and Rhode Island public health officials conducted a field investigation to determine whether this cluster of 10 deaths represented an increase in the typical number of overdose deaths and what role might have been played by acetyl fentanyl. Data on illicit drug (cocaine, heroin, synthetic cathinones [bath salts], gamma-hydroxybutyric acid, and methamphetamine) overdose deaths during March 1, 2012–March 31, 2013 were abstracted from the Rhode Island Office of State Medical Examiners database and examined using Poisson regression. Data also were abstracted from autopsy reports, toxicology results, and medical records relating to the 10 deaths that were preliminarily positive for acetyl fentanyl. The state health laboratories performed all toxicology testing for acetyl fentanyl.

Investigators found that the number of illicit drug overdose deaths in Rhode Island was significantly higher in March 2013 (21, including 10 attributed to acetyl fentanyl), compared with the monthly average during March 2012–February 2013 (8.9, $p<0.001$). During the field investigation, two additional acetyl fentanyl overdose deaths were confirmed (dates of death: March 20 and May 16, 2013), bringing the total number of acetyl fentanyl deaths to 12. Among the 12 acetyl fentanyl decedents, ages ranged from 19 to 57 years, and eight were male. All but one of the deaths occurred in northern Rhode Island: six occurred in the same small city and none in the capital city, Providence. Evidence suggested that acetyl fentanyl was administered intravenously in at least four (33%) of the deaths. The route of acetyl fentanyl administration was undetermined for the remaining eight decedents.

The GC/MS toxicology results for 10 of the 12 decedents showed, in addition to acetyl fentanyl, various mixtures of other drugs, including cocaine (58%), other opioids (33%), ethanol (25%), and benzodiazepines (17%). None of the decedents tested positive for fentanyl by GC/MS. Toxicology results for one decedent showed only acetyl fentanyl. Since completion of the field investigation, two persons using acetyl fentanyl together died on May 26, 2013, increasing the number of acetyl fentanyl deaths to 14.

Acetyl fentanyl overdose deaths have recently been confirmed in Pennsylvania (*2*). If states observe clusters or increases in illicit opioid-related overdoses above expected levels, acetyl fentanyl could be involved and confirmatory testing will be needed. CDC encourages public health officials and laboratories, when feasible, to use an ELISA test to screen specimens from suspected illicit, nonpharmaceutical opioid overdose deaths. If an ELISA test is positive for fentanyl, CDC recommends laboratories conduct confirmatory testing by GC/MS; if no fentanyl is detected by GC/MS, then fentanyl analogs should be suspected, and subsequent testing should be considered.

Naloxone is an opioid antagonist that can reverse potentially fatal opioid-induced respiratory depression and is used as part of the initial treatment of suspected opioid overdose. Because of the increased potency of acetyl fentanyl, larger doses of naloxone might be needed to achieve reversal (*3*); health-care providers who administer naloxone in emergencies might consider increasing the amount they keep on hand. In addition, expansion of community-based programs that provide opioid-overdose prevention services, including distribution of and training in the use of naloxone, might be an effective strategy to help reduce opioid-related overdose deaths (*4*).

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## Announcements

### NIOSH Course for Nurses on Workplace Violence

A free online course has been created to train nurses on recognizing and preventing workplace violence. The National Institute for Occupational Safety and Health (NIOSH) worked with health-care stakeholders, including nursing and labor organizations, academic groups, and other government agencies, to develop the course. The multimedia training incorporates lesson text, videos depicting workplace violence incidents, personal experiences of nurses with violence on the job, and lesson quizzes. Nurses can receive continuing education credits for completing the online course.

The course is separated into 13 units, each expected to take approximately 15 minutes to complete. Participants can restart the course where they last left off, allowing them to manage their time for taking the course. The course is available on the NIOSH website at http://www.cdc.gov/niosh/topics/violence/training_nurses.html.

### New Laboratory Informatics Self-Assessment Tool

CDC and the Association of Public Health Laboratories have recently released a laboratory informatics self-assessment tool to help state and local public health laboratories assess their own informatics capabilities and gaps across a broad range of topics. The self-assessment tool is the first resource aimed at measuring informatics capabilities in public health laboratories in a systematic and comprehensive manner. However, the tool is not limited to use by informatics experts or by public health laboratories. Most of the identified capabilities and guidance are universal in nature and, consequently, can provide valuable assessment and direction to clinical laboratories. The tool is currently available to the public as a downloadable PDF file at http://www.aphl.org/aphlprograms/lss/laboratory-efficiencies-initiative/pages/informatics.aspx.

## Erratum

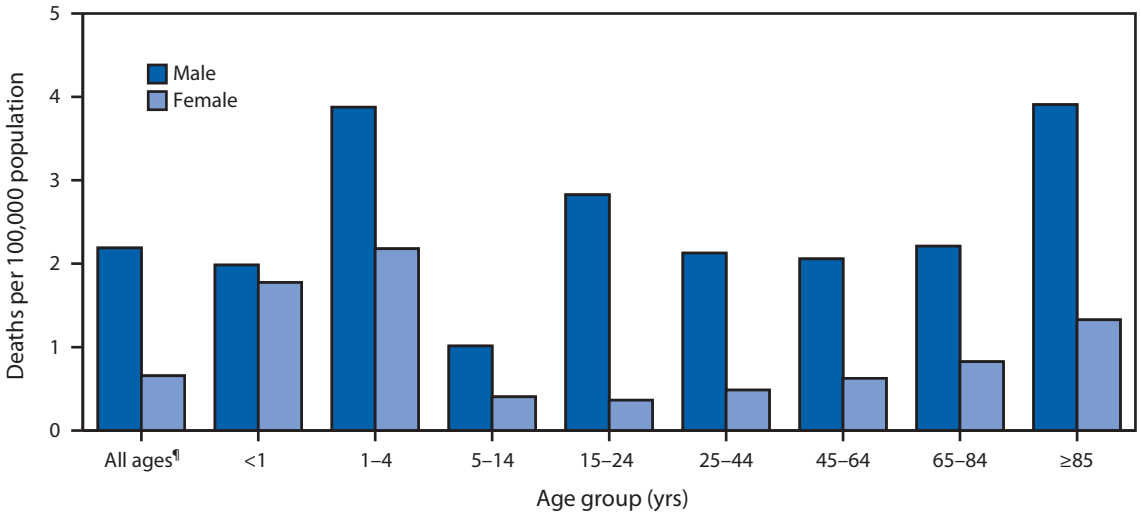
### Vol. 62, No. 33

In the Notice to Readers, "Final 2012 Reports of Nationally Notifiable Infectious Diseases," on page 669, the first sentence should read as follows: "The tables listed in this report on pages **670–682** summarize finalized data, as of June 30, 2013, from the National Notifiable Diseases Surveillance System (NNDSS) for 2012.

# QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

## Average Annual Death Rates from Drowning,*† by Sex and Age Group — United States,§ 1999–2010




* Drowning from all intents (unintentional, homicide, suicide, and undetermined) as the underlying cause of death, coded as W65–74, X71, X92, and Y21, in the *International Classification of Diseases, 10th Revision*. This excludes accidents to watercraft causing drowning and submersion (V90) and water-transport–related drowning and submersion without accident to watercraft (V92).
† Per 100,000 population, based on 12-year annual average.
§ U.S. residents only.
¶ Includes decedents whose ages were not reported.

During 1999–2010, a total of 49,762 deaths from drowning occurred in the United States, an average of 4,147 deaths per year. The average annual death rate from drowning for males (2.2 per 100,000 population) was more than three times that for females (0.7). The death rate for males was highest among those aged 1–4 years and ≥85 years (both 3.9 per 100,000 population). For females, the highest rates were among those aged 1–4 years (2.2) and <1 year (1.8).

**Source:** National Vital Statistics System. Mortality public use data files, 1999–2010. Available at http://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.

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



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