Methods and limitations: Final state-level influenza vaccination coverage estimates for the 2010–11 season–United States, National Immunization Survey and Behavioral Risk Factor Surveillance System, August 2010 through May 2011

Data Source and Methods

CDC analyzed data collected September 2010 through June 2011 from the National Immunization Survey (NIS) and the Behavioral Risk Factor Surveillance System (BRFSS) from all 50 states and the District of Columbia to estimate national and state level influenza vaccination coverage for the 2010–11 influenza vaccination season.

NIS is an ongoing, national landline list-assisted random-digit-dialed telephone survey of households with children who are 19–35 months or 13–17 years (NIS-Teen) at the time of interview. For children 6–18 months and 3–12 years identified during screening households for NIS and NIS-Teen, a short influenza vaccination module was added. A supplemental cellular phone sample was conducted as part of the NIS during 4th quarter 2010 and all quarters of 2011. NIS respondents ≥18 years were asked if their children had received a 'flu' vaccination since August 2010, and if so, in which day, month and year. The NIS Council of American Survey and Research Organizations (CASRO)* response rates across three quarters of data collection ranged from 38.1%–73.6% for landline and 26.4%–35.8% for cellular telephones. BRFSS is an on-going state-based monthly telephone survey which collects information on health conditions and risk behaviors from ~400,000 randomly selected persons ≥18 years among the non-institutionalized, U.S. civilian population. BRFSS respondents were asked if they had received a 'flu' vaccine in the past 12 months, and if so, in which month and year. The median state CASRO BRFSS response rate was 54.4%.

Kaplan-Meier survival analysis was used to determine the cumulative influenza vaccination coverage (≥1 dose) during August 2010 through May 2011 using monthly interview data collected September 2010 through June 2011. NIS data (n=116,799) were used to estimate coverage for children 6 months–17 years and BRFSS data (n=377,569) were used to estimate coverage for adults ≥18 years. Coverage estimates for all persons ≥6 months was determined using combined state-level monthly estimates weighted by the age-specific populations of each state. For participants who indicated they had been vaccinated but had a missing month and year of vaccination, this information was imputed from donor pools matched for week of interview, age group, state of residence and race/ethnicity. Results from both surveys were weighted and analyzed with SAS and SUDAAN statistical software to account for the complex survey design.

Limitations

These estimates are subject to the following limitations. First, influenza vaccination status was based on self or parental report, was not validated with medical records, and thus is subject to respondent recall bias. Second, NIS and BRFSS are telephone-based surveys that do not include households without

telephone service, and BRFSS data analyzed here do not include households with cellular telephone service only which may affect some geographic areas and racial/ethnic groups more than others (1). Third, response rates for both surveys were low and nonresponse bias may remain even after weighting adjustments. Fourth, combining NIS and BRFSS estimates allowed estimation of coverage for all persons ≥6 months; however, differences in survey methodology (e.g., different sampling frame, survey design, exact survey question wording, response rates and weighting) may result in different levels of bias that are averaged for this group. Finally, some age-by-state-specific estimates may be unreliable due to small sample size. The final estimates in these online reports are based on an additional three months or more of data collection compared to the interim results (2), and may differ from the interim estimates, particularly for estimates based on smaller sample sizes. Both final and interim estimates flagged as potentially unreliable should be interpreted with caution.

References

(1) Blumberg SJ Luke JV. Wireless substitution: Early release of estimates from the National Health Interview Survey, July-December 2010; 2011. Available at http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201106.pdf. Accessed September 19, 2011.

(2) Interim results: state-specific seasonal influenza vaccination coverage - United States, August 2010-February 2011. MMWR 2011; 60(22):737-743.

* The CASRO response rate is the product of three other rates: 1) the resolution rate, which is the proportion of telephone numbers that can be identified as either for a business or residence; 2) the screening rate, which is the proportion of qualified households that complete the screening process; and 3) the cooperation rate, which is the proportion of contacted eligible households for which a completed interview is obtained.