Washington State Department of Health Immunization Data –Technical Notes

Washington State immunization rates are available from multiple data sources. This document provides technical details on each of these data sources. If you have additional questions, please contact us at: WAIISDataRequests@doh.wa.gov.

★ Washington State Immunization Information System (WA IIS)

Background:

The Washington State Immunization Information System (IIS) is a lifetime registry that tracks immunization records for people of all ages in Washington State. It is a secure, Web-based tool that is administered by the Department of Health (DOH).

The IIS began as a two county project in 1994 and has since expanded to include all of Washington. An updated version of the IIS was rolled out statewide in 2004. The IIS contains over 80 million individual vaccination records for over 8 million unique individuals. Over 2,100 different organizations use the IIS, including: hospitals, primary care providers, pharmacists, childcare centers, schools, WIC clinics, STD/HIV clinics, tribal and Indian Health Service clinics, family planning clinics and health plans.

Methodology:

Healthcare providers, including hospitals, primary care providers and healthcare plans voluntarily report immunizations for their patients to the WA IIS. Providers can manually enter data into the IIS, can send bulk flat files for upload into the IIS or can send data via automatic, real-time HL7 connections to the system.

New patient records are initiated in the IIS when birth certificates for newborns in the state of Washington are loaded into the system, when a provider adds a new patient record to the IIS or when DOH receives an electronic immunization record for a new patient from providers, pharmacists or health plans. New patient records are those that do not match the identifying information associated with an existing IIS patient record. Birth records for infants who are Washington state residents born in Washington are preloaded into the IIS twice a week. Each year, more than 430,000 new patient records are added to the IIS.

IIS data are fairly complete and completeness and accuracy are improving over time. Currently, over 94% of public sites that participate in the Vaccines for Children (VFC) program share data with the IIS; 25% of non-VFC public sites, 87% of private VFC sites, and 81% of non-private VFC sites share data with the IIS. Twenty percent of birth records enter the IIS within one day or less and 41% are recorded in the IIS in less than seven days. More than 60% of vaccinations are recorded in the IIS in one day or less of administration for all age groups. Over 4 million new immunization records enter the IIS each year and most of them are entered within one day of vaccine administration.

Ninety-seven percent of children ages 4 months-5 years have two or more immunizations recorded in the IIS. Eighty-eight percent of adolescents ages 11-17 years have two or more immunizations recorded and 70% of adults ages 19 years and older have one or more immunizations in the IIS.

Coverage in the IIS is usually calculated using active patients and valid vaccinations. Active patients are those believed to be alive and living in the state of Washington. If a provider or system administrator indicates that a patient died or to has moved or gone elsewhere (MOGE), then their patient record is marked as inactive in the system. Patients may die or move and not be marked inactive in the system. Valid vaccinations are those doses given at the appropriate age and interval. Doses can be marked invalid for a number of reasons, including that the dose was administered to a patient who is not of the recommended age range for the vaccine preparation, the dose is given at the improper interval for the series, the vaccine preparation is not licensed for use in the US, or the vaccine is marked as compromised.

Limitations/Considerations:

Because reporting to the IIS is voluntary, not all providers report all immunizations for their patients. This means that IIS estimates of immunization coverage will be lower than the true immunization rates.

Not all fields are well populated in the IIS. Race/ethnicity data is available for about half of all IIS patient records and is more complete for younger children than for adults. About 64% of children ages 19-35 have race/ethnicity populated in the IIS.

The population of patients captured in the IIS may not reflect the true population of Washington. This is due to how patients are loaded into and removed from the IIS. New patient records are initiated when birth certificates are preloaded into the IIS, when a provider adds a new patient record to the IIS or when DOH receives an electronic immunization record for a new patient via flat files or HL7 transmissions from providers, pharmacists and health plans. Patients are removed from the system or marked inactive when they are known to have died or are marked as moved or gone elsewhere. Once a month, the IIS matches its patient registry with the WA death records and marks patients who match to a death certificate as inactive. These matches are manually reviewed before a patient is marked inactive and younger patients are prioritized over adults for review. Additionally, DOH sends out Child Profile educational mailings to the household of every child 0 – 6 years-old in the state. Returned Child Profile mailings and alerts from the US Postal Service are used to update address information for young children in the IIS and are another mechanism to capture whether young children have moved out of state. As a result of these processes, patients of different ages are differentially captured in the IIS. The IIS captures 105% of children born each year in the state of Washington and children who are ages 4 months-5 years-old. This percentage is higher than 100 because children who are born outside of Washington and move into the state are added to the IIS as they receive immunizations and make contact with the IIS. The IIS contains records for 128% of the adolescent population as determined by the US Census. The IIS overestimates the adolescent population of the state

because not all adolescents who have moved out of the state have been marked inactive by their healthcare providers. The IIS contains at least one immunization record for 70% of the total adults living in Washington as determined by the US Census. The adult data are less reliable because some adults marked as active patients in the IIS have moved elsewhere or died out of state and not all adult immunizations are reported to the IIS.

Coverage in the IIS is calculated using the total population within a given age group as the denominator. This means that the issues described above affect coverage estimates. Coverage for young children is the most accurate, although coverage calculated in the IIS will always be lower than the true population coverage due to under-reporting of vaccines administered to the IIS. Adolescent coverage as calculated by the IIS is an underestimate of true coverage. The adolescent population in the IIS is inflated, which increases coverage denominators and under-reporting of administered immunizations artificially shrinks numerators. Adult coverage as calculated using the IIS is also unreliable due to numerator and denominator issues.

Data quality and completeness continue to improve as the registry matures. The increase in real-time HL7 connections between providers, including health plans, and the IIS mean that more data are entering the IIS and are doing so more quickly and more accurately. Currently, there are 204 HL7 interfaces that provide real-time connections from 1,497 facilities to the IIS. This is up from 149 interfaces and 1,135 facilities at the end of 2014.

As the IIS matures and the number of HL7 connections increases, the IIS will become the best source of Washington childhood immunization data. The IIS is not subject to the same limitations as the National Immunization Surveys or the Behavioral Risk Factor Surveillance Surveys. The IIS is a population based registry and captures all Washingtonians, an advantage that surveys cannot offer. Additionally, IIS data are always available and provide current and timely feedback on immunization coverage. The breadth of information captured in the IIS also allows researchers and DOH staff to perform detailed analyses of immunization coverage. Coverage can be calculated for small geographies like ZIP codes and for specialized populations. Survey data do not allow for this. IIS data can also be used to track coverage at the provider level over time. Finally, most surveys rely upon patient self-report of immunization. All of the immunizations included in the IIS have been verified and reported by a healthcare provider.

★ **National Immunization Surveys (NIS)**

Background:

The National Immunization Surveys (NIS) are sponsored and conducted by the Centers for Disease Control and Prevention (CDC) and the National Center for Immunization and Respiratory Diseases (NCIRD). Currently, three phone surveys are conducted to monitor vaccination coverage among children 19-35 months-old, teens 13-17 years-old, and flu vaccinations for children ages 6 months-17 years. Data collection for the first survey began in April 1994 to check vaccination coverage after measles outbreaks in the early 1990s.

Methodology:

The National Immunization Surveys provide current, household, population-based, state and local area estimates of vaccination coverage among children and teens using a standard survey methodology. The surveys collect data through telephone interviews with parents or guardians in all 50 states, the District of Columbia, and some U.S. territories. Landline and cell phone numbers are randomly selected and called to enroll one or more age-eligible child or teen from the household. The parents and guardians of eligible children are asked during the interview for the names of their children's vaccination providers and permission to contact them. With this permission, a questionnaire is mailed to each child's vaccination provider(s) to collect the information on the types of vaccinations, number of doses, dates of administration, and other administrative data about the health care facility. Estimates of vaccination coverage are determined for child and teen vaccinations recommended by the Advisory Committee on Immunization Practices (ACIP), and children and teens are classified as being up-to-date based on the ACIP recommended numbers of doses for each vaccine. The NIS sample includes a few hundred children from Washington annually.

The NIS launched in 1994 and measures coverage of the following vaccines among children who are or will be 19-35 month of age within a few weeks of being selected to participate in the survey and living in the United States. Vaccinations measured include:

- Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP/DT/DTP)
- Poliovirus vaccine (Polio)
- Measles or Measles-Mumps-Rubella vaccine (MMR)
- *Haemophilus influenzae* type b vaccine (Hib)
- Hepatitis B vaccine (HepB)
- Varicella zoster (chickenpox) vaccine (VAR)
- Pneumococcal conjugate vaccine (PCV)
- Rotavirus vaccine (ROT)
- Hepatitis A vaccine (HepA)
- Influenza vaccine (Flu)

NIS-Teen launched in 2006 and targets adolescents 13-17 years-old living in the United States. Vaccinations measured include:

- Tetanus, diphtheria, acellular pertussis (Tdap)
- Meningococcal conjugate (MenACWY)
- Human papillomavirus (HPV)

NIS-Child Influenza Module (NIS-CIM) is conducted from October through June each year for children 6-18 months-old and 3-12 years-old. Parents and guardians are asked if their children had a flu vaccination and, if so, in which month and year. If the child received a vaccination, respondents are asked how many vaccine doses the child received and whether it was a flu shot or a flu nasal spray. Additional questions about flu vaccination are also asked.

The flu vaccination questions in the NIS-CIM are also included in the NIS and NIS-Teen. The NIS-Flu combines the flu vaccination responses collected from NIS (children 19-35

months), NIS-Teen (adolescents 13-17 years), and NIS-CIM (children 6-18 months and 3-12 years). NIS-Flu data are used to assess annual flu vaccination coverage among children 6 months-17 years at the national level, state level, selected local levels, and some in U.S. territories. These NIS-Flu estimates are based on the parent or guardian reported data.

Limitations/Considerations:

Because the NIS collects the same data each year in the same ways, it is considered the gold standard for comparing immunization rates between jurisdictions and over time in the same jurisdiction. The NIS data are not subject to changes in data quality or methodology.

However, there are a few limitations to these data. First, the NIS does not consider whether vaccine doses were given at the appropriate ages and intervals. This could lead to overestimates of true vaccination coverage. Secondly, the NIS is not population-based and relies upon small samples that are representative of the population as a whole. This means that coverage estimates have the potential to be unrepresentative. This also means that the NIS can provide coverage only at the state level. Coverage variations by county or ZIP code are not captured by these data. Third, these surveys rely upon landline and cell phone interviews. This means that households that do not have telephones are not included in the NIS. Also, as more Americans use cell phones as their primary telephones, sampling could become biased. Most cell carriers allow customers to take their numbers with them when they transfer phone service providers. Unless address information for these customers is kept up to date nationally, sampling could be biased. Finally, the NIS-flu relies upon parent report of influenza vaccination. Parents could be unreliable historians of their child's vaccination history and could provide incorrect data to surveyors.

More information about the NIS is available on the CDC's website, here: http://www.cdc.gov/vaccines/imz-managers/nis/about.html.

★ **Methodological differences between the NIS and IIS**

	IIS	NIS
Data collection	Voluntary report by healthcare provider	Telephone survey of representative sample
Immunizations counted towards completion	Standard coverage calculated using doses given at correct age and interval between doses	More lenient, does not account for interval between doses or child's age
Data consistency	Subject to changes as data quality and completeness improve over time	More or less consistent methodology over time; can compare year to year without caveats

★ **Washington State and CDC - Behavioral Risk Factor Surveillance System (BRFSS)**

Background:

The Behavioral Risk Factor Surveillance System (BRFSS) is a collaborative project between all of the states in the United States (US) and participating US territories and the Centers for Disease Control and Prevention (CDC). The BRFSS is administered and supported by CDC's Population Health Surveillance Branch, under the Division of Population Health at the National Center for Chronic Disease Prevention and Health Promotion. The BRFSS is an ongoing surveillance system designed to measure behavioral risk factors for the noninstitutionalized adult population (aged 18 years of age and older) residing in the United States. The BRFSS was initiated in 1984, with 15 states collecting surveillance data on risk behaviors through monthly telephone interviews. Over time, the number of states participating in the survey increased, and by 2001, 50 states, the District of Columbia, Puerto Rico, Guam, and the US Virgin Islands were participating in the BRFSS. Today, all 50 states, the District of Columbia, Puerto Rico, and Guam collect data annually; American Samoa, the Federated States of Micronesia, and Palau collect survey data over a limited point-in-time (usually 1 to 3 months). In this document, the term state is used to refer to all areas participating in the BRFSS, including the District of Columbia, Guam, and the Commonwealth of Puerto Rico.

Methodology:

The BRFSS objective is to collect uniform, state-specific data on preventive health practices and risk behaviors that are linked to chronic diseases, injuries, and preventable infectious diseases that affect the adult population. Factors assessed by the BRFSS in 2014 include immunizations, tobacco use, HIV/AIDS knowledge and prevention, exercise, immunization, health status, healthy days health-related quality of life, health care access, inadequate sleep, chronic health conditions, alcohol consumption, oral health, falls, drinking and driving, cancer screenings (including breast, cervical, prostate, colorectal cancers), and seatbelt use.

Since 2011, the BRFSS conducts both landline telephone- and cellular telephone-based surveys. In conducting the BRFSS landline telephone survey, interviewers collect data from a randomly selected adult in a household. In conducting the cellular telephone version of the BRFSS questionnaire, interviewers collect data from an adult who participates by using a cellular telephone and resides in a private residence or college housing.

The BRFSS field operations are managed by state health departments that follow protocols adopted by the states, with technical assistance provided by CDC. State health departments collaborate during survey development and conduct the interviews themselves or use contractors.

The data are transmitted to CDC for editing, processing, weighting, and analysis. An edited and weighted data file is provided to each participating health department for each year of data collection, and summary reports of state-specific data are prepared by CDC.

Limitations/Considerations:

Because changes in BRFSS methodology and questions asked are usually minor, it is possible to compare immunization rates between jurisdictions and over time in the same jurisdiction. However, not all questions are asked each year so we do not have data for each immunization measure for each year.

BRFSS data have some limitations. First, BRFSS relies upon small samples that are representative of the population as a whole. This means that coverage estimates have the potential to be unrepresentative. This also means that BRFSS can provide coverage only at the state and county levels. BRFSS data in smaller counties may unstable and years of data are often combined in order to minimize standard error of estimates. Immunization coverage variations at smaller geographies like ZIP code are not captured by BRFSS. Secondly, BRFSS relies upon telephone interviews of non-institutionalized individuals. BRFSS did not include cell phone numbers until the 2014 survey. Households that do not have telephones are not included in BRFSS. As more Americans use cell phones as their primary telephones, sampling could become biased. The CDC BRFSS website (http://www.cdc.gov/brfss/annual_data/2014/pdf/overview_2014.pdf) does an excellent job at explaining this limitation. Finally, BRFSS relies upon patient report of vaccination. Patients can be unreliable historians of their vaccination history and could provide incorrect data to surveyors.

Much more information about BRFSS, including more detail about methodology and limitations, is available on the CDC's website, here: http://www.cdc.gov/brfss/annual_data/annual_data.htm

★ **CDC – Flu vaccination coverage data**

Background:

The CDC estimates annual influenza vaccination coverage for the United States by utilizing data from several nationally representative surveys: the Behavioral Risk Factor Surveillance System (BRFSS), the National Health Interview Survey (NHIS), and the National Immunization Surveys-Flu (NIS-Flu), and internet panel surveys of adults, health care personnel and pregnant women.

Methodology:

Methodology varies by data source. For more information, please visit CDC's Flu Vax View website, here: http://www.cdc.gov/flu/fluvaxview/.

Limitations/Considerations:

Limitations vary by data source. For more information, please visit CDC's Flu Vax View website, here: http://www.cdc.gov/flu/fluvaxview/.

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