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Comparing & Communicating Vaccination Coverage Estimates from IIS & NIS

National Immunization Conference
May 16, 2018
Overview

1. Introduce the *Comparing & Communicating Vaccination Coverage Estimates from IIS & NISguide*

2. Compare NIS and IIS results

3. Develop communication messages related to NIS and IIS results
Comparing & Communicating Vaccination Coverage Estimates

• August 2017
• Available in the AIRA Resource Repository
  • http://repository.immregistries.org/
Background

• Many sources for estimating vaccination rates:
  • National Immunization Survey
  • IIS-based assessments
  • Others

• Can be challenging to interpret and explain differences
Purpose

• Assist IIS and immunization program managers and staff in interpreting and communicating the results of NIS and IIS-based coverage assessments

• Offers tips to explain vaccination coverage assessment results to:
  • Public Health Leadership
  • Legislators
  • Media
Sections of the Guide

1. Descriptions of Common Vaccination Coverage Assessments
2. Developing Communication Messages
3. Practical Strategies for Communicating NIS & IIS Results with Examples
4. Other NIS-IIS Initiatives
# NIS & IIS Comparison

<table>
<thead>
<tr>
<th>Purpose</th>
<th>NIS</th>
<th>IIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides household, population-based, national, state and local</td>
<td>Provides population-based estimates within a jurisdiction, with ability to measure performance or protection levels within a community</td>
<td></td>
</tr>
</tbody>
</table>
| Groups Assessed                              | • 19-35 months
• 13-17 years
• 6 months -17 years (influenza only) | Any ages                                                                |
| Vaccines Assessed                            | • For 19-35-month-olds: All ACIP recommended vaccines
• For 13-17-year-olds: Tdap, MenACWY, HPV, MMR, HepB, Varicella
• For all children 6 months - 17 years: Influenza | Any vaccines                                                              |
### Table 3. Comparing Attributes of Childhood Vaccination Coverage Assessments

<table>
<thead>
<tr>
<th>Who is responsible for the assessment?</th>
<th>National Immunization Survey (NIS)</th>
<th>Immunization Information Systems (IIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Centers for Disease Control and Prevention (CDC)</td>
<td>State/Local Department of Health</td>
</tr>
<tr>
<td>Who is assessed?</td>
<td>Random telephone sample of U.S. children age 19 through 35 months, 13 through 17 years, and for influenza vaccination, 6 months through 17 years</td>
<td>Ability to run assessments for any age group with records in the IIS</td>
</tr>
<tr>
<td>How are the rates generated?</td>
<td>State-level rates based on surveyed sample of 200-400 children 19 through 35 months of age or 13 through 17 years of age</td>
<td>Calculations based on IIS records of all children within a selected age range with active records in the IIS (&quot;active&quot; as defined by the IIS—not deceased, still living in jurisdiction)</td>
</tr>
<tr>
<td></td>
<td>Uses a standard survey methodology with weighting adjustments designed to represent the population</td>
<td>Denominator based on IIS population or on census data or other external source</td>
</tr>
</tbody>
</table>

There can be differences in how the two data sources define coverage with Hib (Haemophilus influenzae type b), varicella (chickenpox), and PCV (pneumococcal conjugate vaccine), as well as with any series that includes these vaccines. The definition of doses counted as fulfilling the vaccination requirement is different. NIS counts all doses, whether or not they meet ACIP age/interval requirements for validity, whereas an IIS can choose to include or exclude invalid doses depending on their own criteria. NIS counts all doses, whether or not they meet ACIP age/interval requirements for validity, whereas an IIS can choose to include or exclude invalid doses depending on their own criteria.
NIS & IIS Comparison

Strengths

Limitations
Developing Communication Messages

- Process for developing communications
  - Planning and organizing
  - Writing and editing
  - Reviewing
- Tables with guidelines for communicating with senior leadership, legislators, and the media
- Information about plain language
- Template for how to organize a message
- Examples of how to tailor a message to an audience
Determine the Methods and Media

• Depends on the audience and the purpose
  • Senior leadership
    • In-person discussion along with a short, written document containing key points and graphs
  • Legislators
    • Presentation of slides, main points and simple graphs
  • Media
    • An assortment of methods and communication tools may be used, including social media, press releases, and website material
## NIS Results

Estimated vaccination coverage with selected individual vaccines and a combined vaccine series among children aged 19–35 months, overall and by U.S. Department of Health and Human Services (HHS) region and state and local area — National Immunization Survey, United States, 2015

<table>
<thead>
<tr>
<th>National, HHS region, state, and local area</th>
<th>MMR (≥1 dose)</th>
<th>DTap (≥4 doses)</th>
<th>Hep B (birth dose)</th>
<th>HepA (≥2 doses)</th>
<th>Rotavirus</th>
<th>Combined vaccine series</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. overall</td>
<td>91.9 (±0.8)</td>
<td>84.6 (±1.1)</td>
<td>72.4 (±1.4)</td>
<td>59.6 (±1.5)</td>
<td>73.2 (±1.4)</td>
<td>72.2 (±1.4)</td>
</tr>
<tr>
<td>HHS Region I</td>
<td>94.1 (±2.1)</td>
<td>88.9 (±2.7)</td>
<td>76.3 (±3.3)</td>
<td>65.4 (±3.9)</td>
<td>80.7 (±3.2)</td>
<td>77.8 (±3.3)</td>
</tr>
<tr>
<td>Connecticut</td>
<td>97.5 (±2.4)</td>
<td>90.8 (±4.5)</td>
<td>81.8 (±6.2)</td>
<td>72.0 (±7.3)</td>
<td>77.9 (±6.7)</td>
<td>80.6 (±6.0)</td>
</tr>
<tr>
<td>Maine</td>
<td>96.0 (±3.1)</td>
<td>92.0 (±5.0)</td>
<td>68.7 (±7.7)</td>
<td>53.8 (±8.3)</td>
<td>71.1 (±7.7)</td>
<td>71.8 (±7.9)</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>91.8 (±4.0)</td>
<td>87.2 (±5.1)</td>
<td>78.4 (±5.8)</td>
<td>65.7 (±6.9)</td>
<td>83.5 (±5.4)</td>
<td>78.5 (±6.0)</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>93.4 (±3.9)</td>
<td>88.4 (±5.4)</td>
<td>72.0 (±7.0)</td>
<td>60.2 (±7.7)</td>
<td>80.9 (±6.2)</td>
<td>74.1 (±7.1)</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>94.5 (±3.2)</td>
<td>90.5 (±4.1)</td>
<td>73.2 (±6.4)</td>
<td>65.1 (±6.9)</td>
<td>87.6 (±4.9)</td>
<td>77.2 (±6.0)</td>
</tr>
<tr>
<td>Vermont</td>
<td>95.5 (±2.7)</td>
<td>89.2 (±4.2)</td>
<td>49.4 (±6.7)</td>
<td>57.1 (±6.7)</td>
<td>72.7 (±6.2)</td>
<td>75.6 (±5.9)</td>
</tr>
<tr>
<td>HHS Region II</td>
<td>92.6 (±2.2)</td>
<td>88.1 (±2.7)</td>
<td>60.6 (±4.0)</td>
<td>53.4 (±4.1)</td>
<td>73.7 (±3.8)</td>
<td>73.4 (±3.7)</td>
</tr>
<tr>
<td>New Jersey</td>
<td>92.8 (±4.4)</td>
<td>89.8 (±4.8)</td>
<td>63.9 (±7.2)</td>
<td>58.3 (±7.4)</td>
<td>75.2 (±6.8)</td>
<td>76.5 (±6.5)</td>
</tr>
<tr>
<td>New York</td>
<td>92.5 (±2.6)</td>
<td>87.4 (±3.3)</td>
<td>59.0 (±4.7)</td>
<td>51.2 (±5.0)</td>
<td>73.0 (±4.5)</td>
<td>71.9 (±4.4)</td>
</tr>
<tr>
<td>City of New York</td>
<td>94.1 (±2.9)</td>
<td>85.5 (±5.0)</td>
<td>53.4 (±6.8)</td>
<td>47.8 (±6.9)</td>
<td>71.1 (±6.4)</td>
<td>68.2 (±6.5)</td>
</tr>
<tr>
<td>Rest of state (NY)</td>
<td>90.9 (±4.3)</td>
<td>89.2 (±4.3)</td>
<td>64.6 (±6.6)</td>
<td>54.6 (±7.2)</td>
<td>75.0 (±6.4)</td>
<td>75.7 (±6.1)</td>
</tr>
</tbody>
</table>
Figure 1. Estimated 4:3:1:h:3:1:4 Coverage: Georgia Versus All Other States

Estimated 4:3:1:h:3:1:4 Coverage:
GA Versus All Other States
Communicating NIS Results

• Evaluate:
  • Margin of error
  • Trends over time
  • Work to improve coverage rates during the assessment period
  • External conditions that may have impacted rates

• Avoid focusing on the ranking – but prepare to address related questions
Communicating IIS Results

• Assess your IIS data quality

• Key messages will be specific to the state or local area

• Distributed materials may include notes, adapted to the specific state or local area
Communicating NIS and IIS Results

• Key messages should include differences or changes in trends and possible reasons for changes
• Graphical representations are helpful

According to the NIS, DTaP coverage in Minnesota is higher than the national average and remains consistent. MIIC DTaP coverage rates are consistent, but remain lower than the NIS rates.
Ideas & Examples

Figure 9. NIS Coverage Estimates for 4:3:1:3:3:1:4 Compared to MCIR Profile Report

NIS Coverage Estimates for 4:3:1:3:3:1:4 Compared to MCIR Profile Report
Children age 19 through 35 months
Michigan, 2007 - 2015

Key messages:
- Overall, the IIS results and the NIS results have been relatively close, especially in the most recent five years.
- The big jump in the 2009 to 2010 NIS data suggests that either there was a big increase in vaccination rates or a sampling error is exaggerating the change.
- Although the 2010 IIS data point is below the 2010 NIS data point, they both show an increase from 2009, evidence that the true vaccination rate did increase.
- The IIS rate might be more stable than the NIS rate, especially during later years. This also demonstrates the fact that the NIS has sampling errors, and small shifts should not be over-interpreted.
- The MCIR is a mature IIS with a very high level of provider participation.
the benefits of flu vaccination 2015-2016

The estimated number of flu illnesses prevented by flu vaccination during the 2015-2016 season:
5 million
as many people use Denver International Airport in one month

The estimated number of flu medical visits prevented by vaccination during the 2015-2016 season:
2.5 million
equal to the population of Portland, Oregon

The estimated number of flu hospitalizations prevented by vaccination during the 2015-2016 season:
71,000
enough to fill every registered hospital bed in the state of Texas
Thanks for your time

Beth Parilla
AIRA Senior Program Manager
bparilla@immregistries.org
Evaluating Quality of Immunization Information Systems (IIS) by Matching to the National Immunization Survey (NIS)

Elizabeth Ormson¹, Megha Ravanam¹
James A. Singleton², Lauren Shaw², Laurie D. Elam-Evans²

¹NORC at the University of Chicago
²Centers for Disease Control and Prevention

2018 National Immunization Conference
May 16, 2018
Agenda

- Background
- NIS-IIS Match Projects Overview
- Matching Rates
- IIS and NIS-Child Vaccination Coverage Comparison
- Discussion
Background

NIS-Child Overview

- Sponsored by the Centers for Disease Control and Prevention (CDC)
- Monitors vaccination coverage rates for children 19-35 months
- Nationwide cell-phone random-digit-dial (RDD) survey
  - Was dual-frame landline/cell-phone through 2017
- National, state, and selected local area and U.S. territory estimates of vaccination coverage using a standard methodology
- Two phase data collection: household and child’s provider(s)
  - Household telephone interview to obtain data on child, mother, and household and to gain consent to contact health care providers
  - Providers mailed an Immunization History Questionnaire (IHQ) for detailed vaccination records
Background

IIS Overview

- Immunization Information Systems (IISs) are state or local confidential, computerized, population-based data systems that collect and consolidate vaccination doses administered to individuals by participating vaccination providers
  - IISs exist in 50 states, five large cities, the District of Columbia, and 8 territories
- Functional standards established in the 1990s
- Varying levels of completeness of the population of children 19-35 months
- Varying levels of completeness of child vaccination histories for children included in the IIS
Background

**IIS Overview**

- **Strengths of IIS**
  - Large sample size (aspiration is to include all children in the population)
  - Many IISs have high levels of completeness for children 19-35 months
  - Timely estimates can be computed

- **Challenges**
  - Inconsistent methods of populating the dataset and/or administration of system
  - Incomplete database
    - Missing children and/or missing vaccination doses
  - Difficult to assess true population coverage and vaccination coverage rates
    - For example, children who have moved or gone elsewhere (MOGE) typically remain in IIS databases and are reflected in the numerator of IIS vaccination coverage rates (and denominator if Census estimate not used)
  - Uncertain completeness and accuracy of contact information
NIS-IIS Match Projects Overview
NIS-IIS Match Projects Overview

- IIS match projects offer ability to compare and assess the quality and completeness of the IIS data to data collected in the NIS-Child.
- During the NIS-Child household interview, respondents are asked for permission to contact both the child’s vaccination providers and their local immunization registry.
- For respondents with consent to contact the IIS, NORC matches the NIS-Child children to children in the IIS database:
  - Matching process looks for exact and “likely” matches between the NIS-Child and IIS eligible children.
  - Manual review of likely matches to assess probability of match.
- Match report provides findings around matching and completeness of IIS vaccination histories compared to the NIS-Child data.
NIS-IIS Match Projects Overview

- IIS match projects began in 2008
  - Built on similar projects conducted in 2002, 2004
- 29 IIS match projects have been completed since 2008 for NIS-Child across 18 geographic areas
  - Some states requested reports for multiple years
  - IISs participated for various reasons and these projects may not be a clear representation of all IISs
- Currently being offered as incentive for engaging in the first wave of the IIS-NIS integration in 2019
  - Participants will receive a report containing results based on the 2019 data collection
  - Will continue to be offered as a stand-alone product
NIS-IIS Match Projects Overview

- Assess IIS quality and completeness using NIS-Child data
- Help IISs understand the following
  - How complete is IIS in terms of children aged 19-35 months
  - How do vaccination rates computed from the IIS vaccination histories compare to rates computed from the NIS-Child provider-reported vaccination histories
  - How complete are the vaccination histories for each ACIP-recommended vaccine or series in the IIS compared to the NIS-Child
  - What characteristics of providers or children/families are associated with completeness of IIS vaccination records, especially characteristics that would provide actionable information for the IIS
NIS-IIS Match Projects Overview

Results of the IIS match projects presented as:

- Match rate for NIS-Child children with consent to contact IIS
- For matched children, what percent have two or more vaccination doses in the IIS data (Participation Rate)
- For matched children, what percent have agreement in UTD status based on the IIS data vs. NIS-Child data
Matching Rates
Matching Rates

- Match rates can be used as a proxy for enrollment of children 19-35 months in the IIS geographic area.
- From 2008 – 2016 across all areas, the median match rate was 91.4% for NIS-Child children with consent to contact the IIS.
- Match rates vary across geographic areas and years:
  - Match rate was greater than or equal to 90% in 16 of the IIS Match Projects.
  - Match rate was below 80% for four IIS Match Projects.
Matching Rates

- IIS Match Rates: Of children with consent to contact the IIS, the percent who were found in the IIS, by year and by state
  - Ranged from 68.2% to 100.0%
IIS and NIS-Child Vaccination Coverage Comparison
IIS and NIS-Child Vaccination Coverage Comparison

- **IIS participation rate**
  - A child was considered to have adequate IIS data if there were two or more vaccinations in the IIS database for the child
  - Excludes children with 0-1 vaccination doses
    - E.g., children with only Hepatitis B birth dose in IIS database were not defined as adequate
- Across all IIS match projects, the median participation rate was 95.1% for NIS-Child children found in the IIS
IIS and NIS-Child Vaccination Coverage Comparison

- **IIS Participation Rates**: Of children matched to the IIS, the percent who had two or more doses in the IIS database, by year and by state
  - Ranged from 75.5% to 99.7%
IIS and NIS-Child Vaccination Coverage Comparison

- NIS-Child vaccination coverage rates were based on the standard NIS-Child provider record check (PRC) process.
- Vaccination history records from the IIS database were used to create the IIS vaccination coverage rates.
- Individual vaccines and series are assessed throughout the match report; focus of this presentation is on 4:3:1:3*:3:1:4.
Across all IIS match projects, among children matched to the IIS and with adequate NIS provider data, the IIS and NIS-Child agreed on the up-to-date (UTD) status for the 4:3:1:3*:3:1:4 vaccination series for 77.2% of the children.

- Wide variation, ranging from 39.3% up to 95.9%
- Includes children UTD in both IIS and NIS-Child or not UTD in both IIS and NIS-Child

Distribution of agreement across all IIS match projects
IIS and NIS-Child Vaccination Coverage Comparison

- IIS Agreement Rates: Of children matched to the IIS, the percent who had agreement in UTD status for the 4:3:1:3*:3:1:4 series, by year and by state
IIS and NIS-Child Vaccination Coverage Comparison

- One key set of match report tables compares UTD counts between the IIS and NIS-Child for individual vaccines and vaccine series in 2x2 tables

- UTD in IIS
  - $A+C = 172$

- UTD in IIS or NIS-Child
  - $A+B+C = 199$

- Capture Rate: Percent UTD in IIS among children UTD in IIS or NIS-Child
  - $100\times\frac{A+C}{A+B+C} = 100\times\frac{172}{199} = 86.4$
  - Overstates IIS “capture” rate because if we combined child-level vaccination data from IIS and NIS-Child, some of D may become UTD

<table>
<thead>
<tr>
<th>IIS Match</th>
<th>NIS APD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UTD</td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>UTD</td>
<td>156</td>
</tr>
<tr>
<td>Not UTD</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>183</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IIS Match</th>
<th>NIS APD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UTD</td>
</tr>
<tr>
<td>UTD</td>
<td>A</td>
</tr>
<tr>
<td>Not UTD</td>
<td>B</td>
</tr>
</tbody>
</table>
IIS and NIS-Child Vaccination Coverage Comparison

- Capture Rate: Of children matched to the IIS, the percent of children UTD in IIS among children UTD in IIS or NIS
  - Ranged from 22.2% to 97.5%
Discussion
Discussion

- NIS-IIS match report offers IISs an external benchmark to compare population coverage of children ages 19-35 months as well as vaccination history completeness
  - As AIRA expands the criteria for certification, the match report can potentially support IISs understanding of meeting those criteria
- Match report undergoing changes to better align with goals of IISs
  - Assess areas that are actionable for the IIS
  - See upcoming presentation at AIRA!
    - Conducting workshop to better understand needs of IISs and what key elements are of interest and need for the match report
Discussion

- Next phase of IIS-NIS integration will involve leveraging more IIS information
  - Utilize IIS database as sampling frame for NIS
- Match report may be offered to those IISs willing to participate in the 2020 IIS-NIS integration
  - Contact your Project officer or Jim Singleton for more information about this opportunity
Full IIS-NIS Integration Plan

Phase 1
- IIS augments the NIS cell phone sampling frame; from augmented sample:
  1) collect uniform set of sociodemographic information, and 2) identify child’s vaccination providers
- NIS vaccination data from the NIS provider record check process (PRC)

Phase 2
- IIS as the only sample frame (drop the random digit dialing cell phone sampling frame):
  1) collect uniform set of sociodemographic information, and 2) identify child’s vaccination providers
- NIS vaccination data from the PRC

Phase 3
- IIS as the only sample frame:
  1) collect uniform set of sociodemographic information, and 2) identify child’s vaccination providers
- NIS vaccination data from the PRC and IIS

Phase 4
- IIS as the only sample frame:
  1) collect uniform set of sociodemographic information, and 2) drop collection of child’s vaccination providers
- NIS vaccination data only from the IIS (drop the PRC)
Thank You!

Elizabeth Ormson
ormson-elizabeth@norc.org