AWARDEE EXPERIENCES IN USING IMMUNIZATION INFORMATION SYSTEMS (IIS) FOR IMMUNIZATION COVERAGE ASSESSMENTS

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Prepared on behalf of
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AIRA Survey Report
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EXECUTIVE SUMMARY

Immunization coverage assessments are systematic measurements of vaccine receipt. Coverage assessments document whether recommended vaccines were actually administered. Measuring coverage helps to identify populations at risk for vaccine-preventable diseases and target efforts to improve vaccine delivery. At the national level, the Centers for Disease Control and Prevention (CDC) conducts regular childhood and adolescent immunization coverage assessments through the National Immunization Survey (NIS) and NIS-Teen, as well as other adult-oriented assessments. In addition, the CDC's 64 immunization awardees are charged with reviewing program-acquired local and state coverage data, and conducting provider-level assessments of Vaccines for Children (VFC) participating providers.

A goal of the American Immunization Registry Association (AIRA) is to develop standard methodologies for using state and local immunization information systems (IIS) to conduct immunization coverage assessments. This White Paper presents the findings of a project to describe current practices for conducting IIS-based coverage assessments, highlighting strengths and weaknesses, and to identify opportunities for AIRA to support immunization program and IIS officials in enhancing their ability to conduct IIS-based coverage assessments. This was accomplished through an online survey of IIS and immunization program staff, conducted in August-September 2013. Fifty awardees (41 states, 4 cities, and 5 territories) are represented in these results.

Findings - AFIX Coverage Assessments

AFIX (Assessment, Feedback, Incentives, eXchange) is a quality improvement program designed to raise immunization coverage levels, reduce missed opportunities to vaccinate, and improve standards of practice at the provider level. CDC established AFIX as a part of the VFC program in 2000. Historically, the assessment piece of AFIX has been conducted by immunization program staff pulling a sample of patient charts in provider offices and entering data into CoCASA, a computer program developed and supported by CDC. As awardees' IIS developed over time, IIS-based assessment became an accepted method for conducting AFIX assessments.

Over ninety percent of survey respondents report that they currently use their IIS to some extent to support AFIX reporting, and 88% (n=43) rate supporting AFIX as a high-value activity for their IIS. However, despite agreeing on the value of using IIS for AFIX, respondents are highly variable in their current practices. With regard to the ***source of immunization history data*** for AFIX:

- 35% (n=16) use IIS data exclusively for <u>all</u> providers
- 28% (n=13) use IIS data exclusively for <u>some</u> but not all providers
- 26% (n=12) use IIS data but supplement with other sources
- 11% (n=5) do <u>not</u> use IIS data at all

Incomplete immunization history significantly limits the use of IIS for AFIX, and 80% of respondents report they would need to upgrade IIS functionality to be able to run all AFIX reports.

Strengths of IIS-based AFIX assessments include:

- When IIS data are complete and AFIX-related functionality is in place, IIS-based AFIX is more efficient than chart review and manual data entry into CoCASA.
- IIS-based AFIX incorporates the provider's entire population of patients in the IIS (vs. only a sample of 50 patients with CoCASA).
- IIS-based AFIX provides an incentive for providers to report to the IIS, which helps improve completeness of IIS data.

Weaknesses of IIS-based AFIX assessments include:

- When IIS data are incomplete, AFIX assessment results will be incomplete.
- Linking patients to a particular provider within the IIS may be challenging, particularly for children who receive vaccines at multiple locations.
- IIS staff may be unfamiliar with what is needed to support AFIX activities.

The most commonly cited areas of support needed to increase the use of IIS for AFIX includes funding for IIS upgrades (n=36, 80%) and technical assistance (n=34, 76%). Selected less often were guidance on calculating AFIX coverage rates (n=17, 38%), additional staff time to run AFIX reports (n=17, 38%), and guidance on how to attribute children to a provider (n=11, 24%).

Findings – General Coverage Assessments for Childhood Immunization

Awardee coverage assessments can provide a more nuanced understanding of immunization patterns and pockets of need, not possible through national surveys. Assessment results can help guide programmatic decisions and priorities.

In this survey, 53% of respondents report that they routinely use their IIS to conduct immunization coverage assessments for preschool children, but fewer conduct routine assessments for kindergarten-aged children (30%) or adolescents (36%). The specific assessment components and target ages vary across awardees.

Fifteen percent of respondents have not successfully conducted a coverage assessment for any age groups.

In addition, 62% of awardees have conducted assessments for targeted geographic areas, most commonly focused on local public health jurisdictions. Smaller proportions have conducted coverage assessments for children in VFC (42%), Medicaid (365), or WIC (13%). Nearly two-thirds of respondents report that the IIS is used by some local health departments and by some private immunization providers to assess their own coverage rates.

Strengths of IIS-based childhood immunization coverage assessments include:

- Over 80% of awardees routinely conduct preschool coverage assessments, underscoring the importance of the primary immunization series.
- When IIS data are complete and functionality is in place, childhood immunization coverage assessments offer insight into variation in vaccination patterns across geographic areas.
- Linkages with programs such as VFC, WIC, and Medicaid, or with private insurers, can create the opportunity to examine coverage rates for key subgroups, which can promote follow-up collaboration with those entities to address areas of under-immunization.
- IIS-based coverage assessments can be used by private and public payers as the basis for performance incentives. Where this occurs, the payers may become strong supporters of the IIS, as it offers a cost-effective means of assessing performance.

Weaknesses of IIS-based childhood immunization coverage assessments include:

- There is substantial variability in the frequency with which awardees conduct IIS-based coverage assessments for children in older age groups and subgroups.
- There is substantial variation in assessment specifications, including age targets and report composition. While this allows awardees to gain unique insights, the lack of consistency across awardees limits the ability to compare standardized rates.
- IIS data quality and completeness are significant weaknesses for many awardees, particularly those without required reporting for all provider groups. Ongoing challenges include dealing with children who no longer reside in the jurisdiction.

- Incorrect address information is more problematic for adolescents than for younger children. Some awardees have made special efforts to address poor data quality for this group, including exploring different sources for address corrections (e.g., US Postal Service, schools, payers, public health programs).
- Improving the accuracy and completeness of adolescent immunization data in IIS can be challenging. Many children do not have regular vaccine-oriented encounters after kindergarten age; thus, providers may have few prompts to review and update IIS information. Moreover, most immunization-related quality measures focus on preschool-age children, limiting the extent to which payers are exerting pressure on providers to improve their data quality for older children.
- Conducting coverage assessments requires significant staff time. Inadequate staffing levels and competing staff demands pose major challenges to generating coverage assessments for the majority of awardees.

The most common ***uses of IIS to support childhood immunization program needs*** were for *completing CDC reports* (92%), *identifying areas of low vaccination coverage* (67%), *comparing with other assessment data* (67%), *evaluating impact of special projects* (63%), *using as internal quality benchmarks* (61%), and *responding to outbreaks or pandemics* (59%).

In ratings of the potential value of IIS data to support program needs, in the event that IIS barriers could be overcome, the ranking changed: the most commonly rated high-value areas were *identifying areas of low vaccination coverage* (82%), *responding to outbreaks or pandemics* (78%), *using as internal quality benchmarks* (69%), and *completing CDC reports* (69%). Moreover, only 2 of 11 program areas (*completing CDC reports, responding to outbreaks or pandemics*) were rated as both high value and high IIS capability by over 40% of respondents.

Future investment in IIS enhancement should target two areas (*identifying areas of low vaccination coverage, responding to outbreaks or pandemics*) where the programmatic rating of high value was more than 10 percentage points greater than the proportion of current IIS use. In other words, current activity is not at the desired level, even though awardees perceive high value. Both areas will require significant attention to address accuracy, as well as training in techniques such as geocoding and mapping.

Less attractive for resource investment are areas where programmatic value is less than or similar to current use, and areas where both programmatic value and current use are very low. However, they may receive indirect benefit from investments in high-value areas.

Findings – General Coverage Assessments for Adult Immunization

At the time of data collection, 47 of 50 participating awardees included adults in their IIS, but in a manner significantly different as compared to children. For example, only 10 IIS have required reporting for all adults, and another 13 have required adult immunization reporting only for pharmacies. Several states have onerous opt-in consent policies for adults, which curtails IIS participation. Overall, the current IIS landscape does not fully support adult assessment.

IIS-based coverage assessments are conducted less frequently for adult immunizations than for childhood immunizations. Almost one quarter of respondents (n=11, 24%) reported no current use of IIS-generated coverage data for adults. Among the 35 respondents who did report using IIS-generated coverage data for adults in the past 4 years, the most common area of adult assessment involved H1N1 vaccination patterns (n=20, 61%). Some awardees use their IIS to generate seasonal influenza vaccination rates for all adults (n=15, 45%) or seniors (n=11, 33%). Fewer generate vaccination rates for pneumococcal (n=9, 27%) or zoster (n=6, 18%) vaccine.

Strengths of IIS-based adult immunization coverage assessments include:

- Several immunization recommendations straddle the line between childhood and adulthood (e.g., human papillomavirus (HPV) vaccine; pertussis booster doses for pregnant women and adults in contact with vulnerable infants). Having a lifetime immunization record in the IIS facilitates coverage assessments across age groups.
- As a mechanism to centralize disparate records, IIS are well-suited for adult assessment. Adults are more likely than children to receive vaccines at non-traditional locations, including pharmacies and workplaces; within the medical setting, there are many more adult immunization providers than child immunization providers, and individuals may not stay with the same provider throughout adulthood. Thus the benefit of a centralized IIS record, with population-based coverage assessment, for adults is significant.
- In some states, expanded pharmacist involvement with immunization has included requirements for pharmacists to report doses administered to an IIS. Mandatory reporting for non-traditional immunization providers is essential to improving the validity of IIS-based adult coverage assessments.
- As IIS become interoperable with electronic health records (EHRs), there is potential for providers to send vaccination data for patients of all ages (i.e., not limited to children), which represents an efficient means to increase IIS data completeness. Federal "Meaningful Use" incentives may prompt more adult providers to engage with IIS.
- In recent years, awardee requirements about adult immunization have expanded; IIS-based assessment is an important tool to gauge progress toward meeting those requirements.

Weaknesses of IIS-based adult immunization coverage assessments include:

- A substantial number of awardees face non-supportive IIS policies, including requiring adults to opt-in to the IIS and limits on IIS data sharing. These policies severely undercut awardees' ability to increase the proportion of adult residents included in the IIS.
- Some adult immunization requirements are based on clinical risk factors; information with which to identify adults with certain clinical risk factors (i.e., those recommended for vaccination) is not available in IIS.
- IIS data quality and completeness were the most commonly cited "major challenges" for adult immunization. While IIS records for children are usually populated in conjunction with birth records, there is no comparable mechanism to populate the IIS with adults. In addition, provider reporting requirements are less common for adult than for child immunizations.
- Two-thirds of awardees cited inadequate staffing and competing staff demands as "major challenges" to conducting adult coverage assessments. Because IIS may not have preset algorithms for adult immunization recommendations, more time may be required to generate coverage assessments for adults than children. In addition, extra staff time may be needed to determine how best to deal with data quality issues.
- Adult coverage assessments for targeted geographic areas are problematic. Many adults do not have regular encounters with a medical provider; as such, it is unclear who would have adequate knowledge of, and responsibility for noting in the IIS, patients moving out of jurisdiction. Young adults present a unique set of problems in this area, as they may have several temporary moves before establishing a permanent adult home.

Overall, awardees' current ***IIS use to support adult immunization program needs*** was relatively low. Nearly two-thirds of respondents use their IIS for *completing CDC reports*; a sizable proportion reported current IIS use for *responding to outbreaks or pandemics* (44%) and *evaluating the impact of special projects* (36%). For 6 of 9 adult program needs, current use of IIS was reported by less than one quarter of respondents.

When respondents were asked to consider the potential value of IIS data to support program needs around adult immunization, only three program areas (*identifying areas of low vaccine coverage, responding to outbreaks or pandemics, completing CDC reports*) were rated by more than half of respondents as high value.

Only two areas (*completing CDC reports, responding to outbreaks or pandemics*) were rated as both high value and high IIS capability by ≥20% of respondents, and value was rated as high by more than half of respondents. All other areas were rated as high value and high IIS capability by less than 10% of respondents. There is tremendous room for improvement in how well IIS support adult immunization program needs.

Future investment in IIS enhancement around adult immunization should target the two areas (*identifying areas of low vaccination coverage, responding to outbreaks or pandemics*) where the programmatic rating of high value had a difference of 20 percentage points more than the proportion of current IIS use, and the programmatic value was rated as high by more than half of respondents. These two program areas also had value/use gaps for childhood immunization.

A second group to consider for future investment includes three areas (*using as internal quality benchmarks, comparing with other assessment data, tracking uptake of new vaccines and recommendations*) where the programmatic rating of high value was higher than the proportion of current IIS use. However, since the overall proportion of awardees rating these activities as high value was <50%, the prioritization of resources may need to be lower, relative to the group described above.

Next Steps – Moving Forward
Based on this study, AIRA's role in moving forward to support IIS-based coverage assessment should include:

Support for IIS-Based AFIX Reporting:

1. Establish consensus on a minimum set of AFIX reports, perhaps with a tiered approach
2. Develop technical assistance, including logic guidance, on how to generate and interpret the full complement of AFIX reports
3. Develop and disseminate AFIX standards to IIS vendors and working groups
4. Provide co-training opportunities for IIS and AFIX staff
5. Advocate for studies of the effect of IIS-based AFIX reporting, so awardees can devote resources to high-impact activities

Support for IIS-Based Childhood Immunization Coverage Assessments:

1. Update and disseminate guidance on generating and interpreting assessment results, considering desired variation
2. Lead a structured discussion about standardization vs best practices, including the challenges of uneven data across age groups
3. Develop profiles of successful partnerships that describe the mutual benefits of collaboration between IIS and partner entities
4. Issue guidance on how vendors/platforms should incorporate recommended functionality for coverage assessment

Support for IIS-Based Adult Immunization Coverage Assessments:

1. Advocate for IIS-supportive policies around adult immunization, working with partner organizations to develop strategies for advocacy
2. Issue guidance on strategies for adult coverage assessment in the context of a suboptimal data environment
3. Encourage awardees to solicit adult immunization data through EHR-IIS interoperability

Support for High-Value Programmatic Areas with Currently Low IIS Use:

1. Advocate for resources to improve IIS support for identifying areas of low immunization and responding to outbreaks or pandemics
2. Disseminate information about strategies to deal with missing or conflicting address information
3. Provide technical assistance on targeted assessment, including geocoding and mapping
4. Develop strategies for using alternative denominator information to compensate for IIS data limitations, when needed

General AIRA Support:

1. Continue to provide training and mentoring programs related to generating and interpreting coverage assessment data
2. Continue to focus on strategies to improve data quality and completeness
3. Ensure that IIS vendors incorporate accepted functionality into their products
4. Urge Electronic Health Record vendors to incorporate functionality that supports coverage assessments, particularly aspects that affect data quality and completeness
5. Serve as the voice of the IIS to CDC

As noted by one participant:

> *AIRA is perfectly positioned to bring the IIS community, Immunization Program community, vendor community, and CDC together*

Introduction

One of the goals of the American Immunization Registry Association (AIRA) is to develop standard methodologies for using state and local immunization information systems (IIS) to conduct immunization coverage assessments. This White Paper presents the findings of a project, requested as technical consultation to AIRA's Assessment Steering Committee (ASC). The project objectives are to describe current practices for conducting IIS-based coverage assessments, highlighting strengths and weaknesses, and to identify opportunities for AIRA to support immunization program and IIS officials in enhancing their ability to conduct IIS-based coverage assessments.

Background

Immunization coverage assessments are systematic measurements of vaccine receipt. Coverage assessments focus on specific populations (defined by age, geography, practice setting, or other characteristics), documenting the extent to which recommended vaccines were administered. Measuring coverage helps to identify populations at risk for vaccine-preventable diseases, target efforts to improve vaccine delivery, and evaluate the impact of programmatic initiatives.

At the national level, the Centers for Disease Control and Prevention (CDC) conducts regular childhood immunization coverage assessments through the National Immunization Survey (NIS) and its companion NIS-Teen.[1] In addition, broad health surveys not specific to immunization (e.g., the National Health Interview Survey (NHIS) and the Behavioral Risk Factor Surveillance System (BRFSS)) are used to estimate immunization coverage rates.[2] Flu vaccine-specific coverage is assessed annually through a combination of these surveys and targeted internet panel surveys.[3]

For the 64 states, cities, and territories that receive CDC funding support through the federal Section 317 and Vaccines for Children (VFC) programs (i.e., "awardees"), coverage assessments are an integral part of their immunization programs. One of the main goals for these 64 awardees is to improve and sustain immunization coverage levels within their jurisdiction, including identifying and addressing disparities by race, ethnicity, and socioeconomic status.

To help meet this goal, the Immunization Program Operations Manual[4] states that awardees should move toward using IIS as the primary source of data for provider coverage level assessment, and annually are required to:

- review awardee-specific, CDC-acquired coverage data (e.g., NIS data), as well as other program-acquired local and state level coverage data;
- report school-enterer coverage to CDC; and
- conduct provider-level assessments of their participating VFC providers.

With the tremendous expansion of IIS, awardees have expanded their potential to use their IIS to conduct immunization coverage assessments to support these requirements, as well as to support other program-specific needs and priorities. Yet the extent to which IIS and immunization programs can and do conduct IIS-based immunization coverage assessments is not well characterized across awardees.

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[1] http://www.cdc.gov/vaccines/imz-managers/coverage/nis/child/index.html and http://www.cdc.gov/vaccines/imz-managers/coverage/nis/teen/index.html

[2] NHIS: http://www.cdc.gov/nchs/nhis.htm and http://www.cdc.gov/vaccines/imz-managers/coverage/nhis/index.html
BRFSS: http://www.cdc.gov/brfss/about/index.htm and http://www.cdc.gov/vaccines/imz-managers/coverage/brfss/index.html

[3] http://www.cdc.gov/flu/fluvaxview/index.htm

[4] http://www.cdc.gov/vaccines/imz-managers/guides-pubs/ipom/index.html

Data Collection

The primary method of gathering data on use of IIS for coverage assessments was an online survey of IIS/immunization officials from the CDC's 64 immunization awardees, fielded in August-September 2013. In addition, brief structured interviews were conducted with IIS lead staff in selected states, to provide specific examples to illustrate the survey data.

The survey included questions on the technical aspects of conducting immunization coverage assessments using an IIS, including resources needed to address technical or functional challenges. In other questions, respondents rated the programmatic value of different assessment activities, and the extent to which their IIS supports high-value activities. AIRA's Assessment Steering Committee performed a critical review of survey drafts, and AIRA encouraged its membership to participate in the project. See Appendix A for the full survey.

To ensure that project findings would reflect both the IIS technical and the immunization programmatic perspectives, a modified version of the survey (Appendix B) was created to focus on questions pertaining to programmatic uses and value of IIS-based coverage assessments. The Association of Immunization Managers (AIM) performed a review of the modified survey, and encouraged its members to participate in the project.

An email invitation was sent to IIS lead personnel and immunization program managers for the CDC's 64 immunization awardees. The dual (technical and programmatic) focus of the survey was described; awardees were encouraged either to have IIS and immunization program staff collaborate on the full survey, or have IIS staff complete the full survey and the immunization program manager complete the modified survey. One state and one territory that did not have a functioning IIS at the time of the survey were sent the modified survey, and encouraged to complete only the questions that were applicable to their situation. In addition, two city awardees that utilize their state IIS (i.e., do not have a separate city IIS) were sent the modified survey only.

In results presented in this report, each awardee is represented once. For the 12 awardees that submitted both a full and modified survey, data from the two forms were combined; where responses differed, the IIS staff's responses were used for technical questions, and the immunization program manager's responses were used for programmatic questions.

Participant Characteristics

A total of 47 awardees provided information via the full survey, while 15 awardees provided information via the modified survey. Combined, these participants represent 50 awardees: 41 states, 4 cities, and 5 territories.

List of Participating Awardees

Arizona[1]	Kentucky[3]	New Mexico[1]	Rhode Island[1]
Arkansas[1]	Louisiana[1]	New York[3]	San Antonio[1]
California[1]	Maine[1]	New York City[3]	South Dakota[1]
Colorado[1]	Maryland[1]	North Carolina[1]	Tennessee[1]
Connecticut[3]	Massachusetts[1]	North Dakota[1]	Texas[1]
Delaware[1]	Michigan[1]	Northern Mariana Islands[1]	Utah[1]
District of Columbia[1]	Micronesia[1]	Ohio[1]	Vermont[1]
Florida[1]	Minnesota[3]	Oklahoma[3]	Virgin Islands[2]
Guam[1]	Mississippi[3]	Oregon[1]	Virginia[1]
Hawaii[3]	Montana[3]	Pennsylvania[3]	Washington[1]
Indiana[3]	Nebraska[1]	Philadelphia[1]	West Virginia[1]
Iowa[3]	Nevada[1]	Puerto Rico[1]	Wyoming[2]
Kansas[1]	New Hampshire[2]		

[1]Full survey only; [2]Modified survey only; [3]Both full and modified survey

Table 1 presents the characteristics of the 50 IIS represented by survey respondents. As shown, 47 of the 50 IIS represented (94%) are lifetime IIS (i.e., collect data for children and adults), while 3 IIS collect data for children only. Most IIS have opt-out consent policies for children (n=35, 72%) and adults (n=31, 62%). Most (n=31, 62%) require reporting to the IIS for at least some immunization providers. For 27 IIS (54%) to which public and/or private providers are required to report, 10 require reporting for all ages. Among the 24 IIS (48%) to which pharmacies are required to report, half require reporting for all ages.

Survey respondents reflect the majority of IIS that use each type of vendor/platform, including 14 WIR, 7 STC, 10 Envision, 6 smaller vendors, and 12 in-house systems. (Map 1 on the next page presents vendor/platform for all IIS.) Experience with their current IIS vendor/platform ranges from 22 IIS in place since 2003 or earlier; 16 IIS implemented 2004-2009, and 10 IIS new since 2010. Six respondents are in the process of adopting a new vendor/platform. Of note, the consistency of functionality varies even among IIS of the same vendor/platform, which limits our ability to analyze survey data by vendor/platform.

Table 1. Characteristics of Participating IIS (N=50)

AGES IN IIS	
All ages	47
Birth-18 years	2
Birth-6 years	1
CONSENT - Child	
Opt-out	35
Opt-in	3
No consent options provided	8
Unknown	4
CONSENT - Adult	
Opt-out	31
Opt-in	8
No consent options provided	5
Unknown	4
N/A-no adults in IIS	2
IIS REPORTING REQUIREMENTS (N=31)	
Type of providers	
Public and private providers	23
Public providers only	4
Pharmacies[1]	24
None	14
Unknown	5
Patient ages for which reporting required	
For public and/or private providers	27
All	10
Children only[2]	17
For pharmacies	24
All	12
Adults only	1
Children only[3]	11
Type of doses that must be reported	
All doses	24
Public doses only	1
Flu vaccine only (pharmacists only)	1
Unknown	5

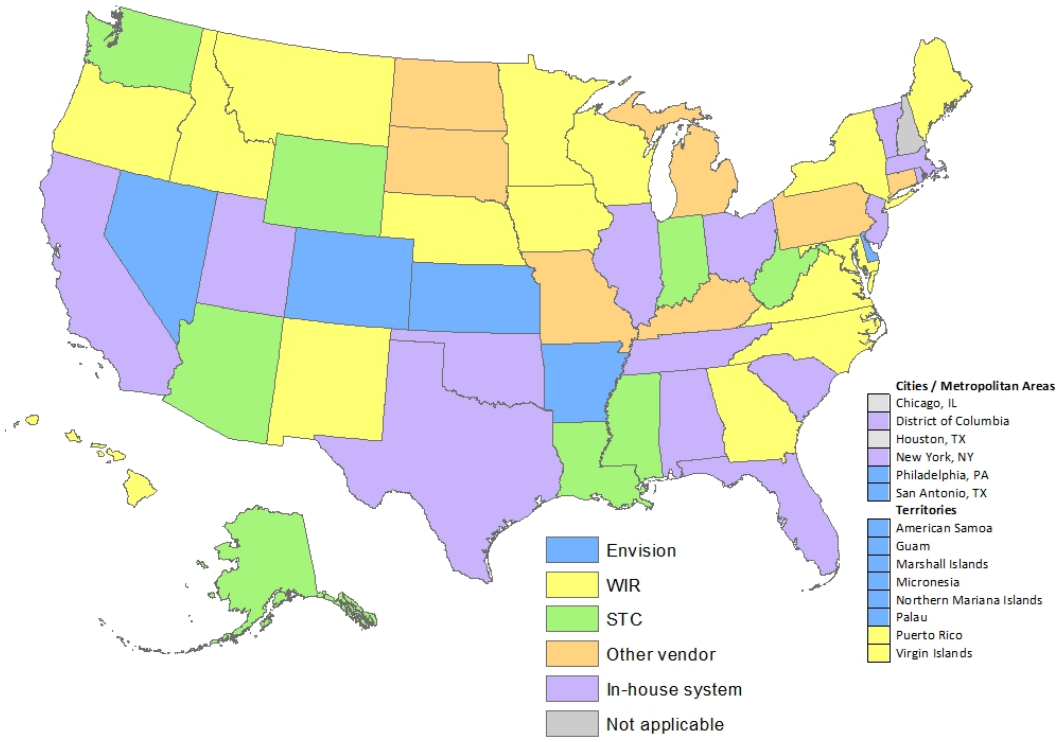
Sources: CDC survey on IIS legislation (http://www2a.cdc.gov/vaccines/iis/iissurvey/legislation-survey.asp), updated through direct contact with IIS staff

[1] Four require only pharmacies to report

[2] Three also include young adults

[3] Three also young adults; one limited to 14-17 years only

Map 1
IIS Vendor/Platform



AFIX Coverage Assessments

AFIX (Assessment, Feedback, Incentives, eXchange) is a quality improvement program designed to raise immunization coverage levels, reduce missed opportunities to vaccinate, and improve standards of practice at the provider level. [5] Assessment is the foundation of the AFIX process, establishing a provider's baseline immunization coverage rate and identifying areas for improvement. CDC established AFIX as a part of the VFC program in 2000.[6]

Historically, the assessment piece of AFIX has been conducted by immunization program staff pulling a sample of patient charts in provider offices and entering data into CoCASA, a computer program developed and supported by CDC,[7] to produce various reports reflecting provider-level immunization coverage. As the development of IIS in the awardee jurisdictions progressed over time, AFIX evolved to include IIS-based assessment, where data either is extracted from the IIS and analyzed within CoCASA or is analyzed from within the IIS, as one of the two CDC-accepted methods for conducting assessments (along with chart-based assessments).

IIS can be used to support AFIX assessments in two ways: (1) IIS can be the source of immunization history data for AFIX assessments; and/or (2) IIS can be used in place of CoCASA as the system that generates AFIX reports. IIS may be used exclusively as the source of immunization history data for all or a subset of providers, or may be supplemented with other data (e.g., patient charts). These data can then be either manually entered or imported into CoCASA to generate AFIX reports of immunization coverage or used to generate IIS-based CoCASA-like reports.

Recently, CDC has begun placing a stronger emphasis on IIS-based AFIX assessments. In the Immunization Program Operations Manual (IPOM) for the current cooperative agreement cycle (January 1, 2013 to December 31, 2017), a new objective for assessing program performance requires awardees to: "Work with VFC providers on quality improvement processes to increase coverage levels and decrease missed opportunities using AFIX components, as appropriate, and move toward use of IIS as primary source data for provider coverage level assessment by the end of the project period."[8] In addition, the AFIX Policies and Procedures Guide released January 2014 contains the following language: "The progression of the program is toward IIS-based AFIX coverage assessments. Beginning in 2014, CDC will consider IIS-based coverage assessments the standard for AFIX even though the timeline for implementing it extends beyond 2014."[9]

Current Use of IIS for AFIX

Over 90% of survey respondents report that they currently use their IIS to some extent to support AFIX reporting, and 88% (n=43) rate supporting AFIX as a high-value activity for their IIS. However, despite agreeing on the value of using IIS for AFIX, respondents are highly variable in their current practices. With regard to the ***source of immunization history data*** for AFIX:

- 35% (n=16) use IIS data exclusively for <u>all</u> providers
- 28% (n=13) use IIS data exclusively for <u>some</u> but not all providers
- 26% (n=12) use IIS data but supplement with other sources
- 11% (n=5) do <u>not</u> use IIS data at all

[5] http://www.cdc.gov/vaccines/programs/afix/index.html

[6] http://www.cdc.gov/vaccines/programs/afix/downloads/standards-guide.pdf

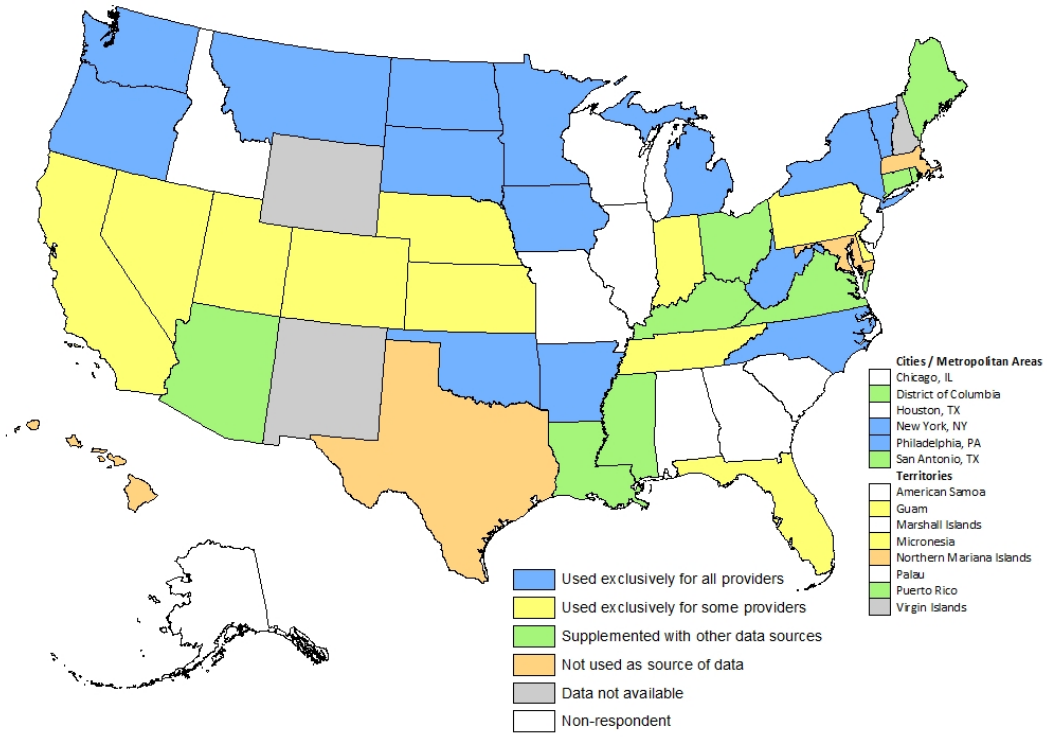
[7] CoCASA (Comprehensive Clinic Assessment Software Application) assesses a provider's/clinic's immunization coverage and practices. Though designed to be used in conjunction with AFIX visits, CoCASA is publicly available and can be used by any provider. See http://www.cdc.gov/VACCINES/programs/cocasa/index.html

[8] Assessing Program Performance; http://www.cdc.gov/vaccines/imz-managers/guides-pubs/ipom/unit-B.html

[9] Policies for Implementing Assessments; http://www.cdc.gov/vaccines/programs/afix/downloads/standards-guide.pdf

Awardee-specific responses are shown in Map 2.

Map 2
Extent to Which IIS Used as Source of Immunization History Data for AFIX Assessments



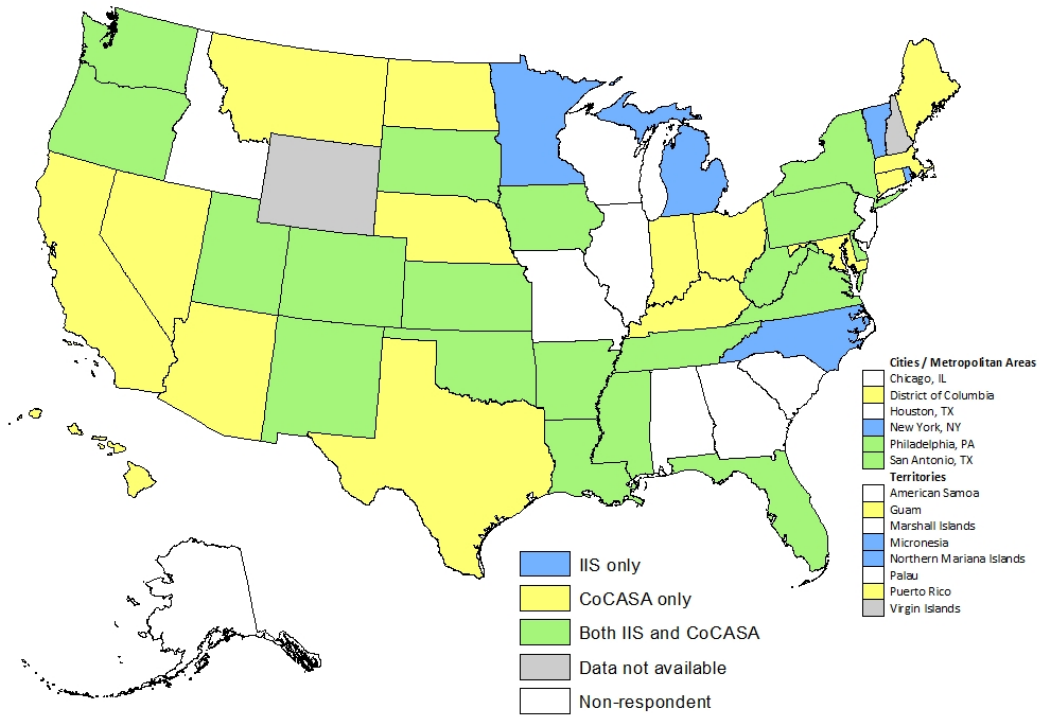
Among the 30 respondents who do not currently use IIS data exclusively for all providers, the most common barriers are incomplete vaccination history for children (n=23, 77%) and adolescents (n=22, 73%); lack of an IIS record for many children (n=16, 53%); and difficulty identifying active patients in the IIS (n=13, 43%).

Respondents report the ***system used to run AFIX reports*** for providers as:

- 17% (n=8) use the IIS exclusively
- 36% (n=17) use CoCASA exclusively
- 47% (n=22) use both IIS and CoCASA

Awardee-specific responses are shown in Map 3 (see next page).

Map 3
System Used to Run AFIX Reports for Immunization Providers



Use of non-IIS data sources for AFIX immunization history is strongly linked to use of CoCASA to run AFIX reports. For example, respondents who supplement IIS data with other sources are 2.5 times more likely to use CoCASA to generate AFIX reports (and less likely to run reports in the IIS), compared to those who exclusively use IIS data for AFIX immunization history. In contrast, awardees who did not report barriers related to incomplete data are more likely to use their IIS exclusively for AFIX.

Several reports are included in the list of standard CoCASA reports recommended for sharing with providers in the new AFIX guide[10]: invalid dose, missed opportunities, need one dose, not up-to-date, diagnostic childhood report (includes late starts and drop offs for certain vaccines), summary report, and adolescent coverage. Although an updated chapter on reports in the CoCASA user guide is under development,[11] IIS-generated reports have not been standardized.

There were differences across respondents in the extent to which IIS are capable of generating selected AFIX reports. The proportion and number of respondents who indicate they can generate the following AFIX reports from their IIS include:

- 83% (n=38) list of patients not up-to-date
- 55% (n=24) invalid doses report
- 39% (n=18) missed opportunities report
- 31% (n=13) late start report
- 17% (n=8) none of the above reports

[10] http://www.cdc.gov/vaccines/programs/afix/downloads/standards-guide.pdf
[11] http://www.cdc.gov/vaccines/programs/cocasa/users-guide.html

Strengths and Weaknesses of IIS-Based AFIX

Strengths of IIS-based AFIX assessments include:

- When IIS data are complete and AFIX-related functionality is in place, IIS-based AFIX consumes less staff time and resources than chart review, which could in turn allow for more time and resources to be devoted to the other components of AFIX (e.g., feedback to providers) or to conducting more AFIX visits.
- For providers who report to the IIS consistently, IIS-based AFIX incorporates the provider's entire patient population (vs. only a sample of 50 patients with CoCASA).
- IIS-based AFIX provides an incentive for providers to report to the IIS, which helps improve completeness of IIS data.

Weaknesses of IIS-based AFIX assessments include:

- When IIS data are incomplete, AFIX assessment results will be incomplete, and providers may get a negative impression of the IIS.
- Attribution of patients to a particular provider may be challenging, particularly for children who receive vaccines at multiple locations.
- The AFIX focus on provider-based assessment is quite different from population-based coverage assessment. Some IIS were not established to generate provider-based assessments, and IIS staff may be unfamiliar with what is needed to support AFIX activities.
- Many IIS are not capable of generating all of the standard AFIX reports; in other instances, IIS staff lack the logic guidance to generate and interpret all AFIX reports.

Several IIS staff described their efforts to address challenges with IIS-based AFIX assessment. For example, some awardees are making incremental progress toward broader use of the IIS for AFIX reporting, even in the face of substantial data quality challenges:

> *Even though we're not perfect, we have some data, and we wanted to test how well it would work, from a beta standpoint. We started with sites that were in our top 25 [for entering data into the IIS] for 2-3 years, and a few others who were not at the top but consistently had been entering some data into the IIS. After looking at data completeness and quality, many of those sites just didn't have good enough data, but there were about 20 who had data to support AFIX. So we started with them.*
>
> - In-house IIS; reporting required for public providers only

Challenges with IIS-based AFIX reporting were not limited to awardees with incomplete IIS data. Several respondents commented on the challenges of establishing common ground between IIS and AFIX staff, and the need for greater interaction and collaboration between the two groups. Often, IIS personnel understand the technical underpinnings of IIS functionality, but are not well versed in the operations of AFIX, VFC or other programmatic initiatives. Conversely, immunization program personnel—including AFIX staff—have considerable expertise in programmatic requirements and working with providers, but may not understand IIS technical standards or appreciate the level of detail required to modify IIS functionality.

> *We [IIS staff] had trouble because the AFIX staff couldn't give clear guidance on what they needed for the AFIX measures. If they were trying to have us do everything that CoCASA did, it would be a LOT of reports!*
>
> - In-house, established IIS; reporting required for all providers

> *The AFIX staff is stretched thin; they do not have the time or the familiarity with our IIS to provide detailed guidance on the business rules behind AFIX reports.*
>
> - Recent change of IIS vendor; no required reporting

In the absence of standard guidance, 14 respondents (30%) have developed their own IIS-generated reports, which support AFIX needs but do not replicate everything in CoCASA.

> *We have something called a "Basic AFIX Report." This is a combination of several reports that are contained in CoCASA. It includes: series assessment, overall assessment, invalid doses, complete with one more visit, complete with one more dose, and missed opportunities.*
>
> - In-house, established IIS; reporting required for all providers

Where current functionality does not allow an IIS to generate all reports available through CoCASA, some respondents have taken a "happy medium" approach:

> *We really tried to meet the needs of AFIX, but had our own constraints. So we looked at what was already in our IIS, and decided to set up a process to generate practice-level complete and up-to-date reports; and that late and up-to-date in one visit [status] would only be assessed at the individual level. It wasn't ideal, but the immunization program was OK with that.*
>
> - In-house, established IIS; reporting required for all providers

Support Needed to Increase Use of IIS for AFIX

Respondents to the full survey selected from a list of resources and assistance they would need to enhance their ability to generate AFIX reports from their IIS. The majority indicated a need for additional funds for IIS upgrades (n=36, 80%) as well as technical assistance (n=34, 76%). Respondents also noted the opportunity costs of expanding AFIX functionality, in terms of limiting time for other IIS initiatives.

> *All IIS changes are in-house. We have a long list of ongoing work, and any AFIX changes would pre-empt other work that has to get done.*
>
> - In-house, established IIS; reporting required for all providers

> *It will be very expensive to add CoCASA functionality to IIS that currently don't have it. Who will pay for that? What other IIS priorities will not get done?*
>
> - Recent change of IIS vendor; no required reporting

From the list of possible resources, respondents less often selected guidance on calculating AFIX coverage rates (n=17, 38%), additional staff time to run AFIX reports (n=17, 38%), and guidance on how to attribute children to a provider (n=11, 24%). Several respondents added open-ended suggestions about needing clarification on methodology and business rules governing the AFIX program, including conventions for disassociating/de-activating children from a provider's calculation.

At the time of data collection, awardees had been informed that the CDC would discontinue CoCASA in the near future. In the intervening months, the timeline for phasing out CoCASA has been relaxed. Still, concerns about the lack of a CoCASA option should be considered, particularly for awardees that do not have broad provider participation in their IIS.

> *We'll do what we can…but the discontinuation of CoCASA will be a move away from standardization.*
>
> - Recent change of IIS vendor; no required reporting

General Coverage Assessments for Childhood Immunization

In addition to supporting AFIX activities, IIS-based coverage assessments can be used to support many other program activities related to childhood immunization. Awardee-specific assessment efforts can provide granularity at the local level not possible through national surveys such as NIS. These data can provide a more nuanced understanding of immunization patterns and specific pockets of need, which in turn can help guide programmatic decisions and priorities. IIS-based assessments can also help with working with other partners that must provide or utilize immunization coverage data (e.g., schools, health plans). This section describes awardees' use of IIS for childhood immunization coverage assessments other than AFIX, highlighting areas of variation across awardees, as well as strengths and weaknesses of IIS-based assessments.

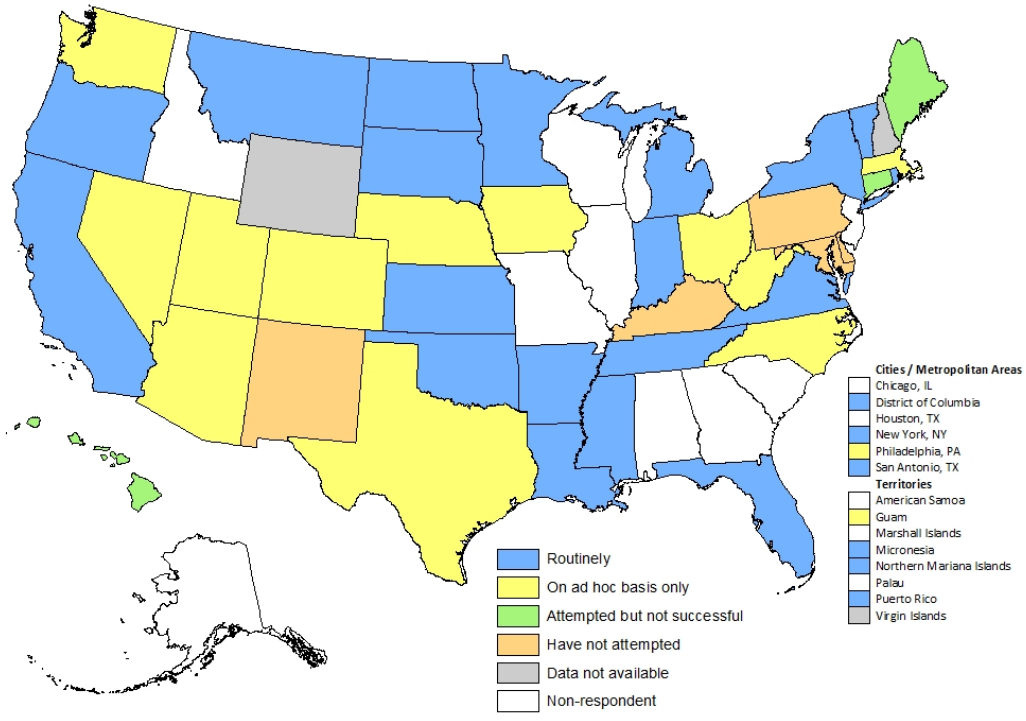
Jurisdiction-Wide Coverage Assessments

General coverage assessments generate vaccination rates for children of a certain age living in a specific jurisdiction (e.g., state, county, clinic population). As shown in Table 2, just over half of respondents report that they routinely use their IIS to conduct population-based immunization coverage assessments for young children, but fewer conduct routine assessments for kindergarten-aged children or adolescents. Fifteen percent (n=7) either have not attempted to use their IIS to conduct coverage assessments, or attempted but were unable to complete the assessment successfully, for any of these age groups. Awardee-specific responses are shown in Maps 4-6.

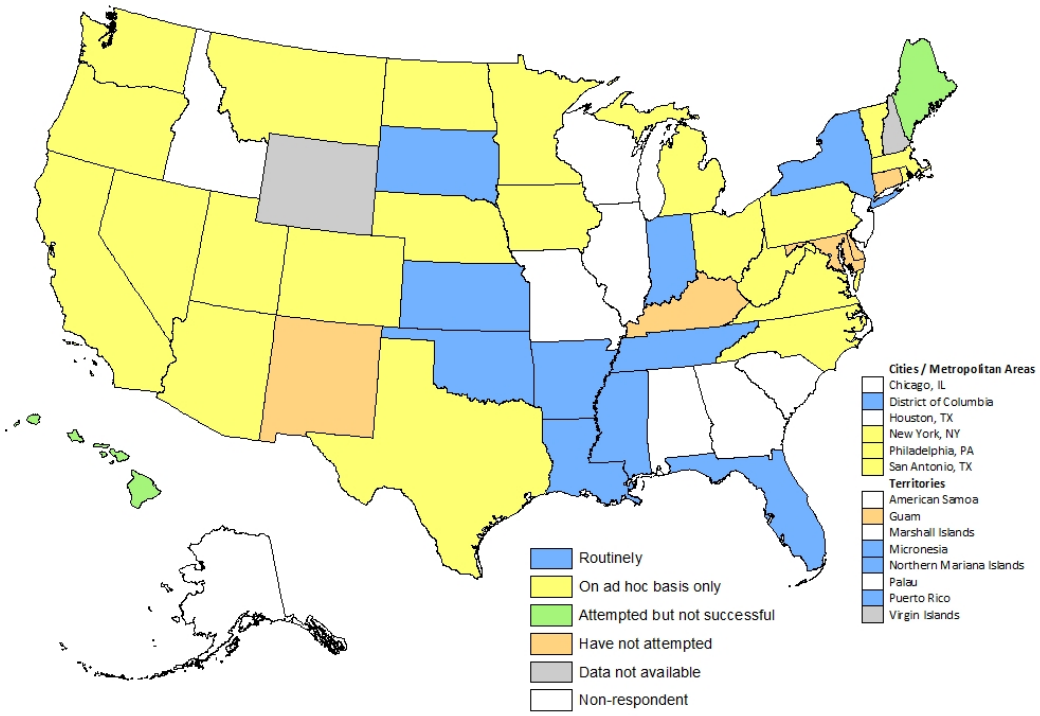
Table 2. Current Awardee Practices for Using IIS for Age-Based, Jurisdiction-Wide Childhood Immunization Coverage Assessments (n=47)

	Routinely	Ad hoc basis	Attempted but not successful	Have not attempted
Infant/preschool age	53%	30%	6%	11%
Kindergarten age	30%	53%	4%	13%
Adolescents	36%	45%	8%	11%

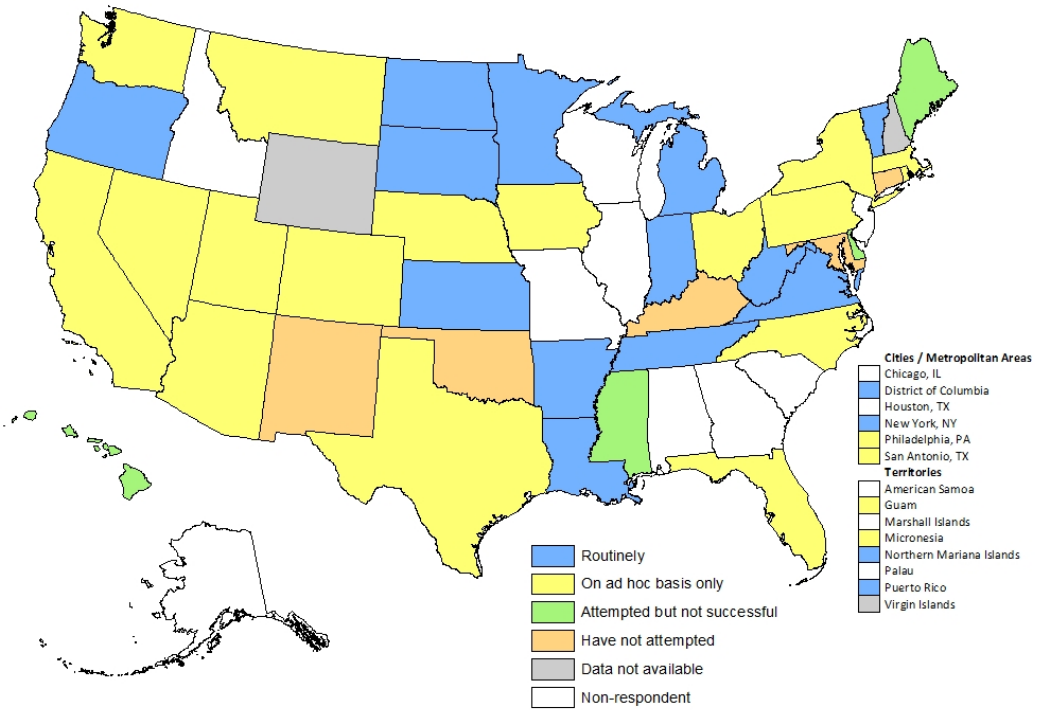
Map 4
IIS Used to Assess Immunization Coverage for Infants / Preschool Age Children



Map 5
IIS Used to Assess Immunization Coverage for Kindergarten Age Children



Map 6
IIS Used to Assess Immunization Coverage for Adolescents



The specifications of coverage assessment vary across awardees in terms of:

- *Reporting mechanism*. Among the 26 respondents that routinely assess coverage for at least one of these age groups, 15 (58%) use both pre-set and customized reports, 3 (12%) use pre-set reports only, 6 (23%) use customized reports only, and 2 did not clarify their mechanism, while the remaining 11 (42%) use one or the other.
- *Report composition*. Among the 26 respondents that routinely assess coverage for at least one of these age groups, most (n=23, 88%) generate rates pertaining to up-to-date for a series; 73% (n=19) also run up-to-date for specific antigens; and 62% (n=16) generate age-appropriate rates.
- *Age targets*. Among respondents who routinely conduct coverage assessments of preschool children, the most common age target is 19-35 months (71%), with others mainly focused on 24-35 months. Of respondents who routinely conduct kindergarten-age coverage assessments, 65% target 4 years of age, while others wait until 5 or 6 years. Of respondents who routinely conduct adolescent coverage assessments, 50% target ages 13-17 years, while 22% include 11-17 years and 17% focus on 11-12 years.

Coverage Assessments for Targeted Populations

In addition to jurisdiction-wide assessments, many respondents use their IIS to conduct coverage assessments for different subgroups of children. As shown in Table 3, the most common type of subgroup assessment involves targeted geographic areas, typically organized by county or local public health jurisdiction; awardee-specific responses are presented in Map 7 (on next page). In comparison, coverage assessments based on program enrollment (e.g., VFC, WIC) are less commonly conducted, and more often not possible with current IIS capability.

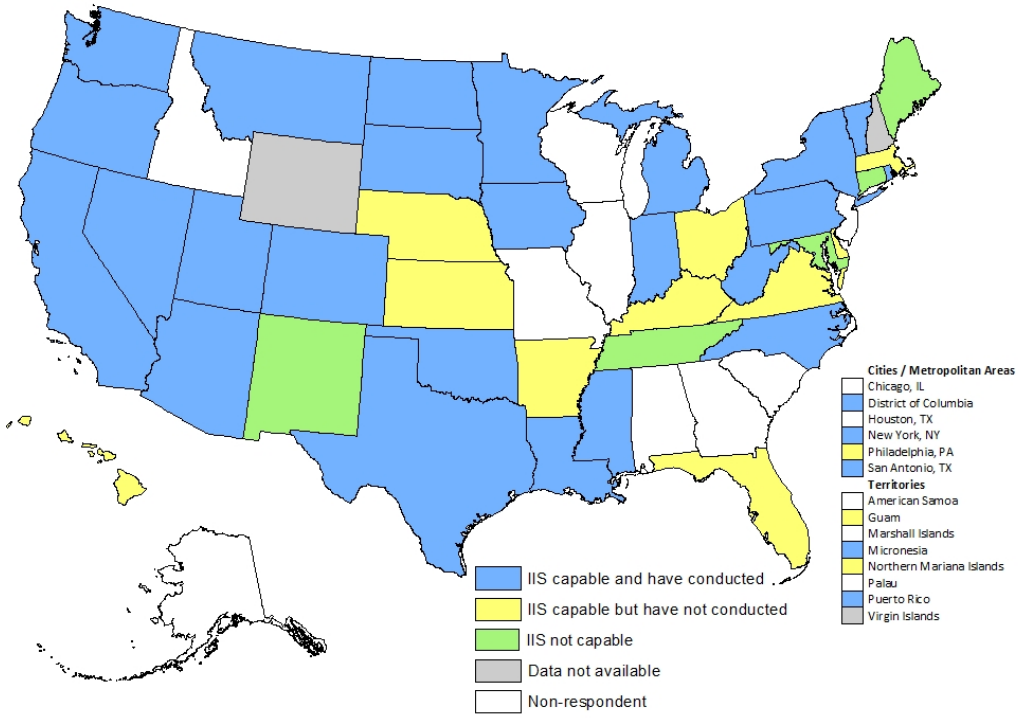
Table 3. Current Awardee Practices for Using IIS for Conducting Childhood Immunization Coverage Assessments among Key Subgroups (n=47)

	IIS capable, have conducted	IIS capable, haven't conducted	IIS not capable
Targeted geographic areas	62%	28%	10%
VFC-eligible children	42%	28%	30%
Children in Medicaid	34%	34%	32%
Children receiving WIC	13%	17%	70%
Insured children	30%	21%	38%

Other IIS-based assessments for children conducted in the last 4 years include: flu vaccination rates for all children (n=23, 50%) and for high-risk children (n=2, 4%); antigen-specific rates during an outbreak (n=22, 48%) or following a vaccine shortage (n=15, 33%); and H1N1 vaccination rates (n=21, 46%).

Although most IIS-based assessments are generated centrally, respondents report that the IIS is used by some local public health departments (n=30, 64%) and private providers (n=29, 63%) to assess their own coverage. Where this occurs, IIS staff typically provide guidance on assessment methods. Less commonly, respondents report that the IIS is used by schools to assess their own coverage (n=8, 17%), with similarly low involvement of IIS staff in providing guidance.

Map 7
IIS Capability for Reporting Immunization Coverage Data for Small Geographic Areas



Strengths and Weaknesses of IIS-Based Childhood Immunization Coverage Assessments

Strengths of IIS-based childhood immunization coverage assessments include:

- Over 80% of awardees are regularly generating preschool coverage assessments. This may be due to program officials' view of the importance of the primary immunization series; perceived or documented better data reporting for preschool vs older children; and readily available points of comparison through NIS state coverage estimates.
- When IIS data are complete and functionality is in place, childhood immunization coverage assessments offer insight into variation in immunization patterns across geographic areas.
- Linkages with programs such as VFC and WIC, or with private and public payers, create the opportunity to examine coverage rates for key subgroups, which can promote follow-up collaboration with those entities to address areas of underimmunization.
- Where staff have training and time, and IIS functionality exists, coverage assessments can generate a broad range of information through the use of customized queries.
- Subgroup coverage assessments can be used by private and public payers as the basis for performance incentives. Where this occurs, the payers may become strong supporters of the IIS, as it offers a cost-effective means of assessing performance.
- Awardees can promote their IIS through IIS-based coverage assessments:

  We have a dashboard with coverage assessment for children 19-35 months in each practice; our system runs it overnight. The dashboard is right there on the screen when the practice pulls up the IIS. We know that people look at it, because when there's a technical problem and the dashboard doesn't appear, we get calls. It's very user-friendly, and highlights the advantages of IIS participation. In a state without mandatory reporting, this is key.

  - Recent change of IIS vendor; no required reporting

Weaknesses of IIS-based childhood immunization coverage assessments include:

- There is substantial variability in the frequency with which awardees conduct IIS-based coverage assessments, particularly for children in older age groups and subgroups.
- There is substantial variation in assessment specifications, including age targets and report composition. While this allows awardees to gain unique insights, the lack of consistency across awardees limits the ability to compare standardized rates.
- IIS data quality and completeness are significant weaknesses for many awardees, particularly those without broad provider participation in their IIS (Table 4).

Table 4. Challenges to Using IIS for Childhood Immunization Coverage Assessments (n=47)

	Major Challenge	Minor Challenge	Not a Challenge
Lack of an IIS record for many children	41%	19%	40%
Duplicate patient records	15%	59%	26%
Multiple records for the same vaccination event	4%	43%	53%
Incomplete history for children 0-6 yrs	43%	43%	14%
Incomplete history for adolescents	62%	34%	4%
Children who no longer reside in jurisdiction	38%	49%	13%
Unreliable or contradictory address information	19%	66%	15%
Overall IIS data quality	55%	36%	9%
Staff expertise	21%	53%	26%
Staff diverted to EHR onboarding	51%	30%	19%
Other competing staff demands	68%	28%	4%
Inadequate staffing level	55%	34%	11%
Inadequate IIS funding	59%	28%	13%

- While awardees have largely solved problems with de-duplicating patient records and multiple records of the same vaccination event, Table 4 demonstrates awardees' ongoing challenges in dealing with children who no longer reside in the jurisdiction. Moreover, variation across awardees and providers in the categorization of children who have Moved Or Gone Elsewhere (MOGE) creates a lack of standardization and impedes the comparability in coverage rates.
- Incorrect address information is more problematic for adolescents than for younger children. Efforts to address poor data quality for this group include exploring different sources for address corrections (e.g., US Postal Service, schools, payers, public health programs). Other strategies to address incomplete immunization data for adolescents involves structuring assessment algorithms to exclude doses recommended at earlier ages:

  We designed our adolescent assessment to focus only on adolescent vaccines, not the entire history. But even given that, we have a lot of missing data. Many kids are sort of in limbo.

  - In-house, established IIS; reporting required for all providers

- Encouraging providers to improve the accuracy and completeness of their adolescent patients' data quality in IIS can be challenging. Many children do not have regular vaccine-oriented encounters after kindergarten age; thus, providers may have few prompts to review and update IIS information. Moreover, most immunization-related quality measures focus on preschool-age children, limiting the extent to which payers are exerting pressure on providers to improve their data quality for older children.

- Conducting a full complement of coverage assessments requires significant staff time. As shown in Table 4, staffing levels and competing demands, rather than staff expertise, pose major challenges to generating coverage assessments for the majority of awardees. Funding challenges are likely to contribute to staffing inadequacy.

Programmatic Uses and Value of IIS-Based Coverage Assessment for Childhood Immunization

As presented in Table 5, respondents report a wide range of current IIS use to support immunization program needs, from near-ubiquitous use of IIS data to complete CDC reports, to more occasional use of IIS assessments in situations of vaccine shortage or surplus.

Table 5. Current Use of IIS to Support Childhood Immunization Program Needs (n=49)

Program Needs	Currently use IIS	For how long… <1 yr	1-4 yrs	5+ yrs
Completing CDC reports	92%	2%	27%	71%
Identifying areas of low vaccination coverage	67%	9%	38%	53%
Comparing with other assessment data (e.g., NIS)	67%	11%	37%	52%
Evaluating impact of special projects	63%	*situational*		
Using as internal quality benchmarks	61%	6%	47%	47%
Responding to outbreaks or pandemics	59%	*situational*		
Tracking uptake of new vaccines & recommendations	57%	*situational*		
Supplying data for health plan quality measures	55%	7%	32%	61%
Assessing impact of new school/daycare requirements	45%	*situational*		
Assessing impact of vaccine shortages	39%	*situational*		
Informing about how to deploy surplus vaccine	35%	*situational*		

Many awardees that currently use their IIS to conduct routine activities have been doing so for five years or more (Table 5, right-hand columns); few have begun new assessment activities in the past year. *Note that situational activities by definition are not expected to be needed every year, so respondents were not asked to report when they initiated assessment activities.*

Respondents were asked to consider the potential value of IIS data to support program needs, in the event that their IIS barriers could be overcome. These value ratings represent a sort of "wish list" for IIS programmatic support, in a way that minimizes the real-world challenges (e.g., data quality, staffing). Table 6 presents respondents' ratings of high, medium or low value.

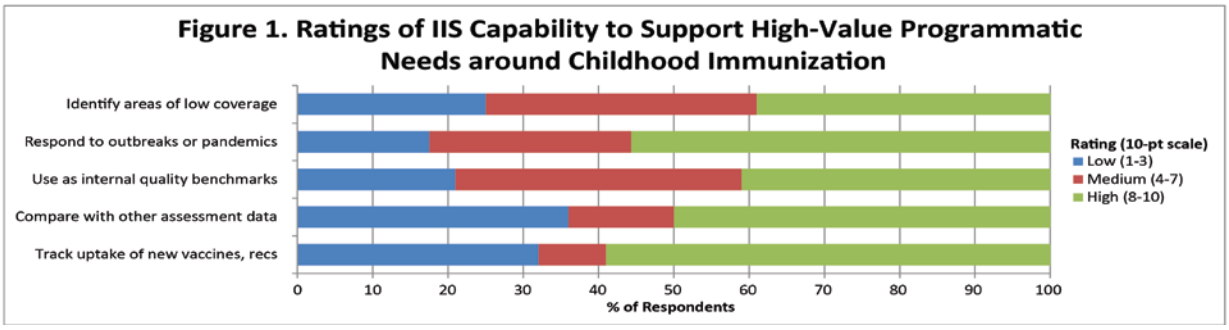
Table 6. Value of IIS Data to Support Childhood Immunization Program Needs (n=49)

Program Needs	*Programmatic Value of IIS Data* Low	Medium	High
Completing CDC reports	2%	29%	69%
Identifying areas of low vaccination coverage	2%	16%	82%
Comparing with other assessment data (e.g., NIS)	12%	35%	53%
Evaluating impact of special projects	18%	41%	41%
Using as internal quality benchmarks	4%	27%	69%
Responding to outbreaks or pandemics	4%	18%	78%
Tracking uptake of new vaccines & recommendations	18%	33%	49%
Supplying data for health plan quality measures	27%	49%	24%
Assessing impact of new school/daycare requirements	14%	41%	45%
Assessing impact of vaccine shortages	8%	55%	37%
Informing about how to deploy surplus vaccine	30%	37%	33%

Overall, respondents placed a higher value on IIS support for program areas that can be done on a routine basis. For 4 of the 5 program areas where awardees could use IIS data routinely (*completing CDC reports, identifying areas of low vaccine coverage, comparing with other assessment data, using as internal quality benchmarks*), more than half of respondents rated the value of IIS as high; the exception was *supplying data for health plan quality measures*.

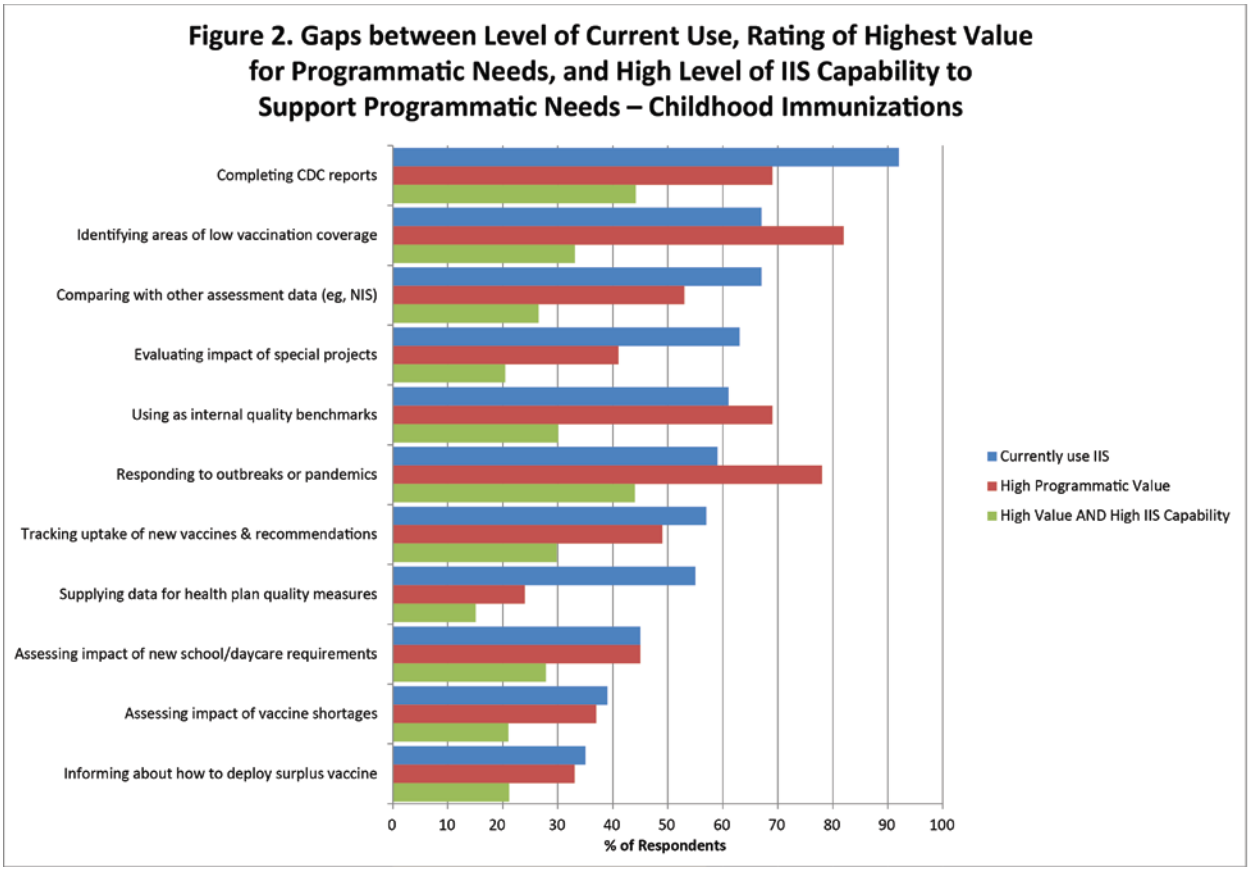
In contrast, less than half of respondents gave a high-value rating for 5 of 6 areas where awardees could use IIS data when certain situations arise (*evaluating impact of special projects, tracking uptake of new vaccines/recommendations, assessing impact of new school/daycare requirements, assessing impact of vaccine shortages, informing about how to deploy surplus vaccine*); the exception was *responding to outbreaks or pandemics*. The higher value placed on responding to outbreaks and pandemics is consistent with time-sensitive nature of those events.

For the specific areas they rated as high value, respondents then rated their current IIS capability on a scale of 1-10. Ratings of 1-3 were categorized as low capability, 4-7 as medium capability, and 8-10 as high capability. Among five high-value areas shown in Figure 1, respondents varied considerably in their IIS capability ratings, ranging from only 39% with a high capability rating for *identifying areas of low vaccination coverage* to nearly 61% for *tracking uptake of new vaccines*. On the opposite end of the scale, the greatest proportion of low capability ratings was given for *comparing with other assessment data*.



Note: each respondent gave IIS capability ratings only to those areas he/she rated as high value.

Figure 2 synthesizes awardees' responses across all three aspects of programmatic support: **blue** bars show the proportion of awardees that report current IIS use in each area; **red** bars show the proportion rating the area as high value, if IIS barriers could be overcome; and **green** bars show the proportion with both a high value and a high IIS capability rating.



As demonstrated in Figure 2, ratings of both high value and high IIS capability were uncommon; only 2 of 11 program areas (*completing CDC reports, responding to outbreaks or pandemics*) were rated as both high value and high IIS capability by over 40% of respondents, and none were rated as both high value and high capability by over 50% of respondents. Clearly there is room for improvement in IIS support for childhood immunization program needs.

A critical question is where to invest limited resources to expand the use of IIS to support program needs. In exploring this question, the patterns in Figure 2 suggest four groupings:

1) *Gaps where programmatic value is substantially greater than current IIS use*: For two areas (*identifying areas of low vaccination coverage, responding to outbreaks or pandemics*), the proportion rated as high value was more than 10 percentage points higher than the proportion of current IIS use. In other words, current activity is not at the desired level, even though awardees perceive high value. Strong consideration should be given to investing in IIS capabilities in these areas; this will likely require improving the quality of address information, in order to target geographic areas for coverage assessment.
2) *Gaps where current IIS use is substantially greater than programmatic value*: For four areas (*completing CDC reports, comparing with other assessment data, evaluating the impact of special projects*, and *supplying health plan quality measures*), the proportion of current IIS use was more than 10 percentage points higher than the proportion rated as high value. In other words, current activity is beyond the desired level. While there should be no action to decrease awardees' use of IIS, there is no compelling reason to invest resources in expanding IIS capabilities in these areas.
3) *Similarities where current IIS use is relatively close to programmatic value*: For three areas (*using as internal quality benchmarks, tracking uptake of new vaccines and recommendations, assessing the impact of school/daycare requirements*), the proportion of current use was within 10 percentage points

of the proportion rated as high value. Given the relative evenness of value and use, there is no compelling reason to focus on these areas for investments in IIS capabilities. However, it is likely that investments made in support of other programmatic areas (e.g., *identifying areas of low vaccination coverage*) would also create enhanced IIS capability for this group.

4) *Similarities where both current IIS use and programmatic value are low*: Two areas (*informing about how to deploy surplus vaccine, assessing the impact of vaccine shortage*s) had less than 40% of respondents who endorsed current use and high value. These areas are not good candidates for broad investment in IIS capabilities, although individual awardees may choose to prioritize them.

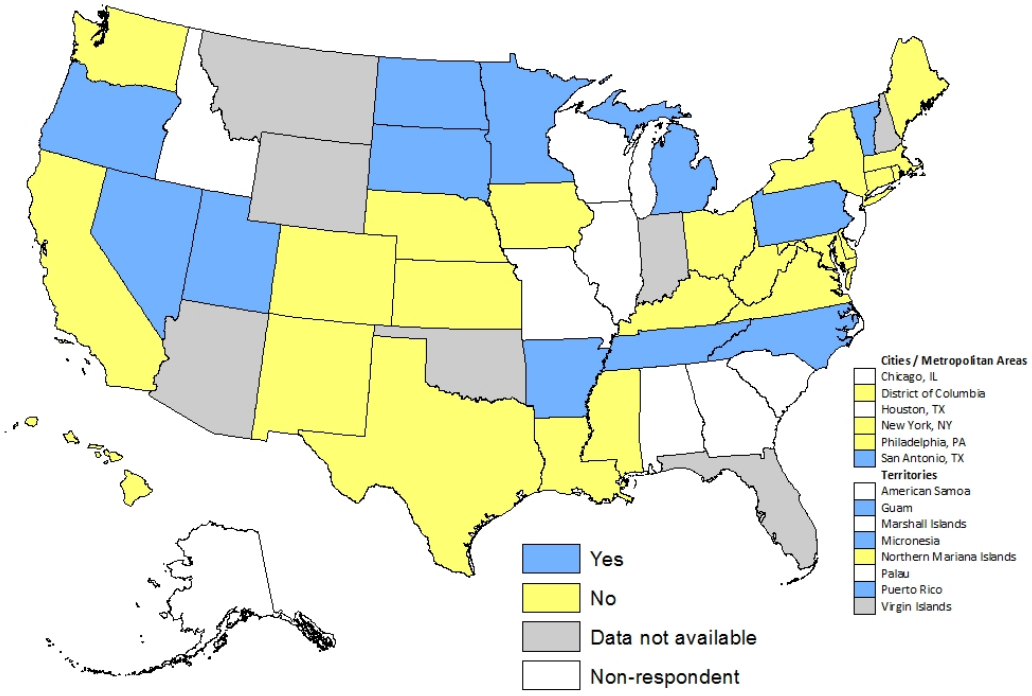
Overall, IIS-based childhood immunization coverage assessments are conducted by many awardees. Strengths include assessments of preschool-aged children, and linkages with payers and other public health programs, which enable targeted assessments. Weaknesses include ongoing issues with data quality, staffing levels and competing demands, and variation in how assessments are conducted, limiting the ability to compare awardee-generated coverage rates across awardees. Areas where respondents report a gap between high programmatic value and lower IIS capability represent strong candidates for future investment.

General Coverage Assessments for Adult Immunization

At the time of data collection for this study, 47 of 50 participating awardees included adults in their IIS (see Table 1). However, the inclusion of adult immunization data in IIS is significantly different as compared to children. Some of this difference is a historical artifact of the evolution of IIS, whereby the initial focus was on IIS as a mechanism to improve the nation's low childhood immunization rates. At the same time, privacy issues were perceived as more concerning for adults than children. The impact of privacy concerns is still apparent, as only 10 IIS have required reporting for all adults, and another 13 have required adult immunization reporting only for pharmacies. Opt-in consent policies are more common for adults than children.[12] Overall, the current IIS landscape does not fully support adult assessment.

Consistent with the disparity in IIS-supportive policies, the use of IIS to generate coverage assessments occurs much less frequently for adult immunizations than for childhood immunizations. Almost one quarter of respondents (n=11, 24%) reported no current use of IIS-generated coverage data for adults. Among the 35 respondents who did report using IIS-generated coverage data for adults, the most common IIS-based assessment activity for adults in the past 4 years has involved H1N1 vaccination patterns (n=20, 61%). With regard to non-pandemic assessments, some awardees use their IIS to generate seasonal influenza vaccination rates for all adults (n=15, 45%) or seniors (n=11, 33%); awardee-specific adult influenza assessments are shown in Map 8. Fewer generate vaccination rates for pneumococcal (n=9, 27%) or zoster (n=6, 18%) vaccine.

Map 8
IIS Used to Assess Adult Influenza Coverage in Last Four Years



[12] Sources: CDC survey on IIS legislation (http://www2a.cdc.gov/vaccines/iis/iissurvey/legislation-survey.asp), updated through direct contact with IIS staff.

Strengths and Weaknesses of IIS-Based Coverage Assessment for Adult Immunizations

Strengths of IIS-based adult immunization coverage assessments include:

- Increasingly, immunization recommendations straddle the line between childhood and adulthood (e.g., human papillomavirus (HPV) vaccine for 11-26 years; pertussis booster doses for pregnant women and adults in contact with vulnerable infants). Having a lifetime immunization record facilitates coverage assessments across age groups. Most IIS are already positioned to collect doses for adults.
- As a mechanism to centralize disparate records, IIS are well-suited for adult assessment. Adults are more likely than children to receive vaccines at non-traditional locations, including pharmacies and workplaces; within the medical setting, there are many more adult immunization providers than child immunization providers, and individuals may not stay with the same provider throughout adulthood. Thus the benefit of a centralized IIS record, with population-based coverage assessment, for adults is significant.
- In some states, expanded pharmacist involvement with immunization has included requirements for pharmacists to report doses administered to an IIS. Mandatory reporting for non-traditional immunization providers is essential to improving the validity of IIS-based adult coverage assessments.
- As IIS become interoperable with electronic health records (EHRs), there is potential for providers to send vaccination data for patients of all ages (i.e., not limited to children), which represents an efficient means to increase IIS data completeness. Federal "Meaningful Use" incentives may prompt more adult providers to engage with IIS.
- In recent years, awardee requirements about adult immunization have expanded; IIS-based assessment is an important tool to gauge progress toward meeting those requirements.

Weaknesses of IIS-based adult immunization coverage assessments include:

- A substantial number of awardees face non-supportive IIS policies, including requiring adults to opt-in to the IIS and limits on IIS data sharing. These policies severely undercut awardees' ability to increase the proportion of adult residents included in the IIS.
- Some adult immunization requirements are based on clinical risk factors; information with which to identify adults with certain clinical risk factors (i.e., those recommended for vaccination) is not available in IIS.
- IIS data quality and completeness was the most commonly cited "major challenge" for awardees (Table 7). While IIS records for children are usually populated in conjunction with birth records, there is no comparable mechanism for adults. In addition, provider reporting requirements are less common for adult than for child immunizations.

Table 7. Challenges to Using IIS for Adult Immunization Coverage Assessments (n=45)

	Major Challenge	Minor Challenge	Not a Challenge
IIS data quality/completeness	73%	22%	4%
Inadequate staffing level	67%	20%	13%
Other competing staff demands	64%	31%	4%
IIS funding	53%	24%	22%
IIS functionality	44%	29%	27%
Staff diverted to EHR onboarding	42%	31%	27%
Staff expertise	33%	44%	22%

- Data quality and completeness was the most frequently cited "major challenge" for awardees.
- Two-thirds of awardees cited inadequate staffing and competing staff demands as "major challenges" to conducting adult coverage assessments (Table 7). Because IIS may not have preset algorithms for adult

immunization recommendations, more time may be required to generate coverage assessments for adults than children. In addition, extra staff time may be needed to determine how best to deal with data quality issues.

- Adult coverage assessments for targeted geographic areas are problematic. Many adults do not have regular encounters with a medical provider; as such, it is unclear who would have adequate knowledge of, and responsibility for noting in the IIS, patients moving out of jurisdiction. Young adults present a unique set of problems in this area, as they may have several temporary moves before establishing a permanent adult home. As such, MOGE standards used for children may not be as applicable for adults.

Programmatic Uses and Value of IIS-Based Adult Immunization Coverage Assessment

Overall, respondents' current IIS use to support immunization program needs was lower for adult than for childhood immunization (Table 8). Nearly two-thirds of respondents use their IIS for *completing CDC reports*; a sizable proportion reported current IIS use for *responding to outbreaks or pandemics* (44%) and *evaluating the impact of special projects* (36%). For 6 of 9 adult program needs, current use of IIS was reported by less than one quarter of respondents.

Table 8. Current Use of IIS to Support Adult Immunization Program Needs (n=45)

	Currently Use IIS
Completing CDC reports	63%
Identifying areas of low vaccination coverage	11%
Responding to outbreaks or pandemics	44%
Using as internal quality benchmarks	22%
Comparing with other assessment data	24%
Tracking uptake of new vaccines & recommendations	18%
Evaluating impact of special projects	36%
Informing about how to deploy surplus vaccine	18%
Supplying data for health plan quality measures	17%

Respondents were asked to consider the potential value of IIS data to support program needs around adult immunization, in the event that their IIS barriers could be overcome. These value ratings represent a "wish list" for IIS support, in a way that minimizes their challenges (e.g., data quality, staffing). Table 9 presents respondents' ratings of high, medium or low value.

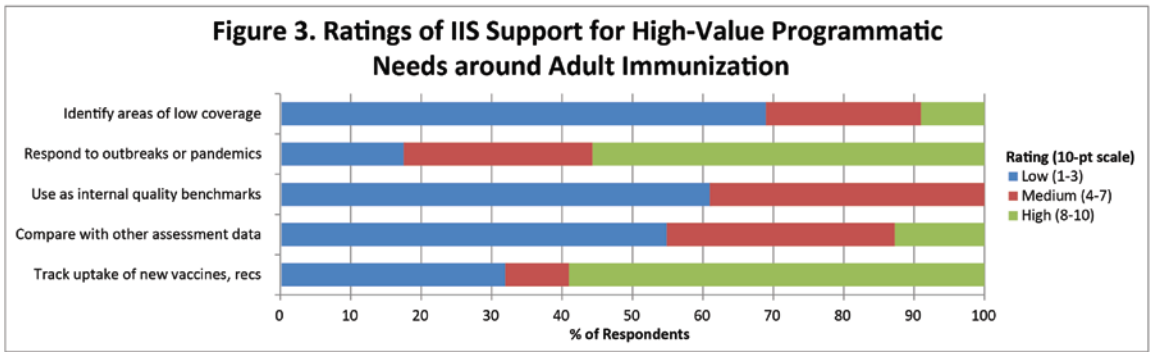
Table 9. Value of IIS Data to Support Adult Immunization Program Needs (n=45)

	Low Value	Medium Value	High Value
Completing CDC-required reports	2%	42%	56%
Identifying areas of low vaccination coverage	2%	18%	80%
Responding to outbreaks or pandemics	4%	27%	69%
Using as internal quality benchmarks	2%	49%	49%
Comparing with other assessment data	16%	44%	40%
Tracking uptake of new vaccines & recommendations	18%	42%	40%
Evaluating impact of special projects	13%	51%	36%
Informing about how to deploy surplus vaccine	31%	44%	24%
Supplying data for health plan quality measures	31%	47%	22%

Only three program areas (*identifying areas of low vaccine coverage, responding to outbreaks or pandemics, completing CDC reports*) were rated by more than half of respondents as high value. For all program areas, the proportion of high-value ratings was lower for adult than for childhood immunization (Table 9 vs Table 6).

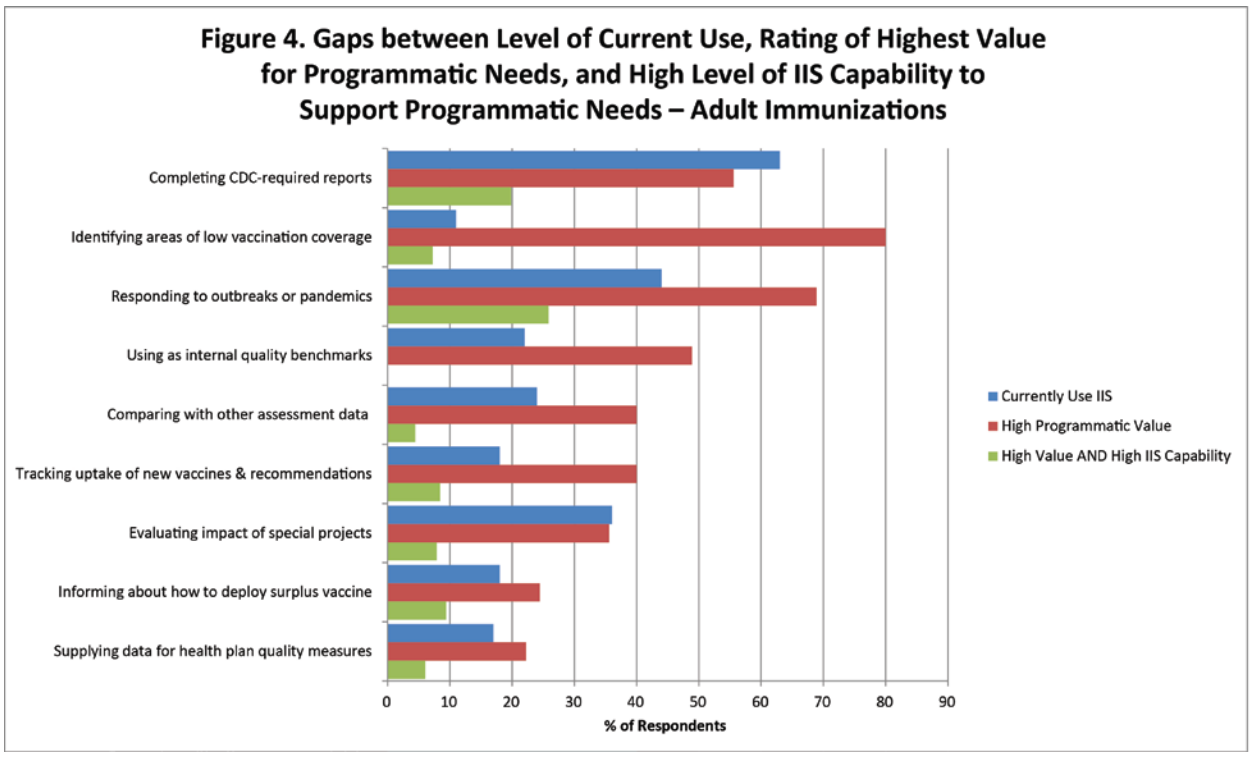
For the specific areas they rated as high value, respondents then rated their current IIS capability on a scale of 1-10, categorized as low (1-3), medium (4-7), or high (8-10). Among five high-value areas shown in Figure 3, respondents varied considerably in their IIS capability ratings. For two areas *(responding to outbreaks or pandemics, tracking uptake of new vaccines)*, over half of respondents gave high capability ratings. Conversely,

over half of respondents gave low capability ratings for *identifying areas of low vaccination coverage, using as internal quality benchmark*, and *comparing with other assessment data*.



Note: each respondent gave IIS capability ratings only to those areas he/she rated as high value.

Figure 4 synthesizes responses across all aspects of programmatic support: **blue** bars show the proportion reporting current IIS use; **red** bars show the proportion rating the area as high value; and **green** bars show the proportion with both a high value and a high IIS capability rating.



As demonstrated in Figure 4, ratings of both high value and high IIS capability were uncommon; only 2 areas (*completing CDC reports, responding to outbreaks or pandemics*) were rated as both high value and high IIS capability by ≥20% of respondents. All other areas were rated as both high value and high IIS capability by less than 10% of respondents; not a single respondent rated *using as internal quality benchmark* as both high value and high capability. There is tremendous room for improvement in how well IIS support adult immunization program needs.

A critical question is where to invest limited resources to expand the use of IIS to support adult program needs. The patterns in Figure 4 suggest four groupings:

1) *Gaps where programmatic value is high and substantially greater than current IIS use*: For two areas (*identifying areas of low vaccination coverage, responding to outbreaks or pandemics*), the proportion rated as high value was >20% more than the proportion of current IIS use, and value was rated as high by more than half of respondents. In other words, current activity is not at the desired level, even though the majority of awardees perceive high value. These two program areas also had value/use gaps for childhood immunization. Strong consideration should be given to investing in IIS capabilities in these areas; this is likely to require policy changes to expand the proportion of the adult population included in IIS, as well as improving the completeness and quality of address information, in order to target geographic areas for coverage assessment.
2) *Gaps where current IIS use is substantially greater than programmatic value, but value level is lower*: For three areas (*using as internal quality benchmarks, comparing with other assessment data, tracking uptake of new vaccines and recommendations*), the proportion of current IIS use was >10% more than the proportion rated as high value. In other words, current activity is beyond the desired level. However, the overall proportion of awardees rating these activities as high value was <50%. Therefore, prioritization of resources may need to be lower, relative to the group described above.
3) *Similarities where current IIS use is relatively close to with programmatic value*: For two areas (*completing CDC reports, evaluating the impact of special projects*), the proportion of current use was within 10% of the proportion rated as high value. Given the relative evenness of value and use, there is no compelling reason to focus on these areas for investments in IIS capabilities. However, it is likely that investments made in support of other programmatic areas would also enhance IIS capability for these areas.
4) *Similarities where both current IIS use and programmatic value are low*: Two areas (*informing about how to deploy surplus vaccine, supplying health plan quality measures*) had less than 25% of respondents who endorsed current use and high value. These areas may not be good candidates for broad investment in IIS capabilities. However, it is possible that other improvements may enhance the quality and completeness of adult IIS data, to the point where IIS can be used to support health plan quality measures.

IIS-based adult immunization coverage assessments are currently used in a limited fashion, but would have benefit, due to the breadth of immunization providers and irregular vaccine receipt for adults. Changes in policies around consent and required reporting—as well as broader relationships with payers and adult immunization providers, perhaps through EHR interoperability—may be key to improving data completeness to the point where adult coverage assessments can be conducted by the majority of awardees.

Next Steps: the Role of AIRA in Supporting IIS-Based Coverage Assessments

IIS and immunization personnel clearly value the role of AIRA in supporting efforts to expand the use of IIS for coverage assessment. Survey respondents identify the following priorities.

Support for IIS-Based AFIX Reporting: Expansion of IIS use for AFIX activities calls for AIRA leadership in several key areas.

1. Establishing consensus on a minimum set of AFIX reports: In the current landscape, most awardees have some IIS involvement in AFIX (as the source of immunization data and/or as the system to run AFIX reports). However, there is wide variation in which reports are run. Several survey respondents described frustration over not knowing exactly what was needed for AFIX. A useful first step may be to establish a working group of both IIS representatives and immunization program representatives (leadership and staff directly involved in AFIX), along with CDC officials, to create a tiered priority list for AFIX activity (e.g., Tier 1 as core reporting, Tier 2 as enhanced reporting, Tier 3 as highest-level reporting). The benefit of a tiered approach is that it establishes minimum criteria, while allowing for the range of AFIX strategies currently employed across awardees.
2. Developing technical assistance, including logic guidance, for the full complement of AFIX reports: Once a prioritization scheme is established, AIRA will need to develop technical assistance for each priority level, starting with core reporting. Survey responses show strong support for AIRA involvement here: 76% respondents (n=34) cite a general need for clarification on the changes that must be made to IIS to generate all needed AFIX reports. More specifically, 38% (n=17) need guidance on how to calculate AFIX rates and 24% (n=11) need clarification on how to attribute children to a provider/practice for AFIX, including whether there are inconsistencies in patient attribution between AFIX and other types of assessments.
3. Developing and disseminating AFIX standards: Three quarters of respondents (n=34, 76%) need to improve functionality in order to generate AFIX reports. For awardees using a common vendor with consistent functionality (e.g., STC), enhancements to functionality may occur primarily through a platform purchase or upgrade, and the AIRA role is to ensure that the vendor and its working groups have updated information on a reporting prioritization scheme and accompanying technical assistance. For awardees using in-house or isolated platforms, or those using platforms with substantial variability across IIS (e.g., WIR), the AIRA role likely includes advocating for funding or open-source programming for IIS technical enhancements to enable AFIX reports.
4. Providing co-training opportunities for IIS and AFIX staff: Training opportunities are needed for using new functionality or applying new technical criteria. Awardees with limited IIS use for AFIX have the greatest interest in training: of the 5 respondents who currently are not using their IIS as the source of AFIX immunization data, 100% endorse hands-on training opportunities and 80% endorse the compilation of an experts list. Regardless of current IIS use for AFIX, consideration should be given to holding combined training for both IIS and AFIX staff. Co-training would have the advantage of allowing IIS staff to better understand how AFIX staff use the IIS in the field during AFIX visits, and allowing AFIX staff to speak a common language with their IIS counterparts when troubleshooting. AIRA collaboration with AIM in the planning of combined training may enhance its relevance for both audiences. With the irregular timing of the National Immunization Conference, there may be few options for in-person training with both groups in attendance; therefore, webinars may be the most effective delivery mode for co-training.
5. Advocating for studies of the effect of IIS-based AFIX reporting: Finally, AIRA may wish to advocate for future research into the effect of expanded AFIX reporting vs core reporting on provider immunization rates and improvement in target immunization practices. This type of research would allow IIS and immunization program officials to devote more resources to high-impact activities.

***Support for IIS-Based Childhood Immunization Coverage Assessments**:* Respondent views on how AIRA should support general childhood immunization coverage assessment focus on specification of processes, technical assistance, and enhanced IIS functionality.

1. Updating and disseminating guidance on how to generate and interpret assessment results: About half of respondents endorse the need for detailed guidance on running childhood coverage assessments, such as standard operating procedures (i.e., data fields and formulas needed to do the calculations) for jurisdiction-wide assessments (n=21, 47%), as well as guidance on how to evaluate the validity of results (n=22, 49%). A key challenge is how to address the known variability in current assessment practices, related to age targets, report composition, and availability of preset reporting. Convening a working group that includes both IIS and immunization program officials may be useful in debating the relative merits of standardized processes (which push all IIS to use exactly the same criteria and operations) vs an array of best practices (which allow for awardee variation).
2. Leading a structured discussion about standardization vs best practices: The need for guidance on data quality issues such as MOGE (Moved Or Gone Elsewhere) status, patient attribution and ownership, and threshold for accepting historical data, was cited by 62% (n=28) of respondents. However, respondents were divided in how the assistance should be structured: some respondents opine that standard business rules should be developed by consensus and then implemented across all IIS, while others note that data quality issues are impacted by IIS functionality and policy, and therefore a "best practices" approach would be more helpful. Moreover, questions exist as to whether guidance should vary for assessments of different age groups, and whether the benefit of new data sources (e.g., through payers or electronic health records) may supersede standards for accepting historical data. MIROW workgroups are well positioned to discuss these issues.
3. Developing profiles of successful partnerships that describe the mutual benefits of collaboration between IIS and partner entities: Coverage assessments for different subgroups can be facilitated through linkages with partners in Medicaid, private payers, and WIC. In many cases, these linkages emanate from personal relationships between officials at the state, city or territorial level. There is potential benefit for AIRA to advocate for broader partnerships, by reaching out to organizations of Medicaid, private payer and WIC officials, and by developing profiles of successful partnerships that awardees can use to explain the value of collaboration.
4. Issuing guidance on how vendors/platforms should incorporate recommended functionality for coverage assessment: Nearly half of respondents (n=21, 47%) indicated a need to improve IIS functionality in order to conduct routine coverage assessments; 24% (n=5) report that enhancements are underway, 38% (n=8) are in the planning stages, and a third (n=7) are waiting for funding. As noted above, the process for improving functionality varies depending on whether an awardee is purchasing a new platform or upgrading their existing system, on the vendor/platform itself, and on whether the IIS staff must guide the enhancement vs relying on vendor collaboration with AIRA/CDC or an existing vendor workgroup. Support from AIRA would include guidance on which vendors/platforms incorporate recommended functionality for coverage assessment; the availability and cost of customized assessment reporting; and strategies for selecting a vendor/platform that supports assessment. Additionally, AIRA should identify opportunities to advocate for centralized funding or other support for open-source programming, to aid awardees with in-house or unique IIS platforms.

***Support for IIS-Based Adult Immunization Coverage Assessments**:* Respondent views on AIRA support for adult immunization coverage assessment focus on policy barriers and data quality.

1. Advocating for IIS-supportive policies around adult immunization: The key to broader use of IIS for adult coverage assessment is improved data completeness; on the CDC's 2012 IIS Annual Report, only 10 of 64 awardees reported IIS participation for >50% of their adult residents. Respondents to this survey strongly felt that IIS-supportive policies were critical to increasing the amount of adult immunization data in IIS, and that AIRA should play an important role in advocating for such policies. An initial step

could involve the creation of a summary document (e.g., a fact sheet) that highlights the growing importance of adult immunization, the role of IIS in centralizing data on vaccines given across a plethora of provider sites, and the need for policies that facilitate data sharing to populate IIS, as well as mandatory reporting for physicians, pharmacists, and other immunization providers. Collaboration with partners such as the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO) may provide insight into effective strategies to promote IIS-supportive policy changes.

2. Issuing guidance on strategies for adult coverage assessment in the context of a suboptimal data environment: Nearly all respondents (89%) endorse the need for a library of standard operating procedures around adult coverage assessment. However, given the current landscape of relatively low adult participation in IIS, standardization may be problematic. Rather, guidance should provide best practices as well as strategies for assessment in the context of a suboptimal data environment. In developing such guidance, AIRA should bring together both IIS and immunization program officials, to ensure that guidance has both technical and programmatic value.
3. Encourage IIS to solicit adult immunization data through EHR-IIS interoperability: Electronic health records (EHRs) and federal meaningful use incentives have significant potential to add new adult records to IIS. Although early efforts around IIS-EHR interoperability appear to focus on childhood immunizations, AIRA should encourage awardees to establish interoperability parameters that include adult records from childhood immunization providers (e.g., family physicians) and to solicit adult providers (e.g., internal medicine practices) to participate in EHR-IIS data exchange. Such exchanges may also include clinical data points that would then have the enhanced benefit of forecasting patient eligibility for vaccines that are based on clinical risk factors. In addition, AIRA should continue to work with CDC and other partners to disseminate guidance on maximizing IIS-EHR data exchange.

Support for High-Value Programmatic Areas with Low IIS Use*:* Analysis of survey responses point to two areas (*identifying areas of low vaccination coverage, responding to outbreaks or pandemics*) rated as high programmatic value but with a significantly lower level of current IIS activity.

1. Disseminating information about strategies to deal with missing or conflicting address information: These areas require accurate address information for individuals in the IIS. However, address information is known to be less accurate for older vs younger children, and little is known about address data quality for adults. A valuable role for AIRA would be to disseminate information about the pros and cons of different strategies to deal with missing or conflicting address information, including exploring different sources for address corrections (e.g., US Postal Service, schools, payers, public health programs).
2. Providing technical assistance on targeted assessment, including geocoding and mapping: Many respondents desire technical assistance through AIRA to be able to conduct and report assessments of target geographical areas, including guidance on how to deal with multiple addresses. Also desired are training opportunities in geocoding and mapping, as the visual display of vaccination patterns can be helpful.
3. Developing strategies for using alternative denominator information to compensate for IIS data limitations, when needed: The ability to identify pockets of underimmunization, either on a routine basis or in an outbreak situation, is difficult without a well-populated IIS. In the absence of a well-populated IIS, other data sources (e.g., Census estimates) may offer usable denominator information with which to assess available IIS data on vaccine doses administered. Though not a substitute to population-based assessment, AIRA leadership on developing and disseminating alternate strategies for evaluating vaccination patterns under less-than-ideal data conditions would enhance IIS support of high-value programmatic needs, particularly for older children and adults.

General AIRA Support: Beyond the efforts described above, respondents identified numerous ways in which AIRA should be supporting IIS-based assessments.

1. Continuing to provide training and mentorship opportunities: AIRA is viewed as a unique hub of IIS-focused training. The majority of respondents endorsed ongoing training opportunities through AIRA, including webinars (89%), hands-on training at conferences (58%), and a library of standard operating procedures (89%). Support for training did not differ by the extent to which the awardee is currently conducting IIS-based assessment, or by IIS features. Rather, all awardees—even those with excellent functionality—have staff turnover, seek to initiate new activities, and/or need to update their existing processes. Several respondents encouraged AIRA to expand its efforts to mentor IIS staff at different levels, to facilitate the steep learning curve and promote sharing of strategies and solutions.
2. Ensuring that IIS vendors incorporate accepted functionality into their products: Several respondents noted the importance of strong AIRA leadership in ensuring that IIS vendors incorporate accepted standards (e.g., MIROW guidelines) and functionality into their products. AIRA guidance on writing and evaluating vendor Requests for Proposals would benefit awardees with limited experience in these areas.
3. Urging EHR vendors to incorporate functionality that supports coverage assessments: AIRA has a role in advocating nationally with EHR vendors to incorporate routinely the key functionality that facilitates coverage assessment, without additional charges to providers. This includes mechanisms to identify and address data errors, and bidirectional immunization data exchange. AIRA's role should also include informing and updating the IIS community about vendor capabilities around data exchange.
4. Serving as the voice of the IIS community to CDC: Numerous survey respondents commented on the need for AIRA to advocate with CDC on behalf of the IIS community. Specific areas mentioned include: allowing reasonable timeframes for implementing new IIS-related requirements; assisting in-house IIS with either funding directed to IIS upgrades or funding for open-source programming that could benefit multiple awardees; understanding the impact of the variation in IIS structures and current capability across awardees, recognizing that in some situations, one size does not necessarily fit all; and the formation of a national strategy to promote IIS-supportive policies at the local, state and federal level.

As noted by one participant:

> *AIRA is perfectly positioned to bring the IIS community, Immunization Program community, vendor community, and CDC together to develop in-depth business rules and specifications surrounding AFIX and small-area analysis. It would be very helpful to consider this development happening in a modular way so that like functionality and tools could be leveraged across our community, further supporting standardization and efficient use of resources.*

Appendix A – Full Survey

Use of IIS for Immunization Coverage Assessment

This survey collects information regarding the use of immunization information systems (IIS) for conducting immunization coverage assessments. The purpose is to document the broad range of IIS experiences and identify areas where additional guidance and best practices may be needed. In addition, select results highlighting IIS procedures and functionality by grantee may be available to the public on the Association of Immunization Manager's (AIM) VaxFacts website.

The first part of the survey asks questions about coverage assessments for children, followed by a section specific to adults. The survey should take about 10-15 minutes to complete.

Please answer for your program (survey references to "you" are shorthand for your program). Feel free to consult with others within your program as needed.

Your responses on each page are recorded when you click "Next" to advance the survey. Please use the "Next" and "Back" buttons at the bottom of the page to navigate through the survey, rather than your internet browser's arrow buttons. Please use the comment boxes for brief clarification, where applicable.

For some questions, you will be prompted to provide a response if no answer is provided. These are considered core questions; please provide a response if possible.

If at any time you wish to stop the survey and return at a later time:
1. Click "Next" to save your most recently entered responses (the page will advance)
2. Click "Continue Later" at the bottom of the page
3. In most internet browsers (e.g., Internet Explorer), your browser window will then close automatically; if not (e.g., Firefox, Google Chrome), simply close your browser window to exit the survey
4. To return to the survey, click on the link provided in your survey invitation email

The first set of questions pertains to using your IIS for AFIX assessments.

Q1. Currently, to what extent is your IIS used as the source of immunization history data for AFIX assessments? ***This is a core question; please provide a response.***

1. IIS data used exclusively for all providers
2. IIS data used exclusively for some providers; for other providers, other data sources (e.g., chart review) used as source or to supplement IIS data
3. IIS data usually or always supplemented with other data sources (e.g., chart review)
4. IIS not used as source of immunization history data for AFIX assessments

[IF Q1=2, 3 OR 4, ASK Q1A]

Q1a. Which of the following limit your ability to use IIS data exclusively for AFIX assessments?

YES/NO Lack of an IIS record for many children
YES/NO Duplicate patient records
YES/NO Multiple records for the same vaccination event
YES/NO Incomplete immunization history for children 0-6 years
YES/NO Incomplete immunization history for adolescents
YES/NO Difficulty identifying a provider's active patients
YES/NO Unreliable or contradictory patient address information

Q2. Currently, what system do you use to run AFIX reports for immunization providers? ***This is a core question; please provide a response.***

1. IIS only
2. Both IIS and CoCASA
3. CoCASA only

Q3. Can you generate the following AFIX reports from your IIS?

YES/NO 1. Missed opportunities
YES/NO 2. Lists of patients who are not up-to-date on their immunizations
YES/NO 3. Late starts
YES/NO 4. Invalid doses

Q3a. Have you created any unique AFIX reports that are generated from your IIS?

No Yes (briefly describe): [TEXT BOX]

Q4. What *resources or assistance* do you need to enhance your ability to generate all desired AFIX reports from your IIS? ***(select all that apply)***

1. Guidance on calculating AFIX coverage rates
2. Guidance on how to attribute children to a provider or practice
3. Technical assistance on what changes are needed in IIS to generate all desired AFIX reports
4. Funds to purchase IIS upgrade or support needed programming changes
5. More staff time to run AFIX reports
6. Other: [TEXT BOX]

The next questions ask about other types of immunization coverage assessments (i.e., <u>not</u> AFIX) for children.

Q5. For each age group shown below, do you use your IIS to assess immunization coverage for children in your IIS jurisdiction? ***This is a core question; please provide a response for <u>each row</u>.***

Age Group	Routinely	On an ad hoc basis only	Attempted but not successful	Have not attempted
(a) Infants / preschool age				
(b) Kindergarten age				
(c) Adolescents				

[IF Q5A="ROUTINELY", Q6A]

Q6a. What is the <u>usual</u> age range for your routine coverage assessments for *infants / preschool age*?

1. 19-24 months
2. 24-35 months
3. 19-35 months
4. Other: [TEXT BOX]

[IF Q5B="ROUTINELY", Q6B]

Q6b. What is the <u>usual</u> age range for your routine coverage assessments for *kindergarten age*?

1. 4 years
2. 4-5 years
3. 5 years
4. Other: [TEXT BOX]

[IF Q5C="ROUTINELY", Q6C]

Q6c. What is the <u>usual</u> age range for your routine coverage assessments for *adolescents*?

1. 11-17 years
2. 13-17 years
3. 11-12 years
4. Other: [TEXT BOX]

[IF <u>ANY</u> ROW IN Q5="ROUTINELY", ASK Q7 ONCE]

Q7. Which of the following do you include in your routine coverage assessments? *(select all that apply)*

1. Up-to-date for series
2. Up-to-date for single antigens
3. Age-appropriate rates

[IF <u>ALL</u> ROWS IN Q5 (Q5A-Q5C)="HAVE NOT ATTEMPTED", SKIP TO Q9]

Q8. When you generate coverage assessments from your IIS, do you:

a. Use "canned" / pre-set assessment reports? Yes No

b. Create a customized assessment? Yes No

[IF YES TO Q8B, ASK Q8B1]

Q8b1. Would you be willing to share your methodology / standard operating procedures (SOPs) for generating customized assessments with other IIS? Yes No

Q9. Overall, what aspects of data quality and completeness present challenges to conducting immunization coverage assessments for children using your IIS? ***Again, these questions refer to assessments other than AFIX. This is a core question; please provide a response for each row.***

	Not A Challenge	Minor Challenge	Major Challenge
Lack of an IIS record for many children			
Duplicate patient records			
Multiple records for the same vaccination event			
Incomplete immunization history for children 0-6 years			
Incomplete immunization history for adolescents			
Children included who no longer reside in the jurisdiction			
Unreliable or contradictory patient address information			

OTHER CHALLENGES: [TEXT BOX]

Q10. What *resources or assistance* do you need to enhance your ability to routinely conduct immunization coverage assessments using your IIS? ***(select all that apply)***

1. Standard operating procedures for how to run standard assessment
2. Best practices on dealing with data quality issues
3. IIS technical enhancement (*describe*): [TEXT BOX]
4. Guidance on evaluating the validity of IIS assessment results
5. Hands-on training opportunities for IIS staff in running assessments
6. Other: [TEXT BOX]

[IF Q10=3 ("IIS TECHNICAL ENHANCEMENT"), ASK Q10A]

Q10a. What is the status of IIS enhancements or upgrades that will address functional barriers to IIS-based assessments for children?

1. Currently in process
2. In the planning stages
3. Waiting for funding
4. Not currently being considered

[IF NONE OF THE ROWS IN Q5 (Q5A-Q5C)="ROUTINELY", ASK Q11]

Q11. Within what timeframe do you think you will use your IIS to routinely conduct immunization coverage assessments?

1. Within 1 year
2. 1-2 years
3. 3-5 years
4. More than 5 years

Q12. Over the last 4 years, have you used your IIS to generate any of the following ad hoc or targeted coverage assessments? ***(select all that apply)***

1. Influenza vaccination rates for children
2. Influenza vaccination rates for high-risk children
3. H1N1 vaccination rates for children
4. Vaccination rates following a period of vaccine shortage
5. Vaccination rates for a specific antigen during an outbreak
6. None of the above

Q13. Is your IIS capable of generating immunization coverage data for the following subgroups of children?

	IIS is capable, and have conducted	IIS is capable, but have not conducted	IIS not capable
VFC-eligible children			
Children enrolled in Medicaid			
Children receiving WIC			
Insured children			

[FOR EACH ROW WHERE Q13="IIS IS CAPABLE, BUT HAVE NOT CONDUCTED", ASK Q13A]

Q13a. Why have you not conducted coverage assessments for [INSERT SUBGROUP]? *(select all that apply)*

1. Data are unreliable to identify subgroup
2. Low priority for our program
3. Assessment done at a different level or through another mechanism
4. Other: [TEXT BOX]

[FOR EACH ROW WHERE Q13="IIS NOT CAPABLE", ASK Q13B]

Q13b. What is the status of IIS enhancements or upgrades that will allow you to report immunization coverage by [INSERT SUBGROUP]?

1. Currently in process
2. In the planning stages
3. Waiting for funding
4. Not currently being considered

Q14. Is your IIS capable of reporting immunization coverage data for small geographic areas (e.g., zip code, local public health jurisdiction)?

1. IIS is capable, and have conducted
2. IIS is capable, but have not conducted
3. IIS not capable

[IF Q14=1, ASK Q14A]

Q14a. Which geography-based assessments have you conducted?

YES/NO Local health department jurisdiction or public health region
YES/NO County
YES/NO Zip code
YES/NO Other: [TEXT BOX]

Q15. What *resources or assistance* do you need in the area of geography-based immunization coverage assessments? *(select all that apply)*

1. Standard operating procedures
2. IIS technical enhancement (*describe*): [TEXT BOX]
3. Guidance on how to deal with multiple addresses for a child
4. Hands-on training opportunities for IIS staff
5. Other: [TEXT BOX]

Q16. Do any local public health departments use the IIS to assess their own immunization coverage rates?

1. Yes
2. No
3. Don't know
4. Not applicable – No local health departments

Q17. Do any private providers use the IIS to assess their own immunization coverage rates?

1. Yes
2. No
3. Don't know

Q17a. Do any schools use the IIS to assess their own immunization coverage rates?

1. Yes
2. No
3. Don't know

Q18. Do you provide guidance to the following providers regarding how to use the IIS to conduct coverage assessments?

YES/NO Local health departments
YES/NO Private providers
YES/NO Schools

Q18a. Would you utilize a "best practice" guide from AIRA regarding how to support local health departments, private providers, and/or schools in conducting assessments using the IIS?

1. Definitely
2. Probably
3. Probably not

The next set of questions addresses the overall use of IIS-generated immunization coverage data by your immunization program and/or IIS unit.

Q19. Over the past 4 years, have you used IIS-generated immunization coverage data for the following programmatic activities related to childhood immunization? ***This is a core question; please provide a response for <u>each row</u>.***

19a.	*YES/NO*	Comparing with other assessment data (e.g., NIS, school surveys)
	YES/NO	Supporting AFIX activities
	YES/NO	Using as internal state/local public health quality improvement benchmarks
	YES/NO	Supplying data for health plan quality measures (private or Medicaid plans)
	YES/NO	Filling out CDC-required reports and other deliverables
	YES/NO	Identifying areas of low vaccination coverage
19b.	*YES/NO*	Responding to outbreaks or pandemics
	YES/NO	Assessing the impact of vaccine shortages
	YES/NO	Assessing the impact of new school or childcare requirements
	YES/NO	Evaluating the impact of special projects
	YES/NO	Tracking uptake of new vaccines or recommendations
	YES/NO	Informing program planning about how to deploy surplus vaccine

[POPULATE Q20 ROWS WITH "YES" RESPONSES FROM Q19A]

Q20. For approximately how long have you been using IIS-generated coverage data to support these programmatic activities? ***This is a core question; please provide a response for each row.***

	<1 year	1-4 years	≥5 years
[INSERT ACTIVITY]			

Q21. Assuming you were able to overcome all IIS barriers, rate the relative value to your program of having IIS-generated assessment data for children to support the following programmatic activities: ***This is a core question; please provide a response for each row.***

	Lower Value	Medium Value	Highest Value
Comparing to other assessment data (e.g., NIS, school surveys)			
Supporting AFIX activities			
Using as state/local public health quality improvement benchmarks			
Supplying data for health plan quality measures (private or Medicaid plans)			
Filling out CDC-required reports and other deliverables			
Identifying areas of low vaccination coverage			
Responding to outbreaks or pandemics			
Assessing the impact of vaccine shortages			
Assessing the impact of new school or childcare requirements			
Evaluating the impact of special projects			
Tracking uptake of new vaccines or recommendations			
Informing program planning about how to deploy surplus vaccine			

[POPULATE & LOOP Q22 ROWS WITH "HIGHEST VALUE" RESPONSES FROM Q21]

Q22. On a scale of 1-10, how well does your IIS-generated assessment data for children support your programmatic needs related to ["HIGHEST VALUE" RESPONSES FROM Q21]? (1=not well at all, 10=extremely well)

☐ *[this question currently formatted with radio buttons in Qualtrics version]*

Q23. Overall, to what extent do the following factors create challenges to using IIS-generated coverage assessment data to support your programmatic needs around childhood immunization? ***This is a core question; please provide a response for each row.***

	Not a Challenge	Minor Challenge	Major Challenge
Limited staff expertise			
Staff diverted to EHR onboarding			
Other competing demands on staff time			
Lack of funding for IIS infrastructure			
Inadequate staffing (due to lack of funds or hiring freezes)			
IIS data completeness / quality			
Limited IIS functionality to support assessment			

Q24. How can AIRA be most helpful in providing *resources or assistance* to enhance your use of IIS-based immunization coverage assessments for children? ***(select all that apply)***

1. Create a library of standard operating procedures
2. Provide webinars on key aspects of running coverage assessments
3. Offer hands-on training opportunities at AIRA conferences and meetings
4. Publish an "experts" list for different vendors / platforms
5. Other: [TEXT BOX]

The next set of questions relates to immunization coverage assessments you have done using your IIS for adults in your IIS jurisdiction.

Q28. For what programmatic activities do you use IIS-generated immunization coverage data for adults? ***This is a core question; please provide a response for each row.***

28a.	*YES/NO*	Comparing with other adult assessment data (e.g., BRFSS)
	YES/NO	Using as internal state/local public health quality improvement benchmarks
	YES/NO	Supplying data for health plan quality measures (private or Medicaid plans)
	YES/NO	Filling out CDC-required reports and other deliverables
	YES/NO	Identifying areas of low vaccination coverage
28b.	*YES/NO*	Responding to outbreaks or pandemics
	YES/NO	Evaluating impact of special projects
	YES/NO	Tracking uptake of new vaccines or recommendations
	YES/NO	Informing program planning about how to deploy surplus vaccine

[IF ALL ROWS IN Q28="NO" THEN SKIP TO Q30]

[POPULATE Q29 ROWS WITH Q28A YES RESPONSES]

Q29. For approximately how long have you been using IIS-generated coverage data for adults to support these programmatic activities? ***This is a core question; please provide a response for each row.***

	<1 year	1-4 years	≥5 years
[INSERT ACTIVITY]			

Q26. Over the last 4 years, have you used your IIS to generate any of the following ad hoc or targeted coverage assessments for adults? *(select all that apply)*

1. Influenza vaccination rates for seniors
2. Influenza vaccination rates for all adults
3. H1N1 vaccination rates
4. Pneumococcal vaccination rates
5. Zoster vaccination rates
6. Any vaccination rates for high-risk adult subgroups
7. None of the above

Q27. Would you be willing to share your methodology / guidance on using your IIS for adult coverage assessments with other IIS? Yes No

[ALL RESPONDENTS ANSWER HERE]

Q30. Assuming you were able to overcome all IIS barriers, rate the relative value to your program of having IIS-generated assessment data to support the following programmatic activities for adult immunization: *This is a core question; please provide a response for each row.*

	Lower Value	Medium Value	Highest Value
Comparing to other adult assessment data (e.g., BRFSS)			
Using as state/local public health quality improvement benchmarks			
Supplying data for health plan quality measures (private or Medicaid plans)			
Filling out CDC-required reports and other deliverables			
Identifying areas of low vaccination coverage			
Responding to outbreaks or pandemics			
Evaluating impact of special projects			
Tracking uptake of new vaccines or recommendations			
Informing program planning about how to deploy surplus vaccine			

[POPULATE & LOOP Q31 ROWS WITH "HIGHEST VALUE" RESPONSES FROM Q30]

Q31. On a scale of 1-10, how well does your IIS-generated assessment data for adults support your programmatic needs related to ["HIGHEST VALUE" RESPONSES FROM Q30]? (1=not well at all, 10=extremely well)

☐ *[this question currently formatted with radio buttons in Qualtrics version]*

Q32. Overall, to what extent do the following factors create challenges to using IIS-generated coverage assessment data to support your programmatic needs around adult immunization? ***This is a core question; please provide a response for each row.***

	Not a Challenge	Minor Challenge	Major Challenge
Limited staff expertise			
Staff diverted to EHR onboarding			
Other competing demands on staff time			
Lack of funding for IIS infrastructure			
Inadequate staffing (due to lack of funds or hiring freezes)			
IIS data completeness / quality			
Limited IIS functionality to support assessment			

Q33. How can AIRA be most helpful in providing *resources or assistance* to enhance your use of IIS-based immunization coverage assessments for adult vaccines? ***(select all that apply)***

1. Create a library of standard operating procedures
2. Provide webinars on key aspects of running coverage assessments
3. Offer hands-on training opportunities at AIRA conferences and meetings
4. Publish an "experts" list for different IIS vendors / platforms
5. Other: [TEXT BOX]

Q34. Please provide any additional comments: [TEXT BOX]

[ENDING TEXT]
You have reached the end of the survey.

Click the "Submit" button if you want to record your responses as final and complete, and you do not wish to return to the survey.
[Follow-up message: Your responses have been recorded. Thank you very much for your time! Please click "Finish" to finalize your submission.]
[Follow-up message [Qualtrics generated]: Please close your browser window.]

Click the "Continue Later" button if you want to return at a later time to finish the survey or review your responses. You may then exit your browser window if it does not close automatically. When you wish to return to the survey, please click on the link provided in your survey invitation email.

Appendix B – Modified Survey (for Immunization Program Managers)

Use of IIS for Immunization Coverage Assessment

This survey collects information regarding the use of immunization information systems (IIS) for conducting immunization coverage assessments to support programmatic activities. The purpose is to document the broad range of IIS experiences and identify areas where additional guidance and best practices may be needed. In addition, select results highlighting IIS procedures and functionality by grantee may be available to the public on the Association of Immunization Manager's (AIM) VaxFacts website.

The first part of the survey asks questions about coverage assessments for children, followed by a section specific to adults. The survey should take about 5 minutes to complete.

Please answer for your program (survey references to "you" are shorthand for your program). Feel free to consult with others within your program as needed.

Your responses on each page are recorded when you click "Next" to advance the survey. Please use the "Next" and "Back" buttons at the bottom of the page to navigate through the survey, rather than your internet browser's arrow buttons. Please use the comment boxes for brief clarification, where applicable.

Responses to all questions are important for our analyses. For most questions, you will be prompted to provide a response if no answer is provided; please provide a response if possible.

If at any time you wish to stop the survey and return at a later time:
1. Click "Next" to save your most recently entered responses (the page will advance)
2. Click "Continue Later" at the bottom of the page
3. In most internet browsers (e.g., Internet Explorer), your browser window will then close automatically; if not (e.g., Firefox, Google Chrome), simply close your browser window to exit the survey
4. To return to the survey, click on the link provided in your survey invitation email

The first set of questions addresses the overall use by your immunization program and/or IIS unit of IIS-generated immunization coverage data for children.

Q1. Over the past 4 years, have you used IIS-generated immunization coverage data for the following programmatic activities related to childhood immunization? ***This is a core question; please provide a response to each row.***

[maps to Q19a, 19b]

1a.	*YES/NO*	Comparing with other assessment data (e.g., NIS, school surveys)
	YES/NO	Supporting AFIX activities
	YES/NO	Using as internal state/local public health quality improvement benchmarks
	YES/NO	Supplying data for health plan quality measures (private or Medicaid plans)
	YES/NO	Filling out CDC-required reports and other deliverables
	YES/NO	Identifying areas of low vaccination coverage
1b.	*YES/NO*	Responding to outbreaks or pandemics
	YES/NO	Assessing the impact of vaccine shortages
	YES/NO	Assessing the impact of new school or childcare requirements
	YES/NO	Evaluating the impact of special projects
	YES/NO	Tracking uptake of new vaccines or recommendations
	YES/NO	Informing program planning about how to deploy surplus vaccine

[POPULATE Q2 ROWS WITH "YES" RESPONSES FROM Q1A]

Q2. For approximately how long have you been using IIS-generated coverage data to support these programmatic activities? ***This is a core question; please provide a response to each row.***

[maps to Q20]

	<1 year	1-4 years	≥5 years
[INSERT ACTIVITY]			

Q3. Assuming you were able to overcome all IIS barriers, rate the relative value to your program of having IIS-generated assessment data for children to support the following programmatic activities: *This is a core question; please provide a response to each row.*

[maps to Q21]

	Lower Value	Medium Value	Highest Value
Comparing to other assessment data (e.g., NIS, school surveys)			
Supporting AFIX activities			
Using as state/local public health quality improvement benchmarks			
Supplying data for health plan quality measures (private or Medicaid plans)			
Filling out CDC-required reports and other deliverables			
Identifying areas of low vaccination coverage			
Responding to outbreaks or pandemics			
Assessing the impact of vaccine shortages			
Assessing the impact of new school or childcare requirements			
Evaluating the impact of special projects			
Tracking uptake of new vaccines or recommendations			
Informing program planning about how to deploy surplus vaccine			

[POPULATE & LOOP Q4 ROWS WITH "HIGHEST VALUE" RESPONSES FROM Q3]

Q4. On a scale of 1-10, how well does your IIS-generated assessment data for children support your programmatic needs related to ["HIGHEST VALUE" RESPONSES FROM Q3]? (1=not well at all, 10=extremely well)

[maps to Q22]

☐ *[Radio buttons]*

Q5. Overall, to what extent do the following factors create challenges to using IIS-generated coverage assessment data to support your programmatic needs around childhood immunization? *This is a core question; please provide a response to each row.*

[maps to Q23]

	Not a Challenge	Minor Challenge	Major Challenge
Limited staff expertise			
Staff diverted to EHR onboarding			
Other competing demands on staff time			
Lack of funding for IIS infrastructure			
Inadequate staffing (due to lack of funds or hiring freezes)			
IIS data completeness / quality			
Limited IIS functionality to support assessment			

Q6. How can AIRA be most helpful in providing *resources or assistance* to enhance your use of IIS-based immunization coverage assessments for children? *(select all that apply)*

[maps to Q24]

6. Create a library of standard operating procedures
7. Provide webinars on key aspects of running coverage assessments
8. Offer hands-on training opportunities at AIRA conferences and meetings
9. Publish an "experts" list for different vendors / platforms
10. Other: [TEXT BOX]

The next set of questions relates to immunization coverage assessments you have done using your IIS for adults in your state/IIS jurisdiction.

Q7. For what programmatic activities do you use IIS-generated immunization coverage data for adults? ***This is a core question; please provide a response for each row.***

[maps to Q28]

7a.	*YES/NO*	Comparing with other adult assessment data (e.g., BRFSS)
	YES/NO	Using as internal state/local public health quality improvement benchmarks
	YES/NO	Supplying data for health plan quality measures (private or Medicaid plans)
	YES/NO	Filling out CDC-required reports and other deliverables
	YES/NO	Identifying areas of low vaccination coverage
7b.	*YES/NO*	Responding to outbreaks or pandemics
	YES/NO	Evaluating impact of special projects
	YES/NO	Tracking uptake of new vaccines or recommendations
	YES/NO	Informing program planning about how to deploy surplus vaccine

Q8. Assuming you were able to overcome all IIS barriers, rate the relative value to your program of having IIS-generated assessment data to support the following programmatic activities for adult immunization: ***This is a core question; please provide a response to each row.***

[maps to Q30]

	Lower Value	Medium Value	Highest Value
Comparing to other adult assessment data (e.g., BRFSS)			
Using as state/local public health quality improvement benchmarks			
Supplying data for health plan quality measures (private or Medicaid plans)			
Filling out CDC-required reports and other deliverables			
Identifying areas of low vaccination coverage			
Responding to outbreaks or pandemics			
Evaluating impact of special projects			
Tracking uptake of new vaccines or recommendations			
Informing program planning about how to deploy surplus vaccine			

[POPULATE & LOOP Q9 ROWS WITH "HIGHEST VALUE" RESPONSES FROM Q8]

Q9. On a scale of 1-10, how well does your IIS-generated assessment data for adults support your programmatic needs related to ["HIGHEST VALUE" RESPONSES FROM Q8]? (1=not well at all, 10=extremely well)

[maps to Q31]

☐ *[radio buttons]*

Q10. Overall, to what extent do the following factors create challenges to using IIS-generated coverage assessment data to support your programmatic needs around adult immunization? ***This is a core question; please provide a response to each row.***

[maps to Q32]

	Not a Challenge	Minor Challenge	Major Challenge
Limited staff expertise			
Staff diverted to EHR onboarding			
Other competing demands on staff time			
Lack of funding for IIS infrastructure			
Inadequate staffing (due to lack of funds or hiring freezes)			
IIS data completeness / quality			
Limited IIS functionality to support assessment			

Q11. How can AIRA be most helpful in providing *resources or assistance* to enhance your use of IIS-based immunization coverage assessments for adult vaccines?

[maps to Q33]

6. Create a library of standard operating procedures
7. Provide webinars on key aspects of running coverage assessments
8. Offer hands-on training opportunities at AIRA conferences and meetings
9. Publish an "experts" list for different IIS vendors / platforms
10. Other: [TEXT BOX]

Q12. Please provide any additional comments: [TEXT BOX]

[maps to Q34]

[ENDING TEXT]
You have reached the end of the survey.

Click the "Submit" button if you want to record your responses as final and complete, and you do not wish to return to the survey.
[Follow-up message: Your responses have been recorded. Thank you very much for your time! Please click "Finish" to finalize your submission.]
[Follow-up message [Qualtrics generated]: Please close your browser window.]

Click the "Continue Later" button if you want to return at a later time to finish the survey or review your responses. You may then exit your browser window if it does not close automatically. When you wish to return to the survey, please click on the link provided in your survey invitation email.