

# Immunization Information Systems:

A Key Enabler of Life Course Immunization, Health Equity, and Healthy Aging Across the Globe

MAY 2025



### **Executive Summary**

On October 14, 2024, alongside the World Health Summit in Berlin Germany and Silver Economy Forum 2024, the Global Coalition on Aging (GCOA) convened a cross-discipline group of experts and leaders in Immunization Information Systems (IIS) across development, implementation, and advocacy from a diverse geographical scope, together with experts in healthy aging and policy.

Participants discussed the status of IIS development at select national and regional levels around the world, exploring enablers and barriers to developing, funding, and implementing optimal IIS. The expert discussion identified actions necessary to drive awareness and uptake of IIS as a critical public health tool and an enabler of life course immunization in support of health systems resiliency, health equity, and healthier longevity worldwide.

This report shares four key takeaways from the discussion, and four calls to action.

#### **KEY TAKEAWAY**



IIS contribute to increased access, evidence-based decision-making, and informed immunization policies and programs across the life course, at multiple levels, ultimately driving increased vaccine coverage rates. However, the value of IIS needs to be highlighted, communicated, and framed in a clear and useful way to make the case.

#### CALL TO ACTION

Through data, targeted communications efforts, coalition building, and advocacy, IIS stakeholders must continue to build the case to policy-makers for life course immunization more broadly and for IIS as a key enabler of increased vaccine uptake, as well as a public health planning tool.

#### **KEY TAKEAWAY**

#### CALL TO ACTION



The COVID-19 pandemic demonstrated the importance of IIS for decisionmakers all over the world. Whether countries are "starting from scratch" with IIS or building on legacy systems, there's an opportunity for all to design effective IIS to strengthen life-course immunization. IIS in different settings differ in terms of existence and implementation. Countries should start from where they are and evaluate what's needed to achieve desired outcomes. This approach will i nstruct where to build from to ensure that IIS are fit for purpose. IIS advocates and decisionmakers must keep outcomes at the center of their efforts. Without a focus on data output and its intended use, IIS can be fragmented and fail to achieve intended goals, such as improved health system functioning, wider vaccine coverage, or better decisionmaking.



Countries and regions face different challenges to IIS development and implementation, but one critical success factor across all geographies is building vaccine confidence and public trust in data collection systems (enabled through privacy best practices). Considering vaccine confidence and trust in data privacy as a key IIS success factor, IIS architects must meaningfully engage with their end users healthcare providers and the public—to build confidence, trust, and buy-in on IIS safety and utility.



IIS require more than just a technical approach. Alignment across all stakeholders on the opportunity and value of IIS is essential, particularly for enabling an optimized approach for adult immunization and improved routes to vaccination in complex contexts. Advocates must emphasize the shared value of well-functioning IIS across the wide range of stakeholders, from HCPs to policymakers, to technical experts and the public. Focusing on systems interoperability and the optimal outcomes this brings is essential in underpinning this message.

### Participants

#### Hamad Bastaki, PhD

Head of Communicable Disease Control Division, Ministry of Health in Kuwait

#### Marta Lomazzi, PhD

Executive Manager, World Federation of Public Health Associations

#### Ziad A. Memish, MD

Professor, College of Medicine, Alfaisal University, Saudi Arabia

#### Melissa Mitchell

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#### Tudor Pitulac, PhD

Head of Research Projects, Open Sky Data Systems

#### **Bjelle Roberts**

Director, Global Vaccines Public Policy, Merck Sharp & Dohme (MSD)

#### Sebastián García Saisó, MD

Director, Evidence and Intelligence for Action in Health (EIH), Pan American Health Organization

#### Eric Sutherland

Senior Health Economist, OECD

#### Aneta Tyszkiewicz

Director, Data and Digital at European Federation of Pharmaceutical Industries and Associations (EFPIA)

#### Gracey Vaughn

Deputy Director of Program Implementation for Digital Square, PATH

## Background

Across the world, demographic change is placing increased pressure on countries to prioritize prevention and health promotion across the life course to safeguard the capacity and ensure the sustainability of their health systems. Fortunately, the immunization landscape is shifting along with this demographic change, as more adult vaccines are becoming available to help protect against a range of diseases and infections. With this, countries are now evaluating how to integrate new vaccines into their national immunization programs to enable a life course approach to immunization. Immunization is one of the most effective and efficient preventive health strategies available, yet vaccine coverage rates among adults remain low worldwide. This is due in large part to lack of infrastructure, both digital and otherwise, to support widespread vaccine awareness, access, uptake, and the sharing of coverage and surveillance data, marking a missed opportunity for governments and health systems around the world.

Immunization information systems (IIS), also referred to as "immunization registries," are confidential, population-based, computerized databases that store vaccination data. IIS collect, store, and facilitate access to consolidated immunization information across the life course. At the individual and provider level, the data exists as individual records. At the system level, it's moved into aggregate, de-identified data to support evidence-based decision-making.<sup>1,2</sup>

IIS implementation effectively improves immunization-related activities linked to increased immunization and reduced risk of vaccine-preventable diseases (VPDs), as demonstrated in a recent systematic review of 240 peer-reviewed studies.<sup>3</sup>

#### Immunization-related activities enabled by IIS data include:

Real-time collection of information on vaccine coverage rates (VCRs), to support vaccination programs
Patient and provider reminders and recommendations on immunization that increase uptake
Support for outbreak and public health emergency responses
Public health supply chain planning for vaccine ordering, inventory, and accountability
Post-market data collection to strengthen vaccine safety and effectiveness monitoring

Ultimately, IIS house secure data crucial for monitoring and improving vaccine administration and equity, allowing evidence-based decision-making for immunization programs to support high VCRs. Effective IIS provide governments, policymakers, providers, and individuals a critical tool in supporting more widespread uptake of vaccines across the life course.<sup>4</sup>

Conversely, poorly implemented IIS can lead to information fragmentation, data gaps, and as a result, can lead to suboptimal vaccination coverage, undermining public health goals. Despite available guidance, notably from the United States Centers for Disease Control and Prevention (CDC), whose IIS guidance and definitions are seen as a standard worldwide, IIS existence and quality can vary across a given region, and globally.<sup>5,6</sup> During the COVID-19 pandemic, it became clear that we possess the technological capability to develop and stand up such systems to track and share patient immunization data. Yet, access to these tools was far from universal, often fragmented across jurisdictions, and gaps in digital infrastructure across the vaccine ecosystem were exposed. These gaps included: (1) lack of adequate resources to develop, implement, and manage IIS, (2) lack of interconnectivity across different health providers and alternative vaccination sites, and (3) failure to include or disaggregate adult vaccination data in many IIS.<sup>7</sup>

The European Commission acknowledges vaccination as one of the most cost-effective public health tools and is keen to support cooperation between Member States on national immunisation programmes.<sup>8</sup> In April 2018, the European Commission proposed a set of recommendations to increase vaccination coverage and ensure access to vaccines to respond to increased outbreaks of vaccine-preventable diseases and increasing level of distrusts in vaccines in the EU. The development of comprehensive immunisation information systems is recognised as an essential tool to the implementation of these recommendations.<sup>9</sup>

#### DATA GAPS ACROSS THE LIFE COURSE REMAIN A KEY CHALLENGE OF IIS

Many countries still lack robust IIS or have systems that vary widely in quality and interoperability. These systems often fail to integrate data from across the entire life course, leaving gaps in tracking immunizations beyond early childhood. Even in the wake of the COVID-19 pandemic, many registries have not evolved or expanded to include broader vaccination data or integrate with other healthcare systems, limiting their effectiveness in managing both routine and emergency immunization efforts. Further, the existence of multiple IIS within a region creates interoperability issues. As a result, public health responses can be slower and less precise, hindering efforts to maintain high VCRs.

- » Pre-pandemic, among countries belonging to the EU, only 29.6% had an IIS meeting the US CDC's IIS definition, 18.5% had more than one sub-national IIS, and 22% had no IIS at all.<sup>10</sup>
- » Within the United States alone, over 60 different IIS operate at various levels (state, city, county, etc.) as of February 2022.<sup>11</sup>
- » A recent systematic review (2023) examining IIS across 9 countries and 39 IIS found a high degree of variability across systems, hindering data integration and systems interoperability.<sup>12</sup>
  - Importantly, the study found that 64% of the IIS were utilized only for pediatric populations, creating an important data gap on VCRs across the life course.

Policymakers, healthcare professionals, other stakeholders, and the public are beginning to understand the value of vaccination across the life course, particularly to reduce the burden of vaccine-preventable diseases in the adult population. Simultaneously there is increased adoption of digital health solutions across healthcare systems—in large part responses to the COVID crisis. Ensuring robust IIS that can capture immunization data across the life course would significantly support increased vaccine coverage rates, particularly across the adult population. However, this obvious solution for health and prevention has not been prioritized, threatening the achievement of the now global goal of healthy aging as highlighted during the UN Decade of Healthy Ageing (2021-2030). We are at a critical junction to emphasize life course immunization and IIS on the priority lists of policymakers and health systems everywhere.

## Key Takeaways and Calls to Action





## 1.

**KEY TAKEAWAY** 

IIS contribute to increased access, evidence-based decision-making, and informed immunization policies and programs across the life course, at multiple levels, ultimately driving increased vaccine coverage rates. However, the value of IIS needs to be highlighted, communicated, and framed in a clear and useful way to make the case.

**Tudor Pitulac, PhD,** Head of Research Projects, Open Sky Data Systems

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"While pandemics highlight the urgent need for IIS, we must also recognize their **importance in supporting routine life course immunization, which is essential for achieving global health goals,** reducing the burden of vaccine preventable diseases. Additionally, IIS can support vaccine safety by monitoring adverse events, helping address vaccine inequity, and identifying underserved populations and regions."

Childhood vaccinations in the 20th century have had much success, among other things, leading to the eradication of smallpox and near-eradication of polio.<sup>13</sup> In many countries, IIS are in place for infants and children, but not for adults. Adult immunization is incredibly important, especially as populations age globally, but has been historically overlooked, even though vaccine-preventable diseases can have significant negative effects throughout the life course. With the increase in availability and access to adult vaccines, there is an opportunity to protect populations from vaccine-preventable diseases and their consequences.<sup>14</sup> IIS would improve health systems', providers', and patients' ability to track and advocate for the routine vaccinations they need, and create consistent tracking across the life course that can be used for population health planning and resource mobilization, among other things. In turn, these IIS will provide the data that advocates can use to continue to establish the importance of adult immunization programs with IIS as a key enabler.

**Bjelle Roberts,** Director, Global Vaccines Public Policy, Merck Sharp & Dohme (MSD)

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"It's difficult across the life course to keep track of your immunization status, especially as you're getting older and facing multiple conditions, and seeing different healthcare professionals as well. **IIS can play a strong role in in helping to solve for some of those issues,** providing timely and accurate data, improving policy decision-making, and helping healthcare professionals and individuals understand the status of the patient when it comes to immunization."

Participants from regions with strong IIS programs, including those in Kuwait and Rwanda, spoke to the strong impact that IIS have had on immunization uptake across the life course but also highlighted the need for and importance of sharing these experiences with policymakers both domestically and abroad to show the possibilities of what IIS can achieve. IIS are a proven tool for supporting immunization efforts in a given region—allowing individuals, healthcare providers, public health systems, and policymakers to access differing levels of data to support their unique needs.<sup>15,16,17,18,19</sup> Even with these successes, the story needs to be clearly told, and currently, a lot of the existing data on the successes of IIS in improving these metrics is not widely shared across regions.

**Gracey Vaughn,** Deputy Director of Program Implementation for Digital Square, PATH "While we intuitively know that digital health systems are beneficial, we have very few data to back up that claim. This study on our work in Rwanda stands out in its approach to meet this need and provides a strong example of the type of studies that are currently lacking in digital health."<sup>15</sup>



CALL TO ACTION	Through data, targeted communications efforts, coalition building, and advocacy, IIS stakeholders must continue to build the case to policy-makers for life course immunization more broadly and for IIS as a key enabler of increased vaccine uptake, as well as a public health planning tool.
	Advocates should communicate the full value of life course immunization— social, health, and economic—and the need to address low vaccine coverage rates as a pathway to policy support for IIS. They can further highlight how IIS can further momentum towards universal healthcare goals and the UN Sustainable Development Goals.
Hamad Bastaki, PhD, Head of Communicable Disease Control Division, Ministry of Health in Kuwait	"In 2020, we launched the electronic immunization registry for COVID-19, which proved highly successful, but we didn't have it in place for all other immunizations. We leveraged the system that we developed for COVID and expanded it to include all vaccinations. This approach provided multiple advantages, including being able to link to adverse events, expand to additional vaccination sites, and enable nationwide monitoring. If we take the flu vaccine as an example, following the introduction of the immunization registry, we achieved a <b>112% increase in the</b> <b>number of administered doses.</b> "
<b>Ziad A. Memish, MD,</b> Professor, College of Medicine, Alfaisal University, Saudi Arabia	"The world has invested in childhood vaccination for the last 50 years or so, and unfortunately, we're seeing a decline in childhood rates. <b>But adult vaccinations</b> <b>have been recent, and countries are just starting to invest.</b> I hope more investment is made to make it happen and to address the issue of vaccine hesitancy."





## 2.

#### **KEY TAKEAWAY**

**Tudor Pitulac, PhD,** Head of Research Projects, Open Sky Data Systems

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"During the COVID-19 pandemic, IIS were crucial in tracking vaccine distribution and coverage. **Post pandemic, we have a valuable opportunity to build on these systems and address digital infrastructure gaps.** We must tackle common barriers such as insufficient funding, inelegant infrastructures, and fragmented data systems and reporting mechanisms, which hinder global immunization information systems development."

The COVID-19 pandemic demonstrated the importance of IIS for decision-

makers all over the world. Whether countries are "starting from scratch" with IIS or building on legacy systems, there's an opportunity for all to

design effective IIS to strengthen life-course immunization.

When building IIS from the ground up, thoughtful design can be helpful in creating a robust system that has optimal impact on metrics like vaccine coverage rates.

In some cases, a country's early leadership on IIS can pose a challenge as needs and technological capabilities evolve. Countries with existing infrastructure may seek to work with a legacy system that lacks interoperability and other important characteristics. These pre-existing limitations can render these systems difficult to use and less useful in their outputs.

#### **Eric Sutherland,** Senior Health Economist, OECD

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"I find that in many OECD countries, when they implemented IIS, they **focused on the technology and they forgot about the data**, and as a result, that created massive fragmentation of the data, preventing the ability to find insights for program improvement. Now these programs have fragmented data foundations, there is resistance to change even though given the prior investment. A pragmatic approach could be by starting by strengthening the data foundations rather than technology investments that propagate the fragmented environment."

#### CALL TO ACTION

IIS in different settings differ in terms of existence and implementation. Countries should start from where they are and evaluate what's needed to achieve desired outcomes. This approach will instruct where to build from to ensure that IIS are fit for purpose. IIS advocates and decision-makers must keep outcomes at the center of their efforts. Without a focus on data output and its intended use, IIS can be fragmented and fail to achieve intended goals, such as improved health system functioning, wider vaccine coverage, or better decisionmaking.

Aneta Tyszkiewicz, Director, Data and Digital at European Federation of Pharmaceutical Industries and Associations (EFPIA) **"The health information infrastructure needs to be interoperable for the IIS to deliver on its original purpose.** It's equally important to build a system that merits citizens' trust so that representative data is available to generate reliable information."





## 3.

**KEY TAKEAWAY** 

Countries and regions face different challenges to IIS development and implementation, but one critical success factor across all geographies is building vaccine confidence and public trust in data collection systems (enabled through privacy best practices).

With the growing ubiquity of telehealth, artificial intelligence, and leveraging of health data, many individuals are wary of how their health data will be seen, used, and stored, with a keen eye to ensuring safety and privacy. This sentiment was reflected by participants across most regions, especially Europe, but was noted to be less of a barrier in both Kuwait and Saudi Arabia.

Aneta Tyszkiewicz, Director, Data and Digital at European Federation of Pharmaceutical Industries and Associations (EFPIA)

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"The European Health Data Space sets the high ambition to transform health data access, sharing, and governance across EU member states, but its successful implementation depends on shared confidence in the system. **Hence, it's important to have targeted campaigns showcasing the benefits of data exchange, supported by appropriate funding.** Healthcare professionals play a critical role in fostering trust in IIS with patients by providing accurate and evidence-based information."

IIS advocates must be prepared to address concerns about data privacy and trust in how data will be used. Data privacy and trust are a central barrier to address in building support to both implement and use IIS. Communication about data and privacy can build trust by explaining what data will be collected, how it will be used and for what purpose, and how it will be limited, anonymized, and protected as it moves through the system.

Advocates must be prepared to communicate these nuanced messages to different stakeholders and actors in different ways. Healthcare providers must be engaged, as they often are the ones who are responsible for entering data into a given IIS. The general public and healthcare providers (HCPs) alike must be shown that IIS are a solution and a tool bringing benefit and value to themselves as individuals, their health systems, and society, not just

	another burden. HCPs can help their patients understand the benefits of data sharing and address concerns or hesitancy. Carefully addressing concerns and securing the buy-in of both HCPs and the public are prerequisites to achieving needed trust in both adult vaccines and IIS.
Marta Lomazzi, PhD, Executive Manager, World Federation of Public Health Associations	"Trust takes time. We know that health professionals in general build trust in com- munities, but they need to have time to spend with every person to build this trust. We need to invest in IIS, but also to build the capacity and train health profession- als. We need to make sure we have them on board to have time to explain that sharing data is fine, that getting vaccinated is fine, and in terms that are easy to understand. If healthcare providers understand the goal of the work, they will be able to prioritize this."
CALL TO ACTION	Considering vaccine confidence and trust in data privacy as a key IIS success

factor, IIS architects must meaningfully engage with their end users healthcare providers and the public—to build confidence, trust, and buy-in on IIS safety and utility.



## 4.

#### **KEY TAKEAWAY**

IIS require more than just a technical approach. Alignment across all stakeholders on the opportunity and value of IIS is essential, particularly for enabling an optimized approach for adult immunization and improved routes to vaccination in complex contexts.

Individual champions across sectors need to work together for successful IIS. This is not only important to build trust, but also to build functional systems and ensure sustainable financing through shared goals and buy-in. In many countries with existing systems, there is an outsized focus on the technology over data and utility, resulting in fragmentation, multiple systems without interoperability, and therefore reduced utility.

Sebastián García Saisó, MD, Director, Evidence and Intelligence for Action in Health (EIH), Pan American Health Organization

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"Regions face particularly complex contexts, where large countries with multiple autonomous administrative levels, each capable of shaping policy and implementation, coexist with much smaller nations with populations of just a few thousand, each requiring tailored approaches rather than a single solution. **Furthermore, the fragmentation seen in information systems is not isolated—it reflects the broader fragmentation within health systems.**"

Further, representatives from countries shared that a challenge spanning across regions was ensuring long-term sustainable funding for IIS, which requires support from multiple aspects and levels of government, as well as regional entities in the health sphere. This will vary depending on the unique context and policy setting of a given region.

There was broad agreement among the participants on a core need for advocacy around life course immunization to secure support for IIS. Building the case for life course immunization with IIS as a key enabler is crucial to build widespread consensus on the value of IIS—giving concrete examples as to the goal for an IIS, why the data is wanted, how it will be used, and how will it improve the health and lives of people.

#### Aneta Tyszkiewicz, Director, Data and Digital at European Federation of Pharmaceutical Industries and Associations (EFPIA)

"We cannot neglect any of these components. We need to really work in parallel to make sure that IIS are developed and that government sees the value of maintaining these data systems. Economic arguments related to how much saving IIS can actually bring to the healthcare systems would be very helpful."

#### CALL TO ACTION

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Advocates must emphasize the shared value of well-functioning IIS across the wide range of stakeholders, from HCPs to policymakers, to technical experts and the public. Focusing on systems interoperability and the optimal outcomes this brings is essential in underpinning this message.

### Conclusion

There is currently a substantial opportunity to build a cross-expertise and cross-regional cadre of support for immunization information systems (IIS), aligning with global and local momentum for healthy aging and health system transformation. This opportunity includes the 21st century megatrend of aging, the push for universal health coverage, the UN's Sustainable Development Goals and Decade of Healthy Ageing, and the World Health Organization's Immunization Agenda 2030. IIS, when implemented and supported, are powerful tools to enable equitable immunization access and uptake, public health planning and policymaking, and healthier longevity. Cross-sectoral support for IIS can unlock the full value of life course immunization, promote health systems resilience, and drive a healthier future for all.

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### Global Coalition on Aging

GCOA represents a cross-section of global business including technology, pharmaceuticals, healthcare, home care, financial, transportation, and consumer sectors. We engage global institutions, policymakers, and the public to drive debate on, create, and promote innovative policies and actions to transform challenges associated with the aging of the global population into opportunities for social engagement, productivity and fiscal sustainability.

For more information, visit www.globalcoalitiononaging.com

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