

Global Framework to Strengthen Immunization and Surveillance Data for Decision-making

A companion document to the Global Vaccine Action Plan (GVAP)

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Acronyms

AEFI	Adverse Events Following Immunization
DHS	Demographic and Health Survey
DTP	Diphtheria toxoid, Tetanus toxoid and Pertussis containing vaccine
DQA	Data Quality Audit
DQS	Data quality Self-assessment
EPI	Expanded Programme on Immunization
FETP	Field epidemiology training program
GVAP	Global Vaccine Action Plan
HMIS	Health Management Information System
JRF	Joint Reporting Form (to WHO and UNICEF)
MICS	Multi-Indicator Cluster Survey
MOH	Ministry of Health
NGO	Non-Governmental organization
NITAG	National Immunization Technical Advisory Group
SAGE	Strategic Advisory Group of Experts (WHO)
SARA	Service Availability and Readiness Assessment
SOP	Standard Operating Procedure
UNICEF	U.N. Children's Fund
VPD	Vaccine-Preventable Disease
WHO	World Health Organization

1. Why a framework is needed

Background

The demand for high-quality and timely immunization and disease surveillance data at the local, country and global levels has grown in recent years. As immunization programmes have matured – often achieving their initial vaccination coverage goals and adding more and more new vaccines to their immunization schedule – they have set increasingly ambitious goals, for instance to reach the populations that are the hardest to reach and improve equity in coverage across regions and demographic groups. These goals require the timely availability of high quality data:

- At the local and district level to track the vaccination status of residents, plan for targeted delivery strategies, and to quickly detect cases of vaccine-preventable diseases (VPDs).
- At the national level to monitor programme performance, determine priority areas that require focused support, detect disease outbreaks, guide strategic decisions about whether and how to introduce new vaccines, optimize schedules for current vaccines, and document the impact of vaccination to ensure sustained financing.
- At the global and regional levels to measure the progress and success of efforts to improve immunization programmes, such as the Decade of Vaccine's Global Vaccine Action Plan (GVAP)¹.

In 2007, WHO and its partners published the *Global Framework for Immunization Monitoring and Surveillance* (GFIMS) that defined the types of data needed to monitor and evaluate immunization programmes.² However, the availability, quality, and use of data have remained suboptimal; the WHO Strategic Advisory Group of Experts (SAGE) in its 2013 assessment report of the GVAP stated that the quality of available data was inadequate to properly monitor and improve the performance of immunization programmes in many countries.³ At the global level, challenges also remain to monitor implementation of the GVAP, as well as progress in reaching the Sustainable Development Goals (SDGs).

Countries and immunization partners have made a number of efforts in recent years to improve the availability, quality, and use of immunization-related data. For example, the Gavi Alliance has established a "Strategic Focus Area" in immunization, surveillance, and safety data ("the

¹ Global Vaccine Action Plan 2011–2020. Geneva: World Health Organization, 2012. Found at: <http://apps.who.int/iris/handle/10665/78141>.

² Global Framework for Immunization Monitoring and Surveillance. Geneva: World Health Organization, 2007. Found at: <http://apps.who.int/iris/handle/10665/69685>.

³ Strategic Advisory Group of Experts on Immunization. 2013 Assessment Report of the Global Vaccine Action Plan. Geneva: World Health Organization. Found at: http://www.who.int/entity/immunization/global_vaccine_action_plan/OMS-IVB-AssessmentReport-20131212v5.pdf.

data SFA”) to allow for synchronized investments in data improvements by countries and partners. In addition, the WHO SAGE established a Working Group on Quality and Use of Global Immunization and Surveillance Data in August 2017 to review current data collection, use and impact, as well as limitations and needs, and to propose recommendations to improve the quality, access to and use of data to enhance immunization program performance at the national and sub-national levels.

This document aims to provide a common framework for actions by countries and their partners involved in improving immunization and surveillance data quality, availability and use. In line with GFIMS, for the purpose of this document, immunization data can be divided into two main categories:

- 1) ***Immunization programme data***: This includes vaccination coverage data to monitor programme performance, take corrective actions where needed and prioritize interventions for underserved geographic areas and population groups. It also includes management data – such as information on vaccine supply, cold chain, financial resources, human resources, and service availability – to ensure that all building blocks of a successful immunization programme are in place;
- 2) ***Disease surveillance and vaccine safety data***: Disease surveillance is critical to estimate the burden of VPDs, monitor changing epidemiologic patterns and the impact of vaccination, detect and respond to disease outbreaks, and monitor immunization programme performance. Surveillance needs are different for different diseases and objectives. For diseases targeted for elimination or eradication, such as polio, measles and rubella, extremely robust surveillance systems are required that can identify every case. In contrast, surveillance for diseases such as rotavirus can be conducted through high-quality surveillance in a relatively small number of sentinel sites. Finally, vaccine safety surveillance helps to ensure public confidence in the immunization programme by identifying and investigating possible adverse events following immunization (AEFI).

Challenges

While immunization programmes in many countries have more data available than most other public health programmes, more needs to be done. Despite the renewed focus on timely and accurate immunization data, a number of important challenges and issues at the local, national and global levels continue to be observed. These include the following:

- ***Data are not always available, complete, or detailed enough.*** This includes weak disease surveillance for certain vaccine-preventable diseases; incomplete case investigations; no linkage between epidemiologic and laboratory data; fragmented reporting by private sector providers and non-governmental organizations (NGOs); non-existent or weak AEFI monitoring; and a lack of data on vaccine supply chain, financial and human resource availability at all levels. In addition, data needed to monitor inequities in immunization coverage by such variables as rural versus urban residence,

household income, and mothers' educational level are usually collected only during periodic coverage surveys, limiting countries' ability to monitor and reduce inequities on a continuous basis.

- ***Data are not always consistent between various sources.*** Immunization coverage estimates often differ substantially between administrative sources and coverage surveys, and inconsistencies such as district-level coverage rates of more than 100%, negative dropout rates between vaccine doses, and negative vaccine wastage rates all cast doubt on the reliability of vaccination coverage data. Private sector vaccination data are furthermore not always easily taken into account for coverage estimation. There are also large discrepancies in the numbers of VPDs between different surveillance sources (e.g., aggregate vs. case-based data vs active vs passive surveillance data), and VPD outbreaks occur frequently in populations showing high administrative vaccination coverage.
- ***Information systems and tools are often inefficient,*** not user-friendly, not standardized at the national level, and not available at the local level (e.g., lack of reporting forms and home-based records). There may be duplicative systems supporting disease surveillance, or immunization coverage monitoring systems that require re-entering the same information on several forms or computerized systems. Finally, infrastructure or limited access to telecommunications may limit data entry and data use.
- ***There is a limited "data use culture".*** A good data culture doesn't start with good data, but with health workers, managers and decision-makers at different levels analyzing, sharing and using the available data, no matter how imperfect. This lack of data use may be due to insufficient capacity among these workers (a lack of data literacy or analytic skills, personnel shortages and heavy workloads); little focus on data quality and analysis by supervisors (e.g., a lack of periodic data review and data harmonization meetings); the absence of standard operating procedures (SOPs); and the lack of policies, procedures and governance that support such a culture. Supportive policies focus on the quality and use of data; provide feedback, ensure health workers understand how data can be used; and encourage accurate reporting of low performance, without possible negative consequences for those reporting the data.

Purpose of this document and target audience

This Framework articulates a shared strategic approach among countries and partners to improve the quality, availability and use of immunization and VPD surveillance data to enable countries to reach their immunization programme goals – towards GVAP and beyond.

The specific purposes of this framework are to:

1. Identify key issues with immunization and surveillance data and formulate credible and feasible strategies to improve data quality, availability and use, with a view towards future needs of immunization programmes;
2. Establish a consensus concerning the areas of work and collaboration between countries and partners that will help ensure that goals and activities related to improving the quality and use of immunization and surveillance data for decision-making are included in country and partner work plans;
3. Raise the profile of immunization and surveillance data for decision-making as a priority within the immunization and health community at the local, national and global levels, and make it “everyone’s business”.

The intended **audience** for this framework includes global and country-level decision-makers with an interest in improving and using immunization and surveillance data, such as health authorities, national immunization programme managers, communicable disease surveillance managers, Health Management Information Systems (HMIS) managers, NITAGs, international agencies, immunization partners, and non-governmental organizations.

Guiding principles of the framework

Country ownership and sustainability

To allow for the implementation of scalable and long-term sustainable solutions, any intervention aimed at improving data availability, quality, and use should be fully owned by countries. Rather than developing tools and interventions and handing them over to national governments after their technical assistance ends, partners should support the country’s priorities and allow national decision-makers to coordinate activities across programmes to improve data quality and use from the start. This will help ensure that these efforts to improve immunization and surveillance data are appropriate for their specific context, maximize the efficient use of resources, and are sustainable.

Focus on users

Data can be a game-changer, but only if the appropriate data elements are captured to track the programme’s indicators and goals, and the data are sufficiently scrutinized, analysed and used to trigger appropriate corrective actions. Data – from the health facility to the national level – should never be collected for their own sake, or only to fulfil reporting requirements. Systems should instead be designed with the purpose of informing decisions, and this should dictate which data are needed, the quality standards desired, and who should have ready access to the data. In addition to meeting the needs of decision-makers, the systems should also provide effective feedback mechanisms, so that health workers at the lowest level feel

empowered to use the data to improve programme performance and to contribute their ideas to improving the system's design.

Innovation and evidence-based approaches

Many countries have experienced similar challenges with their immunization and surveillance data systems. While there have been a number of innovative efforts to improve immunization data and its use on a pilot basis, many have not gone to scale, nor they have been well documented. Innovative approaches – for example, in the training of health workers in data analysis and use through peer-to-peer exchanges, and in the design of effective data management tools – should be encouraged through operations research that measures and documents what works and doesn't work.

Integration and interoperability

GVAP recognizes the value and importance of integrating immunization systems within the broader health system. This includes creating immunization information systems that are aligned with or integrated into health management information systems to avoid having to enter the same data more than once in different systems, which places extra burden on health workers. In some cases, the best ways to achieve this is through the use of a single national health management information system (HMIS) or integrated disease surveillance system, while in other cases, data should be exchanged electronically between different systems using data exchange protocols. To this end, national eHealth strategies can help define interoperability standards that all health programmes and systems must comply with. While efficiency is important, immunization and surveillance stakeholders should be involved to ensure that integrated systems collect data that are adequate to achieve programme objectives.

Collaboration between stakeholders and partners

Different reporting and data requirements by various international partners, as well as uncoordinated efforts to improve the quality and use of immunization and surveillance data, have often complicated the job of countries to develop effective and efficient immunization data collection and reporting systems. Collaboration and consensus between partners will be greatly enhanced if – as recommended in this framework – they all work from the same data improvement plan in deciding which data they require from countries, in streamlining reporting needs, and in providing assistance to countries in making improvements to their immunization information systems.

2. The case for investing in better immunization and surveillance data

Data for better health outcomes

Investments in information systems should aim to improve decision making and ultimately lead to better health outcomes. In this context, the goal is not to achieve high quality data for its own sake, or to meet reporting requirements, but rather to improve the quality, availability and use of data to the point where they can adequately inform decisions on which actions to take.

Thus, the focus of this Framework is for immunization programmes to obtain data that are ***"fit for purpose"***; ***that is, they help decision-makers, programme managers and health workers take timely actions to optimize the performance and impact of immunization programmes, based on programme objectives.***

Vision of the framework

The quality and use of immunization and surveillance data will improve only if countries, international organization and immunization partners agree to a common vision and set of strategies and collaborate more closely on activities to improve immunization and surveillance data. The proposed vision of this framework is:

Vision: All countries continuously improve the performance of their national immunization programmes and reduce morbidity and mortality from vaccine-preventable diseases through the availability and use of reliable immunization programme monitoring and vaccine-preventable disease surveillance and vaccine safety data.

The building blocks of immunization and surveillance information systems

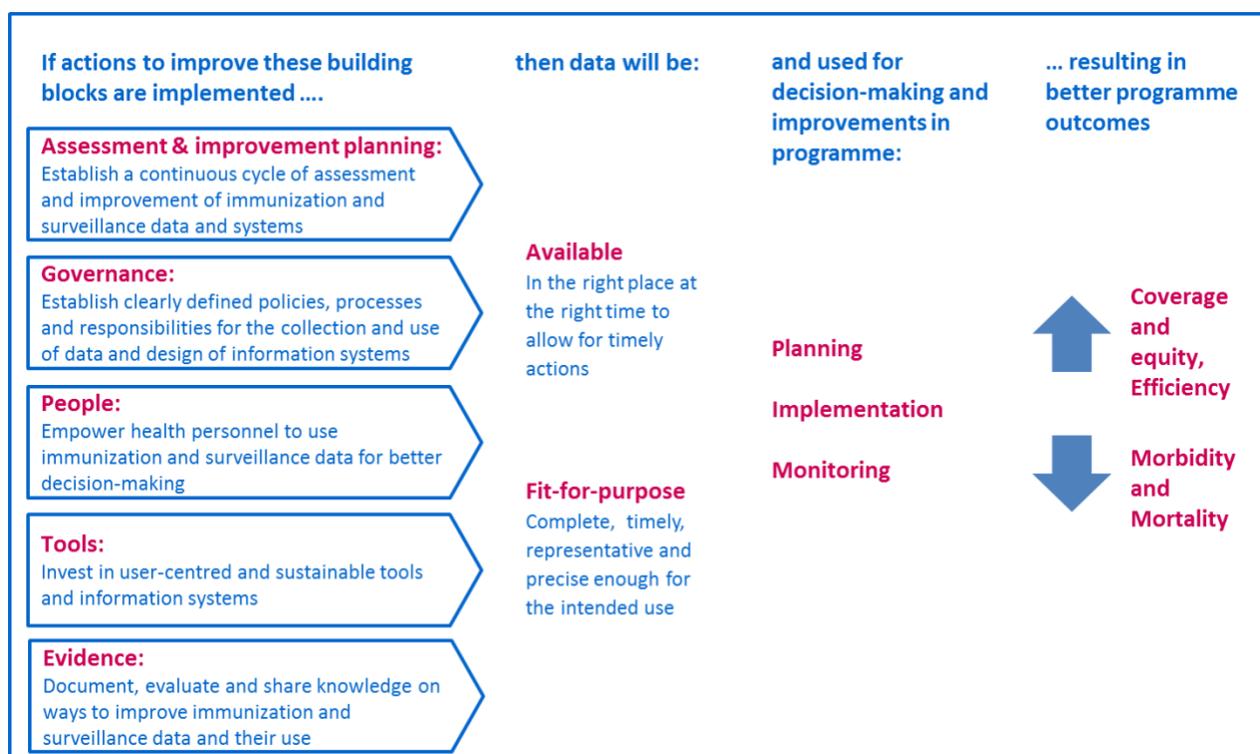
To achieve this vision, this document identifies five fundamental building blocks that underpin immunization and surveillance data systems, and defines what is needed to strengthen each of these building blocks:

1. **Assessment and improvement planning:** The systems that collect data, and the practices to analyze and use these data for programme improvements require a continuous cycle of assessment and improvement based on evidence, to ensure that these systems remain aligned with overall programme objectives.
2. **Governance:** Effective systems require clearly defined policies, processes, and responsibilities for the collection of data and the design of information systems.

3. **People:** Health personnel need to be empowered, able, and motivated to use immunization and surveillance data for better decision-making at all levels.
4. **Tools:** Tools and information systems need to be user-centred (that is, they support and not overburden their users), stable and sustainable (that is, well supported both technically and financially).
5. **Evidence:** Knowledge on ways to improve data and their use is documented, evaluated, and shared.

Countries with substantial gaps and weaknesses in the fundamental building blocks of immunization and VPD surveillance data systems will struggle to generate the data they need to successfully make programme improvements, or may even be misinformed taking their focus away from where the problems really are. The strategies and actions that this document proposes for countries, with their immunization partners, to use to improve each of these building blocks are shown in the box. The theory of change, depicted in Figure 1 is that the improved availability and quality of data resulting from the proposed actions should lead to better use of data, better informed decisions, less waste, and eventually better health outcomes.

Figure 1. Theory of change on how proposed actions will lead to improvements in immunization programmes and health outcomes



The box below illustrates how people at all levels can use better data for better outcomes.

Box 1. Expected outcomes

- 1) Communities and health facilities identify and follow-up on eligible individuals and defaulters, know their target populations, regularly collect and review data to track the immunization status of their population, monitor vaccination coverage rates, AEFI's, and monitor disease burden, and report and respond to outbreaks in a timely manner;
- 2) Health districts and other higher administrative levels (e.g., provinces) regularly collect and report relevant data through efficient and user-centered tools and processes that facilitate the regular review and use of data to improve programme performance and monitor and prevent or rapidly respond to disease outbreaks;
- 3) National programme managers and communicable disease surveillance managers regularly review their immunization programme monitoring and disease surveillance data and the systems that produce them, and use the information to monitor progress and inform vaccination strategies and policies, including prioritizing geographic areas and populations for remedial action as needed,;
- 4) Countries and global partners agree on a rational set of immunization programme monitoring and surveillance data to share and use at the regional and global level. This consists of a minimum set of data, collected through an efficient system that minimizes duplication and the burden to countries, and the more meaningful analysis and use of data, with a common understanding of the limitations of the data;
- 5) Evidence-based information on the effectiveness of different strategies aimed at improving immunization and surveillance programme performance is made available to decision makers at all levels to use this information to increase coverage and equity, and to improve the collection, analysis and use of data for decision-making at all levels;
- 6) Global partners support countries in strengthening their immunization information and surveillance systems and capacity to collect (from all vaccine providers and in a timely manner), assess and use high-quality data for coordinated decision-making at all levels. This includes developing minimum standards and user-friendly tools and guidance to support the routine use of data.

3. Strategies to improve immunization and surveillance data availability, quality, and use

3.1 Assessment and improvement planning: Establish a continuous cycle of assessment and improvements of immunization and surveillance data and information systems

Many countries have completed data quality self-assessments (DQs) or data quality audits (DQAs) for immunization data, and others have conducted vaccine-preventable disease surveillance reviews. Sometimes these assessments are integrated into programme reviews, and increasingly data checks are incorporated in routine supervision practices. Awareness about data quality is likely higher now than it has ever been, but challenges remain:

- Data quality assessments are sometimes completed mechanically, or are otherwise inadequate or insufficient to identify or tackle the most relevant issues. They may not lead to actionable recommendations or substantial improvements in data quality or use, due to a lack of country ownership in the assessment process and/or to limited human or financial resources, as well as leadership and governance issues or contextual issues that go beyond immunization, to implement the recommendations.
- DQAs also tend to focus on compliance with norms and policies, rather than examining the policies or design of the systems themselves and what data they should be collecting based on programme objectives. Similarly, they may not identify issues related to duplicative systems and/or barriers and enablers for the use of data at the different levels.
- Disease surveillance reviews are conducted by many countries, but are infrequent and usually only focus on a few vaccine-preventable diseases. Furthermore, few assessments look at the completeness and quality of the surveillance data reported and its linkages with laboratory results.
- Efforts to strengthen immunization and surveillance data are often fragmented, uncoordinated, not aligned with country planning cycles, and not based on evidence regarding which measures for improvement are most cost-effective. They may also not sufficiently take into account the country context and maturity level and capacity of the country's immunization programme and data systems.

Recommendations to address these challenges:

At the country level:

- 1. Conduct systematic** Serious efforts to strengthen the quality and use of immunization

assessments of immunization and surveillance data and information systems, as needed

program monitoring and surveillance data in countries require systematic assessments of current data and systems. Such assessments should examine data collection and reporting forms and tools, data flows, availability and use of the data at different levels of the health system, and barriers and bottlenecks.

This should not be a “one-off” activity, but a continuous process, with periodic in-depth assessments (e.g., every three to five years), followed by more routine desk reviews at all levels. These assessments are quite common, but don’t always lead to implementable recommendations. There is also less evidence on interventions that do increase data quality and use. The reviews need not always be done at the national level with international partners, but can include periodic sub-national reviews led by national or sub-national staff.

2. Implement continuous improvements of immunization and surveillance data and information systems, based on the results of the assessments and a sufficiently-funded data improvement plan that all relevant partners agree to support collaboratively

Based on the assessment and on evidence of what works and doesn’t from experiences in other countries, a robust and realistic plan to improve immunization and surveillance data quality and use on a continuous basis should be developed. The planned improvements should be costed out and sufficient resources mobilized to ensure that they can be implemented adequately. To help ensure their sustainability, the improvement plans should be integrated into existing immunization plans, such as comprehensive multi-year plans (cMYPs) or annual EPI plans. The plan should also include a timeline for accountability and be reviewed and updated routinely, based on the regular assessments of data quality and use and the implementation of the agreed-upon activities.

To avoid parallel or fragmented efforts of partners to improve immunization and surveillance data, it is critical that relevant in-country actors and partners collaborate in supporting countries – from the assessment and planning phase to implementing and monitoring data and system improvements. This can best be accomplished by having partners align their resources and activities with the national data improvement plan.

In implementing and monitoring these improvements, efforts must be made to ensure that governments and stakeholders have realistic expectations and do not expect to see results overnight. Furthermore, programme managers should be aware that improvements in data quality often result in evidence of

lower programme performance (e.g., a decrease in administrative coverage, the detection of more cases and outbreaks of VPDs). In Middle Income Countries specifically, it is often important that the private sector be involved as well.

3. Establish a national data improvement team to lead the needs assessment and the development, implementation and monitoring of continuous data improvements

Institutionalizing the continuous review and strengthening of immunization data and their use will require identifying an existing or new group of individuals to take the lead in and coordinate these efforts. This will ideally be a multi-disciplinary team of national EPI staff and other in-country experts as needed (e.g., from national statistics offices, the national health information system, communicable disease surveillance department, national laboratory, WHO, UNICEF, civil society and private sector as appropriate). The group could be part of, or liaise with, existing bodies supporting the immunization programme, such as a sub-committee of the country's interagency coordinating committee (ICC) or the national immunization advisory body (NITAG), as appropriate.

4. Identify in-country organizations to support the activities to assess and improve data availability, quality and use

These can include universities, NGOs, and data-oriented programmes, such as field epidemiology training programmes (FETPs). This strategy will create specialized capacity in countries, and lend some independence to the assessments. Involving schools of public health in monitoring and surveillance could also lead to improved pre-service training.

At the global or regional level:

5. Develop improved methods and tools and provide trained experts to assist countries in conducting needs assessments and in developing data improvement plans

Partners can play a vital role in supporting the development of improved methods and tools for conducting needs assessments of immunization data and systems, and preparing data quality improvement plans, as well as in mobilizing resources to implement the plans.

Performing data and systems assessments, planning and implementing improvements, and monitoring progress is an iterative and time-consuming process that requires specialized skills. Currently, not enough capacity exists in regions and countries to meet all needs, and leadership from global agencies is required to support countries. It is therefore proposed to establish a network of consultants and organizations with

appropriate expertise (e.g., in immunization and surveillance data, information management systems) and train them to provide assistance.

6. Monitor countries' progress in implementing data improvements and advise accordingly

Partners, with the help of the network of experts and organizations, will follow up closely with countries on the implementation of their data improvements and advise on required corrective actions.

3.2 Governance and leadership: Establish clearly defined policies, processes, and responsibilities for the collection and use of data and the design of information systems

In many countries, immunization and surveillance data are regularly collected, reviewed, analyzed, and reported from health facilities all the way up to the global level. In fact, the immunization programme benefits from a relatively greater amount of data being available than most other health programmes. However, in many countries, challenges exist around the governance of those data and the systems that collect them:

- There is often a lack of a well-defined integrated country-led vision of the information system, including what health data should be collected (including indicators), as well as associated governance mechanisms, standards, tools that ensure interoperability and approaches to collaboration with other groups.
- Some countries design information systems around global reporting requirements, yet global agencies and partners may require too much data to be reported. This can impose an undue strain on country ministries of health, and lead to a system that does not adequately support different programme objectives.
- There is often too much focus on the collection, aggregation, and reporting of data, and not enough attention on the critical review, use for decision-making at the different levels and accountability of the data.
- In many countries, there is a lack of collaboration between programmes and sectors (e.g., EPI, communicable diseases surveillance, Health Management Information System, Civil and Vital Registration Systems), and between the Ministry of Health and the private and NGO sectors. This lack of collaboration often leads to duplicative reporting mechanisms and/or incomplete reporting.
- Poor communication and data sharing between the immunization programmes, disease surveillance departments and diagnostic laboratories can delay responses to disease outbreaks or actions to improve vaccination coverage in areas with high incidence of vaccine-preventable diseases.

- While the health sector relies heavily on population estimates for monitoring, there is often a lack of collaboration with national statistics bureaus, civil registration and vital statistics systems, which can result in incorrect denominators to forecast vaccine needs and estimate vaccination coverage. Other common problems are the fact that population estimates may be based on old censuses and the existence of multiple sets of population estimates from different sources. The improvement of denominator estimates may thus require collaboration between different government agencies as well as new estimation methods, both actions that will likely take time to improve denominators. Nevertheless, inaccurate denominators should not prevent efforts to improve the quality and use of numerator data.
- At the global level, there is a lack of updated and consolidated guidance around monitoring standards and practices that can help address the challenges of universal health coverage, including the monitoring of immunization coverage and disease burden among marginalized and vulnerable populations, including migrants, minorities and others. This limits countries' ability to track equity measures in real-time or on a more frequent basis and to make programme adjustments based on these data.
- In a number of countries, there are political or financial disincentives for programme managers and local health officials to report low performance (e.g., low coverage rates), often leading to inflated data, especially for vaccines used as indicators for performance-based incentives. Similarly, some national governments are not keen to announce disease outbreaks due to negative economic effects (e.g., on tourism) or to share reports of AEFIs for fear of their impact on the immunization programme. It can be argued that disincentives to report accurately start at the global level, since donors and technical partners may exert pressure on countries to improve performance based on certain measures (e.g., DTP3 coverage rates), and often condition support on achieving these measures. In 2011, SAGE warned against using coverage estimate for performance-based rewards.

Recommendations to address these challenges:

Good governance helps create the enabling environment for the establishment of successful information systems. The recommendations below focus on institutionalizing at the national and global level policies and procedures aimed at strengthening immunization and surveillance data and their use.

At the country level:

1. Determine which data and associated data standards are needed at different levels of the health system to monitor

A critical part of the data assessment and improvement planning should involve mapping out what decisions programme managers and NITAGS need to make on a regular basis and what data are critical to making these decisions, including data required to reach coverage and equity goals.

programme performance and inform decision-making

This list of critical data should then be compared to the information currently being collected to determine which data elements should continue to be collected and reported and which are unnecessary and can be eliminated. Sources of information generated outside of the immunization programme, such as the multi-indicator household surveys Demographic and Health Surveys (DHS), UNICEF's Multi-indicator Cluster Surveys (MICS) and others, as well as the service availability and readiness assessments (SARA), should be explored to fill in critical gaps. Countries are also encouraged to clearly define standard indicators for use at all levels, following global and regional guidance.

2. Strengthen collaboration between different government sectors and with other institutions that generate critical data to improve data accuracy

Forging stronger and more regular ties with other sectors, programs and agencies that are important sources of data can be a key step in improving the quality of immunization and surveillance data. These institutions and sectors can include private providers and NGOs to ensure better reporting of immunization and surveillance data from these sectors, other Ministry of Health divisions (e.g. maternal and child health, statistics), and HMIS departments to better coordinate the immunization information system with that of the overall HMIS. Regular coordination between the immunization programme, disease surveillance departments and diagnostic laboratories can lead to more rapid responses to disease outbreaks and actions to improve vaccination coverage in high-incidence areas.

3. Identify mechanisms to increase the accuracy of denominators for use by immunization programmes and disease surveillance systems

It is recommended that countries seek to identify and understand potential limitations with official, census-based denominators and estimates of catchment areas and their populations. In situations where official denominators do not address programmatic needs (e.g., they are not thought to accurately reflect current birth rates, in- and out-migration and urban mobility, and/or broader population growth and distribution), immunization programmes should explore opportunities to use alternative, non-census based population estimates for making programmatic decisions. Sources of such estimates can include immunization microplans, community registries, and individual-based e-registries.

Concurrently, more regular coordination with civil registration

and vital statistics systems for birth and other population data is also recommended.

4. Conduct advocacy and communications with stakeholders and policymakers on the importance of improving immunization and surveillance data

Making long-lasting improvements in data quality and use will likely require conducting advocacy and communications activities with policymakers and programme managers at the national and sub-national levels on the importance of accurate and timely data to inform decisions (e.g., to detect VPD outbreaks early on, counter misinformation about AEFIs, improve vaccination coverage in marginalized populations) in order to ensure their buy-in to invest in these improvements. This can include advocating for investments in research (to NITAGs or other influential groups) on effective ways to improve data quality, availability and use, to ensure that planned improvements are based on sound evidence (see Section 3.5).

At the global or regional level:

5. Establish a rational and inclusive process to determine standards for immunization and VPD surveillance reporting, and revise reporting mechanisms accordingly, with special attention on developing indicators to achieve equity

Partners need to agree to standards for immunization and VDP surveillance reporting, including a minimum set of data from countries. The goal is to reduce the administrative burden on countries while at the same time ensuring that key information is still reported. Given the focus on equity in immunization coverage, this activity will include developing guidance on collecting data on equity and universal health coverage – in the simplest ways possible without overburdening immunization programmes – and developing generic indicators that countries can adapt for their specific context.

This process will be overseen by the SAGE mechanisms, and should result in revisions to current data reporting mechanisms used by countries, such as the joint reporting format (JRF).

6. Develop policies and agreements between international organizations and countries concerning confidentiality and the

Sharing of immunization and surveillance data with global partners, such as case-based surveillance data, can be controversial in some countries and can result in incomplete reporting. Specific policies and agreements between WHO, UNICEF and countries on sharing different types of

sharing of different types of immunization data

immunization data are needed to clarify which data can be shared publicly, how they will be shared, and how they will be used to ensure data availability while maintaining confidentiality.

7. Improve global platforms that present and visualize comprehensive immunization and surveillance data

The collection, synthesis and dissemination of immunization and disease surveillance data at the global level can be much improved and better coordinated to monitor trends and identify problems. There are, for instance, separate global reporting systems for several vaccine-preventable diseases (e.g., polio, measles, rotavirus), and data have to be triangulated from multiple datasets to bring coverage and disease burden information together. There may also be multiple data sources for a single disease, such as measles, all of which are stored in different places and require hand coding for analysis. To improve this situation, relevant partners should collaborate more on the collection, analysis, and presentation of immunization and surveillance data that are shared on their respective platforms.

8. Partners work together to develop strategies to counter the political and financial disincentives for countries to prioritize accurate reporting over achievement of national and global goals

To counter disincentives at the sub-national, national, regional and global levels to report accurate immunization and disease surveillance data that indicate poor performance, the global community should encourage countries to report their best estimates of true performance, rather than demanding the achievement of predefined goals. One approach could be declaring a “data amnesty”, in which countries are allowed to lower coverage estimates, for example based on high-quality surveys, without loss of funding or negative consequences for health workers.

3.3 People: Empower health personnel to use immunization and surveillance data for better decision-making

Health workers’ qualifications, motivation, and efforts, working in a supportive environment, are probably the most critical factors in the generation and use of health data. Yet in many countries, their full potential is underused because of the following challenges:

- Health personnel at the local and even national level may lack the skills and knowledge to analyze and interpret immunization data (e.g., to calculate coverage or dropout rates correctly, or draw a monitoring chart), due to a lack of training and education. In addition, training on data collection, analysis and use, if it exists, may not be based on

the actual knowledge and skill levels of frontline workers and higher-ups, and can consequently be ineffective. Moreover, evaluations of training and its impact on programme performance are rarely conducted.

- Health workers may also lose motivation if they are able to identify defaulters, develop plans to conduct targeted outreach or know where to go to vaccinate in response to VPD cases, yet they are not able to act due to financial constraints, lack of authority or other limitations.
- The motivation among health personnel to report and use data correctly is often missing because of a lack of supervision, incentives to identify and troubleshoot obvious data problems, feedback from higher levels, or understanding of why and for whom the data are collected. At lower levels, health workers may also lack the means to implement corrective actions.
- Health workers on the frontlines are often overburdened by heavy clinical and/or administrative workloads and consequently focus on reporting obligations rather than on use of data to monitor and improve programme performance. This is often exacerbated by staff shortages and high turnover rates.
- Health staff and programme managers may feel pressure not to report data that indicate poor performance of the immunization programme or surveillance system in their geographic area.

Recommendations to address these challenges:

Efforts to address these challenges and increase the analysis and use of immunization and surveillance data by health workers and programme managers include the following:

At the country level:

1. Assess the skills and knowledge of health workers at various levels concerning data analysis, interpretation and use, and identify training/learning needs

A training needs assessment is a critical step to identify the gaps in health workers' skills and knowledge related to collecting, analyzing and using data in order to design effective training. The assessment can also determine whether additional training is in fact needed or whether capacity-building in data quality and use should focus instead on addressing other barriers to accurate reporting and use of data, such as personnel shortages, low motivation among health workers, and disincentives to report poor programme performance.

2. Enhance the skills and knowledge of health

This will be achieved by increasing and improving pre-service and in-service training to doctors, nurses and other health

workers at all levels in the collection, analysis and use of immunization and surveillance data, based on training needs assessment

workers in data collection, analysis and use, as well as in assessing and improving data quality, based on the training needs assessment. The training should ideally cover the collection and analysis of survey data, as well as routine programme data. It should be a continuous process (e.g., periodic refresher training and supportive supervision/on-the-job training) and should be evaluated to assess its impact on the immunization programme and/or surveillance system. In addition, a focus on data quality and use should be incorporated into supportive supervision of all health staff involved in immunization at all levels. This could involve, for example, adding data quality and use items to supervisory checklists.

3. Monitor and ensure the availability of health personnel responsible for collection, management and analysis of immunization and surveillance data at all levels of the health system

To ensure that data-related tasks are rationally distributed, data management positions need to be created at different levels and included as a line item in budgets. These positions might need to be shared across programmes. At the service delivery level, a balance of administrative and clinical work needs to be reflected in job descriptions.

4. Create a “data use culture” among health workers at all levels

In addition to a greater focus on data in training and supportive supervision, health ministries can create a “culture” conducive to producing high-quality data, so that it becomes routine practice for health workers to check and question immunization and surveillance data for logic and consistency, and use data to make sure that their communities are fully immunized. Such a culture emphasizes the use of data to improve programme outcomes, over merely collecting and recording data to meet administrative reporting requirements. Growing a data use culture can involve simplifying guidance for health workers on data collection and use; reviewing monitoring and evaluation (M&E) tools to determine if they promote the use of data and revising them accordingly; having those at higher levels of the health system explain the need for and use of the data in order to justify their data requests and to be accountable; and providing incentives for health professionals to increase data use. These incentives can include organizing regular data review meetings at different levels, and creating

feedback mechanisms so that frontline health workers feel informed and empowered to make use of their data to improve their programme's performance.

5. Reinforce support for immunization data and VPD surveillance focal points

Those responsible for data collection, analysis, and reporting are often staff members with relatively little decision-making power. Elevating the profile, professional recognition and status of immunization data managers and VPD surveillance officers can have an important impact on improving the quality and use of data. Other ways that countries can support these critical personnel include providing mentoring and advanced training opportunities, organizing regular data review meetings at the national and sub-national levels, and other opportunities to provide feedback.

At the global or regional level:

6. Define the profile of country immunization data and VPD surveillance focal points, and emphasize and support the role of these persons within the EPI and other relevant MOH departments

Partners can help emphasize the importance of data management and disease surveillance Focal Points by developing model job descriptions and qualifications, performance standards and field guides for self-monitoring, as well as supporting them to receive advanced training. Professional certification could also serve as an incentive.

7. Develop effective methods and materials for workforce training and capacity-building in immunization and surveillance data

To assist countries in developing effective training and capacity-building programmes in immunization and disease surveillance data, partners can develop guidance and training materials based on adult learning principles that have been found to be effective, for countries to adapt, as needed. These can include distance-learning courses, training videos, and generic training modules and accompanying teacher manuals that translate guidance into effective adult learning tools.

3.4 Tools: Invest in user-centred and sustainable tools and information systems

As programmes include more and more data to be collected by national systems, they are facing a number of challenges with the tools they are using:

- Paper forms are updated in a piecemeal fashion to accommodate new vaccines and vaccine-preventable diseases, or different ways are used to disaggregate vaccinations (for example, by gender, delivery strategy, age of the child), which often result in less usable tools.
- Electronic tools, which are not always well designed and implemented, may sometimes add to the health staff's administrative burden, rather than help reduce it. They may also incur considerable cost and not be financially sustainable.
- Data management systems and forms are often designed to collect and report data, rather than to analyze and visualize the data to inform decisions on corrective actions to take at the level at which the data are produced.
- Often, parallel systems exist at the country level (e.g., for the EPI and for the HMIS), requiring multiple entries of the same data. In general, there is a justified movement away from parallel systems towards an integrated system, but if the immunization programme is not actively engaged in the design of the integrated health information system, some key immunization data elements may no longer be captured, and, in addition, the programme staff may have limited access to the data.
- Tools that may not work adequately in certain areas due to insufficient infrastructure, connectivity or other barriers to the use of ICT.

Recommendations to address these challenges:

Actions to improve immunization and surveillance information systems and tools include:

At the country level:

1. Develop and implement a plan to improve the immunization and surveillance information system, tools and processes, based on the results of the overall needs assessment

This will focus on countries developing or refining easy-to-use information systems with tools that are harmonized with national health information systems and with global recommendations and goals. The systems, tools and processes should be designed or modified and introduced in a thoughtful way that involves the input of key experts, including the end users, and that anticipates and mitigates the likely reaction of health workers to these changes (i.e., "change management"). They should also place emphasis on

the analysis and use of data for decision-making, instead of simply data collection and reporting.

The switch from paper-based to digital tools will be encouraged in countries with sufficient capacity and funding to maintain such systems. These can include, for example, electronic immunization registries and civil registration and vital statistics systems, which have the potential to help move from planning based on aggregate numbers (e.g., total numbers of children immunized by facility, district, province) to identifying individual children who have missed vaccinations to ensure that all individuals are fully immunized. Support for case-based surveillance systems for priority diseases will also facilitate evidence-based decision-making and public health responses. Electronic systems should be aligned with the country's national e-Health system and strategies.

In making decisions about digitalizing immunization information systems and forms, countries should assess the readiness of the health system and immunization programme at all levels to determine whether and to what degree to use electronic vs. paper tools (e.g., nation-wide or in selected areas and down to what level), taking into consideration such factors as availability of electricity and the Internet, personnel to maintain the system and to do timely troubleshooting, and the costs and sustainability of a digitalizing system (e.g., training, maintenance costs). It should also be noted that if the current paper-based system is not being used properly, digitalizing the system won't necessarily remedy this.

A key area of focus to promote the interpretation and use of data for action will be to encourage the development and use of "dashboards" or other means of visualizing key data automatically in a format that is easily understood by programme managers, policymakers and political leaders.

2. Ensure that EPI has a continual voice in efforts to integrate immunization systems into HMIS

It is critical that immunization programme staff provide input into the design and updating of the integrated system on a continual basis to ensure that all data that they need to monitor the programme and report to international agencies is captured. In designing the integrated system, it is also

vital that immunization programme managers at the national and sub-national levels are able to access data on a continual basis to monitor performance and take corrective action. This can be achieved by establishing national HMIS working groups that include EPI representatives.

At the global or regional level:

3. Develop global guidance on what components are needed in designing an immunization and surveillance information system

Countries can benefit from global guidance on the key elements or components needed to ensure that an information system – whether paper-based, electronic, or a hybrid – facilitates the collection, visualization and use of information and are thus user-friendly. Examples of these components include data dictionaries, lists of essential programmatic data and key performance indicators, and reference data (e.g., population data for denominators, master health facility list, a list of all districts along with their shapefiles that are needed for mapping).

4. Provide guidance to countries on how best to use digital systems for programme management, including the best ways to visualize data

Guidance should include information on developing, scaling up, and sustaining digital tools and platforms, producing effective data visualization, and integrating or linking immunization and health information systems. For countries in the process of integrating their immunization information systems into the national HMIS, guidance should also be provided on key data elements to maintain and how the immunization programme can access these data to ensure that integration does not reduce the programme's effectiveness to monitor and use its data.

3.5 Evidence: Document, evaluate and share knowledge on ways to improve immunization and surveillance data and their use

To date, there is little published evidence about the barriers to improving immunization and surveillance data and interventions that have been successful (and not successful) in improving the quality and use of these data. Key areas of research where information is especially lacking include major barriers and enablers to producing high-quality data for action at different levels and in different settings; the main sources of inaccuracies in the system and their relative contribution; the economic costs and implications of countries converting to electronic immunization information systems; how best to integrate immunization information systems

and tools with national HMIS; the most effective ways of creating a “data use culture”, including strategies to increase the motivation of health workers to check and improve the quality of data they are responsible for collecting and to utilize these data effectively; and the types of initial and refresher training that are most effective in creating data-savvy staff.

There is also at present no one place at the global level where country programme staff can easily find resources that will help them in improving immunization and surveillance data, such as model guidelines, SOPs and data collection forms; and journal articles or reports on successful and unsuccessful methods and experiences in improving data quality. A global forum is also needed to facilitate the sharing of information and experiences between countries and other stakeholders in improving immunization or other health data and their use.

Recommendations to address these challenges:

At the country level:

1. Encourage information sharing on ways to improve and use immunization and surveillance data

Efforts should be made to build in-country “communities of practice” in which individuals and groups from different Ministry of Health departments and from other organizations and sectors (beyond health) share information and experience in improving data quality and use, including results of the research conducted through the activities outlined in #2 below. In addition, relevant EPI and HMIS staff should be able to participate in regional and global forums on immunization data quality and use.

2. Identify priority research topics related to improving immunization and surveillance data and use and support in-country research on the priority topics

The data needs assessment and improvement planning phase described in Section 3.1 above provides the opportunity to identify gaps in knowledge on which strategies work and don’t work to improve the quality, availability and use of immunization and surveillance data, and to prioritize research topics to fill in these gaps. The selection of priority research projects should take into account what research already exists both in the country and beyond (e.g., from the global landscape analysis described below). The research can be conducted in many countries by existing institutions, such as universities, research institutes or private organizations, with technical and financial support from partners, as needed and an emphasis placed on strengthening local research capacity in this area.

3. Broadly disseminate the results of operations

The results of the in-country research, along with relevant research conducted in other countries, should be

research on improvements in data quality and use conducted domestically and in other countries

disseminated and discussed in national workshops and written up in reports and in local, regional and/or international journals, as possible. The results should include both successful and unsuccessful experiences in improving immunization data and their use. Writing workshops may be considered to ensure that high-quality papers are written and published. The country's data improvement plans should also be revised based on the research findings, as appropriate.

At the global or regional level:

4. Create a global Web-based platform to share and exchange valuable resources and information concerning immunization data and use, using an existing or newly-created electronic platform

This will be a global resource and information-sharing platform, similar to Technet-21.org for countries and organizations interested in improving immunization and disease surveillance data quality, analysis, presentation and use. This resource can either be part of an existing electronic platform or a stand-alone Website. It will have at least two components: 1) a repository of tools, research papers and other resources, including the tools and research papers to be developed under this Framework; and 2) a communications forum for participants to exchange information and share experiences (e.g., on best practices and lessons learned) concerning how to improve immunization and surveillance data and information systems. These experiences can come from such sources as Technet-21, the Better Immunization Data (BID) Initiative, the WHO Health Data Collaboration, PAHO's IDQi initiative and the Optimize project. The platform can also include a page for immunization data visualization to showcase best practices from countries, regions and global organizations in presenting immunization and surveillance data.

5. Create a global research working group to direct, fund and publish country research on ways to improve immunization and surveillance data and their use

The global research working group on immunization and VDP surveillance data will consist of experts in research, immunization, surveillance, data systems and other relevant areas from a range of appropriate organizations (e.g., universities, international technical agencies, research institutes). The working group will conduct or commission a landscape analysis of existing research on immunization and surveillance data and systems and remaining gaps in knowledge, and advise on the selection of country-level

research projects for partners to support, based on set criteria.⁴

Partners can also facilitate the documentation of what is and isn't working well by assisting country researchers in publishing papers on their research activities, and potentially by supporting the preparation of a supplement in a peer-reviewed journal devoted to this issue.

⁴ See Annex ___ for an illustrative list of research topics.

4. Implementation and monitoring

This Framework will only succeed in strengthening immunization and VPD surveillance data towards the goal of more equitable provision of vaccinations for all, if countries and partners start implementing the outlined recommendations and actions, with systematic and continuous monitoring of progress.

Implementation of this framework should be planned through country and partner work plans, and facilitated by donors. For Gavi-eligible countries, this can be coordinated through the Gavi Alliance Strategic Focus Area (SFA) on immunization, surveillance, and safety data. Other countries will need to rely more on domestic finances, coupled with technical assistance from partners.

To ensure that partners and countries remain focused on strengthening the building blocks of data systems to improve data availability, quality, and use, we propose that the key partners prepare a yearly report to the SAGE data working group that contains the following elements:

- Qualitative description of investments and achievements at the global and regional levels towards strengthening the fundamental building blocks of immunization and surveillance data systems, with illustrative case studies in priority countries;
- Quantitative analysis of the improved availability, quality and use of data. The indicators for these aspects will be developed in alignment with the Gavi results framework for the data SFA