Mid-Level Management Course
for EPI Managers

BLOCK VII: Monitoring and evaluation

Module 15: Monitoring and data management

World Health Organization

REGIONAL OFFICE FOR **Africa**

Mid-Level Management Course
for EPI Managers

List of course modules

Mid-Level Management Course
for EPI Managers

BLOCK VII: Monitoring and evaluation

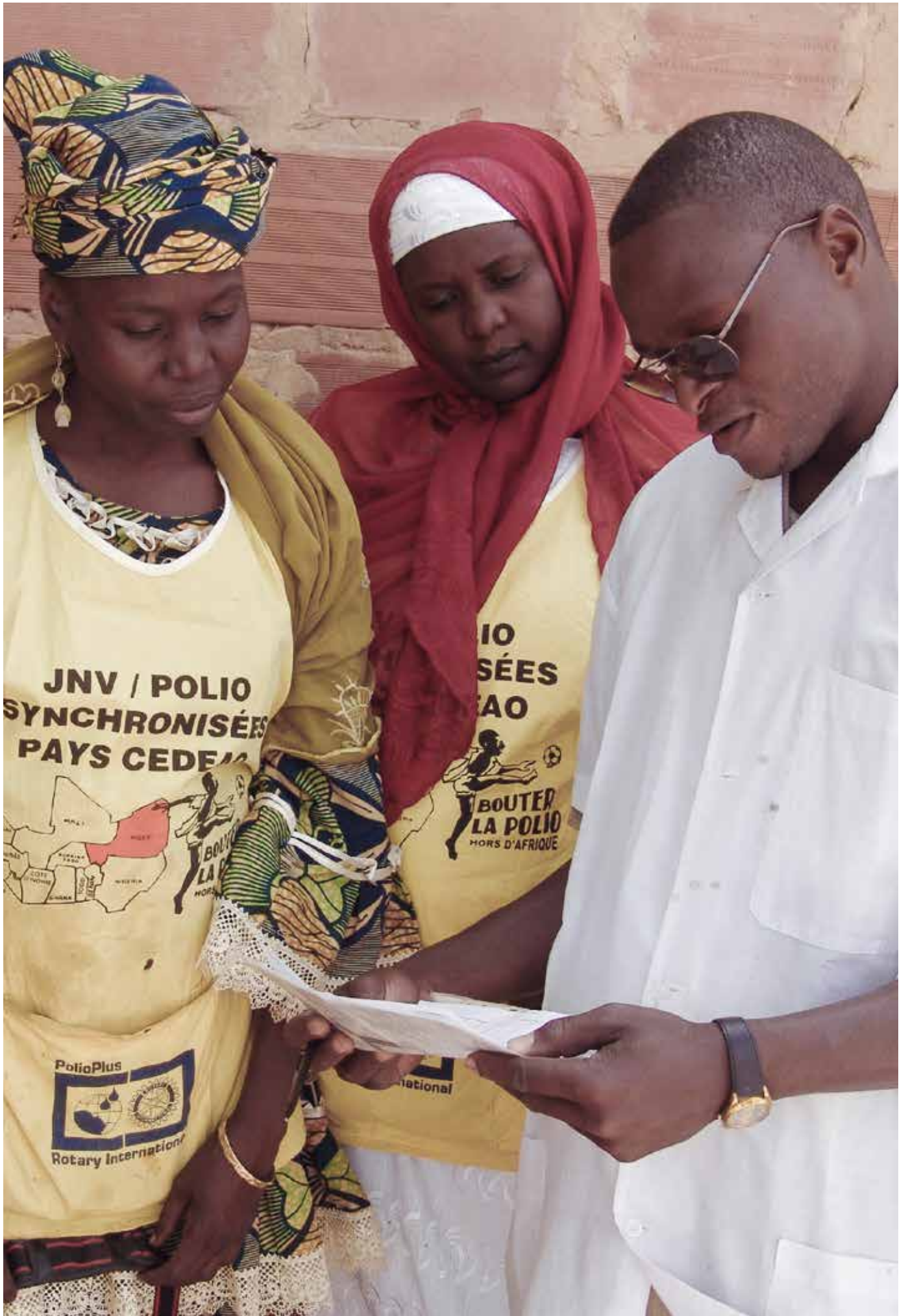## Module 15: Monitoring and data management

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Abbreviations and acronyms

AEFI	adverse event following immunization
AFP	acute flaccid paralysis
BCG	Bacillus Calmette-Guérin (vaccine against TB)
CEIS	computerized EPI information system
cMYP	comprehensive multi-year plan
DHMT	district health management team
DHS	Demographic and Health Survey
DOR	drop-out rate
DQA	data quality audit
DQR	data quality review
DQS	data quality self-assessment
DTP3	third dose of diphtheria-tetanus-pertussis-containing vaccine
DVDMT	district vaccine data management tool
EPI	Expanded Programme on Immunization
FIC	fully immunized child
GAPPD	Global Action Plan for the Prevention and Control of Pneumonia and Diarrhoea
Gavi	Global Alliance for Vaccines and Immunization
GVAP	Global Vaccine Action Plan (2011–2020)
HepB	hepatitis B vaccine
Hib	Haemophilus influenzae type b (vaccine)
HMIS	health management information system
HPV	human papilloma virus
ICC	interagency coordination committee
IEC	information, education and communication
IMCI	Integrated Management of Childhood Illness
ISA	immunization systems assessment
JRF	WHO/UNICEF Joint Reporting Form
LQAS	lot quality assurance sampling
MCV	measles-containing vaccine
MDVP	multi-dose vial policy
MICS	Multiple Indicator Cluster Survey
MNT	maternal and neonatal tetanus
NIDs	national immunization days

NIP	national immunization programme
NT	neonatal tetanus
OPV	oral polio vaccine
PAB	protection at birth
Penta	pentavalent vaccine (DTP+HepB+Hib)
RED/REC	Reaching Every District/Reaching Every Community
RIM	routine immunization module
RSPI	Regional Strategic Plan for Immunization (2014–2020)
SIAs	supplementary immunization activities
SMT	stock management tool
SNIDs	subnational immunization days
TT	tetanus toxoid
UNICEF	United Nations Children's Fund
VAR	vaccine arrival report
WHO	World Health Organization

Glossary

Activity	A task or a set of interrelated tasks aimed at generating a product or a result.
Assessment (results)	An examination of inputs, process and outputs of a project or programme conducted to measure performance and ascertain readiness and capacity to perform roles and responsibilities or achieve objectives. It is linked to policies and systems under which the programme operates.
Coverage	A measure of the extent to which the services rendered cover the potential need for this service in the community.
Drop-out rate	A comparison of the number of children or women who start receiving immunization and the number who do not receive later doses for full immunization. This is a measure of utilization of services
Evaluation	A periodic assessment of overall programme status: performance, effectiveness and efficiency. It is linked to policies, programme processes, systems under which the programme operates, strategic choices, outcomes and impact.
Implementation	The act of actually undertaking an intended and planned course of action.
Indicator	A variable used to compare performance in terms of efficiency, effectiveness and results. The indicator measures achievement against the expected result of an objective.
Milestone	Recognizable achievement toward the accomplishment of an activity.
Monitoring	A systematic and continuous process of examining data, procedures and practices to identify problems, develop solutions and guide interventions. Monitoring is conducted regularly (daily, weekly, monthly and quarterly). It is linked to implementation of programme activities. The information collected directs programme activities.
Objective	The result a programme, project or institution seeks to achieve. It is related to measurable product or positive changes expected from the implementation of a plan.
Performance	Level of fulfilment of operational capacity of a programme or a person.
Plan of action	A document defining activities for generating result/product under a specific programme; it identifies who does what, when, how and for how much.
Programme	A coherent entity of related projects or services that a group of people direct to achieve specific objectives.
Progress	Stage reached towards the achievement of an objective or goal.
Project	A set of activities planned to achieve specific objectives by project staff within a given budget and timeframe.

Strategy

A description of how the objectives of EPI will be achieved, namely the types of services or methods of intervention.

Supervision

A process to guide, support and assist service providers to carry out their duties to achieve organizational goals. Supervision is conducted using supervisory checklists or questionnaires, which help supervisors to assess the situation regarding various aspects of the programme or project.

Target

Categories expressed exclusively in measurable terms in relation to each objective. They are time-bound and have a specific deadline for achieving the desirable level or result.

Under-immunized

A child of one year of age who has started his/her immunizations but has not received all doses of vaccines as stipulated by the national immunization schedule for under one-year-old children. For example, if a child who has completed their first year and had BCG at birth, Penta1/OPV1 and Penta2/OPV2 but not Penta3/OPV3 or had all three shots of Penta/OPV but not measles, is considered "under-immunized". However, if the child is under one year of age and still is "waiting" for their second or third Penta shots they will not be counted as under-immunized. For practical reasons, Penta (or DPT-containing vaccine) immunization status of children of one year of age is used as an indicator for "under-immunized". This definition may change with changes in national EPI schedules. Currently, countries may begin recommending a routine second dose of measles vaccine between the ages of 12 and 23 months. To address this change according to the "age appropriate" concept, the above definition "under-immunized child" will be expanded to accommodate under-immunized children "by 24 months of age".

Unimmunized

A child of one year of age who has not received their immunizations as stipulated by the national immunization schedule for children under one. For practical reasons, Penta (or DPT-containing vaccine) immunization status of children of one year of age is used as an indicator for "unimmunized". However, the national programmes may choose some other indicators (e.g. "a child who has not received any of their immunizations as stipulated by the national immunization schedule for children under one year", or as mentioned in the above definition, if the national schedules include the second dose of measles vaccine between 12 and 23 months of age, the "unimmunized child" will be used for children "by 24 months of age").

1. Introduction

1.1 Context

The Expanded Programme on Immunization (EPI) is a key global health programme. Its overall goal is to provide effective and quality immunization services to target populations. EPI programme managers and staff need to have sound technical and managerial capacities in order to achieve the programme's goals.

The immunization system comprises five key operations: service delivery, communication, logistics, vaccine supply and quality, and surveillance. It also consists of three support components: management, financing and capacity strengthening.

National immunization systems are constantly undergoing change, notably those related to the introduction of new vaccines and new technologies, and programme expansion to reach broader target populations beyond young children. The EPI programme also faces external changes related to administrative decentralization, health reforms, as well as the evolving context of public-private partnerships (PPPs) for health, among others.

To ensure the smooth implementation of immunization programmes, EPI programme staff have to manage these changes. This requires specific skills in problem-solving, setting priorities, decision-making, planning and managing human, financial and material resources as well as monitoring implementation, supervision and evaluation of services.

National immunization programmes (NIPs) operate within the context of national health systems, in alignment with global and regional strategies. For the current decade, 2011–2020, the key global immunization strategies are conveyed through the Global Vaccine Action Plan (2011–2020) (GVAP) and the African Regional Strategic Plan for Immunization (2014–2020) (RSPI).

These strategic plans call on countries to:
- improve immunization coverage beyond current levels;
- complete interruption of poliovirus transmission and ensure virus containment;[1]
- attain the elimination of measles and make progress in the elimination of rubella and congenital rubella syndrome;[2] and
- attain and maintain elimination/control of other vaccine-preventable diseases (VPDs).

The key approaches for implementation of the GVAP/RSPI include:
- implementation of the Reaching Every District/Reaching Every Community (RED/REC) approach and other locally tailored approaches and move from supply-driven to demand-driven immunization services;
- extending the benefits of new vaccines to all;
- establishing sustainable immunization financing mechanisms;
- integrating immunization into national health policies and plans;
- ensuring that interventions are quantified, costed and incorporated into the various components of national health systems;
- enhancing partnerships for immunization;
- improving monitoring and data quality;
- improving human and institutional capacities;
- improving vaccine safety and regulation; and
- promoting implementation research and innovation.

The RSPI promotes integration using immunization as a platform for a range of priority interventions or as a component of a package of key interventions. Immunization is a central part of initiatives for the elimination and eradication of VPDs, and of the integrated Global Action Plan for the Prevention and Control of Pneumonia and Diarrhoea (GAPPD) by 2025.

It is understood that while implementing the above strategies, EPI managers will face numerous challenges and constraints that they need to resolve if the 2020 targets are to be met. Building national capacity in immunization service management at all levels of the health system is an essential foundation and key operational approach to achieving the goals of the global and regional strategic plans.

In view of this, the WHO Regional Office for Africa, in collaboration with key immunization partners such as the United Nations Children's Fund (UNICEF), United States Agency for International Development (Maternal and Child Survival Program) (USAID/MCSP), and the Network for Education and Support in Immunisation (NESI), have revised the Mid-Level Management Course for EPI Managers (MLM) training modules. These modules are complementary to other training materials including the Immunization in Practice (IIP) training manuals for health workers and the EPI/Integrated Management of Childhood Illnesses (IMCI) interactive training tool.

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1 WHO, CDC and UNICEF (2012). Polio Eradication and Endgame Strategic Plan 2013-2018.
2 WHO (2012). Global Measles and Rubella Strategic Plan 2012-2020.

This module (15) titled *Monitoring and data management* is part of Block VII: Monitoring and evaluation.

1.2 Purpose of the module

The purpose of this module is to provide guidance to managers of immunization programme on the needs for monitoring immunization activities, how to monitor and how to use the generated data for action.

1.3 Target audience

This module is intended for EPI managers at national, regional (provincial) and district levels, teachers at training institutions and partners involved or supporting immunisation activities.

1.4 Learning objectives

At the end of the training using this module, participants should be able to:
- Identify the steps and elements of the monitoring system.
- Identify the types of monitoring data that are generated in the immunization system, the basic data collection tools and sources of information.
- Discuss the attributes of good programme indicators.
- Apply the basic techniques for data verification and data quality checking.
- Analyse the factors that influence the quality of the immunization monitoring system.
- Utilize the immunization monitoring chart to plot coverage and use the information for programme decisions.
- Critically evaluate and interpret immunization programme monitoring data.
- Use the monitoring process to direct or adjust actions towards the programme.

1.5 Contents of the module

The module focuses on the following practical issues:
- Principles of monitoring process.
- Tools for data collection and management.
- Analysis and interpretation of data.
- Basic indicators and their characteristics.
- Quality of the monitoring system and data.
- Using monitoring as a decision-making process and a leverage for action.

This module is divided into seven main sections shown below :

1.6 How to use this module

This module introduces the process for immunization services monitoring. To use this module:
- Read the supporting text.
- Ask your facilitator questions or clarifications on the technical content of the module.
- Go through exercises as proposed.
- At the end of each exercise discuss the answers with your group or facilitator.
- Make presentations in the group or plenary if requested.
- This module or some of its chapters can be adapted and used as a tool for on-the-job training.

Monitoring system → Identifying information sources → Selecting monitoring indicators → Collecting data for monitoring → Managing collected data → Analysing and interpreting information → Using data for action
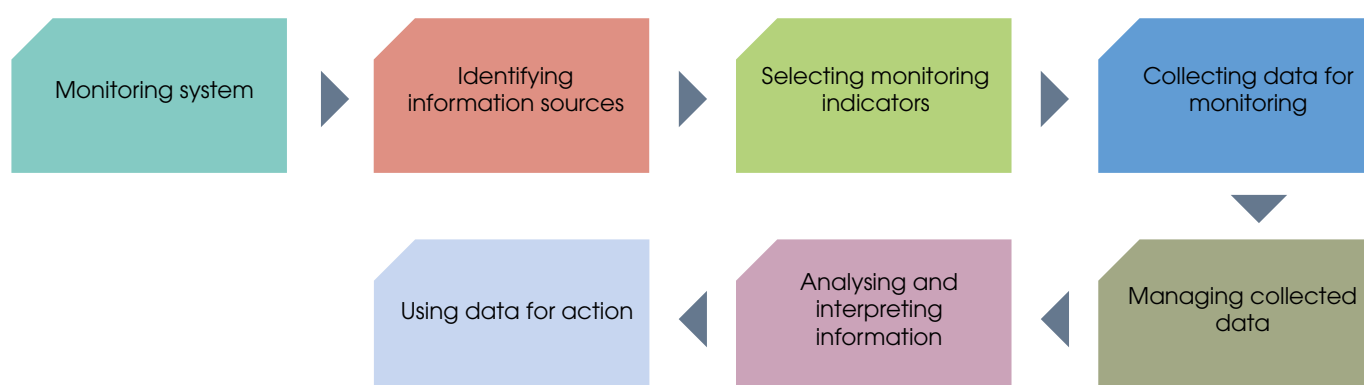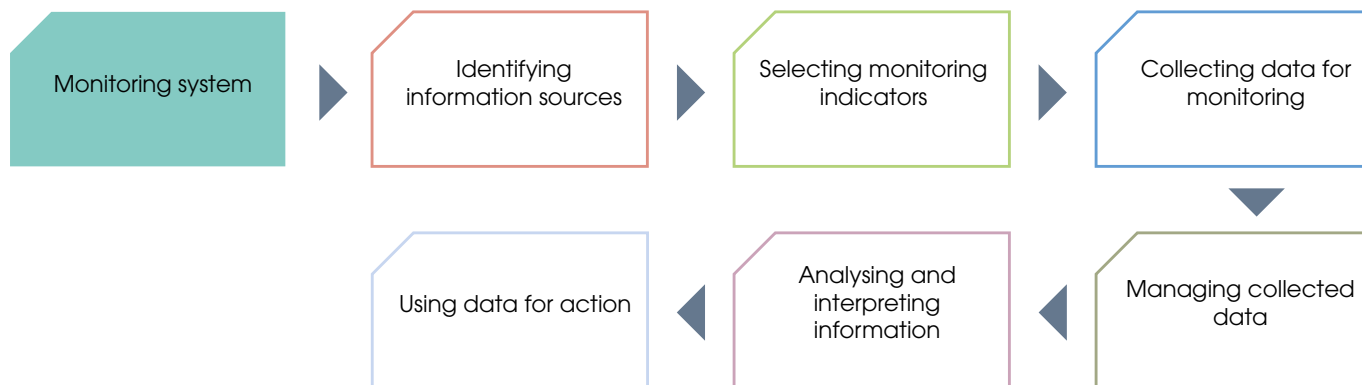
2. Monitoring system

2.1 What is monitoring and why is it important?

Monitoring health information involves observing, collecting and examining programme data. "Monitoring for action" takes this one step further, not only by analysing data but by using the data at all levels to direct the programme – measuring progress, identifying areas needing specific interventions and making practical revisions to plans.

Monitoring, the essential component of any plan, is a systematic and continuous process of examining data, procedures and practices. It is used to measure progress, identify problems, develop solutions and guide policies and interventions. Monitoring is an important tool for managers at all levels. It can help improve the quality of the immunization programme by ensuring that:

- All infants and pregnant women are immunized.
- Vaccines and safe injection equipment are delivered in correct quantities and on time.
- Staff are well trained and adequately supervised.
- Information on disease incidence and adverse events following immunization (AEFI) are collected, reported and analysed.
- The community has confidence in the vaccines delivered and the immunization service they received.

2.2 Which aspects of the immunization programme should be monitored?

For the purpose of monitoring your immunization programme, it is useful to divide the immunization system into five operational and three supportive components (refer to Module 1: *A problem-solving approach to immunization services management*). The operational components include service delivery; vaccine supply and quality; logistics and cold chain; surveillance (which includes monitoring); and advocacy and communication (Figure 2.1). The supportive components comprise:

management, financing and capacity building. All of these components must be monitored.

Figure 2.1 Operational components of immunization systems
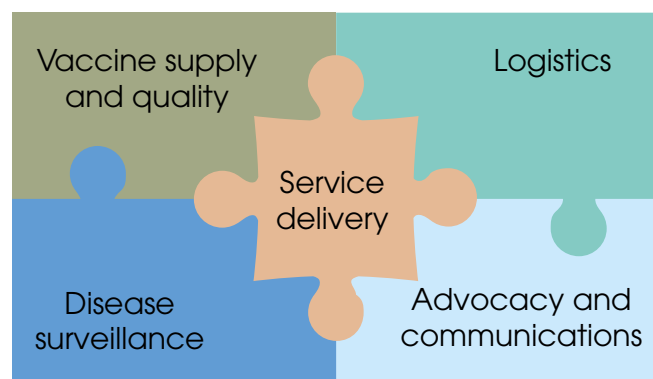
2.3 How is the immunization system monitored?

Now that you are familiar with the five different operational and three supportive components and understand that each one can be broken down into smaller parts to make monitoring easier, you must decide what level of quality or type of performance you are aiming for in your programme.

For example, drop-out rates (DOR) are very important when monitoring component one: service delivery. But what DOR do you consider acceptable?

A statement that describes the quality you hope to achieve in your programme is called a "programme goal", "benchmark" or a "standard".

Developing good quality indicators is the first, and one of the most important steps in monitoring the progress of your immunization programme. The indicators will need to be developed during the planning process.

2.4 Which levels of the immunization programme should be monitored?

To ensure that your immunization programme is monitored systematically, each level of the health system should be included. For simplicity, three levels are used in this document: health facility, district and national levels. Sometimes it is not possible to use the same indicator for each level because the data are not available or the indicator is not relevant. In these cases it might be necessary to adapt the indicator for each different level of the system. A well-designed monitoring programme will measure the quality of the immunization services at each level of the health system.

USEFUL QUESTIONS WITH BUILT-IN ANSWERS	
What to monitor?	Monitoring covers the entire immunization programme with all of its components.
Where to monitor?	The level of monitoring: national to district/province or from district to health facility. (This may help you to select your monitoring tools specific for a particular level.)
When, how often?	The regularity of monitoring varies, it can be done daily, weekly, monthly, quarterly, annually.
How to monitor?	Reports from intermediate or peripheral levels can be obtained with passive (waiting to receive) or active (asking or visiting health facility to receive) methods. The latter may include visits to the health offices to collect necessary information. In an extensive monitoring exercise, such as annual reviews, surveys or focus group discussions may also be applied.
Who is in the monitoring team?	It may include a single person or a team from your unit. In an integrated monitoring exercise (joint monitoring), it may involve several members from family/child health or epidemiology departments.
What are your monitoring tools?	Select appropriate monitoring tools relevant to your purpose. In the case of joint monitoring, limit your questions to key areas because the local staff to be interviewed or providing documentation may be under pressure to respond to all team members.
Whom to report to?	Monitoring involves persons at other levels to whom the collected information should be communicated – the immediate supervisor, the originator of the information, community.
Economics: How much it will cost?	Consider the relative costs involved in the monitoring exercise: it may involve per diem, cost of fuel, stationery, etc.
How the feedback is done?	How are the findings fed back through the system: by letters, by newsletters, by phone? (Use monitoring wall charts, maps, graphs, monthly summary reports to display your findings.)

Exercise 1

Individual work followed by group discussion.
Task 1: Review the definition of the monitoring process given in the glossary.
Task 2: Based on this definition and your experience, identify:
a) Monitoring versus evaluation:
  • Differences between monitoring and evaluation.
  • What evaluation and monitoring have in common.
b) Monitoring versus supervision.
c) Differences between monitoring and supervision.
d) What do evaluation and supervision have in common?

Monitoring system → Identifying information sources → Selecting monitoring indicators → Collecting data for monitoring

Using data for action ← Analysing and interpreting information ← Managing collected data
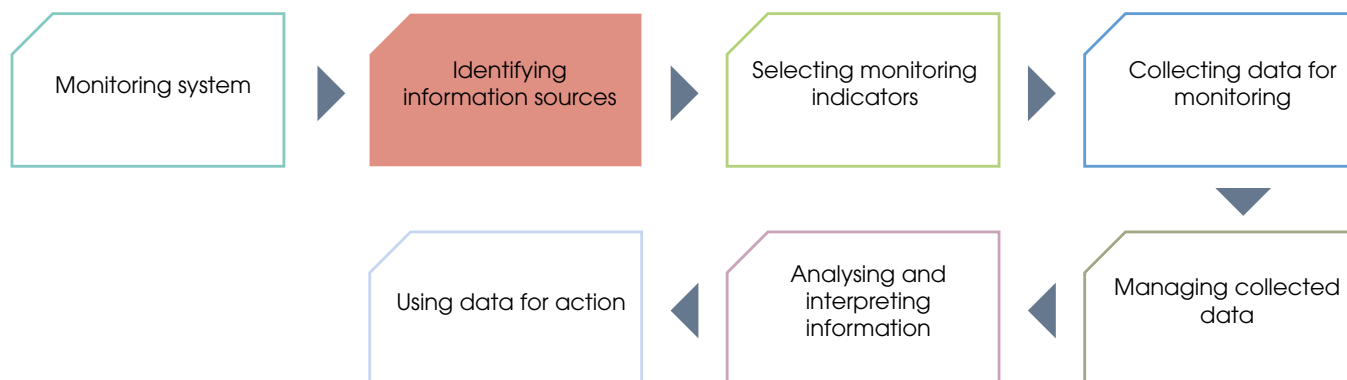
3. Identifying information sources

National information systems vary from country to country. The country may have a separate monitoring system for immunization or have a common national health management information system (HMIS).

Whatever the system, the national EPI manager is responsible for putting together the programme's monitoring needs so that information on the necessary minimal variables is collected and available in a timely manner to facilitate assessment of progress, to identify problems and to take management decisions at different levels.

Sources of information are many. In the districts, most data are from routine administrative reporting. Other information may be taken from periodic reports (technical, financial, supervisory visits) and studies such as vaccination coverage or other types of surveys and programme assessments.

At health facility level these may include:
- Census data for the provision of target populations and used to calculate programme performance.
- Immunization tally sheets to collect tally figures and check if they match with reported figures.
- Child immunization cards to see the actual dates of immunization and validity of immunizations as well as retention of cards to assist in EPI programme evaluation through a census, coverage surveys.
- The immunization register, recording the immunization history of the child, acts as a backup if the card is lost and check if immunization figures match with reported data on tally sheets, monitoring charts, summary sheet as well as used during the EPI programme evaluation e.g. data quality self-assessments (DQS), surveys, etc.
- Monthly immunization summary sheets to aggregate figures and see if monthly immunization targets have been achieved and

whether reported immunization figures match with those in the immunization register.
- Tracking system to monitor defaulters in the form of defaulter registers, bin card system, electronic immunization register, village community registers.
- Cold chain temperature monitoring chart to observe consistency of daily monitoring.
- Vaccine order forms and vaccine register/stock cards to ensure proper vaccine management.
- Inventory list of immunization and cold chain equipment to compare what is actually available and conditions of the equipment.
- Outpatient and inpatient registers to apply active surveillance of target diseases.
- Target diseases routine reports to compare reported and registered number of cases of target diseases.

At **district, provincial or national** level some of the common sources of information are:
- Monthly reports on the number of immunizations performed and the occurrence of target diseases.
- Immunization coverage survey reports.
- Supervisory reports.
- Cold chain inventory register.
- Cold chain review reports.
- Programme assessment/review reports.
- Interagency coordination committee (ICC) meeting minutes.

Table 3.1 Examples of information sources

Indicator	Needed variable/information		Source
Health facility level: Proportion of fully immunized children by end of first year of life in the catchment area	Numerator	Children that have received valid doses of all the primary vaccines before 12 months of age	• Immunization register • Health facility tally sheet
	Denominator	Birth cohort of that specific period for the catchment area	District planning unit (population census report)
District/province level: Proportion of health facilities achieving at least 80% Penta3 coverage	Numerator	Number of health facilities that have vaccinated at least 80% of the targeted infants with Penta3	Health facility summary sheets
	Denominator	Total number of health facilities vaccinating in the district	District list of health facilities District planning unit (population census report)
National level: Proportion of government funding for routine immunization	Numerator	Total funds for immunization activities disbursed from government sources for routine immunization	• Ministry of health • Ministry of finance • Finance department of district authority
	Denominator	Total expenditure on immunization activities	Ministry of health

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Exercise 2

List the most relevant sources of information you will use to verify or interpret each of the following situations. Explain why the source is essential and what could be the reason for such a situation.

Task 1: You have received reports from a district whereby the Penta3 figure is higher than Penta1 and no information is given for BCG.

Task 2: Review of vaccine arrival reports (VAR) and vaccination performance reports indicates that the national vaccine store has received 720 000 doses of measles vaccine during the last year. The total number of vaccination performed, however, has been only 130 675 during the same period.

When you complete the exercise, use a flipchart to share your answers with your group.
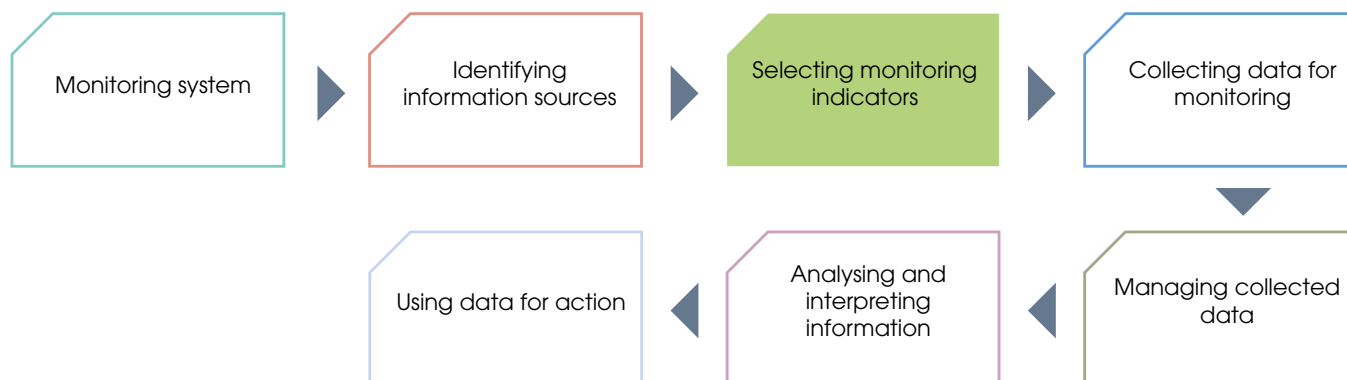
4. Selecting monitoring indicators

4.1 Steps for formulating indicators

What is an indicator? An indicator is a measurable variable used as a representation of an associated (but non-measured or non-measurable) factor or quantity. Indicators should be defined in precise, unambiguous terms that describe clearly and exactly what is being measured. Where practical, the indicator should give a relatively good idea of the data required and the population among whom the indicator is measured. There should be at least one indicator for each outcome. Good quality indicators are focused, clear and specific. The change measured by the indicator should represent progress that the programme hopes to make.

The process of formulating indicators is not an easy task. It undergoes several steps.

Steps in formulating indicators

- **Step 1:** Reaching a consensus by programme staff on the need for, and use of, monitoring progress and issues for which indicators need to be developed. Staff will identify a list of monitoring indicators and milestones that will assist in making sure that implementation goes according to the plan.
- **Step 2:** Identifying indicators that are considered essential for monitoring. Indicators should be able to specify:
  - ° the target population (for whom)
  - ° the quantity (how much)
  - ° the quality (how well)
  - ° the administrative level (where).
- **Step 3:** Defining each potential indicator in order to provide a comprehensive description of data needed – this will include intended use, numerator and denominator, sources and methods for data collection, staff involved, timing (periodicity of measurement) and limitations.

- **Step 4:** Selecting indicators based on feasibility criteria. Indicators for monitoring purposes should be built into the plan and related closely to the means available for data collection and processing.
- **Step 5:** Setting (adopting) the indicators and establishing a baseline for each of them to be used for repeated measurements at regular intervals. If the indicator has been selected for the first time, it should be field tested before its adaptation

The initial list of potential indicators could be long. After discussion, the number needs to be reduced to the essential indicators.

4.2 Types of indicators

The objective of the immunization programme is to reach high vaccination coverage of the target population through provision of quality services, using the available human, material and financial resources, so as to reduce morbidity and mortality, and eliminate or eradicate the diseases using available vaccines. In order to measure all the above parameters in the plan, the monitoring indicators are categorized into key areas:

- **Input indicators:** Immunization policies, resource inputs (human, material, financial). These are pre-requisite indicators for implementation.
- **Process indicators:** This area examines functionality and quality of the immunization system and includes all activities: planning, financing, quality of service delivery, immunization safety, assessment of the programme and its efficiency, training, etc.
- **Output indicators:** The programme's immediate results, e.g. vaccination coverage and other results or products contributing to the achievements of the programme objectives.

- **Outcome indicators:** Relates to the objectives of the programme, i.e. achievement of the final goal of polio eradication, neonatal tetanus (NT) elimination, etc.
- **Impact indicators:** Relates to the goal of the programme, i.e. reduction of morbidity and mortality of targeted diseases.

4.3 Selecting indicators

4.3.1 General considerations

When selecting indicators, consider the following:
- How practical and feasible is it to collect data for the indicator?
- How important is the information provided by an indicator to the overall implementation of the key areas of the programme?
- How difficult is the method of measuring by a particular indicator in terms of time, money and complexity?
- What are the required qualities of the indicator? Can it measure level of achievements or changing parameters of an activity? Can it also be used to compare progress between various periods or various areas where the programme is operational? Can an indicator provide explanatory insight to make an effective analysis, which is a part of monitoring process?

Monitoring all aspects of the programme would consume many resources (human, material and financial). Therefore, the choice of indicators must be prioritized. The EPI manager should be able to adapt them to the programme needs and select those that are most relevant.

4.3.2 Criteria for selection of indicators

Taking the example of Penta3, indicators should satisfy the following criteria:
- **Pertinent (relevant):** To address the issue or area of the programme you are concerned with (e.g. Penta3 is a relevant indicator to be applied for monitoring the immunization programme).

- **Sensitive:** To capture variations of values within a reasonable range (e.g. proportion of children who had their Penta3 vaccination before their first birthday. When we refer to Penta3 coverage, we always mean the age range of children from six weeks to one year old. Children vaccinated beyond this range are not counted for the Penta3 coverage indicator).

- **Specific:** To reflect a specific objective or target (e.g. Penta3 coverage rate, which specifically refers to the proportion of children who have received a third dose of Penta vaccine, or any other vaccine containing Penta component, before their first birthday).

- **Technically valid:** To be based on latest technical information (e.g. the efficacy of each component in the Penta vaccine has been proved in many clinical and epidemiological trials).

- **Feasible to collect:** this includes three sub-criteria:
  - Based on data that are readily available or that can be collected with reasonable extra efforts (vaccination tally sheets or child health card with Penta1 and Penta3 records).
  - Collected data are reliable (reports come from an official source, e.g. immunization reports with Penta1/Penta3 coverage from the health centre nurse in charge or from the district health office). This indicates reliability of the source (however, it does not indicate the technical reliability of the reported data, which may be incomplete or with certain misprints or mistakes. This can only be considered reliable after validation of reported data discussed later in this module).
  - It is accessible (Penta1/Penta3 figures are always present in monthly reports at health centres, which are accessible to health workers or supervisors).

- **Simple:** Simple and understandable for the user (user-friendly, e.g. a facility health worker can easily count the number of children who have received a third dose of Penta vaccine and those that have defaulted/dropped out).

- **Verifiable:** Penta3 indicator is based on the number of doses administered from the health facility tally sheets or summary reports at district level. The tally sheets are stored for a specified time. This information can be verified as needed.

Exercise 3

Individual work.

Review the requirements for the indicators below in conjunction with the drop-out rate (DOR) and give your justifications for selection as an important monitoring indicator. Use scoring (scale of 1 to 5) to indicate the strength of DOR as an indicator in respect of each criterion. (1 means it does not satisfy the criterion; 5 means it satisfies the criterion at the highest degree.)

Indicator criteria	Does drop-out rate (DOR) satisfy the criteria as an indicator?	If yes, why?	Score
• Pertinent (relevant)			
• Sensitive			
• Specific			
• Technically valid			
• Feasible			
○ Available			
○ Accessible			
○ Reliable			
• Simple (user-friendly)			
• Verifiable			

The selection of indicators for monitoring depends on many factors, some of which are discussed below.

4.3.3 Indicators by programme component
You may decide to intensify your monitoring in one or more components of your programme to overcome certain weaknesses. In this case, you will select relevant indicators for that particular component, for example:
- monitoring indicators for cold chain
- indicators for monitoring vaccine stock
- indicators to monitor resource mobilization, etc.

4.3.4 Indicators by level of monitoring
As an example, take again the indicator on Penta3 coverage. Table 4.1 illustrates its appropriate use at the different levels of the health system.

Table 4.1 Comparison of use of Penta3 coverage indicator by levels of the health system

Indicator	Level of use			
	Health facility	**District**	**Province**	**National**
Penta3 coverage rate	XXX	XXX	XXX	XXX
Number of un/under-immunized children with Penta vaccine	XXX	XX	XX	X
Proportion of health facilities with Penta3 coverage >/= 90%	-	XXX	XX	X
Proportion of districts that have achieved >/= 90% Penta coverage	-	-	XXX	XXX

Notes: XXX – most appropriate level; XX – appropriate but at moderate degree; X – less appropriate level.

Exercise 4

In their respective groups, participants will critically review Table 4.1 and make a similar assessment for the following indicators:
- vaccine wastage rate
- vaccine stock outs
- target diseases reporting completeness
- proportion of government funding for outreach/supervision services.

After completing the table, participants will discuss and justify their scoring in the plenary.

4.4 Indicators for routine immunization monitoring

Participants may recall Module 1: *A problem-solving approach to immunization services management* referring to the following five operational components of the immunization systems (service delivery; vaccine supply and quality; logistics and cold chain; surveillance, including monitoring; and advocacy and communication – see Figure 2.1, as well as three supporting elements (management, financing and capacity building) of health systems.

To cover the entire immunization system, all operational components with their supporting elements should be monitored, providing a comprehensive picture of the programme. The monitoring will include:

1. Coverage levels: Coverage level for each vaccine (and each dose of the same vaccine) included in the national immunization schedule.

2. Percentage of fully immunized children under one year of age: A fully immunized under one-year-old child is one who has received all valid doses of vaccines according to the national primary vaccination schedule.

3. Percentage of pregnant women with adequate TT doses: Adequate TT is defined as the number of pregnant women who have received valid TT-2, TT-3, TT-4 and TT-5 doses during the pregnancy (otherwise known as TT2+).

4. Percentage of children protected at birth (PAB) from NT: This is an alternative method to determine TT2+ coverage (particularly where TT2+ is unreliable). To monitor PAB, health workers record during Penta1 visits whether the infant was protected at birth by the mother's TT status. PAB is then estimated as:

$$\% \text{ PAB} = \frac{\text{Number of infants protected}}{\text{Number of live births}} \times 100$$

Note: An infant is protected if the mother received a valid dose of TT+ (at least two weeks before delivery).

5. Reported non-polio acute flaccid paralysis (AFP) rate: This is calculated by dividing the number of new cases (among under 15-year-old children) by the total number of under 15-year-old children in the catchment area multiplied by 100 000.

6. Reported incidence rate of NT: Number of new cases of NT per 1000 live births. This is calculated by dividing number of new cases of NT by the total number of live births multiplied by 1000.

7. Reported incidence of confirmed measles in the population: This is calculated by dividing the number of confirmed measles cases by the total number of the population in the catchment area; the result is expressed as a rate per million population.

8. Availability of vaccines and supplies: This is calculated by dividing the sum of days when each vaccine or supply item was available by the total number of days in the period under review, and the result multiplied by 100.

9. Drop-out rates: Especially for BCG to Penta3; Penta1 to Penta3; Penta1 to MCV1 (measles first dose), and MCV1 to MCV2.

10. Vaccine wastage rate: Refer to Module 8: *Vaccine management.*

11. Reporting completeness.

12. Reporting timeliness.

13. Number of cases (or incidence) of other VPDs.

14. Case/outbreak investigation rate: Number of reported cases/outbreaks of target diseases investigated divided by the total number of cases/outbreaks of the target diseases reported, multiplied by 100.

15. Existence of a system for detecting and reporting AEFIs.

4.5 Core indicators

A list of core indicators for monitoring immunization services at the national level has been developed (Annex 1). They are relevant, feasible to collect and to interpret, and inexpensive to measure in terms of time and cost. The core indicator set is representative but limited and should be monitored at the national level using existing health information system. These indicators:

- Provide a practical and representative profile of the status of the NIP.
- Allow tracking of country performance. It is believed that the core set is common for every national programme and provides essential information needed by all EPI managers.
- Allow comparisons between countries and monitoring of the programme at global level.

The core indicators are included in the ministry of health (MOH) reporting to WHO/UNICEF through the Joint Reporting Form (JRF), to allow for a uniform source of information on national immunization systems. Given recent developments in health sector reform and the goal of RED and reaching each child, particular emphasis has been put on information relevant to district level. All the information in the JRF, and that produces the core indicators, should be part of the national health information system. Not all aspects of monitoring national immunization systems are included. However, national programme managers are not limited to this core set of indicators, additional choices can be made in accordance with their specific national programme objectives.

Table 4.2 represents a summary of monitoring indicators related to the operational components and supporting elements of the immunization system.

Table 4.2 Summary of monitoring indicators related to the immunization system

Component supporting elements	Measuring parameter	Indicators
Service delivery	Access	Penta1 coverage
	Coverage	Coverage with: BCG, Penta3, OPV3, HepB3, Hib3, measles, yellow fever, vitamin A, TT2+
	Equity	DTP3 coverage by catchment area or by district
	Utilization	Drop-out rates for Penta1 to Penta3; Penta1 to MCV1; MCV1 to MCV2
Logistics and cold chain	Availability Functioning management	Availability and continuity of services (adequate equipment and transport for distribution, outreach and supervision) Vaccine storage and distribution Vaccine wastage rate
Vaccine supply and quality	Forecasting Ordering	Vaccine stocks (minimum, maximum and critical stocks) Sources of vaccine (quality)
Surveillance and monitoring	Effectiveness of reporting system	Completeness of reports submitted Timeliness of report submission
	Disease incidence; deaths; AEFI incidence	Disease-incidence rate Proportion of cases confirmed by laboratory Mortality rate Case fatality rate Notified and investigated AEFIs
Advocacy and communication	Political commitment	Availability of plan Availability of immunization policy Existence of active community health committees
Financial sustainability	Community participation	Government funding of vaccines for RI and all vaccination activities
	Sustainable funding	Programme recurrent costs Multiple-year commitment to financing (government and partner)
Human and institutional resources	Supervision	Supervisory visits to health facilities Adequacy, training
	Staff	Availability of adequate human resources
Management	Ability to plan and implement	Existence of micro-plans of each district Reports on implementation of the plans

4.6 RED/REC indicators – monitoring for action

Adapt and use the following process indicators to monitor ("monitoring for action") across districts and health facilities (taken from the RED monitoring tool, see Annex 7).

- Percentage of districts that conduct at least *one* review meeting per *quarter* in which data, trends and monitoring for action are discussed with health facilities.
- Percentage of total immunization reports that districts receive *monthly*. Note: reports received from health facilities must be both on time and complete to qualify as "up to date".
- Percentage of health facilities that have up-to-date immunization monitoring charts, correctly drawn, *and visibly displayed* at the health facility per *quarter*.

Note: All three criteria must be met to qualify; definition of "up to date" to be determined at national level.

These core indicators measure the level of effort districts and health facilities put into submission, review and updating of immunization data. They are intended to remind health facilities and district health teams (and inform those at higher levels of the health system) of the importance of using location-specific data to make timely adjustments in immunization and other primary health-care services.

In addition to determining whether districts and health facilities are tracking and discussing data, supervisors will also want to know if the data are actually understood and are being used in problem-solving, and how best to reach all target populations (a qualitative more than quantitative exercise). These qualitative aspects of "monitoring for action" can be assessed during support supervision, review meetings, joint district-health facility discussions during micro-planning, etc.

Below is an illustrative list of questions that districts and health facilities should ask when analysing coverage problems and deciding what actions to take in response:

- What are the main causes of low coverage in your facility or district catchment area?
- Are there access and/or utilization problems?
- What are some of the key causes of these problems – supply, staffing, service delivery and demand for services, information, education and communication (IEC), etc.?
- What local solutions can best address these causes?
- What resources (existing or extra) are needed to implement solutions?
- How can you revise your plan based on the

above analysis?
- Are there options in your district to conduct and document operational research to improve performance and explore innovations?
- How can you better involve communities in understanding data trends, what they mean and how communities themselves can assist in addressing them?

4.7 Other indicators

To measure country progress against regional and global immunization goals, the following are examples of indicators that are used.

Process indicators

Proportion of countries providing written feedback on immunizations to district level at least every quarter.

- Proportion of countries with five-year strategic plan for the national immunizations system.
- Proportion of countries with national annual workplan for immunizations services.
- Countries at risk having introduced yellow fever immunizations in their EPI schedule.
- Proportion of countries with injection safety plan as a component to the national workplan.

Output indicators

- Proportion of countries with HepB3 coverage =/>90 %.
- Proportion of countries with first dose measles (MCV1) coverage =/>90%.
- Proportion of countries that have introduced new and under-used vaccines in their EPI schedule.

Outcome indicators

- Proportion of countries with maternal and neonatal tetanus (MNT) elimination status (all the districts with <1 NT case per 1000 live births) validated.
- Proportion of countries that have achieved the measles elimination goal.

In recent years, countries are often using "new" indicators quantifying the number of "unimmunized" and "under-immunized" children in absolute figures. The advantage of this method is to show to decision-makers the number of children behind percentage values which are sometimes less impressive for triggering robust action towards improving immunization services delivery. This method is especially effective in countries with large populations where hundreds of thousands or even millions of children may be categorized under these definitions.

It is therefore highly recommended to use in your analysis and reports these indicators parallel to common coverage proportions expressed in percentage figures. (Refer to Glossary for definitions.)

Exercise 5

Individual work.

Ask participants to answer (tick) the following "True" or "False" questions:

	True	False
1. Penta3 coverage rate is an indicator for fully immunized child (FIC)	☐	☐
2. According to WHO, the drop-out rates in a successful immunization programme should be: less than 10%	☐	☐
less than 20%	☐	☐
3. Vaccine stock-out indicator shows that all vaccines in your vaccine store are kept outside refrigerators or cold rooms	☐	☐
4. Indicators used in your immunization programme can measure your successes and failures	☐	☐
5. The same indicator can be used for monitoring and for evaluating your programme	☐	☐
6. The core indicator level for measles immunization coverage rate should be >/= 70%	☐	☐
7. Penta1 is an impact indicator	☐	☐

When you finish this exercise, show your answers to your facilitator.

Remember:
1. Choose relevant, technically valid, simple and measurable indicators.
2. Select indicators according to the programme level you are monitoring: local, district or national.
3. While selecting indicators, consider components of the immunization programme (service delivery, logistics, vaccine quality, surveillance and advocacy) as well as cross-cutting elements (financing, human resources and management); they all have specific indicators for monitoring (as described in Annex 1).
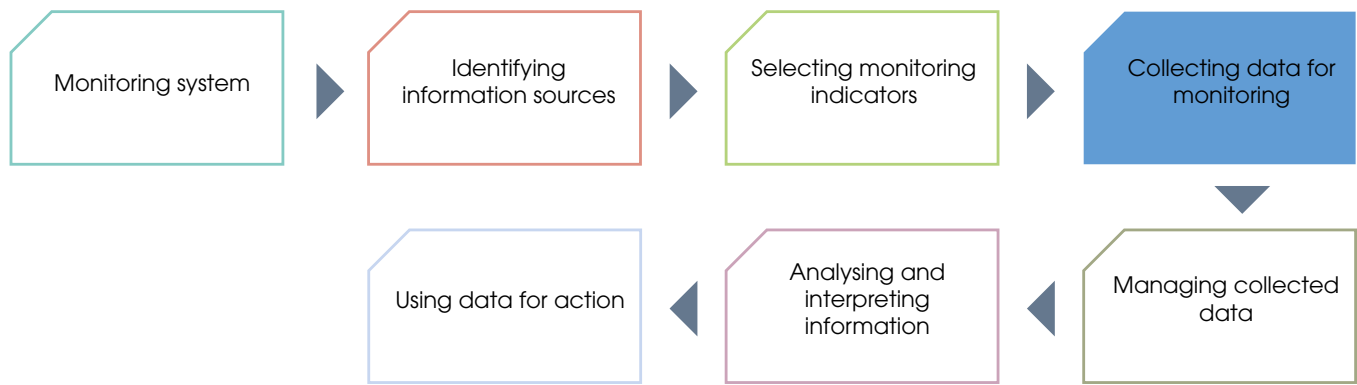
5. Collecting data for monitoring

5.1 Demographic data

To be able to estimate the proportion of the targeted group reached with vaccination, population data by age and geographic area (catchment health area, district, national) are crucial. Unfortunately, high quality demographic data is hard to obtain at country level. In most countries, a population census was last done more than 5 to 10 years ago. Population counts conducted (by community volunteers) in some countries are not well organized and when they are, political authorities may not accept them.

The different population groups targeted for some selected immunization services are:
- Infants (0–11 months) for primary vaccinations/ vitamin A supplementation.
- Infants (12–23 months) for countries that have introduced the second measles vaccine dose into their national EPI schedule.
- Children (0–59 months), supplementary immunizations for polio.
- Children (9 months to 59 months), follow-up supplementary immunizations for measles.
- Children (0–14 years of age) for AFP surveillance.
- Children (9 months to 14 years), catch-up supplementary immunizations for measles/ rubella.
- Pregnant women, for TT.
- Women of childbearing age (usually 15–49 years), routine and supplementary immunizations for TT.

Most immunization programmes in the African Region target infants 0–11 months of age, for primary vaccinations. This group changes from the number of live births (this can be estimated from the fertility rates if not available in the estimate, for vaccines administered at birth – BCG, hepatitis B birth dose, OPV0) to surviving infants (for later doses – first to third doses

of Penta, OPV, pneumococcal conjugate vaccine (PCV), rotavirus vaccine; yellow fever and measles). The number of surviving infants takes into consideration prevailing infant mortality and should be slightly lower than the number of live births.

For data to be collected:
- Use the best estimate for the number of target population.
- Use the most reliable source (e.g. latest national census or central statistical office updates).
- Ensure consistency of denominator figures in the reports of other initiatives, e.g. polio, nutrition, malaria, making pregnancy safer, etc.

5.2 Data collection and monitoring tools

5.2.1 Data collection at health facility level
At health facility level, data are collected using the following data collection tools:
- tally sheet
- immunization register
- immunization monitoring chart
- immunization cards
- reminder file or other systems for tracking defaulters (bin card, village health worker registers, local chiefs register etc.)
- SIAs service delivery reporting forms
- VPD surveillance reports.

5.2.2 Data collection at district/provincial level
- monthly reports
- weekly reports (VPD surveillance)
- immunization coverage summary forms
- supportive supervision visit logs
- monthly review meetings (monitoring timeliness and completeness of reports)
- other reports.

5.2.3 Data collection at the national or central level
- immunization database

- VPD surveillance database (polio, measles, yellow fever, NT, meningitis, new vaccines, e.g. rotavirus, HPV, etc.
- SIA database (administrative results, independent monitoring results)
- annual reports (national report, JRF report, annual progress report or annual situation report)
- assessment reports (EPI review, EPI coverage survey, surveillance review, effective vaccine management assessment report, rehabilitation plan, etc.).

Important hints for this step:
- The data collection tool should be appropriate – should contain all the variables to be recorded in order to avoid lumping together of information by the service provider.
- The tool must be available at the service delivery point all the time to ensure that all information (type, date of vaccination, doses administered, batch number on the vial, etc.) is entered.
- Doses administered are tallied immediately after administration of vaccines (and not before or much later).

To accommodate changes and avoid loss of information, timely revisions of the data collection tools are important whenever there are new interventions such as the introduction of new vaccines or vitamin A supplementation or a change in vaccine formulation.

Collecting information that will not be used is an unnecessary workload to the health worker. The extra workload contributes to human errors. Conversely, excessive rationalization may compromise the accuracy, the completeness and usefulness of information collected.

Common mistakes in tallying are:
- Tallying before the vaccine is administered (the child may not receive the vaccine).
- Tallying at the end of the session according to the number of doses contained in the used vials ("wasted" doses may be counted).
- Tallying vaccines under one age group (to include those outside the targeted age) will distort the numerator.

To assess the service delivery strategies, tally the outreach services separately and complete the information in immunization register.

The data collection tool should contain the variables used to generate the indicators. For example, to be able to calculate

the Pentavalent vaccine drop-out rate, data on the first and third doses of Pentavalent vaccine are essential.

The tally sheet should provide information on the number of doses of a specific vaccine administered during a particular time (date of immunization session) to a particular age group. The register too should have enough information to identify the child and show dates of administration and whether the child is fully immunized for the primary series.

Examples of a tally sheet and a summary form are provided in annexes 2 and 3.

Data collected from the tally sheets needs to be consolidated, either manually or electronically, for transmission to district level. The district consolidates data for use and transmission to the next level, eventually to reach the central level.

An essential monitoring tool for immunization coverage is the immunization monitoring chart. It shows the progress in covering the target population in the specific health centre catchment area. It summarizes the information given in monthly immunization reports. This chart enables the comparison of the number of people you actually immunize each month with your coverage targets.

Each vaccine, even each dose of the same vaccine, can have a monitoring chart. In order to be viewer-friendly, locate not more than two vaccine components in one chart. This will allow you to follow immunization progress simultaneously for two components and to calculate drop-out rates between them. For example, you can record Penta1 and Penta3 in one chart and monitor achievement of the target for Penta3 and drop-out rates between Penta1 and Penta3. Health clinics (or districts) with a good monitoring system have the following monitoring immunization charts:

- BCG, measles and yellow fever; Penta1 and Penta3; OPV1 and OPV3; TT1 and TT2+.

- For setting up the immunization monitoring chart, refer to Figure A4.1 in Annex 4.

At health facility level, some tools are available such as the immunization register, to monitor immunization status of each child and identify defaulters or those parents who forget or overlook their child's immunization dates.

At district level, monitoring tools are based on routine reports from the health facilities on immunizations and target diseases occurrence and other information (on cold chain, vaccine stock levels, availability of injection materials, etc.). These may include:

- District immunization coverage monitoring chart – this is the most important monitoring tool for district health officers to see whether the programme is in line with national objectives and targets for immunization coverage as well as for the drop-out rates. This chart should be on display in the district health office.

- Districts may also calculate vaccination coverage rates in hard-to-reach villages/areas with a view to intervene if necessary.

- Districts should monitor target disease occurrence in relation to vaccination coverage rates through maps and graphs.

- District monitoring should include all components of the immunization system (distribution of vaccines and cold chain equipment, their proper use, field application of the updated immunization policy, such as use of VVM).

- Record of completeness and timeliness of monthly routine surveillance reports from health centres (see Annex 5).

The provincial/regional level (where applicable) should monitor all operational components by district by month, to identify those that are behind the target and provide them any necessary support. The tools include maps and graphs. This level should also develop tools to monitor training of health personnel on a yearly basis.

At national level, various monitoring tools provide information to national authorities and to international partners:

- Immunization and surveillance databases for VPD control of target diseases have been developed and help to provide monitoring data to immunization programme managers, MOH, country-based partners and international partners. The MOH report to WHO/UNICEF through the JRF summarizes data on vaccinations, target diseases and health system indicators annually for the government, WHO and UNICEF. This tool ensures that the three parties use the same denominator and nominator and share data with other partners.

- Based on these databases, other monitoring tools are developed, such as tables and graphs on completeness and timeliness of the reports, drop-out rates, coverage rates per districts and provinces, distribution of target diseases by administrative regions, by age, sex, etc.

- Tools are available to monitor cold chain equipment (inventories), distribution of equipment, vaccine stock management and distribution (vaccine registers and stock sheets) and others.

Exercise 6

Individual work.

As a member of the district health management team (DHMT), you are responsible for immunization services in the district. You are required to report progress of immunization activities to the DHMT.

Your task:

List the 10 main indicators you would like to monitor and the tools to collect data for monitoring. Create a table with columns to accommodate the elements of this task (e.g. indicator, its function, tools required to collect information, etc.)

```
┌─────────────────┐     ┌─────────────────┐     ┌─────────────────┐     ┌─────────────────┐
│  Monitoring     │ ►   │  Identifying    │ ►   │  Selecting      │ ►   │  Collecting     │
│  system         │     │  information    │     │  monitoring     │     │  data for       │
│                 │     │  sources        │     │  indicators     │     │  monitoring     │
└─────────────────┘     └─────────────────┘     └─────────────────┘     └─────────────────┘
                                                                                 │
                                                                                 ▼
┌─────────────────┐     ┌─────────────────┐     ┌─────────────────┐
│  Using data     │ ◄   │  Analysing and  │ ◄   │  Managing       │
│  for action     │     │  interpreting   │     │  collected      │
│                 │     │  information    │     │  data           │
└─────────────────┘     └─────────────────┘     └─────────────────┘
```
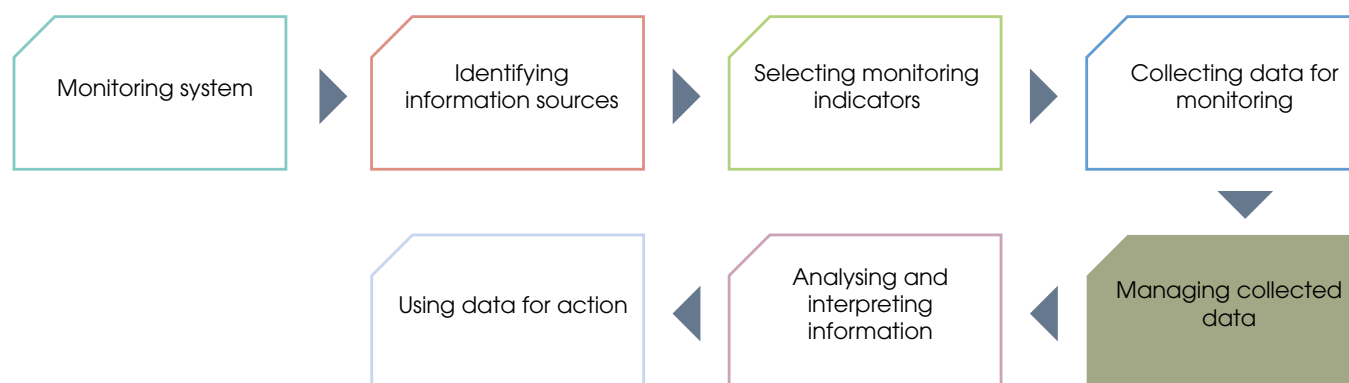
6. Managing collected data

Collecting data at the point of generation is not the end of monitoring. The data needs to be validated for accuracy and completeness, and analysed. Also, any data that has been collected should be archived safely so that it is available for use.

6.1 Validate data received

6.1.1 Completeness and timeliness of reports

Units responsible for data management should prepare an inventory of all reports received and assess the **completeness** of reporting for the reporting period. Completeness of reporting for the particular period is calculated on the total number of reports expected **(denominator)** and the number of reports received **(numerator)**. This proportion is expressed as percentage. If reports are not complete for a district, the cumulative immunization coverage figure will drop and will not reflect the true picture. Your immunization monitoring chart will be affected as the line showing your actual performance will be far below your planned target line. Thus, reporting completeness should be monitored along the same lines as immunization coverage. The district health office should have a checklist to monitor the receipt of the incoming reports from the health facility and follow up on those that have not submitted.

6.1.2 Timeliness of reports

When reports arrive from the field to district/province or national level, the timeliness of the reporting should be monitored against the agreed upon schedule. Together with completeness, this can be done using a monitoring tool provided in Annex 5.

The data manager should calculate the proportion (%) of the reports that have been received within the deadline for the reporting **(numerator)** out of all expected reports for the same period **(denominator)**. Ideally, all data should be available and analysed in good time to provide information on the prevailing situation and to be used for programmatic action. Late reports hinder timely

response to problems and inaccuracies. Countries may have different deadlines for report submission.

The proposed schedule for the flow of regular monthly data is for health facility data to reach the district on the 7th of the following month, and the district to summarize and share data with the provincial level by the 15th, and on to the national level by the 21st of the month. However, late coming data should not be ignored; they must be used to update the existing data set at all levels.

Upon receipt of late reports, data managers are expected to update the database and pass it on to the next level. Districts should not wait to submit their reports – waiting to receive the last report from the delaying health facility. **If they do so, they may delay their own reporting.** Not reporting late data affects the overall district coverage and, subsequently, the national immunization coverage or disease incidence rates.

> Keep on the wall, or any other visible place, a calendar table updated with the names of the facilities and dates of submission of all forms received. React immediately when health centres fail to report – call/communicate with the nurse or officer in charge and remind them to send the reports as soon as possible.

6.1.3 Data validation and verification

Before the report is submitted to the next level, the responsible officer should check the report and authorize it, by way of a signature or a date stamp. A data validation and verification protocol should be developed and used so that all persons who handle data are aware of the standards and apply them uniformly.

The report should be cross-checked for data quality attributes, including for validity, accuracy, completeness, currency (state of being up to date or current) and consistency (Annex 6). Examples:

- Compare BCG vaccination figure for under one-year-olds with the number of live births (hospital, clinic and at home) – the former should not be more than the latter.
- Figures for antigens that are given at the same time, such as OPV1 and Penta1 (as well as for, PCV1 or Rota1 if introduced), usually should be the same, since these vaccines are given during the same visit. This also applies to second and third doses of these vaccines.
- In providing a series of vaccination doses as boosters (e.g. Penta, OPV, HepB, Hib, PCV, Rota, etc.), the initial doses should not be lower than the subsequent ones. The third dose may be lower due to the drop-out effect. For example, Penta1 will be greater than Penta2 which will be greater than Penta3 doses provided/coverage achieved.
- If vitamin A is given with the measles vaccine, then the number of measles vaccinations and vitamin A should generally match.
- Countries in the yellow fever zone in the region are advised to include yellow fever vaccination in the immunization schedule given with measles vaccine at nine months. If this combination is successfully implemented, the vaccination performance figures should also match. These rules apply in general unless there is some recording problem or a stock-out of one antigen.

Always cross-check data either selectively or randomly. For example:

- choose one vaccine
- recalculate the sum of the figures representing each individual health facility (or district) figure
- compare the presented sum with your own calculated figure
- change randomly every month the vaccine to be checked involving another vaccination
- compare the same figures in different reports to see the consistency
- discuss any discrepancy with lower level.

Currently, information systems in many countries are equipped with modern computing systems used in performing accurate summations, data aggregations and analysis. However, even the best computer cannot improve the quality of data. Remember the expression "garbage in equals garbage out" – if you enter incorrect data, your computer will not correct them for you. The analysis you get may not correlate with reality and will mislead your actions.

6.1.4 Store your data

For purposes of verification and also retrieval whenever needed, records and reports must be stored at all different levels. Storage of data can be done in hard copy and/or electronically. At the health facility, all the data collection tools should be stored for at least three years, depending on the national standard operating procedures. Districts and higher levels may use computers; however, it is important that back-ups are available to avoid losing the data in the case of a systems crash. Storing data is also useful when conducting health facility supervision and records review for external verification purposes: this basically includes a review of health facility documentation to see if targets and target populations are properly defined, immunization plans are regularly monitored, verifying completeness and timeliness.

6.2 Ensure data quality

Usually, routine administrative reporting will be the main source of data. Routine reporting, however, has a number of limitations and multiple factors may influence its accuracy and the quality of the data. For example:

- Demographic and administrative factors:
  - Imprecise census data: old census figures and outdated population growth rate may prevent having a reliable denominator (e.g. target population under one year of age).
  - Overlap of catchment areas due to changes in administrative set up and district borders.
  - Influx or repatriation of massive refugee populations from neighbouring areas/countries.
  - Private sector and nongovernmental organization data may not be included in the reports.
- Human factors:
  - Insufficient motivation of staff.
  - Temptation to "adjust" data to show greater coverage.
  - Pressure towards an upward bias to report.
  - Absenteeism of staff due to family reasons, maternity leave or chronic illness leading to gaps in reporting.
- Insufficient knowledge/skills:
  - Inaccuracy in data entries.
  - Misunderstanding the reporting forms and procedures.
- Factors related to poor management of the programme:
  - Failing to report all vaccinations performed (especially vaccinations in hospitals).
  - Poor functional system to collect (or receive) data from hard-to-reach health centres.
  - Lost records.

One or more of the above factors may create inconsistencies and inaccuracies in reports, compromising data quality and reducing the reliability of the reporting system as a whole. A verification system should be built in to ensure accuracy and completeness. This may be complemented by data reviews carried out by the supervisor, data quality assessments and surveys.

6.2.1 Ensuring data quality through systematic reviews

The immunization systems assessment (ISA), data quality review (DQR) or data quality self-assessment (DQS) represent a flexible toolbox of methods to evaluate different aspects of the immunization monitoring system and data quality at all levels starting from district and health unit levels. The ISA, DQR or DQS aim to assist countries in diagnosing problems and provide orientation to improve EPI monitoring as part of the Reaching Every District strategy. These methods help to determine: the accuracy of reported numbers of immunizations; and the quality of the immunization monitoring system.

The final goal is to integrate the options that are most relevant for one country into routine practice, so that constant attention is given to improve monitoring practices and management of immunization activities. The ISA, DQR or DQS are designed by and for staff using immunization data at national, provincial or district levels.

How ISA, DQR or DQS are performed: An initial system assessment and a data desk review/historical data analysis are performed by a group of data specialists followed by a practical assessment in a number of province/regions, districts and health units, which provides a self-diagnosis of the monitoring system of the country. Assessments include review of data accuracy at different levels and a self-administered questionnaire reviewing monitoring quality issues (e.g. availability of vaccination cards, use of tally sheets, directly observed recording and reporting practices).

These are then analysed, strengths and weaknesses identified, conclusions reached and practical recommendations made. These recommendations will need to be converted into a list of corrective actions to improve the use of accurate, timely and complete data for action at all levels – the data quality improvement plan. This is done during a national workshop involving key people. This plan will then be included within the national immunization plan (NIP) and the comprehensive multi-year plan (cMYP). A data quality team will be established as part of the technical ICC to follow up on the implementation of the data quality improvement plan.

Exercise 7

You have been appointed as a public health nurse in district K in Hopelandia. One of your responsibilities is to manage the immunization programme in the district. Reviewing your files on supervision, you noticed that in a number of recent supervisory reports the reporting system on immunization coverage was qualified as "poor". In fact, one of the supervisors called it "unreliable".

Task 1: Identify the possible programmatic issues that make the reporting system unreliable.

Task 2: For each issue, give five possible reasons why supervisors were not happy with the reporting system in the district.

Task 3: After identifying the five possible reasons for poor reporting performance, suggest measures to address each of them to improve the quality of reporting.

After participants have completed the exercise, the facilitator may ask one of them to display their answers on the flipchart for group discussion.

6.3 Validate immunization data through surveys

Routine reports from health centres provide important information about immunization coverage. However, immunization coverage estimates based on administrative data, as indicated in the previous section, may be inaccurate. Periodically (three to five years) or in conjunction with the comprehensive programme review, programme managers may decide to undertake surveys to validate the immunization coverage in the country or

district. Surveys conducted according to procedures are useful tools for data validation.

For example, a health centre's records may show that more than 100% of the children in its catchment area were immunized, not indicating that some of the immunized children were from outside the official catchment area. An advantage of a coverage survey is that it also indicates how many people were actually immunized correctly, that is at the correct age and with correct interval between vaccine doses. Listed below

are several survey methods for collecting, monitoring, verifying and validating immunization data.

6.3.1 EPI cluster sampling survey

This is the most conventional survey for NIPs (and also for other health programmes) and is widely used due to its simplicity, reliability and comparability. This technique allows a small number of the target population to be sampled while providing data that are statistically valid. The survey uses randomly selected clusters and households with target children aged 12–23 months (for evaluating the immunization coverage among children against all target diseases) or children aged 0–11 months (to evaluate TT coverage among their mothers to see if the children were protected against neonatal tetanus at birth).

The results of the survey:
- Have a level of accuracy of survey coverage rates plus or minus approximately 5% or 10%.
- The level of confidence is 95%, which satisfies statistical criteria.

This technique has some limitations, however. It only allows drawing conclusions about the population surveyed as a whole. It will not permit comparisons among different clusters or subsections of the population surveyed. If important differences are anticipated in the immunization of children due to, for example, urbanization, geographical factors, social and economic factors in the country, for which different immunization strategies were applied, then the population should be stratified and independent surveys undertaken in each stratum. Also, these types of surveys have to be scrupulous in their sampling and execution, otherwise biases may easily render the results faulty.

Refer to Module 17: *Conducting immunization coverage survey*, which describes this survey in detail with an updated version of the methodology aiming to minimize sample selection bias.

6.3.2 Demographic and Health Surveys (DHS)

These surveys are usually conducted every five years to assess a wide variety of socioeconomic and health indicators, including immunization. During this survey, the immunization coverage is assessed using one of the survey methods described in this section.

6.3.3 Multiple Indicator Cluster Survey (MICS)

The surveys are usually conducted every 10 years. MICS provide up-to-date information on socioeconomic and health indicators, including immunization. They also form a basis for future action. Both DHS and MICS are huge undertakings with results taking quite a long time to be available.

6.3.4 Lot quality assurance sampling (LQAS)

This type of survey is designed to test whether a "lot" (a sampled population) meets a specified standard. It is based on a null hypothesis: either the standard is met and the "lot" is accepted or the standard is not met and the "lot" is rejected. This method is more suitable for production sectors (e.g. vaccine production), but it has been used for surveys to validate elimination of NT. It is not often used for assessing vaccination coverage.

6.3.5 Sampling methods used for surveys

Because populations tend to be large and resources and time available for studies limited, it is usually not possible to study each elementary unit or each listing unit comprising a population. For this reason, it is convenient to select a sample from the population and then make estimates regarding the entire population. For such estimates, some scientifically valid sampling methodology must be employed.

- **Simple random sampling:** A simple random sample is one in which each of the possible sample units has the same chance of being selected. First, you have to make a list of all units (sample frame) from where the sample is to be drawn randomly. This process is expensive and time consuming to implement in practice.
- **Systematic sampling:** This method can save much time and effort and is more efficient in some situations than simple random sampling. Applying this method, choose the first unit randomly. Then choose the next units in a systematic manner, e.g. every fifth person in the list or every tenth house in the street.
- **Stratified sampling:** Stratified random sampling is the process of breaking down the population into mutually exclusive strata, selecting a random sample from each of the stratum to estimate the population parameters. Divide the population into groups or strata, for example, sex, age, geographic location (urban/rural or northern versus southern provinces, etc.). Then select a systematic random sample from each stratum using the same sampling interval.
- **Multistage random sampling:** In multistage sampling, the selection is done in stages until the final sampling units, e.g. households or persons, are chosen. In the first stage, a list of large sized sampling units is prepared. These may be towns or villages or schools. A sample of these is selected at random. For each of the selected first stage units, a list of smaller sampling units is prepared (for example, if the first stage units are towns then second stage units may be houses or households). A sample of these second stage units is then selected at random from each of the selected first stage units and studied.

6.4 Manage your data

At the end of every month, district and provincial managers need to review all the data collected through passive and active reporting. The following steps ensure that the manager will be in a good position to take action on the data they receive.

- **Scan incoming reports:** All reports should be reviewed for blanks, inaccuracies (such as miscalculation or misplacement of figures) and inconsistencies. Reasons should be sought and corrections made, if possible.
- **Focus on priority indicators and areas:** Collate the data that will measure the progress, and examine the results from priority locations that may have performed poorly in the past, or areas that have had an unexpected change in performance.
- **Consolidate the data:** Prepare a report for forwarding on to the next administrative level. The monthly report includes some of the data necessary for measuring progress and is designed for use by all levels. Data that are not presented in the monthly report, such as results from supervisory visits, should also be consolidated.
- **Analyse the data:** The following section describes how the data can be analysed to measure progress towards the targets.

6.4.1 Using a computerized data base

Ideally, data collected from monthly reports and other sources should be consolidated into a computer database for ease of reference and to generate useful tables and graphs. The database should be sufficiently comprehensive to include all the quantitative data provided in the monthly report; for example, immunization doses, disease incidence, AEFI, vaccine supply and stock levels, etc. There are many examples of computerized databases available in various countries. The following are some of the computerized programmes and software that can assist in managing the immunization data collected in the field.

- **Routine immunization module (RIM):** Computerized data management system for NIPs developed by WHO and the Centers for Disease Control and Prevention (CDC), Atlanta. This software helps to collect and manage immunization data by district on a monthly basis. This database includes also demographic data by district to allow the coverage calculation by district. This system includes time series data for countries.

- **District vaccine data management tool (DVDMT):** It provides application for recording monthly vaccine management, vaccination reports and analysis. The DVDMT helps to monitor:
  - º Performance of service delivery (vaccine wastage, vaccination coverage and dropout).
  - º Vaccine stock management key indicators at district level (availability of supplies, quality of vaccines storage, compliance with bundling principle).
- **Case-based surveillance data management systems:** These data management tools and databases provide a wide range of menus to collect and report case based data, per administrative area. This data management system exists for polio, measles, yellow fever, NT, diseases targeted by the new vaccines (rotavirus and pneumococcal vaccines) and meningitis.
- **SIAs data bases:** The data from SIAs are also being managed using various systems, e.g.:
  - º Administrative coverage report database: Used for administrative reports by district (target, number of vaccinated, coverage, doses used, cases of AEFI, vaccine used for all VPD related SIAs).
  - º Independent monitoring report: Used for polio SIAs during the end process evaluation.
  - º LQAS data: To manage the LQAS data during polio SIAs in selected areas.
- **Computerized EPI information system (CEIS):** This is a Windows-based software developed by WHO headquarters for analysis of vaccination coverage and disease incidence by district. The analysis includes vaccination coverage by antigen and drop-out rates.
- **COSAS and COSAS-TT:** A programme to assist in analysing the results of the EPI cluster sampling survey involving children 12–23 months of age for primary vaccinations (COSAS) and mothers for TT immunization (COSAS-TT).
- **Epi Cost:** This is a useful tool that helps to make cost estimations of various components of the EPI programme: cold chain equipment, cost of EPI vaccines etc. This software is especially useful to countries planning to introduce new vaccines or new technologies.
- **Epi Info:** A standard computer software that assists in data collection and epidemiological analysis of disease and vaccination coverage trends; provides various menus for district- or province-based analysis, creates graphs and other analytical tools. This programme is common and many of its menus are used for other software

modifications (e.g. new programme called IFA – Information for Action).

- **Epi Map, MapInfo, Health Mapper, ARC, GIS:** These programmes provide mapping tools for analysing various data on surveillance (spotting disease cases, places of outbreaks, high-risk areas etc.) or any other data including immunization coverage levels. These programmes help EPI managers present data to decision-makers and partners in a user-friendly manner to involve them in advocacy and resource mobilization activities.

- **Information for Action (IFA):** This is a software tool developed for the computerization of surveillance data for immunization programmes using Epi Info and Epi Map software. The system is disease oriented but also includes a section on vaccination to enable input of monthly coverage data per district. It also provides assistance in report writing, analysis of data received from the field and feedback.

- **Stock management tool (SMT):** This is a daily management tool for a vaccine store. It provides applications for planning vaccines and safe injection materials needs, storage capacity requirements (cold chain and dry storage), recording stock movements and distribution, reporting stock management indicators.

All the above software programmes can be obtained from WHO Regional Office for Africa or from WHO headquarters.

Remember:
- There are many sources of data on routine immunization programmes – collect information from all relevant sources, including other departments/units and ministries.
- Make every effort to receive regular reports from all subunits in your district/province/country (completeness of reporting).
- Check and cross-check collected data for accuracy – completeness, correctness.
- Information should be sent to the next level within established deadlines (timeliness of reporting). Do not forget to include late reports in your next report with explanation.
- As a main stakeholder of your programme, analyse and interpret the collected information frequently and regularly.

A number of countries are using HMIS databases for data management at the operational level to avoid multiple tools at the ground. These countries should ensure immunization data are fully included in the system and their completeness, timeliness and quality are maintained as well as a dashboard for key indicators and monthly raw data by district generated based on the regional standards.

During the regional partners' consultation meeting on the integration between EPI information and integrated HMIS held in Kampala on 14 November 2016, an agreement was reached on five key requirements to best include immunization data within integrated HMIS software:

- EPI data elements, immunization sessions, vaccine administration, vaccine availability and use, AEFI, and surveillance to be fully included in the HMIS.

- EPI dashboard with key indicators to be included to maintain EPI capacity to access to the needed information for monthly performances monitoring and decision-making.

- Ensure availability of monthly raw data by district via a local desk for additional offline analysis by EPI staff and sharing within the region.

- Ensure flexibility of system updating for new vaccines introduction.

- A transition period is required during which both systems should run in parallel.
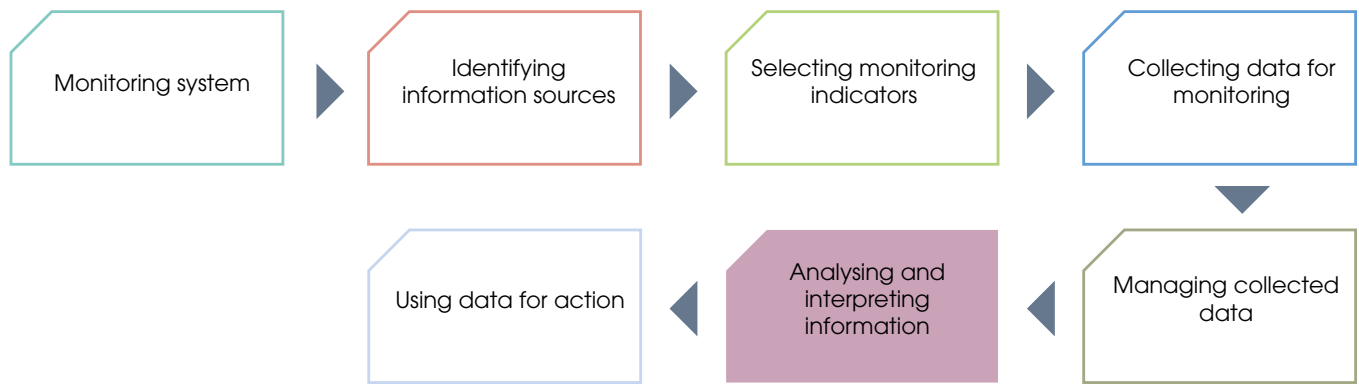
7. Analysing and interpreting information

Data only become useful when they have been processed and analysed. The monitoring process generates data from various sources: routine reporting, special surveys, supervisory reports, personal observations and others, which should be collated and analysed in order to follow up on your programme as per established targets and indicators. You should now apply the indicators described in Section 4 to calculate rates or proportions. At health facility level, these will help you measure and compare your data with the set targets and with the results achieved in the previous period. In addition, the higher levels will use the data to compare areas within the districts or provinces to find out regional fluctuations in the coverage rates.

A few basic charts may be drawn up, such as coverage by health catchment area, district and national levels.

These charts are useful because they provide a strong visual representation of the situation and can be easily understood and referred to. Charts on trends over a time period are also informative because they show the progress made to achieve the objectives set or the increase/reduction of immunization coverage rates against a given target disease as shown in Figure 7.1.

The scope of analysis and interpretation of the data generated by the monitoring will differ depending on the level of the health system. This can be illustrated in conjunction with immunization programme core indicators as described in Annex 1.

Figure 7.1 Measles reported cases and regional MCV1 and MCV2 coverage, African Region 2000–2015
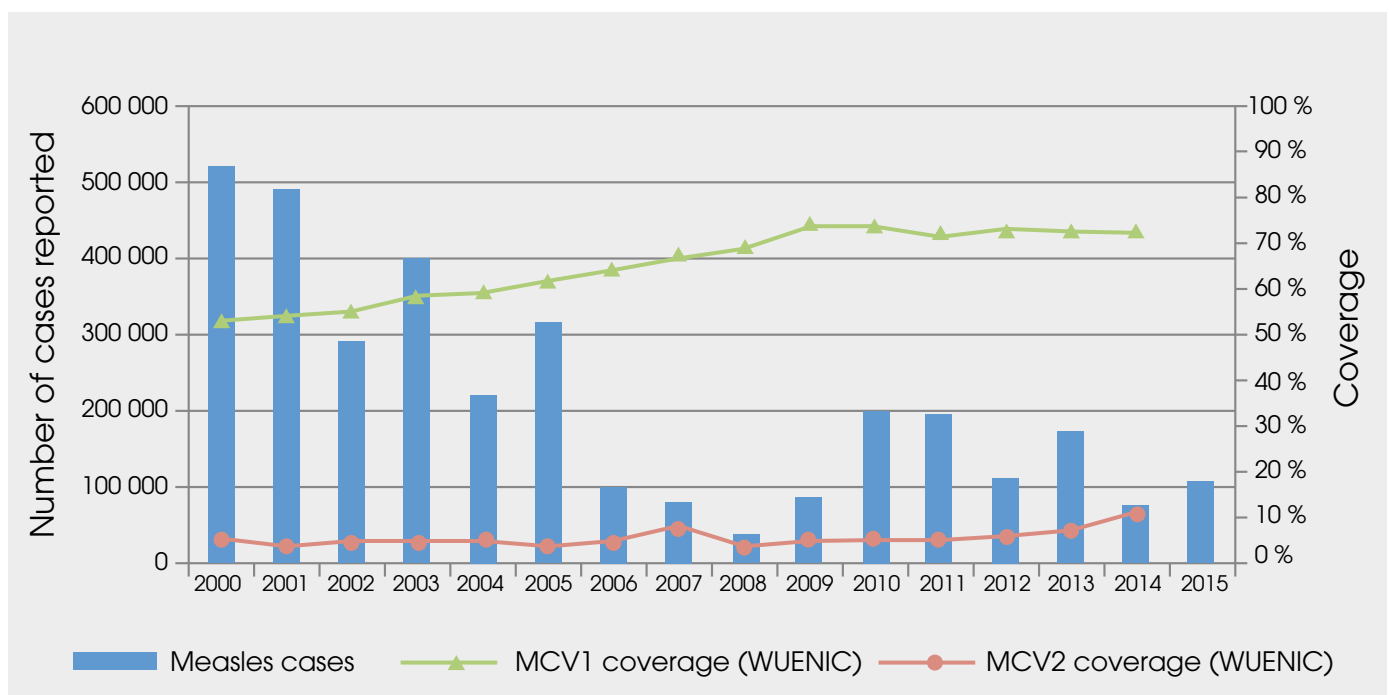
7.1 Analysing and interpreting data at health facility level with your district focal point

Table 7.1 will help you to analyse and interpret your immunization data by programme component at health facility level.

Table 7.1 Analysing and interpreting data by programme components at health facility level

a) Service delivery

Monitoring indicators	Issues to consider	Possible interpretations/reasoning
Immunization coverage rates for Penta1, Penta3, and measles.	Compare this month's number of immunizations doses given to the last month's numbers. Are there any changes: numbers increased or decreased? Calculate cumulative coverage achieved for the period.	After this review you will have a good idea about the successes and problems in immunization service delivery; If you are not achieving DTP3 targets, look for reasons and obstacles. The supervisor may suggest you use the "but why" technique to explore various options. From the previous MLM modules, you know that at health facility level there are four main categories of problems affecting the programme: dropouts; missed opportunities; hard-to-reach children and women; geographical inaccessibility. Use DTPI coverage level to assess if your target groups have sufficient access to immunization. Use measles coverage rates to judge if your facility is doing enough towards accelerated disease initiatives. Find out why some sites did not send their reports. Is it due to absenteeism, annual leave, communication breakdown? Is the community aware of the sessions and is the session schedule adhered to?
Drop-out rates: Penta1 to Penta 3 DOR.	From the immunization monitoring chart, calculate monthly and cumulative DOR values.	Explore reasons for the high number of dropouts in communities in the catchment area; identify these communities. Discuss with your staff and visiting caregivers from that area the possible constraints: accessibility/missed opportunities or both? Or is the DOR due to vaccine stock-out. Continue exploring! The supervisor will tell you how other health facilities in the district solved a similar problem in their catchment area.
Adequate supply of AD syringes during the year.	Check stocks of AD syringes during the period under review.	If a stock-out of AD syringes happened, this is a serious problem: immunization safety might be compromised. Is this a real shortage or is it related to the delivery system at any level? Find out!

b) Logistics and cold chain

Monitoring indicators	Issues to consider	Possible interpretations/reasoning
Vaccine wastage rates.	Calculate wastage rate for your facility (see Annex I for calculations). Specify: the vaccine vial size in use, number of vials opened for use, number of closed vials discarded.	This is a critical indicator, especially for new vaccines, which are far more expensive than the traditional EPI vaccines. If the analysis shows high wastage rates, there may be various reasons to be considered: • Do the vaccines supplied have a short expiry date? So some vials were discarded without even opening them?! Is the facility appropriately applying the multi-dose vial policy (MDVP)? • Have community information programmes been conducted to bring more children for immunization so that opened vaccine vials can be used more rationally? There may be even more reasons for a high wastage rate, continue reasoning! Do not respond alone to all questions of your supervisor, involve others too. You will come up with an answer.

c) Vaccine supply and quality

Monitoring indicators	Issues to consider	Possible interpretations/reasoning
Vaccines stock-out – health facility lacks all or any one EPI vaccine for a particular period of time.	Are the vaccine needs (annual, monthly) known? Were any vaccination sessions cancelled due to vaccine stock-outs? Have vaccines been supplied/ordered according to needs? Do the amounts used correlate with vaccinations performed? Have the needs of any particular vaccine exceeded the supply? Your analysis and physical checks will reveal if there is/has been a real stock-out.	Stock-out of vaccines reflects vaccine management problems at various levels, including health facility level, where the problem can be associated with some of the following issues: • Inaccurate calculations and orders of the health facility. • Other activities have consumed some of the vaccines that were ordered for routine immunization. • The vaccine stock-out may be related to an influx of refugees requiring urgent immunization of target population. • There has been a supply problem – fewer vaccines were delivered than requested. If so, this needs to be discussed with your supervisor and the clinic health committee to find a solution. • Could be a result of unavoidable high wastage rate (part of the community not respecting vaccination sessions). You may eventually identify the real cause of the stock-out in the health facility.

d) Surveillance

Monitoring indicators	Issues to consider	Possible interpretations/reasoning
Completeness of reporting target diseases to health facility.	Does the community report the cases to the health facility?	Is the community educated on VPDs: layman's definition/local name, possible complications, beliefs and cultural taboos?
Timeliness of reporting of target diseases to health facility.	Why does the community report the cases late?	Availability of standard case definition and appropriate format in the register.
Number of cases/ deaths reported.	Are all the cases/deaths registered and compiled with the required variables (age, sex, vaccination status)?	Availability of case investigation forms.
Investigation of cases.	Using bar charts and line graphs, what is the trend by month and over two to three years?	Why is there a sudden increase in cases – outbreak/cases from outside service area?
Trend of cases and deaths.	How does the number of cases correlate with vaccination coverage?	Does the trend (over two to three years) indicate a corresponding reduction of cases with increase in coverage?

e) Communication

Monitoring indicators	Issues to consider	Possible interpretations/reasoning
Involvement and participation of community.	Any problem in utilization of services by the whole community or a particular group. How much involved are community-based organizations, local healers, nongovernmental organizations?	The health facility plan may not have included social mobilization activities. There is no interaction between staff of the service delivery point and the community. No or under-utilization of community structures. Service providers lack communication skills.

7.2 Analysing and interpreting data at district/provincial level

When monitoring at district or province/region/zone levels, ask yourself the following important questions:

a) Do I have the data to measure – are the data timely, complete and accurate? If not:
- Are the appropriate reporting forms and tally sheets available at all health facilities/districts?
- Are all health facilities/districts providing the data?
- Which are the weak facilities/districts that need extra support – training, communication?

b) What do the data show in terms of:
- Coverage.
- Other system indicators.
- How are the trends?
- Which are the strong and weak facilities/districts in performance?
- What are the lessons learned from the best performing facilities/districts: planning, social mobilization?
- Is there a correlation between coverage and disease data?

c) Discuss with health facilities/districts (during meetings or supervisions etc.) on reviewing the data and causes of problems encountered.

d) Provide written feedback on outcome of analysis.

e) Elaborate solutions and revise plans.

Key elements for analysis:

1. Where is the population – population distribution in a given territory?

2. Where are the hard-to-reach populations – low coverage areas?

3. Where are the unreached populations – areas with the highest number of unimmunized children?

4. Where are the problems with access to immunization services – catchment areas with Penta1 <90%?

5. Where is utilization of services low – areas with high drop-out rates?

Elaborating the questions on analysis:
- What is my district/province's current immunization coverage for BCG, Penta1/Penta3? These are key indicators, as mentioned above, for vaccination coverage, access and basis for calculation of drop-out rates.
- What were coverage figures for the same vaccines during the last year and last three years?
- Has the immunization coverage in my district/province risen, fallen or remained stable during these periods? How far or near am I from the coverage targets set by the annual or multi-year plan?

- Which health facilities have coverage rates <80%? What is the lowest performing health facility in the district? For health services in general and for immunization services in particular? Which are the main obstacles for low-performing facilities?
- What are the persisting factors for the district/province preventing achievement of planned targets?
  - ° Is completeness of surveillance reports satisfactory for each month and the cumulative rate for the previous year?
  - ° What are the reporting sites that have not sent disease surveillance reports?
  - ° Analyse data by time, place, age and sex. Prepare graphs or curves to reflect findings and to observe monthly or annual trends.

Remember:
- Always discuss collected data and emphasize the need for their analysis, identify problems and the causes with health facility staff (during meetings or supervisory visit).
- Provide feedback on the analysis of data.
- Based on data analysis, suggest solutions and revise plans.

7.3 Data analysis and interpretation at national level

This is the highest level where analysis of the data on immunization coverage alone may have many facets.
- Calculate immunization coverage rates by district to see which ones have achieved >80% coverage rate. Find out the strategies used that have led to the achievements.
- Identify districts that fail to achieve the target. Review data for the past three to five years. The coverage rates are influenced by many factors, like availability of budget, vaccines, transport or human resources. These factors tend to become stable over the years, any sudden variation upwards and downwards should have a clear reason. If no explanation is provided, the increase or decrease can point to a data entry error.
- Review the geographical distribution of the health facilities, using available district maps. How accessible are the services to the population groups? Which specific groups are not covered?
- Probe further to see if specific interventions are in place for the underserved areas.

Exercise 8

Individual work and group discussion.

The table below lists the vaccination coverage level achieved in 2015 each month for OPV, Penta and TT at a health centre. The total number of children in the target population of the health centre is 1350 under one-year-old children. The coverage target for the year 2016 for both OPV3 and Penta3 is 75%, for TT2+ it is 50%.

	OPV1	OPV3	DTP1	DTP3	TT2+
January	80	60	80	75	30
February	70	60	70	60	20
March	75	70	75	65	25
April	55	35	55	50	15
May	80	55	80	75	30
June	80	80	80	80	30
July	80	65	80	75	25
August	50	35	50	45	15

Task 1: Assuming that the number of children to be reached monthly is uniform throughout the year, calculate the actual number of persons immunized per month with DTP1, DTP3 and TT2+.

Task 2: Record and graph these numbers on the immunization monitoring chart.

Task 3: Calculate drop-out rates for OPV1 to OPV3 for May and the same for Penta1 to Penta3 for August.

Task 4: Calculate the average number of children immunized from January to August.

Task 5: Analyse and interpret data and answer the following questions:
- Will the health centre achieve its targets for child immunization and for the immunization of pregnant women at the end of 2016?
- If no, what would be the possible reasons for failure? What is the monthly average increase needed to achieve the target?

At the end of the exercise, the facilitator will arrange a group discussion.

Monitoring system	→	Identifying information sources	→	Selecting monitoring indicators	→	Collecting data for monitoring

Using data for action	←	Analysing and interpreting information	←	Managing collected data
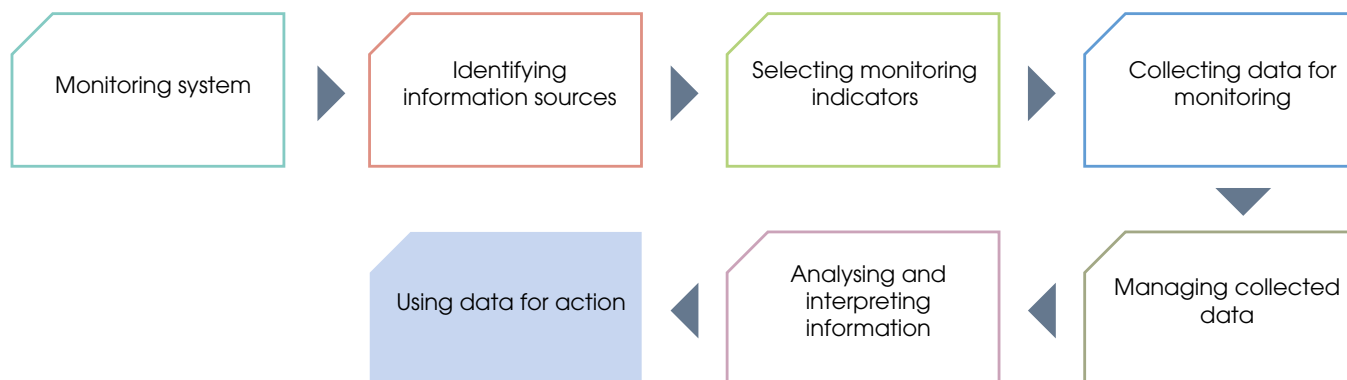
8. Using data for action

8.1 Call for action through monitoring

The renewed interest of focusing on district and health facility very much relies on effective monitoring of the whole immunization system at all levels. This includes taking action based on the results of the monitoring. One of the key reasons for implementing a monitoring system is to identify problems and develop solutions that will improve the quality of the immunization system. Having established a reliable monitoring system, the mid-level manager must be prepared to respond to these problems and concerns. In this section we refer to "taking action" specifically in the context of rectifying or averting problems. This section describes various problems and corrective actions taken by different levels to improve programme performance based on the immunization monitoring and surveillance data analysis.

Key concepts:
- Data should be useful to you.
- Avoid collecting data that you are not going to use.
- Unorganized data do not provide sufficient information for decision-making.
- Collected and well-organized data initiate correct actions.

The actions will vary by level and even by country in some cases. The following subsection provides lists of possible actions at the different levels from health facility to national.

8.2 Finding solutions and adding corrective actions to your workplan

Table 8.1 presents some examples based on real situations at health facility level.

8.2.1 Actions at health facility level

Table 8.1 Gaps observed in immunization programme management and proposed corrective actions at health facility level

Observations/interpretations	Action
Poor understanding of catchment areas, overlapping, uncertainties in the number of target population	• District staff assist health facility to determine catchment areas and target population. • Data should be displayed using maps and tables showing boundaries and population figures for each target groups. • Discuss ways to collect denominator information from community (e.g. birth register).

Recording and reporting on immunizations are inadequate	District to arrange a seminar or talk on importance of data collection with health facility staff.
	On-site training will be necessary on the following issues:
	• Each immunization should be recorded and reported, including those performed during outreach sessions, by private sector, hospitals and other providers.
	• Standard wall immunization monitoring charts, graphs and maps should be widely used by each health facility for self-monitoring.
	• Drop-out rates should also be monitored and action taken to minimize its damage to the programme. Health facility should intensify efforts:
	  º using default retracing methods
	  º increasing outreach to hard-to-reach areas
	  º linking more with communities and asking support of community leaders/volunteers, etc.

Unclear or absence of annual immunization	• Based on present coverage levels and long-term objectives, district officer with health facility focal person calculates annual targets for immunization, e.g.:
	  º 2017: 60%
	  º 2018: 70%
	  º 2019: 80%.

Low targets for the health facility regarding adequacy of skills of field staff in vaccine management especially in monitoring vaccine stock and vaccine wastage	• Discuss issue with district supervisors and with their support organize in-service training of health personnel in vaccine handling, stock control and measures to reduce vaccine wastage rate:
	  º use of VVM
	  º adoption to multi-dose vial policy (MDVP)
	  º stringent control on vaccine use and others.

Linkages on technical matters between health facility and district office is weak	• District officer assists nurse in charge to prepare and make presentation on progress towards immunization targets at district monthly meeting. • District sends manuals and guidelines on immunization to the health facility.
Immunization coverage is dropping/stagnant as few children are brought for vaccination	• During monitoring visit, district officer and local health staff hold discussions with community leaders/focal points. • District assists health facility to intensify social mobilization activities. • Change of schedule of sessions.
Communities are not involved in planning and implementing the programme	• Health facility organizes community meetings and focus group discussions. • Makes presentation on health facility plans and achievement of targets at village development committee meetings asking committee's support to reach hard-to-reach people.

8.2.2 Actions at district level

Coverage gaps can be broadly associated either with access or with utilization. The problem may be related to one or more villages/areas or may apply to the entire district. The role of districts in monitoring the programme is crucial. Based on the results of monitoring, districts may take actions as appropriate. These may include:

- Summarizing the results of the monitoring and adjusting district micro-plans accordingly. For example:
  - º reviewing the effectiveness of applied strategies
  - º changing priorities in the plan
  - º providing immediate support to health facilities that are behind the target and need more support from district level
  - º it may also necessitate shifting human and material resources from one facility to another.
- Preparing overview of the situation reflecting achievements of each health facility in the district towards district target, such as:
  - º a chart showing Penta3 coverage, or Penta1 to Penta3 drop-out rate per health facility
  - º updating district immunization monitoring chart
  - º a chart with proportion of immunizations performed within and outside target groups
  - º preparing a map showing distribution of target diseases in the district versus immunization coverage for the same diseases, etc.
- Identifying major problems, reporting them to province or central level and seeking solutions (e.g. initiating supply of out of stock vaccines or AD syringes).
- Compiling information for monthly reporting to province or central level.
- Presenting the status of the programme and the extent of achieving targets to the district development committee and seeking the committee's political and financial support for the programme.
- Informing on or involving district-based partners in monitoring the programme.

8.2.3 Actions at subnational (state, province or regional) level

- Organize quarterly meetings for district medical officers and supervisors to discuss progress and constraints and to provide feedback from higher levels.
- Initiate peer discussions to exchange best practices among the districts.
- Analyse district data and provide feedback to districts.

- Undertake in-service and on-site training of district health staff.

8.2.4 Actions at national level

- Build national capacity to produce and maintain district-level indicator database including mapping.
- Provide feedback to provinces and partners.
- Review timeliness, completeness and accuracy of district reporting system.
- Compare and adjust district, subnational and national numerators and denominators to ensure consistency.
- Develop national consensus on reporting guidelines.
- Identify priority districts and provinces for strengthening monitoring, supervision, surveillance and reporting systems.
- Use ICC as a forum for regular monitoring of the programme in the country. Establish regular reporting schedule by the programme manager to be included in the ICC's annual plan. Invite members of the ICC in monitoring visits to district level.
- Organize travelling ICC meetings at district level (select first low performing districts!).
- Organize regular review meetings with participation of the ICC, other partners, private sector, etc.

8.3 Provide feedback and feed-forward

Two other ways of taking action – feedback and feed-forward – form part of the routine reporting and management of a monitoring system. The terms "feedback" and "feed-forward" refer to the process of routinely sending the results of data analysis to different levels of the monitoring system. Feedback (sending processed information from the central level to the peripheral levels) is particularly important for those who have provided the data, so that they can see the value of collecting and reporting information, and to compare their performance in relation to others at the same level. Feed-forward means forwarding cleaned databases or the results of data analysis to higher administrative levels which can help to promote accomplishments as well as highlight areas of concern and seek assistance with problems.

8.3.1 Feedback to reporting sites

Although one of the aims of monitoring is for programme managers to know where the programme stands and what its problems are in order to plan corrective measures, it also informs all stakeholders on the situation. This may include the director of medical/ health services, departmental heads, other stakeholders,

community leaders, partners and health workers; particularly those who are contributing to the database. In the first instance, however, feedback must be to the supplier of the information. It is polite and motivating to do this.

The main reasons for providing feedback to reporting sites (such as district health staff and health facilities) are to create a collaborative environment by acknowledging the hard work of data providers and reassuring them that their data will be analysed.

Feedback in this manner will:

- Improve the accuracy and promptness of reports.
- Verify with the peripheral levels that the data received at higher levels are correct.
- Improve performance by showing national progress towards specific public health goals and comparing performances between regions.
- Facilitate the use of data by providing data analysis in greater depth than can be achieved peripherally; for instance, if the peripheral level is not computerized, the central level might provide the computerized tables, graphs and maps to enhance the local analysis of data.
- Provide the community with the information on coverage, drop-out rates and other indicators, so they can help plan and implement better services.
- Place the local data in the context of regional data, allow for comparison of data and performance and visualize the extent of coverage and drop-out rates.

Key point
The importance of feedback should never be underestimated. The mid-level manager should remember that feedback can be a valuable tool for improving coverage and other indicators.

Routine feedback to the reporting sites should comprise a consolidated report of the provincial and district priority indicators for the five components of the immunization system. It is important to first show the overall progress made in the last quarter and secondly to show a more detailed analysis of the location and nature of the problem areas. At a minimum, the following information should be included in routine feedback reports.

- Coverage and drop-out rates
- Timeliness/completeness of reports
- Cases of vaccine preventable diseases
- Results of investigations into adverse events following immunization
- Stock-outs

- Summary of problems identified, including underlying problems or contributing factors
- Information on actions taken and requests for further actions, if needed
- Congratulations on doing a good job and encouragement to do a better job

The easiest way of ensuring feedback may be to publish a newsletter or bulletin. This does not need to be sophisticated or costly. It could entail a text of one or two pages with illustrations, maps, graphs or tables to make the document reader-friendly. Accounts of personal experiences or success cases will enable the staff to recognize itself in the process – provided such stories are presented positively. The distribution of the newsletter could be as wide as possible.

The other method of feedback is to prepare a circular letter or to organize a seminar to discuss the results of the monitoring exercise. The latter may end up with interesting discussions, exchange of ideas and problem-solving proposals.

8.3.2 Methods and frequency of feedback

There are many different ways a mid-level manager can provide feedback on the results of monitoring. These depend on the data that are to be presented, and the level at which the information is targeted. Every mid-level manager should have a plan for providing regular feedback, but one-off, spontaneous or ad hoc opportunities can also be advantageous.

Although monthly newsletters or reports help to keep the peripheral levels informed and updated, a quarterly meeting can give the mid-level manager an opportunity to discuss achievements and problems face to face with staff and other interested partners. Meetings are most effective if the relevant data are analysed and prepared in advance in the form of visual displays.

Although monthly newsletters or reports help to keep the peripheral levels informed and updated, a quarterly meeting can give the mid-level manager an opportunity to discuss achievements and problems face to face with staff and other interested partners. Meetings are most effective if the relevant data are analysed and prepared in advance in the form of visual displays.

Key point
Prompt feedback of results should occur regularly; by monthly newsletter if possible, or at least quarterly in a meeting.

8.3.3 Feed back to the community

As a mid-level manager, you should encourage your staff to provide feedback to communities about immunization services, and always involve local politicians, religious leaders, community group leaders and parents in planning, implementing and improving immunization programmes.

8.3.4 Feed-forward

Feed-forward is the process of forwarding the results of monitoring activities to next levels. There are many formal feed-forward requirements with which the mid-level manager must comply, including a variety of surveillance reports. Unfortunately, these formal reports do not always provide a full picture of the situation. Feed-forward is therefore a very useful mechanism for both communicating issues/concerns that are affecting programme performance and promoting successes, achievements or "lessons from the field", from which others could learn.

Since feed-forward data is usually intended for people who make or influence decisions at the higher level, the mid-level manager should ensure that they tell an accurate story about the performance in their province. The manager should also remember that feeding-forward does not always have to be through formal mechanisms such as monthly reports; ad hoc opportunities such as writing newsletter articles and attending meetings can also be invaluable.

Key point
In addition to regular feed-forward reports, the mid-level manager can send ad hoc information to inform decision-makers of important changes in monitoring results, both good and bad.

Recommended reading

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WHO (2015). Immunization in practice: A practical guide for health staff. Geneva: World Health Organization.

WHO (2015). Regional Strategic Plan for Immunization 2014–2020. Regional Office for Africa: World Health Organization. Available at: https://www.aho.afro.who.int/en/ahm/issue/19/reports/regional-strategic-plan-immunization-2014–2020 (accessed 5 December 2016).

Websites

WHO – Immunization, Vaccines and Biologicals (Disease surveillance and burden):
http://www.who.int/immunization/monitoring_surveillance/burden/en/

WHO – Immunization, Vaccines and Biologicals (Immunization coverage):
http://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/

WHO – Immunization, Vaccines and Biologicals (Strategic indicators):
http://www.who.int/immunization/monitoring_surveillance/routine/indicators/en/

WHO – Immunization, Vaccines and Biologicals (Surveillance for VPDs):
http://www.who.int/immunization/monitoring_surveillance/burden/VPDs/en

Annex 1: Core indicators

Annex 1A: Ten core indicators applied to the operations of immunization systems
(adapted from Gavi paper on core indicators)

INDICATORS FOR SERVICE DELIVERY COMPONENT OF OPERATIONS

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
1. Proportion of districts in the country with >/=80% DTP3 coverage among infants. Numerator: number of districts in a country with >/=80% DTP3 coverage. Denominator: number of all districts in the country.	This is a key indicator to monitor immunization system performance. It is an output indicator to measure the country's efforts to cover all districts in the country with high immunization coverage.	80% or more DTP3 coverage in all districts in the country (100%).	District immunization monthly reports. Completeness of reporting from districts and health facilities. Immunization monitoring charts.	National/province/district (also useful for health facility level).
2. Proportion of districts with >/=90% measles coverage among infants. Numerator: number of districts in a country with >/=90% measles vaccination coverage. Denominator: number of all districts in the country.	This is one of the key indicators to measure progress towards achieving measles elimination.	90% or more measles immunization coverage in all districts in the country (100%).	District immunization monthly reports. Completeness of reporting from districts and health facilities. Immunization monitoring charts.	National/province/district (also useful for health facility level).
3. Proportion of districts in the country with >/=80% DTP1 coverage among infants. Numerator: number of districts in a country with >/=80% DTP1 immunization coverage. Denominator: total number of districts in the country.	This is a key indicator to monitor the level of access to immunization services. It is a process indicator to measure the ability of the programme to reach its target population including those in hard-to-reach areas. In combination with DTP3, both can measure DTP1 to DTP3 DOR (see the next indicator).	80% or more DTP1 coverage in all districts in the country (100%).	District immunization monthly reports. Chart showing completeness of reporting from districts and health facilities. Immunization monitoring charts.	National/province/district (also useful for health facility level).
4. Proportion of districts in the country with DOR (DTP1 to DTP3) of less than 10%. Numerator: DTP1. Denominator: DTP1-DTP3.	An important process indicator for the assessment of the utilization of immunization services. It can reflect problems of vaccine supply (e.g. stock-outs), inadequate staffing, quality of service delivery and lack of demand due to economic or other reasons. It can also indicate a high level of missed opportunities in the health facility.	Less than 10%.	District immunization monthly reports. Chart showing completeness of reporting from districts and health facilities. Immunization monitoring charts.	National/province/district (also useful for health facility level).
5. Proportion of districts supplied with adequate (equal or more) number of AD syringes for all routine immunizations during the year. Numerator: number of districts that have been supplied with above. Denominator: total number of districts in the country.	This indicator measures the level of injection safety in immunization programmes It also reflects the adoption of AD syringes policy by the programme. It shows the adequacy of supply management and accuracy in calculating necessary logistics supplies. Last, but not least, it indicates the commitment of the government to improve the quality of immunization services in the country.	All districts (100%). Equal number of AD syringes with all immunizations given through injection.	Order forms. Logistics register. Inventory books or reports. Supervisory reports.	National/province / district (also useful for health facility level).

INDICATOR FOR LOGISTICS AND COLD CHAIN COMPONENT OF OPERATIONS

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
6. National level wastage rates of DTP and new vaccines (HepB and Hib). The vaccine wastage rate (%) = 100 - vaccine usage rate.	This is an indicator of vaccine management, especially in relation to the introduction of new vaccines, which are much costly than traditional EPI vaccines. The wastage depends on vial size in use, open vial policy adoption, etc.	The wastage rate of only 10% should be applied to new vaccines which makes the wastage factor 1.1.	Vaccine order form. Vaccine arrival report. Vaccine register. Vaccines stock sheets. Physical count of opened and discarded vials.	National/province/ district/health facility.

INDICATOR FOR VACCINE SUPPLY AND QUALITY COMPONENT OF OPERATIONS

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
7. Proportion (%) of districts in the country that had no vaccine stock-outs. Numerator: number of districts in the country that had no vaccine stock-outs. Denominator: total number of districts in the country.	This is an input indicator characterizing the vaccine supply side of the programme. It is described here in positive terms but can also be used to show districts which had stock-outs. It indicates how well districts are doing in vaccine management, storage and handling. It shows, most importantly, the programme's ability to make a proper ordering and monitor minimum, maximum and critical stocks to avoid stock-outs.	All districts (100%). Definition of district stock-out: district vaccine store has no remaining doses of any one EPI vaccine, for any period of time.	Vaccine order form. Vaccine arrival report. Vaccine register. Vaccine stock sheets.	National/province/ district (also useful for health facility level).

INDICATORS FOR SURVEILLANCE AND MONITORING COMPONENT OF OPERATIONS

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
8. Proportion of districts sending disease surveillance reports to national level compared with number of reports expected. Numerator: number of reports received. Denominator: total number of reports expected.	This is a process indicator showing how effective the reporting system works in the country regarding disease reporting. It monitors the completeness of the reporting; it does not, however, assess the quality of the reports or the representativeness of the data they contain.	All districts (100%): • weekly • monthly • quarterly • annual reports.	District health office.	National (also useful for province/district/ health facility levels).
9. Proportion of districts sending immunization coverage reports to national level compared with number of reports expected. Numerator: number of reports received. Denominator: total number of reports expected.	This is a process indicator showing how effectively the reporting system works in the country regarding reporting on immunization activities. It monitors the completeness of the reporting. It does not, however, assess the quality of the reports or the representativeness of the data they contain.	All districts (100%): • monthly • quarterly • annual reports.	District health office.	National (also useful for province/district/ health facility levels).

INDICATOR FOR ADVOCACY AND COMMUNICATION COMPONENT OF OPERATIONS

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
10. Existence of an advocacy and communication strategic plan (annual) with identified focal point and annual budget.	This is an input indicator showing political commitment. It reviews a country's proposed advocacy and communications activities but does not give an indication of the quality of activities carried out. The level of resources allocated gives an indication as to the commitment of the government.	Existence of an annual plan on advocacy and communications.	Office of the national EPI manager. Office of the health education and promotion unit at MOH.	National (also useful for province/district/health facility levels).

Annex 1B: Three core indicators applied to the supporting elements of immunization systems

INDICATOR FOR FINANCIAL SUSTAINABLITY SUPPORTING ELEMENT

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
11. Government financed recurrent programme-specific immunization spending in the past year per million US dollars of total government spending. Numerator: government spending and the expenditure of loan funds (excluding funds provided to government for immunization services by bi- or multilateral agencies) x million. Denominator: total government spending.	This indicator measures the financial sustainability of the programme. "Recurrent" budget-specific spending includes salaries and per diem of staff working full time for immunization programme; fuel and maintenance for exclusively immunization activities excluding capital items (vehicle, cold chain equipment etc.). "Spending" in the definition means actual expenditure, not budgeted or planned amounts.	Currently there are no guidelines on the specified level of government support for immunization programmes. However, it should be reasonable compared with the external support. Some countries purchase all or part of the vaccines used, others contribute 10–30% of total programme expenditure.	Government end-of-year expenditure report. Ministry of finance. Ministry of health finance department. Recognized international sources.	National.

INDICATOR FOR HUMAN AND INSTITUTIONAL RESOURCES SUPPORTING ELEMENT

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
12. Proportion of districts that received at least one supervisory visit per health facility in the last calendar year. Numerator: number of districts having one or more supervisory visits. Denominator: total number of districts in the country.	The area of this indicator is supervision. The formative supervision is extremely useful for capacity building.	One or more supervisory visits per year (in some successful programmes supervision is done once per quarter).	Supervisory reports at district and health facility levels. Visitor's book or register.	National. District/province. Health facility.

INDICATOR FOR MANAGEMENT SUPPORTING ELEMENT

Indicator and definition	What area or function it measures?	Targeted range or optimal values	Source of information	Monitoring level
13. Proportion of districts with micro-plans that include activities to raise immunization coverage Numerator: number of districts with micro-plans on immunization. Denominator: total number of districts in the country.	Although once a year appears a minimum requirement for supervision, logistical field difficulties make this target challenging. The supervisory visit may not necessarily be specific to immunization but should include the supervision of immunization activities (integrated supervision). This indicator shows how district managers plan their routine activities within their districts, which is usually done through micro-planning. It does not give any information on the quality of the plan or to what extent activities have been implemented.	Presence of a micro-plan at each district.	District health office. Annual reports from districts.	National. District/province.

Annex 2: Sample tally sheet for health facility

Static session..

Outreach post..   District............................   Health facility........................

Month....................... Year...........................

Dose	Children <1 year of age				Total	Children >1 year of age				Total
BCG	00000	00000	00000	00000		00000	00000	00000	00000	
OPV0	00000	00000	00000	00000		00000	00000	00000	00000	
OPV1	00000	00000	00000	00000		00000	00000	00000	00000	
OPV2	00000	00000	00000	00000		00000	00000	00000	00000	
OPV3	00000	00000	00000	00000		00000	00000	00000	00000	
DTP1*	00000	00000	00000	00000		00000	00000	00000	00000	
Protected at birth (PAB)	00000	00000	00000	00000		00000	00000	00000	00000	
DTP2	00000	00000	00000	00000		00000	00000	00000	00000	
DTP3	00000	00000	00000	00000		00000	00000	00000	00000	
HepB-birth**	00000	00000	00000	00000		00000	00000	00000	00000	
Hep1**	00000	00000	00000	00000		00000	00000	00000	00000	
Hep2	00000	00000	00000	00000		00000	00000	00000	00000	
Hep3	00000	00000	00000	00000		00000	00000	00000	00000	
Hib1	00000	00000	00000	00000		00000	00000	00000	00000	
Hib2	00000	00000	00000	00000		00000	00000	00000	00000	
Hib3	00000	00000	00000	00000		00000	00000	00000	00000	
Measles1	00000	00000	00000	00000		00000	00000	00000	00000	
Measles2						00000	00000	00000	00000	
Yellow fever**	00000	00000	00000	00000		00000	00000	00000	00000	
Vitamin A supplement	00000	00000	00000	00000		00000	00000	00000	00000	

*All children who receive DTP1 should be assessed for PAB status against neonatal tetanus.

**This tally sheet should be modified to reflect the national immunization schedule.

Dose	Pregnant women				Total	Childbearing age not pregnant				Total
TT1	00000	00000	00000	00000		00000	00000	00000	00000	
TT2	00000	00000	00000	00000		00000	00000	00000	00000	
TT3	00000	00000	00000	00000		00000	00000	00000	00000	
TT4	00000	00000	00000	00000		00000	00000	00000	00000	
TT5	00000	00000	00000	00000		00000	00000	00000	00000	
DTP1*	00000	00000	00000	00000		00000	00000	00000	00000	
Protected, non-eligible***	00000	00000	00000	00000		00000	00000	00000	00000	
Vitamin A postpartum women	00000	00000	00000	00000		00000	00000	00000	00000	

***These women have recently received a dose of TT or have already completed their S-dose series.

Vaccine vials opened during the session							
Vaccine	Size	Number	Doses	Size	Number	Doses	All doses
BCG		00000			00000		
DPT		00000			00000		
OPV		00000			00000		
Measles		00000			00000		
Yellow fever		00000			00000		
HepB		00000			00000		
Hib		00000			00000		

Date........................   Signature...   Designation...

Annex 3: Immunization summary form

Dose	Children <1 year of age			Children >1 year of age			Vaccine doses		
	Static	Outreach	Total	Static	Outreach	Total	Opened	Administered	Broken/ expired/ VVM
BCG									
OPV0									
OPV1									
OPV2									
OPV3									
DTP1*									
Protected at birth (NT)									
DTP2									
DTP3									
HepB-birth**									
Hep1**									
Hep2									
Hep3									
Hib1									
Hib2									
Hib3									
Measles1									
Measles2									
Yellow fever**									
Vitamin A supplement									
	Childbearing women								
	Pregnant			Non-pregnant			Postpartum		
	Static	Outreach	Total	Static	Outreach	Total	Static	Outreach	Total
TT1									
TT2									
TT3									
TT4									
TT5									
Protected, non-eligible***									
Vitamin A postpartum women									

*All children who receive DTP1 should be assessed for PAB status against neonatal tetanus.

**This tally sheet should be modified to reflect the national immunization schedule.

***These women have recently received a dose of TT or have already completed their S-dose series.

Annex 4: Immunization monitoring chart

How to prepare the chart for monitoring doses administered and dropouts

This chart has been developed to track the monthly progress you are making towards immunizing infants under one year of age each month and throughout the year. It also helps you to determine whether your target population is completing the series of vaccines (e.g. Penta3) or dropping out.

1. Calculate the annual and monthly target population to receive immunization services

a) Annual target population
Use existing population figures for infants under one year of age obtained from official census data or your own community census. If you do not have these numbers, obtain an estimate by multiplying the total population by 4%. This document uses 4% as the estimated percentage of infants less than one year of age and of pregnant women in a population. If you have a more precise percentage for your country or region, use this number instead.

If the total population is 3900 then infants under one year would be 3900 x 4/100 = 156

b) Monthly target
To get a monthly target population, divide the number of infants under one year of age by 12.

If annual target under one year is 156, the monthly target is 156/12 = 13

2. Label the chart

a) Label the left side of the chart with the monthly target figures.
b) Complete the information on the top of the chart, i.e. area and year.
c) Label the boxes at the bottom with the name of the vaccine and dose, e.g. Penta1 and Penta3 or Penta1 and measles, as shown in Figure A4.1.

3. Plot immunization data on the chart

The chart can be used to monitor doses given and drop-out rates. The example given shows Penta1 and Penta3, but other rates can be used (e.g. Penta1 and measles):
a) Locate the row of boxes underneath the graph. Locate the spaces for the month you are recording. Enter the monthly total of Penta1 immunization given.
b) Add the current month's total to the previous cumulative total to calculate the current cumulative total and enter it on the right side of the month column you are recording.

The monthly total for March is 7, the previous cumulative total is 22, so the current cumulative total for March is 22 + 7 = 29

c) Make a dot on the graph for the cumulative[3] total recorded on the right side of the month column you are recording.
d) Connect the new dot to the previous month's dot with a straight line.
e) Repeat above (a to d) every month until the end of the year.

4. Plot Penta3 immunizations given the same way as Penta1 (follow steps a to e).

5. Calculate the total number of dropouts between Penta1 and Penta3.

6. Subtract the cumulative total for Penta3 from the cumulative total for Penta1.

7. Calculate the cumulative dropout rate (DOR%) as follows:

$$\frac{\text{Penta1 cumulative total} - \text{Penta3 cumulative total}}{\text{Penta1 cumulative total}}$$

The dropout rate can be easily visually monitored – it is the gap between the line of Penta1 and Penta3. There are many ways to monitor coverage and dropouts using charts – key charts include:
- Penta1 and Penta3
- BCG and measles
- OPV1 and OPV3
- Measles and yellow fever
- TT2+.

- Put the monitoring chart at a place that can be seen easily by the health staff every day.
- Plot the monthly figures on the graph each month to monitor progress.

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3 Cumulative means the total number of doses of vaccines given in the current month plus the monthly totals for all the previous months. Use the same time period for each dose and vaccine. For example, the cumulative number of Penta1 doses given by the end of March is the total number of doses given in January plus the total number given in February plus the total number given in March.

Figure A4.1: Immunization monitoring chart

FILL IN AT THE END OF EACH MONTH	JAN	CUM. TOT.	FEB	CUM. TOT.	MAR	CUM. TOT.	APR	CUM. TOT.	MAY	CUM. TOT.	JUNE	CUM. TOT.	JULY	CUM. TOT.	AUG	CUM. TOT.	SEPT	CUM. TOT.	OCT	CUM. TOT.	NOV	CUM. TOT.	DEC	CUM. TOT.
TOTAL IMMUNIZED DTP1	10	10	12	22	7	29	12	41	14	55	15	70	14	84	7	91								
TOTAL IMMUNIZED DTP3	8	8	9	17	8	25	10	35	11	46	12	58	12	70	7	76								
DROP OUT NUMBER (DO) (DTP1 - DTP3)		2		5		4		6		9		12		14		15								
DROP OUT % (DO/DTP1) * 100		20		23		14		15		16		17		17		16								

Target population: 156   Monthly target: 13

Interpreting the chart

Determine which percentage line your cumulative total line is near. That will tell you what percentage of your target population you are immunizing during the year. If the cumulative total line, representing actual immunizations performed by your staff, is on or above the target line, you are making good progress. If it is below but close to the target line you have modest results. If your line is far below the target line you are not making progress and you should find out the reasons for your failure and overcome it. If you are reaching less than 50% of your target, your programme is not successful, and you must try to find out the reasons by asking the following questions:

- Are your sessions easy and pleasant to attend (for example, are they held regularly, are they held at a good time, is the place accessible)?
- Are opportunities to vaccinate children missed?
- Ask other clinic staff whether they know why people do not come.
- Ask people in the villages and community leaders if they know of any problem that the people have with your immunization programme.
- Discuss the problem with your supervisor and decide what you can do to improve the programme.

Annex 5: Record of completeness and timeliness of monthly routine surveillance reports at district level

Health facilities	Month													Received			Timely
	1	2	3	4	5	6	7	8	9	10	11	12		L+T		T only
														n	%	n	%
Received — n																	
L+T — %																	
Timely — n																	
T only — %																	
Quarterly TB treatment centre report																	
Quarterly leprosy report																	

T = Received on time
L = Received late
n = Did not receive
Target: 80% of reports are timely

Annex 6: Guide for reporting data collection and verification

1. Reports from intermediate or peripheral levels can be obtained with **passive** (waiting to receive) or **active** (asking to receive) methods. They can be transferred by electronic media (e-mail, fax), telephone, postal service or by hand.

2. After receiving the report, the central level (or intermediate level) epidemiologist should check its accuracy and verify if all parts of the reporting form are completed.

3. They should check if the **reports** received are for the period under review (particular week or month for which reports are received).

4. They should make a quick review of the report content to see if diseases requiring immediate action are reported and, if positive, arrange epidemic response action according to previously established protocol.

5. The manager should also prepare an inventory of all reports received and make an assessment of the completeness of reporting for the reporting period. The completeness of reporting is calculated from the total number of reporting centres in the catchment area (denominator) and the number of reporting centres that sent in their report (numerator).

6 The data manager should assess the timeliness of the reporting. For this, they should calculate the proportion of the reports received within the deadline period for the reporting (numerator) out of all expected reports for the same period (denominator).

7. The results of the assessments should be communicated to those reporting centres that failed to report or reported beyond deadline. Communication can be through epidemiological bulletins, supervisory visits or during seminars/working meetings.

8. The data analysis can be done using information in Section 7 of this module.

Annex 7: Reaching Every District (RED) approach monitoring tools

To further support the scaling up of RED in the Africa Region, WHO and its partners have developed the RED monitoring tool. Its purpose is to help determine if all five of the RED components are being fully implemented, and if districts implementing RED are, in fact, achieving and sustaining increased immunization coverage. The tool consists of:

- Illustrative performance standards for each of the five RED components that can be assessed using a set of core indicators.
- A set of core indicators that can be measured over time.
- A list of optional "supplementary" or alternative indicators that may be useful in particular country situations (not included in this guide).
- An excel spreadsheet that can be used to collect, compile and present RED monitoring data.
- Guidelines for adapting the RED monitoring tool to country specifications.

The tool is intended to help managers make better decisions – without over-burdening service providers with yet more data to collect and send up through the health system. Therefore, the RED monitoring tool is designed for use with existing data – data collected through the routine health information or immunization programme information system, by supervisors during regular supervisory visits, etc. The tool may be used for "self-assessment" by health facilities and districts implementing RED. Additionally, supervisors may use it to monitor key immunization functions and results across health facilities, districts and regions.

REACHING EVERY DISTRICT APPROACH
CORE PERFORMANCE INDICATORS

S/N	RED Component	Area	Core Indicator Standard	Core Indicator Definition, Unit of Measurement and Suggested Frequency of Collection		
				HF	District	National
1	PLANNING AND MANAGEMENT OF RESOURCES	PLANNING	Microplans up-to-date	Number of HFs with microplans up-to-date / Total number of HFs *Measurement: percentage* *Frequency: quarterly*	Number of districts with microplans up-to-date / Total number of districts *Measurement: percentage* *Frequency: quarterly / 6 months*	National EPI Annual Plan up-to-date? *Measurement: Y/N* *Frequency: annual*
2		VACCINE MANAGEMENT	No vaccine stock-outs of any antigen	Number of HFs with no vaccine stock-outs of any antigen / Total number of HFs *Measurement: percentage* *Frequency: monthly*	Number of districts with no vaccine stock-outs of any antigen / Total number of districts *Measurement: percentage* *Frequency: monthly*	Vaccine stock-out of any antigen at national level? *Measurement: Y/N* *Frequency: monthly*
3		SAFETY	No AD syringe stock-out	Number of HFs with no AD syringe stock-outs / Total number of HFs *Measurement: percentage* *Frequency: monthly*	Number of districts with no AD syringe stock-outs / Total number of districts *Measurement: percentage* *Frequency: monthly*	AD syringe stock-out at national level? *Measurement: Y/N* *Frequency: monthly*
4		PERSONNEL	At least one personnel trained in immunization	Number of HFs with at least one staff trained on immunization in the previous year / Total number of HFs *Measurement: percentage* *Frequency: annual*	Number of districtss with at least one staff trained on immunization in the previous year / Total number of districts *Measurement: percentage* *Frequency: annual*	
5		FINANCING	Disbursement of funds for routine immunization	Number of HFs with funds disbursed for outreach activities / Total number of HFs *Measurement: percentage* *Frequency: quarterly*	Number of districts with funds disbursed for routine immunization activities / Total number of districts *Measurement: percentage* *Frequency: quarterly*	Funds disbursed for routine immunization activities at national level? *Measurement: Y/N* *Frequency: quarterly*
6	LINKING SERVICES WITH THE COMMUNITY		Community meetings conducted	Number of HFs with at least 1 meeting conducted with community / Total number of HFs *Measurement: percentage* *Frequency: quarterly*	Number of districts with at least 1 meeting conducted with the community (CBOs and/or local authorities) / Total number of districts *Measurement: percentage* *Frequency: quarterly*	

S/N	RED Component	Core Indicator Standard	Core Indicator Definition, Unit of Measurement and Suggested Frequency of Collection		
			HF	District	National
7	REACHING THE TARGET POPULATIONS	Effective outreach* where target population for outreach sites is not well defined, use # sessions conducted / # sessions planned	Number of DPT1-containing vaccines given via outreach in all HFs / Total number of DPT1-containing vaccines planned to be given via outreach in all HFs in the month X 100; alternative if outreach target not well defined use: Number of outreach sessions conducted by HFs / Total number of sessions planned by HFs Meas: num/denom & percentage Frequency: monthly		
8	SUPPORTIVE SUPERVISION	Supportive supervision conducted	Number of supportive supervisory visits conducted by districts to HFs / Total number of HFs Measurement: percentage Frequency: quarterly		Number of supportive supervisory visits conducted by national level to districts / Total number of districts Measurement: percentage Frequency: quarterly
9		Timely reporting	Number of immunization reports received by districts from HFs / Total number of HFs Measurement: percentage Frequency: monthly		Number of immunization reports received at national level from districts / Total number of districts Measurement: percentage Frequency: monthly
10	MONITORING FOR ACTION	Review meetings conducted		Number of districts conducting review meetings / Total number of districts Measurement: percentage Frequency: monthly	
11		Data monitored	Number of HFs with monitoring chart up-to date and correctly drawn / Total number of HFs Measurement: percentage Frequency: monthly		

HEALTH FACILITY LEVEL PERFORMANCE MONITORING TOOL

DATE: _____

NAME OF HEALTH FACILITY: _____

MONTHLY TARGET OF CHILDREN UNDER 1YR: _____

MONTH	PLANNING AND MANAGEMENT OF RESOURCES					LINKING SERVICES WITH THE COMMUNITY	REACHING THE TARGET POPULATIONS			MONITORING FOR ACTION	PERFORMANCE					
	PLANNING	VACCINE MANAGEMENT	SAFETY	PERSONNEL	FINANCING						ACCESS			UTILIZATION		
	Micro Plans up-to-date	No vaccine stock-outs of any antigen	No AD syringe stock-outs	At least one personnel trained in immunization	Disbursement of funds for outreach	Community meetings conducted	Effective outreach*			Data monitored	DPT1-containing coverage rate			DPT1-containing to DPT3-containing drop-out rate	DPT1-containing to Measles-containing drop-out rate	
	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO	NUM/DENOM		%	YES/NO	NUM/DENOM		%	%	%	
	1	2	3	4	5	6	7			8	9			10	11	
JANUARY																
FEBRUARY																
MARCH																
APRIL																
MAY																
JUNE																
JULY																
AUGUST																
SEPTEMBER																
OCTOBER																
NOVEMBER																
DECEMBER																

*Note: countries to change indicator based on what is most appropriate for country; see "RED Core Indicators" tab

REACHING EVERY DISTRICT APPROACH
DISTRICT LEVEL PERFORMANCE MONITORING TOOL + SUMMARY OF HEALTH FACILITIES IN DISTRICT

NAME OF DISTRICT:

		PLANNING AND MANAGEMENT OF RESOURCES									LINKING SERVICES WITH THE COMMUNITY		REACHING THE TARGET POPULATIONS		SUPPORTIVE SUPERVISION		MONITORING FOR ACTION						SUMMARY PERFORMANCE OF ALL HFs IN DISTRICT			
	PLANNING	VACCINE MANAGEMENT		SAFETY		PERSONNEL		FINANCING									Supportive supervision conducted		Timely reporting		Review meetings conducted		Data monitored			ACCESS	UTILIZATION	
	Micro Plans up-to-date	No vaccine stock-outs of any antigen		No AD syringe stock-outs		Personnel trained in immunization		Disbursement of funds for routine immunization		Community meetings conducted		Effective outreach*													DPT1-containing coverage rate	DPT1-containing to DPT3-containing drop-out rate	DPT1-containing to Measles-containing drop-out rate
	1	2		3		4		5		6		7		8		9		10		11			12	13	14
MONTH	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DIST	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DIST		DIST SUMMARY	DIST SUMMARY	DIST SUMMARY
	Y/N	%	Y/N	%	Y/N	%	Y/N	%	Y/N	%	Y/N	%		# visits		# reports		Y/N		%		NUM/DENOM	% (cumulative)	% (cumulative)	% (cumulative)
JANUARY																									
FEBRUARY																									
MARCH																									
APRIL																									
MAY																									
JUNE																									
JULY																									
AUGUST																									
SEPTEMBER																									
OCTOBER																									
NOVEMBER																									
DECEMBER																									

*Note: countries to change indicator based on what is most appropriate for country; see "RED Core Indicators" tab

REACHING EVERY DISTRICT APPROACH
NATIONAL LEVEL TOOL SUMMARIZING DISTRICT AND HEALTH FACILITY DATA

NAME OF DISTRICT: _____

	PLANNING AND MANAGEMENT OF RESOURCES										LINKING SERVICES WITH THE COMMUNITY		REACHING THE TARGET POPULATIONS		SUPPORTIVE SUPERVISION		MONITORING FOR ACTION						SUMMARY PERFORMANCE OF ALL HFs IN DISTRICT			
	PLANNING		VACCINE MANAGEMENT		SAFETY		PERSONNEL		FINANCING								Timely reporting		Review meetings conducted		Data monitored		ACCESS		UTILIZATION	
MONTH	Micro Plans up-to-date		No vaccine stock-outs of any antigen		No AD syringe stock-outs		Personnel trained in immunization		Disbursement of funds for routine immunization		Community meetings conducted		Effective outreach*		Supportive supervision conducted								DPT1-containing coverage rate		DPT1-containing to DPT3-containing drop-out rate	DPT1-containing to Measles-containing drop-out rate
	1		2		3		4		5		6		7		8		9		10		11		12		13	14
	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DIST	HF	DISTRICT	HF	DISTRICT	HF	DISTRICT	HF	DIST	DIST SUMMARY		DIST SUMMARY	DIST SUMMARY
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	NUM/DENOM	% (cumulative)	% (cumulative)	% (cumulative)
JANUARY																										
FEBRUARY																										
MARCH																										
APRIL																										
MAY																										
JUNE																										
JULY																										
AUGUST																										
SEPTEMBER																										
OCTOBER																										
NOVEMBER																										
DECEMBER																										

*Note: countries to change indicator based on what is most appropriate for country; see "RED Core Indicators" tab

REACHING EVERY DISTRICT APPROACH
NATIONAL LEVEL PERFORMANCE MONITORING TOOL

Country: _____

DATE: _____

MONTH	PLANNING AND MANAGEMENT OF RESOURCES				SUPPORTIVE SUPERVISION	MONITORING FOR ACTION	PERFORMANCE SUMMARY OF HFs IN COUNTRY			
	PLANNING	VACCINE MANAGEMENT	SAFETY	FINANCING			ACCESS	UTILIZATION		
	National EPI Annual Plan up-to-date	Vaccine stock-out of any antigen at national level in last month	AD syringe stock-out at national level in last month	Funds disbursed for routine immunization activities during the last quarter at national level	Number of supportive supervisory visits conducted by national level in the last quarter	Number of monthly immunization reports received at national level from districts in last month	DPT1-containing coverage rate	DPT1-containing to DPT3-containing drop-out rate	DPT1-containing to Measles-containing drop-out rate
	YES/NO	YES/NO	YES/NO	YES/NO	No. visits	No. reports	Coverage	Drop-out rate	Drop-out rate
	1	2	3	5	6	7	9	10	11
JANUARY									
FEBRUARY									
MARCH									
APRIL									
MAY									
JUNE									
JULY									
AUGUST									
SEPTEMBER									
OCTOBER									
NOVEMBER									
DECEMBER									