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Communicable disease surveillance and response systems

Guide to monitoring and evaluating

EPIDEMIC AND PANDEMIC
ALERT AND RESPONSE

World Health Organization

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List of abbreviations used in this document

CDC	Centers for Disease Control and Prevention (Atlanta, GA, United States of America)
EPR	Epidemic preparedness and response
HF	Health facility
HIS	Health information system
IDSR	Integrated disease surveillance and response
IEC	Information, education and communication
IHR	International Health Regulations
LFA	Logical framework approach
M & E	Monitoring and evaluation
PH	Public health
POA	Plan of action
PPV	Positive predictive value
SCDs	Standard case definitions
SOPs	Standard operating procedures
RRK	Rapid response kit
RRT	Rapid response teams
WHO	World Health Organization

1 Introduction

1.1 Background

Surveillance is the ongoing systematic collection, analysis, and interpretation of outcome-specific data for use in planning, implementing and evaluating public health policies and practices. A communicable disease surveillance system serves two key functions; early warning of potential threats to public health and programme monitoring functions which may be disease-specific or multi-disease in nature.

The early warning functions of surveillance are fundamental for national, regional and global health security. Recent outbreaks such as the severe acute respiratory syndrome (SARS) and avian influenza, and potential threats from biological and chemical agents, demonstrate the importance of effective national surveillance and response systems. The International Health Regulations (IHR) 2005 underscore the commitment to the goal of global security and request all Member States to establish and implement effective surveillance and response systems to detect and contain public health threats of national and international importance.

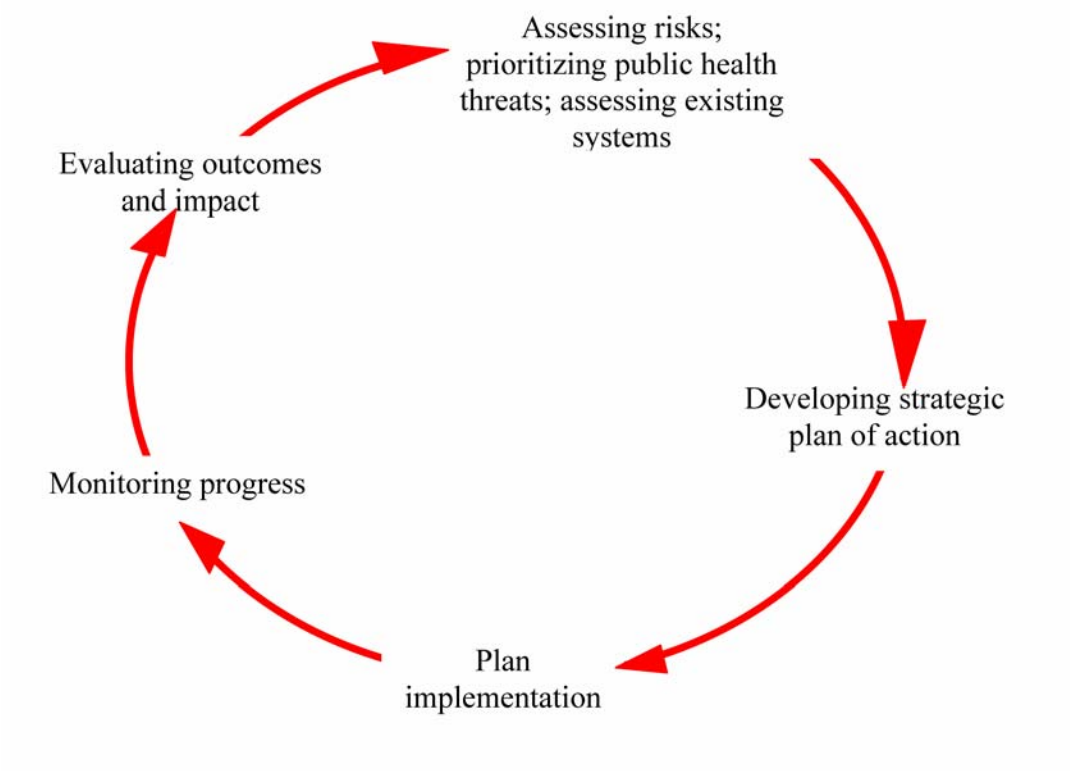
The programme monitoring function of surveillance of communicable diseases encompasses a variety of goals such as eradication or elimination (e.g. of guinea worm, measles) and surveillance for acute flaccid paralysis. Surveillance systems also serve to monitor trends of endemic diseases, progress towards disease control objectives, and to provide information which may be used to evaluate the impact of disease prevention and control programmes.

All Member States should enhance their national surveillance systems for communicable diseases in order to meet the various objectives. A structured approach to strengthen national communicable disease surveillance systems could include:

- Assessment of communicable disease risks to identify major public health threats.
- Prioritization of public health threats to ensure that surveillance is limited to the important public health events.
- Assessment of existing systems to review strengths, weaknesses, and opportunities for strengthening the systems.
- Development of a strategic plan of action based on the findings of the assessment.
- Implementation of activities planned to strengthen the systems.
- Monitoring progress in implementation of planned activities, the evolution and performance of the surveillance system.
- Evaluating outcomes and overall impact of the surveillance system.

This approach is summarized in Figure 1.

Figure 1 Cycle illustrating surveillance systems strengthening activities



Guidelines have been developed to support implementation of the various steps shown in Figure 1. Annex 2 contains a list of some of the currently-available WHO guidelines.

This Guide has been developed to support implementation of monitoring and evaluation of communicable disease surveillance and response systems at country level. It was reviewed by experts in communicable disease surveillance and response systems, and pre-tested in Estonia and Ethiopia.

1.2 Purpose of the monitoring and evaluation guide

As the momentum to scale up the global response to communicable diseases increases, public health practitioners need to constantly review their performance in detecting and responding to communicable diseases. At the same time, they should account for the planned activities, policies and resources to a variety of stakeholders. The staff working at different levels of surveillance need to report accurate data in a timely manner to the next higher level to ensure timely and effective responses to contain communicable disease outbreaks. They may be required to report on progress to partners and donors, but most importantly, surveillance information should be used locally to address and resolve problems related to control of communicable diseases and to strengthen evolving programmes. Monitoring and evaluation are keys to establishing and maintaining effective and efficient surveillance and response systems.

This guide aims to assist countries in formulating and implementing monitoring and evaluation strategies.

It comprises:

- An overview of the concepts for monitoring and evaluation.
- The components of the surveillance and response system usually targeted for monitoring and for evaluation, including some practical illustrations on collection and interpretation of data on surveillance attributes.
- Practical steps in implementing monitoring and evaluation and the identification of relevant indicators.
- A list of indicators for adaptation at country level.

1.3 Intended users

The guide is designed primarily for the ministry of health staff implementing surveillance and response systems. It is expected to be useful for the following persons:

- staff of the surveillance and epidemiology units in ministries of health;
- programme managers at national level;
- regional and district level surveillance officers;
- public health laboratory personnel at all levels;
- other persons with the mandate or interest in monitoring and evaluation of disease surveillance and response systems.

2 Overview of monitoring and evaluation of surveillance & response systems

Monitoring in the context of surveillance and response systems refers to the routine and continuous tracking of the implementation of planned surveillance activities (monitoring the implementation of the plan of action) and of the overall performance of surveillance and response systems.

Evaluation is the periodic assessment of the relevance, effectiveness and impact of activities in the light of the objectives of the surveillance and response systems.

Routine monitoring of systems serves to:

- track progress of implementation of planned activities;
- ensure that planned targets are achieved in a timely manner;
- track progress of improvements in targeted indicators of the quality and attributes of the system, such as timeliness of reporting, completeness of reporting, etc;
- identify problems in the system in order to institute corrective measures in a timely manner;
- provide a basis for re-adjusting resource allocation based on ongoing needs and priorities;
- help to ensure that all implementers of the systems are held responsible and accountable for their defined activities.

Implementation of surveillance & response systems without routine monitoring will result in little or no adjustment to the plan, thus leading to increased risk of failure, lack of achievement of the desired outcomes and of the overall objectives of the systems.

Evaluation of surveillance & response systems serves to:

- ensure that the surveillance system meets the objectives for which it was formulated;
- document the status of, and any change in the performance of the system;
- provide an evidence-base on which to modify surveillance objectives, implementation strategy and planned activities;
- enable planning of resource allocation;
- provide explanations for achievements and failures in the system;
- provide specific recommendations for improving the system.

2.1 Principles of monitoring and evaluation of surveillance and response systems

M & E of surveillance & response systems should be guided by the following principles:

- The surveillance plan should include a detailed M & E plan
- The sources of information, methods and frequency of data collection and analysis, and use of information should be specified within the M & E plan.
- Both monitoring and evaluation should have clear objectives which are specific, measurable, action-oriented, realistic, and time-bound (SMART objectives).
- The availability of baseline data against which changes can be monitored and evaluated should ensured.
- Monitoring should be routine and continuous while evaluations are less frequent and dictated by need.
- Monitoring data should be, as far as possible, easily collected through the system itself (with minimal resource implications) and should be collected by persons implementing the system.
- Monitoring of indicators should be done with equal intensity and frequency in areas where planned changes have not yet been implemented as in areas where the planned changes have occurred.
- Written records of both monitoring and evaluation should be kept
- The recommendations resulting from monitoring and evaluation should be acted upon in a timely and appropriate way.

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2.2 Indicators as tools for M & E

Indicators are variables that can be measured repeatedly (directly or indirectly) over time and provide measures of change in a system. They provide useful information on the status of the system and flag areas that need improvement. They are usually expressed as simple counts, proportions, rates or ratios. These measurements should be interpreted in the broader context, taking into consideration other sources of information (e.g. supervisory reports and special studies), and supplemented with qualitative information.

2.2.1 Qualities of a good indicator

A good indicator should have a precise definition of numerator and denominator and should be:

2.2.2 Types of indicators in the logical framework approach

Indicators can be classified in various ways. In the logical framework approach (LFA), there are five types of indicators; input, process, output, outcome and impact indicators.

Input indicators are the resources needed to implement the system. They include trained personnel, finance, standards and guidelines, communication facilities, forms for surveillance, computers, stockpiles for emergency response, and any other logistics as deemed necessary.

Process indicators are used to monitor and track implementation of the planned activities which are critical for attaining the surveillance core functions such as training, supervision, development of guidelines and tools, etc.

Output indicators are measures of the immediate results of the activities. They include reports from surveillance data, feedback given to the data providers, number/proportion of health staff trained, number/proportion of planned supervisory visits implemented etc.

Outcome indicators are measures of the quality of the surveillance system and the extent to which the surveillance objectives are achieved. They may include indicators for assessing usefulness of the system, completeness of reporting, use of surveillance data for policy and programme decisions, and appropriateness of outbreak response.

Impact indicators are measures of the extent to which the overall objectives of the system are being achieved. They may include changes in case fatality rates from epidemic-prone diseases, changes in morbidity patterns, behaviours changes in health staff in implementing the system, and changes in health-related behaviours of the target population.

At the outset of implementation of all surveillance systems, emphasis is placed on the input and process indicators. As the systems stabilizes with time, the emphasis shifts systematically to the outcome, and impact indicators.

2.2.3 Selection of indicators

In addition to identifying indicators on the basis of qualities outlined in 2.1.1, the following considerations are useful in their selection:

- **Policy relevance**: Can the indicator provide guidance for critical decisions and policy issues?
- **Simplicity**: Can the indicator be presented in a clear, concise and easily comprehensible way?
- **Sensitivity**: Can the indicator detect a small change in the system?
- **Time-series data**: Are time-series data available and reflective of the trend of the indicator over time?

3 Components of surveillance & response systems for M & E

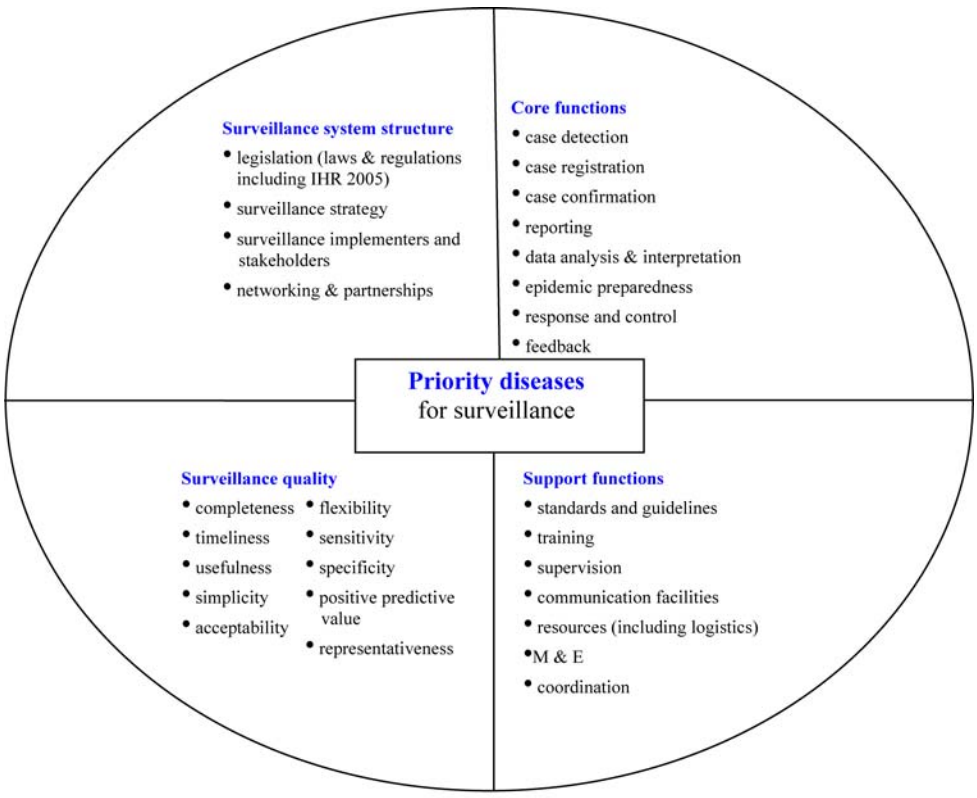
The components of surveillance and response systems targeted for M & E comprise:

- the priority diseases targeted for surveillance
- the structure of the system
- core functions of the system
- support functions of the system
- quality of the system.

These components are illustrated in Figure 2 and provide the basis for the identification of the indicators contained in Annex 3.

Figure 2

Components of surveillance and response systems for M & E



3.1 Priority diseases targeted for surveillance and response

Surveillance should be conducted for diseases and conditions considered to be of public health importance. The list of diseases and syndromes in the national health information system (HIS) is useful for planning and routine management but too extensive for effective and useful surveillance in view of the limited human and financial resources. Therefore, depending on the objectives of the system, priority diseases for surveillance should be identified and reviewed regularly to ensure they remain relevant and important.

The selection of priority diseases for surveillance, and their periodic review can be achieved through a prioritization exercise conducted at approximately 5-yearly intervals (refer to the WHO Guideline on prioritization of diseases for surveillance).

Examples of the indicators that can be used for M & E of priority diseases for surveillance are contained in Annex 3.1.

3.2 Structure of the system

The structure of the surveillance and response system is defined by legislation (laws, and regulations, including IHR 2005), the strategy for implementing activities, the implementers and stakeholders, and how they relate to each other and to the various networks and partnerships. The indicators that measure different aspects of the structure of a system constitute part of the evaluation indicators; some useful examples are contained in Annex 3.2.

3.2.1 Legislation[1] for surveillance

Public health legislation and regulations, including IHR 2005 (for example, regulations governing notifiable diseases and other communicable diseases of public health importance) provide the regulatory framework for the implementation of surveillance and response systems. Some of these laws and regulations have become outdated and may require some amendments. Periodic review and evaluation will establish the relevance, adequacy and need for update.

The IHR 2005 constitute an important component of public health legislation and aim to ensure adequate measures for the protection of public health and strengthening of the global public health response to the international spread of diseases. Their purpose is to ensure maximum security against the international spread of diseases with a minimum interference with the international traffic and trade. Annex 1 of the IHR 2005 stipulates the minimum core capacity requirements for surveillance and response to communicable diseases at the local community level, the intermediate public health response, and also at the national level. They call upon Member States to develop and enhance their capacities for surveillance, reporting, notification, verification, response, and collaboration, and their activities concerning designated airports, ports and ground crossings after an initial assessment.

M & E should establish the relevance, effectiveness, progress in implementation and compliance with the legislation.

[1] The definitions and explanations of Legislation, Acts, Regulations and IHR are outlined in the glossary of terminology in Annex 1.

3.2.2 Surveillance strategy

The surveillance strategy depends on the diseases under surveillance, the objectives of the surveillance system, the methods for conducting surveillance and how the surveillance data are used to inform public health policy and practice. For example, an early warning surveillance system needs to be more comprehensive while a system that serves a programme monitoring function could be conducted through sentinel sites.

In a multi-disease surveillance system, a limited degree of integration and coordination may be required for efficiency. Some countries have also embarked on a structured approach to strengthening national surveillance systems through prioritization of diseases for surveillance, systematic assessments of existing systems, development of action plans to strengthen the systems, implementation of these plans, and monitoring and evaluation.

M & E of the surveillance strategy should not only establish if the strategy is most suited to meet the surveillance objectives, but should also examine progress and challenges in implementation of the strategy.

3.2.3 Implementers and stakeholders

The important surveillance levels are central, intermediate (province /region, district) peripheral (sub-district, health facility) and community level. Each of these levels may comprise formal and private health-care providers that may or may not be included in the surveillance system. Other stakeholders and implementers include the disease-specific programmes, public health laboratories, and public health training institutions.

The roles and responsibilities of the implementers and stakeholders, and how they relate to each other should be clearly articulated. The flow of surveillance data through the system, and the dissemination and utilization of information needs to be clear and known to implementers and stakeholders, and the mechanism for response should be well coordinated across the different levels of surveillance.

3.2.4 Networking and partnership

Surveillance of communicable diseases requires concerted efforts and collaboration between stakeholders and partners in and between countries. At country level, intersectoral collaboration and coordination between key partners is crucial for the implementation of effective and comprehensive surveillance systems.

Various surveillance networks and partnerships exist at country level and between countries. The laboratory network is a good example of a country-level network, while collaboration on surveillance and response activities between countries bordering one another represents inter-country networking. Intersectoral collaboration is a necessity in order to implement early warning and response functions.

M & E is an opportunity to track network and partnership activities, determine their effectiveness and provide recommendations for improvement.

3.3 Core functions of surveillance systems

The indicators related to the core functions measure the processes and outputs from the system. The core functions include case detection, case registration, case confirmation, reporting, data analysis and interpretation, and public health response including reports and feedback from the

systems to the data providers, stakeholders and decision-makers. Indicators for M & E of the core functions of surveillance and response systems are given in Annex 3.3.

3.3.1 Case detection

Case detection is the process of identifying cases and outbreaks. Case detection can be through the formal health system, private health systems or community structures. Case definitions and a functioning rumour verification system are vital for case and outbreak detection.

3.3.2 Case registration

Case registration is the process of recording the cases identified. This requires a standardized register to record minimal data elements on targeted diseases and conditions. Monitoring should establish the proportion of health facilities having the standardized registers. Evaluation could then examine the validity and quality of information recorded as well as factors that affect the registration of cases.

3.3.3 Case confirmation

Case/outbreak confirmation refers to the epidemiological and laboratory capacity for confirmation. Capacity for case confirmation is enhanced through improved referral systems, networking and partnerships. This means having the capacity for appropriate specimen collection, packaging and transportation. The existence of internal and external quality control mechanisms are important elements for case confirmation which help to ensure the validity and reliability of test results.

3.3.4 Reporting

Reporting refers to the process by which surveillance data moves through the surveillance system from the point of generation. It also refers to the process of reporting suspected and confirmed outbreaks. Different reporting systems may be in existence depending on the type of data and information being reported, purpose and urgency of relaying the information and where the data/information is being reported. The national guidelines for the different reporting systems should be implemented.

3.3.5 Data analysis and interpretation

Surveillance data should be analysed routinely and the information interpreted for use in public health actions. Appropriate "alert" and "epidemic" threshold values for diseases with epidemic tendencies should be used by the surveillance staff. Capacity for routine data analysis and interpretation should be established and maintained for epidemiological as well as laboratory data.

3.3.6 Epidemic preparedness

Epidemic preparedness refers to the existing level of preparedness for potential epidemics and includes availability of preparedness plans, stockpiling, designation of isolation facilities, setting aside of resources for outbreak response, etc.

3.3.7 Response and control

Public health surveillance systems are only useful if they provide data for appropriate public health response and control. For an early warning system, the capacity to respond to detected outbreaks and emerging public health threats needs to be assessed. This can be done following a major outbreak response and containment to document the quality and impact of public health response and control.

Surveillance systems designed to monitor and evaluate programme interventions should be evaluated to establish the extent to which the objectives of the systems are being met.

3.3.8 Feedback

Feedback is an important function of all surveillance systems. Appropriate feedback can be maintained through supervisory visits, newsletter and bulletins. It is possible to monitor the provision of feedback by the different levels of surveillance and to evaluate the quality of feedback provided, and the implementation of follow-up actions.

3.4 Support functions of surveillance systems

The support functions are those that facilitate implementation of the core functions and included the following:

- standards and guidelines (case definitions, laboratory guidelines, outbreak investigation guidelines, etc);
- training for epidemiology and laboratory personnel and/or community health agents;
- supervisory activities;
- communication facilities;
- resources (human, financial, logistical);
- monitoring and evaluation
- coordination.

Indicators related to M & E of support functions are contained in Annex 3b.

3.4.1 Standards and guidelines

Standards, norms and guidelines are necessary for implementing, monitoring and evaluating surveillance and response systems. A comprehensive surveillance guideline should define the priority diseases for surveillance and standard and updated case definitions and action thresholds, and include reporting and data management tools, a description of roles and responsibilities and the expected actions by level. Other important guidelines include those for outbreak investigation, for case management and infection control, and laboratory standard operating procedures etc. It is possible to monitor the proportion of surveillance units with updated versions of standards, norms and guidelines, and to review the guidelines for usefulness and ease of applicability.

3.4.2 Training

Training refers to the needs for capacity building for staff involved with surveillance and response systems through knowledge transfer. Surveillance staff at different levels have varying training needs. An assessment can help to identify the training needs for different categories of staff, which in turn can be used to draw up a training plan. The implementation of the training plan and the proportion of surveillance staff (epidemiology, laboratory and community resource persons) trained on the different aspects of surveillance and response can then be monitored. Evaluation could examine the quality, relevance, impact and cost-effectiveness of the training.

3.4.3 Supervision

Supportive supervision serves numerous functions. It helps to strengthen the capacity of staff and ensure that the right skills are used appropriately, the necessary logistics are in place, and that planned activities are implemented according to schedule. It is necessary for each of the surveillance levels to include supervisory activities in their annual workplans. The proportion of the planned supervisory visits with checklists and feedback reports conducted by different surveillance units during the year can be monitored. Evaluation could then consider the quality and effectiveness of the supervision conducted by staff at the different levels of surveillance.

3.4.4 Communication facilities

In order to support the function of reporting and feedback in any surveillance system, an appropriate and effective medium for communication at each level of surveillance should be defined, instituted and maintained. Evaluation could determine the emerging needs of communication facilities at different levels of surveillance are being met.

3.4.5 Resources

Surveillance and response activities can only be performed if the required and appropriate financial, human and logistic resources are in place. This means identification of the resource needs to implement the various surveillance activities at each level of surveillance during planning stage. These resources should be mobilized from potential sources, managed and used efficiently.

3.4.5 Monitoring and evaluation

M & E is an important element of all surveillance and response systems to ensure that the surveillance objectives are being achieved and that planned activities are on track. A framework and plan for M & E should be developed, indicators identified, and activities implemented. Also ensure that the recommendations resulting from the M & E are disseminated and utilized to improve the systems.

3.4.7 Coordination

It is necessary to ensure effective coordination between implementers and stakeholders for effective and efficient implementation of surveillance and response systems. Through M & E, the needs for improvements in coordination can be identified and effective coordination mechanisms and strategies implemented.

3.5 Surveillance quality

The quality of the surveillance system is defined by attributes such as completeness, timeliness, usefulness, sensitivity, positive predictive value (PPV), specificity, representativeness, simplicity, flexibility, acceptability, and reliability.

While monitoring will help identify changes in the attributes over time, periodic evaluations should assess the extent of the improvements in the quality of surveillance systems, the data they generate, and the type and quality of the public health responses to the information.

Surveillance attributes can be evaluated using quantitative and qualitative methods. The updated guidelines for evaluating public health surveillance systems produced by the United States Centers for Disease Control and Prevention (CDC) and the framework for evaluating public health surveillance systems for early detection of outbreaks illustrate some of the approaches. Annex 3b contains indicators related to attributes of surveillance systems.

3.5.1 Completeness

Completeness in surveillance can have varying dimensions and may include the following:

- completeness of reporting sites/surveillance forms
- completeness of case reporting
- completeness of surveillance data

3.5.1.1 Completeness of reporting sites/surveillance forms

Completeness of reporting sites refers to the proportion of reporting sites that submitted the surveillance report irrespective of the time when the report was submitted. This is measurable in situations where the surveillance system is such that the number of reporting sites or expected surveillance reports is known, as in the case of "zero reporting". Examples include zero reporting of notifiable conditions, weekly or monthly reporting of surveillance data.

Table 1

Computation of completeness of reporting sites/surveillance reports

Type of surveillance report being monitored/evaluated: _____

Period of time for monitoring/evaluation: _____

Name of the health jurisdiction/surveillance level: _____

Information item	**Calendar quarter**				**Yearly total**
	1	2	3	4	
1. Number of reporting sites in the health jurisdiction (A)	A1=___	A2=___	A3=___	A4=___	A=___
2. Number of reports expected in the time period (B)	B1=___	B2=___	B3=___	B4=___	B=___
3. Total number of reports received within the time period (irrespective of time of receipt) (C)	C1=___	C2=___	C3=___	C4=___	C=___
4. Completeness of reporting sites by quarter (Cr)	Cr1=(C1/B1) x 100	Cr2=(C2/B2) x 100	Cr3=(C3/B3) x 100	Cr4=(C4/B4) x 100	Cr=(C/B) x 100

The percentage completeness of reporting sites (Cr) = C/B x 100

In a comprehensive system (such as an early warning system for notifiable/epidemic prone diseases) where all reporting sites are expected to report:

- A = B and
- B = B1 + B2 + B3 + B4

In a sentinel surveillance system where only a few of the sites are expected to report:

- B < A

Computing completeness of reporting sites for each of the surveillance reports can:

- provide a trend analysis on completeness of reporting for each of the surveillance reports over a period of time;
- help to identify how each site is performing.

Further investigation should provide the reasons for poor and good performances and possible solutions to correct poor performance.

3.5.1.2 Completeness of case reporting

Completeness of case reporting refers to the match between the number of cases reported and the actual number of cases. This can be obtained by comparing the number of the reportable conditions reported to the next higher level over a period of time with the number of cases recorded in the patient register over the same period of time. The capture and recapture method can also be used to estimate the completeness of case reporting.

In a system where the level of reporting of detected cases is very high, the completeness of case reporting will be directly related to the sensitivity of the surveillance system.

3.5.1.3 Completeness of surveillance data

Completeness of surveillance data is the match between the expected minimum data requirement and what is reported. The following questions are useful in determining completeness of surveillance data and its implications on public health actions.

- Are all the data on each of the required variables in a surveillance form collected, registered and compiled?
- If not, which are the variables that are not routinely collected and what is the problem in their collection?
- What is the implication of the missing data on the quality of the surveillance data?
- How can this problem be resolved?

3.5.2 Timeliness of reporting

The single most important measure of timeliness is whether data are submitted in time to begin investigations and implement control measures. Timeliness of reporting should be measured against standards developed by each country.

Important aspects of timelines of reporting in a communicable disease surveillance system include:

- timeliness of immediate notification, i.e. within 24 hours
- timeliness of weekly reporting
- timeliness of monthly reporting

The timeliness of standardized types of reporting can be calculated as indicated in Table 2 below.

Table 2

Computation of timeliness of reporting

Information item	Calendar quarter				Yearly total
	1	**2**	**3**	**4**	
1. Number of reporting sites in the health jurisdiction (A)	A1=___	A2=___	A3=___	A4=___	A=___
2. Number of reports expected in the time period (B)	B1=___	B2=___	B3=___	B4=___	B=___
3. Total number of reports received within the time period (irrespective of the time of receipt)(C)	C1=___	C2=___	C3=___	C4=___	C=___
4. Total number of reports received on time within the time period (D)	D1=___	D2=___	D3=___	D4=___	D=___
5. Timeliness of reporting* (Tr)	Tr1=(D1/B1) x 100	Tr2=(D2/B2) x 100	Tr3=(D3/B3) x 100	Tr4=(D4/B3) x 100	Tr=(D/B) x 100

* calculation shown for a "zero" reporting system

The timeliness of reporting can be calculated in two different ways depending on the reporting system, as shown below:

a) Timeliness of reporting in a "zero" reporting system

In a "zero" reporting system where all reporting sites are required to report in a timely manner, irrespective of whether a health event is identified or not,

Timeliness of reporting (Tr) = D/B x 100

b) Timeliness of reporting in "non zero" reporting system

In a "non zero" reporting system, where reporting is based on cases seen, timeliness of reporting (Tr) is calculated as:

Timeliness of reporting (Tr) = D/C x 100

Depending on the reporting system, the proportion of surveillance reports received in a timely manner over a given time frame is computed as indicated above. During an evaluation, factors contributing to timely or delayed reports, and the consequences and implications of the timeliness of reporting should be identified, and appropriate recommendations provided.

3.5.3 Usefulness of the surveillance data and the surveillance system

Surveillance data have many potential uses. The usefulness of the surveillance data and the system should be evaluated in the context of the two key surveillance functions i.e. early warning and routine programme monitoring.

An early warning system serves to:

- detect outbreaks of diseases in a timely manner
- inform appropriate and effective public health responses
- determine the distribution and spread of disease
- illustrate the epidemiology of new diseases
- provide information to categorize the outbreak as of national or international importance
- provide data to evaluate control measures.

The surveillance systems for monitoring effectiveness of control programmes serve to:

- estimate disease burden
- identify risk groups
- determine incidence trends over time
- measure outcomes and impacts of preventive and public health interventions
- evaluate the overall control interventions.

Evaluations should determine the extent to which surveillance objectives are being met.

The section below contains examples of how to assess the usefulness of public health data and surveillance systems.

3.5.3.1 Usefulness of surveillance data in an early warning system

As indicated above, surveillance systems with an early warning function mainly serve to provide data that can be used to detect and respond to outbreaks or public health threats in a timely and appropriate manner.

To evaluate the actual usefulness of the data for this purpose, the surveillance data in an early warning system over the previous year should be reviewed to identify cases and suspected outbreaks for which an epidemiological response was required. For the suspected outbreaks, it should be determined whether:

- the suspected outbreaks were detected early by the system
- epidemiological investigations were undertaken
- the response was initiated in a timely manner
- the surveillance data were used to guide the public health response.

In addition, the factors that led to inappropriate or lack of use of surveillance data should be determined.

3.5.3.2 Usefulness of surveillance data with a programme monitoring function

Evaluators should ask both the surveillance staff and the end users of the data to list the different ways they have been able to use the data, e.g. for case detection, planning, policy, etc. They should also ask them to specify factors relating to lack of use of the data and identify the data elements that are not useful.

3.5.4 Simplicity of the system

Simplicity refers to the structure of the system and the ease of implementation. As part of the structure, the simplicity of information flow from its point of generation to the end users should be considered. The structure for response to ensure that all the different structures are complementary to one another should also be reviewed.

In terms of implementing the system, the amount and type of information collected, ease of collection, compilation, analysis, reporting, and ease of using the reporting format should all be considered.

Analysing the simplicity of a surveillance system does not easily lend itself to quantitative evaluation, and remains a largely subjective process. The evaluation team can determine the perceived simplicity of the system from the persons responsible for operating and managing the existing system. Some of the suggested questions to be posed include:

- In your experience/judgment do you believe any part of the surveillance system is unnecessarily complicated?
- What changes to the system do you believe would make it easier to implement while still achieving its purpose?

Depending on the responses to these initial questions, the evaluators can follow up with more specific questions to determine the features of the system which are identified as problematic, what changes could be made and why the changes might improve the system.

3.5.5 Acceptability of the system

Acceptability of a system is a reflection of the willingness of the surveillance staff to implement the system, and of the end users to accept and use the data generated through the system. Evaluation of the acceptability should establish if the staff implementing the surveillance system, or who otherwise support the system, view it as appropriate to their needs. In cases where the system is found to be inappropriate, suggestions for improvements to make it more acceptable by the implementers and end users of the data should be made.

3.5.6 Flexibility of the surveillance system

Flexibility refers to the ability of the system to be adapted to changing needs such as the removal or inclusion of additional diseases, modification of the reporting frequency, data requirement needs, etc. An early warning system may need to be adapted from time to time to meet additional case detection needs, for example by:

- adapting the system to the required data collection needs for signals and alerts
- collecting exposure information and data requirements for outbreak management
- increasing coverage by increasing data sources or data providers

- modifying the case definitions in use
- redefining the alert and action threshold values.

The system should also be flexible enough to shift from providing the needs for outbreak detection to outbreak response and control.

The following questions could help in ascertaining the flexibility of a surveillance system:

- Could you please describe how your system was adapted to changes and new challenges?
- Are there existing elements that make your system difficult to adapt?
- Briefly describe circumstances when it was not possible to adapt the surveillance system and why it was not possible to adapt it.

3.5.7 Sensitivity in surveillance

Sensitivity in surveillance refers to the proportion of actual cases in a population that are detected and notified through the system. Sensitivity is particularly important in an early warning system designed to detect outbreaks. It is usually not practical to obtain highly accurate estimates of sensitivity as this requires the true number of cases in the population be known, something that is almost impossible, and that the diagnosis of reported cases be confirmed to eliminate "false positives."

Sensitivity in surveillance can be described at three different levels:

3.5.7.1 Sensitivity of the surveillance case definition

This refers to the ability of the case definition to identify all possible cases in the community. A surveillance case definition is very sensitive but it may create problems by increasing the number of false positives. A laboratory-confirmed case definition may not be very sensitive in countries where laboratory testing is not widely available.

3.5.7.2 Sensitivity of the detection of events for public health response

This refers to the proportion of cases detected and reported through the system. It includes the use of "thresholds" which should trigger intervention.

$$\text{Sensitivity} = \frac{\text{persons with the disease detected by the surveillance system}}{\text{total number of persons with the disease}} \text{ x } 100$$

3.5.7.3 Sensitivity of the notification system

This refers to the proportion of cases meeting the case definition (regardless of the sensitivity of the case definition itself) that are detected and notified as they should be.

3.5.8 Specificity in surveillance

Specificity refers to the proportion of persons without the disease that are considered by the surveillance system as not having the disease.

$$\text{Sensitivity} = \frac{\text{persons without the disease detected by the surveillance system}}{\text{total number of persons without the disease}} \text{ x } 100$$

Very low specificity would result in the surveillance system indicating many "false" outbreaks, and the staff spending a lot of resources to verify and investigate.

3.5.9 Positive predictive value

The positive predictive value (PPV) is the proportion of people the surveillance system indicates as having the disease who actually have it.

$$\text{PPV} = \frac{\text{true positives}}{\text{all positives}}$$

The PPV for surveillance can be viewed in three different ways:

3.5.9.1 The PPV of the case definition

The positive predictive value of the case definition (PPVcd) is the proportion of actual cases that meet the case definition (PPVcd). This is calculated as:

$$\text{PPV}_{\text{cd}} = \frac{\text{cases meeting case definition}}{\text{total number of actual cases}}$$

The higher the PPVcd, the better is the case definition. The PPVcd is affected by the sensitivity and the specificity of the case definition, and the prevalence of the condition in the population. Improving the specificity of the case definition would involve making the case definition more restrictive (which may decrease its sensitivity).

A low PPVcd means that either the case definition is not adequate or is not applied appropriately. In this case, it may be necessary to review the case definition in use and update or recommend the training of clinical staff in its proper use.

3.5.9.2 The PPV of case detection

The positive predictive value of detecting cases (PPVdc) is the proportion of diseased persons that are detected (clinically or through laboratory confirmation) by the surveillance system.

$$\text{PPVdc} = \frac{\text{total cases detected (clinically or by laboratory)}}{\text{total number of diseased persons}} \text{ x } 100$$

3.5.9.3 The PPV of outbreak detection

The PPVdo of detecting outbreaks refers to the proportion of the alerts detected by the system that were indeed confirmed after initial verification.

$$\text{PPV}_{\text{do}} = \frac{\text{total alerts confirmed as outbreaks}}{\text{total alerts received / detected}}$$

The higher the PPVo, the better is the surveillance system. If the value of the PPVdo is low then the thresholds used for triggering an alert should be made more specific (higher values) without impairing the sensitivity too much.

3.5.10 Representativeness of the surveillance system

Representativeness refers to the degree to which the reported cases reflect the occurrence and distribution of all the cases in the population under surveillance. Geographical representativeness is particularly important in an early warning system to ensure detection of outbreaks of infectious diseases. In a situation where the reported cases of a particular health condition in a population are not representative of all the cases that are occurring in that population, the disease prevention and health promotion priorities may be inappropriate and inadequate compared to the actual needs.

Representativeness can be diminished if:

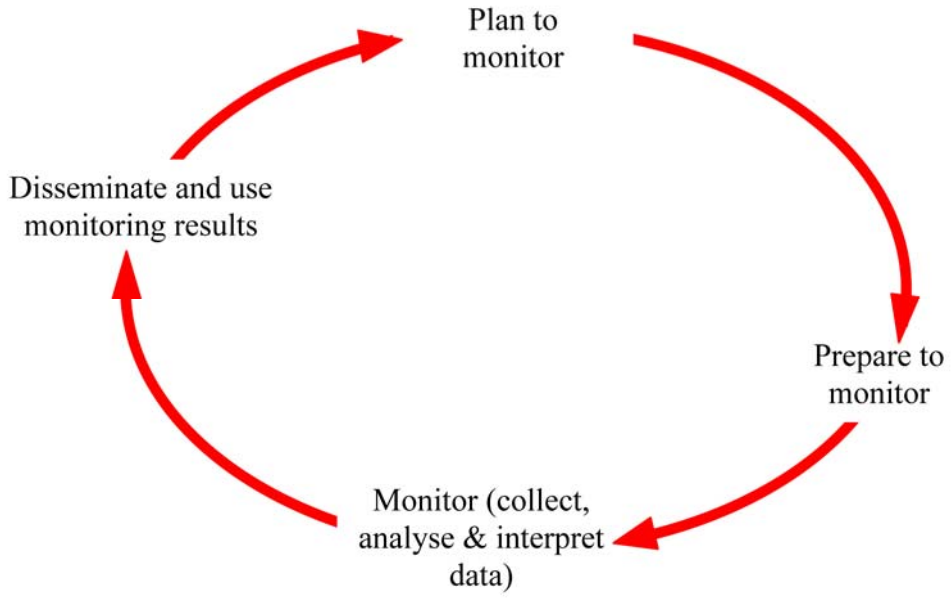
- The population attending a given health facility is not representative of the population covered by that facility.
- Some segment of the population seeks medical care from non-governmental sources that do not report through the formal reporting system.
- The health facility does not accurately diagnose or report conditions among persons of different ages, sex, origin and background in a standard format.

Because the true frequency and distribution of the health condition in a population is usually unknown, it is impossible to measure representativeness accurately. If population-based studies have been conducted and reliable estimates made, then evaluators can compare the frequency and distribution reported by the surveillance system to that established by those studies. The degree to which the reported data corresponds to the data from population-based studies is a measure of the representativeness of the reported data. However, if such population-based data are not available, evaluators must decide whether the importance of knowing the representativeness of the reported data is sufficient to recommend and/or implement one or more of the following:

- A population-based study of the incidence or prevalence of a particular disease or syndrome. This would provide the most useful data, but is time-consuming and very costly.
- A study of the demographic characteristics of clinic/health facility attendees and a comparison of this information with that of census data for the same jurisdiction. This is the easiest to do if reliable census data exist. It will not measure representativeness, but it will measure the degree of opportunity for the reported data to be representative.
- A study to determine the proportion or characteristics of the population that seek medical care from non-governmental facilities. This, combined with follow-up evaluation, will provide information that can be used directly to adjust projections of the occurrence of the health condition in the population.
- a study of reporting of notifiable conditions by different care providers e.g. non-governmental, military, private, etc.
- a study of the diagnostic and reporting practices of the health service.
- a study on health-seeking behaviour among the public.

4 Practical steps to monitor surveillance and response systems

Monitoring is an ongoing process that should be maintained throughout the lifespan of a surveillance and response system. The major steps in conducting monitoring are depicted in Figure 3 and described below.



4.1 Plan to monitor surveillance and response systems

This plan should be developed at the same time as the plan for implementing and strengthening national surveillance and response systems is being developed. The monitoring plan should include a series of activities that will help to ensure a functioning monitoring system at all levels of surveillance. The planning process should entail:

- defining components for monitoring
- defining the objectives for monitoring
- selecting monitoring indicators
- identifying methods of data collection for monitoring purposes.

The workplan for monitoring should comprise:

- objectives for monitoring
- indicators for monitoring
- baseline measurements for each of the indicators
- frequency of data collection
- targets
- methods of data collection
- levels and persons responsible for collecting the data
- intervals for analysis and review of the measurements
- estimated cost to implement monitoring, and budget source.

This workplan should be consolidated with the workplan for the evaluation component and incorporated into the overall surveillance and response plan.

4.1.1 Definition of components for monitoring

Section 3 of this guide provides a description of the different components of surveillance systems which can be targeted for M & E. Monitoring of the surveillance system should be accompanied by monitoring of the plan of action (if it exists), as this plan should ensure timely implementation of planned activities, efficient and rational use of available resources in order to achieve the targeted objectives.

4.1.2 Defining the objectives of monitoring

Defining the purpose and the objectives of monitoring ensures that the monitoring activities are useful and are geared towards strengthening the system in question.

Monitoring of any surveillance and response system should provide information on:

- progress in achieving the desired results
- improvements in the outputs from the system
- improvements in the attributes of the surveillance system
- gaps and areas for improvement.

Based on the components of the system targeted for monitoring and the established targets, objectives that are specific, measurable, achievable, realistic and time-bound (SMART) should be formulated. These monitoring objectives should relate to specific key result areas (KRAs) or outputs to be achieved through implementation of planned activities of the surveillance and response system.

4.1.3 Selection of monitoring indicators

Identification of monitoring indicators should be guided by:

- the rationale, i.e. to track progress towards achieving set targets
- the frequency of collection of information, i.e. ongoing
- the method of collection of required data, which should be almost automatic through the system with little or no resource implication.

A model worksheet to aid identification and selection of M & E indicators is shown in Table 3. For each of the monitoring objectives defined above, appropriate indicators (input, process, output, outcome, impact) should be identified to aid monitoring progress towards established targets. If necessary, additional indicators to monitor plan implementation should also be identified. These indicators should be pre-tested for usefulness, clarity, availability of denominator and numerator data, ease of collection and calculation of measurements. Annex 3 contains a list of proposed indicators for adaptation at country level.

Table 3

Worksheet for defining M & E indicators

No	Expected KRA/objectives	Indicators	Indicator definitions		Target	Measurements at diff. times					Data source	Comments
			numerator	denominator		Q1	Q2	Q3	Q4	Yr.		

KRA, key result area

4.1.4 Identification of methods of data collection

For each indicator, the frequency of data collection, methods for obtaining the data, and frequency of data analysis should be determined. To reduce costs, the collection of monitoring data should integrate into surveillance system e.g. through weekly or monthly reporting. Where it is not possible to collect the data automatically through the system, the additional data collection needs should be integrated as far as possible into routine supervisory visits. Any other additional methods selected should be feasible, realistic and linked to the data sources. Annex 4 describes some methods of data collection.

4.1.5 Development of the monitoring tool

The monitoring tool should aid collection of data and calculation of the measurements on each of the indicators. It should also include a section on the interpretation of the measurements, and the recommendations for overall system improvements. The tool should also contain instructions for use. Annex 5 contains sample tools for collecting data on a few selected indicators.

The monitoring tool should be pretested for ease of applicability to ensure that the target users find it user-friendly. Pretest of the tool is achieved through administration of the tool in its final form to a sample of target users to determine whether they understand it and whether it serves the purpose for which it was developed. Any suggestions for modification should be incorporated in the final tool before large-scale production.

4.1.6 Identification of persons to participate in the monitoring system

The monitoring system comprises the implementers and the users of the data. Monitoring should be performed at all levels of the surveillance system by people implementing the system. These people are the primary target users of the monitoring data, but additional users of the data should also be identified. The central level should have the overall coordination of the monitoring activities, and all stakeholders should be involved in planning and implementing the monitoring system.

4.2 Prepare to monitor

4.2.1. Mobilization of resources

Resources should be mobilized for data collection, compilation, analysis and interpretation. Appropriate logistics for documentation, dissemination and use of information generated should be available.

4.2.2 Preparation of job aids and training of staff

Job aids should be prepared and should include:

- details on:
    - definition of the indicators
    - levels of the surveillance system for data collection
    - when the data should be collected for each indicator

  - instruction on how to calculate the indicator value
  - targets for the indicator measurements
  - interpretation of the indicator measurements
  - recommendations for improvements
- an analysis tool or form for doing trend analysis for selected indicators
- any other tool deemed necessary for monitoring the surveillance and response systems.

Health workers should be trained on the use of the job aids, how to collect data on the different indicators, procedures, use of the tools, frequency of collection and how the data should be managed, interpreted and disseminated.

4.2.3 Dissemination of tools and procedures

Job aids, monitoring tools and procedures should be disseminated to all staff involved in monitoring and at each level of surveillance. Continuous availability and maintenance of tools and job aids should be ensured. In case of a computerized monitoring system, the appropriate software and programmes should be installed, and a monitoring database developed.

4.3 Monitor surveillance and response systems

4.3.1 Generation of baseline data

The first step in implementing monitoring activities is to generate baseline data on the monitoring indicators against which progress towards established targets can be assessed. The baseline data should be, to a large extent, extracted from the data derived from the assessment of the surveillance and response system. Where some of the data were not captured during the assessment, attempts should be made to collect the additional information. These baseline measurements should be entered and stored in an M & E database.

4.3.2 Collection and analysis of monitoring data

Monitoring data should be collected and compiled according to the schedule set out in the monitoring workplan. It is important to follow up missing data. The data should be validated, cleaned, and analysed at regular intervals and brief summary reports prepared every 3–6 months.

4.4 Dissemination and use of monitoring results

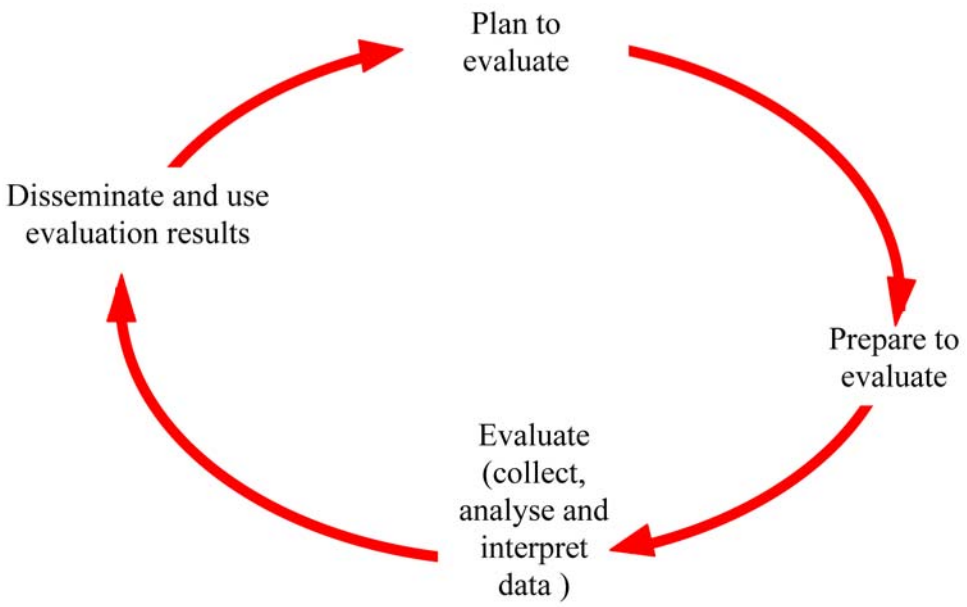
Results of monitoring should be disseminated, through the summary reports, to all users of the system and to stakeholders. The results should be used as a basis on which to plan improvements of the surveillance system.

5 Practical steps to evaluate surveillance and response systems

An evaluation cycle starts with the development of a comprehensive plan for evaluation and continues through the phase for preparation, to the actual evaluation. The cycle ends with the dissemination of the findings from the evaluation and use of the recommendations to improve the system. These steps are summarized in Figure 4 and described in detail below.

Figure 4

The evaluation cycle



5.1 Plan to evaluate surveillance and response systems

5.1.1 The scope of evaluation

A comprehensive evaluation should include the surveillance system and the surveillance POA. Evaluation of the surveillance system should:

- show to what extent the desired outputs and outcomes are achieved;
- provide explanations for achievements, disparities and failures;
- document the quality of system and demonstrate any changes in its performance;
- demonstrate the extent to which the overall surveillance objectives are achieved.

Evaluation of the surveillance plan should:

- determine the degree to which each element of the plan has been implemented;
- explain the status of implementation;
- demonstrate the outcomes and impact of the implemented activities;
- provide recommendations for improving the POA and its implementation;
- identify new or previously unrecognized opportunities for improving surveillance implementation.

5.1.2 Timing the evaluations

Where a strategic plan of action (with a defined term) exists for strengthening surveillance systems, it is appropriate to conduct mid-term and end-of-term evaluations. Otherwise surveillance systems should be evaluated every 2, 3 or 5 years.

Mid-term evaluations aim at determining whether implementation is broadly on target, whether the objectives are being met or whether some corrective measures need to be instituted. A series of intermediate evaluations may be conducted if required. End-of-term evaluations are conducted at the end of the strategic plan of action to assess the improvements in performance and thus the impact of the plan and of the systems.

During the evaluation planning phase, the types and frequency of evaluations to be conducted should be defined. It is important to remember that every evaluation activity has a cost implication and the resources required will need to be identified. Thus planning the types and frequency of evaluation should be realistic and modest.

5.2 Prepare to evaluate surveillance and response systems

5.2.1 Definition of evaluation objectives

The type and scope of the evaluation should be guided by objectives which should be simple, measurable, attainable, realistic, and time-bound (SMART). It is possible to conduct repeated evaluations with similar objectives, or implement a series of evaluations with differing objectives and assessing different components of the surveillance system.

5.2.2 Development of evaluation indicators

Indicators should be identified for each of the evaluation objectives, and should be harmonized as far as possible with the monitoring indicators. The model worksheet in annex 3a can be used to identify and define the evaluation indicators that will help to measure the outcomes and the impact of the system. Annex 3b provides a list of suggested indicators which can be adapted to specific needs.

5.2.3 Development of evaluation methods and tools

Based on these indicators, an evaluation protocol should be developed containing:

- study design or survey methods (e.g. cross-sectional studies, case studies etc)
- target population
- sampling procedures
- data sources
- data collection methods (refer to Annex 4 for details)
- data collection tools (indicators, checklist, questionnaires)
- plan for data analysis and utilization.

For each evaluation indicator the frequency of data collection and the data collection methods should be defined. Evaluation tools should be pre-tested and adapted as necessary.

5.2.4 Persons to conduct the evaluation

Three main types of evaluation exist:

- internal/self evaluations
- external evaluations
- mixed evaluations.

Internal/self evaluations refer to evaluations initiated and undertaken by implementers of the system, primarily the ministry of health. The involvement of all surveillance levels and stakeholders is encouraged in order to improve the application of the findings to strengthen the system.

Evaluations undertaken by persons outside the ministry of health or the actual implementers are referred to as external evaluations. These are useful in identifying issues that the national surveillance programme may find sensitive, and yet need to be pointed out. The disadvantage of external evaluations is that sometimes the recommendations are not used because the implementers of the system do not appreciate the results. To overcome this, the staff should be involved in the conceptualization and consulted at all stages. Furthermore, there should be active discussions with the staff of the major findings, conclusions and recommendations and the final report should be widely disseminated.

Evaluation performed jointly by ministry of health surveillance staff (implementers) and partners or external persons is referred to as mixed evaluation.

Depending on the scope of the evaluation, its purpose and the available resources, a decision should be made during the planning stage on the type of evaluations to be conducted, and on who should undertake them.

5.2.5 Resource mobilization

Depending on the type of the evaluation, the evaluation team should be constituted, the protocol finalized (objectives, methodology and data collection tools) and the teams trained on its

application. The necessary financial and logistical resources required for the evaluation exercise should be mobilized and documentation required to support the evaluation exercise should be compiled.

5.3 Conduct the evaluation

The evaluation should be undertaken according to the time schedule determined (see above) and data should be collected and compiled according to evaluation protocol. The data should be validated, cleaned, and analysed. A summary report of the evaluation should be prepared, including the background to the evaluation, objectives, methods, results, conclusions and recommendations.

5.4 Dissemination and use of evaluation results

The evaluation results should be disseminated, through the summary reports, to all implementers and users of the system, to stakeholders, and all who need to know. The recommendations should be used as a basis on which to plan improvements of the surveillance system. Routine monitoring and follow-up evaluations should continue as scheduled.

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Annex 1

Key definitions in M & E

The following terminology and concepts are adapted and defined in the context of M & E of surveillance and response systems for communicable disease control. (Those marked with a * are taken from John M. Last, ed. A dictionary of epidemiology, 4th ed. Oxford, Oxford University Press, 2001).

Acceptability: Is a reflection of the willingness of surveillance staff to implement the system, and the end users of the data to accept and use the data generated by the system.

Act: An Act (also known as the principal legislation) is the means by which laws are made and always requires parliamentary committee for review. It starts as a bill, and goes through a formal process known as proclamation before it eventually becomes a law. A Public Health Act establishes the public health management arrangements for communicable diseases, some environmental health risks, and other miscellaneous issues.

Activities: Actions performed to produce specific outputs using a given set of resources.

Alert threshold: Is the critical number of cases (or indicator, proportion, rate etc) that is used to sound an early warning, launch an investigation at the start of an epidemic and prepare to respond to the epidemic.

Assessment: Is a systematic or non-systematic way of gathering relevant information, analysing and making judgment on the basis of the available information.

Baseline assessment: Is an assessment performed during the design phase of a Surveillance plan of action. It provides information on the existing situation, forms the basis for the development of the plan of action, and provides baseline data against which prospective changes in the surveillance system are progressively assessed or measured.

Baseline data: Data or measurements collected at the outset of implementation of a surveillance system or of strengthening activities, or a set of indicators that have been identified to monitor and evaluate the performance of a surveillance and response system.

Case definition: Is a set of diagnostic criteria that must be fulfilled in order to identify a case of a particular disease. Case definitions can be based on clinical, laboratory, epidemiological, or combined clinical and laboratory criteria. When a set of criteria is standardized for purposes of identifying a particular disease, then it is referred to as "standard case definition". A surveillance case definition is one that is standardized and used to obtain an accurate detection of all cases of the targeted disease or condition in a given population, while excluding the detection of other similar conditions.

Completeness of reporting: Proportion of surveillance reports (or forms) received irrespective of when the reports were submitted. Proportion of reports received based on expected reporting units (if the system includes zero reporting).

Cost effectiveness analysis: This form of analysis seeks to determine the costs and effectiveness of surveillance and response strategies and activities. It can be used to compare similar or alternative strategies and activities to determine the relative degree to which they will obtain the desired objectives or outcomes. The preferred strategy or action is one that has the least cost to

produce a given level of effectiveness, or provides the greatest effectiveness for a given level of cost.

Decree: An authoritative order having the force of a law; a legally-binding command or decision entered on the court record.

Decree for National Public Health Laboratories: Are the laws, regulations and orders that govern the functions and establishment of public health laboratories in a country.

Early warning system: Is a communicable disease surveillance and response system that is designed to detect as early as possible any departure from the usual or normally-observed frequency or phenomenon.

Effectiveness*:* This is a measure of the extent to which a specific intervention, procedure, regimen, or service, when deployed in the field in routine circumstances, does what it is intended to do for a specific population;[1] A measure of the extent to which a health care intervention/activity fulfills its objectives[2].

Epidemic*: The occurrence in a community or region of cases of an illness, specific health-related behaviour, or other health-related events clearly in excess of normal expectancy. The community or region and the period in which the cases occur are specified precisely. The number of cases indicating the presence of an epidemic varies according to the agent, size, and type of population exposed, previous experience or lack of exposure to the disease, and time and place of occurrence.

Epidemic threshold: Is the critical number or density of susceptible hosts required for an epidemic to occur. The epidemic threshold is used to confirm the emergence of an epidemic so as to step-up appropriate control measures.

Evaluation*: A process that attempts to determine as systematically and objectively as possible, the relevance, effectiveness, and impact of activities in light of the objectives. Several evaluations can be distinguished, e.g. evaluation of structure, process, and outcome. Last, 2001

Flexibility: Ability of the surveillance system to adapt to changing needs, incorporate new diseases, leave out less important diseases, change reporting frequency, change or modify data source.

Indicators: Are variables that measure change over time

Legislation: Is a legally-enforceable guideline and comprises the principal legislation (acts), and the subordinate or delegated legislation (regulations).

International Health Regulations: Are an agreed code of conduct adopted by the World Health Assembly to protect against the spread of serious risks to public health and, the unnecessary or excessive use of restrictions in traffic or trade.

Milestones: Key events or markers that show progress in implementation of activities and the related achievements.

Monitoring of surveillance systems: Is the ongoing tracking and analysis of routine measurements aimed at detecting changes in the surveillance system.

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[1] Cochrane A L. *Effectiveness and efficiency; Random reflections on Health Services.* London: Nuffield Provicial Hospitals Trust, 1972.

[2] *Statistical indicators for Planning and Evaluation of Public Health Programmemes;* 14th Report of the WHO Expert Committee on Health Statistics. WHO Technical Report Series No. 472. Geneva, 1971.

Notifiable disease*: A disease that, by statutory requirements, must be reported to the public health authority in the pertinent jurisdiction when a diagnosis is made. A disease deemed of sufficient importance to public health to require that its occurrence be reported to health authorities.

Outcomes*:* All possible results that may stem from implementing surveillance and response activities.

Output: The immediate result of implementing surveillance and response activities.

Positive predictive value of case definition (PPVcd): Ability of the case definition to identify real cases or the proportion of true cases of the disease that meet the case definition.

Positive predictive value of detecting outbreaks/ cases (PPVdo): Ability of the surveillance system to detect real alerts, i.e. confirmed alerts (after verification)/all alerts detected.

Prioritization: Is the process of identifying and selecting issues or activities using a set of predefined criteria designed for the purpose.

Priority diseases*:* Are diseases/conditions that have been identified to be of important/major public health concern.

Quality assurance*: System of procedures, checks, audits and corrective actions to ensure that all testing, sampling, analysis, monitoring and other technical and reporting activities are of the highest achievable quality.

Quality control*: The supervision and control of all operations involved in a process usually involving sampling and inspection, in order to detect and correct systematic or excessively random variations in quality.

Regulations: Often referred to as delegated legislation or subordinate legislation, are a means of making laws and usually reflect policy objectives. However, they are not made by parliament but rather by someone to whom parliament has delegated the authority to make them. All regulations should be consistent with the authority under which they are made. They can go beyond what an Act provides. Regulations may be viewed as the operational part of the law, commonly dealing with matters such as the meaning of certain terms used in the act; procedures and processes that must be followed or standards that must be met, in order to comply with an act.

Reliability*: The degree to which the results obtained by a measurement/procedure can be replicated.

Representativeness: Ability of the system to accurately describe the occurrence of a health-related event by place and person over time in a given population.

Sensitivity in surveillance: The ability of a surveillance or reporting system to detect true health events, i.e. the ratio of the total number of health events detected by the system to the total number of true health events as determined by an independent and more complete means of ascertainment (WHO Protocol for the assessment of national communicable disease surveillance and response systems: Guidelines for the assessment teams).

Sensitivity of case definition: Ability of the case definition to detect all cases of the disease targeted for surveillance.

Sensitivity of detection of cases: Ability of the surveillance system to detect cases, i.e. proportion of cases notified divided by the total number of cases meeting the case definition.

Sensitivity of the detection of outbreaks: Ability of the surveillance system to detect outbreaks.

Situation analysis*: Study of a situation which may require improvement. This begins with a definition of the problem and an assessment or measurement of its extent, severity, causes, and impacts upon the community, and is followed by appraisal of interaction between the system and its environment and evaluations of performance.

Specificity in surveillance: A measure of how infrequently a system detects false positive health events, i.e. the number of individuals identified by the system as not being diseased divided by the total number of all persons who do not have the disease. (Protocol for the assessment of national communicable disease surveillance and response systems: Guidelines for the assessment teams)

Target*: An inspired outcome that is explicitly stated e.g. to achieve 90% of timeliness of reporting, 100% completeness of reporting, etc.

Timeliness *of reporting*: Proportion of all expected reports in a reporting system received by a given due date. (Protocol for the assessment of national communicable disease surveillance and response systems: Guidelines for the assessment teams)

Usefulness: Ability of the surveillance system to meet the objective(s) for which it was designed.

Validity: An expression of the degree to which the surveillance data measure the true incidence of cases in the population.

Zero reporting*: Reporting of the absence of cases of a disease under surveillance; this ensures that participants have not merely forgotten to report.

Annex 2

Summary of existing communicable disease surveillance guidelines

Various guidelines that are useful in implementing and strengthening communicable disease surveillance and response systems have been developed or are under development. Below is a brief description of some existing WHO guidelines, including those that are under development.

Protocol for the assessment of national communicable disease surveillance and response systems

This protocol aids Member States in assessing the status of national surveillance and response systems. It is recommended that the assessment be done at the beginning of implementation of surveillance strengthening activities. The assessment provides information on the strength, weaknesses and opportunities for strengthening the surveillance system, and generates baseline data against which improvements in the system can be measured and evaluated. The results provide the basis for developing strategic plans of action for strengthening communicable disease surveillance and response systems.

Guideline for prioritization of communicable diseases for surveillance

This guideline complements the above protocol and is intended for public health professionals at national level, WHO staff, and partners to assist them in the process of prioritization of communicable diseases/health events for public health surveillance.

Planning guide for communicable disease surveillance and response systems

This guide is intended to support the development of national plans of action for implementing surveillance and response activities. Two types of plan are crucial, the strategic plan of action (covering 3–5 years) and the operational plan extracted from the strategic plan of action on an annual basis. The planning guide aims at assisting countries in defining and developing a well-structured and appropriate plan of action that meets the needs for building an effective system. It can be used to guide planning activities at all levels of surveillance.

WHO guidelines on implementation of early warning and response functions within public health surveillance systems

This guideline is intended to provide Member States with the detailed technical information and understanding to support the establishment of early warning functions within the broader surveillance and response system to meet the minimal core capacity requirements of the International Health Regulations (2005).

Technical guidelines for integrated disease surveillance and response

This guideline is intended to provide an understanding and to guide implementation of the integrated disease surveillance and response strategy. It is considered that this strategy provides a rational use of resources for disease control and prevention. The general objective of the

strategy is to provide a rational basis for decision-making and implementation of public health interventions that are efficacious in responding to national and regional priority communicable diseases. Regional versions of this guideline exist.

Monitoring and evaluation guide for communicable disease surveillance and response systems

Surveillance systems and the surveillance plans of action need continuous adaptation and update. This guide assists countries to monitor the development and evolution of national surveillance and response systems.

Indicator user guide for monitoring and evaluation of communicable disease surveillance and response systems

This guide should be used in consultation with the monitoring and evaluation guide. It provides instructions on the calculation of measurements of the different indicators, their interpretation, and use the measurements to improve the system. It was developed based on the list of indicators contained in Annex 5.3 of the Monitoring and evaluation guide.

Protocol for global indicators on surveillance systems

In order to compare different surveillance systems and to see their evolution after improvements, a set of global indicators has been defined. The indicators for the global data base (GDB) have been derived from the assessment of surveillance and response systems, and follow up M & E activities.

Annex 3a

Template to guide identification and development of M & E indicators for communicable disease surveillance systems

The table below is a summary of the tables in annex 3b and were developed based on Figure 2. For each component identify the elements for improvement that require monitoring and/or evaluation. Additionally identify appropriate indicators that can be used for M & E. Some indicators are proposed in Annex 3b that can be modified, adapted or changed depending on national priorities and needs. For each indicator identified, decide on how the measurements will be generated and used.

Component	**Element**	**Indicator numbers**
Public health priorities targeted for surveillance	Prioritizing public health events for surveillance and response	1–3
Surveillance structure	Surveillance legislation (laws and regulations)	4–6
	Compliance with IHR	7–9
	Surveillance strategy and coordination	10–19
	Networking and partnership	20–26
Core functions	Case detection	27–30
	Case registration	31–34
	Case confirmation	35–45
	Reporting	46–48
	Data analysis and interpretation	49–52
	Epidemic preparedness	53–57
	Response and control	58–63
	Feedback	64–66
Support functions	Standards, guidelines	67–72
	Training	73–79
	Supervision, communication	80–81
	Resources	82–83
Quality/outputs of surveillance systems	Timeliness	84–87
	Completeness	88–89
	Usefulness, simplicity, flexibility, sensitivity, acceptability	90–94
	Reliability	95

Annex 3b

Abbreviations used in the tables in Annex 3c:

C	Core indicator
DMC	District medical committee
E	Evaluation (indicator)
EPR	Epidemic preparedness and response
HCW	Health-care worker
HF	Health facility
IDSR	Integrated disease surveillance and response
IEC	Information, education and communication
IHR	International Health Regulations
KI	Key informant
M	Monitoring (indicator)
MOH	Ministry of health
NPHL	National public health laboratory
O	Optional indicator
POA	Plan of action
RRT	Rapid response team
SOP	Standard operating procedure
Y/N/U	Yes/no/unknown

Annex 3c

Proposed list of Indicators for M & E

Component: Public health priorities targeted for surveillance
Element: Prioritizing public health events for surveillance and response

No	Indicator	Indicator definition	Type & purpose[1] of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator[2]
1	Objectives for disease surveillance	Existence of objectives for surveillance of diseases in the national communicable disease surveillance system	Input/ process E	Y/N/U	National	Every 5–10 years or as necessary	Surveillance guidelines, national level staff	Document review, KI interview	O
2	Disease prioritization	Evidence of prioritization of diseases for surveillance	Process/ output E	Y/N/U	National	,,	Prioritization report, prioritized disease list	Document review, KI interview	C
3	Updated list of diseases under surveillance	Number of years since last update of the list of diseases under surveillance	Process E	Number (in years)	National	,,	,,	,,	C

Component: Structure
Element: Surveillance legislation (laws & regulations)

No	Indicator	Indicator definition	Type & purpose[1] of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
4	Legislative support for implementation of surveillance and response activities	Requirement for update or amendment of legislation (laws and regulations) for communicable disease surveillance and response activities	Input E	Y/N/U	National / state	Every 5–10 years or as necessary	Existing public health legislation (laws & regulations), KIs	Document reviews, KI interview	C
5	Compliance with the surveillance legislation	Rating of the level of compliance with the surveillance legislation (laws & regulations)	Process M & E	1, 2, 3, 4, 51	National/ intermediate/ peripheral	Every 2–5 years	KIs	KI interview	O
6	Decree for NPHL	Existence of a decree for NPHL	Input E	Y/N/U	National	Every 2–5 years	Decree for NPHL	Document review, KI interview	C

1= 20%; 2 = 40%; 3 = 60% 4 = 80% 5 = 100%

[1] The purpose of the indicator is either for monitoring (M), for evaluation (E) or for both M & E.
[2] Categorization of indicators: C = Core indicator O = Optional indicator
Y, yes; N, no; U, unknown; KI, key informant.

Component: Structure
Element: Compliance with International Health Regulations (IHR)

No	Indicator	Indicator definition	Type & purpose of Indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
7	Presence of national IHR Focal Point	Presence of a National IHR focal point (designated by each State Party) which is accessible at all times for communication with WHO IHR Contact points under the IHR 2005	Input / Process E	Y/N/U	National	2–5 years	KI	KI interview	C
8	Functioning IHR communi-cation facilities	Evidence of functional e-mail/telephone at the IHR focal point for international notification and reporting	Input E	Y/N/U	National	2–5 years	KI	KI interview, observation	C
9	Timely notification to WHO of outbreaks of international importance	Proportion of outbreaks of International concern that were notified to WHO within 24 hours of detection	Output M & E	Percent	National	Annually	Outbreak log, outbreak reports	Review of documents	C

Component: Structure
Element: Surveillance strategy and coordination

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
10	Assessment of communi-cable disease surveillance systems	Assessment of the national surveillance systems for communicable diseases performed	Process E	Y/N/U	National	5–10 years	Assessment reports, head of surveillance programme	Review of assessment reports, KI interview	O
11	POA for communi-cable disease surveillance systems	Presence of a strategic and operational plans for implementing and strengthening communicable disease surveillance and response systems	Input E	Y/N/U	National	3–5 years for strategic plans; annually for operational plans	Strategic POA, operational POA, KI	Observa-tion and review of POAs, KI interview	O
12	Implementat ion of POA	Proportion of activities implemented according to plan	Process M & E	Percent	National, provincial district	Annually	POA, activity reports, KI	Review of documents KI interview	C

Component: Structure
Element: Surveillance strategy and coordination (continued)

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
13	Monitoring system for communicable disease surveillance and response systems	Proportion of surveillance units that perform routine monitoring of the communicable disease surveillance and response systems	Process E	Percent	National provincial district	Annually	Monitoring reports	KI interview, document review	C
14	Performance of routine evaluation	Whether evaluations are conducted according to plan	Process M & E	Y/N/U	National / state	2–5 years	Evaluation reports	KI interview, document review	C
15	Presence of a surveillance coordinating body	Presence of a surveillance unit at national level for coordination of communicable disease surveillance activities	Input E	Y/N/U	National	Every 5 years	Organigramme in MOH, KI	KI interview	O
16	Scheduled surveillance coordination meetings	Proportion of scheduled surveillance (IDSR) coordination meetings held	Process M & E	Percent	National	Annually	Minutes of meetings	Review of minutes	C
17	Laboratory representa-tion in the surveillance coordinating body	Regular coordination body includes laboratory personnel	Process E	Y/N/U	National, sub-national	Annually	Meeting reports, KI	KI interview, review of meeting reports	C
18	Existence of documented roles & responsibili-ties	Roles and responsibilities are well-documented at each level of surveillance system	Input E	Y/N/U	National, intermediate, peripheral, community	Every 5 years	Documented functions and responsibilities, terms of reference, surveillance guidelines,	Document review, KI interview	O
19	Evidence of sharing of resources	Evidence of sharing of resources/activitie s between different surveillance programmes	Process E	Y/N/U	National, intermediate, peripheral	Annually	KI	KI interview	O

Component: Structure
Element: Networking and partnership

No	Indicator	Indicator definition	Type & purpose of Indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
20	Intersectoral collaboration, networking and partnership	Existence of intersectoral collaboration, networking and partnerships with other sectors (water and sanitation, agriculture, animal health, etc)	Process E	Y/N/U	National, intermediate, peripheral	Every 2–5 years	KI, reports, minutes of meetings	KI interview, observation	O
21	Functional laboratory networks	Existence of functional laboratory networks established	Process E	Y/N/U	National	Every 5–10 years or as necessary	National level staff, surveillance and laboratory guidelines	Interview, review of documents	C
22	Cross-border collaboration	Evidence of a framework for intercountry/cross-border collaboration	Input E	Y/N/U	National	Every 5–10 years or as necessary	Report of cross-border meetings	Review of relevant reports, interview of personnel	O
23	Planned cross border meetings	Proportion of planned cross-border meetings held	Process M & E	Percent	National, district	Annually	Minutes of meetings, workplans, KI	KI interview, review of documents	C
24	Regular intercountry meetings	Evidence of regular intercountry meetings	Process M & E	Y/N/U	National	Every 2–5 yrs	MOH, ICP	KI interview, review of reports	O
25	Routine information-sharing between neighboring countries	Evidence of routine sharing of data and information between neighboring countries, in regional and international networks	Process M & E	Y/N/U	National	Annually	Newsletters, bulletins, outbreak alerts, KI	Document review, KI interview	O
26	Capacity for sharing outbreak-related information between neighboring countries	Existence of intercountry and cross-border communications during outbreaks	Process E	Y/N/U	National	Annually	KI, outbreak alerts	KI interview	C

Component: Core functions
Element: Case detection

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
27	Health facilities with standard case definitions	Proportion of health facilities with standard case definitions for diseases to be reported regularly in the surveillance system (epidemic-prone, vaccine-preventable & other diseases of public health importance)	Input M & E	Percent-age	National, sub-national	Annually	Available standard case definitions	Observation	C
28	Mechanism for outbreak detection within hospitals	Existence of surveillance systems for the detection of healthcare-associated infections and outbreaks in hospital settings	Process M & E	Y/N/U	National	Annually	KI, hospital records	KI interview, records review	O
29	Existence of event based surveillance	Existence of a mechanism to capture unusual or public health events from non-routine sources in the health system (e.g. from the community, media or other informal sources)	Process E	Y/N/U	National, intermediate, peripheral, community	Annually	KI	KI interview	C
30	Capacity to detect and notify unusual/ abnormal health events	Inclusion of unusual/abnormal health events in the surveillance system for immediate reporting	Process E	Y/N/U	National, intermediate, peripheral	Annually	KI, list of diseases/ syndromes for reporting	Document review, KI interview	O

Component: Core functions
Element: Case registration

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
31	Availability of registers	Proportion of health facilities with standardized registers	Input E	Percent-age	District, national	Annually	Health facility	Observa-tion	C
32	Correct filling of registers	Proportion of HF with correctly filled registers	Process M & E	Percent-age	District, national	Annually	Registers at health units	Review of registers	C
33	Routine validation of surveil-lance data	Existence of routine data validation	Process M & E	Y/N/U	National	Annually	Surveillance reports, registers	Review of documents	O
34	Existence of rumour log	Existence of rumour log or database for registration of suspected public health events from informal sources	Input/process E	Y/N/U	National, intermediate, peripheral	Annually	Rumour log/ database for rumours	Observa-tion	O

Component: Core functions
Element: Case confirmation

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category
35	Confirma-tion of priority diseases	Capacity to confirm selected priority diseases either within the laboratory or at a reference laboratory	Process M & E	Y/N/U	National, intermediate, peripheral	Annually	KI, laboratory test results	KI interview, observation	C
36	Documented list of reference laboratories	Presence of a documented list of reference laboratories for confirmation of epidemic-prone diseases	Input/process E	Y/N/U	National, intermediate, peripheral	Annually	KI	KI interview, observation	C
37	Capacity to refer samples in a timely manner	Capacity for timely referral of samples to reference labs for rapid confirmation of causative agents	Input M & E	Y/N/U	National, intermédiate, peripheral	Annually	KI, record review, public health laboratories	KI interview	C
38	Routine monitoring of antimi-crobial resistance	Routine testing and reporting of antimicrobial resistance	Process M & E	Y/N/U	National	Annually	KI, record of tests conducted and test results	KI interview, document review	C

Component: Core functions
Element: Case confirmation (continued)

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category
39	Routine monitoring of food safety	Routinely monitoring (testing) of food safety	Process M & E	Y/N/U	National, sub-national	Annually	KI, record of food safety results	KI interview, review of records	C
40	Routine monitoring of water quality	Routinely testing of water quality	Process M & E	Y/N/U	National, sub-national	Annually	KI, record of water quality results	KI interview, review of records	C
41	Knowledge of where to refer samples appropriately	Presence of a documented list of reference laboratories for confirmation of epidemic-prone diseases	Input E	Y/N/U	Surveillance level under investigation	Annually	KI	KI interview, observation	C
42	Laboratory reagents	Presence and maintenance of appropriate laboratory diagnostic reagents	Input M & E	Y/N/U	National, sub-national	Annually	KI, reagents	KI interview, observation	C
43	Supplies for specimen collection and transporta-tion	Presence and maintenance of supplies for specimen collection and transportation	Input M & E	Y/N/U	National, sub-national	Annually	KI, supplies	KI interview, observation	C
44	Laboratory confirmation of outbreaks	Proportion of outbreaks that are laboratory-confirmed	Output M & E	Percent-age	National, provincial, district	Annually	Outbreak log, outbreak reports	KI interview, document review	C
45	Presence of quality assurance system	Performance of routine external quality assurance	Process E	Y/N/U	National, provincial, district, health facility	Annually	Laboratory personnel, certification documents	Interview, review of certification documents	C

Component: Core functions
Element: Reporting

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
46	Case-based reporting rate	Proportion of cases of diseases targeted for elimination/eradication[1] line listed or reported using case-based reporting forms in the past 12 months	Process M & E	Percent-age	Health facility, district, national	Quarterly, annually	Reporting forms, registers	Document review	C
47	Timely notification of epidemics	Proportion of epidemics (above epidemic threshold) detected in previous 12 months that were notified to the next higher level within 2 days of detection	Output M & E	Percent-age	Health facility, district, national	Annually	Outbreak log	Review of log	C
48	Reporting of healthcare-associated infections/ outbreaks in hospitals	Proportion of hospitals that routinely report outbreaks occurring within the health-care setting	Process M & E	Percent-age	National, district	Annually	Outbreak log, hospital registers, KI	Document review, KI interview	C

[1] MOH should provide a list of diseases for case-based reporting.

Component: Core functions
Element: Data analysis and interpretation

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
49	Routine analysis of data by surveillance units	Proportion of health facilities with evidence of data analysis by time, place and person for selected indicator diseases (epidemic-prone, vaccine-preventable, others of public health importance)	Output M & E	Percent-age	National, sub-national	Annually	Summary reports, charts on the walls, computerized analysis output	Observa-tion	C
50	Pre-defined epidemic threshold values	Presence of pre-defined action thresholds for selected indicator diseases (epidemic-prone, vaccine-preventable, others of public health importance)	Input E	Y/N/U	National, sub-national	Annually	Guidelines, KI	KI interview, observation	O
51	Surveillance units having epidemic threshold values	Proportion of surveillance units with defined epidemic threshold values for priority diseases	Input M & E	Percent-age	National, sub-national	Annually	National, sub-national	KI interview, observation	C
52	Capacity for routine laboratory data analysis and interpreta-tion	Evidence of routine laboratory data analysis and interpretation	Output M & E	Y/N/U	National, sub-national	Annually	National public health laboratory, laboratories at sub-national level	KI interview, observation	C

Component: Core functions
Element: Epidemic preparedness

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
53	Epidemic prepared-ness plan	Presence of epidemic preparedness plans	Input E	Y/N/U	National, sub-national	Annually	KI, annual workplans	Observa-tion/review	C
54	Emergency funds	Existence of funds for emergency response	Input M & E	Y/N/U	National, sub-national	Annually	KI	KI interview, budget review (disaster/ epidemic prepared-ness plans, disease-specific plans)	C
55	Adequacy/ availability of supplies and drugs for outbreak management and control	Proportion of public health units that experienced shortage of drugs and supplies for the most recent outbreak (define the time frame e.g. 3, 6, 12 months)	Output M & E	Percent-age	National, sub-national	Quarterly, annually	Stock out cards, outbreak reports, KI	KI interview, document review	C
56	Availability of contingency stocks	Proportion of surveillance units that have contingency stocks for 3–6 months	Input/process M & E	Percent-age	National, sub-national	Quarterly, annually	KI, stock cards, logistic management record	KI interview, document review	C
57	Availability of IEC materials for surveillance and response	Proportion of surveillance units with IEC materials/activities	Input M & E	Percent-age	National, sub-national	Annually	Existing IEC strategy & materials	Document review, KI interview	O

Component: Core functions
Element: Response and control

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
58	Epidemic prepared-ness committee	Presence of a functional epidemic preparedness committee	Input E	Y/N/U	National, sub-national	Annually	KI, minutes of EPR/DMC meetings	Review of minutes, KI interview	C
59	Rapid response teams (RRT)	Presence of RRT at national level	Input E	Y/N/U	National	Annually	KI	KI interview, reports of outbreak investiga-tions	C
60	Districts with RRTs	Proportion of districts with RRTs	Input M & E	Percent-age	National, provincial	Annually	KI	KI interview	C
61	Capacity for outbreak response	Proportion of outbreaks responded to in the previous 12 months[1]	Output M & E	Percent-age	National, sub-national	Annually	KI, outbreak log and reports	Review of documents	C
62	Availability of rapid response kits	Availability of rapid response/ emergency kits at various levels	Input M & E	Y/N/U	National, sub-national	Annually	KI	KI interview, observation	C
63	Availability of isolation facilities	Proportion of hospitals with isolation facilities	Input M & E	Percent-age	National	Annually	KI	KI interview, observation	C

Component: Core functions
Element: Feedback

No	Indicator	Indicator definition	Type & purpose of Indicator	Value	Surveillance level	Frequency	Data source	Method	Category of indicator
64	Existence of regular feedback	Presence of a feedback mechanism	Process E	Y/N/U	National, sub-national	Annually	KI, feedback reports	KI interview, observation	C
65	Feedback dissemi-nated	Proportion of feedback reports/bulletins disseminated	Output M & E	Percent-age	National, sub-national	Annually	KI, feedback reports/ bulletins	KI interview, observation	C
66	Feedback received	Proportion of feedback bulletins/reports received from the next higher level	Output M & E	Percent-age	National, sub-national	Annually	KI, feedback reports/ bulletins	KI interview, observation	C

[1] Outbreak investigation includes preliminary timely measures leading to confirmation of the outbreak and institution of appropriate measures.

Component: Support functions
Element: Standards, guidelines

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
67	Surveil-lance standards and guidelines	Availability of surveillance standards and guidelines for priority diseases	Input E	Y/N/U	National	Annually	KI, existing guidelines/ standards	KI interview, document review	C
68	Surveil-lance units with standards and guidelines	Proportion of surveillance units with standards and guidelines for surveillance	Input M & E	Percent-age	National, sub-national	Annually	KI, existing surveillance guidelines	KI interview, observation	C
69	Standard case manage-ment protocols	Proportion of surveillance units with standard case management protocols or guidelines for case management	Input E	Percent-age	National, sub-national	Annually	Health units	KI interview, observation	C
70	Infection control guidelines	Proportion of health facilities using guidelines for infection control	Process M & E	Percent-age	Sub-national	Annually	Health units	Observation	C
71	Guidelines for specimen collection, packaging and referral	Proportion of laboratory units with SOPs for collection, packaging and referral of specimens of targeted epidemic-prone pathogens	Input M & E	Percent-age	National, Sub-national	Annually	National public health laboratory, other laboratories	Observation	C
72	Availability of reporting forms at HF/District levels	Proportion of HF/Districts that were not short of reporting forms[1] in the previous 6 months	Input	Percent-age	District, provincial, national	6-monthly	KI	KI interview, observation	C

[1] Please check for weekly and monthly reporting forms for communicable diseases.

Component: Support functions
Element: Training

No	Indicator	Indicator definition	Type & purpose of Indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
73	Availability of training manuals/ modules for surveillance	Proportion of surveillance units with surveillance training manuals/modules	Input E	Percent-age	National, sub-national	Annually	Surveillance units	KI interview, observation	O
74	Availability of surveil-lance training plan	Proportion of surveillance units with a training plan for surveillance	Input E	Percent-age	National, sub-national	Annually	Training plans	Observatio n	C
75	Staff trained on surveil-lance/IDSR	Proportion of surveillance staff/HCWs trained in surveillance or IDSR	Input M & E	Percent-age	National, sub-national	Annually	KI, training reports	KI interview, document review	O
76	Laboratory personnel trained on innovative techniques	Proportion of laboratory personnel trained on innovative techniques	Input M & E	Percent-age	National, sub-national	Annually	KI, training reports	KI interview, document review	C
77	HCWs trained in infection control	Proportion of HCWs trained in infection control	Input M & E	Percent-age	National, sub-national	Annually	KI, training reports	KI interview, document review	C
78	Districts having trained epidemiol-ogist	Proportion of districts with at least one trained epidemiologist	Input M & E	Percent-age	National	Annually	KI	KI	C
79	Staff receiving refresher courses on surveillance	Proportion of health staff that have received at least one refresher course on surveillance in the previous 2 years	Process M & E	Percent-age	National, sub-national	1–2 years	KI, training reports	KI interview, document review	C

Component: Support function
Element: Supervision, communication

No	Indicator	Indicator definition	Type & purpose of Indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
80	Supervisions conducted	Proportion of supervisions conducted according to plan	Process	Percentage	National, sub-national	Annually	KI, surveillance levels, supervisory reports	KI interview, document review	C
81	Availability of communication facilities	Proportion of surveillance units with functional communication facilities for immediate, weekly, and monthly reporting[1]	Input	Percentage	National, sub-national	Annually	KI at different surveillance units	KI interview, observation	C

Component: Support functions
Element: Resources

No	Indicator	Indicator definition	Type & purpose of Indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
82	Availability of budget line for surveillance activities	Evidence of a budget line for surveillance activities (reporting forms, feedback bulletins, communication, supervision, training, etc)	Input	Y/N/U	National[2]	Annually	Workplan and budget	Document reviews, KI interview	C
83	Availability of functioning computers	Proportion of surveillance units with functional computers for surveillance purposes	Input	Percentage	National, sub-national	Annually	KI	KI interview, observation	C

[1] The communication facilities should be appropriate to the surveillance level and may include one or more of the following; email, fax, telephone, radio call.
[2] To be asked at national and any other level as deemed appropriate.

Component: Quality/outputs of surveillance systems
Element: Timeliness

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
84	Timeliness of submi-ssion of surveillance reports[1]	Proportion of surveillance units that submitted surveillance reports (immediate, weekly, monthly) to the next higher level on time	Output M & E	Percent-age	National, sub-national	Annually, quarterly	Reporting log, newsletters	Review of documents	C
85	Timeliness of receipt of surveillance reports	Proportion of expected surveillance reports (weekly or monthly) received on time	Output M & E	Percent-age	National, sub-national	Annually, quarterly	Reporting log, newsletters	Review of documents	C
86	Timeliness of notify-cation of suspected outbreaks[13]	Proportion of outbreaks (with observed no. of cases > threshold values) notified to the next higher level within 48 h of detection	Output M & E	Percent-age	National, sub-national	6-monthly	Outbreak logs and reports	Review of documents	C
87	Timeliness of response to suspected outbreaks[13]	Proportion of suspected outbreaks that were verified within 48 h of detection	Output M & E	Percent-age	National, sub-national	6-monthly	Outbreak logs and reports	Review of documents	C

[1] To effectively monitor timeliness, the different surveillance units may be required to keep a chart that shows the submission and receipt dates of the different surveillance reports. Timeliness should then be judged against the standards set by the ministries of health. Evaluation will provide explanations for achievements and discrepancies observed.

Component: Quality/outputs of surveillance systems
Element: Completeness

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
88	Completeness of reporting	Proportion of total expected surveillance reports received, regardless of the timeliness of submission	Output M & E	Percentage	National, sub-national	6-monthly	Reports	Review of reports	C
89	Completeness of data reported	Proportion of surveillance reports/registers with no missing required information[1]	Output E	Percentage	National, sub-national	Annually	Reports	Review of reports	C

Component: Quality/outputs of surveillance systems
Element: Usefulness, simplicity, flexibility, sensitivity, acceptability

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
90	Usefulness of surveillance data	Rating of the usefulness of the surveillance system (for case detection, planning, priority setting and interventions)	Outcome	Scale 1–5[2]	National, sub-national	Annually	KI,	KI interview	C
91	Simplicity of the surveillance system	Rating of the simplicity of the surveillance system (in terms of data collection, compilation, reporting, analysis and utilization) by implementers and users of the systems	Output	Scale 1–5	National, sub-national	2-yearly	KI	KI interview	C
92	Flexibility/ adaptability of the surveillance system	Rating of the ability of the surveillance system to adapt to changing needs, as perceived by the national health managers and evaluators	Output	Scale 1–5	National, sub-national	5–10-yearly	KI	KI interview	C

[1] This indicator is applicable in systems emphasizing zero reporting and does not need to be monitored on a routine basis.
[2] 1 = 20 %; 2 = 40%; 3 = 60%; 4 = 80%; 5 = 100%

Component: Quality/outputs of surveillance systems
Element: Usefulness, simplicity, flexibility, sensitivity, acceptability (continued)

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
93	Sensitivity of outbreak detection	Rating of the sensitivity of the surveillance system to detect outbreaks	Output	Scale 1–5	National, sub-national	Annually	KI, databases	KI interview, review of database	C
94	Acceptability of the surveillance system	Rating of the acceptability of the surveillance system by users and implementers	Output	Scale 1–5	National, sub-national	2–5-yearly	KI	KI interview	C

Component: Quality/outputs of surveillance systems
Element: Reliability

No	Indicator	Indicator definition	Type & purpose of indicator	Value	Surveillance level	Frequency of data collection	Data source	Method	Category of indicator
95	Reliability of surveillance data reports	Rating of the reliability of the surveillance data/ reports by implementers and users of the system	Output	Scale 1–5	National, sub-national	1–2-yearly	KI	KI interview	C

Annex 4

Methods of data collection for M & E

No one single method is able to generate all the data on the indicators for monitoring and evaluating communicable disease surveillance and response systems. A combination of different data collection methods is often required before a conclusion can be made. The method of data collection will usually depend on the indicator being measured, the frequency of measurement, and the level of precision of the measurements. Care should be taken to strike a balance between the most suitable methods of data collection, ease and feasibility of collection, and the costs involved in the collection.

Evaluation can be done through special studies and surveys while the data for monitoring purposes should, as far as possible, be collected or reported through the surveillance system in order to reduce costs.

Selection of the methods for conducting monitoring or evaluation should be guided by the:

- purpose of the monitoring and/or evaluation exercise
- scope of the monitoring and/or evaluation
- objectivity/subjectivity of the measurements to be made
- type, quality and sources of information required
- accessibility of information
- ease of collection of the required information
- simplicity of application of the methods
- skills of those participating in the monitoring and/or evaluation
- travel requirements and other costs involved
- time available for conducting the monitoring and/or evaluation
- frequency with which the information should be collected or generated.

In situations where there has been a prior assessment of the surveillance and response systems, it is preferable that the same methods used for the assessment are re-applied for the evaluation exercise, but with the necessary modifications to take account of the evaluation objectives. Ongoing monitoring and repeated evaluations produce trends over time and can also allow comparison of the results generated.

Whatever specific methods are used, it is important to have components of field or on-site verification of the information gathered and to observe the actual facts on the ground.

4.1 Sources of data for monitoring and/or evaluation

Potential sources of data for routine monitoring and periodic evaluation include:

- health registers (inpatient & outpatient) and/or community registers

- laboratory registers/records
- food and water quality test results
- weekly, monthly, quarterly, half yearly and annual surveillance reports
- self-assessment reports (where they exist)
- outbreak or rumour log
- surveillance bulletins
- case reports
- outbreak investigation and response reports
- minutes of surveillance coordination meetings (e.g. the IDSR monthly coordination meetings)
- surveillance plan of action
- previous monitoring and evaluation data and reports
- surveillance staff and stakeholders.

4.2 Data collection methods

Both quantitative and qualitative methods of data collection may be used to generate monitoring and/or evaluation information. In deciding on the best method for collecting the required data, the practical implications of data collection, data management, processing and utilization to improve the system should all be considered. An information need or indicator may have several different possible sources and methods for collection. Each of the methods has specific advantages and disadvantages in terms of costs, reliability of data, required skills, ability to quantify results, richness and adequacy of the information generated. Overall, selection of the methods should take into consideration the category and level of training of staff who will be involved in collecting, compiling and analysing the information.

4.2.1 Checklist for feasibility of data collection methods

The checklist below can be used in the design stage as an aid to assess the appropriateness of the different methods of information gathering:

- Feasibility: *will it be possible and practical to collect the required data or information using the suggested methods?*
- Validity: *will the methods generate valid information?*
- Reliability: *will the method produce reliable data?*
- Sensitivity: *is the method sensitive enough to detect even the smallest change?*
- Cost–effectiveness: *is it the most cost-effective method or are there other methods that can produce similar results but at a lower cost?*
- Timeliness: *will the method generate the required information in time for appropriate action? This is relevant for the monitoring, which is an ongoing process.*

4.3 Performance questions and indicators

Whichever data collection methods are used, they should be guided by standardized questions or indicators. Examples of these are given below.

- **Activities**: *which of the planned activities have actually been implemented, and of the implemented activities, which ones were implemented as per schedule?*
- **Outputs**: *how many of the planned targets have been achieved? (e.g. proportion of health staff trained in surveillance, proportion of health facilities that received case definitions, etc).*
- **Outcomes**: *What has been achieved as a result of the outputs? (e.g. as a result of training or provision of surveillance reporting forms or communication facilities, timeliness and completeness of reporting improved from 50– 80%, which also improved timeliness of outbreak response, etc).*
- **Impacts**: *what has been achieved as a result of the outcomes or what contribution is being made to the overall goal? Are there negative or positive anticipated impacts? (e.g. reduction in disease-specific case fatality rates; achieving or failing to achieve elimination goals, etc).*
- **Lessons**: *what has been learnt to contribute to the pool of information on surveillance or to help improve implementation of surveillance activities? (e.g. in Uganda, publishing the weekly surveillance data in the Government newspaper that is read by the majority of the population increased timeliness and completeness of weekly reporting from 60% to over 90% within a period of 6 months).*

4.4 Quantitative methods of data collection

Some of the quantitative methods that are useful to derive monitoring and evaluation data include:

- questionnaires and surveys
- case studies e.g. impact evaluation case studies
- direct observations
- routine and periodic analysis of routinely-collected data.

4.4.1 Questionnaires and surveys

Questionnaires and surveys are important and the most commonly-used methods for evaluations. However, because it is not feasible and cost effective to study all the sample units in a surveillance system, the use of sampling methods that result in a representative sample is recommended. This will normally include multistage sampling as there are many different levels of surveillance. Within each level, selection of the study sites and subjects can be made by the simple random technique (SRT). Purposeful selection may be applied in special circumstances or when there are characteristics that may be useful to study in order to re-apply some of the lessons.

The following criteria are useful in the selection of the study sites and study units:

- geographical representation of the study sites
- presence of regional or higher level laboratories
- ease of accessibility to the study areas
- inclusion of good and poor performing areas/facilities
- presence of public health training institutions (depending on what is being evaluated).

A combination of different methods for information gathering can be applied and often include interviews, observations, review of records and analysis of routinely-collected information, review of activity reports or other related surveillance reports, review of previous monitoring and evaluation reports.

Surveys are one of the most expensive methods of evaluation of national surveillance systems and are normally recommended for specialized and highly focused evaluations such as the mid-term and end-of-term evaluation of surveillance systems. Repeated surveys can provide information for monitoring performance and progress of a surveillance system. They should, where possible, be done using a standardized tool and in similar geographical location.

4.4.2 Case studies

Case studies are sometimes used for evaluations as they allow for focused data collection about specific performance questions or indicators from a sample of study units. Case studies usually provide an in-depth understanding of the issues being studied or documented. However, they are normally considered unrepresentative and should be used in combination with other methods.

Case studies are particularly useful for evaluation purposes e.g. impact evaluation. Special case studies are useful in documenting new strategies and achievements, or providing explanations for factors underlying successes and failures in the surveillance system. They can also be used for comparing poorly- and well-performing provinces, districts and health facilities.

4.4.3 Direct observation

Direct observation is useful for both monitoring and evaluation. It is usually used in combination with other methods. It provides actual evidence of the indicator or variable being studied. For example, the presence of case definitions, evidence of their use, or evidence of data analysis (by observing displayed charts, graphs, tables or maps) can be observed directly.

4.4.4 Periodic analysis of routinely-collected data

Minimum health data that include age, sex, geographical location, diagnosis and reporting facility are routinely collected and compiled at the health facility level, mainly for planning purposes and for reporting to the next higher level. Such information can be obtained from sources such as the health registers, case report forms, notification reports, other relevant information from sentinel sites, etc. Often such data are compiled for onward transmission or for purposes of preparing end-of-year reports and no attempts are made to interpret the information analysed. Such sources can provide useful information on progress of activities and on the evolution of the system if analysed routinely.

Such data will usually provide information on outcome indicators such as completeness and timeliness of reporting, and impact indicators that may be reflected in the trends of the different diseases under surveillance. It is important to identify the kind of information or indicators derived from routine data sources that can be useful in monitoring or evaluating the system. For such information to be useful it is often necessary to triangulate it with information from other sources such as activity reports, outbreak investigation and control reports, health intervention reports (e.g. mass vaccination campaigns, health education, etc) or actual evaluation surveys.

This method is particularly useful for monitoring purposes especially if the indicators for routine monitoring are identified and organized into a monitoring tool that can be filled in by staff at regular intervals.

4.4.5 Review and analysis of hospital discharge records

This method has been used to evaluate the sensitivity of surveillance systems. A sample of hospitals should be selected and hospital discharge records reviewed for cases that should have been reported. This requires a mechanism to verify the cases that had been reported through the surveillance system. This verification is usually impossible for highly aggregated systems, but can be done for most the serious diseases or rare conditions such as those targeted for elimination or eradication.

4.4.6 Capture and recapture method

The capture and recapture method is useful for the evaluation of sensitivity of surveillance systems. In this method, additional sources of information about cases (e.g. social security claims, laboratory registers, etc) are identified and the proportions of cases appearing in the other systems, and separately in each system are assessed. This gives a very good estimate of sensitivity and can be repeated over time to track progress.

4.5 Qualitative methods of data collection

Qualitative methods that can be used to aid monitoring and/or evaluation of national surveillance systems include:

- supervision
- surveillance meetings and workshops
- document review
- focus group discussions (FGD)
- key informant interviews (KI)
- analysis of strengths, weaknesses, opportunities and threats (SWOT analysis).

4.5.1 Supervision

Supervision occurs in the context of the hierarchy. It is the process by which the lower level health staff are supported and guided by the higher level(s) to help them perform better, and to ensure that planned activities are broadly on target. Supervision of the surveillance staff at the different levels of surveillance provides opportunities for informal training, support and qualitative monitoring. The lower the surveillance level, the more rigorous is the required

supervision. Each country needs to prepare a supervisory plan that meets the needs of the different levels of surveillance. A standardized tool which details the process and the areas for supervision should be provided to each level.

Supervision of national surveillance activities can be integrated into the overall supervisory activities of health-care delivery systems or it can be more focused and performed separately. It is necessary to have a standardized supervisory checklist that is easy to use and apply at the different levels of surveillance. This checklist should include process (activities to be implemented), output, outcome and some impact indicators. The measurement of the indicators in the checklist provides a good source of monitoring data in particular, and is also useful for evaluation purposes.

During the supervision, attempts should be made to obtain explanations for both failures and successes, and to discuss with the surveillance level staff the best way to overcome the challenges and constraints, so that they feel part of the whole exercise and can then implement the recommendations.

The completed supervisory checklist should normally contain a section summarizing major findings, recommendations for follow-up during the next supervisory visit and should be signed by both the supervisors and the supervised. This summary section should be produced in duplicate, a copy taken by the supervisor and the other copy retained at the level of supervision for reference purposes during follow-up supervisions.

If planned appropriately and if the indicators for monitoring are integrated within the supervisory checklist, supervision can be a very cost-effective means of generating data for routine monitoring. The pre-selected indicators for monitoring the performance of the surveillance system can be fed into an M & E database, analysed, and the results interpreted and used for further improvements in the system.

Supervision, if it is done properly and written records kept, can also be very useful in monitoring implementation of the plan of action and of the overall surveillance system.

4.5.2 Surveillance meetings and workshops

Meetings normally provide useful qualitative information which is often difficult to verify and thus they are usually not considered as practical methods for deriving data on monitoring indicators for surveillance. However, repeated and focused meetings, with clear objectives can sometimes be used to report and discuss data on the selected indicators which pertain to the performance of the surveillance system. In this case, the meeting agenda should include the surveillance indicators of interest e.g. reporting on progress of implementation of the surveillance workplan. The monthly surveillance coordination meeting recommended in the IDSR strategy is one such meeting through which monitoring of surveillance activities can be achieved.

On the other hand, special meetings, for example in form of a workshop, can be organized whereby the different levels of surveillance report on progress in implementing the overall surveillance system. For such meetings to be useful for M & E purposes, standardized tools which reflect the progress of implementation of activities and their outcomes should be provided to the different surveillance levels as a guide for reporting, and the outcome should be documented through reports.

4.5.3 Document review

Review of relevant documents can supplement other data collection methods and the information from all different sources can then be merged and synthesized to make a conclusion. Usually, the indicator or variable including the data source is pre-defined and the relevant documents are reviewed for the measurements of these indicators/variables. The information collected is compiled and analysed either manually or by use of appropriate computer software. Conclusion regarding the performance of the indicator or variable being studied can be derived based on the results of the triangulation of data from all the available sources reviewed.

4.5.4 Focus group discussions

FGDs are particularly useful for collecting qualitative information. A small number of experts or implementers of the system should be identified who are well-versed in the topic area for discussion, and who represent the viewpoints of all concerned. These people are brought together for a meeting (of about 90 min) which should be guided by questions organized around broad sub-themes to help focus the discussion. At least 4–6 FGDs should be organized around the same broad themes but with different participants. The information generated should be transcribed and analysed.

4.5.5 Key informant interviews

Key informants (KIs) represent a group of people, who, by the nature of their job, have expert knowledge on the performance of the surveillance system. Depending on the variables of interest, KIs are people such as the head of the epidemiological surveillance unit, programme managers, district directors of health services, etc. The KIs can be interviewed with the aid of a standardized key informant guide or questionnaire. The information generated is often analysed in order to outline strengths, weaknesses, opportunities and threats and should be used to draw conclusions and provide recommendations to improve the system.

Annex 5

Sample tools for compiling data for M & E

This annex contains examples of some of the reporting tools which may be used to collect data for monitoring and evaluation purposes. They include the model forms for the following:

- Proportion of surveillance reports sent to the next higher level in a timely manner
- Graph of timely reporting of weekly surveillance reports
- Proportion of surveillance reports received in a timely manner at the next higher level
- Proportion of cases of diseases for case-based reporting that were reported to the district using case-based report forms
- Proportion of surveillance units that have current trend analysis for selected indicator diseases
- Proportion of suspected outbreaks notified to the next higher level within two days of surpassing the epidemic threshold
- Proportion of reports of investigated outbreaks that include case-based data
- Proportion of outbreaks of epidemic-prone diseases with laboratory confirmation
- Proportion of laboratory-confirmed outbreaks with recommended response
- Case fatality rate of epidemic-prone diseases

Proportion of surveillance reports sent to the next higher level in a timely manner

Measurement: Timely reporting

Proportion of surveillance reports sent to the next higher level on time							
Surveillance reporting level:		Health facility:		Health sub-district:		District:	
Surveillance officer:						Province:	

Surveillance week	**Date report sent to next level**	**Surveillance week**	**Date report sent to next level**	**Surveillance week**	**Date report sent to next level**	**Surveillance week**	**Date report sent to next level**
1		14		27		40	
2		15		28		41	
3		16		29		42	
4		17		30		43	
5		18		31		44	
6		19		32		45	
7		20		33		46	
8		21		34		47	
9		22		35		48	
10		23		36		49	
11		24		37		50	
12		25		38		51	
13		26		39		52	

Graph of timely reporting of weekly surveillance reports

Measurement: Timeliness of weekly reporting, evidence of monitoring and analysis

Graph of timely reporting of weekly surveillance reports			
Surveillance level:	Health facility:	Health sub-district:	District:
Surveillance officer:			Province:

1st quarter reports:

On time, or no. of days late:

8+													
7													
6													
5													
4													
3													
2													
1													
On time													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**

Surveillance week

2nd quarter reports:

On time, or no. of days late:

8+													
7													
6													
5													
4													
3													
2													
1													
On time													
	14	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**

Surveillance week

3rd quarter reports:

On time, or no. of days late:

8+													
7													
6													
5													
4													
3													
2													
1													
On time													
	27	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**

Surveillance week

4th quarter reports:

On time, or no. of days late:

8+													
7													
6													
5													
4													
3													
2													
1													
On time													
	40	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**

Surveillance week

Proportion of surveillance reports received in a timely manner at the next higher level

Proportion of surveillance reports received timely at the next higher level				
Name and level of surveillance unit receiving report	*Health sub-district*	*District*	*Province*	*National*
Surveillance report	*Weekly reporting*		*Monthly reporting*	
Total no. of surveillance reports expected =				

Surveillance week	**Name of reporting unit date of receipt of report in each week**						**Number received on time**	**Proportion received on time**
	RU[1]#1	**RU #2**	**RU #3**	**RU #4**	**RU #5**	**RU #6**		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
..								
..								
..								
..								
..								
..								
..								
..								
..								
..								
..								
52								

[1] Reporting Unit

Proportion of cases of diseases for case-based reporting that were reported to the district using case-based report forms

Proportion of cases of each disease for case based reporting that were reported to the district using case-based reporting forms					
Name of disease for case-based reporting (diseases targeted for elimination and eradication[1]) **Name of health facility:** **District:** **Province:** **Surveillance officer:**					
Report number	**Targeted disease reported**	**Date report received at District**	**The original report was on correct case-based form?(Y/N)**	**Date of follow-up contact with the source of report[2]**	**Date that correct form was received**
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
..					
..					

[1] The log can be used to record all reports of all targeted diseases

[2] If the case-based form was not used to report the case, additional information from reporting surveillance officer may probably be needed. Plans should then be made for more extensive follow up and response

Proportion of surveillance units that have current trend analysis for selected indicator diseases

Measurement: Data analysis

Surveillance units with current trend analysis for selected indicator diseases				
Surveillance unit:	**Health facility:**	**Health subdistrict:**	**District:**	**Province:**
Surveillance supervisor:				**National:**

Indicator diseases		**Surveillance level, date of visit and those not having a current trend line**						**Total SU[1] NOT having a current trend line**	
		SU 1	**SU 2**	**SU 3**	**SU 4**	**SU 5**	**SU 6**	**Number**	**Percent**
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
Total									
Percent									

Discussions with the SU contacts:
SU1:

SU2:

SU3:

SU4:

[1] Surveillance unit e.g. Health facility/Health sub-district/District/Province

Proportion of suspected outbreaks notified to the next higher level within two days of surpassing the epidemic threshold

Measurement: Outbreak response

Proportion of suspected outbreaks of epidemic-prone diseases notified to the next higher level within two days of surpassing the epidemic threshold

Surveillance Unit:	**Health facility:**	**Health sub-district:**	**District:**	**Province:**		
Surveillance officer:						

Suspected outbreak report number	**Surveillance reporting unit**	**Disease reported**	**Number of cases initially reported**	**Date reported to the next higher level**	**Date trend line crossed epidemic threshold**	**Suspected outbreak reported on time? (Y/N)**
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

Proportion of reports of investigated outbreaks that include case-based data

Proportion of reports of investigated outbreaks that include case-based data

District: **Province:**

Surveillance officer:

Outbreak report number	**Source of outbreak report**	**Disease**	**Date investigation began**	**Case data have been summarized by at least one variable in each of the three groups (write the names of the variables used in the appropriate column)**			**Outbreak case data summarized by at least 3 variables (Y/N)?**
				TIME (e.g. by date of onset of illness)	**PLACE (e.g. by place of residence)**	**PERSON (e.g. by age-group)**	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

Proportion of outbreaks of epidemic-prone diseases with laboratory confirmation

Measurement: Involvement of laboratories in outbreak control

Proportion of outbreaks of epidemic-prone disease with laboratory confirmation

District: **Province:**

Surveillance officer:

Suspected outbreak report number	Health facility	Disease reported	Number of cases registered in the outbreak	Date initial report received at district level	Date outbreak confirmed by laboratory	Total no. of cases confirmed by laboratory
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

Proportion of laboratory-confirmed outbreaks with recommended response

Proportion of laboratory confirmed outbreaks with recommended response	
District:	**Province:**
Surveillance officer:	

Outbreak report no. (lab-confirmed outbreaks only)	**Disease responsible for the outbreak**	**Location of outbreak**	**Start and end dates of outbreak**	**Control measures**			
				Enter the start and end dates	**Were appropriate control interventions implemented to all the identified populations at risk? (Y/N)**	**Date incidence of the disease returned to pre- outbreak levels**	**Date in col.7 was consistent with timely imple-mentation of control measures? (Y/N)**
1							
2							
3							
4							
5							

Case fatality rate of epidemic-prone diseases

Case fatality rate of each epidemic-prone disease

Health facility: **District:** **Province:**

Surveillance officer:

Year	Outbreak-related			Non-outbreak-related			Total		
	No. of cases	No. of deaths	Rate	No. of cases	No. of deaths	Rate	No. of cases	No. of deaths	Rate