

CHAPTER 11 HEALTH INFORMATION SYSTEM MODULE

11.1 Overview

The purpose of this module is to provide guidance on how to conduct an assessment of a country's health information system (HIS). Note that the intent of the assessment is *not* to review, interpret, or analyze the values of health statistics or data produced by the system but rather to assess the ability of the system to produce valid, reliable, timely, and reasonably accurate information for use by planners and decision-makers. The outcome of the assessment will allow the user to better appreciate the ability of a country's HIS to "integrate data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services" (Lippeveld, Sauerborn, and Bodart 2000).

The goal of an HIS is to allow decisions to be made in a transparent way, based on evidence. Therefore, the objective of the HIS is to produce relevant and quality information to support decision making (Health Metrics Network 2006).

Note that a review of a country's HIS should not be limited to the data that are routinely collected and reported by health care facilities and other important population-based sources such as census, demographic and health survey, and vital statistics reporting. Performance of HIS should be measured both in terms of the quality of data produced and the evidence of continued use of data for improving the performance of the health system and, ultimately, the population's health status.

The results of this assessment will therefore provide insights into how HIS strengthening might be included in plans to support overall health system strengthening.

Section 11.1.1 defines an HIS and its key components, and Section 11.1.2 outlines how it works. Section 11.2 provides guidelines on preparing a profile of the HIS of the country of interest. Section 11.3 presents four topical areas around which the HIS assessment should be structured and includes indicators to assess the performance of the HIS in these topical areas. Section 11.4 provides suggestions on how the assessment results can be developed into possible solutions to strengthen the health system by addressing HIS-related issues that have been identified through this assessment.

11.1.1 What Is a Health Information System?

For the purposes of this assessment, an HIS can be defined as "a set of components and procedures organized with the objective of generating information which will improve health care management decisions at all levels of the health system" (Lippeveld, Sauerborn, and Bodart 2000).

An approach for describing the HIS in any given country is to consider the dimensions of demand (i.e., who needs data and for what purpose), of supply (i.e., tools and methods available to generate the needed information), and of level (i.e., the level of the health system at which data are generated and used) (AbouZahr and Boerma 2005).

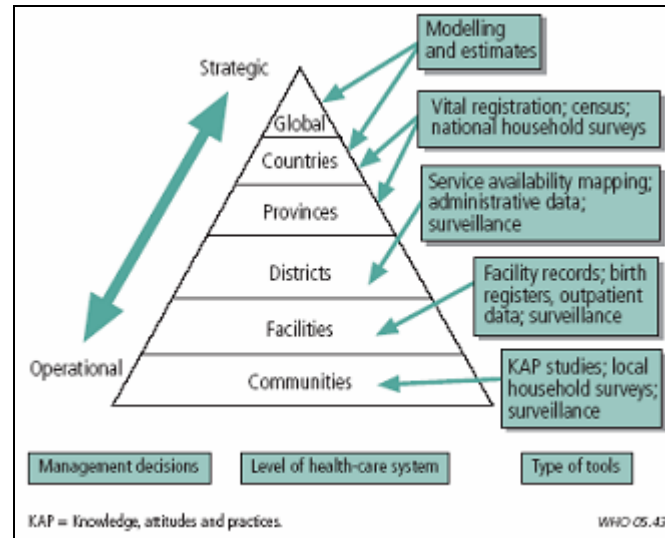
The HIS should address the following demand dimensions—

- Health determinants
- Inputs to the health system and related processes (e.g., health infrastructure, human and financial resources, equipment, policy, and organization)
- Performance or outputs of the health system
- Health outcomes (e.g., mortality, morbidity, disability, well-being, and health status)
- Health inequities in determinants (e.g., coverage and use of services stratified by sex, socioeconomic status, ethnic group, and geographical location)

As for the supply of health information, many methods and sources are available for generating data. They can be divided into those that generate data relative to populations as a whole (census, vital registration, surveys), and those that generate data about the operation of the services¹ (administrative records, service records, health and disease records). Surveillance is considered as a function and not a data source. The notifiable conditions—diseases or health events that require enhanced notification and a public health response—are classified within the disease and health records domain of health services-based sources.

Different data are needed at different levels of the system. At a lower level, data regarding a patient, often presented in patient charts, are needed for patient management. At the facility and district level, summary indicators are needed for management, planning and procurement purposes. Indicators are also needed at district level for planning and reporting to the national level. The national summary indicators are then used for the governance of the health system and for regional/global reporting (for example, reporting on the Millennium Development Goals). Feedback from the national levels to lower, or peripheral, levels is also important and promotes a culture of information use. Even though the data needs are different for the management and stewardship of the health system, policy making, resource allocation and patient care, these needs are also linked along a continuum, as seen in Figure 11.1.

¹ Health services-based data are referred to as health management information systems (HMIS), routine health information systems (RHIS), management information systems (MIS), or even health information systems (HIS). The framework presented here is in accordance with the Health Metrics Network's framework that refers to health information system to describe the total HIS, including population-based and service-based data sources (Health Metrics Network (2006a). The term "health services based data sources" will be used throughout the document to refer to data that originates in the health facilities.



Source: AbouZahr and Boerma (2005)

Figure 11.1 Data Needs and Sources at Different Levels of the Health Care System

11.1.2 How Does a Health Information System Work?

HISs generally evolve in an erratic way in response to different pressures faced by the health system: administrative, economic, legal, or donor pressures. The result has been health systems that are fragmented and have a dispersal and dilution of responsibility. Competing interests between different stakeholders further contribute to the generation of parallel subsystems within the HIS. Programs that are disease-specific also contribute to the fragmentation in their efforts to respond to donor requirements and international reporting of indicators. All these factors result in an overburdened and uncoordinated HIS.

The performance of an HIS is linked not only to technical determinants such as data quality, system design, or adequate use of information technology. Other determinants are also involved, such as (1) organizational and environmental determinants that relate to the information culture within the country context, the structure of the HIS, the roles and responsibilities of the different actors and the available resources for HIS, and (2) the behavioral determinants such as the knowledge and skills, attitudes, values, and motivation of those involved in the production, collection, collation, analysis, and dissemination of information (Lafond and Field 2003).

For the HIS to work adequately, certain prerequisites need to be in place, such as—

- *Information policies*—referent to the existing legislative and regulatory framework for public and private providers, use of standards
- *Financial resources*—investment in the processes for the production of health information (e.g., collection of data, collation, analysis, dissemination, and use)
- *Human resources*—adequately trained personnel at different levels of government

- *Communication infrastructure*—infrastructure and policies for transfer and management or storage of information
- *Coordination and leadership*—mechanisms to effectively lead the HIS

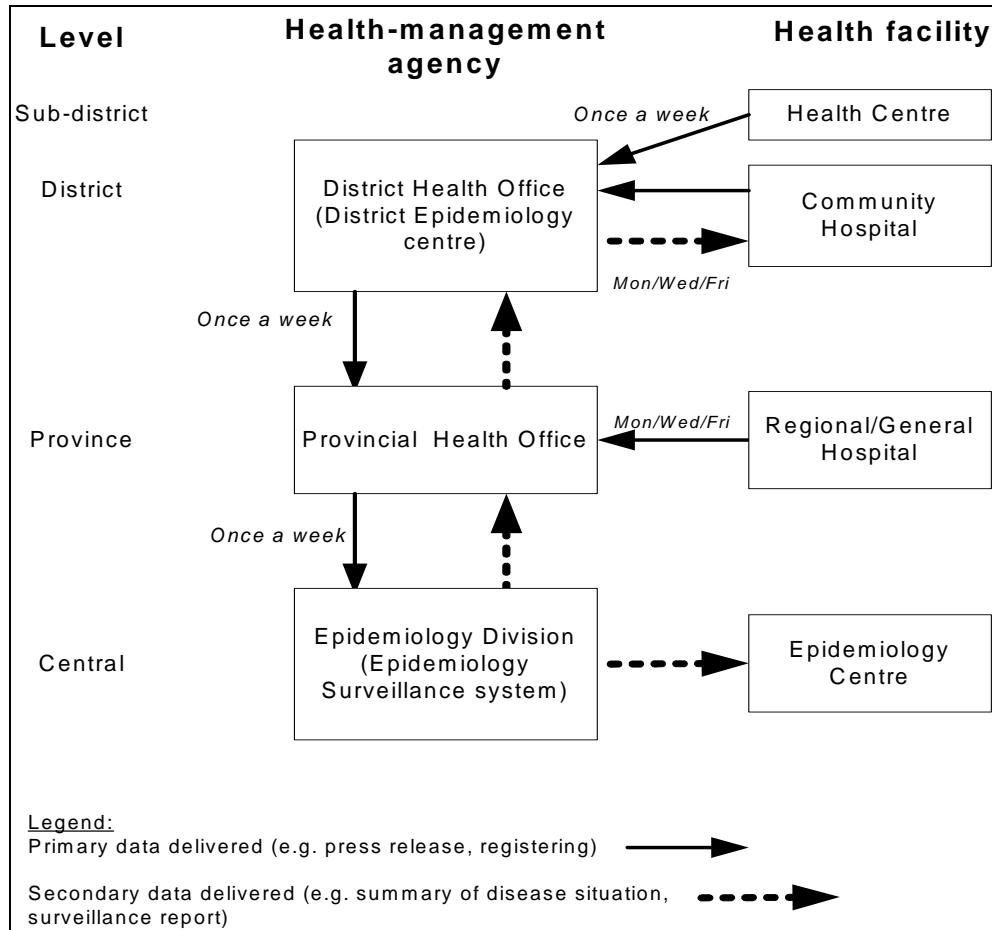
A functioning HIS should be able to provide a series of indicators that relate (1) to the determinants of health, including socioeconomic, environmental, behavioral, and genetic determinants or risk factors; (2) to the health system, including the inputs used in the production of health; and (3) to the health status of the population. The list of indicators should be defined by the users of information at different level in a consensus-building process.

To obtain the data required for the calculation of such estimations, different data sources must be used. A very important function of the HIS is precisely the matching of a data item or indicator with the most cost-effective tool for generating it. In many cases, however, one data item can be obtained from two different sources. Understanding the strengths and weaknesses of each data source and knowing what purpose the information is needed for contributes to making the right choice as to what data source to use.

Because of the diversity in the design or composition of individual country HIS, developing a single schematic flowchart that portrays the function and structure of a generic or universal HIS is difficult. Constructing a flowchart for the HIS² as a product of this assessment is helpful, however, to show the flow of data, linkages with other elements of the HIS, and possible gaps in the HIS. An example of a flowchart is shown in Figure 11.2, which illustrates the information flow of a typical epidemiological surveillance subsystem. It shows, by level of government, who reports to whom, at which frequency, and the type of data reported. It does not reflect the completeness, accuracy, or timeliness of data that moves through the system. Considering the context for the functioning of this flow is also important.

- Is it established by law?
- Are procedures standardized?
- Are international classifications being used for classifying diseases?
- Are control mechanisms in place to ensure the quality of data?

² The development of a single comprehensive flowchart showing all elements of a country's HIS may be well beyond the scope of this assessment. It may, however, still be helpful and insightful to develop flowcharts for some of the key subsystems to understand existing data flows and potential for their improvement and perhaps integration.



Source: Adapted from WHO (2005, Chapter 8 “Thailand”).

Figure 11.2 Flowchart of Agencies in the Epidemiological Surveillance System

A number of HIS components may be in operation within a given health sector, and each may have different and separate flows of data and reporting mechanisms. Understanding all of these components and diverse elements, their operation, and their level of integration, consolidation, and cohesion is an important step in assessing and understanding the performance of the HIS and opportunities for its strengthening. Most relevant, consider whether the HIS includes the private sector and, when in existence, social sector providers as well (such as nongovernmental organizations [NGOs]).

The level of integration can be analyzed from two different angles—

- The level and quality of coordination between the subsystems
 - Is there dialog between them?
 - Do they share information and data?
 - Do they coordinate their work to avoid duplication of efforts?

- Are the different components using the same standards for quality assurance?
- Do all subsystems and components use the same coding classifications for facilities and human resources?
- The level of integration and use of the results produced for policy-making and management decisions, including the management and storage of information

Again we must note that the structure and functional format of an HIS reflect the organizational structure of the health system and its functions and the degree of decentralization at its various levels. To do an assessment, you must, thus, first have a clear understanding of the overall, “big picture” organization of the health care system, and of the division of responsibilities among the different levels (see Chapter 5) which, in many countries, are national or ministry level, regional or provincial level, district level, and the health center or facility. You will also need a good understanding of the role of the private sector and its participation in the HIS in advance and the role of other ministries or national statistics offices (e.g., counting births and deaths is often a function of the interior ministry, and the census is often the purview of the office of statistics).

11.2 Developing a Profile of the Health Information System

This section provides guidance on developing a profile of the HIS, a starting point for the indicator-based assessment.³

Before addressing the specific indicators in Section 11.3, you will need to develop a map of the HIS by first listing all the current operational HIS components and subsystems. Developing a schematic or flowchart for each component or subsystem, by level of government, will help you visualize the structure.

An illustrative example of this step is provided in Figure 11.2. For the analysis, you will probably want to be able to produce such a chart and answer the following primary questions.

- For each level of government, where are the data collected?
- Who receives the data?
- At what frequency are the data collected, aggregated, and reported?
- Who manages the information? (What unit is responsible for data collection, analysis, and reporting?)
- What standards and classifications are used?

³ Note that these indicators provide a framework for assessing the structure and function of an HIS. They do not, however, represent or constitute data collection instruments. You will need to organize and develop a process for the review of records and documents as well as the interviews of informants and stakeholders to obtain the information necessary to make judgments with respect to the indicators listed. The organization of data collection will vary from country to country.

- Which indicators are captured? How is the list of core indicators defined?
- Who produces the secondary data, and to whom are they sent?
- What are the intended uses of the data or indicators?

Developing detailed maps of all of the elements of all possible components and subsystems is probably not feasible in the time envisaged for this assessment. Instead, you may want to develop a general map that at least indicates the following—

- What types of data are being collected at which level(s)
- The existence of various subsystems
- Whether any consolidation of data (e.g., unified data collection forms, consolidation at reporting or analysis levels) occurs and, if so, where and how

If time permits, more detailed maps of components and subsystems can be charted to provide illustrative examples of HIS operation in more detail.

Because major HIS-related donor support may affect how the country's HIS is shaped and how it functions, you must investigate the presence of international donors providing specific assistance to strengthen the entire HIS or its

individual components in more than one region. For some countries, it may be the main source of funds and resources for the HIS. This area is covered in Topic A (“Resources, policies, and regulation”) in Section 11.3.2. You may also want to look at donor implementation plans and activity reports. (Refer also to the donor mapping performed in the Core Module, Chapter 5.)

Tip!

The mapping steps in the assessment are intended to develop insight into the following questions.

- What components of an HIS actually exist and operate?
- What is the level of integration of those components?
- What is the contextual framework in which they operate?
- What are the available resources for HIS?

As information is collected, by going through the Component 2 indicators, you will be able to formulate answers to the following questions.

- Does the Ministry of Health (MOH) budget include staff and other resources for routine health information and statistics functions?
- Is a law or regulation in place that mandates private health facilities to report health service delivery activities to MOH?
- Are HIS data incorporated into basic management and planning activities?
- How many reports is a typical facility required to submit monthly, quarterly, and annually?

11.2.1 Special Concerns Posed by a Decentralized System

In the context of a decentralized health system, some government functions and responsibilities are devolved to lower levels of government (provincial, regional, or district levels). In such a context, you will need to determine whether the HIS is structured to satisfy the information needs of those levels. Data that flow to the central level and are analyzed there may be needed most at the regional or district level where important resource allocation decisions are made. You will need to determine whether the level of decentralization of the health system is consistent with that of the HIS. Otherwise, the utility of the HIS as a management tool is likely to be severely limited.

In general, most HIS components and subsystems are managed as central level functions. If you find or observe that some or all HIS subsystems are the responsibility of lower levels of government or that just certain areas (e.g., financing, data collection) of these subsystems are the responsibility of lower government levels, you will need to approach the assessment differently and look for information at lower government levels.

A decentralized HIS system could result in the following—

- The presence of different definitions and methods used for data collection at different levels
- Different data collected at different locations (cultural influences may affect the type of data collected)
- Inequity in the number of data collected or in the level of funding (of the HIS subsystems) between regions, provinces, or districts
- Inequity in reporting to the central level and converting data for national programs and having nationally representative data (e.g., in some highly decentralized countries, some regions report to the central level and some regions do not)

This extreme form of decentralization is not desirable. Although the responsibility and management of the HIS may be shifted to districts and regions, that shift must be made with the understanding that the contents and structure of the HIS conform to national standards and guidelines. Even in a decentralized system, lower levels must still be held accountable for the application and implementation of national standards with respect to data collection, reporting, and analysis.

Tip!

Use the HIS system to inform the decentralization process and progress made.

The HIS can be a useful tool to monitor the decentralization process and to identify regional inequities and differences with regard to health indicators, budget allocations, and staff distribution or allocation.

For this module, you will first need to determine if the HIS (as a whole or for just certain functions) is decentralized. For this step, refer to Section 5.3.5 of the Core Module (Chapter 5), which presents the concept of decentralization and how to determine the level of decentralization of the country. Second, you will need to, as much as possible, understand the operation of the HIS at regional, provincial, or district levels by paying special attention to the

following indicators (each indicator below is selected from the comprehensive list of indicators in Section 11.3.2, which also provides more detailed explanations for each indicator)—

- *Indicator 8*: Availability of financial or physical resources (or both) to support the HIS within regional and district budgets
- *Indicator 10*: Existence of policies, laws, and regulations at regional, provincial, or district levels, mandating public and private health facilities to provide reports of defined services and activities to the HIS
- *Indicator 18*: Availability of a national summary report that contains HIS information, analysis, and interpretation (for the most recent year)
- *Indicator 22*: Whether lower levels report to the central level; in some countries, health facilities report to the provincial level, but few provincial governments relay the information to the central level
- *Indicator 23*: Whether the denominators also available for provinces, regions, and districts?

If time allows, further analysis can evaluate the following indicators at provincial, regional, and district levels: Indicators 8, 10, 12–17, 19, 20, 21, 25, and 26.

11.3 Indicator-based Assessment

11.3.1 Topical Areas

The HIS profile to be constructed as a result of this assessment can be organized as responses to the following topical areas—

- Component 1:
 - A. Health Status Indicators—*Mortality*
 - B. Health Status Indicators—*Morbidity*
 - C. Health System Indicators
- Component 2:
 - D. Resources, Policies, and Regulation
 - E. Data Collection and Quality
 - F. Data Analysis
 - G. Use of Information for Management, Policy Making, Governance, and Accountability

The HIS profile to be constructed as a result of this assessment can be organized as responses to the following four topical areas, all of which are Component 2 indicators assessed through in-country document review and interviews—

- Resources, policies, and regulation
- Data collection and quality
- Data analysis
- Use of information for management, policy making, governance, and accountability

11.3.2 Health Information System Indicators

Table 11.1 groups the indicators in this module by topic.

Table 11.1 Indicator Map—Health Information System

Component	Topical Area	Indicator Numbers
Component 1	Health status indicators— <i>Mortality</i>	1–2
	Health status indicators— <i>Morbidity</i>	3–4
	Health system indicators	5–7
Component 2	Resources, policies, and regulation	8–12
	Data collection and quality	13–18
	Data analysis	19–24
	Use of information for management, policy making, governance, and accountability	25–26

11.3.2.1 Component 1

Component 1 guides the user to review the availability of a limited number of key indicators for the country under study. These indicators can usually be found in secondary data sources made available by sources such as the World Health Organization (WHO) and the World Bank. For the most part, these indicators arise from HIS sources other than the routine facility-based reporting systems most commonly assumed to represent a country's HIS.

For the purposes of this assessment, an analysis of the values of these key statistics and the interpretation of their meaning with respect to the health status of the population is not required. The collection of these statistics is meant to allow the user to assess whether a given country's HIS has collected and reported commonly agreed-upon indicators of health status to international sources and how current these data are.

Tip!

Note that interpretation of each indicator in this component is not based on the indicator's value or its comparison to those of similar countries but rather on whether these data are reasonably current (generally within five years or less of the assessment).

The absence of these indicators at this level would be a strong indictment of the system's function and capacity, and lack of current data for these critical indicators would also imply serious weaknesses in the HIS. Completion of this section of the assessment can be carried out via the data sets included as Component 1 data (available only on the CD version of this manual).

A. Health Status Indicators—Mortality

1. Maternal mortality ratio reported by national authorities

Note: Estimates derived by regression or similar modeling methods should NOT be considered

Definition, rationale, and interpretation	Measures the annual number of deaths of women from pregnancy-related causes per 100,000 live births; is a basic indicator of maternal health services
Suggested data source	UNICEF (2006). <i>The State of the World's Children 2006</i> . < www.unicef.org/sowc06/ > or most recent.
Notes and caveats	<p>In assessing this indicator, you need to note the timeliness (age) of its reporting and also any indications of the data's quality or completeness used in the calculation. Indicate whether the data value is at least within the last five years.</p> <p>Note that in most of the least developed countries, routine HIS reporting systems do not or cannot produce maternal mortality ratio estimates. Such estimates can be reliably derived only from separate surveys since many births and deaths are not in health facilities and not reported.</p>

2. Mortality rate, under age 5 (per 1,000)

Definition, rationale, and interpretation The probability that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates; expressed as a rate per 1,000

This measure is one of the indicators of Millennium Development Goal number 4 (to reduce the under age five mortality rate by two-thirds between 1990 and 2015). Furthermore, it is one of the indicators commonly used to monitor and evaluate the results, in terms of health status, of key functions of the health system.

Indicate the year of the most current data value.

Suggested data source

World Bank (2006). *World Development Indicators 2006*.

<www.worldbank.org> or most recent.

Module link: Core Module, indicator 10 (mortality rate, under 5 [per 1,000])

Notes and caveats

This indicator can be measured using vital statistics records and household surveys. Note whether the country is using vital statistics or surveys. In the case of vital statistics, the degree to which these statistics provide information on all or nearly all births and deaths of children under five is relevant. Using household surveys to obtain this information is subject to sampling and other errors that can lead to uncertainty in the calculation of indicators. Surveys can provide information for as long as 15 years in the past, however, allowing trends to be estimated from a single survey.

B. Health Status Indicators—Morbidity

3. HIV prevalence among pregnant women aged 15–24

Definition, rationale, and interpretation A basic indicator of HIV/AIDS prevalence; measured by the percentage of blood samples taken from pregnant women, aged 15–24, that test positive for HIV during anonymous sentinel surveillance at selected prenatal clinics

Indicate the most recent prevalence rate (year) available.

Suggested data source

UNICEF (2006). *The State of the World's Children 2006*.

<www.unicef.org/sowc06/> or most recent.

Notes and caveats

In assessing this indicator, note the timeliness (when was it last produced and at what intervals) of its reporting and also any indications of quality or completeness of the data used in its calculation.

4. Proportion of children under 5 years who are underweight for age

Definition, rationale, and interpretation The percentage of children under five years who have a weight-for-age measurement below minus two standard deviations of the WHO's National Center for Health Statistics reference median

This indicator is also associated with the Millennium Development Goals, specifically the goal of eradicating extreme poverty and hunger. It is, therefore, considered one of the core indicators needed to support macro and micro health system functions.

Indicate the most recent prevalence rate (year) available.

Suggested data source

WHO (2006). *The World Health Report 2006*.
<www.who.int> or most recent.

Notes and caveats

In assessing this indicator, note the timeliness (when was it last produced and at what intervals) of its reporting and also any indications of quality or completeness of the data used in its calculation. Data collection is often done with household surveys. Because of the inherent issues of sampling errors and the difficulties in accuracy of measuring height and weight, you will need to obtain some indication as to the accuracy of data collected.

C. Health System Indicators

5. Number of hospital beds (per 10,000 population)

Definition, rationale, and interpretation Number of in-patient beds per 10,000 population. Hospital beds include in-patient and maternity beds. Maternity beds are included while cots and delivery beds are excluded.

The interpretation of this indicator is based not on the number of hospital beds but rather on the most recent year for which data is available. For example, if the reported date of data for this indicator is within the last five years then the country is maintaining fairly current data on this key indicator.

Suggested data source

WHO (2006). *The World Health Report 2006*. <www.who.int> or most recent.

Notes and caveats

In assessing this indicator, note the timeliness (when was it last produced and at what intervals) of its reporting and also any indications of quality or completeness of the data used in its calculation.

6. Contraceptive prevalence (% of women aged 15–49)

Definition, rationale, and interpretation Measures the percentage of women in union aged 15–49 years currently using contraception; is a basic indicator of family planning services, usually derived from survey data

The interpretation of this indicator is based on its most recent value (year).

6. Contraceptive prevalence (% of women aged 15–49)

Suggested data source

World Bank (2006). *World Development Indicators*.
<www.worldbank.org> or most recent.

Module link: Core Module, indicator 4 (contraceptive prevalence)

Notes and caveats

In assessing this indicator, note the timeliness (when was it last produced and at what intervals) of its reporting and also any indications of quality or completeness of the data used in its calculation.

7. Percentage of disease surveillance reports received at the national level from districts compared to the number of reports expected

Definition, rationale, and interpretation

An indirect measure of the performance of the disease surveillance system in place

For example, a value of 70 percent would indicate that 70 percent of districts forward surveillance data and reports to the central level. If this percentage is 10 percent, then only 10 percent of districts report to the central level on disease statistics, which could possibly be a sign of a weak HIS.

Indicate whether such data are available, and note the most recent compilations (by year).

Suggested data source

WHO and UNICEF. (2005). *Annual WHO/UNICEF Joint Reporting Form*.
<www.who.int/entity/immunization_monitoring/data/indicator_data.xls>

Notes and caveats

If the country has a passive reporting system, reports are submitted only when cases are identified and not necessarily routinely.

11.3.2.2 Component 2

Component 2 provides a list of indicators that can be used to assess the structure and performance of an HIS. Indicators in Component 2 are grouped into the following four topical areas.

D. Resources, Policies, and Regulation

E. Data Collection and Quality

F. Data Analysis

G. Use of Information for Management, Policy Making, Governance, and Accountability

Sources and availability of data for these indicators may be collected through a desk-based review of reports, documents, and forms, as well as through interviews with key informants and stakeholders. Note that data sources for these indicators may not be readily available. Therefore, you will be responsible for organizing and developing a process for the review of records, documents, informants' and stakeholders' interviews to obtain information necessary to make judgments with respect to the indicators listed.

D. Resources, Policies, and Regulation

This topic is concerned with assessing the HIS design and function by looking at the country resources available to the HIS in terms of personnel, funding, and infrastructure, and the laws, regulations, or policies in place for the functioning, sustainability, and political support to the HIS. This topic has five indicators.

8. Availability of financial and/or physical resources to support HIS-related items within MOH/central budget (or other central sources), regional, and/or district budgets

Definition, rationale, and interpretation

The level of support the government provides to the HIS functioning is a contributing determinant to its quality and sustainability.

Assess this indicator by determining which specific HIS-related items, among the items listed below, are funded by the government and which are not. Assess this indicator separately for the central and local levels.

Make notes about amounts (absolute numbers and proportionate to the total budget) for subsequent discussion. If the breakdown suggested below is not available, collect any budget information about personnel involved in HIS activities and allocation of resources.

- Data processing and reporting equipment and software (e.g., computers, printers, telephones)
- Meetings of interagency committees
- Record books, forms, stationery, instruments for data collection, storage, and reporting
- HIS-related training
- Operational costs related to data collection/transmission (e.g., fuel, per diem, phone bills)

8. Availability of financial and/or physical resources to support HIS-related items within MOH/central budget (or other central sources), regional, and/or district budgets

- Population-based surveys (e.g., health surveys, census)
- Facility-based records
- Administrative records

Suggested data source

MOH budget, regional and district budgets (review guidelines for what is to be included in these budgets)

Module link: Health Financing Module, indicators 9 and 13 (MOH budget process and allocations by line items)

Stakeholders to interview

Central level MOH budget authorities; central level heads of units responsible for statistics and HIS and subsystems

Notes and caveats

In some countries, HIS staff may be seconded from the central statistical office and may not appear on the MOH establishment register.

9. Presence of international donors providing specific assistance to support strengthening the entire HIS or its individual and/or vertical components in more than one region

Definition, rationale, and interpretation

Permits assessment of the integration of support. Specifically, are the donors who fund vertical programs promoting the creation of parallel systems to address their health information needs?

Major HIS-related donor support may affect how the country HIS is shaped and functions. For some countries, it may be the main source of funds and resources for the HIS.

If donors provide assistance for the HIS, include assessment of the scope, type, level, and impact of such assistance in your analysis.

Suggested data source

Donor implementation plans and activity reports.

Refer also to the donor mapping performed in the Core Module (Chapter 5.3.7).

Stakeholders to interview

Donor representatives, MOH unit responsible for donor coordination

Even where there is no significant donor involvement in HIS, interviews with international advisers may be highly informative. The public health program directors can also be interviewed (e.g., the head of the malaria or HIV/AIDS programs).

Issues to explore

Note which items are supported directly from donor sources because this support has a direct link to questions of both ownership (of the system or subsystem as well as results) and sustainability. How can vertical HIS systems be linked with the rest of HIS? For example, are the same codes for identifying health facilities being used?

9. Presence of international donors providing specific assistance to support strengthening the entire HIS or its individual and/or vertical components in more than one region

Notes and caveats You may find projects that address HIS issues on a limited basis (i.e., specific program or geographic region) but have little impact on the broader system. Inefficiencies arise when resources (such as computers bought by a program and their use limited to that program only) are not shared.

10. Existence of policies, laws, and regulations mandating public and private health facilities/providers to report indicators determined by the national HIS

Definition, rationale, and interpretation A regulatory framework for the generation and use of health information enables the mechanisms to ensure data availability of public and private providers. If a general law is not available, review decrees pertinent to individual sub-sectors. For example, assess if the legal framework is consistent with the United Nations' "Fundamental Principles of Official Statistics" (UN 2006).

Suggested data source MOH policies, decrees, public health law

Stakeholders to interview Central level MOH authorities (e.g., director of the secretary general's office)

Issues to explore Is any person or office responsible for regulating or interacting with the private sector? Does regulation go beyond licensing? Has any attempt been made to plan health service delivery in collaboration with the private sector? Are clear mechanisms in place for collating health information at the national level? Does the country have specific requirements in terms of periodicity and timeliness of reports? Is there a minimum set of core health indicators that both public and private providers should report?

Notes and caveats If possible, assess the degree to which the laws are enforced since the presence of a regulatory framework does not guarantee compliance.

11. Presence of a clear procedure for allocating resources and planning in the health system based on the information products of HIS (e.g., use of mortality and morbidity indicators to assess health status and allocate resources accordingly)

Definition, rationale, and interpretation One of the ways data obtained from the HIS can be used is for functions, such as planning, reforms, program management, and program design. Consequently, a mandate and the authority to make decisions are critical for data use and the usefulness of generating data.

For this indicator, review documents and make notes if you have concerns.

11. Presence of a clear procedure for allocating resources and planning in the health system based on the information products of HIS (e.g., use of mortality and morbidity indicators to assess health status and allocate resources accordingly)

Suggested data source	MOH decrees, human resource policy documents, public health laws <i>Module link:</i> Health Financing Module, indicator 8 (Needs-based budget allocation process)
Stakeholders to interview	Central level program heads (especially the head of the planning or statistics unit), human resources officers, regional and district program heads, medical officers, health management team members

12. Presence of mechanisms to review the utility of current HIS indicators for the planning, management, and evaluation process, and to adapt and modify accordingly

Definition, rationale, and interpretation	<p>An HIS must provide relevant and important information to stakeholders. HIS design and contents should be seen as a dynamic process subject to periodic review and adaptation to the changing health environment in the country.</p> <p>For example, some mechanisms would be the presence of an active national HIS Steering Committee, the existence of a national HIS policy, periodic HIS review meetings, or any combination of the three.</p> <p>Interviews with stakeholders will indicate whether HIS system outputs are reviewed. The lack of such mechanisms may be indicative of a system that is unresponsive to need and ultimately seen as a burden with limited utility.</p>
Suggested data source	Central level authorities (e.g., director or secretary general), head of statistics or analysis unit, central level program heads
Stakeholders to interview	Central, regional, and district level planners
Issues to explore	Does the system provide relevant and necessary information to support the planning, management, and evaluation processes? Is the HIS seen as a burden rather than an effective and important tool?
Notes and caveats	The content of reports and data collection tools has probably been static for many years. Most systems do not regularly reflect on the utility of HIS outputs (or methods). Alternatively, many HIS suffer from a lack of clarity and definition and, as a result, are constantly revised, not fully functional, often error-ridden, and incomplete.

E. Data Collection and Quality

This topic has six indicators investigating the data collection process. You will determine whether guidelines exist for data collection, if the data's quality is verified, where the data come

from, the burden of data collection on health facilities, and finally, if national summary HIS reports are compiled.

This topic is designed to provide insight into the following questions.

- Do all districts report? Are any districts missing? Can this be discerned from reports?
- Do private sector facilities report data to the MOH? Can this be discerned from reports?
- Are clear standards and guidelines available for data collection and reporting procedures?
- Are methods available to assess and document whether the reported data are complete and accurate?
- Does the country have recent national level reports (annual or other interval) for the HIS subsystems? Is a recent comprehensive HIS annual report available?

13. Percentage of districts represented in reported information

Definition, rationale, and interpretation	<p>Incomplete data do not permit adequate decision making. The absence of this indicator is itself an indication of an HIS weakness.</p> <p>Compare the number of reports received at the national level from districts to the number of expected reports for the last six months (separately for each of the HIS subsystems). If the percentage is below 95 percent, then the data quality is compromised.</p>
Suggested data source	<p>All reports at district, regional, and national level</p> <p>Review program specific reporting here as well.</p> <p><i>Module link:</i> Governance Module, indicators 7–11 (information/assessment capacity)</p>
Stakeholders to interview	<p>Staff working in the statistical department, staff who analyze the data</p>
Issues to explore	<p>Is a quality review mechanism in place to improve the reporting of districts or units?</p>
Notes and caveats	<p>You may find that reports do not include indications of the percentage of districts represented. This omission places a question mark over the information reported. The lack of indication regarding the percentage of units reporting may also be indicative of a system that lacks quality control mechanisms to review and improve data and report quality.</p> <p>Note, however, the existence of any regularly published HIS reports or data summaries (complete or incomplete) that are widely disseminated and in the hands of users and decision makers. The existence of a mechanism to disseminate information is an important element that can be built upon when strengthening HIS activities.</p>

14. Percentage of private health facility data included in reported data

Definition, rationale, and interpretation	<p>Inclusion of private facilities in the HIS is important if they provide a considerable amount of services in a given subsector.</p> <p>MOH reports should indicate whether private facilities or services are included.</p>
Suggested data source	<p>MOH reports</p>
Stakeholders to interview	<p>Central level program heads (especially the head of the planning or statistics unit), regional and district program heads, medical officers, health management team members</p>
Notes and caveats	<p>In many cases, information on this indicator will be unspecified and unknown.</p>

15. Availability of clear standards and guidelines for data collection and reporting procedures

Definition, rationale, and interpretation	<p>Clear instructions contribute to increased data quality.</p> <p>To measure this indicator, list available documents and topics covered by them. Review the documents carefully, make notes if they are not complete or if you have other concerns.</p>
Suggested data source	<p>Central level technical guidelines, specific program guidelines, and directives</p>
Stakeholders to interview	<p>District health management team members, central level heads of programs</p>
Notes and caveats	<p>In many instances, staff will indicate that such procedures, standards, and guidelines exist but will be unable to produce copies or evidence of them.</p>

16. Number of reports a typical health facility submits monthly, quarterly, or annually

Definition, rationale, and interpretation	<p>Health workers may be overburdened with data collection and reporting requirements, which can negatively affect the HIS quality.</p> <p>The greater the number of required reports, the higher the HIS burden on a typical health worker. In this case, poor-quality data should be expected. Make notes about the specific types of reports required, duplication, and overlap of information.</p>
Suggested data source	<p>HIS reports</p>
Stakeholders to interview	<p>Facility level workers, health information unit</p>

16. Number of reports a typical health facility submits monthly, quarterly, or annually

Issues to explore Does the staff feel that the number of reports and other HIS requirements are a burden?

Does the staff see or appreciate the importance of HIS activities, including data collection, reporting, or analysis, that they are asked to do?

Is any feedback provided to the data producers? Lack of feedback can have a detrimental effect on data and report quality.

Notes and caveats Some probing and persistence may be needed to fully catalog all of the forms and reports required at this level.

17. Presence of procedures to verify the quality of data (accuracy, completeness, timeliness) reported, such as data accuracy checklists prior to report acceptance, internal data quality audit visits

Definition, rationale, and interpretation Tracking the quality of data, data verification, and subsequent correction are critical methods for data quality improvement. Data quality is an important consideration when interpreting or using system information and results.

According to the International Monetary Fund's "Data Quality Assessment Framework" (IMF 2006), six criteria are used to assess the quality of health data—

- *Timeliness*: the gap between when data are collected and when they become available to a higher level or are published
- *Periodicity*: the frequency with which an indicator is measured
- *Consistency and transparency of revisions*: internal consistency of data within a database and consistency between datasets and over time; extent to which revisions follow a regular, well-established and transparent schedule and process
- *Representation*: the extent to which data adequately represent the population and relevant subpopulations
- *Disaggregation*: the availability of statistics stratified by sex, age, socioeconomic status, major geographic or administrative region, and ethnicity, as appropriate
- *Confidentiality, data security, and data access*: the extent to which practices are in accordance with guidelines and standards for storage, backup, transport of information, and retrieval

Although actually measuring these indicators as a means of assessing data quality is beyond the scope of this assessment, you should attempt to obtain some feel for, or insights into, how the HIS or subsystem under study responds to these important criteria.

Review the documents carefully; make notes if they are not complete or if you have other concerns.

17. Presence of procedures to verify the quality of data (accuracy, completeness, timeliness) reported, such as data accuracy checklists prior to report acceptance, internal data quality audit visits

Suggested data source	This type of information is obtained mainly through interviews with primary stakeholders. Supervision checklists; MOH district level procedures and directives; health information unit routines
Stakeholders to interview	District health management team members, central level program heads, central level statistics and HIS staff
Issues to explore	If these indicators exist, what is the government response to poor quality?
Notes and caveats	Many systems will assign this task to supervision. In many cases, however, such supervision is not carried out for a variety of reasons. Although most systems do have checklists to be used during supervision, the checklists do not often include steps to improve the quality of data or reports. Data entry staff, or those who aggregate forms, often make corrections and carry out data quality functions.

18. Availability of a national summary report which contains HIS information, analysis, and interpretation (most recent year)

Definition, rationale, and interpretation	Is a current-year report that includes HIS data, analysis, and interpretation available? Information availability is a key to its widespread use. Such reports offer an opportunity to bring together results of different HIS subsystems and integrate their analysis and interpretation.
Suggested data source	MOH reports
Stakeholders to interview	Central level program heads, central level statistics, HIS staff
Issues to explore	Why is a summary report not produced? What are the constraints to integration of HIS results? What are the uses of such a report for planning, management, budgeting, and other functions?

F. Data Analysis

This topic is divided into six indicators. The first goal of this topic is to determine what resources are available for the analysis of data (i.e., once the data have been collected) in terms of number

of personnel, infrastructures, guidance, and training. The second goal is to assess how the data are analyzed and whether the results are made available at regular intervals and in what form.

19. Availability at each level of a sufficient number of qualified personnel and infrastructure to compile and analyze information

Definition, rationale, and interpretation	Data analysis by qualified personnel is critical for HIS to function. Look at the percentage of designated posts that are filled and the qualifications of those filling these posts. Identify the type of personnel performing the different tasks for the analysis, as well as their level of skills (i.e., degrees, experience). Try to match level of skills to task performed and note the time devoted to analysis.
Suggested data source	Staffing and human resource documents, organizational charts, program documents <i>Module link:</i> Governance Module, indicator 10 (Technical capacity for data analysis)
Stakeholders to interview	Central level program heads (especially the head of the planning or statistics unit), the health information unit, regional and district program heads, medical officers, health management team members
Issues to explore	Investigate the level of motivation of public health managers for data analysis. The staff may be overburdened with data analysis or collection.
Notes and caveats	At the district level and below, HIS functions may be carried out part time by service delivery staff or clerks and not by dedicated staff.

20. Evidence of ongoing training activities related to HIS data collection and analysis

Definition, rationale, and interpretation	Training is essential to maintain analytical skills of personnel. Investigate for the presence of training curricula. Review training curricula, and make notes if you have concerns.
Suggested data source	MOH budget
Stakeholders to interview	Central level program heads (especially the head of the planning or statistics unit), regional and district program heads, medical officers, health management team members
Issues to explore	Look for the type(s) of training provided: training to record and analyze data, training in the use of information and the type(s) of staff by type of training.
Notes and caveats	Most HIS training activities are funded by external donors.

21. Presence of written guidelines specifying the methods and products of data analysis to be performed

Definition, rationale, and interpretation

Clear instructions are essential for data analysis.

Suggested data source

Review the documents carefully, make notes if they are not complete or if you have other concerns.

Program-specific documents covering MOH general technical guidelines for data collection and analysis

Module link: Governance Module, indicator 7 (state of systems for data collection, reporting, analysis)

Stakeholders to interview

District health management team members, central level heads of programs

Notes and caveats

Many HIS have predefined analyses, which have been programmed into the system. The origin and utility of these analyses may not be known or reviewed. Most analyses are done as a routine and are a function of what was done in the past.

22. The data derived from different health programs/subsectors are grouped together for reporting purposes (or even integrated in a single document), and these documents are widely available

Definition, rationale, and interpretation

Integrated HIS are cheaper to maintain, and they allow and encourage analysts and decision makers to explore links between indicators in various subsectors (e.g., number of measles cases and immunization rates). Managers get easier access to more consistent and better quality data under such systems. Integration makes sense, first of all, for countries in which public health decisions are concentrated in a limited number of offices. All countries can benefit from reduced administrative burden and inconsistencies generated by overlapping reporting requirements for the same facility.

Flowcharting the various HIS subsystems will demonstrate where data are integrated and grouped (if at all). Too many parallel subsystems are indicative of a fragmented HIS that cannot provide the type of analysis necessary for good planning, management, or evaluation of health policies or programs. Interpretation of the level of integration is basically a judgment call on the part of the assessment team.

Suggested data source

Routine program reports; decrees specifying reporting requirements and data flow; annual program reports; annual MOH report (central, regional, and district levels).

Module link: Governance Module, indicator 9 (data flows) and 11 (data presentation to policy makers)

22. The data derived from different health programs/subsectors are grouped together for reporting purposes (or even integrated in a single document), and these documents are widely available

Stakeholders to interview	Central level program heads (especially the head of the planning or statistics unit), health information unit, regional and district program heads, medical officers, health management team members
Issues to explore	You will also need to also identify at which level the data are grouped (facility or district). Are key pieces of information not grouped (but possibly available)? Who is responsible for grouping or integrating data from various sources?

23. Availability of appropriate and accurate denominators (such as population by age groups, by facility catchment area, by sex, number of pregnant women) for analysis

Definition, rationale, and interpretation	Accurate denominators are critical for data analysis. Analyze each subsystem, and answer yes or no. Make notes if you have concerns if the information is partially available.
Suggested data source	Program level and MOH general documents should clearly define the method for determination of the denominators.
Stakeholders to interview	District health management team members, central level heads of programs, the health information unit
Notes and caveats	Denominators for district level and above are based on census data with assumptions about population growth built into the calculations. At lower levels, denominators and effective catchment areas can be difficult to derive and substantiate. Expanded Programme on Immunization (WHO) documents can be a source of commonly used denominators at the facility level, based on numbers of estimated or reported births.

24. Availability of timely data analysis, as defined by stakeholders and users

Definition, rationale, and interpretation	Physical evidence of data analysis can provide support to any theoretical conclusions or observations. This indicator must be assessed at the central, regional, and district levels by reviewing documents; make notes if they are incomplete or if you have areas of concern.
Suggested data source	MOH statistical units, wall charts and other records, and reports at regional, district, and facility levels <i>Module link:</i> Governance Module, indicator 22 (responsiveness to stakeholders)

Stakeholders to interview	Central level program heads (especially the head of the planning or statistics unit), regional and district program heads, medical officers, health management team members
Issues to explore	Who defines what analysis to perform? Do staff understand the analysis and its interpretation and implications (or do they carry out analysis as routine required activity)
Notes and caveats	When assessing the timeliness of any analysis, remember that the frequency of analysis depends on the program and on its specific needs and guidelines.

G. Use of Information for Management, Policy Making, Governance, and Accountability

This topic contains two indicators and is concerned with determining how the data obtained through the HIS or other surveys are used for decision making, planning, budgeting, or fundraising activities.

The purpose of any HIS is to provide system managers with information by which to manage and evaluate services delivered by the system. These questions are meant to guide the assessment's understanding of the HIS ability to do so.

- Did you find evidence that the data collected was incorporated into planning, budgeting, and fundraising activities in the past year (e.g., a change in budget in response to a new health issue or funding of new proposals that used HIS data)?
- Did you find evidence that the results of data analysis were communicated to data providers to inform them of their performance?

25. Use of data for planning, budgeting, or fundraising activities in the past year (e.g., a change in budget levels in response to a new major health issue, fund allocation/budgeting proposals utilizing HIS data for advocacy)

Definition, rationale, and interpretation	Gives an idea of the level of commitment of the government as well as an indication of the mechanisms in place to use the data produced by the HIS. Such data will be used to inform decision making in areas such as resource allocation, the issuing of health insurance cards, health promotion, and disease-prevention planning.
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Suggested data source	Inquire of senior managers what key sources they use for health information. This indicator must be assessed at the central, regional, and district levels. <i>Module link:</i> Governance Module, indicator 13 (Policy changes based on performance review) Look for reports, graphs, or maps that display the information provided through the HIS. MOH, regional and district budgets
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25. Use of data for planning, budgeting, or fundraising activities in the past year (e.g., a change in budget levels in response to a new major health issue, fund allocation/budgeting proposals utilizing HIS data for advocacy)

Stakeholders to interview	Central level program heads (especially the head of the planning or statistics unit), regional and district program heads, medical officers, health management team members
Issues to explore	Presence of stakeholder cooperation mechanisms. For example, are meetings held to analyze disease patterns, trends, outbreaks, financial issues affecting health facilities, performance of the health care delivery system. What is the promptness and adequacy of response measures?

26. Data or results of analyses are fed back to data providers to inform them of program performance

Definition, rationale, and interpretation	Feedback (written or oral) is the simplest form of data use, which is indicative of information management practices at various levels. Search for evidence in documents or communications.
Suggested data source	Newsletters, supervision reports, central level reports to regions and districts, minutes of review meetings <i>Module link:</i> Governance, indicator 24 (communications with stakeholders on priority health issues)
Stakeholders to interview	Central level program heads (especially the head of the planning or statistics unit) regional and district program heads medical officers health management team members.
Issues to explore	What is the promptness and adequacy of response measures to a noted lack (or problem) of performance?

11.3.3 Summary of Issues to Address in Stakeholder Interviews

As mentioned in Section 11.2, this assessment is based on a desk-based review and on stakeholder interviews. Below is an illustrative list of major stakeholders to identify before the assessment and perhaps interview (adapted from Health Metrics Network 2006b). The number of prospective interviewees will be many, and your time will be limited, so you should attempt to target these interviews to the extent possible to try and interview the major players. Stakeholders can also be a good source to identify published and unpublished reports on the HIS system.

- Central statistics office
 - Officials and analysts responsible for the national population census
 - Officials and analysts responsible for household surveys

- Senior advisers of the MOH and heads or coordinators of the following—
 - MOH planning unit
 - Monitoring and evaluation annual performance review
 - Health management information system unit
 - Acute disease surveillance and response
 - Disease control, immunization, and maternal and child health or family planning programs
 - Noncommunicable disease control programs
 - Unit responsible for management of human resources, pharmaceuticals or logistics, and finances
- Other ministries and government agencies responsible for planning, monitoring, and evaluation of social programs
 - Ministries or government agency responsible for civil registration
 - Planning commission
 - Ministry of Finance
 - Population commission
 - Commissions developing master plans for social statistics
- Researchers and directors of demographic surveillance systems, public health institutes, and universities
- Major donors to the health sector and donors who finance specific activities of relevance, for example, national population census, large-scale national population surveys (such as demographic and health surveys, multiple indicator cluster surveys, or the Living Standards Measurement Study), demographic surveillance systems, sample vital registration systems, demographic survey system, health accounts, health facility surveys
- Representatives of key private sector, NGOs, and civil society
 - Private health professional associations
 - Private health facilities
 - Associations of faith-based health providers and other NGOs
 - Health advocacy groups

Table 11.2 provides a summary of the issues to address with stakeholders.

Table 11.2 Summary of Issues to Address in Stakeholder Interviews

Profile of Stakeholder to Interview	Issues to Discuss with Stakeholder
Central statistics office; central level MOH budget authorities	<ul style="list-style-type: none"> • Availability of financial and physical resources to support the HIS • Financing of training activities related to the HIS (e.g., for data collection, analysis, or reporting) • Use or role of HIS data in financial management and resource allocation decisions within MOH
Human resources officers at the MOH	<ul style="list-style-type: none"> • Availability of financial and physical resources to support the HIS • Presence and availability of formal documents defining and describing staff responsibilities regarding data collection, analysis, or reporting • Trainings regarding data collection, analysis, or reporting • Use or role of HIS in human resource management
Central statistics office; central level program heads (especially the head of the planning or statistics unit)	<ul style="list-style-type: none"> • Guidelines for data collection • Procedures to verify the quality of data • Availability of personnel, infrastructures, and equipment for data collection, reporting, and analysis • Presence and availability of formal documents defining and describing staff responsibilities regarding data collection, analysis, or reporting and for staff trainings • Availability of appropriate and accurate denominators • Availability of timely data analysis • Use of data and results for planning and decision making
Donor representatives; MOH department or unit responsible for donor coordination	<ul style="list-style-type: none"> • Presence of international donors providing specific assistance to support strengthening the entire HIS or its individual components in more than one region • Ability of HIS to meet donor needs for information • Reporting requirements for vertical programs (HIV/AIDS, malaria)
District health management team	<ul style="list-style-type: none"> • Guidelines for data collection • Procedures to verify the quality of data • Availability of personnel, infrastructures, and equipment for data collection, reporting, and analysis • Whether trainings are taking place • Availability of appropriate and accurate denominators • Availability of timely data analysis • Level of responsibility and authority with respect to program management and perceived data needs

Profile of Stakeholder to Interview	Issues to Discuss with Stakeholder
	<ul style="list-style-type: none"> • Use of data and results for planning and decision making
Facilities	<ul style="list-style-type: none"> • Number of reports they are required to submit and at what intervals • Availability of personnel, infrastructures, and equipment for data collection, reporting, and analysis
Health information unit (there may be no central information management unit and separate programs will be responsible for their individual subsystems, a sign of a fragmented system).	<ul style="list-style-type: none"> • Number of reports they are required to submit and at what intervals • Relationship between information unit and program management units • Availability of personnel, infrastructures, and equipment for data collection, reporting, and analysis • Availability of appropriate and accurate denominators

11.4 Summarizing Findings and Developing Recommendations

Chapter 4 describes the process that the team will use to synthesize and integrate findings and prioritize recommendations across modules. To prepare for this team effort, each team member must analyze the data collected for his or her module(s) to distill findings and propose potential interventions. Each module assessor should be able to present findings and conclusions for his or her module(s), first to other members of the team and eventually at a stakeholder workshop and in the assessment report (see Chapter 3, Annex 3J for a proposed outline for the report). This process is an iterative one; findings and conclusions from other modules will contribute to sharpening and prioritizing overall findings and recommendations. Below are some generic methods for summarizing findings and developing potential interventions for this module.

11.4.1 Summarizing Findings

Using a table that is organized by the topic areas of your module (see Table 11.3) may be the easiest way to summarize and group your findings. (This process is Phase 1 for summarizing findings as described in Chapter 4.) Note that additional rows can be added to the table if you need to include other topic areas based on your specific country context. Examples of summarized findings for system impacts on performance criteria are provided in Annex 4A of Chapter 4. In anticipation of working with other team members to put findings in the SWOT framework (strengths, weaknesses, opportunities, and threats), you can label each finding as either an S, W, O, or T (please refer to Chapter 4 for additional explanation on the SWOT framework). The “Comments” column can be used to highlight links to other modules and possible impact on health system performance in terms of equity, access, quality, efficiency, and sustainability.

Table 11.3 Summary of Findings—Health Information System Module

Indicator or Topical Area	Findings (Designate as S=strength, W=weakness, O=opportunity, T=threat.)	Source(s) (List specific documents, interviews, and other materials.)	Comments ^a

^aList how HIS findings affect the ability of policy makers and health system stakeholders and workers to measure, analyze, and improve system performance with respect to the five health systems performance criteria (equity, access, quality, efficiency, and sustainability) and list any links to other modules.

11.4.2 Developing Recommendations

After you have summarized findings for your module (as in Section 11.4.1), it is now time to synthesize findings across modules and develop recommendations for health systems interventions. Phase 2 of Chapter 4 suggests an approach for doing this with your team. Some generic solutions or recommendations are given if the system is deemed deficient in each area.

The objective of this section is to develop a comprehensive evaluation of the ability of current HIS subsystems to provide timely and relevant information for use by decision makers at all levels (and not necessarily only within the health sector). In interpreting the information gathered, reflect on results and group findings (many of which will be subjective) around the following themes.

- **Completeness:** There are two levels at which the completeness of the HIS can be assessed—
 - The percentage of all cases or events that are captured and represented in HIS outputs and products
 - The extent to which the HIS captures all of the relevant information necessary for informed and effective decision making and resource allocation

In general, improving the coverage of the HIS might include the following activities—

- Inclusion of the private sector in the HIS. This activity may be difficult because in many countries, the private sector is nominally required to submit reports and data to the MOH. In reality, the MOH has little or no means to enforce their participation.
- Capacity building and support or supervision to improve compliance with MOH requirements and guidelines

- **Timeliness:** The usefulness of many HIS subsystem products is determined in part by their timeliness. Epidemiologic surveillance data that are months old are obviously of limited value in helping the health system to recognize and respond to the threat of infectious disease outbreaks. An HIS that cannot collect, analyze, and report on data within a time frame of the data's usefulness (within the time frame of the decision making processes) is of little value or effect.

Timeliness of data collection, transmission, analysis, and reporting might be improved by the following generic activities—

- Capacity building and support or supervision to improve compliance with MOH requirements and guidelines
 - Improved means of communication at all levels to facilitate timely data flow
 - Improved means of data handling and analysis (usually this improvement implies computerization or upgrading of existing means of electronic analysis)
 - Revision of HIS guidelines to better align the needs of data and information users with existing collection, communications, and analysis capacities
 - Revision of HIS guidelines to better reflect the true needs of data users (i.e., are data *really* required on a monthly basis when they are only used annually as part of program review?)
- **Integration and management of information:** To what extent are the various subsystems integrated or linked? In many instances, no linkages exist between the results and outputs of the various subsystems. Some linkages may be subtle, such as whether census data are used to calculate appropriate denominators used in analyzing data collected in other subsystems.

Improving the integration of HIS subsystems might be accomplished by the following—

- Improved means of data handling and analysis (usually this improvement implies computerization or upgrading of existing means of electronic analysis)
 - Consolidation of data collection tools to bring subsystems together
 - Increased demand by information users and stakeholders for integrated analysis (i.e., combining or comparing vaccination program coverage data with vaccine preventable disease data obtained from the infectious disease surveillance subsystem as a means of measuring program effectiveness and not simply coverage)
- **Use for decision making:** There are no obvious or universally recognized indicators of information use. The determination of information use is left to the judgment of the assessment team based upon discussions with key system implementers and health sector decision makers.

The following broad actions, however, can be suggested as strategies to improve the use of data in decision making—

- Increased decentralization and clearly defining limits of authority and decision making. In many nominally decentralized systems, little decision making authority is transferred to lower levels. These lower levels are merely given the responsibility to act upon and carry out decisions actually made centrally.
- Improved information availability
- Dialogue with stakeholders and information users to better define their needs and requirements and adaptation of HIS to fill those defined needs
- Feedback on performance

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