**Health Information Systems (HIS)**

Health information systems refer to any system that captures, stores, manages or transmits information related to the health of individuals or the activities of organisations that work within the health sector.

This definition incorporates things such as district level routine information systems, disease surveillance systems, and also includes laboratory information systems, hospital patient administration systems (PAS) and human resource management information systems (HRMIS).

Overall, a well-functioning HIS is an integrated effort to collect, process, report and use health information and knowledge to influence policy and decision-making, programme action, individual and public health outcomes, and research. Sound decision-making at all levels of a health system requires reliable health statistics that are disaggregated by sex, age and socioeconomic characteristics.

At a policy level, decisions informed by evidence contribute to more efficient resource allocation and, at the delivery level, information about the quality and effectiveness of services can contribute to better outcomes.

Information systems, particularly at lower levels of the health system (closer to the collection source), need to be simple and sustainable and not overburden health delivery staff or be too costly to run. Staff need feedback on how the routine data they collect can be used and also need to understand the importance of good quality data for improving health.

Capacity building is required to ensure policymakers at all levels have the ability to use and interpret health data, whether it originates from routine systems, health surveys or special operational research. It is also important that health system staff understand the significance of local data for local program management, and that their needs for strengthened capacity for critical health statistical analysis are met.

Local use of data collected at lower levels of the health system is a key step for improving overall data quality. Furthermore, aggregate patient information collected at various points of service delivery and made interoperable with routine HIS improves the quality and use of health information.

The Health Metrics Network (HMN), in their *Framework and Standards for Country Health Information Systems,*has defined a Health Information System as consisting of six components:



1. **Health Information Systems Resources**

These include the legislative, regulatory and planning frameworks required for a fully functioning health information system, and the resources that are required for such a system to be functional. Such resources involve personnel, financing, logistics support, information and communications technology (ICT), and coordinating mechanisms within and between the six components

1. **Indicators**

A core set of indicators and related targets is the basis for a health information system plan and strategy. Indicators need to encompass determinants of health; health system inputs, outputs and outcomes; and health status

1. **Data Sources**

These can be divided into two main categories; (1) population-based approaches (censuses, civil registration and population surveys) and (2) institution-based data (individual records, service records and resource records). A number of data-collection approaches and sources do not fit into either of the above main categories but can provide important information that may not be available elsewhere. These include occasional health surveys, research, and information produced by community based organisations

1. **Data Management**

This covers all aspects of data handling from collection, storage, quality-assurance and flow, to processing, compilation and analysis

1. **Information Products**

Data must be transformed into information that will become the basis for evidence and knowledge to shape health action

1. **Dissemination and Use**

The value of health information is enhanced by making it readily accessible to decision-makers and by providing incentives for, or otherwise facilitating, information use.

**Introduction**

Sound and reliable information is the foundation of decision-making across all health system building blocks, and is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and financing.

The health information system provides the underpinnings for decision-making and has four key functions: data generation, compilation, analysis and synthesis, and communication and use. The health information system collects data from the health sector and other relevant sectors, analyses the data and ensures their overall quality, relevance and timeliness, and converts data into information for health-related decision-making.

 The health information system is sometimes equated with monitoring and evaluation but this is too reductionist a perspective. In addition to being essential for monitoring and evaluation, the information system also serves broader ends, providing an alert and early warning capability, supporting patient and health facility management, enabling planning, supporting and stimulating research, permitting health situation and trends analysis, supporting global reporting, and underpinning communication of health challenges to diverse users.

Information is of little value if it is not available in formats that meet the needs of multiple users − policy-makers, planners, managers, health care providers, communities, individuals.

Therefore, dissemination and communication are essential attributes of the health information system. Health planners and decision-makers need different kinds of information including:

 • *Health determinants* (socio-economic, environmental behavioural, genetic factors) and the contextual environments within which the health system operates;

 • *inputs to the health system* and related processes including policy and organization, health infrastructure, facilities and equipment, costs, human and financial resources, health information systems;

• *The performance or outputs of the health system* such as availability, accessibility, quality and use of health information and services, responsiveness of the system to user needs, and financial risk protection;

• *Health outcomes* (mortality, morbidity, disease outbreaks, health status, disability, wellbeing); and

 • *health inequities,* in terms of determinants, coverage of use of services, and health outcomes, and including key stratifies such as sex, socio-economic status, ethnic group, geographic location etc. A good health information system brings together all relevant partners to ensure that users of health information have access to reliable, authoritative, useable, understandable, comparative data.

**Expectations of a country health information system**

Health information systems serve multiple users and a wide array of purposes that can be summarized as the generation of information to enable decision-makers at all levels of the health system to identify problems and needs, make evidence-based decisions on health policy and allocate scarce resources optimally. Data from different sources are used for multiple purposes at different levels of the health care system.

**• *Individual level data*** about the patient's profile, health care needs, and treatment serve as the basis for clinical decision-making. Health care records provide the basis for sound individual clinical care. Problems can arise when health workers are overburdened by excessive data and reporting demands from multiple and poorly coordinated subsystems.

• ***Health facility level data****,* both from aggregated facility-level records and from administrative sources such as drug procurement records, enable health care managers to determine resource needs, guide purchasing decisions for drugs, equipment and supplies, and develop community outreach. Data from health facilities can provide immediate and ongoing information relevant to public health decision-making but only if certain conditions are met. The data must be of high quality, relate to all facilities (public and private), and be representative of the services available to the population as a whole.

• ***Population level data*** are essential for public health decision-making and generate information not only about those who use the services but also, crucially, about those who do not use them. Household surveys have become a primary source of data in developing countries where facility based statistics are of limited quality. But household surveys are needed everywhere because they are the only good source of information on individual beliefs, behaviours and practices that are critical determinants of health care use and of health status.

 • Public health surveillance brings together information from both facilities and communities with a focus mainly on defining problems and providing a timely basis for action. This is especially so when responses need to be urgent, as in the case of epidemic diseases. The need for timeliness of reporting and response, and the requirement for effective linkages to those in authority with the responsibility for disease control, impose additional requirements on health information systems.

Recognition of the importance of health information systems capable of generating reliable data is growing. In many countries, health sector reform and decentralization have brought about shifts in functions between the central and peripheral levels and generated new information needs with changing requirements for data collection, processing, analysis and dissemination. Health sector reforms also magnify the need for standardization and quality of information.

 Performance and results based monitoring, stimulated by unprecedented increases in development assistance and global health initiatives such as the GAVI Alliance, the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM), the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), and the Roll Back Malaria (RBM) partnership, have increased pressure on governments and organizations to improve their performance and demonstrate tangible results to their stakeholders. In this environment, a premium has been placed on the existence of adequate, quality 2 Health Metrics Network Framework and Standards for Country Health Information Systems , Geneva, World Health Organization, 2008 http://www.healthmetricsnetwork.org 4 health information.

Health information systems are called upon to enable tracking along the continuum of inputs to the health system, processes and outputs, as well as outcomes and impact. Few developing countries have sufficiently strong and effective health information systems to meet all these diverse information needs. New technologies can contribute to improving data generation, compilation and exchange but will require the existence of clear data quality standards to be of optimal value.

**Sources of information about the country health information system**

 Information about the functioning of the health information system can be obtained from the different sectors and agencies that have responsibilities for the generation, synthesis, analysis and use of data at country, regional and global levels.

 At country level, Ministries of Health record the timeliness and quality of data reported through health services and disease surveillance systems. National Statistics Offices maintain of information about the availability and quality of data generated through major data collection undertaking such as the decennial census, large scale household surveys, and the civil registration system.

 As custodians of national official statistics, they often have explicit requirements for the way data are collected, compiled and shared, and adhere to the Fundamental Principles of Official Statistics.3 International agencies working in health also maintain information about the availability and quality of data

**Criteria for assessing country health information system performance**

Criteria for assessing performance of health information systems and the quality of data they generate have rarely been defined, let alone implemented. By contrast, in sectors other than health, and particularly for macroeconomic and financial statistics, considerable work has been done to define standards, guidelines and best practices (BOX). A commonly used standards framework is provided by the UN Fundamental Principles of Official Statistics. Data quality assurance approaches generally distinguish assessment criteria for data outputs from those that relate to the quality of institutional frameworks that are prerequisites for the generation of reliable data. Some of the quality frameworks are intended to be used to assess national level data whereas others relate to the quality of data issued by international agencies such as the World Bank or the IMF.

The Health Metrics Network (HMN) Framework identifies the key components and standards of a country health information system. The Framework describes health information system components in terms of resources, indicators, data sources, data management, information products, United Nations. Fundamental principles of official statistics. New York, United Nations Statistics Division, 1994. Principles include impartiality, scientific soundness, professional ethics, transparency, consistency and efficiency, coordination and collaboration. 4 Health Metrics Network Framework and Standards for Country Health Information Systems , Geneva, World Health Organization, 2008 http://www.healthmetricsnetwork.org 5 and dissemination and use. The Framework lays out standards to be attained for each component and describes data-management, transformation of data into useable information, dissemination and use.

Country information system performance can be assessed either through independent (often external) expert evaluation or using a self-administered tool (see matrix). Independent, assessment is generally based on existing sources such as databases of international agencies so as to minimize the reporting burden on countries. The disadvantage is that countries may not agree with the assessment and therefore may not use the results for developing an improvement strategy. The major advantage of self-assessment approaches are the degree of country ownership generated that enables the assessment to serve as the basis for the development of a plan for improvement. However, self-assessment approaches are generally time consuming and complex to implement and are less likely to generate results that can be compared over time or between countries, and are likely to be biased

**QUALITY ASSURANCE**

Often used interchangeably with quality control (QC), it is a wider concept that covers all policies and systematic activities implemented within a quality system. QA frameworks include:

 (1) Determination of adequate technical requirement of inputs and outputs,

 (2) Certification and rating of suppliers,

(3) Testing of procured material for its conformance to established quality, performance, safety, and reliability standards,

(4) Proper receipt, storage, and issue of material,

(5) audit of the process quality,

 (6) Evaluation of the process to establish required corrective response,

 (7) Audit of the final output for conformance to (a) technical (b) reliability, (c) maintainability, and (d) performance requirements.

**Quality assurance** (**QA**) is a way of preventing mistakes or defects in manufactured products and avoiding problems when delivering solutions or services to customers; which [ISO 9000](https://en.wikipedia.org/wiki/ISO_9000) defines as "part of [quality management](https://en.wikipedia.org/wiki/Quality_management) focused on providing confidence that quality requirements will be fulfilled". This defect prevention in quality assurance differs subtly from defect detection and rejection in [quality control](https://en.wikipedia.org/wiki/Quality_control), and has been referred to as a *shift left* as it focuses on quality earlier in the process.

The terms "quality assurance" and "quality control" are often used interchangeably to refer to ways of ensuring the quality of a service or product. For instance, the term "assurance" is often used as follows: *Implementation of inspection and structured testing as a measure of quality assurance in a television set software project at Philips Semiconductors is described.* The term "control", however, is used to describe the fifth phase of the DMAIC model. DMAIC is a data-driven quality strategy used to *improve* processes.

Quality assurance comprises administrative and procedural activities implemented in a [quality system](https://en.wikipedia.org/wiki/Quality_system) so that requirements and goals for a product, service or activity will be fulfilled.[[3]](https://en.wikipedia.org/wiki/Quality_assurance#cite_note-asq.org-3) It is the systematic measurement, comparison with a standard, monitoring of processes and an associated feedback loop that confers error prevention. This can be contrasted with [quality control](https://en.wikipedia.org/wiki/Quality_control), which is focused on process output.

Quality assurance includes two principles: "Fit for purpose" (the product should be suitable for the intended purpose); and "right first time" (mistakes should be eliminated). QA includes management of the [quality](https://en.wikipedia.org/wiki/Quality_%28business%29) of raw materials, assemblies, products and components, services related to production, and [management](https://en.wikipedia.org/wiki/Management), production and [inspection](https://en.wikipedia.org/wiki/Inspection) processes.

Suitable quality is determined by [product](https://en.wikipedia.org/wiki/Product_%28business%29) users, clients or [customers](https://en.wikipedia.org/wiki/Customer), not by [society](https://en.wikipedia.org/wiki/Society) in general. It is not related to cost, and adjectives or descriptors such as "high" and "poor" are not applicable. For example, a low priced product may be viewed as having high quality because it is disposable, whereas another may be viewed as having poor quality because it is not disposable.

# **Principle of quality assurance**

# 1: **Customer focus.** The customer is always the most important factor for any business, which is why organisations need to understand current and future customer needs and aim to surpass expectations. Quality assurance relies on researching and understanding the customer’s needs and ensuring that the organisations objectives are in line with those expectations. A quality management system needs to be in place to manage customer relationships and communicate those needs across the organisation.

# 2: **Leadership-** Quality assurance principles also suggest that an organisation needs leadership in order to have purpose and direction. Quality assurance relies on a business having a clear vision of the future – a vision which should consider the needs of all relevant parties including customers, directions, employees, local community etc. Good leadership within an organisation should establish trust and remove fear, whilst encouraging and recognising employee’s contributions.

# 3: **Involvement of people** -An organisation needs to be able to put quality management training into practice. People at all levels of the business need to be motivated, committed and fully involved in the organisation. This principle of quality assurance involves people evaluating their own performance and identifying their constraints, as well as actively seeking opportunities.

# 4: **Process approach** -ISO 9001 training encourages that in order to achieve a desired result, resources and activities should be managed as a process. The process should focus on resources, methods and materials which affect the key activities within a business. In order to maintain quality assurance within a service or product, risks, consequences, the impact on customers and suppliers and other relevant parties should be continuously evaluated.

# 5: **System approach to management** -Quality assurance training demonstrates how to create a structured system which is designed to achieve the organisations aims and objectives using the most effective and efficient methods. Quality management system training should provide a better understanding of the roles and responsibilities necessary for achieving those objectives and should be continually improved by evaluating and measuring its performance.

# 6: **Continual improvement** -Another quality assurance principle is that continual improvement should always be an objective for any business. To maintain quality assurance, it is essential to provide people with the necessary tools and knowledge for continual improvement. Continual improvement of products, processes and systems should be promoted as an objective for every employee throughout all levels in the organisation.

# 7: **Factual approach to decision making**- This quality assurance principle simply ensures that decisions are based on analysed data and information. To comply with this quality management standard, data and information should be accurate and reliable, accessible to those who need it and analysed using valid methods.

# 8: **Mutually beneficial supplier relationships.** The Quality management standard ISO 9001 encourages organisations to create mutually beneficial relationships with its suppliers. These mutually beneficial relationships allow the organisation to benefit from optimised costs and resources, clear and open communication and being able to share knowledge and plans on market changes and consumer expectations.