Comprehensive Assessment of Health Information System: Iraq, 2019

Preliminary Report

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Contents

Foreword

A well-functioning national health information system (HIS) is a prerequisite for the provision of reliable and timely health-related information. This information is essential for policy development and evidence-informed decision-making; proper health management and rational resource allocation; and monitoring and evaluation of health systems and other related social services performance.

Generation, availability and accessibility of timely and quality information for key health indicators is essential for monitoring the progress towards achieving the targets of the health related Sustainable Development Goals.

The lack of reliable, timely and comparable information often hampers tracking and evaluation of progress. As a result, there has been reliance on estimates and modelling to substitute, which do not always reflect the reality in countries.

This situation calls for effective and sustained action to strengthen national HIS, as well as reinforce the capacity in generating, compiling, analyzing, disseminating and reporting reliable data for the monitoring of health situations.

The aim of this comprehensive HIS assessment is to review the national situation, identify constraints and collectively develop and implement strategic directions to address these, and support the country in reinforcing informed decision-making and strengthening our capacity to monitor national health development.

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Preface

The role of health information systems (HIS) including civil registration and vital statistics (CRVS) systems in generating health information data for program and performance monitoring, quality of care, planning and policy making is widely acknowledged. Within the context of the agenda for sustainable development, countries are encouraged to generate reliable data to track progress and inform decision making. In line with the WHO's General Programme of Work 2019-2023, WHO is collaborating with Member States to improve their HIS, analytical capacity and reporting for universal health coverage. In particular, the organization is supporting countries to develop comprehensive and efficient systems to monitor health risks and determinants; track health status and outcomes; including cause specific mortality; and assess health system performance. The organization is also helping countries to disaggregate data so that progress made on gender equality and health equity can be measured.

Since 2012, WHO has been working with Member States to agree on priority actions to strengthen HIS. Through a consultative process and intensive work with Member States, WHO has developed a framework for HIS and 75 core indicators that focus on three main components: 1) monitoring health determinants and risks; 2) assessing health status, including morbidity and cause-specific mortality; and 3) assessing health system response.

As part of WHO efforts to support Member States to meet their national, regional and international obligations in reporting health indicators, a number of comprehensive HIS assessments have been conducted in the Eastern Mediterranean Region since 2016 to identify key gaps and strategies to strengthen HIS. The first comprehensive assessment was conducted in Jordan, followed by Libya, Pakistan, Afghanistan, and Iraq. The assessment identified gaps in the HIS and generated recommendations and priority actions aimed at improving country health data systems. Other key interventions focus on capacity building in death certification, ICD coding, data analysis, and use of DHIS 2 platform to enhance collection, processing, analysis and use of health-related data for decision-making.

We hope this report will guide decision-makers in the Ministry of Health and all development partners and stakeholders in planning and implementing effective interventions to enhance the Iraq HIS. WHO expects that the priority areas identified by the assessment team and ongoing strategies to improve CRVS, including the quality of cause of death data, will enhance Iraq's efforts to monitor the health situation and sustainable development indicators.

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Abbreviations

CRVS	Civil Registration and Vital Statistics
CSO	Central Statistical Organization
CHW	Community Health Worker
DHIS	District Health Information System
DOH	Directorate of Health
e-CAP	Electronic Community Assessment Programme
EMRO	Eastern Mediterranean Regional Office (for WHO)
EWARN	Early Warning and Response Network
GPW	General Programme of Work (for WHO)
HeRAMS	Health Resources Availability Monitoring System
HIS	Health Information System
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HMN	Health Metrics Network
HRIS	Human Resources Information System
HVSD	Health and Vital Statistics Division
HVSS	Health and Vital Statistics Section
PRDD	Planning and Resource Development Directorate
ICD	International Classification of Diseases
ICT	Information, Communication and Technology
MEASURES	Monitoring of Events Against Safe Use & Running of Health Services in complex emergencies
M&E	Monitoring and Evaluation
MIS	Management Information System
MoH	Ministry of Health
NGO	Non-Governmental Organization
NHA	National Health Accounts
PHC	Primary Health Care
RHIS	Routine Health Information System
SDG	Sustainable Development Goal
SWG	Stakeholders Working Group
SOP	Standard Operating Procedures
UHC	Universal Health Coverage
WHO	World Health Organization

Executive summary

Health information systems (HIS) including civil registration and vital statistics (CRVS) systems remain key sources of data for evidence-based decision-making both at the national and the sub-national level. In order to enhance the operations of the Iraq national HIS, the World Health Organization (WHO) in collaboration with the Ministry of Health (MoH) conducted an assessment of the national HIS from 13 to 17 January 2019 in two parts: 3-day field visits to the governorates and a two-day national workshop in Baghdad. The assessment team reviewed the operations of the Iraq HIS in terms of its adherence to sound policy and institutional environment; utilization of well-functioning data sources; availability of strong institutional capacity for data collection, management, analysis, use and dissemination; and implementation of effective mechanisms for review, data use and action. Using a methodology developed by the WHO Regional Office for the Eastern Mediterranean for comprehensive HIS assessment, the assessment team was guided by the WHO M&E Assessment and Planning tool which provides an overview of the weaknesses and strengths of the country M&E systems and enables identification of priority actions based on those findings.

Findings

A number of observations were made related to HIS operations in Iraq. One of the main strengths of the HIS includes the existence at the national level of health and vital statistics department in the Directorate of Planning and Resource Development that define roles and responsibilities for collecting, managing and disseminating health data, including confidentiality. The recent CRVS system assessment has also generated momentum to improve the quality of causes of death data. International standards are also followed in presenting key indicators to ensure comparability of results between populations and over time. Standard case definitions are also available for all diseases and syndromes under surveillance. With respect to core health indicators reporting, the percentage of indicators reported to WHO increased from 71% in 2014 to 78% in 2018.

Despite a number of interventions that have been implemented to enhance Iraq HIS, the assessment team found that the national HIS across all components fulfil only about 24% of the attributes of a functional HIS. Some of the weak dimensions include key strategic areas such as lack of comprehensive and costed M&E plan for the national health sector strategy; no common investment framework to be used as a basis for partners and domestic support. There is also lack of national policy/strategy for e-health and ICT development and use, including governance and legal frameworks; enterprise architecture; standardization and interoperability; and research and evaluation on e-health. Independent reviews of data in strategically important programmes such as maternal, child and perinatal deaths are not conducted regularly. Other key attributes which are not present include weak institutional collaboration within the MoH such as duplication of activities with weak collaboration between different directorates, departments, and sometimes between units of the same directorates; duplication of data collection at the facility level (e.g. paper and electronic formats used for same data collection); limited incorporation of results from health sector reviews into decision-making including resource allocation and financial disbursement. Facility reporting systems do not use web-based systems such as DHIS 2 when

feasible. Iraq HIS also lacks institutionalization of regular and independent data quality assessments. The system of automated coding of causes of death are also not progressively used including lack of trained resources to conduct verbal autopsies. Conduct of household surveys is irregular due to weak coordination with the MoH thereby limiting the ability to effectively monitor progress on key health indicators. Regular annual statistical reports of the MoH not published on time, almost one year behind with lack of regular analysis report of progress and performance that covers progress against the objectives and targets. The detailed priority actions and their timeline will be presented in the main body of the report whereas the overarching recommendations emanating from the assessment are presented below:

Governance and policy
- Establish a high level HIS national committee to monitor implementation of HIS assessment recommendations and operations.
- Through an HIS coordination committee, developing a costed M&E plan with clearly defined baseline and targets for all the indicators.
- Implement annual reviews of health system data to assess progress in line with the M&E plan.
- Develop a unified strategy for e-health and ICT.
- Develop a harmonized national surveys plan to ensure that the country is able to report on the maximum number of core health indicators. This will ensure that key surveys such as health examination surveys remain a priority to provide data on most of the core health indicators.
- Regulate private health sector operations including reinforcing private sector compliance for data sharing.

Infrastructure and support
- Adopt technology that provides greater storage capacity (mostly cloud-based), a safer databank, and with easier data recovery.
- Improve the existing infrastructure to ensure that technological and staffing needs are in line with existing demands for capacity to collect, process, analyse, disseminate and use data for decision-making particularly for public financial management systems and across all sub-information systems.
- Strengthen the functionality of hospital laboratory system by using a centralized web-based and integrated system.
- Roll out DHIS 2 across all facilities in order to support implementation of a unified and standardized system of data collection.

Data management and standards
- Conduct regular workshops on data analysis and use at the national and sub-national levels to build capacity of relevant staff across all levels and ensure timely generation of key health reports.
- Develop SOPs on analysis, use and evaluation of data at national and sub-national level.

Quality assurance
- Conduct periodic reviews of all routine health management information system including vital statistics data at the national level using international standards for data quality reviews.
- Develop and/or review SOPs for regular supportive supervision visits to enhance functionality of all sub-information systems and ensure that data are easily accessed, retrieved, and utilized for decision making.
- Conduct regular data analysis, independent reviews of data, and performance reviews at the national and sub-national levels and incorporating results from the reviews into decision-making.

Data dissemination and use
- Implement IT platforms such as DHIS 2 that facilitates development of dashboards to support use of information for decision making at all levels including for senior health managers.
- Promote feedback mechanisms on data collected at lower levels.
- Promote and establish a national health observatory and open data access policy subject to rules and regulations governing the type of data that can be shared publicly.
- Conduct regular data dissemination workshops at the national level for population-based surveys and census.

Way forward

The basic structure of an HIS is available in Iraq. However, there are existing opportunities to enhance the operations of the Iraq HIS. Eighty-one priority actions, across all the HIS functional areas, were identified during the working group sessions to enhance HIS operations. The detailed priority actions which will be presented in the main report will provide an opportunity for the MoH, in collaboration with other HIS stakeholders and development partners, to deploy interventions to enhance the HIS in the short-term, mid-term, and long-term. Some of the interventions can be implemented with limited effort; without a great deal of change to the existing systems; and with the leadership of the MoH. However, to ensure effective monitoring of the progress in implementing interventions, a functional national HIS coordinating committee should be established and taking the ownership to oversee this process. The agreed set of recommendations/priority actions can be costed to facilitate domestic and external resource mobilization. The timelines for implementation of the interventions can be adjusted depending on the local circumstances.

1. Background

1.1   Overview of the health situation in Iraq

The population of Iraq was estimated at 38 million in 2018, spread across 18 governorates including 3 governorates in a semi-autonomous region of Kurdistan. The estimated population living in rural settings is 30.1% (2017) with 40.5% of the total population under the age of 15 (2017). With an annual population growth rate of 2.4% (2017) and a life expectancy at birth of 70.3 years (2017)[1], the country has experienced significant armed conflict with concomitant disruption of the health system delivery and destruction of livelihoods. Infrastructure and public services have grown weaker to address the basic needs of the people especially the most vulnerable (women, children, elderly, injured, displaced, handicapped). In particular, the health sector has also suffered from old physical structures, limited human resources, loss of equipment, and inadequate medical supplies. The protracted emergencies have made emergency response a significant portion of the health sector.

Improving health and quality of life remains a priority within the country's Sustainable Development Agenda 2030. Health services are offered mostly through the public sector, with the private sector and non-governmental organizations also gradually establishing their health facilities. Iraq is also signatory to various declarations and internationals agreements/treaties such as the World Health Assembly declarations, the Sustainable Development Goal (SDG) agenda, WHO Framework Convention on Tobacco Control, and International Health Regulations (IHR) 2005.

Key health challenges include burden of disease attributable to communicable diseases (19.1%); noncommunicable diseases (61.6%); and injuries (19.2%), which are largely a result of the armed conflict and requiring post-operative care and long term rehabilitation. The share of out-of-pocket expenditure is 76.5% (2015) and the health workforce density (2017) is 9.4 physicians per 10,000 population. The main causes of mortality include cerebrovascular disease, malignant neoplasm, cardiovascular diseases, renal failure, respiratory and cardiovascular disorders specific to perinatal period, operations of war, road traffic accidents and diabetes mellitus.

There are capacity constraints related to overall governance, financial management, human resource management, procurement, surveillance, M&E, and laboratory services. Despite these challenges, the Ministry of Health (MoH) with support from the Iraq Health Cluster[2] has continued its efforts to improve routine health care, public health functions and health system development. Current government's efforts focus on the development of the health sector with a particular focus on enhancing health information systems (HIS) and evidence for decision making. In line with current efforts to respond to national, regional, and global demands for reliable and timely health information, this comprehensive HIS assessment was aimed at aligning the country's efforts to improve health outcomes and accelerate progress towards universal health coverage.

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[1]Iraq Annual Statistical Report, 2017.
[2]The Iraq Health Cluster consists of international NGOs, local NGOs and United Nations Agencies.

1.2   Overview of the health information system in Iraq

1.2.1   Evolution of health administration and statistical department in the Ministry of Health

The Public Health Management in Iraq was established in 1914, under the management of the British Army - until 1921. On 12 September 1921, after the First World War, the first Iraq Government (Republic of Iraq) was established and the Public Health Directorate was converted into the Ministry of Health (MoH). In 1922, the MoH was aligned to the Ministry of Internal Affairs. In 1936, it was related to the Ministry of Social Affairs; and in 1952, the MoH was established as an independent Ministry. In 1949, the Statistical Section had been established in the Public Health Directorate in the Ministry of Social Affairs. In 1952, the section was converted into a Department, followed by Vital Statistics Directorate in the MoH. In 1985, the Statistical Department was linked with the Planning and Health Education Directorate which was renamed into Planning and Resource Development Directorate (PRDD) as it is currently named.

1.2.2   The national health information system structure and data flow system

Health information system provides data for all health system functions and health facilities and is often considered as a proxy for the level of development of health system. Data are collected through routine national information system and supplemented by population-based surveys, vital registration system and health surveillance.

During the recent past key steps have been taken to strengthen the national HIS at various levels. The use of information technology in data collection, data storage and data analysis was increased and many professionals working in public hospitals were trained on the WHO International Classification of Diseases (ICD 10).

The department in-charge of national information system, Health and Vital Statistics Department (HVSD), is hosted in the PRDD of the MoH and has units in the planning departments of all Directorates of Health (DOH) at governorate level, called Health and Vital Statistics Section (HVSS). The HVSD at the national level is staffed by 37 persons with different levels of statistical skills including physicians, statisticians, IT programmers, and administrative staff. Health statistics at the HVSS of DOHs are usually handled by an individual with some skills in information management and analysis. The hospitals have usually statistics units in their structure for data compilation and coding that is staffed by at least one skilled person in birth and death registration as well as compilation of monthly statistical reports. In the health facilities as the PHC level, data recording and compilation is done, generally, by a person with little training in information management. A summary of health facilities that provided data for the health statistics at different levels as of 2017 is presented in Table 1.

Table 1: Health facilities in Iraq, 2017

Indicator	Value
Primary Health Care centers (PHCs)	2658
Main PHCs (10 000 population and above, have at least one physician)	1295 (48.2%)
Sub-center (5000 -7000 population, run without physician)	1363 (51.8%)
Health sectors	135
Public hospitals	273
Private hospitals	127
Specialized health centers	27
Births and deaths registration office	284

Source: MoH Annual Statistical Report, 2017

All the data collected in the facilities are disaggregated by sex, age and residence at intake and remain disaggregated when compiled for monthly/annual reports at all levels. There is also private health sector, which delivers health services through private hospitals, clinics, pharmacies and medical laboratories. The MoH doesn't capture health data from the private sector, except for the numbers of inpatients and their causes of admission from the private hospitals report to the HVSD. In 2018, the total statistical workforce across all facilities was 3,444. Of these, 521 (15%) were Statisticians, 1,822 (53%) were medical and paramedical staff, and 1,100 (32%) were administrative staff.[3]

Registration of birth and death events that take place in private sector is recorded on the same birth and death certificate which are used in public health facilities, and then endorsed in the birth and death offices of MoH. The HVSD is mainly concerned with collecting statistical data, analysing them and producing annual reports, a mean that makes health information available for use.

There are also a number of vertical programme information systems that provided data for the national HIS. These include systems for noncommunicable diseases; tuberculosis; HIV/AIDS; cancer registration; maternal mortality surveillance; immunization; surveillance of notifiable diseases (infectious diseases); substance abuse (drug addiction); national health accounts; EWARN (WHO); Ecap (WHO); HeRAMS (WHO); and MEASURES (WHO). These systems are not expanded at the national level but used in selected areas.

1.2.3 Earlier efforts to assess health information system

In 2011, an assessment of HIS in Iraq was carried out through a series of consultative workshops in collaboration with other stakeholders, forming the HIS Stakeholders Working Group (SWG). WHO provided technical support in the form of training of the SWG members on the use of HIS assessment tool, which was based on the Health Metrics Network (HMN). The final assessment workshop was performed in March 2011 in Baghdad with 38 participants from different stakeholders. The assessment results, placed the national HIS in Iraq in the "Adequate" (62%)

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[3]Data from Ministry of Health, Statistics Department, 2018.

range. This was interpreted as weak with most of the elements function poorly. The scoring for the specific categories during the 2011 assessment were as follows:

- Resources: Present but not adequate (45%)
- Essential Health Indicators: Adequate (67%)
- Data sources: Adequate (60%)
- Data management: Adequate (53%)
- Information products: Adequate (73%)
- Dissemination and use: Adequate (50%)

The key areas identified during the 2011 assessment as weak points for the national HIS were:

- Lack of statisticians' within MoH to run the HIS operations;
- No special institutions for medical/health recording training;
- Poor feedback from private health sectors because of poor coordination and collaboration between public and private sectors (clinics, labs and hospitals) except from private hospitals;
- Longer intercensal periods (last census in Iraq was conducted in 1997);
- There were other sources of data that did not constitute part of the information reported by health information system;
- Physicians and relevant health workers lacked proper training in recording cause of death, coding morbidity and the optimum use of information;
- Lack of specific training programs in curriculum of medical undergraduates;
- Lack of statistical awareness of some health institutional managers;
- Huge numbers of statistical forms with repetition of some indicators;
- Weak feedback mechanism between DOH and its health institutions;
- Weakness in using ICD-10 for diagnosis of diseases by medical staff; and
- High turnover of the trained statistical staff.

2. Purpose and objectives of assessment

The role of health information systems (HIS) including civil registration and vital statistics systems (CRVS) in generating health information data for program and performance monitoring, quality of care, planning and policy making is widely acknowledged. Within the context of the agenda for sustainable development, countries are encouraged to generate reliable data to track progress and inform decision making. In line with the WHO's General Programme of Work (GPW) 2019-2023, WHO is collaborating with Member States to improve their HIS, analytical capacity and reporting for universal health coverage (UHC). In particular, the organization is supporting countries to develop comprehensive and efficient systems to monitor health risks and determinants; track health status and outcomes; including cause specific mortality; and assess health system performance. The organization is also helping countries to disaggregate data so that progress made on gender equality and health equity can be measured.

The HIS assessment of 2011 in Iraq (see Section 1.2.3) provided key priority areas for improvement. Since then, the MoH and other stakeholders embarked on a number of interventions to strengthen the health information and evidence system. For example, in 2012, a CRVS system road map (2013–2015) was developed to address the gaps in the system identified through a rapid and comprehensive assessment. Another key initiative that was undertaken was a comprehensive review of all the statistical forms used at different levels of the health system. This was aimed at updating the forms, identifying duplicates and removing those no longer needed. A three-year maternal death surveillance and response plan for the country was developed outlining priority actions to address deficiencies in the maternal death surveillance and response system thereby reducing morbidities and mortalities related to maternal health. A maternal death surveillance and response plan committee was established to provide guidance and monitor programme performance. Despite these initiatives, the performance of the Iraq HIS remains modest and warranted another comprehensive assessment to take stock of progress made since the last assessment in 2011 and identify key gaps and challenges in line with increasing demands for countries to generate reliable data to monitor progress towards UHC.

In order to ensure that Iraqi HIS responds to national, regional, and global demands for reliable and timely health information, a comprehensive HIS assessment was conducted aimed at supporting Iraqi's efforts to monitor its health development agenda as well as enhance its reporting capacity on the 100 core health indicators (plus health-related Sustainable Development Goals (SDGs)) and the 75 regional core health indicators. A comprehensive approach enables identification of weaknesses and strengths of the country monitoring and evaluation and health information systems, and to identify priority actions based on those findings. The approach involved assessment of a check-list of attributes of the five main components of the M&E system: governance; infrastructure; data management and standards; quality assurance; and dissemination and data use.

Following consultations with the MoH, the key objectives of the assessment as outlined in the terms of reference (ToR) were:

- Develop a common understanding of information systems and databases available in a country in order to identify areas for improvement particularly on information flow across the country.
- Provide documentation of the different sources of data for HIS (i.e. population-based, institution-based, service records and individual records, and surveillance or community system).
- Provide an understanding of their content, data elements, associated reporting burden, and how these information systems are used and by whom.
- Assess the strengths and weaknesses of these components and operations within the HIS, including aspects of governance; infrastructure; data management and standards; quality assurance; and data dissemination and use.
- Provide recommendations for an over-arching HIS agenda that is consistent with global and regional HIS standards, indicator frameworks and guidelines.

- Recommend strategies that build capacity of the information management system enabling it to produce core indicators on disease burden, health access and utilization, mortality, HIV surveillance, and human resources, including responding to the information requirements of SDGs and UHC.
- Develop a roadmap to strengthen HIS based on the findings of the assessment, including priority actions, responsible parties or stakeholders and timeline.

The results of the assessment are expected to help the Iraq MoH develop a prioritized and detailed roadmap for HIS improvement and reporting of core indicators at the national, regional, and international level.

3. Assessment methodology

In line with scope of the ToR, the assessment team implemented a methodology that sought to develop common understanding of available information systems and databases; assessing the strengths and weaknesses of these components and operations within HIS; and providing recommendations consistent with WHO and HIS standards, indicator frameworks and guidelines. The methodology was based on an approach developed by the WHO Regional Office for the Eastern Mediterranean (EMRO) for comprehensive assessment of HIS (Figure 1). During the Iraq HIS comprehensive assessment, discussions were guided by the WHO M&E Assessment and Planning tool[4] which provides an overview of the weaknesses and strengths of the country M&E systems and enables identification of priority actions based on those findings.
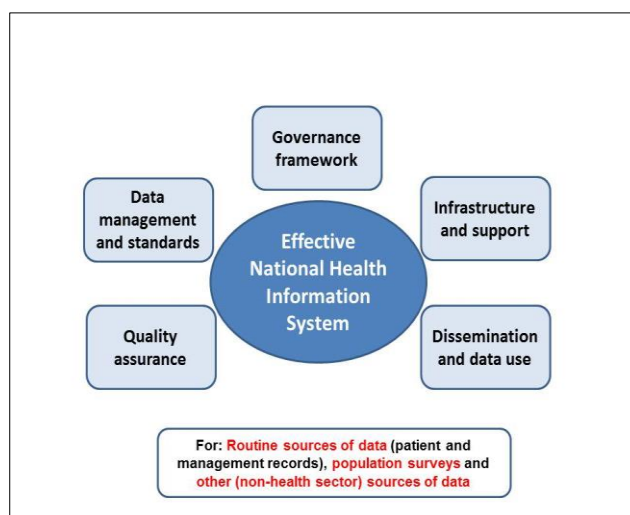
Fig. 1. Adapted model of effective national health information system
Source: WHO, EMRO, version 2.

3.1 Document reviews

As part of the mission preparations, the assessment team reviewed documents provided by the MoH, the 2011 HIS assessment report, documents on interventions by other development partners to improve HIS, and documents available in the public domain. Some documents were also received during the meetings.

3.2 Field visits

All field visits were conducted from 13 to 15 January 2019. The assessment team was divided into three teams and visited different parts of Iraq. The first team visited the following institutions and establishments in Baghdad: the MoH, Baghdad Medical City, Bab Al Muatham

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[4]M&E assessment and planning tool, version 1. WHO, February 2017.

PHC, and Baghdad General Hospital, including two focus group discussions with disease specific surveillance programmes and HGIS team . The second team was assigned to Basra and Mysann and made visits to Basra DOH, Al Razi PHC Training Centre, Basra Teaching Hospital, Mysann DOH, Al Auroba PHC Centre and Al Sader Teaching Hospital. The third team visited Kirkuk and the Kurdistan Region; and visited the following: Kirkuk DOH, Azadi Hospital, Tesseen PHC Centre, the Kurdistan Region MoH, Erbil DOH, Rizgary Hospital and Brayati PHC Centre. The assessment team members met with managers of facilities, service providers, and HIS officers. The team members took notes on discussions and findings, which were later assimilated and analyzed.

3.3   Health information system assessment workshop and working groups

A two-day workshop was conducted in Baghdad, Iraq from 16 to 17 January 2019 to learn and document different systems (manual and automated) focusing on information systems directly relevant to the MoH interests. During the workshop an overview of the information systems was made by the MoH. Four working groups sessions[5] were held focusing on key issues of a functioning HIS: policy and governance; data sources (CRVS system, routine HIS, disease surveillance); institutional capacities; and mechanisms for review, data use and decision making. Presentations from the MoH including discussions during working group sessions focused on the types of systems used, challenges related to data collection and flow, data quality, timeliness and efficiency in data flows, challenges in reporting compliance, analysis and interpretation, capacity of staff, use of information for decision-making, and difficulty of assembling information from different sources at all levels. The assessment team also highlighted the potential and need for Iraq to implement DHIS 2 as a data collection tool across all facilities since DHIS 2 implementation road map had already been developed by the MoH and some initiatives to pilot the system started in other parts of the country such as the Kurdistan Region. Discussions were guided by the quantitative WHO M&E Assessment and Planning tool. A debriefing meeting was held with the MoH and other stakeholders on the last day of the mission to present the observations made in this assessment and to discuss next steps.

3.4   Synthesis of findings, recommendations, and report preparation

In addition to the document reviews and the information gathered during the discussion and working groups with MoH officials and other stakeholders, the team also made technical judgements and consolidated the findings according to the thematic areas of the M&E Assessment and Planning tool. The team used this information to formulate priority actions or recommendations for HIS improvement in Iraq. All team members contributed to each of the sections of the report which were later compiled and shared with the MoH and other stakeholders for review and feedback. The final report was shared with the MoH and all stakeholders.

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[5]Each of the four working group sessions was facilitated by one participant with experience in the key HIS issues for discussion. The facilitators were assisted by the review team members.

4. Key findings on health information system

Improved collection, processing, analysis, dissemination, and use of health information is a key step in achieving better health outcomes in Iraq. Evidence-based decision making can be realized if a country has a functional, integrated and comprehensive HIS. Within the context of the sustainable development agenda and the need to monitor the WHO GPW 13, the growing demand for health-related information by policy makers, program managers, development partners, the public at large and other stakeholders call for enhancement of data collection and reporting systems from the health facility to the national level.

In Iraq, as in the case with most countries, HIS serve multiple users and a wide range of purposes. The discussion of the key findings on HIS focuses on two key components: observations from field visits in selected facilities and a quantitative assessment on the availability of key attributes of a functional HIS. This is followed by a discussion on the key priorities to enhance the HIS in Iraq.

4.1   Observations from field visits

The field visits (see Section 3.2) were made in line with the objectives of the assessment (see Section 2). Briefly, three teams made the field visits aimed at understanding the operations and functionality of the various components of HIS at the governorate level and identify areas for improvement. While the selected facilities were not representative at the national level and within the constraints of the available time, this approach enabled the assessment team to gain insights into the current practices at the facility level. The findings (strengths and weaknesses) from each of the teams are consolidated according to the four functional areas of policy and governance; data sources; institutional capacities; and mechanisms for review, data use and decision making (Table 2).

Table 2: Key observations on HIS from field visits

Key HIS component	Strengths	Areas for improvement
1. Sound policy and institutional environment	Availability of list of indicators and targets to monitor health status in some governorates. The list includes mostly WHO regional core health indicators.	Matching existing indicators with SDG indicators across all data collection units
		Master list of national core indicators
	Availability of priority disease lists for surveillance, including case definitions.	Comprehensive and budgeted plan for HMIS – developed with involvement of key stakeholders as well as engagement of relevant units/departments in planning and implementation.
	HIS staff have job descriptions in many locations.	
		SOPs for core HIS operations related to data collection, management, analysis and reporting
	Supportive monitoring visits are conducted (6 facilities per month).	
		Integrating all sub-information systems
	Implementation of electronic/automated platforms for data collection particularly for PHC programmes - but not in all	Implementing electronic systems that can meet growing data demands, in terms of volume of data, quality, and real time

Key HIS component	Strengths	Areas for improvement
	locations.	reporting.
	Data from private sector are collected (for in-patients) in some locations.	Policy on data collection from private sector
	Interest to implement DHIS 2 at the national level.	Communication between health facilities and the Ministry level.
	Availability of capacity building programmes.	Mechanisms to address staff turnover Assess the current HR capacity and develop a plan for HR
	Human resources plan is available in some areas.	Enhancing capacity of existing staff in relevant areas of HIS functionality
		Mobilizing development partners to support HIS operations to ensure that the system is able to generate data that can be used by the MoH and all development partners
2. Data sources	Data collection for many indicators, including SDG 3 indicators.	Standardization of HIS tools and platforms. This includes definitions (and job titles) for the HR database.
	Data collection from all sub-reporting units.	Upgrading and standardization of software for use across facilities for data collection and processing.
	Completeness and timeliness of data relatively good at facility level in some areas.	Upgrading HIS software to easily manage HIS data since the current and common HIS software (Fox Pro and MS Excel) has limitations related to flexibility and the ability to handle transactional data.
	Local servers available for storage in all areas.	
	Although not scaled nationally, Health Visitor Programme with (1) georeferenced coding to track health events; (2) data that are benefiting other programmes to define their interventions; (3) opportunities to track unvaccinated children, including SMS alerts to minimize defaulters.	Overburdened and duplicated data collection processes (i.e. paper forms and electronic data entry taking place for the same data).
		Completeness of data and ICD coding, including registration of infant deaths.
		Staff capacity to monitor and implement ICD-10.
		Quality and completeness of birth registration data.
		In areas where the Health Visitor Programme is operational, efforts should be made to collect other relevant data instead of only vaccination data as was the case at the time of the assessment.

Key HIS component	Strengths	Areas for improvement
		Systematic feedback to reporting units. Adequacy of surveys and assessments to generate data for planning. Electronic document archiving system Back-up or cloud storage. Tracking system for patients with multiple visits.
3. Strong institutional analytical capacities	Data analysis conducted at the MoH and partially at the DOH level. Basic analyses of data recently started at the district level in some areas using Fox Pro and MS Excel. Willingness to analyse data at the lowest level of data collection to guide decision making. Timeliness and completeness of data checks as part of monitoring visits. ArcGIS and MapInfo used in the sites visited for georeferenced data to enhance visualization of data.	Detailed analyses of data in some areas for decision making. Staff capacity and technical resources to conduct detailed analyses of data.
4. Mechanisms for data use, review, and action	Data collection to support annual reporting of data; with limited use for decision making in some areas.	Systematic approach for data reviews or quality assurance Use of data for planning

4.2 HIS assessment and planning tool: scoring

The assessment team administered the HIS assessment and planning tool to get an overview of the current status of the different components of a functional HIS, and to identify priority actions that require further strengthening or development. The tool consists of a check-list of attributes of the four main components of a functioning HIS platform: sound policy and institutional environment; well-functioning data sources; strong analytical capacities; and mechanisms for review and action. The tool was presented to the participants in a plenary session.

During the national workshop, participants were divided into four groups to score 71 attributes of the check-list, falling under the following categories:

Group 1:   Sound policy and institutional environment; and Effective country mechanisms for review and action.
Group 2:   Well-functioning data sources related to routine health information systems.

Group 3:   Well-functioning data sources related to household surveys, census, and CRVS; and strong institutional capacity for data collection, management, analysis, use and dissemination

Group 4:   Well-functioning data sources related to disease surveillance and health systems.

Figure 2 displays results of the scoring of the attributes. Complete scoring results for each component (by working group) are presented in Annex 1.
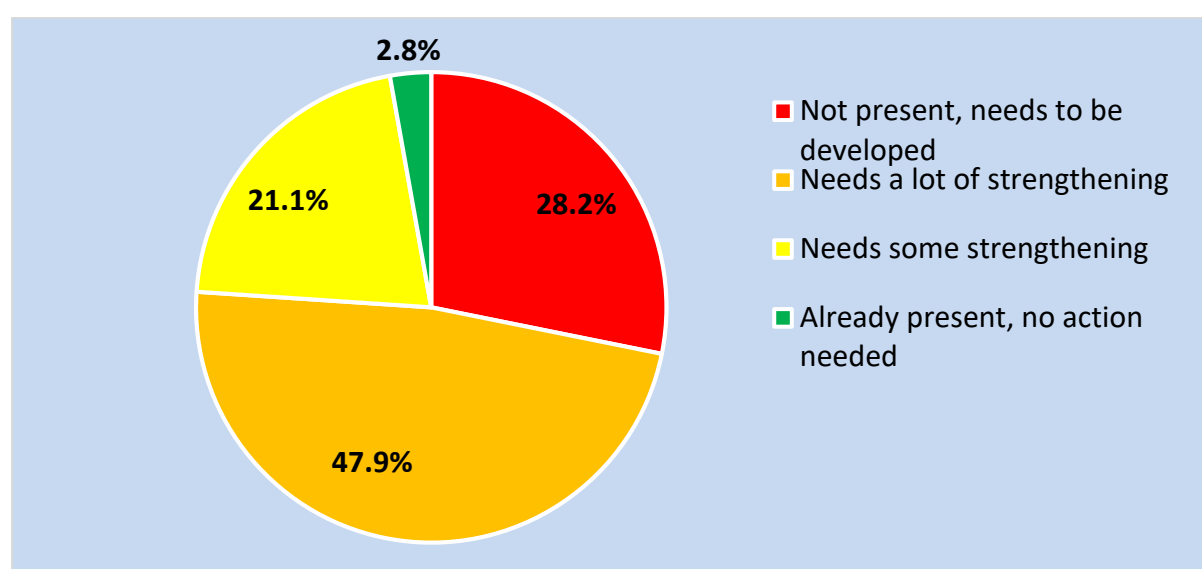
Figure 2: Summary of scores from the assessment and planning tool

According to the assessment conducted by the workshop participants, **28% of the attributes of a functioning platform are not present**, distributed across all components. Although several initiatives have been implemented to enhance HIS in Iraq, there is no comprehensive costed M&E plan for the national health sector strategy; and no mechanisms established for a common investment framework to be used as a basis for partners and domestic support. There is also lack of M&E plan that includes a framework that specifies a balanced and limited set of core indicators with well-defined baselines, targets, frequency of measurement and data sources. There is also lack of national policy/strategy for e-health and ICT development and use, including governance and legal frameworks; enterprise architecture; standardization and interoperability; and research and evaluation on e-health. Independent reviews of data in strategically important programmes such as maternal, child and perinatal deaths are not conducted regularly.

Other key attributes which are not present include engagement of civil society organizations to actively participate in country reviews of progress and performance at all levels. Results from reviews are also not incorporated into decision-making including resource allocation and financial disbursement. Facility reporting systems do not use web-based systems such as DHIS 2 when feasible. Iraq HIS also lacks institutionalization of regular and independent data quality assessments. The system of automated coding of causes of death are also not progressively used including lack of trained resources to conduct verbal autopsies. Conduct of household surveys is

irregular thereby limiting the ability to effectively monitor progress on key health indicators. There is also lack of regular (annual) report of progress and performance that covers progress against the objectives and targets.

A collaborative approach involving all key stakeholders to synthesise and analyse national data from all relevant sources is lacking. In addition, effective processes to support analysis and use of data at sub-national level are lacking. Country-specific routine recording systems for tracking private health expenditures (e.g., by NGOs, enterprises, and private insurances), to replace health accounts annual surveys are lacking. Health accounts results are not used for policy planning and evaluation, from overall health system policies to health system financing policy specifically. To a large extent, "health systems" information sub-systems are not interoperable nor integrated into the HMIS.

Almost 48% of the attributes need a lot of strengthening, meaning that although key attributes of a good functioning HIS are in place, there is still significant room for improvement. This includes key strategic areas such as disease- and programme-specific monitoring, evaluation mechanisms, including indicators, aligning with the M&E plan; ensuring availability of agreed indicators, means of measurement and targets for M&E of health-related SDGs; and existence of an effective country-led coordination mechanism for M&E and review with active involvement and support of relevant development partners, civil society and other actors. Other areas requiring a lot of strengthening include development of up-to-date legislation and detailed regulations for health information including all data sources; regular and transparent system of reviews of progress and performance against national and locally defined priorities with broad involvement of key stakeholders; availability of systematic linkages between health sector reviews and disease and programme-specific reviews; and ensuring that health information flows include regular feedback and use of data locally to improve services and programs.

Other key areas requiring a lot of strengthening include building capacity of hospital information systems to report deaths with cause of death through medical certification using ICD; enhancing the IT infrastructure to enter information on the deceased including the cause of death by individual record; developing strategies and mobilizing resources to strengthen the notification of births and deaths and medical certification of cause of death. To ensure regular availability of data generated from population-based surveys, there is a need to develop a national survey plan and research agenda for household surveys detailing content, sequencing, periodicity and funding aligned with the M&E plan and the National Health Strategy.

Plans are also needed to ensure that there is adequate country level capacity for census and survey data collection, analysis, report writing and dissemination. Further, a lot of strengthening is needed in areas related to building strong analytical institutional capacities for supporting synthesis of data. At the national level, a lot of strengthening is needed for periodic performance reviews/analytical reviews based upon robust analysis of health data from all sources including contextual and qualitative information; a range of dissemination strategies to enhance health information, census and vital statistics including reports, policy-briefs and web-based dissemination; and ensuring that health data are transparent and accessible. Ensuring that

national public health and academic institutions, advocacy groups and media are engaged by MoH and Central Statistical Organization (CSO) to disseminate key health information is another area requiring a lot of strengthening.

With respect to surveillance and health systems, the following are areas requiring a lot of strengthening: defining a list of priority diseases and syndromes under the current national surveillance; ensuring that public and private healthcare facilities, laboratories and communities contribute to routine case detection; enhancing capacity to diagnose and record cases of notifiable diseases; analyzing data on a regular basis at the different levels to detect events involving cases or deaths above expected levels for the particular time and place; and defining alert/action thresholds for priority diseases and syndromes. Similar areas relate to integration of all disease surveillance programmes; effective and sufficient deployment of equipment and logistics across the country to appropriately conduct public health surveillance activities; recruitment or redeployment of sufficient staff at all levels to conduct public health surveillance and response; and ensuring that there is a reliable and transparent system for tracking the aggregate availability of human resources. Interventions requiring a lot of strengthening relate to development of an electronic registry ("HRIS") with up-to-date data on each individual health worker including a unique identifier, qualifications and key characteristics (e.g. name, birth date, sex, contact, and place of work). Annual health expenditures tracking using the global standard of System of Health Accounts; development of logistics information system for tracking commodities, medicines, equipment, and supplies; and development of a functional laboratory information system remain key areas that require a lot of strengthening.

Almost 21% of the attributes need some strengthening. These include development of SOPs that define roles and responsibilities for collecting, managing and disseminating health data, including confidentiality; development of unique facility identifiers and geocodes for all health facilities; ensuring that disease- and programme-specific data elements and indicators are integrated into the national common data repository; and reviewing the current CRVS system performance to identify any existing gaps. Other critical areas requiring some strengthening include availability of a functional multi-sectorial HIS coordination committee; an up-to-date legislation and regulation for CRVS system; a coordination mechanism to coordinate plans for national census and national surveys; ensuring that the Central Statistical Organization publishes timely and reliable annual population estimates for various demographic and geographic groups (e.g. live births, surviving infants, women of reproductive age by district); following international standards for analysis and presentation of key indicators in order to ensure compatibility of results between populations and over time; and establishing a timeframe to verify an event and to report all relevant weekly aggregated data at all levels. Critical areas that require additional strengthening include developing a strong public financial management system, tracking government budgets, disbursements, and expenditures at all levels (from facility to central level).

Finally, **only one attribute (about 3% of the attributes) were already present and didn't require further action.** That is, standard case definitions were available for all diseases and syndromes under surveillance.

Table 3 summarizes some of the key issues discussed by component in each of the working groups, aggregated in two main domains: Substantial support is needed (which includes attributes scored as 1 and 2); and some support is needed (score 3).

Table 3: Key areas requiring improvement in HIS identified in working groups

Key HIS component	Substantial support is needed	Some support is needed
Group 1. Sound policy and institutional environment	Implementing the costed M&E plan for the national health sector strategy Developing a mechanism to engage domestic and external development partners to discuss HIS initiatives and align their support with national HIS needs. Development of a national strategy for e-health and ICT Development of national core health indicators with baselines, targets and frequency of measurement Coordination mechanisms to improve HIS operations and M&E related activities	Development of SOPs on roles and responsibilities for collecting, processing, analysing and disseminating data
Group 1. Effective country mechanisms for review and action	Operationalizing the progress and performance review system to include engagement of all stakeholders. Using data for decision making Developing and implementing effective feedback mechanisms	N/A
Group 2. Routine health information systems	Staffing, supervision and analytical capacities inadequate. Feedback mechanisms and use of web-based systems across all reporting facilities needs to be improved. Rolling out DHIS 2 as a data collection tool across all facilities. Current infrastructure for a functional RHIS in place needs improvement. Developing Electronic Medical Records	Integrating disease and programmatic-specific data elements into the national common data repository Completing and updating exact geo-reference codes for health facilities.

Key HIS component	Substantial support is needed	Some support is needed
	System	
Group 3. Household surveys; censuses; CRVS	Improving data on cause of death through medical certification using ICD Automated causes of death Developing national survey plans Conducting population census	Improving conduct and frequency of multi-sectoral coordination committee Follow-up with Parliament to endorse amended CRVS legislation
Group 3. Strong institutional capacity for data collection, management, analysis, use and dissemination	Data analytical capacities at national and sub-national level Collaborative approaches to analyse health data at the national level Making health data transparent and accessible	Following international standards in analysing and presenting key health indicators
Group 4. Disease surveillance	Identification of priority diseases at the national level Engaging private sector to report data Capacity building in data analysis	Updating standard case definitions for all diseases and syndromes under surveillance
Group 4. Health systems information (LMIS, NHAs, Human Resources).	Tracking private health expenditure Developing electronic human resources registry Effective use of system of national health accounts Developing national policy on HIS	Improving financial management system

A detailed table with a summary of the scores by attribute and component of the M&E platform is presented in Annex 2. The priorities emerged from the discussion and presented in Table 3 have also been included into the roadmap, Section 5.

4.3 Fragmentation of health information system

In Iraq, data collected from various health service delivery points are sent to the respective DOH or the HVSS at the governorate level. These data are compiled and prepared in specially designed statistical tables and transmitted on fixed dates. The statistical copies are also available in hard copies and in electronic format (CD-ROMs) for further aggregation and analysis to the HVSD at the national level.

In the health facilities, while most services are provided from the same premises, each service is managed independently of other closely interrelated services. To a large extent, most of the data come from various programs that operate concurrently with vertical management information system (MIS). By implication, the service delivery systems and sub-information systems are fragmented.

5. Roadmap of key priority actions

During the national workshop, stakeholders identified priority actions during working group sessions, based on the score of the attributes and the qualitative information gathered during Day 1 of the workshop. Workshop participants discussed the priorities extensively in a plenary session. Tentative timeframe, responsible actors, and other key actors needed for implementation were identified. The key priorities are presented in Table 4.

Table 4: Key priority interventions to enhance Iraq health information system

Roadmap of key priority actions			Chronogram				
Strategic dimensions	Key priority actions	Responsible/ other actors	2019	2020	2021	2022	2023
1. Policy, governance and institutional environment	1.1 Establish high level national committee to monitor implementation of HIS interventions	MoH, HIS stakeholders	X				
	1.2 Develop M&E indicators for the disease programmes as part of the M&E plan	MoH, HIS stakeholders	X				
	1.3 Develop a national core indicator list for inclusion in the M&E plan and in line with global and regional standards		X				
	1.4 Develop a comprehensive costed M&E plan in a workshop format with relevant partners including Ministry of Finance		X				
	1.5 Dissemination of comprehensive M&E plan			X			
	1.6 Establish metadata dictionary to standardize data collection and processing at all levels			X			
	1.7 Annual review of health systems data to assess progress in line with the M&E plan			X	X	X	X
	1.8 Update national standardized mechanisms for unifying health data and health data collection across all reporting units and institutions			X			
	1.9 Establish a common investment framework for the M&E plan in collaboration with relevant stakeholders		X	X			
	1.10 Update legislation and detailed regulations for disseminating health information including use and sharing of all data sources			X			
	1.11 Establish a unified strategy for e-health and ICT			X			
	1.12 Updating/developing SOPs for data collection		X	X			
2. Routine Health Information systems	2.1 Development of ICT/data management infrastructure for health facilities & offices			X	X	X	X
	2.2 Increasing financial resources for enhancing the logistic support of statistic units			X	X	X	X
	2.3 Build capacity of relevant staff within the HMIS unit at national and subnational levels		X	X	X	X	X
	2.4 Recruitment/re-deployment and training of sub-national Health Information Officers		X	X			
	2.6 Updating of field supervision checklist in line with international standards		X	X			
	2.7 Develop and implement SOPs for			X	X	X	X

Roadmap of key priority actions			Chronogram				
Strategic dimensions	Key priority actions	Responsible/ other actors	2019	2020	2021	2022	2023
	regular supervisory visits (central, intermediate and peripheral) including feedback mechanisms						
	2.8 Implement mechanisms to evaluate actions taken regarding the recommendations of the supervisory visits			X			
	2.9 Training workshops on data collection, processing, and analysis for relevant staff using data from facility and community-based information			X	X	X	X
	2.10 Develop SOPs on analysis of facility data including how to deal with incompleteness, inconsistency, and implausibility			X	X		
	2.11 Develop standards for evaluation of data analysis conducted at DOH level by involving all stakeholders			X	X		
	2.12 Developing, printing and disseminating quarterly, dashboards and summary reports			X	X	X	X
	2.13 Updating the master list of health facilities		X	X			
	2.14 Roll out DHIS 2 to all districts/facilities, including capacity building			X	X	X	X
	2.15 Upgrade/establish a national online common data repository to meet national and international needs		X	X	X	X	X
	2.16 Develop a unified Electronic Medical Records systems, ensuring interoperability				X	X	X
	2.17 Implement facility assessments to assess service delivery and quality of care			X			
	2.18 Conduct annual data quality assessment reviews including data verification based on international standards		X	X	X	X	X
	2.19 Assess available community based HIS (e.g. health visitors, KOICA project) to identify potential for upgrading at national level		X				
3. Health systems monitoring	3.1 Review the human resources tracking system to identify gaps and challenges for further strengthening			X			
	3.2 Adopt the electronic registry (HRIS) system and link it with the HR department in the Directorate of Planning				X		
	3.3 Capacity building of staff responsible for managing the HRIS database				X	X	
	3.4 Allocation of funds to train relevant staff working on health systems data			X	X	X	X
	3.5 Track national health expenditures in line with international standards for System of Health Accounts		X	X	X	X	X
	3.6 Implement studies on the economic burden of diseases as part of System of Health Accounts)			X	X	X	X
	3.7 Develop infrastructure and technology to improve public financial management system			X	X	X	X

Roadmap of key priority actions			Chronogram				
Strategic dimensions	**Key priority actions**	**Responsible/ other actors**	**2019**	**2020**	**2021**	**2022**	**2023**
	3.8 Develop a routine recording system to track private health expenditures (e.g. by NGOs)			X	X	X	X
	3.9 Implement mechanisms to use data from national health accounts in decision making			X	X	X	X
	3.10 Implement an electronic logistics management information system to track commodities, medicines, equipment, and supplies			X			
	3.11 Enhance functionality of public health laboratory information system by using a centralized web-based and integrated system				X	X	X
	3.12 Develop a national identification system for each patient			X	X		
	3.13 Adopt a national policy for HIS in line with international standards (i.e. electronic and interoperable systems)			X			
4. Surveillance	4.1 Revision and development of communicable diseases and noncommunicable diseases list for age categories		X				
	4.2 Identification of priority diseases for monitoring at the national level		X	X			
	4.3 Inclusion of private health sector in the list of priority disease surveillance		X	X	X		
	4.4 Develop mechanisms (including legislation) to collect data from the private health sector		X	X	X	X	
	4.5 Develop SOPs on the diagnosis of communicable and noncommunicable diseases			X			
	4.6 Develop timelines for verification of events and reporting weekly aggregated data from the public and private sector		X				
	4.7 Capacity building of MOH staff to analyse and disseminate disease surveillance data		X	X	X		
	4.8 Develop Emergency Response for activation based on relevant thresholds for events			X			
5. Household surveys and censuses	5.1 Increase participation of national coordination mechanisms for census and surveys to include involvement of relevant ministries and the private sector		X				
	5.2 Develop a national survey plan which included type of surveys and implementing partners		X				
	5.3 Implement the national surveys plan			X	X	X	X
	5.4 Conduct national population census			X			
	5.5 Implement capacity building for census and survey data collection, analysis, report writing and dissemination		X	X	X	X	X
6. Civil Registration and Vital Statistics	6.1 Review progress in implementing interventions to improve CRVS based on the CRVS assessment conducted in 2013			X			
	6.2 Establish a CRVS functional multisectoral committee which includes		X	X	X	X	X

Strategic dimensions	Key priority actions	Responsible/ other actors	2019	2020	2021	2022	2023
	representation from relevant stakeholders at the national level						
	6.3 Follow-up with Parliament Office to endorse the recently amended CRVS legislation		X				
	6.4 Conduct TOT on ICD including medical certification		X				
	6.5 Develop and implement curriculum to train medical doctors on medical certification using ICD		X	X	X	X	X
	6.6 Assess capacity of existing IT infrastructure and staff to collect and process information on the deceased including cause of deaths by individual records		X				
	6.7 Conduct training of relevant staff to enhance their skills in core areas of processing and managing CRVS data, including automated coding of causes of death		X	X	X	X	X
	6.8 Establish standards and legislation to ensure that reports on births and deaths (with medical certification) are not delayed by responsible persons or reporting units		X	X			
7. Analysis, use and dissemination of data, including mechanisms for review and action	7.1 Re-distribution and training of staff trained in statistics specialty for those working in MOH/Office		X	X	X	X	
	7.2 Establish a health analysis unit within the Health Statistics Department			X			
	7.3 Develop electronic dashboards for policy makers to support decision making		X	X			
	7.4 Develop an action plan to analyse national data from all relevant sources with involvement of MOH, Central Statistical Organization, technical experts and public and private sector		X	X			
	7.5 Implement mechanisms to start reporting on core indicators that are not yet reported to WHO		X	X	X		
	7.6 Develop SOPs on analysis and use of data at national and sub-national level		X	X			
	7.7 Develop multi-sectoral strategy on dissemination and use of health data		X	X			
	7.8 Implement mechanisms for annual review of health data		X	X			
	7.9 Analysis and revision of priority health programmes			X	X	X	
	7.10 Review of maternal mortality surveillance system			X			
	7.11 Implement systems to link health sector reviews with disease and programme specific reviews			X	X		
	7.12 Engage civil society organizations in country reviews of progress and performance through training workshops and meetings		X	X	X	X	X
	7.13 Preparation of annual plans using results from annual health sector reviews		X				

6. Recommendations

Based on the existing strengths and challenges observed by the assessment team during the comprehensive assessment of Iraq HIS, the recommendations listed here are expected to enhance HIS operations by generating data of high quality for decision-making. This can be achieved by implementing the priority actions presented in Section 5. Addressing the recommendations can be achieved through effective coordination mechanisms under the leadership of the Ministry of Health and a well-functioning HIS coordination multi-sectoral committee.

6.1   Sound policy and institutional environment

The following recommendations and suggested activities in this component are expected to improve management, coordination, and efficiency of HIS operations across the country and include:

- Enhance the operations of the national HIS, with the leadership of the MoH, by establishing an HIS national coordination committee.
- The MoH should continue its leading role to mobilize HIS stakeholders and develop mechanisms for mobilizing domestic and external support to improve HIS through the HIS coordination committee. For the committee to be effective, regular meetings should be held with all relevant HIS stakeholders at the governorate and national level including development partners.
- Strengthen HIS operations by developing legislation, policy and SOPs to improve all data-related processes including legislation on data access and sharing.
- Develop a national strategy for e-health and ICT development within the context of data revolution.

6.2   Data sources

6.2.1   Health systems, health facility, and community information systems

Robust health system, health facility and community information systems are a backbone of any HIS. Initiatives to enhance these data building blocks need to be valued by all stakeholders. This can be achieved by implementing the following key recommendations:

- Improve the existing ICT/data management infrastructure to ensure that technological and staffing needs match existing demands for data to monitor progress towards universal health coverage. This can be achieved through capacity building and purchasing relevant ICT equipment.
- Updating the master list of facilities, including for the private sector.
- Pilot and scale-up use of DHIS-2 to collect, process, and disseminate data across the country.
- Conduct facility assessments to generate data that can be used to assess service delivery and quality of care.
- Identify required data, their sources and reporting mechanisms to establishing a national online common data repository to meet national and international needs.

- Set up a mechanism and regulate private sector data reporting on the priority epidemic prone diseases and routine data collection.

6.2.2   Disease surveillance

Recognizing the critical role of public health surveillance in improving health outcomes, the following recommendations have been identified to strengthen the disease surveillance system:

- Reviewing the list of communicable and noncommunicable diseases for relevant age groups.
- Develop mechanisms (including legislation) to collect data from the private health sector.
- Develop timelines for reporting weekly aggregated data, including verification of events, from the public and the private sector.
- Involve the private sector in reporting on the priority epidemic prone diseases.
- Build capacity of staff at all levels on epidemiological data analysis and reporting.
- Develop and adapt the DHIS 2 platform to reinforce disease surveillance system.

6.2.3   CRVS, household surveys and census

Population-based data sources provide valuable information for the entire population on overall health status and access to health services, among others. While several interventions have been implemented in Iraq to strengthen population-based data sources, the following areas should be the focus for improvement:

- Develop sustained collaboration between different agencies that are responsible for the CRVS system including a timely schedule for meetings to improve CRVS operations and increase utilization of CRVS data for policy making.
- Develop and implement standard quality assurance tools to monitor key components of the CRVS system such as coding.
- Consolidate efforts to ensure that cause of death statistics from northern governorates are included in the national statistics.
- Develop a multi-sectoral mechanisms to coordinate plans for the national census and national surveys.
- Develop a harmonized national surveys plan to ensure that the country is able to report on the maximum number of core health indicators. This will ensure that key surveys such as health examination surveys remain a priority to provide data on most of the core health indicators.
- Follow-up with the Parliament Office to endorse the recently amended CRVS legislation.
- Build capacity of doctors in ICD coding and medical certification of causes of death. Capacity building should also be extended to relevant staff responsible for analysis of cause of death data in order to promote timely production of vital statistics reports.

6.3   Institutional capacity for data management and analysis

Institutional capacity for data management and analysis can be enhanced by addressing the following key areas:

- Conduct regular workshops on data analysis and use at the national and sub-national levels to build capacity of relevant staff across all levels and ensure timely generation of key health reports.
- Implement mechanisms to start reporting on core health indicators (that are not reported to WHO), including other health-related SDG indicators.
- Develop multi-sectoral strategy on dissemination and use of health data.
- Implement mechanisms for annual review of data.

6.4   Mechanisms for data use, review and action

Data collection and processing are not an end in themselves. Ensuring existence of mechanisms to use the data, regularly review them, and implement evidence-based interventions are critical steps towards measurement of health outcomes. Key areas to strengthen these mechanisms include:

- Revamp the national data warehouse to address fragmentation challenges by ensuring that all facilities are able to report and access the data to monitor their progress and promote experience.
- Promote and establish national health observatory and open data access policy.
- Develop SOPs on analysis and use of data at the national and sub-national level.
- Engaging civil society organizations in country reviews of progress and performance through training workshops and meetings.

6.5   Addressing fragmentation of HIS

While global standards call for implementation of integrated MIS, many countries including Iraq are running vertical MIS that do not provide an opportunity to assess the performance of the health system. The design of information systems should be influenced by the management design of a country's health system. While various MIS demonstrate key strengths, they are also inundated with several limitations such as gross under use of information they collect. Comparison of related data (i.e. triangulation) from all vertical MIS provides an opportunity to use them at the national, regional, and international level. Addressing MIS fragmentation requires, among other things, adopting a holistic approach that can easily be applied simply by changing the management practices without adding any financial burden to the system.

One of the key steps in enhancing HIS operations is to define indicators and identifying data needs. This should be followed by comparing additional data needs and what is already existing or collected in the current sub-information systems. Once gaps are identified, data collection tools are modified, or additional tools are developed to ensure that all the required data are collected and reported. This is very important particularly for Iraq where 16 out of the 75 WHO regional core health indicators were not reported at the time of the assessment (Annex 3)[6]. These additional operations should be reflected in the entire integrated HIS. Periodic reviews of data needs and operations should be made by all stakeholders and guided by a national HIS strategic plan. The recommendations to address fragmentation are as follows:

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[6]A list of indicators reported through United Nations estimation processes is presented in Annex 4.

- Define health indicators that are required for the country to respond to national, regional and international demands for health data.
- Develop integrated data aggregation mechanisms across all facilities to ensure that they are responsive to system needs and data demands.
- Implement or customize an electronic tool such as DHIS-2 with capability of storing data required to calculate all national priority indicators.
- Periodic reviews of data to identify alignment and promote triangulation of data for effective decision-making.
- Conduct period reviews of HIS performance based on existing resources and emerging needs.

6.6 Using DHIS-2 package to enhance HIS operations: Key considerations

A pilot DHIS 2 implementation was implemented in Erbil and at the time of the assessment, DHIS 2 was being used in 10 health facilities and the DOH to enhance collection of population data and improve the access and quality of public health care. While DHIS 2 is one of the available web-based solutions to support and enhance collection, processing and analysis of routine HIS data, its use in low and middle income countries has been widely acknowledged. Iraq HIS may benefit from some of the key features and functionality of DHIS 2. If the country makes progress in piloting and implementing DHIS 2 nationwide (to replace the existing system), it should not be considered as "another parallel HMIS system running along" but cognized as reference medium for national surveillance and response system. The following sections provides key areas for consideration for a smooth transition to DHIS-2.

6.6.1 Key considerations for transitioning to DHIS-2 in Iraq

A successful implementation of DHIS 2 at the national level entails the following:

- **Establishing a National DHIS-2 Steering Committee:** A steering committee should consist of a multidisciplinary team comprising of decision makers/authorities in charge of current HMIS systems. The committee is responsible for managing and monitoring, among others, the transition roadmap, M&E plans and indicators, and resource allocation. The committee is also in charge of establishing workgroups responsible for policy definition, standard development and capacity building.

- **DHIS-2 capacity building plan:** Capacity building for any new technology is critical to enable a consistent understanding of the technology across all stakeholders, from end-users to high-level country-wise decision makers. Such capacity building should include not only professional-based training on how to implement and make DHIS 2 operations a success in Iraq, but also focus on training of all key players or individuals at the governorate or local level.

- **National HIS standards:** Every national HIS strategy requires a health information standard plan and a committee defining key elements such as the coding, case definition and

terminology to address the local to international expectations of indicator monitoring and surveillance reports. In addition, the standard development facilitates the transition from the current HMIS system, using a detailed data mapping of existing databases.

- **DHIS-2 storage and access policy:** During the field visits, the assessment team found that data were being stored in local servers with no option for cloud storage or backup. The steering committee is expected to define a transparent and restrict policy on where to store health information data, and who, when, where, and how to access such information. This is particularly important as it defines every stakeholder and contributor's rights on the produced data. It is also recommended that MoH eventually invests on infrastructure required to install and implement DHIS 2.

A successful implementation of DHIS 2 also entails engagement of a consultancy team to carefully study the current HMIS databases, available human resources, the MoH data; and develop a realistic timeline for DHIS 2 implementation. This would be used as a basis for further investments and budget expenditure for the national HIS system.

6.6.2   DHIS 2 in Iraq: A practical platform for nationwide data collection

In countries with limited or erratic power supply, a triple-class solution using a combination of DHIS 2 platform plus mHealth (mobile-based healthcare IT solutions), particularly in areas of no-internet-access can be considered as a practical IT-based solution for Iraq. Using this solution, three classes of incidence report can be made feasible:

- **Class One (No-internet non-literate to literate protocol):** According to this protocol, a non-literate community health worker (CHW) reports any case of incidence (such as death case) to a literate body at a designated call center. The call center agent can further transfer the data to DHIS 2 system using either Class 2 or 3.

- **Class Two (No-internet GSM-based short data message):** In this class, any case of disease outbreak, incidence, and death can be reported using a coded SMS (with less than twenty characters), containing only name, event code, and location code, sent to an SMS server connected to DHIS 2 servers. This could highly resolve the current issue of outdated reporting and weak death report, particularly in the areas of poor access.

- **Class Three (Internet-based Mobile/Table Solutions**): In this class, a basic tablet or smartphone is used by rather literate and trained people for data entry and reporting at the service point or facilities. DHIS 2 has a well-support network for such devices to be defined within its data entry platforms. Using this class, any basic service, such as CHW visits, vaccination and medicine distribution can be recorded and monitored even instantly.

DHIS 2 has been piloted elsewhere in Iraq and there is potential to use the platform for data collection at the facility level across the country. While DHIS 2 allows customization of HIS data collection, aggregation, and reporting, there is a need to carefully plan its roll-out at the national level as discussed in Section 6.6.1.

7. Next steps

Enhancing HIS operations in Iraq requires a plan which identifies the key HIS components, the expected output, financial cost, responsible stakeholders, and key recommended areas for improvement. In Iraq, an HIS improvement plan can be implemented effectively with involvement of all stakeholders across the country. This can be achieved by development of a strategic plan that highlights the existing HIS strengths and opportunities; and builds on the information provided in *Section 4 on Key findings on health information systems* (including the priority actions in Section 5).

Within the context of monitoring the sustainable development agenda, a seamless and well-integrated HIS is the ultimate goal for any country. The priority actions (Section 5) should provide sufficient background information to develop an HIS strategy which will act as a resource mobilization document to enhance HIS operations. Development of a detailed short-term, mid-term, and long-term plan for HIS strengthening should be an overarching priority. The focus should be on implementing HIS interventions that can enhance HIS operations without much change ("quick-wins"). The HIS strategy should then be costed based on the type of intervention, the estimated person-days, and any other additional materials or equipment needed.

Development of the HIS strategy should also take into consideration the need to ensure that the national HIS is able to generate data that can be used to report on the core health indicators that were not being reported to WHO at the time of the assessment. The priority actions identified in this report can yield significant results if their implementation builds on the interventions and efforts of the MoH and other development partners to enhance Iraq HIS. This approach is in line with strategies adopted by the Health Data Collaborative[7], an inclusive partnership of international agencies, governments, philanthropies, donors and academics, with the common aim of improving health data.
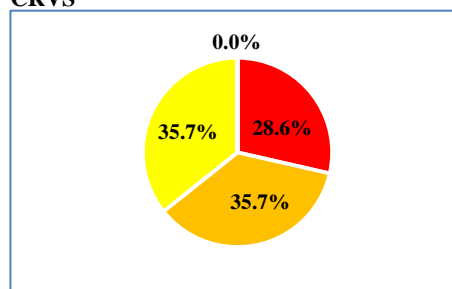
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[7]Details about the Health Data Collaborative are available at https://www.healthdatacollaborative.org/

Annex 1.   Summary of scores by working group

Group 1. Policy & institutional environment
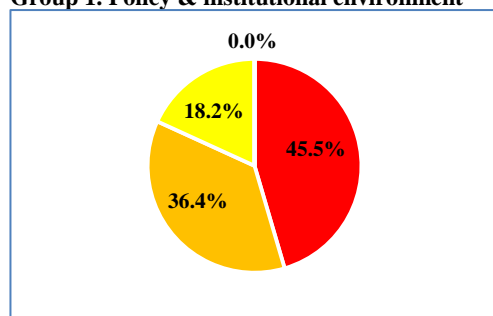
0.0%
18.2%
45.5%
36.4%

Group 3. Household surveys; censuses; CRVS

0.0%
35.7%
28.6%
35.7%

Group 1. Effective country mechanisms for review and action

0.0%   0.0%
50.0%   50.0%

Group 3. Strong institutional capacities

11.1%   0.0%
33.3%
55.6%

Group 2. Routine health information systems

0.0%
16.7%   16.7%
66.7%

Group 4. Disease surveillance

0.0%
10.0%
10.0%
80.0%

Group 4. Health systems

11.1%   0.0%
33.3%
55.6%
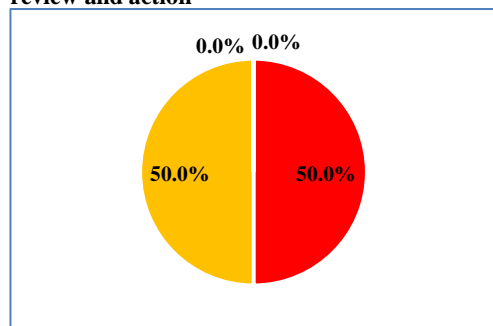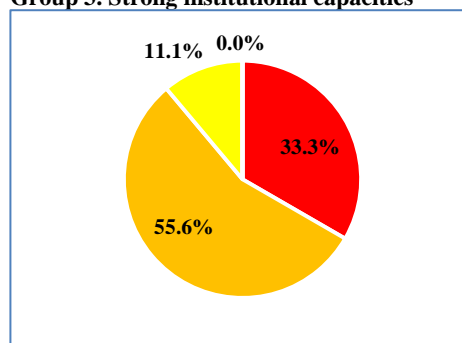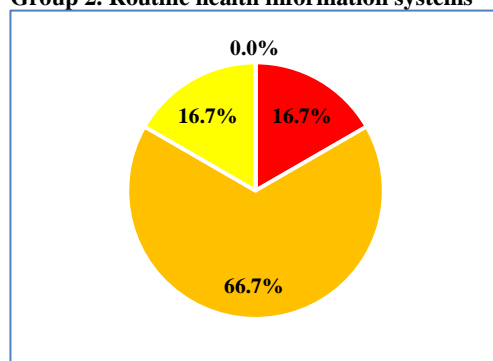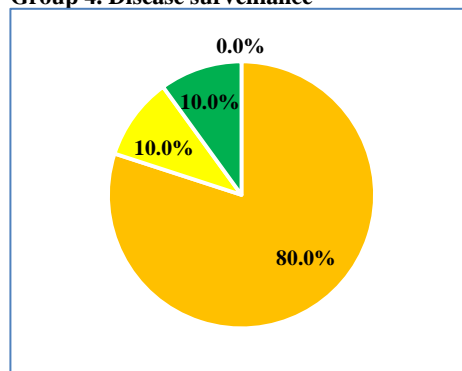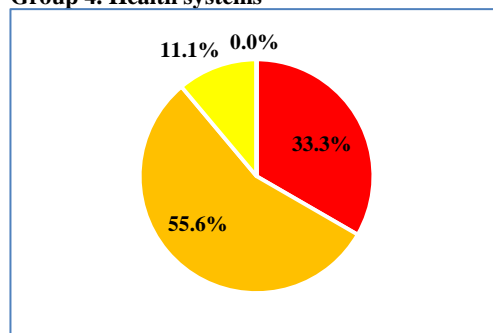
Colour code:

- ■ Not present, needs to be developed   ■ Needs a lot of strengthening
- ■ Needs some strengthening   ■ Already present, no action needed

Annex 2. Results of the scoring exercise, by component and attribute

The table below captures the results of the scoring exercise, by working group and attribute

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
Policy & institutional environment	1.1.1 There is a comprehensive costed M&E plan for the national health sector strategy 1.1.2 The M & E Plan has been informed by a recent (< 2 years) assessment of current M & E /HIS. 1.1.3 The M & E Plan includes a framework that specifies a balanced and limited set of core indicators with well-defined baselines, targets, frequency of measurement and data sources. 1.2.2 There is a common investment framework used as the basis for partner and domestic support. 1.4.1 There is a national policy/strategy for e-health and ICT development and use, including governance and legal frameworks; enterprise architecture; standardization and interoperability; and research and evaluation on e-heath.	1.2.1 Disease- and programme-specific monitoring, evaluation mechanisms, including indicators, are aligned with the M&E Plan. 1.2.3 There are agreed indicators, means of measurement and targets (developed in collaboration between relevant ministries and agencies) for M&E of health-related SDGs 1.3.1 Existence of an effective country-led coordination mechanism for M&E and review with active involvement and support of relevant development partners, civil society and other actors. 1.3.2 There is up-to-date legislation and detailed regulations for health information including all data sources.	1.4.2 Standard operating procedures have been written that define roles and responsibilities for collecting, managing and disseminating health data, including confidentiality. 1.4.3 There is an overall unifying health data architecture & health data collection standards.	

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
Routine health information systems	2.2.7 Facility reporting systems use web-based systems (e.g. DHIS) when feasible. 2.2.11 Regular and independent data quality assessments are institutionalized.	2.2.1 There is adequate infrastructure and staffing for a functional RHIS 2.2.2 Effective supervisions are in place (up-to-date checklist, resources). 2.2.3 Local level decision-makers and community members analyse and use facility and community-based information to develop responsive and appropriate service delivery strategies and community-based	2.2.6 There is a comprehensive list of health facilities, with unique facility identifier and geocodes. 2.2.8 Disease- and programme-specific data elements and indicators are integrated into the national common data repository	

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
		interventions. 2.2.4 Feedback is systematically provided to all sub-reporting units. 2.2.5 There is adequate training and capacity building for a functional RHIS. 2.2.9 There is a system for collection and use of patient management data at the point of service. 2.2.10 There is a harmonized system of facility assessments to verify service delivery & quality of care 2.2.12 Data on community-based health programs are available in formats that are easy to access and linked to facility-based databases.		

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
Household surveys; censuses; CRVS	2.1.6 Systems for the automated coding of causes of death are progressively used. 2.1.7 There are trained resources to conduct verbal autopsies 2.1.8 Use of verbal autopsy is being gradually expanded to generate nationally representative cause of death statistics. 2.3.3 Household surveys are conducted every 2-3 years to monitor progress on key health indicators of the national health strategic plan	2.1.4 Hospitals are reporting deaths, with cause of death, through medical certification using ICD. 2.1.5 There is IT infrastructure for entering information on the deceased including the causes of death by individual record 2.1.9 There are strategies and resources to strengthen the notification of births and deaths and medical certification of causes of death. 2.3.2 There is a national survey plan and research agenda for household surveys detailing content, sequencing, periodicity, and	2.1.1 A comprehensive assessment has been conducted of current CRVS performance. 2.1.2 A functional multi-sectorial coordination committee is in place (NSOs, MoH, …). 2.1.3 There are an up-to-date legislation and regulations for civil registration and vital statistics. 2.3.1 A coordination mechanism is in-place to coordinate plans for the national census and national	

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
		funding, aligned with the M&E plan and the National Health Strategy. 2.3.5 There is adequate country level capacity for census and survey data collection, analysis, report writing and dissemination.	surveys. 2.3.4 The National Statistics Office publishes timely and reliable annual population estimates for various demographic and geographic groups (e.g. live births, surviving infants, women of reproductive age by district).	

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
Disease surveillance		2.4.1 List of priority diseases and syndromes under current national surveillance is defined. 2.4.3 Public and private healthcare facilities, laboratories and communities contribute to routine case detection. 2.4.4 The country has adequate capacity to diagnose and record cases of notifiable diseases. 2.4.6 Data are analysed on a regular basis at the different levels to detect events involving cases or deaths above expected levels for the particular time and place. 2.4.7 Alert/action thresholds have been defined for priority diseases and syndromes. 2.4.8 There is integration of all diseases surveillance programs. 2.4.9 Equipment and logistics (forms and registers, computers, telephones, communication including internet connectivity, cars and motorbikes) are sufficient and appropriately disseminated in	2.4.5 Timeframe to verify an event and to report weekly aggregated data are defined at all levels.	2.4.2 Standard case definitions are available for all diseases and syndromes under surveillance.

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
		the country to conduct public health surveillance activities. 2.4.10 Enough staff is available at all levels to conduct public health surveillance and response.		

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
Health systems	2.5.5 There are country-specific routine recording systems for tracking private health expenditures (e.g., by NGOs, enterprises, private insurances, etc.), to replace health accounts annual surveys. 2.5.6 Health accounts results are used for policy planning and evaluation, from overall health system policies to health system financing policy specifically. 2.5.9 "Health systems" information sub-systems are interoperable, or have been integrated, into the HMIS.	2.5.1 There is a reliable and transparent system for tracking the aggregate availability of human resources. These aggregate data on HR availability, by cadre and by health facility, are widely available for purposes of assessing equity productivity. 2.5.2 There is an electronic registry ("HRIS") with up-to-date data on each individual health worker including a unique identifier, qualifications and key characteristics (name, birth date, sex, contact, place of work, etc…). 2.5.3 Health expenditures are tracked on an annual basis, using the global standard of System of Health Accounts 2011 (SHA 2011). 2.5.7 There is a logistics information system for tracking commodities, medicines, equipment, and supplies. 2.5.8 There is a functional laboratory information system.	2.5.4 There is strong public financial management system, tracking government budgets, disbursements, and expenditures at all levels (from facility to central level).	

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
Strong institutional capacities	3.1.3There is a regular (annual) report of progress and performance that covers progress against the objectives and targets, equity and efficiency. 3.1.4 Synthesis and analysis of national data from all relevant sources is conducted using a collaborative approach involving health ministries, national statistics offices, technical experts and public and private sector. 3.1.6 There are effective processes to support analysis and use at sub-national level.	3.1.1 Strong analytical institutional capacity for supporting synthesis of data is in place. 3.1.2 At national level, there are periodic Performance Reviews / Analytic Reviews based upon robust analysis of health data from all sources including contextual and qualitative information. 3.2.1 A range of dissemination strategies exist for health information, censuses and vital statistics, including reports, policy-briefs and web-based dissemination. 3.2.2 Health data are transparent and accessible. 3.2.3 National public health and academic institutions, advocacy groups, and the media are engaged by MoH and NSO to disseminate key health information.	3.1.5 International standards are followed for analysis and presentation of key indicators in order to ensure comparability of results between populations and over time.	

Component	Not present, needs to be developed	Needs a lot of strengthening	Needs some strengthening	Already present, no action needed
Effective mechanisms for review and action	4.1.2 Independent reviews of data in strategically important programs, such as maternal, child and perinatal deaths, are conducted regularly. 4.1.4 Civil society organizations actively and meaningfully participate in country reviews of progress and performance at all levels. 4.1.5 Results from reviews are incorporated into decision-making, including resource allocation and financial disbursement.	4.1.1 Regular and transparent system of reviews of progress and performance against national and locally defined priorities with broad involvement of key stakeholders is in place. 4.1.3 There are systematic linkages between health sector reviews and disease and programme-specific reviews. 4.1.6 Health information flows include regular feedback and use of data locally to improve services and programs.		

Annex 3. Regional core health indicators not reported to WHO

Major domain	Indicator name
Health determinants and risks	Literacy rate among persons 15- 24 years
	Children under 5 who are obese
	Tobacco use among persons 15+ years
	Anaemia among women of reproductive age
Health status	Estimated number of new HIV infections cases
	Number of people requiring interventions against neglected tropical diseases (Leishmaniasis, Leprosy, Rabies and Mycetoma)
	Population at risk of neglected tropical diseases (subject to treatment campaigns)
Health system response	Population with catastrophic health expenditure
	Population impoverished due to out-of-pocket health expenditure
	International Health Regulations (IHR) technical areas
	Availability of selected essential medicines in health facilities
	Surgical wound infection rate
	Treatment coverage for opioid dependence
	Antiretroviral therapy (ART) coverage among all adults and children living with HIV
	Percentage of key populations at higher risk (who inject drugs, sex workers, men who have sex with men) who have received an HIV test in the past 12 months and know their results

Annex 4.   Regional core health indicators reported through UN estimation process

- Life expectancy at birth
- Estimated number of new HIV cases
- Adolescent fertility
- Access to improved drinking water
- Access to improved sanitation
- Neonatal mortality rate
- Infant mortality rate
- Child mortality rate
- Maternal mortality ratio
- Mortality by cause of death
- Mortality attributed to household and ambient air
- Mortality attributed to unsafe water and sanitation
- Cancer incidence (all types)
- Demand for family planning satisfied
- Adults and children currently receiving ART