Comprehensive assessment of Iraq's health information system 2019

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Foreword

A well-functioning national health information system (HIS) is a prerequisite for the generation 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 the performance of other related social services.

The generation, availability and accessibility of timely and quality information for key health indicators is also essential for monitoring progress towards the targets of the health-related Sustainable Development Goals (SDGs). A 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 does not always reflect reality in the countries.

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

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

HE Dr Ala Alwan
Minister of Health and Environment
Iraq

Preface

The role of the health information system (HIS), including civil registration and vital statistics (CRVS) systems, in generating health information data for programme and performance monitoring, quality of care, planning and policy-making is widely acknowledged. Within the context of the 2030 Agenda for Sustainable Development, countries are encouraged to generate reliable data to track progress and inform decision-making. In line with WHO's Thirteenth General Programme of Work 2019–2023, the Organization is providing technical support to Member States to improve their HISs, develop analytical capacity and improve reporting to monitor country progress towards 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. WHO also supports countries to disaggregate data in order 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 their HISs. Through a consultative process and intensive work with Member States, WHO has developed a framework for the HIS and 75 core indicators, focusing on three main components: monitoring health determinants and risks; assessing health status, including morbidity and cause-specific mortality; and 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 assessments have been conducted in the Eastern Mediterranean Region since 2016 to identify key gaps and strategies to strengthen HISs. The first comprehensive assessment was conducted in Jordan, followed by subsequent assessments in Libya, Pakistan, Afghanistan and Iraq. The assessments 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, International Classification of Diseases (ICD) coding, data analysis and use of the District Health Information Software (DHIS-2) platform to enhance collection, processing, analysis and use of health-related data for decision-making.

It is hoped that this report will guide decision-makers in the Ministry of Health and Environment and all development partners and stakeholders in planning and implementing effective interventions to enhance Iraq's HIS. WHO expects that the priority areas identified by the assessment team and the ongoing strategies to improve the CRVS, including the quality of cause of death data, will enhance Iraq's efforts to monitor the health situation and measure progress towards the targets of the SDGs.

Dr Arash Rashidian
Director, Information, Evidence and Research
WHO Regional Office for the Eastern Mediterranean

Dr Adham Abdel Moneim
Acting WHO Representative and Head of Mission
WHO country office in Iraq

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Members of the assessment team, including field visits

WHO Regional Office for the Eastern Mediterranean: Dr Arash Rashidian, Dr Henry Doctor, Dr Ghada Muhjazi, Mr Ahmed Osman.

WHO country office in Iraq: Dr Aamr Bebany, Dr Manhal Alhalasa, Dr Karwan Hasan, Dr Awatif Habeeb, Dr Yadi Hadi, Dr Firas Mustafa, Mr Ammar Nore.

Ministry of Health and Environment: Dr Ali Mahmood Hasan, Dr Khalid Razzaq Hassan, Dr Alaa Hussein Ali, Dr Oday Hatem Mohammed, Ms Shmim Riyadh Abbas, Dr Sabiha Majeed Shayaee, Ms Amal Astifan Jajji

Key informants

Basra Directorate of Health, Basra Teaching Hospital and Ali Raz Primary Health Care Centre: Dr Nameer Mohamad Wedad, Dr Hussain Natiq Sadiq, Mr Ali AbdulKarim Jassim, Muaarji Jassim Uthafa, Ms Fayhaa Ahmed, Dr Haider Al Attar, Dr Lubna Qais Mohammad Jawd, Ms Hoda Karreem, Ms Futooh Abdal Wadood, Ms Fodhila Abu Al Zahraa.

Kurdistan Region Ministry of Health and Environment, Erbil Directorate of Health: Dr Viyan Galaly, Dr Saman Barzanji, Dr Bakhtyar Salih, Ms Saryan Ahmed, Dr Rawnaq Aqrawi.

Kirkuk Directorate of Health: Dr Aqeel Jumaa, Dr Gailan Qader.

Mysann Directorate of Health, Al Sader Teaching Hospital, Al Uroba Primary Health Care Centre: Dr Salam Abdullah Al Musawi, Dr Hmou Madhi, Mr Abdulaai Jether, Dr Jamal Mehbas, Dr Haider Khalaf, Mr Omar Muhyee, Mr Ali Aamr, Mr Ghazwan Jabbar, Dr Mohammed Al Shayhan, Mr Jawad Abdul Hussain, Mr Salah Hassan.

Medical City Directorate, Baghdad Teaching Hospital, Bab Al-Mutham Primary Health Care Centre, Shakh Omar Birth and Death Registration Office: Dr Farah Abdulkareem Ali, Mr Salah Mahdi, Mr Ala Husain, Mr Emad Foad, Dr Sameer Raoof, Dr Ghaith Sabree.

Participants in assessment workshop

HE Dr Ala Alwan, Minister of Health and Environment

Dr Zamel Shayya Mohammad Al Ereibi, Deputy Minister of Administration Affairs

Dr Diaa Awwad Kazem, Head of Central Statistical Organization, Ministry of Planning

Dr Abdulamir Mahmoud Abbas Al Mokhtar, Adviser

Dr Ibrahim Hamid Mohsen, Inspector General

Dr Hani Moussa Badr Al Eqabi, Director General, Technical Affairs

Dr Riyad Abdulamir Hussein Al Hilfi, Director General, Public Health

Dr Ihsan Jaafar Ahmad, Director General, Directorate of Inspection

Mr Thair Jaafar Abbas, Engendering Projects Director General

Dr Zaid Ali Abbas, Director General, Forensic Medicine

Dr Hassan Mohammad Abbas Al Temimi, Director General, Medical City

Dr Jasseb Latif Ali Al Hegami, Director General, Al-Karkh Health Directorate

Dr Abdulghani Sa'doun Hamdan Al Saidi, Director General, Al-Rusafa Health Directorate

Dr Ali Al Temimi, Director General, Diyala Health Directorate

Assessment team

Dr Ali Mahmood Hasan, Minister's Office

Dr Khaled Razzaq Hasan, Minister's Office

Dr Sami Shati Majid, Directo, Specialized Centres Authority

Dr Hamza Hydar Obeid, Secretary General, Cancer Council

Dr Ayman Mahmoud Abdullatif, Deputy Director General, Public Health Clinics

Dr Alaa Hussein Ali, Director, Health and Vital Statistics Division

Dr Mona Atallah Khalifa, Director, Noncommunicable Diseases Control Department

Dr Raghd Abdulreda Abbas, Director, Primary Health Care Department

Dr Asaad Mahdy Asaad, Director, Centres for Disease Control

Dr Seif Motlaq Badr, Director, Media Department

Dr Karima Abdulhussein, Director, International Health Department

Ms Nadia Jabbar Karim, Director, IT Department

Dr Nizar Abdulmahdi Nahi, National AIDS Centre

Dr Ahmad Abbas Hassan, Technical Affairs Directorate

Dr Oday Hatem Mohammad, Administrative Directorate

Ms Shamim Riyad Abbas, Health and Vital Statistics Division

Dr Urgwan Marawan Shaban, Health and Vital Statistics Division

Ms Amal Istifan Jajji, Health and Vital Statistics Division

Mr Ali Mohammad Hussein, Planning and Resource Development Directorate

Ms Sohad Adnan Hussein, Health and Vital Statistics Division

Dr Farah Abdulkareem Ali, Medical City, Statistical Section

Ms Enaam Lateef, Al-Karkh Health Directorate, Baghdad

Ms Saja Sitar Abbas, State Company for Marketing Drugs and Medical Appliances (KIMADIA)

Dr Faris Hassan Subeir Lami, Baghdad University

Dr Atheer Jawad Abdulamir, Al Nahrain University

Ms Rawnaq Ibrahim Yassin Aqrawi, Kurdistan Region Ministry of Health and Environment

Ms Walaa Tahseen Al Naqshbandi, Erbil Directorate of Health

Mr Salah Mahdi Saleh Mahdi, Directorate of Forensic Medicine

Mr Samir Khudeir Hadi, Ministry of Planning, Central Statistical Organization

Ms Iman Abdulwahhab Abdulrazzaq, Ministry of Planning, Central Statistical Organization

WHO Iraq: Dr Ali Akbar, Dr Amer Omar Ali, Ms Lana Sami Saber, Ms Raghad Al Khafaji

International organizations/donors: Dr Moazem Hossain, Mr Ali Ismael Khalil Al Taee, Dr Shaimaa Mohammad Jawad Ibrahim (UNICEF)

Acronyms

CRVS	Civil registration and vital statistics
DHIS	District Health Information Software
HIS	Health information system
HIV	Human immunodeficiency virus
ICD	International Classification of Diseases
ICT	Information, communication and technology
IT	Information technology
PHC	Primary health care
SDGs	Sustainable Development Goals
SOPs	Standard Operating Procedures
WHO	World Health Organization

Executive summary

Assessment

Health information systems (HISs), including civil registration and vital statistics (CRVS) systems, remain key sources of data for evidence-based decision-making, both at the national and subnational level. In order to enhance the operations of Iraq's HIS, the World Health Organization (WHO), in collaboration with the Ministry of Health and Environment, conducted an assessment during 13–17 January 2019 in two parts: three-day field visits to the governorates and a two-day national workshop in Baghdad. The assessment team reviewed the operations of the 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 to undertake a comprehensive HIS assessment, the assessment team was guided by the WHO monitoring and evaluation assessment and planning tool, which provides an overview of the strengths and weaknesses of the country's monitoring and evaluation systems and enables identification of priority actions based on those findings.

Findings

Overview

One of the main strengths of the HIS is the existence at national level of a health and vital statistics department in the Directorate of Planning and Resource Development that defines roles and responsibilities for collecting, managing and disseminating health data, including confidentiality. A recent CRVS system assessment has also generated momentum to improve the quality of cause 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 reporting of core health indicators, 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 the HIS, the assessment team found that the HIS across all components fulfils only about 24% of the attributes of a functional HIS. Some of the weaker elements include key strategic areas, such as lack of a comprehensive and costed monitoring and evaluation plan for the national health sector strategy and lack of a common investment framework to be used as a basis for partners and domestic support. There is also a lack of national policy/strategy for e-health and information, communication and technology (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. There is also a lack of institutional collaboration within the Ministry of Health and Environment, which results in duplication of activities; weak collaboration between different directorates and departments (and sometimes between units of the same directorate); duplication of data collection at the facility level (e.g. paper and electronic formats used for the same data); and 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 District Health Information Software 2 (DHIS-2) even when implementation is a feasible option. The HIS also lacks institutionalization of regular and independent data quality assessments. A system for automated coding of causes of death is also not used and there is a lack of trained human resources to conduct verbal autopsies. The conducting of household surveys is irregular owing to weak coordination with the Ministry of Health and Environment, thereby limiting the ability to effectively monitor progress

on key health-related indicators. Annual statistical reports of the Ministry of Health and Environment are published a year after the reporting year, and there is a lack of regular analysis and reporting on progress towards national and global targets and performance of the system.

Below are the main recommendations arising from the assessment.

Governance and policy

- Establish a high-level national committee to monitor implementation of HIS assessment recommendations and operations.
- Develop a costed monitoring and evaluation plan with clearly defined baselines and targets for all indicators.
- Implement annual reviews of health system data to assess progress in line with the monitoring and evaluation plan.
- Develop a unified strategy for e-health and ICT.
- Develop a plan to harmonize national surveys 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, are able 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 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 the 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 subnational levels to build the capacity of relevant staff across all levels and ensure timely generation of key health reports.
- Develop standard operating procedures (SOPs) on analysis, use and evaluation of data at national and subnational level.

Quality assurance

- Conduct periodic reviews of all routine health management information systems, including civil registration and 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 subnational levels and incorporate results from the reviews into decision-making.

Data dissemination and use

- Implement information technology (IT) platforms such as DHIS-2 that facilitate the development of dashboards to support the use

of information for decision-making at all levels, including for senior level 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 workshops for journalists and civil society organizations on disseminating health-related data.

Way forward

Across all the functional areas of the HIS, 81 priority actions were identified during working group sessions to enhance its operations. The detailed priority actions presented in this report provide guidance for the Ministry of Health and Environment, in collaboration with other stakeholders and development partners, on interventions to enhance the HIS in the short, mid and long term. Some of the interventions could be implemented with limited effort or significant change to the existing system. However, to ensure effective monitoring of progress in implementing interventions, a coordinating committee should be established to take ownership of the 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 local circumstances.

1. Background

1.1 Overview of the health situation

The population of Iraq was estimated at 38 million in 2018, spread across 18 governorates, including three governorates in the 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 years (2017). The annual population growth rate is 2.4% (2017) and life expectancy at birth is 70.3 years (2017).[1] The country has experienced significant armed conflict in recent years with concomitant disruption of health service delivery and destruction of livelihoods. Protracted emergencies have taken a heavy toll on the health sector with many of its resources diverted to emergency response. Health services are offered mostly through the public sector, with the private sector and nongovernmental organizations also gradually establishing their own health facilities. Weakened infrastructure and public services are less able to address the basic needs of the population, especially the most vulnerable – women, children, older people, those who have been injured or displaced, and people with physical disabilities.

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 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 is 9.4 physicians per 10 000 population (2017). The main causes of mortality include cerebrovascular disease, malignant neoplasm, cardiovascular diseases, renal failure, respiratory and cardiovascular disorders specific to the perinatal period, armed conflict, road traffic crashes and diabetes mellitus.

There are capacity constraints related to overall governance, financial management, human resources management, procurement, surveillance, monitoring and evaluation, and laboratory services. Despite these challenges, the Ministry of Health and Environment, with support from the Iraq Health Cluster,[2] has continued efforts to improve routine health care, public health functions and health system development. Current government efforts focus on the development of the health sector with a particular focus on enhancing the HIS and generating 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 assessment aims to align national efforts to improve health outcomes with accelerating progress towards universal health coverage.

1.2 Overview of the HIS in Iraq

1.2.1 National HIS structure and data flow system

As one of the six building blocks of the health system an effective HIS is essential; it provides data for all health system functions and health facilities. These data are collected through the routine national HIS, population-based surveys, the CRVS system and public health surveillance system.

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

The department in charge of the national information system, the Health and Vital Statistics Department, is hosted in the Planning and Resource Development Directorate of the Ministry of Health and Environment and has units in the planning

[1] Iraq Annual Statistical Report, 2017.

[2] The Iraq Health Cluster consists of international nongovernmental organizations, local nongovernmental organizations and United Nations agencies.

departments of all directorates of health at governorate level, (the health and vital statistics section). The Health and Vital Statistics Department at the national level has a staff of 37 persons, including physicians, statisticians, IT programmers and administrative staff, with various levels of statistical skills. Health statistics in the health and vital statistics sections in the directorates of health are usually handled by an individual with skills in information management and analysis. Most hospitals have a statistics unit for data compilation and coding staffed by at least one person skilled in birth and death registration, as well as the compilation of monthly statistical reports. In PHC facilities, data recording and compilation is generally done by a person with some 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.

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 the private health sector, which delivers health services through private hospitals, clinics, pharmacies and medical laboratories. The Ministry of Health and Environment does not capture health data from the private sector, except for the number of inpatients and reason for admission. This information is contained in private hospital reports sent to the Health and Vital Statistics Department. In 2018, the total statistical workforce across all facilities was 3444, of whom 521 (15%) were statisticians, 1822 (53%) were medical and paramedical staff and 1100 (32%) were administrative staff.[3]

The same certificate is used for the registration of births and deaths in private and public health facilities, and then endorsed in the birth and death offices of the Ministry of Health and Environment. The Health and Vital Statistics Department is mainly concerned with collecting statistical data, analysing them and producing annual reports for dissemination.

There are also a number of vertical programme information systems that provide 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

Table 1. Health facilities and administrative sectors in Iraq, 2017

Indicator	No.
PHC centres	2658
Main PHC centres (≥ 10 000 population, having at least one physician)	1295 (48.2%)
Subcentres (5000–7000 population, run without a physician)	1363 (51.8%)
Primary health care sectors	135
Public hospitals	273
Private hospitals	127
Specialized health centres	27
Births and deaths registration offices	284

Source: Ministry of Health and Environment of Iraq, Annual statistical report, 2017.

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

abuse, national health accounts; the Early Warning and Response Network (EWARN); the Electronic Community Assessment Programme (e-CA), the Health Resources Availability Monitoring System (HeRAMS), and Monitoring of Events Against Safe Use and Running of Health Services in Complex Emergencies (MEASURES). These are not national level systems but are used in selected areas.

2. Purpose and objectives

The role of an HIS, including the CRVS system, in generating health information data for programme and performance monitoring, quality of care, planning and policy-making is widely acknowledged. Within the context of the 2030 Agenda for Sustainable Development, countries are encouraged to generate reliable data to track progress and inform decision-making. In line with the WHO General Programme of Work 2019–2023, WHO is collaborating with Member States to improve their HISs, develop analytical capacity and improve 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 providing support to countries to disaggregate data in order that progress made on gender equality and health equity can be measured.

Since a previous assessment of the HIS in 2011, the Ministry of Health and Environment and other stakeholders have implemented a number of interventions to strengthen the health information system. 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 and all statistical forms used at different levels of the health system were reviewed and updated. 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 maternal morbidity and mortality. A maternal death surveillance and response plan committee was established to provide guidance and monitor programme performance. In spite of these initiatives, the current assessment aims to identify key gaps and challenges in line with increasing demands for countries to generate reliable data to monitor progress towards universal health coverage and enhance its reporting capacity on the 100 core health indicators (plus health-related SDGs) and the 75 regional core health indicators. This assessment reviews a checklist of attributes of the five main components of the monitoring and evaluation system: governance; infrastructure; data management and standards; quality assurance; and data dissemination and use.

The assessment aims to facilitate:

- a common understanding of information systems and databases available in country to identify areas for improvement, particularly on information flow;
- provision of documentation on different sources of data for HIS (i.e. population-based, institution-based, service and individual records, and surveillance or community system);
- understanding of their content, data elements, associated reporting burden, and how these information systems are used and by whom;
- assessment of 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;
- development of recommendations to improve the system in order that it complies with global and regional HIS standards, indicator frameworks and guidelines;
- development of strategies to build capacity and 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 universal health coverage;

- development of a roadmap to strengthen the HIS based on the findings of the assessment, including priority actions, responsible parties or stakeholders and timeline.

3. Assessment methodology

The assessment team adopted a methodology that sought to develop a common understanding of available information systems and databases, assess the strengths and weaknesses of these components and operations within the HIS and provide recommendations consistent with international standards, indicator frameworks and guidelines. The methodology was based on an approach developed by the WHO Regional Office for the Eastern Mediterranean for comprehensive assessment of HISs (Fig. 1). Discussions during the assessment were guided by the WHO monitoring and evaluation assessment and planning tool,[4] which provides an overview of the weaknesses and strengths of a country's monitoring and evaluation systems and enables identification of priority actions based on those findings.

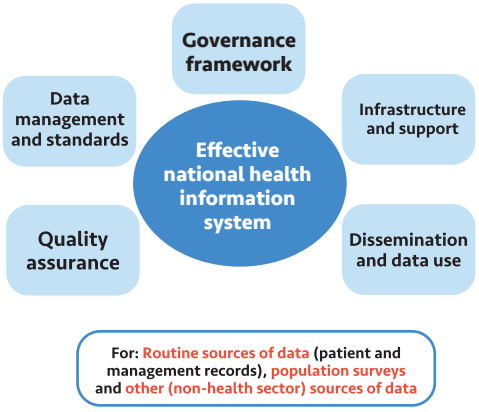


Fig. 1. Adapted model of an effective national health information system

3.1 Document reviews

The assessment team reviewed documents provided by the Ministry of Health and Environment and other development partners, the 2011 HIS assessment report and documents available in the public domain.

3.2 Field visits

Field visits were conducted during 13–15 January 2019 by three teams, who visited different governorates of Iraq. The first team visited the following institutions and establishments in Baghdad: the Ministry of Health and Environment, Baghdad Medical City, Bab Al Muatham PHC Centre, and Baghdad General Hospital. They also conducted two focus group discussions with disease-specific surveillance programmes and Geographic Information System team. The second team was assigned to Basra and Mysann and made visits to Basra Directorate of Health, Al Razi PHC Training Centre, Basra Teaching Hospital, Mysann Directorate of Health, Al Auroba PHC Centre and Al Sader Teaching Hospital. The third team visited Kirkuk and the Kurdistan Region and visited Kirkuk Directorate of Health, Azadi Hospital, Tesseen PHC Centre, the Kurdistan region Ministry of Health and Environment, Erbil Directorate of Health, Rizgary Hospital and Brayati PHC Centre. The assessment team members met with managers of facilities, service providers and HIS officers.

3.3 Assessment workshop

A two-day workshop was conducted in Baghdad on 16–17 January 2019 to learn about and document information on the different systems (manual and automated). An overview of systems was presented on behalf of the Ministry of Health and Environment. Four working group sessions[5] were held focusing on key issues of a functioning HIS:

[4] O'Neill K, Viswanathan K, Celades E, Boerma T. Monitoring, evaluation and review of national health policies, strategies and plans. In: Schmets G, Rajan D, Kadandale S, editors. Strategizing national health in the 21st century: a handbook. Chapter 9. Geneva: World Health Organization; 2016.

[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.

policy and governance, data sources (CRVS system, routine HIS, disease surveillance), institutional capacities, and mechanisms for review, data use and decision-making. Discussions 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 in assembling information from different sources at all levels. The assessment team also highlighted the value for Iraq in implementing DHIS-2 as a data collection tool across all facilities as a road map for its implementation had already been developed by the Ministry and initiatives to pilot the system had started in other parts of the country such as the Kurdistan region. Discussions were guided by the quantitative WHO monitoring and evaluation assessment and planning tool. A debriefing meeting was held with officials from the Ministry and other stakeholders on the last day to present observations and discuss next steps.

3.4 Synthesis of findings, recommendations and report preparation

In addition to document reviews and working group discussions with Ministry officials and other stakeholders, the team also made technical judgements and consolidated the findings according to the thematic areas of the monitoring and evaluation assessment and planning tool. The team used this information to formulate priority actions or recommendations for health information strengthening in Iraq. A report was compiled and shared with Ministry officials and other stakeholders for review and feedback and a final report was shared with these groups.

4. Key findings

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 progress towards the triple billion targets of WHO's Thirteenth General Programme of Work, the growing demand for health-related information by policy-makers, programme managers, development partners, the public at large and other stakeholders calls for enhancement of data collection and reporting systems from the health facility to the national level.

In Iraq, as is the case with most countries, the HIS serves 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 of the availability of key attributes of a functional HIS. This is followed by a discussion on key steps needed to enhance Iraq's HIS.

4.1 Observations from field visits

Three teams conducted field visits aimed at understanding the operations and functionality of the various components of the HIS at the governorate level and identifying 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).

4.2 HIS assessment and planning tool: scoring

The assessment team used the HIS assessment and planning tool to obtain an overview of the current status of the different components of a functional HIS and to identify priority areas that required further strengthening or development. The tool consists of a checklist 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.

Table 2. Key observations on the health information system 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; list includes mostly WHO regional core health indicators Availability of priority disease lists for surveillance, including case definitions HIS staff have job descriptions in many locations Supportive monitoring visits are conducted (six facilities per month) Implementation of electronic/ automated platforms for data collection, particularly for PHC programs, but not in all locations Data from private sector collected (for in-patients) in some locations Interest to implement DHIS-2 at the national level. Availability of capacity-building programmes Human resources plan is available in some areas	Matching existing indicators with SDG indicators across all data collection units Master list of national core indicators Comprehensive and budgeted plan for a health management information system – developed with involvement of key stakeholders, as well as engagement of relevant units/departments in planning and implementation SOPs for core HIS operations related to data collection, management, analysis and reporting Integrating all subinformation systems Implementing electronic systems that can meet growing data demands, in terms of volume of data, quality and real time reporting Policy on data collection from private sector Communication between health facilities and ministry level Mechanisms to address staff turnover Assessing the current human resources capacity and developing a plan for human resources 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 Ministry of Health and Environment and all development partners

Key HIS component	Strengths	Areas for improvement
2. Data sources	Data collection for many indicators, including SDG 3 indicators Data collection from all subreporting units Completeness and timeliness of data relatively good at facility level in some areas Local servers available for storage in all areas Although not scaled nationally, the Health Visitor Programme with: 1) georeferenced coding to track health events; 2) data that benefit other programmes to define their interventions; and 3) opportunities to track unvaccinated children, including SMS alerts to minimize defaulters	Standardization of HIS tools and platforms; includes definitions (and job titles) for the human resources database Upgrading and standardization of software for use across facilities for data collection and processing Upgrading HIS software to easily manage HIS data since the current and common HIS software (FoxPro and MS Excel) has limitations related to flexibility and the ability to handle transactional data Overburdened and duplicated data collection processes (i.e. paper forms and electronic data entry for the same data) Completeness of data and ICD-10 coding, including registration of infant deaths Staff capacity to monitor and implement ICD10 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 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

Key HIS component	Strengths	Areas for improvement
3. Strong institutional analytical capacities	Data analysis conducted at the Ministry of Health and Environment and partially at the Directorate of Health level Basic analyses of data recently started at the district level in some areas using FoxPro 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

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 on the checklist, covering 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 HISs;
- Group 3: Well-functioning data sources related to household surveys, censuses 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.

Fig. 2 displays the results from scoring of the attributes. Complete scoring results for each component (by working group) are presented in Annex 1.

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 the HIS in Iraq, there is no comprehensive costed monitoring and evaluation 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 the absence of an monitoring and evaluation plan that includes a framework specifying a balanced and limited set of core indicators with well-defined baselines, targets, frequency of measurement, and data sources. There is also the lack of 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-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

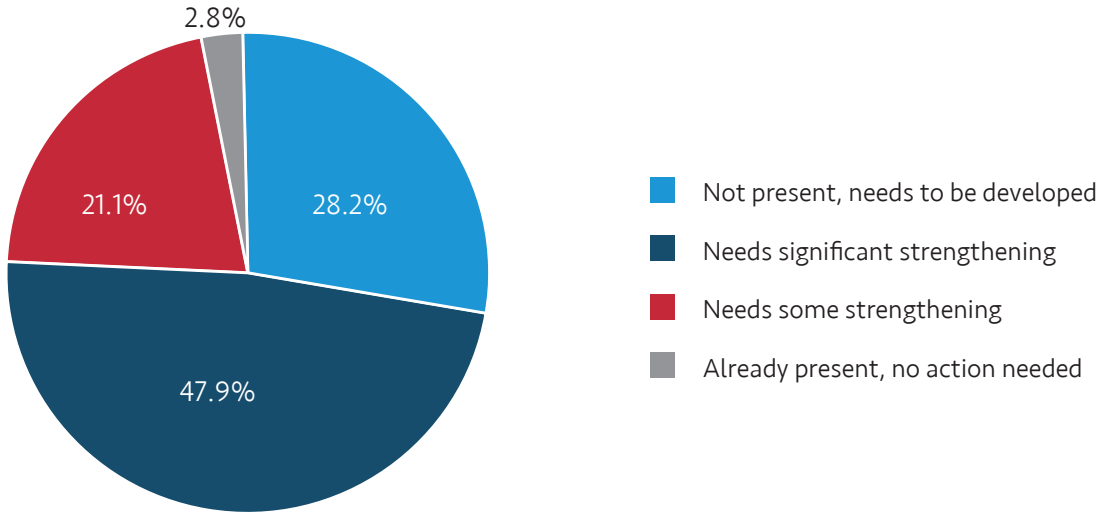


Fig. 2. Summary of scores from the assessment and planning tool

and performance at all levels. The 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, even when implementation is a feasible option. The HIS also lacks institutionalization of regular and independent data quality assessments. The system for automated coding of cause of death is also not used, and there is a 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) reports of progress and performance covering progress on 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 to effective processes to support analysis and use of data at subnational level. Country-specific routine recording systems for tracking private health expenditures (e.g. by nongovernmental organizations, enterprises and private insurances), to replace annual surveys for health accounts 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 subsystems are not interoperable nor are they integrated into the health management information system.

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

Other key areas requiring a great deal of strengthening include building the capacity of hospital information systems to report deaths with cause of death through medical certification using ICD 10; enhancing the IT infrastructure to enter information on the deceased, including individual records of cause of death; 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 monitoring and evaluation 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. Furthermore, considerable strengthening is needed in areas related to building strong analytical institutional capacities to support the synthesis of data. At the national level, much strengthening is needed for: delivering periodic performance reviews/analytical reviews based upon robust analysis of health data from all sources, including contextual and qualitative information; affording 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 the Ministry of Health and Environment and the Central Statistical Organization to disseminate key health information is another area requiring strengthening.

With respect to surveillance and health systems, the following are areas requiring much strengthening: defining a list of priority diseases and syndromes under the current national surveillance; ensuring that public and private health care facilities, laboratories and communities contribute to routine case detection; enhancing capacity to diagnose and record cases of notifiable diseases; analysing data on a regular basis at all 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 great deal of strengthening relate to the development of an electronic registry (human resources information system) with up-to-date data on each individual health worker, including a unique identifier, qualifications and key characteristics (e.g. name, date of birth, sex, contact and place of work). Annual health expenditures tracking the use of the global standard of the System of Health Accounts; development of logistics information system for tracking commodities, medicines, equipment and supplies; and the development of a functional laboratory information system remain key areas that require much strengthening.

Almost 21% of the attributes need some strengthening. These include the 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 performance of the current CRVS system to identify any existing gaps. Other critical areas requiring some strengthening include the availability of a functional multisectoral HIS coordination committee; up-to-date legislation and regulations for the CRVS system; a mechanism to coordinate plans for national censuses and 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

Table 3. Key areas of the HIS requiring improvement as identified in the working groups

Key HIS component	Substantial support is needed	Some support is needed
Group 1. Sound policy and institutional environment	Implementing the costed monitoring and evaluation 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 needs Developing a national strategy for e-health and ICT Developing national core health indicators with baselines, targets and frequency of measurement Establishing coordination mechanisms to improve HIS operations and monitoring and evaluation-related activities	Developing 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 HISs	Ensuring adequate staffing, supervision and analytical capacities Improving feedback mechanisms and use of web-based systems across all reporting facilities Rolling out DHIS-2 as a data collection tool across all facilities Improving current infrastructure for a functional routine HIS in place Developing an electronic medical records system	Integrating disease- and programme-specific data elements into the national common data repository Completing and updating exact georeference codes for health facilities
Group 3. Household surveys; censuses; CRVS	Improving data on cause of death through medical certification using ICD-10 Automating cause of death Developing national survey plans Conducting population censuses	Improving conduct and frequency of multisectoral coordination committee Following up with parliament to endorse amended CRVS legislation

Table 3. Key areas of the HIS requiring improvement as identified in the working groups

Key HIS component	Substantial support is needed	Some support is needed
Group 3. Strong institutional capacity for data collection, management, analysis, use and dissemination	Developing data analytical capacities at national and subnational levels	Following international standards in analysing and presenting key health indicators
	Establishing collaborative approaches to analysing health data at the national level	
	Making health data transparent and accessible	
Group 4. Disease surveillance	Identifying priority diseases at the national level	Updating standard case definitions for all diseases and syndromes under surveillance
	Engaging private sector to report data	
	Building capacity in data analysis	
Group 4. Health systems information (logistics management information system, national health accounts, human resources).	Tracking private health expenditure	Improving financial management system
	Developing electronic human resources registry	
	Using effective system of national health accounts	
	Developing national policy on HIS	

A detailed table with a summary of the scores for the attributes and components of the monitoring and evaluation platform is presented in Annex 2. The priorities emerging from the discussion and presented in Table 3 have also been included into the roadmap (Section 5).

infants, women of reproductive age, by district); following international standards for analysis and presentation of key indicators to ensure the compatibility of results between populations and over time; and establishing a time frame 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, and tracking government budgets, disbursements and expenditures at all levels (from facility to central level).

Finally, only one attribute (about 3% of the attributes) was already present and did not require further action: standard case definitions were available for all diseases and syndromes under surveillance.

Table 3 summarizes some of the key issues discussed for key components in each of the working groups, aggregated in two main domains: "substantial support needed" (which includes attributes scored as 1 and 2); and "some support needed" (scored as 3).

A detailed table with a summary of the scores for the attributes and components of the monitoring and evaluation platform is presented in Annex 2. The priorities emerging from the discussion and presented in Table 3 have also been included into the roadmap (Section 5).

4.3 Fragmentation

In Iraq, data collected from various health service delivery points are sent to the relevant Directorate of Health or the Health and Vital Statistics Section at the governorate level. These data are compiled

and prepared in specially designed statistical tables and transmitted on fixed dates. The statistical copies are available in hard copy and in electronic format (DVDs) for further aggregation and analysis to the Health and Vital Statistics Department 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 the various programmes that operate concurrently with a vertical management information system. By implication, the service delivery systems and subinformation systems are fragmented.

5. Roadmap of key priority actions

During the working group sessions of the national workshop, stakeholders identified priority actions based on the scores for the attributes and the qualitative information gathered during Day 1. Workshop participants discussed the priorities extensively in a plenary session. The tentative time frame, 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 the HIS in Iraq: roadmap of key priority actions

Roadmap of key priority actions		Time frame				
Strategic dimensions	**Key priority actions**	**2019**	**2020**	**2021**	**2022**	**2023**
1. Policy, governance and institutional environment	Establish high level national committee to monitor implementation of HIS interventions	X				
	Develop monitoring and evaluation indicators for the disease programmes as part of the monitoring and evaluation plan	X				
	Develop a national core indicator list for inclusion in the monitoring and evaluation plan and in line with global and regional standards	X				
	Develop a comprehensive costed monitoring and evaluation plan in a workshop format with relevant partners, including Ministry of Finance	X				
	Disseminate comprehensive monitoring and evaluation plan		X			
	Establish metadata dictionary to standardize data collection and processing at all levels		X			
	Conduct annual review of health systems data to assess progress in line with the monitoring and evaluation plan		X	X	X	X
	Update national standardized mechanisms for unifying health data and health data collection across all reporting units and institutions		X			

Table 4. Key priority interventions to enhance the HIS in Iraq: roadmap of key priority actions

Roadmap of key priority actions		Time frame				
Strategic dimensions	**Key priority actions**	**2019**	**2020**	**2021**	**2022**	**2023**
	Establish a common investment framework for the monitoring and evaluation plan, in collaboration with relevant stakeholders	X	X			
	Update legislation and detailed regulations for disseminating health information, including use and sharing of all data sources		X			
	Establish a unified strategy for e-health and ICT		X			
	Update/develop SOPs for data collection	X	X			
2. Routine HISs	Develop ICT/data management infrastructure for health facilities and offices		X	X	X	X
	Increase financial resources for enhancing the logistic support of statistic units		X	X	X	X
	Build capacity of relevant staff within the health management information system unit at national and subnational levels	X	X	X	X	X
	Recruit/redeploy and train subnational health information officers	X	X			
	Update field supervision checklist in line with international standards	X	X			
	Develop and implement SOPs for regular supervisory visits (central, intermediate and peripheral), including feedback mechanisms		X	X	X	X
	Implement mechanisms to evaluate actions taken regarding the recommendations of the supervisory visits		X			
	Conduct training workshops on data collection, processing and analysis for relevant staff using data from facility- and community-based information		X	X	X	X
	Develop SOPs on analysis of facility data, including how to deal with incompleteness, inconsistency and implausibility	X	X			
	Develop standards for evaluation of data analysis conducted at Directorate of Health level by involving all stakeholders	X	X			
	Develop, print and disseminate quarterly reports, dashboards and summary reports		X	X	X	X
	Update the master list of health facilities	X	X			
	Roll out DHIS-2 to all districts/facilities, including capacity-building		X	X	X	X
	Upgrade/establish a national online common data repository to meet national and international needs	X	X	X	X	X

Table 4. Key priority interventions to enhance the HIS in Iraq: roadmap of key priority actions

Roadmap of key priority actions		Time frame				
Strategic dimensions	**Key priority actions**	**2019**	**2020**	**2021**	**2022**	**2023**
	Develop a unified electronic medical records systems, ensuring interoperability			X	X	X
	Implement facility assessments to assess service delivery and quality of care		X			
	Conduct annual data quality assessment reviews, including data verification based on international standards	X	X	X	X	X
	Assess available community-based HIS (e.g. health visitors, Korea International Cooperation Agency project) to identify potential for upgrading at national level	X				
3. Health systems monitoring	Review the human resources tracking system to identify gaps and challenges for further strengthening		X			
	Adopt the electronic registry (human resources information system) system and link it with the human resources department in the Directorate of Planning			X		
	Build capacity of staff responsible for managing the human resources information system database			X	X	
	Allocate funds to train relevant staff working on health systems data		X	X	X	X
	Track national health expenditures in line with international standards for the System of Health Accounts	X	X	X	X	X
	Implement studies on the economic burden of diseases as part of the System of Health Accounts		X	X	X	X
	Develop infrastructure and technology to improve public financial management system		X	X	X	X
	Develop a routine recording system to track private health expenditures (e.g. by nongovernmental organizations)		X	X	X	X
	Implement mechanisms for using data from national health accounts in decision-making		X	X	X	X
	Implement an electronic logistics management information system to track commodities, medicines, equipment and supplies		X			
	Enhance functionality of public health laboratory information system by using a centralized, web-based, integrated system			X	X	X
	Develop a national identification system for each patient		X	X		
	Adopt a national policy for HIS in line with international standards (i.e. electronic and interoperable systems)		X			

Table 4. Key priority interventions to enhance the HIS in Iraq: roadmap of key priority actions

Roadmap of key priority actions		Time frame				
Strategic dimensions	**Key priority actions**	**2019**	**2020**	**2021**	**2022**	**2023**
4. Surveillance	Revise/develop communicable and noncommunicable disease lists for age categories	X				
	Identify priority diseases for monitoring at the national level	X	X			
	Include private health sector in the priority disease surveillance list	X	X	X		
	Develop mechanisms (including legislation) to collect data from the private health sectors	X	X	X	X	
	Develop SOPs on the diagnosis of communicable and noncommunicable diseases		X			
	Develop timelines for verification of events and reporting weekly aggregated data from the public and private sector	X				
	Build capacity of Ministry of Health and Environment staff to analyse and disseminate disease surveillance data	X	X	X		
	Develop emergency response for activation based on relevant thresholds for events		X			
5. Household surveys and censuses	Increase participation of national coordination mechanisms for censuses and surveys to include involvement of relevant ministries and the private sector	X				
	Develop a national survey plan which includes type of survey and implementing partners	X				
	Implement the national survey plan		X	X	X	X
	Conduct national population census		X			
	Implement capacity-building for census and survey data collection, analysis, report writing and dissemination	X	X	X	X	X
	Review progress in implementing interventions to improve CRVS based on the CRVS assessment conducted in 2013		X			
6. Civil registration and vital statistics	Establish a functional, multisectoral, CRVS committee which includes representation from relevant stakeholders at the national level	X	X	X	X	X
	Follow-up with the Health and Environment Committee to endorse the recently amended CRVS legislation	X				
	Conduct training of trainers on ICD-10, including medical certification	X				
	Develop and implement curriculum to train medical doctors on medical certification using ICD-10	X	X	X	X	X

Table 4. Key priority interventions to enhance the HIS in Iraq: roadmap of key priority actions

Roadmap of key priority actions		Time frame				
Strategic dimensions	**Key priority actions**	**2019**	**2020**	**2021**	**2022**	**2023**
	Assess capacity of existing IT infrastructure and staff to collect and process information on the deceased, including cause of death, in individual records	X				
	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
	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	Redistribute and train staff trained in statistics specialty for those working in the Ministry of Health and Environment office	X	X	X	X	X
	Establish a health analysis unit within the Health Statistics Department		X			
	Develop electronic dashboards for policy-makers to support decision-making	X	X			
	Develop an action plan to analyse national data from all relevant sources with involvement of Ministry of Health and Environment, Central Statistical Organization, technical experts and public and private sector	X	X			
	Implement mechanisms to start reporting on core indicators that are not yet reported to WHO	X	X	X		
	Develop SOPs on analysis and use of data at national and subnational levels	X	X			
	Develop multisectoral strategy on dissemination and use of health data	X	X			
	Implement mechanisms for annual review of health data	X	X			
	Analyse and revise priority health programmes		X	X	X	
	Review maternal mortality surveillance system		X			
	Implement systems to link health sector reviews with disease- and programme-specific reviews		X	X		
	Engage civil society organizations in country reviews of progress and performance through training workshops and meetings	X	X	X	X	X
	Prepare annual plans using results from annual health sector reviews	X				

6. Recommendations

6.1 Sound policy and institutional environment

Implementation of the following recommendations could improve the management, coordination and efficiency of HIS operations across the country.

- Enhance the operations of the national HIS under the leadership of the Ministry of Health and Environment and establish a national coordination committee. The Ministry should continue its leading role in mobilizing stakeholders and developing mechanisms for the mobilization of domestic and external resources and the committee should convene regular meetings with all relevant stakeholders at the governorate and national level.
- 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 the 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 the 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 key recommendations itemized below.

- 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.
- Update the master list of facilities, including for the private sector.
- Pilot and scale up the 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, sources and reporting mechanisms to establish 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.

- Review 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 private sectors.
- 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 Civil registration and vital statistics, household surveys and census

Population-based data sources provide valuable information for the entire population on overall health status and access to health services, etc. 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 the various 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 (such as coding) to monitor key components of the CRVS system.
- Consolidate efforts to ensure that cause of death statistics from northern governorates are included in the national statistics.
- Develop a multisectoral mechanism 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 findings from key surveys, such as health examination surveys, provide data on most of the core health indicators.
- Follow up with the Health and Environment Committee to endorse the recently amended CRVS legislation.
- Build capacity of doctors in ICD coding and medical certification of cause 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 subnational 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 a multisectoral 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 the existence of mechanisms to use the data, regularly reviewing them and implementing evidence-based interventions are critical steps towards measurement of health outcomes. Key areas to strengthen these mechanisms include the following.

- 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 a national health observatory and an open data access policy.
- Develop SOPs on analysis and use of data at the national and subnational level.
- Engage civil society organizations in country reviews of progress and performance through training workshops and meetings.

6.5 Addressing fragmentation

While global standards call for implementation of an integrated management information systems, many countries, including Iraq, are running vertical management information systems 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 some management information systems demonstrate key strengths, they are also beset by a number of limitations, such as gross underuse of the information they collect. Comparison of related data (i.e. triangulation) from all vertical management information systems provides an opportunity to use them at the national, regional and international level. Addressing management information system 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 identify data needs. This should be followed by comparing additional data needs and what is already existing or collected in the current subinformation 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, guided by a national HIS strategic plan, should be made by all stakeholders. The following recommendations were developed to address fragmentation.

- 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 the capability of storing the data required to calculate all national priority indicators.
- Carry out periodic reviews of data to identify alignment and promote triangulation of data for effective decision-making.
- Conduct periodic reviews of HIS performance based on existing resources and emerging needs.

6.6 Key considerations in using the DHIS-2 package

6.6.1 Implementation

A pilot DHIS-2 implementation was carried out in Erbil and at the time of the assessment, DHIS-2 was being used in 10 health facilities and the Directorate of Health to enhance the collection of population data and improve access to 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. The 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, health management information system running alongside" but as a reference medium for the national surveillance and response system. The following sections provide key areas for consideration for a smooth transition to DHIS-2.

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

6.6.2 Key considerations for transitioning to DHIS2 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 decision-makers/authorities in charge of current health management information systems. The committee is responsible for managing and monitoring, among others, the transition roadmap, monitoring and evaluation plans and indicators and resource allocation. The committee is also in charge of establishing workgroups responsible for policy definition, standards 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-wide 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 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, standards development facilitates the transition from the current health management information system using detailed data mapping of existing databases.

- **DHIS2 storage and access policy:** During the field visits, the assessment team found that data were being stored on local servers with no option for cloud storage or backup. The steering committee is expected to develop a clear policy on where and how health information data is stored, and who can access such information. This is particularly important as it defines the rights of every stakeholder and contributor in regard to the data produced. It is also recommended that the Ministry of Health and Environment invests in infrastructure required to install and implement DHIS-2.

A successful implementation of DHIS-2 also entails the engagement of a consultancy team to carefully study the current health management information system databases, the available human resources and the Ministry of Health and Environment data and develop a realistic timeline for DHIS-2 implementation. This would be used as a basis for further investment and budget expenditure for the national HIS system.

6.6.3 DHIS-2: a practical platform for nationwide data collection

In countries with limited or irregular power supply, a triple-class solution using a combination of the DHIS-2 platform plus mHealth (mobile-based health care IT solutions), particularly in areas with 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 nonliterate to literate protocol):** According to this protocol, a non-literate community health worker reports any case of incidence (such as a death) to a literate body at a designated call centre. The call centre agent can further transfer the data to the 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 or death can be reported using a coded SMS (with less than 20 characters), containing only name, event code and location code, sent to an SMS server connected to DHIS-2 servers. This could greatly resolve the current issue of outdated reporting and weak death report, particularly in areas of poor access.

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

The use of 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 6.6.2.

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. 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 existing HIS strengths and opportunities and builds on the information provided in Section 4 on key findings on the HIS (including the priority actions in Section 5).

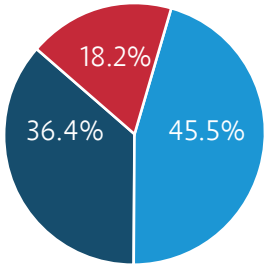
Within the context of monitoring the sustainable development agenda, a seamless and well-integrated HIS is the ultimate goal for any country. The priority actions should provide sufficient background information to develop an HIS strategy which will act as a resource mobilization document to enhance HIS operations. Development of detailed short-, mid- and long-term plans for HIS strengthening should be a main 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 Ministry of Health and Environment and other development partners to enhance the 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.

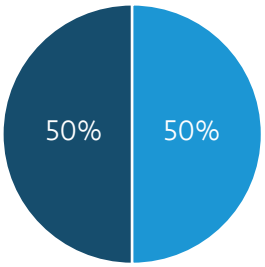
[7] Details about the Health Data Collaborative are available at: https://www.healthdatacollaborative.org/.

Annex 1. Summary of scores for each working group

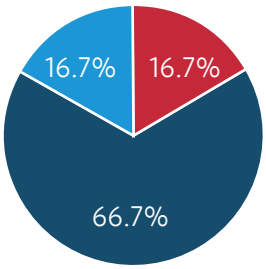
Group 1. Policy & institutional environment



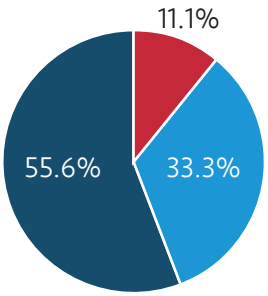
Group 1. Effective country mechanisms for review and action



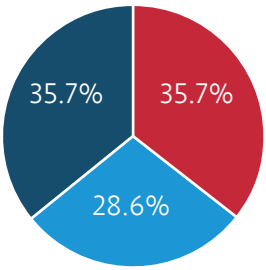
Group 2. Routine health information systems



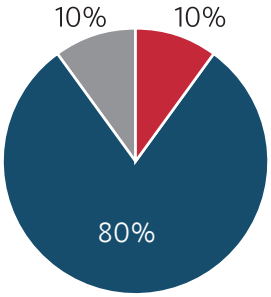
Group 3. Strong institutional capacities



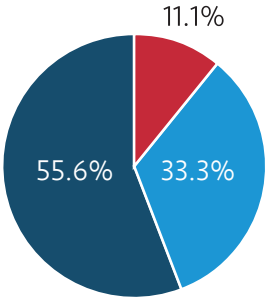
Group 3. Household surveys; censuses; CRVS



Group 4. Disease surveillance



Group 4. Health systems



Key

- Not present, needs to be developed
- Needs significant strengthening
- Needs some strengthening
- Already present, no action needed

Annex 2. Results of the scoring exercise: components and attributes

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

Component	Not present, needs to be developed	Needs significant strengthening	Needs some strengthening	Already present, no action needed
Policy and institutional environment	There is a comprehensive costed monitoring and evaluation plan for the national health sector strategy. The monitoring and evaluation plan has been informed by a recent (< 2 years) assessment of current monitoring and evaluation /HIS. The monitoring and evaluation 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. There is a common investment framework used as the basis for partner and domestic support. 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-health.	Disease- and programme-specific monitoring and evaluation mechanisms, including indicators, are aligned with the monitoring and evaluation plan. There are agreed indicators, means of measurement and targets (developed in collaboration between relevant ministries and agencies) for monitoring and evaluation of health-related SDGs. Existence of an effective country-led coordination mechanism for monitoring and evaluation and review with active involvement and support of relevant development partners, civil society and other actors. There is up-to-date legislation and detailed regulations for health information, including all data sources.	Standard operating procedures have been written that define roles and responsibilities for collecting, managing and disseminating health data, including confidentiality. There is an overall unifying health data architecture and health data collection standards.	

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

Component	Not present, needs to be developed	Needs significant strengthening	Needs some strengthening	Already present, no action needed
Routine HISs	Facility reporting systems use web-based systems (e.g. DHIS) when feasible. Regular and independent data quality assessments are institutionalized.	There is adequate infrastructure and staffing for a functional routine HIS. Effective supervisions are in place (up-to-date checklist, resources). 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 interventions. Feedback is systematically provided to all subreporting units. There is adequate training and capacity-building for a functional routine HIS. There is a system for collection and use of patient management data at the point of service. There is a harmonized system of facility assessments to verify service delivery and quality of care. Data on community-based health programmes are available in formats that are easy to access and linked to facility-based databases.	There is a comprehensive list of health facilities, with unique facility identifiers and geocodes. Disease- and programme-specific data elements and indicators are integrated into the national common data repository.	

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

Component	Not present, needs to be developed	Needs significant strengthening	Needs some strengthening	Already present, no action needed
Household surveys, censuses, CRVS	Systems for the automated coding of cause of death are progressively used. There are trained resources to conduct verbal autopsies. Use of verbal autopsy is being gradually expanded to generate nationally representative cause of death statistics. Household surveys are conducted every 2–3 years to monitor progress on key health indicators of the national health strategic plan.	Hospitals are reporting deaths, with cause of death, through medical certification using ICD 10. There is IT infrastructure for entering information on the deceased, including the cause of death, by individual record. There are strategies and resources to strengthen the notification of births and deaths and medical certification of cause of death. There is a national survey plan and research agenda for household surveys detailing content, sequencing, periodicity and funding, aligned with the monitoring and evaluation plan and the national health strategy. There is adequate country level capacity for census and survey data collection, analysis, report writing and dissemination.	A comprehensive assessment has been conducted of current CRVS performance. A functional multisectoral coordination committee is in place (National Statistical Office, Ministry of Health and Environment, etc.). There is up-to-date legislation and regulations for CRVS. A coordination mechanism is in place to coordinate plans for the national census and national surveys. The National Statistical 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).	Household surveys are conducted every 2–3 years to monitor progress on key health indicators of the national health strategic plan.

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

Component	Not present, needs to be developed	Needs significant strengthening	Needs some strengthening	Already present, no action needed
Disease surveillance		A list of priority diseases and syndromes under current national surveillance is defined. Public and private health care facilities, laboratories and communities contribute to routine case detection. The country has adequate capacity to diagnose and record cases of notifiable diseases. 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. Alert/action thresholds have been defined for priority diseases and syndromes. There is integration of all disease surveillance programme equipment and logistics (forms and registers, computers, telephones, communication, including Internet connectivity, cars and motorbikes) are sufficient and appropriately disseminated in the country to conduct public health surveillance activities. Enough staff is available at all levels to conduct public health surveillance and response.	The time frame to verify an event and to report weekly aggregated data is defined at all levels.	Standard case definitions are available for all diseases and syndromes under surveillance.

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

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

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

Component	Not present, needs to be developed	Needs significant strengthening	Needs some strengthening	Already present, no action needed
Strong institutional capacities	There is a regular (annual) report of progress and performance that covers progress vis-à-vis the objectives and targets, equity and efficiency. 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 the public and private sectors. There are effective processes to support analysis and use at the subnational level.	Strong analytical institutional capacity for supporting synthesis of data is in place. At national level, there are periodic performance reviews/ analytic reviews based on robust analysis of health data from all sources, including contextual and qualitative information. A range of dissemination strategies exist for health information, censuses and vital statistics, including reports, policy-briefs and web-based dissemination. Health data are transparent and accessible. National public health and academic institutions, advocacy groups and the media are engaged by the Ministry of Health and Environment and the National Statistical Office to disseminate key health information.	International standards are followed for analysis and presentation of key indicators in order to ensure comparability of results between populations and over time.	

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

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

Annex 3. Regional core health indicators not reported to WHO

Major domain	Indicator name
Health determinants and risks	Literacy rate among persons aged 15–24 years
	Children under 5 years who are obese
	Tobacco use among persons aged 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 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 (e.g. those 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 the United Nations 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 antiretroviral therapy (ART).

This report presents the findings of a comprehensive assessment of Iraq's health information system undertaken by WHO in 2019 at the request of the Ministry of Health and Environment. Health information systems, including civil registration and vital statistics systems, provide health information data for programme and performance monitoring, quality of care, planning and policy-making. The assessment resulted in a set of recommendations to enable the Ministry of Health and Environment and other stakeholders 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 recommendations also provide an opportunity for the country to respond to the growing demands for health data to measure progress towards the health-related Sustainable Development Goals.

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