Pan American Health Organization

World Health Organization
REGIONAL OFFICE FOR THE Americas

IS4H TOOLKIT

QUESTIONNAIRE

DEPARTMENT OF EVIDENCE AND INTELLIGENCE
FOR ACTION IN HEALTH
PAHO/WHO
www.paho.org/ish

Data Management and Information Technologies - DMIT

Data Sources	Level 1	Level 2	Level 3	Level 4	Level 5
Data collection mechanisms and technologies. Structured data refers to content that has a predefined structure and is normally classified and stored in a traditional relational database. Unstructured data refers to different types of content that that is not classified in a standard manner.	Data is not collected, and some data is available from external estimations (international organizations)	Data is sometimes obtained from few sources, largely using paper-based methods, although a few simple electronic tools like spreadsheets may be used for some data sources. Data frequently has limited utility because of quality or disaggregation issues. Some indicators definitions are defined but not easily accessible/shared.	Health data are routinely from key data sources. Data is collected electronically using a variety of tools like spreadsheets, databases and client-based information systems. Integration from different sources is often a manual process and may be constrained by comparability issues.	Health data is derived routinely and timely form all key data sources. The country carries out proactive activities to improve data collection processes. Some data is available in near-real time to support decision-making.	Data from multiple data source types incl. unstructured sources such as social media and various types of devices (IoT) are used in health analysis. Large data sets integrated from multiple sources are readily available for analysis to support decision making.

For each structured key data source, identify how often data is collected/updated.

Individual health records	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
Health service (production) records	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
Public Health Surveillance	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
Health infrastructure and facilities information	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time

Human resources information	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
Materials and supplies information	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
Financial information	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
Population based surveys related to health	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
Civil registration and vital statistics (CRVS)	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule, delayed mortality coding	Routinely collected, some data available real time to support decision-making	Routinely collected, coded and available real time
Population census	Not collected	Collected on demand or on an ad hoc basis as required.	Routinely collected based on a defined schedule.	Routinely collected, some data available real time to support decision-making.	Routinely collected and available real time
For the country structured key data sources identify how data is collected (format):					
Individual health records	Not collected	Mostly paper-based with some electronic tools (e.g. spreadsheets) used.	All data is collected electronically, mostly using databases or other electronic client-based information systems. Data integration from various sites is done manually.	All data is collected electronically into integrated data repositories from multiple sites for specific data sources. Some data is available in real or near-real time for decision-making (e.g. dashboards).	A data is collected e data sets integrated across multiple sources (e.g. acrsoss different data sources or different institutions, or sub-national and national levels). All relevant data is available in real or near-real time for decision-making (e.g. dashboards).

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Population based surveys related to health	Not collected	Mostly paper-based with some electronic tools (e.g. spreadsheets) used.	All data is collected electronically, mostly using databases or other electronic client-based information systems. Data integration from various sites is done manually.	All data is collected electronically into integrated data repositories from multiple sites for specific data sources. Some data is available in real or near-real time for decision-making (e.g. dashboards).	A data is collected e data sets integrated across multiple sources (different data sources or different institutions, or sub-national and national levels). All relevant data is available in real or near-real time for decision-making (e.g. dashboards).

Civil registration and vital statistics (CRVS)	Not collected	Mostly paper-based with some electronic tools (e.g. spreadsheets) used.	All data is collected electronically, mostly using databases or other electronic client-based information systems. Data integration from various sites is done manually.	All data is collected electronically into integrated data repositories from multiple sites for specific data sources. Some data is available in real or near-real time for decision-making (e.g. dashboards).	A data is collected e data sets integrated across multiple sources (different data sources or different institutions, or sub-national and national levels). All relevant data is available in real or near-real time for decision-making (e.g. dashboards).
Population census	Not collected	Mostly paper-based with some electronic tools (e.g. spreadsheets) used.	All data is collected electronically, mostly using databases or other electronic client-based information systems. Data integration from various sites is done manually.	All data is collected electronically into integrated data repositories from multiple sites for specific data sources. Some data is available in real or near-real time for decision-making (e.g. dashboards).	A data is collected e data sets integrated across multiple sources (different data sources or different institutions, or sub-national and national levels). All relevant data is available in real or near-real time for decision-making (e.g. dashboards).
For each data source, disaggregation is available for the following variables (dimensions for equity measurement):					
Individual health records	Not collected	Sex, age	Sex, age, subnational location	Age by birth date, sex, subnational location, income level, education level	Age by birth date, sex, subnational location, income level, education level and other equity characteristic relevant to country (e.g. ethnicity, migration status, disability, sexual identity, etc.)
Public Health Surveillance	Not collected	Sex, age	Sex, age, subnational location	Age by birth date, sex, subnational location, income level, education level	Age by birth date, sex, subnational location, income level, education level and other equity characteristic relevant to country (e.g. ethnicity, migration status, disability, sexual identity, etc.)

Human resources information	Not collected	Sex, age	Sex, age, subnational location	Age by birth date, sex, subnational location, income level, education level	Age by birth date, sex, subnational location, income level, education level and other equity characteristic relevant to country (e.g. ethnicity, migration status, disability, sexual identity, etc.)
Population based surveys related to health	Not collected	Sex, age	Sex, age, subnational location	Age by birth date, sex, subnational location, income level, education level	Age by birth date, sex, subnational location, income level, education level and other equity characteristic relevant to country (e.g. ethnicity, migration status, disability, sexual identity, etc.)
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Population census	Not collected	Sex, age	Sex, age, subnational location	Age by birth date, sex, subnational location, income level, education level	Age by birth date, sex, subnational location, income level, education level and other equity characteristic relevant to country (e.g. ethnicity, migration status, disability, sexual identity, etc.)
Data quality (completeness, consistency, accureacy, timeliness, interpretability):					

Individual health records	Not available	Data is collected, but often not used due to completeness, consistency and accuracy problems.	They are known completeness and accuracy problems for some data elements. Data from different sources are often not comparable due to quality issues.	Data is generally complete, consistent and accurate for all data elements for at least 10 years. Biases/issues are known, and analyses can be accordingly adjusted. Data is comparable across sources and time.	Data is reliably complete and accurate for at least 20 years.
Health service (production) records	Not available	Data is collected, but often not used due to completeness, consistency and accuracy problems.	They are known completeness and accuracy problems for some data elements. Data from different sources are often not comparable due to quality issues.	Data is generally complete, consistent and accurate for all data elements for at least 10 years. Biases/issues are known, and analyses can be accordingly adjusted. Data is comparable across sources and time.	Data is reliably complete and accurate for at least 20 years.
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Materials and supplies information	Not available	Data is collected, but often not used due to completeness, consistency and accuracy problems.	The are known completeness and accuracy problems for some data elements. Data from different sources are often not comparable due to quality issues.	Data is generally complete, consistent and accurate for all data elements for at least 10 years. Biases/issues are known and analyses can be accordingly adjusted. Data is comparable across sources and time.	Data is reliably complete and accurate for at least 20 years.
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Population based surveys related to health	Not available	Data is collected, but often not used due to completeness, consistency and accuracy problems.	The are known completeness and accuracy problems for some data elements. Data from different sources are often not comparable due to quality issues.	Data is generally complete, consistent and accurate for all data elements for at least 10 years. Biases/issues are known and analyses can be accordingly adjusted. Data is comparable across sources and time.	Data is reliably complete and accurate for at least 20 years.

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Population census	Not available	Data is collected, but often not used due to completeness, consistency and accuracy problems.	The are known completeness and accuracy problems for some data elements. Data from different sources are often not comparable due to quality issues.	Data is generally complete, consistent and accurate for all data elements for at least 10 years. Biases/issues are known and analyses can be accordingly adjusted. Data is comparable across sources and time.	Data is reliably complete and accurate for at least 20 years.
National Health Accounts data is available.					
	Not available	Health expenditure data relies on survey estimates, ad hoc studies and external estimations from international organizations.	There is at least 1 year of collection and classification of health expenditure data using the SHA 2011 system.	There is a time series of health accounts data (SHA 2011) for at least 3 years.	There is a system of national health accounts that produces annual health expenditure data, monitors health system performance and benchmarks health care spending. The government has established a health accounts team.
Information Products *Health data that are processed and published openly in a variety of formats that accomplish the different needs of IS4H constituencies.*	Indicator are not generally produced by the national health authorities. Indicators rely heavily on estimates from international organizations.	Some information products are generated, but not routinely, require intensive work and use of resources. Data is not readily shared across units, with stakeholders or public. Sharing data frequently requires permission from senior levels. Indicators generation largely relies on	A range of information products are efficiently and routinely produced from varies country information systems that may complement each other. Dissemination of information products is typically limited to senior-level decision makers.	Information products are routinely produced that meet the specific needs of various stakeholders, and are routinely distributed to stakeholders at all levels of the health system.	Information products are developed from a range of structured and unstructured data sources. Data for decision-making is available in near real time to all stakeholders

		data from survey's, census, and other ad hoc studies.			
Data sources for key health indicators:					
Cause of Death Data	International estimations	Survey, census, ad hoc studies	Mix of sources including verbal autopsy	CRVS civil registration and vital statistics	integrated national information system (CVRS)
Maternal Mortality	International estimations	Survey, census, ad hoc studies	CRVS or Maternal Mortality Surveillance	Country specific information systems incl proactive search of maternal deaths in some but not all regions of the country	integrated national information system (CVRS)
(Cancer, fasting blood glucose-diabetes) Non Communicable Diseases	International estimations	Survey, ad hoc studies	Mix of sources	Country specific information systems	integrated national information system
Malaria, Dengue (communicable diseases)	International estimations	Ad hoc studies	Mix of sources	Country specific information systems	integrated national information system
HIV - TB (communicable diseases)	International estimations	Ad hoc studies	Mix of sources	Country specific information systems	integrated national information system
Disability statistics	International estimations	Survey, census, ad hoc studies	Mix of sources	Country specific information systems	integrated national information system
Vaccine preventable diseases and Immunization coverage	International estimations	Survey, census, ad hoc studies	Mix of sources	Country specific information systems	integrated national information system
Overweight and obesity (Risk Factors)	International estimations	Survey, census, ad hoc studies	Mix of sources	Country specific information systems	integrated national information system
Physicians, Nurses, Dentists (Health Systems)	International estimations	Survey, census, ad hoc studies	Mix of sources	Country specific information systems	integrated national information system
Indicator and event-based surveillance system in place based on IHR standards	none	Planned	Indicator or event based system in place	In place	In place and support other countries with expertise
Frequency of indicator reporting					
Cause of Death Data	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
Maternal Mortality	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.

Mortality Neonatal	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
(Cancer, fasting blood glucose-diabetes) Non Communicable Diseases	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
Malaria, Dengue (communicable diseases)	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
HIV - TB (communicable diseases)	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
Disability statistics	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
Vaccine preventable diseases and Immunization coverage	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
Overweight and obesity (Risk Factors)	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
Physicians, Nurses, Dentists (Health Systems)	Never	On demand/ad hoc	Most indicators routinely reported on defined schedule	All indicators routinely available on a defined schedule	Indicators are always updated with current data.
Access and dissemination of indicators					
Cause of Death Data	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
Maternal Mortality	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
Neonatal Mortality	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
(Cancer, fasting blood glucose-diabetes) Non Communicable Diseases	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
Malaria, Dengue (communicable diseases)	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
HIV - TB (communicable diseases)	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
Disability statistics	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available

Vaccine preventable diseases and Immunization coverage	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
Overweight and obesity (Risk Factors)	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
Physicians, Nurses, Dentists (Health Systems)	No dissemination	Upon request	Disseminated to senior authorities	Disseminated to stakeholders throughout the health system	Publicly available
Availability of census results					
	No results are available	Only final results available in paper-based formats	Final results available online	Preliminary and final results available online	A release calendar for population census results is published and all results online
Availability of population health survey results					
	No results are available	Only final results available in paper-based formats	Final results available online	Preliminary and final results available online	A release calendar for population survey results is published and all results online
National Health Observatory is available					
	No	An institutional platform is in development but not operational	An institutional platform exists and updated less than annually and with limited content of indicators	An institutional platform is updated frequently with extensive coverage of health statistics	A national platform is updated frequently with full coverage of health statistics and open access
Frequency of selected information products					
National core health indicators (incl SDG)	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Epidemiological bulletins	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Conference presentations	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Academic papers	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule

Management reports	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Guidelines/protocols (evidence informed)	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Policy briefs (evidence informed)	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Annual Reports (e.g. program reports, CMO's report)	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Health Situation Analysis	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Media releases (evidence informed)	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Social media (evidence informed)	Never	Yes, but rarely	Ad hoc basis	Frequently, but with no defined schedule	Routinely on a defined schedule
Standards for Quality and Interoperability *Use and availability of data standards, identifiers, standards for interoperability and a national health information architecture.*	There are few, if any, formal data standards enforced.	Some standards are defined in individual data sources but are not consistent or available across data sources. Standards for interoperability have been identified but not implemented	Some standards have been identified for specific data sources, and there are formal plans for adoption.	Standards have formally adopted and the national health information architecture has been documented. A national identifier is available for integrating health data form all sources.	Information systems for health are interoperable, enabled by a national infrastructure that uses current standards, technologies and architectures.
Data standards					
WHO International Classification Family(e.g. ICD-9/10/11, ICPC, ICF)	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
Clinical Procedural Terminology (CPT)	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
Laboratory data standards (e.g.) LOINC	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally

Pharmacy data standards (e.g., National Drug Codes)	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
National Core Data Standards (data dictionary)	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
Messaging standards					
HL7	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
FHIR	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
DICOM	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
Content standards					
SNOMED-CT	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
CDA (Clinical Document Architecture)	No awareness or plans to adopt.	There is general awareness of the standards, but no plans to adopt.	Identified as a standards, with a formal plan for adoption	Formally defined and adopted nationally.	Fully implemented nationally
Common data model implemented					
	No awareness or plans to adopt.	There is general awareness , but no plans to adopt.	Defined and implemented for some sources	Formally defined and adopted nationally.	Fully implemented nationally
A set of national core health indicators including definitions and metadata exists					
	No awareness or plans to adopt.	There is general awareness , but no plans to adopt.	Defined and implemented for some sources	Formally defined and adopted nationally.	Fully implemented nationally
Definitions and metadata for the Sustainable Development Goals (SDGs)					

	No plans to adopt.	There is general awareness but no plans to dedicate resources to monitor SDG	Defined and implemented to monitor some SDG	Formally defined SDG set of indicators and adopted nationally. In process to indicators that are currently not being collected. Expansion of disaggregated data.	A national set of SDG - tailored to country priorities - fully adopted and monitored, including disaggregation
Unique identifier and identity management					
	None	Unique identifiers at the facilities not unique to the individual, but no identity management.	Unique identifier at the facility level with identity management	Unique identifier for the public health system, converging with identifiers at the health facilities	Unique identifier at the national level
There is a national health information architecture					
	None	Key data sources and data flows are mapped	Data sources, data flows, data repositories, messaging and data standards documented within the public health system	Data sources, data flows, data repositories, messaging and data standards documented and partially implemented within the national health system	National health information architecture fully implemented
Data Governance *Health data governance is the framework for establishing national and sub-national strategies, objectives, policies, standards, and tools for the management of technical data, which is supported by a legal framework.*	There a few if any best practices for data management implemented. Data management is largely ad hoc. There are no formal mechanisms for decisions about data quality and standards.	Data management best practices are in development, but not fully implemented. Data quality is not routinely monitored. Decision about standards quality and standards are made at the facility/unit/team level.	Data management processes and best practices are implemented for some facilities/units/teams. (e.g. Data quality frameworks, data standards, policies, SOPs,…) Core data sets are readily available. Data are often integrated for analysis across various sources. Some metadata are documented and maintained (indicator compendium, data dictionaries). A data governance body within the national health authority exists.	A formal health data governance mechanisms has been established at the national level with other health data stakeholders, and there are processes and plan in place to strengthen alignment of standards, data quality frameworks and data management practices across all stakeholders.	Data management policies, procedures and best practices are consistently applied, resulting in availability of quality data. Formal data governance mechanisms (committees, policies, data quality frameworks, data sharing agreements etc.) have been established among national health stakeholders, including private sector, are effectively functioning. Continuous improvement processes established to monitor and invest in data quality.

There is a formal data governance body that makes decisions about data quality, standards and investments.					
	There are no formal mechanism for making decisions about data.	Decision about data are made within the facility/unit/team.	The national health authority has established a formal body for making decisions about data	There is a national body that makes decisions about health data that meets and works across sectors including part of private sector	There is a national body that make decisions about data and that functions and works across sectors including the private sector
There is a data quality framework in place.					
	no framework	Some facilities/units/teams work on data quality but no data quality framework exists.	There is a data quality framework for the national health authorities.	There is a data quality framework that is shared or aligned between national health authorities and some key multisectoral stakeholders	There is a data quality framework that is aligned and fully implemented at the national health system
There are defined SOPs for data management (data collection, aggregation, cleansing, store and archiving, etc.)					
Cause of Death Data	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system
Maternal Mortality	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system
(Cancer, fasting blood glucose-diabetes) Non Communicable Diseases	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system
Malaria, Dengue (communicable diseases)	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented Dented at the national health system
HIV - TB (communicable diseases)	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system
Disability statistics	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system
Vaccine preventable diseases and Immunization coverage	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system

Overweight and obesity (Risk Factors)	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system
Physicians, Nurses, Dentists (Health Systems)	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national health system
The quality of data is monitored					
Cause of Death Data	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
Maternal Mortality	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
(Cancer, fasting blood glucose-diabetes) Non Communicable Diseases	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
Malaria, Dengue (communicable diseases)	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
HIV - TB (communicable diseases)	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality - monitored and improved continuously.

Disability statistics	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
Vaccine preventable diseases and Immunization coverage	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
Overweight and obesity (Risk Factors)	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
Physicians, Nurses, Dentists (Health Systems)	No	On an ad hoc basis	Routinely for some data sets, but there is a lack of investments for improving data quality. Quality checks are automatized to help data verification.	Routinely for all data sets, and there are formal plans, technical discussions and investments for improving data quality issues.	Data quality monitored and improved continuously.
IT Infrastructure *Availability and maintenance of Tools, Networks, Hardware and Software to support IS4H. Interoperability among platforms and integration of data repositories.*	Basic tools and technology (hardware, software, internet connectivity) are not widely available.	Basic Tools are generally available but many be older or not performing well.	There is evidence of interoperability between some health platforms.	Widely available and interoperable across the public health system.	There is evidence of significant interoperability across health platforms. Integrated national repositories from multiple data sources.
There is IT governance body in place to supervise ICT standards; ICT performance; policies and to coordinate investments.					
	There are no formal mechanism for making decisions about IT.	Decision about IT are made within the facility/unit/team.	The national health authority has established a formal body for making decisions about IT.	There is a national body that makes decisions about some aspects of publics sector IT, and coordinates investments.	There is a national body that coordinates investments in both public and private sector investments in IT.

Infrastructure availability and performance:					
End-user devices (mobile, desktop)	Not available	Generally available but not performing well	Widely available and performance meets basic needs	Widely available and systems are continuously upgraded	Available and high-end/cutting-edge technology and performance
Local area network	Not available	Generally available but not performing well	Widely available and performance meets basic needs	Widely available and systems are continuously upgraded	Available and high-end/cutting-edge technology and performance
Wide area networks	Not available	Generally available but not performing well	Widely available and performance meets basic needs	Widely available and systems are continuously upgraded	Available and high-end/cutting-edge technology and performance
Internet connectivity	Not available	Generally available but not performing well	Widely available and performance meets basic needs	Widely available and systems are continuously upgraded	Available and high-end/cutting-edge technology and performance
Data hosting	Not available	Generally available but not performing well	Widely available and performance meets basic needs	Widely available and systems are continuously upgraded	Available and high-end/cutting-edge technology and performance
Availability of health information solution/platforms					
Hospital Management Information System	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Electronic Medical Record	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Electronic Health Record	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Laboratory Information System	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Pharmacy Information System	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Radiology Information System	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system

Logistics management information system	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Picture and Archiving System (PACS)	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Surveillance information system	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Mortality information system/national vital statistics system	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Immunization Information System	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
Data repositories (data warehouse)	Not available	Available in some facilities	Available in all facilities with some interoperability within facilities	Interoperability across public health system	Interoperability within the national health system
There are defined policies and SOPs for IT management.					
Acceptable use policies	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national public sector level.
IT standards policies	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national public sector level.
Business continuity and disaster recover SOPS	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national public sector level.
IT security management policies and SOPs	No	Defined for facilities/units/teams, but not formally implemented	Fully implemented in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national public sector level.
Evergreening policies (hardware/software renewal)	No	Defined for facilities/units/teams, but not formally implemented	Fully implemeening in some facilities/units/teams	Fully implemented and aligned across national health authorities	Yes, fully implemented at the national public sector level.

Management and Governance - MAGO

Leadership and Coordination	Level 1	Level 2	Level 3	Level 4	Level 5
Coordination and distribution of the governance structure for IS4H accountability and decision-making at the managerial and technical level among all actors.	Accountability and decision-making for IS4H components is distributed across different units within national health authorities, and investments and activities are not coordinated.	IS4H investment decisions are coordinated at the management level within individual national health authorities (e.g., MOH, reginal health authorities, health facilities, etc.) but not formally coordinated among health authorities or other national actors.	There is a formal governance structure in place for strategic planning and oversight of IS4H among the national health authorities (e.g. MOH, regional health authorities, health facilities, etc.).	IS4H governance structures are established at the national level across at least some key national stakeholders (e.g. health authorities, national IT authorities, vital Statistics, national statistics authorities)	The governance and management of IS4H is fully transparent and integrated across all national stakeholder organizations.
Roles and functions of key national health system actors are formally documented and mapped.					
	No mapping or documentation exist. Knowledge of roles and functions of health system actors resides in individuals	Individual institutions have mapped the roles and functions of some key stakeholders but not shared at the national level.	There is a formal roster of national health system actors (public and private) documented and available.	There is a formal roster of national health system actors (public and private with a mapping of roles and relationships.	Health sector functions, roles and responsibilities are mapped, integrated and aligned across national health system actors.
Decisions mechanisms for IS4H strategic priorities, investments and technical approaches.					
	Decision for IS4H are only addressed at the unit/facility level	There is no formal governance structure within the National Health Authority, but IS4H issues are routinely discussed within the National Health Authority executive leadership body.	There is a formal IS4H governance structure within the National Health Authority.	There is a national governance structure that at a minimum includes National Health Authority, vital statistics authority, national statistics authority, and the national IT/e-gov authority.	The national governance structure is integrated with the IS4H governance structure s in national stakeholder organizations (e.g. organizational IS4H governance structure reference the national IS4H body in Terms of Reference or reporting structures).
Strategic and Operational Plans *Addressing IS4H under policies, strategies and SOPs at the national, regional and local level. Mechanisms*	There is no current National Health System Strategic Plan, and IS4H components are not reflected in operational plans.	There is a National Health System Strategic Plan, but it does not address IS4H. Some individual units/departments/facilities	There is a current National Health System Strategic Plan that include priorities for strengthening health information. IS4H is included	There is a formal strategic plan in place among national health authorities for strengthening IS4H that reflects the IS4H Strategic Framework.	There is a National IS4H Strategic Plan, and operational plans are aligned and integrated across multisectoral stakeholders.

for developing or adopting an IS4H governance strategy or policy that promotes a better decision- and informed policy-making mechanisms.		include some components of IS4H in their operational plans.	within operational plans of national health authorities.	Operational plans of the units within national health authorities reflect IS4H activities and outcomes based on the IS4H Strategic Plan.	
There is a National IS4H Strategic Plan.					
	There is no current National Health System Strategic Plan.	There is a current National Health System Strategic Plan, but it does not address components of IS4H.	There is a current National Health System Strategic Plan that includes a priority for strengthening health information that reflects two or more strategic domains within the IS4H framework.	There is a formal strategic plan in place among national health authorities for strengthening IS4H that reflects all of the domains in the IS4H Strategic Framework	There is a specific National IS4H Strategic Plan that include strategic goals and initiatives from multi-sectoral partners.
There are IS4H operational plans.					
	IS4H components are not reflected in operational plans of the national health authority.	Some units/departments/facilities include some IS4H components in their individual operating plans.	IS4H is specifically included within the operational plans of national health authorities.	IS4H is included within the operational plans of national health authorities, and is aligned with National IS4H Strategic Plan.	IS4H is included within the operational plans of multisectoral stakeholders, and aligned or integrated across stakeholders within the framework of the National IS4H Strategic Plan.
Organizational Structure and Functions *Organizational Structure & Information flows of health-related institutions. Roles and responsibilities of IS4H health system actors.*	Some IS4H functions are formally defined and performed, but there are significant gaps	There are gaps in IS4H services or functions, and/or services and functions may be duplicated across units/programs.	Accountability and responsibility for IS4H functions within national health authorities have been defined, and there are plans in place for organizational restructuring or re-alignment to rationalize functions and decision-making.	An organizational structure that defines clear accountabilities and responsibilities for IS4H has been fully implemented within/among national health authorities, and is reflected in unit/program mandates and job descriptions.	IS4H functions are defined, performed and aligned across national stakeholders. Functions are integrated across national stakeholders, optimizing performance, value and investments at the national level.
There is a documented and formally adopted organizational structure (organigram) for the national health authority (e.g. Ministry of Health and/or other national and sub-national health authorities).					

	No formal organizational structure for the national health authorities are defined.	Yes, but the organizational structure has not yet been formally approved or published.	Yes, but IS4H roles and responsibilities are not fully reflected.	Yes, with IS4H roles and responsibilities fully reflected.	Yes, with IS4H fully reflected and aligned with organizational structures across national multisectoral partners.
The overall leadership and accountability for IS4H is defined within the organization is defined.					
	IS4H responsibility is not currently defined in the organization, and there is no clear leadership for IS4H.	Responsibility for IS4H is defined within national health authorities for individual components, but there is no clear overall leadership role defined.	Leadership for IS4H is defined, and there are formal plans for organizational re-structuring to clearly define roles and responsibilities within the national health authorities.	Responsibility for IS4H is defined and integrated within national health authorities, and leadership is well defined.	Leadership and accountabilities for IS4H are well defined across multi-sectoral national partners.
Change management program is integrated into the institutional culture-capacity.					
	There is no awareness of the importance of change management at the leadership level.	There is awareness of principles, but no organizational capacity to implement change management methodologies	Some capacity for change management but lack organizational resources	There are formal and efficient change management program unit or team.	Change management is an integral part of initiatives and projects
There are formally defined organizational functions for:					
Information Technology Management	Some IS4H functions formally present and performed with significant gaps.	Most functions are performed but not formally defined, and/or their are overlapping accountabilities or duplication of efforts.	Functions are defined, and there are plans to address gaps and to align accountabilities.	Functions are fully defined and accountabilities are aligned within the national health authority	Functions are fully defined and accountabilities are aligned across national multisectoral partners
Information Management and Analysis	Some IS4H functions formally present and performed with significant gaps.	Most functions are performed but not formally defined, and/or their are overlapping accountabilities or duplication of efforts.	Functions are defined, and there are plans to address gaps and to align accountabilities.	Functions are fully defined and accountabilities are aligned within the national health authority	Functions are fully defined and accountabilities are aligned across national multisectoral partners
Health Informatics	Some IS4H functions formally present and performed with significant gaps.	Most functions are performed but not formally defined, and/or their are overlapping accountabilities or duplication of efforts.	Functions are defined, and there are plans to address gaps and to align accountabilities.	Functions are fully defined and accountabilities are aligned within the national health authority	Functions are fully defined and accountabilities are aligned across national multisectoral partners

Knowledge and Performance Management	Some IS4H functions formally present and performed with significant gaps.	Most functions are performed but not formally defined, and/or their are overlapping accountabilities or duplication of efforts.	Functions are defined, and there are plans to address gaps and to align accountabilities.	Functions are fully defined and accountabilities are aligned within the national health authority	Functions are fully defined and accountabilities are aligned across national multisectoral partners
There are policies and standard operating procedures defined to guide activities and processes within the IS4H core functions:					
Information Technology Management	There are few, if any, policies/SOPs defined to guide the activities and processes across IS4H domains.	There are some policies/SOPs defined to guide IS4H activities and processes, but many are out of date, or not formally adopted within national health authorities.	Specific gaps in policies/SOPs have been identified, and there are plans in progress to update and adopt policies/SOPs within national health authorities.	Policies/SOPs are well defined and formally adopted to guide IS4H activities and processes within the national health authorities.	Policies/SOPs are to guide IS4H activities and processes, and are integrated and aligned across national multi-sectoral stakeholders.
Information Management and Analysis	There are few, if any, policies/SOPs defined to guide the activities and processes across IS4H domains.	There are some policies/SOPs defined to guide IS4H activities and processes, but many are out of date, or not formally adopted within national health authorities.	Specific gaps in policies/SOPs have been identified, and there are plans in progress to update and adopt policies/SOPs within national health authorities.	Policies/SOPs are well defined and formally adopted to guide IS4H activities and processes within the national health authorities.	Policies/SOPs are to guide IS4H activities and processes, and are integrated and aligned across national multi-sectoral stakeholders.
Health Informatics	There are few, if any, policies/SOPs defined to guide the activities and processes across IS4H domains.	There are some policies/SOPs defined to guide IS4H activities and processes, but many are out of date, or not formally adopted within national health authorities.	Specific gaps in policies/SOPs have been identified, and there are plans in progress to update and adopt policies/SOPs within national health authorities.	Policies/SOPs are well defined and formally adopted to guide IS4H activities and processes within the national health authorities.	Policies/SOPs are to guide IS4H activities and processes, and are integrated and aligned across national multi-sectoral stakeholders.
Knowledge and Performance Management	There are few, if any, policies/SOPs defined to guide the activities and processes across IS4H domains.	There are some policies/SOPs defined to guide IS4H activities and processes, but many are out of date, or not formally adopted within national health authorities.	Specific gaps in policies/SOPs have been identified, and there are plans in progress to update and adopt policies/SOPs within national health authorities.	Policies/SOPs are well defined and formally adopted to guide IS4H activities and processes within the national health authorities.	Policies/SOPs are to guide IS4H activities and processes, and are integrated and aligned across national multi-sectoral stakeholders.
Financial Resources *Budget for IS4H implementation, sustainability, investment. Resources mobilization plans and ERP systems.*	IS4H activities/resources are not formally identified in program/unit budgets. While it is sometimes possible to secure one-time financial resources for IS4H investments, required	IS4H activities are identified in individual unit/program annual budgets of national health authorities, but are not integrated or aligned across units/programs. The financial resources requirements to	There is a plan in place for resource mobilization for specific IS4H capital investments. Financial resources secured for the sustainable implementation.	An IS4H investment framework is established at the national level.	There is a National IS4H Strategic Plan, and operational plans are aligned and integrated across multisectoral stakeholders.

	investments are difficult to sustain.	effectively sustain IS4H have been identified, but there is no plan to address gaps.	Operations of IS4H have been secured with annual budgets.		

Financial requirements and resources for IS4H are available.

	Financial requirements for IS4H are not known, although it is sometime possible to secure one-time, limited financial resources.	Financial resource requirements for some components of IS4H are known, but there is no plan in place to address financial resource gaps.	Financial requirements for IS4H are known. Although the required financial resources are not fully available, there is a resource mobilization strategy in place.	There is an IS4H investment framework at the national level that identifies financial resource requirements, and investment sources.	IS4H is sustainable, supported by an investment model that address both short-term operational finance resource requirements, and longer-term innovation and capacity development.

There are formal budgets for planning, implementing and sustaining IS4H.

	Budgets do not specifically include line-items for IS4H components.	Budgets do no include specific line-items for IS4H components, but budgets do include IS4H components under other line-items (e.g. program budgets).	Individual units/departments/facilities have line-items for some IS4H components in their budgets, but it is not possible to roll-up these budgets as the organizational or national health authority level.	There are specific budget line-items for IS4H components that are consistent across units/departments/facilities, and that can be rolled up across national health authorities.	There are specific budget line-items for IS4H components that are consistent across multi-sectoral stakeholders that can be rolled up at the national level.
Human Resources *Human capital for planning, implementing, and managing IS4H. Competency building activities to strengthen to IS4H skills. Job functions identified to effectively support IS4H.*	There is little awareness of the human resource requirements to support IS4H.	There are identified human resource constraints for planning, implementing, and managing IS4H, but there is no formal plan for addressing human resource needs.	Skills and job functions required to effectively support IS4H have been identified, although not all resources have yet been secured. There are is some evidence of competency building activities (training, workshops, conferences) for IS4H domains but these are typically ad hoc.	Sufficient human resources with the required skills to effectively implement and sustain IS4H have been secured. Relevant IS4H skills and competency development are integrated into training plans for leadership, management and staff.	There is a national strategy for building IS4H human resource competencies that includes national and international educational institutions to ensure the long term availability of skilled IS4H resources.

There are identified human resource requirements for:

Information Technology Management	No IS4H human resource requirements have been identified.	Human resource requirements have been identified, but there are no formal plans to address gaps	There are short-term plans in place to address human resource gaps.	There is a long-term IS4H human resources strategy in place that reflects the overall IS4H strategic priorities.	There is a national IS4H human resource strategy in place aligned with multisectoral partners.
Information Management and Analysis	No IS4H human resource requirements have been identified.	Human resource requirements have been identified, but there are no formal plans to address gaps	There are short-term plans in place to address human resource gaps.	There is a long-term IS4H human resources strategy in place that reflects the overall IS4H strategic priorities.	There is a national IS4H human resource strategy in place aligned with multisectoral partners.
Health Informatics	No IS4H human resource requirements have been identified.	Human resource requirements have been identified, but there are no formal plans to address gaps	There are short-term plans in place to address human resource gaps.	There is a long-term IS4H human resources strategy in place that reflects the overall IS4H strategic priorities.	There is a national IS4H human resource strategy in place aligned with multisectoral partners.
Knowledge and Performance Management	No IS4H human resource requirements have been identified.	Human resource requirements have been identified, but there are no formal plans to address gaps	There are short-term plans in place to address human resource gaps.	There is a long-term IS4H human resources strategy in place that reflects the overall IS4H strategic priorities.	There is a national IS4H human resource strategy in place aligned with multisectoral partners.
Human resources with the required knowledge and skills to effectively implement and sustain IS4H are available:					
Information Technology Management	There are few IS4H human resources available.	There are some IS4H human resources available, but not sufficient to effectively plan and implement IS4H.	There are IS4H human resources available, but recruitment and retention of skilled resources is an ongoing challenge.	There is enough human resource capacity to effectively sustain IS4H.	There is enough human resource capacity to drive continuous innovation across all the core IS4H domains.
Information Management and Analysis	There are few IS4H human resources available.	There are some IS4H human resources available, but not sufficient to effectively plan and implement IS4H.	There are IS4H human resources available, but recruitment and retention of skilled resources is an ongoing challenge.	There is enough human resource capacity to effectively sustain IS4H.	There is enough human resource capacity to drive continuous innovation across all the core IS4H domains.
Health Informatics	There are few IS4H human resources available.	There are some IS4H human resources available, but not sufficient to effectively plan and implement IS4H.	There are IS4H human resources available, but recruitment and retention of skilled resources is an ongoing challenge.	There is enough human resource capacity to effectively sustain IS4H.	There is enough human resource capacity to drive continuous innovation across all the core IS4H domains.

Knowledge and Performance Management	There are few IS4H human resources available.	There are some IS4H human resources available, but not sufficient to effectively plan and implement IS4H.	There are IS4H human resources available, but recruitment and retention of skilled resources is an ongoing challenge.	There is enough human resource capacity to effectively sustain IS4H.	There is enough human resource capacity to drive continuous innovation across all the core IS4H domains.
Leadership and staff have knowledge of key IS4H concepts to effectively plan, implement and support IS4H across the entire organizations.					
Information Technology Management	There is a low level of awareness among leadership and staff on key IS4H concepts.	There is a developing awareness among leadership and staff of key IS4H concepts.	There is adequate knowledge among leadership and staff on key IS4H concepts/skills, and there are ad hoc competency building activities to address knowledge/skill gaps.	Leadership and staff have strong knowledge and understanding of key IS4H concepts, and there is a formal IS4H competency building framework in place.	Leadership and staff have expert level knowledge of key IS4H concepts and skills.
Information Management and Analysis	There is a low level of awareness among leadership and staff on key IS4H concepts.	There is a developing awareness among leadership and staff of key IS4H concepts.	There is adequate knowledge among leadership and staff on key IS4H concepts/skills, and there are ad hoc competency building activities to address knowledge/skill gaps.	Leadership and staff have strong knowledge and understanding of key IS4H concepts, and there is a formal IS4H competency building framework in place.	Leadership and staff have expert level knowledge of key IS4H concepts and skills.
Health Informatics	There is a low level of awareness among leadership and staff on key IS4H concepts.	There is a developing awareness among leadership and staff of key IS4H concepts.	There is adequate knowledge among leadership and staff on key IS4H concepts/skills, and there are ad hoc competency building activities to address knowledge/skill gaps.	Leadership and staff have strong knowledge and understanding of key IS4H concepts, and there is a formal IS4H competency building framework in place.	Leadership and staff have expert level knowledge of key IS4H concepts and skills.
Knowledge and Performance Management	There is a low level of awareness among leadership and staff on key IS4H concepts.	There is a developing awareness among leadership and staff of key IS4H concepts.	There is adequate knowledge among leadership and staff on key IS4H concepts/skills, and there are ad hoc competency building activities to address knowledge/skill gaps.	Leadership and staff have strong knowledge and understanding of key IS4H concepts, and there is a formal IS4H competency building framework in place.	Leadership and staff have expert level knowledge of key IS4H concepts and skills.
There is capacity within the country to educate, train and strengthen the IS4H workforce:					
Information Technology Management	There is no national capacity to educate and train human resources.	There is some technical training capacity in the country.	There is academic undergraduate education capacity in country.	There is postgraduate education capacity in country.	There are advance centers for excellent in country that drive research and innovation in the filled.

Information Management and Analysis	There is no national capacity to educate and train human resources.	There is some technical training capacity in the country.	There is academic undergraduate education capacity in country.	There is postgraduate education capacity in country.	There are advance centers for excellent in country that drive research and innovation in the filled.
Health Informatics	There is no national capacity to educate and train human resources.	There is some technical training capacity in the country.	There is academic undergraduate education capacity in country.	There is postgraduate education capacity in country.	There are advance centers for excellent in country that drive research and innovation in the filled.
Knowledge and Performance Management	There is no national capacity to educate and train human resources.	There is some technical training capacity in the country.	There is academic undergraduate education capacity in country.	There is postgraduate education capacity in country.	There are advance centers for excellent in country that drive research and innovation in the filled.
Multisectoral Collaboration *Relations with public and private key stakeholders at the national and international level.*	Identified key stakeholders are from the public health sector exclusively.	There are some relationships with other public sector stakeholder for specific some information and service needs. However, engagement and coordination is ad hoc.	Informal relationships have been established with key multisectoral national actors, including private sector organizations.	Formal relationships have been established with multisectoral actors, including the private sector. There are examples are collaborative initiatives between multisector partners.	IS4H governance includes representation from multi-sectoral partners. IS4H roles, responsibilities and functions are aligned across multisectoral partners.
There are established relationships with other public sector stakeholders for information sharing and coordination.					
National statistics sector	No relationships with stakeholders within the broader public sector	Information sharing with other health system stakeholders is ad hoc, for some specific information needs.	Information sharing with public sector stakeholders happens routinely, but not based on a formal agreement.	There are specific formal intersectoral agreements for information sharing.	National IS4H governance structure provides formal arrangements for the sharing of information across multisectoral partners.
Economy	No relationships with stakeholders within the broader public sector	Information sharing with other health system stakeholders is ad hoc, for some specific information needs.	Information sharing with public sector stakeholders happens routinely, but not based on a formal agreement.	There are specific formal intersectoral agreements for information sharing.	National IS4H governance structure provides formal arrangements for the sharing of information across multisectoral partners.
Education	No relationships with stakeholders within the broader public sector	Information sharing with other health system stakeholders is ad hoc, for some specific information needs.	Information sharing with public sector stakeholders happens routinely, but not based on a formal agreement.	There are specific formal intersectoral agreements for information sharing.	National IS4H governance structure provides formal arrangements for the sharing of information across multisectoral partners.

Social services	No relationships with stakeholders within the broader public sector	Information sharing with other health system stakeholders is ad hoc, for some specific information needs.	Information sharing with public sector stakeholders happens routinely, but not based on a formal agreement.	There are specific formal intersectoral agreements for information sharing.	National IS4H governance structure provides formal arrangements for the sharing of information across multisectoral partners.
Police/justice	No relationships with stakeholders within the broader public sector	Information sharing with other health system stakeholders is ad hoc, for some specific information needs.	Information sharing with public sector stakeholders happens routinely, but not based on a formal agreement.	There are specific formal intersectoral agreements for information sharing.	National IS4H governance structure provides formal arrangements for the sharing of information across multisectoral partners.
There are established relationships with private sector stakeholders for information sharing and coordination.					
	No relationships with stakeholders within the private sector	Information sharing with private sector stakeholders is ad hoc, for some specific information needs.	Information sharing with private sector stakeholders happens routinely, but not based on a formal agreement.	There are specific formal agreements for information sharing with private sector stakeholders.	National IS4H governance structure provides formal arrangements for the sharing of information across private sector partners.
There are established relationships with international organizations and NGOs for information sharing and coordination.					
	No relationships with international organizations/NGO stakeholders.	Information sharing with international/NGO stakeholders is ad hoc, for some specific information needs.	Information sharing with international organizations/NGO stakeholders happens routinely, but not based on a formal agreement.	There are specific formal agreements for information sharing with international/NGO stakeholders.	National IS4H governance structure provides formal arrangements for the sharing of information across international/NGO partners.
Legislation, Policy and Compliance *Key and core legislation, policy and compliance mechanisms, elements to enable IS4H implementation, operation and maintenance.*	There is some awareness that there are gaps in legislation, policy and compliance mechanisms that create barriers to the effective use of IS4H, but specific gaps and needs have not been formally documented.	Requirements for IS4H enabling legislation, policy and compliance mechanism have been identified, but solutions have not yet implemented.	There are policies and SOPs that address ethical use and protection of health data (e.g., privacy, security, secondary use), but there may be gaps in regulation or legislation.	The legislation, policies, and compliance mechanism required to effectively implement and operate IS4H are implemented.	The legal-ethical framework fully enables the use of information and technology to improve health outcomes and the performance of the health system while protecting individuals and populations, and is responsive to emerging innovations.
There is a legislation/regulation for the mandatory reporting of:					

Vital Statistics	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
Maternal Mortality	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
Neonatal Mortality	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
Non Communicable Diseases	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
Communicable Diseases	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
Disability	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
Immunizations	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.

Risk Factors	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
Health Systems	No or not sure.	Yes, but out of date or not adequate.	Yes, but out of date or not adequate. However, there are formal plans in place to address gaps.	Yes, up to date, implemented and routinely maintained.	Yes, and mechanism are able to accommodate emergent requirements driven by innovations or new strategic priorities.
There are compliance mechanisms for mandatory reporting for the following types of data:					
Vital Statistics	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
Maternal Mortality	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
Neonatal Mortality	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
Non Communicable Diseases	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
Communicable Diseases	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
Disability	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.

Immunizations	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
Risk factors	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
Health Systems	No or not sure.	Yes, but not enforced.	Yes, but not consistently enforced because of policy or lack of resources.	Yes, and enforced consistently and effectively.	Yes, and compliance mechanisms are able to accommodate emergent reporting needs.
There is a policy for the ethical collection and secondary use of data that recognizes the inherent biases in data and analyses.					
	No	Some guidelines exist, but there is no formal policy.	Some facilities/units/areas have polices as part of their institutional policy framework.	There are policies at the national level for the public health sector.	There are policies at the national level that apply to all national multi-sectoral stakeholders.
There is legislation/regulation enabling the effective use of electronic medical records.					
	No	Some guidelines exist, but there is no formal policy, regulation or legislation.	There are formal policies in place governing the effective use of electronic medical records.	There is legislation that enables the effective use of electronic medical records.	There is legislation that enables the effective use of a national electronic health record.
There is legislation/regulation addressing the protection of personal health information (health information privacy).					
	No	There is general legislation that addresses the protection of data, but it does not specifically address electronic health information.	There are regulatory/policy mechanisms that addresses the protection of health information, within a general data protection legal framework.	There is a legislation that specifically address the protection of personal health information in the context of electronic health information.	The legal and regulatory framework is flexible and able to accommodate emergent requirements for the protection of personal health information.
National and International Agreements *National and International agreements to contextualize national plans and investments. Commitment to regional and global mandates.*	There is some awareness of data and reporting obligations under national and international agreements, but little capacity to meet obligations.	Data and reporting obligations under national and international agreements are frequently met, but with high resource impact.	Data and reporting obligations under national and international agreements are consistently met with an effective use of resources.	Agreements enable data and information sharing across national and international stakeholders.	Data and information are able to flow freely among national and international partners in support of agreements, guided by frameworks that ensure the ethical use of information that

					protects individuals and populations.
Capacity to meet data and reporting obligations under national and international agreements.					
IHR	There is little capacity to meeting data and reporting obligations.	There is some capacity to meet data and reporting obligations, but with high resource impact.	There is sufficient capacity to meet national data and reporting obligations with an effective use of resources.	There is sufficient capacity to meet national and international data and reporting obligations with an effective use of resources.	Systems, process and agreements allow data to flow freely between national and international partners.
SDG´s	There is little capacity to meeting data and reporting obligations.	There is some capacity to meet data and reporting obligations, but with high resource impact.	There is sufficient capacity to meet national data and reporting obligations with an effective use of resources.	There is sufficient capacity to meet national and international data and reporting obligations with an effective use of resources.	Systems, process and agreements allow data to flow freely between national and international partners.
PAHO Core Indicators	There is little capacity to meeting data and reporting obligations.	There is some capacity to meet data and reporting obligations, but with high resource impact.	There is sufficient capacity to meet national data and reporting obligations with an effective use of resources.	There is sufficient capacity to meet national and international data and reporting obligations with an effective use of resources.	Systems, process and agreements allow data to flow freely between national and international partners.
National statistical reporting requirements	There is little capacity to meeting data and reporting obligations.	There is some capacity to meet data and reporting obligations, but with high resource impact.	There is sufficient capacity to meet national data and reporting obligations with an effective use of resources.	There is sufficient capacity to meet national and international data and reporting obligations with an effective use of resources.	Systems, process and agreements allow data to flow freely between national and international partners.
Agreements enable data and information sharing.					
	There is no formal data sharing among national stakeholders.	There is some data sharing among national stakeholders, but data sharing requirements new agreements or approvals each time.	Data can be shared routinely among national stakeholders, which contributes to national capacity to meeting national and international data and reporting obligations.	Data can be shared routinely among national and international stakeholders, which contributes to national capacity to meeting national and international data and reporting obligations.	Data is able to flow freely among national and international partners guided by frameworks that ensure the ethical use of information that protects individuals and populations.

Knowledge Management and Sharing - KMSH

Knowledge Processes *Knowledge management methodologies and mechanisms to improve decision-making, capture, share and measure organizational knowledge.*	Level 1	Level 2	Level 3	Level 4	Level 5
	Knowledge sharing in the organization is ad hoc and Organizational knowledge resides with key individuals rather that on repeatable processes documented in unit descriptions, job descriptions, policies and SOPs.	There are some basic knowledge management mechanism and processes (e.g. formal meeting notes, trip reports, SOPs, documentation etc.) in place but not always accessible and updated and are not required in policy or practice.	There are numerous knowledge management processes defined (lessons learned, trip reports, mentoring, shadowing, etc.) guided by formal policies and procedures. There is a formal basic KM strategy at the organizational level	Knowledge management sharing is integrated into business processes, job descriptions and organizational functions. . Metrics are used to quantitatively measure organizational knowledge management processes and capacities, and continuously improve performance.	Health authorities and their multisectoral partners are fully learning organizations: The organizational culture encourages the free-flow of knowledge throughout the organization, enabled by KM processes, tools and technology.
There is an official institutional taxonomy for the classification of documents					
	Not used	Awarded of them but not implemented	Defined and implemented in some facilities	Formally defined and adopted institution wide	Fully implemented nationally
Use of KM metrics					
	There are no metrics on the use of KM tools	There are some metrics of use on some KM tools used for basic use reports to authorities	Metrics are used to quantitatively measure organizational knowledge management processes and capacities	Result of KM metrics is used for statistics and diagnosis	The result of KM metrics Are used to improve performance
Knowledge transfer from experienced to new staff is					
	Not practiced	Practiced ad hoc as an individual initiative	Process and/or SOP under development	Part of the Institutional policy, but not consistently practiced	Part of the Institutional policy and fully implemented
Organizational knowledge is shared					
	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas do as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization
There is a coaching and mentoring program					

	No	Practiced ad hoc as an individual initiative	Some facilities/units/teams are developing a program, currently informal initiatives	Most facilities/units/teams have a program in place	In process of implementation through all the institution
There are established KM institutional methodologies for					
Preservation of the institutional memory	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Open access/open source	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Research for health	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Repositories	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Information access	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Editorial or publishing	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Mentoring	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement

Travel reports	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Meeting reports	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Communities of practice	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Lessons learned	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Critical Information sharing and managing	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Virtual meetings	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Social networking	No	On demand and in person, is an individual voluntary process based on confidence	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
There is a KM policy including					
Preservation of the institutional memory	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement

Open access/open source	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Research for health	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Repositories	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Information access	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Editorial or publishing	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Mentoring	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Travel reports	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Meeting reports	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Communities of practice	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement

Lessons learned	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Critical Information sharing and managing	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Virtual meetings	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Social networking	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
There are KM SOPs on					
Preservation of the Institutional Memory	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Open access/open source	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Research for health	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Repositories	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Information access	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among

					areas of the organization with continuous improvement
Editorial or publishing	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Mentoring	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Communities of practice	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Lessons learned	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Critical Information sharing and managing	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Virtual meetings	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Social networking	No	On demand and in person, is an individual voluntary process based on confident	Some facilities/units/areas have, as part of their institutional processes	Formal process under development in the entire organization	Established in a formal process and operationalized among areas of the organization with continuous improvement
Knowledge Architecture *Knowledge management and sharing policies, processes, infrastructure, tools and skills strengthening as part of a learning organization framework.*	Knowledge management is felt as a need, but there is a few knowledge and expertise in this matter Although some basic knowledge management technologies and tools are	There is an awareness among leadership and staff of the key concepts and importance of knowledge management. Some isolated KM&S pilot projects (no necessarily by management initiative)	Basic KM infrastructure (e.g., share information repositories, content management standards, etc.) is in place. Some CG projects have been launched at some levels of the	A formal knowledge management framework has been established within the organizations, with robust policies, processes and mechanisms for knowledge	The KM&S systems are fully operational. Integration of technology with content architecture.

	available (physical library of internal resources, shared drives), they are not consistently or organized. Accessing organizational knowledge is time-consuming and difficult.		organizational structure. KM skills strengthening is part of a training program	management and knowledge sharing.	
Organizational Knowledge is accessible through:					
	Not accessible	Separate, physical repositories	A central physical repository/library	Separate electronic repositories, shared drives, intranet	Digital/open Institutional Memory repository
Knowledge management and sharing is integrated into business processes, job descriptions and organizational functions					
	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	In process of implementation through all the institution	Yes
HR Competencies include Knowledge Management and related topics					
	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	In process of implementation through all the institution	Yes
Technical staff KM Skills are					
	Beginner (a few knowledge)	Developing (awareness among leadership and staff of the key concepts)	Competent (KM skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on KM in place)	Expert (Health staff and leadership incorporate functionally their KM Knowledge in their routine activities)
There is an agenda/curriculum for training staff on:					
Use of scientific information for health-related decision making	No	Training is encouraged but not formalized capacitation curriculum exists,	In process of implementation through institution into the HR policy and partially enforced.	Yes, implementation based roadmap is ongoing but not fully implemented, effective resources allocation varies with years	Yes, fully implemented and resourced

Knowledge production	No	Training is encouraged but not formalized capacitation curriculum exists,	In process of implementation through institution into the HR policy and partially enforced.	Yes, implementation based roadmap is ongoing but not fully implemented, effective resources allocation varies with years	Yes, fully implemented and resourced
Knowledge management & sharing	No	Training is encouraged but not formalized capacitation curriculum exists,	In process of implementation through institution into the HR policy and partially enforced.	Yes, implementation based roadmap is ongoing but not fully implemented, effective resources allocation varies with years	Yes, fully implemented and resourced
Knowledge access	No	Training is encouraged but not formalized capacitation curriculum exists,	In process of implementation through institution into the HR policy and partially enforced.	Yes, implementation based roadmap is ongoing but not fully implemented, effective resources allocation varies with years	Yes, fully implemented and resourced
Uuse and evaluation of information technologies in order to support health priorities	No	Training is encouraged but not formalized capacitation curriculum exists,	In process of implementation through institution into the HR policy and partially enforced.	Yes, implementation based roadmap is ongoing but not fully implemented, effective resources allocation varies with years	Yes, fully implemented and resourced
Leadership and staff awareness of Knowledge Management is					
	Beginner (a few knowledge)	Developing (awareness among leadership and staff of the key concepts)	Competent (IS4H skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on in place)	Expert (Health staff and leadership incorporate functionally their KM Knowledge in their routine activities)
The institution uses ICT tools and platforms that facilitate communication					
Social networks	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system
Web 2.0	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system

Direct Messaging	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system
APPs	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system
The institution uses ICT tools and platforms that facilitate knowledge exchange and effective collaboration:					
Web Conferences (e.g.: WebEx, Blackboard, Skype, Adobe Connect. etc.)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system
Collaborative platforms / Forum	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system
Video Conference (CISCO)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system
Communities of Practice	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, there are key shared tools and platforms among public health system	Yes, standardized and interoperable among the national health system
There is a methodology/process/policy to facilitate public access to contents resulting from research activities financed primarily by public funds					
	No	Some facilities/units/areas do as part of their institutional processes	Formal process under development in the entire organization	Yes, established in a formal process and operationalized among areas of the organization for some calefied staff	Yes, established in a formal process and operationalized among areas of the organization for some al staff and sustainable
Strategic Communications *Strategic tools and methodologies for supported decision-making. Public*	There are routine public health communications on national priority issues (e.g., healthy lifestyle, vector	A informal public health communication strategy in in place, not operationalized. Public health strategic	A formal public health communication strategy in place with targeted	There is a public health communication strategy with defined messages customized for specific audiences and	Strategic communications are informed by advanced analytics in near real-time.

health communication strategy on national priority issues, as well as promoting (individual, social, and political) changes that lead to achievement and maintenance of health.	control, etc.). Data and information typically flow only from source to the central level.	communications include healthy life style and prevention issues	messages to specific audiences.	purposes informed by national evidence. National authorities can measure the impact of strategic communications, and adjust communications strategies accordingly.	
Public health communication strategy					
	No, some communications are oriented to National Priority issues when occur (vector control, outbreaks, disasters)	Not a formal communication strategy in place, but there are routine ad hoc communication messages that include e.g. healthy life style and prevention issues	Yes, There is a health communication strategy with targeted messages to specific audiences	There is a health communication strategy with targeted messages to specific audiences and purposes informed by national evidence	Yes, Health Communications strategy allows flexibility and opportunity on interventions, oriented by advanced analytics in near real-time.
Data and information flow					
	Information available stays at the level of collection, used for self reports or specific reports to national or international level	Routinely from sources to central level, with no feedback to the local level	Routinely from sources to central level, with some feedback to the local level with key information.	There is feedback from central to local level	There is an integration of all sources levels for information use. Horizontal flow of information with permanent feedback
Impact of strategic communications is measured					
	No	Yes, for some specific issues, not as routine	Yes, routinely for all the communications to inform leadership	Yes, and communications strategies are adjusted accordingly	Impact of health communications is measured in real time by unstructured data, social networks.
Strategic communications are informed by					
	National Data	National and International Data	International evidence	National and international evidence	Advanced analytics, unstructured data
Health information for health service delivery management is used					
	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	In process of implementation through all the institution	Yes

Social Participation	Communication with civil society and the public is typically "one-way" (e.g., through websites and advertising).	There is limited engagement with civil society and the public through basic mechanisms such as surveys and focus groups.	The participation of civil society in the health system is actively encouraged through social media and formal roles on governance bodies and advisory groups.	Civil society organizations and the public are constantly engaged	Decisions by health authorities and other health system actors are transparent, driven by evidence and engagement with civil society and the public.
Transparency and sound communication in an early stage can build trust in the system and facilitate contributions and cooperation across different sections of society. Communication and engagement with civil society and the public through mechanisms for active encouragement and transparent decision making process.					
Communication mechanisms with civil society and the public					
One way (websites, advertising, etc.)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes , there are key shared tools and platforms among public health system	Yes standardized and interoperable among the national health system
Specific commemorative activities (campaigns)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes , there are key shared tools and platforms among public health system	Yes standardized and interoperable among the national health system
Surveys	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes , there are key shared tools and platforms among public health system	Yes standardized and interoperable among the national health system
Focus groups	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes , there are key shared tools and platforms among public health system	Yes standardized and interoperable among the national health system
Social networks and website interaction	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes , there are key shared tools and platforms among public health system	Yes standardized and interoperable among the national health system
Participation in governance bodies	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes , there are key shared tools and platforms among public health system	Yes standardized and interoperable among the national health system

Participation in advisory groups	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes , there are key shared tools and platforms among public health system	Yes standardized and interoperable among the national health system
Civil society and/or the public are included in health decisions					
	No	Yes, through indirect methods like surveys	Yes, through direct methods as surveys or focus groups; community meetings/forums	Yes, as part of standing advisory or decision-making bodies;	Yes, Integrated into decision-making through a variety of engagement mechanisms, continuously
Academia & Scientific Community *The academic and scientific communities contribute to research and producing new knowledge in health.*	No formal relationships have been established between health authorities and the academic/scientific community.	Relations with academia are fluid, informal and on demand	Formal relationships with academia have been established to expand organizational knowledge and learning.	Formal relationships have been established with academia/scientific community focused on supporting projects and programs with specific studies.	Formal relationships have been established with academia/scientific community focused on supporting specific projects or studies, support decision-making and programs evaluation.
The organization formally integrates academic institutions in					
	No integration or collaboration	No, there are informal relations, not supported by formal documents, based on relations among staff and academia personnel.	Expand organizational knowledge and learning. (training activities) based on formal relationship	Public health interventions, through their experts support, ongoing with results.	To support the process of public health policy making through evidence integration and public health programs evaluation
The organization has an expert advisory group of selected external experts					
	No technical advisory group	No, but experts are consulted ad hoc for some specific program/units/staff/leadership, to solve specific problems	No, in process of implementation. The group works ad hoc.	Yes, if needed, a group is convocated for specific needs on policy and decision-making based on evidence but does not meet regularly	Yes, there are all the technical advisory groups needed in place, that meet regularly.
Networks *Different types of networks implemented, such as: strategic and*	Networks for knowledge sharing are typically ad hoc and informal.	Staff participate in knowledge networks (e.g. communities of practice, conferences, listservs) on ad hoc basis.	Participation in communities of practice is encouraged and staff routinely capture	Knowledge networks are integrated into organizational structures and practices by a	As an integrated organizational practice, participating and creating networks is focused in helping the organization to

			and share knowledge from these forums.	resources and compensations program.	continually identify and adopt emerging knowledge.

diplomatic networks of relations, thematic and knowledge networks, and social networks for community engagement					
There are internal networks for knowledge sharing					
	No, but staff participates and organize ad hoc	Staff and leadership participates ad hoc in local initiatives. (communities of practice, conferences, listservs)	Participation in knowledge networks is encouraged and led by leadership and is known as an essential way for capturing and sharing knowledge.	Organization and development of knowledge network for capturing and sharing knowledge is resourced and implemented	Knowledge networks are integrated into organizational structures and practices as a way of identify and adopt emerging knowledge
Interprogramatic networks for specific projects are					
	Not created, the decisions are made by the entity, staff with the direct responsibility	No, but some teams creates ad hoc networks to implement some projects	There are some successful formal initiatives at the local/team level, but not part of routine.	Yes, is encouraged by management as part of project implementation.	There is a mechanism in place for each project to create interprogramatic or multisectoral networks to generate a better impact and results.
Participation in international networks for knowledge sharing					
	No	Staff and leadership participates ad hoc in international initiatives. (communities of practice, conferences, listservs)	Participation in international knowledge network is encouraged by leadership, as an essential way for capturing and sharing knowledge.	Participation in international knowledge network is part of the staff responsibility and its included in their job descriptions	Is integrated into organizational structures and practices as a way of identify and adopt emerging knowledge

Innovation - INNO					
	Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*

Key Concepts *Leadership and staff awareness and knowledge of IS4H key concepts: big data, open data, predictive analytics, social analytics, forecasting, modelling, and more…*	leadership and staff are not familiar with IS4H concepts	While some IS4H concepts are understood, leadership and staff are not widely aware of all concepts.	Most leadership and staff have an understanding IS4H concepts. There are recent assessments that demonstrate strong digital literary among most leadership and staff.	Knowledge of IS4H Key Concepts and digital literacy is high among leadership and staff, and there is evidence that these concepts are routinely applied in practice at all levels of the organization.	Knowledge of IS4H Key Concepts and digital literacy is high among leadership and staff, and there is evidence that these concepts are routinely applied in practice at all levels and across sectors.
Leadership and staff have awareness of IS4H concepts					
	Beginner	Developing (awareness among leadership and staff of the basic concepts)	Competent (IS4H skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on IS4H in place)	Expert (Health staff and leadership incorporate functionally their IS4H Knowledge in their routine activities)
Leadership and Staff are digitally literate					
	Beginner	Developing (awareness among leadership and staff of basic concepts)	Competent (Digital Literacy strengthening is part of a training program)	Advanced (Continuous capacity building framework Digital Literacy in place)	Expert (Health staff and leadership develop functionally in the information society)
Key concepts knowledge levels are:					
Open government	Beginner	Developing (awareness among leadership and staff of basic concepts)	Competent (concept strengthening is part of a training program)	Advanced (Continuous capacity building framework includes concept)	Expert (Health staff and leadership incorporate functionally their conceptual knowledge in their routine activities)
Big data	Beginner	Developing (awareness among leadership and staff of basic concepts)	Competent (concept strengthening is part of a training program)	Advanced (Continuous capacity building framework includes concept)	Expert (Health staff and leadership incorporate functionally their conceptual knowledge in their routine activities)
Internet of Things	Beginner	Developing (awareness among leadership and staff of basic concepts)	Competent (concept strengthening is part of a training program)	Advanced (Continuous capacity building framework includes concept)	Expert (Health staff and leadership incorporate functionally their conceptual knowledge in their routine activities)

Data management and governance	Beginner	Developing (awareness among leadership and staff of basic concepts)	Competent (concept strengthening is part of a training program)	Advanced (Continuous capacity building framework includes concept)	Expert (Health staff and leadership incorporate functionally their conceptual knowledge in their routine activities)
Open data	Beginner	Developing (awareness among leadership and staff of basic concepts)	Competent (concept strengthening is part of a training program)	Advanced (Continuous capacity building framework includes concept)	Expert (Health staff and leadership incorporate functionally their conceptual knowledge in their routine activities)
Health Analysis for Decision-Making *A systematic approach for health needs assessments; accessibility of essential information; advanced analytical techniques to support real time clinical, management, policy and decision making.*	Standard statistical analysis is routinely applied to available health data to generate reports on health status and outcomes. Most health analysis is focused on the generation of indicators, although other types of health analysis are done on an ad hoc basis are required for special presentations and projects. Information is used to support decision-making in limited circumstances, but evidence-informed decision making is integrated into the policy and management culture.	Data typically flows from sources to central decision-makers for health analysis, but little health information is available for decision-making at the local level. There is evidence that data and information are routinely used to support policy and management decision-making.	All essential information to support clinical, management, policy decision-making and is readily accessible, and end-users have on-demand access to information products or health analysis resources.There is capability among clinicians, administrators, and policy-makers for evidence-informed decision-making, and clinical, management and policy decisions are data-driven. A range of defined health analysis approaches are routinely applied (e.g., ASIS ARMAR7, Health Inequalities, Multiple Cause of Death Analysis, etc.).	There is advanced capacity among technical staff. Continuous capacity building (investment in skills, tools, partnerships) for more advanced approaches of health analysis	There is expert knowledge and capacity among technical staff that go beyond routine analysis required. There is annual capacitation and budget towards training. Health Analysis can be done real-time and routine clinical, management and policy decision-making are based on timely analysis. Data driven decision-making. for public health strategies and activities.
Staff skills and knowledge to analyze the data are:					
Descriptive analysis	No knowledge or beginner	Developing (awareness of the key concepts among leadership and staff)	Competent (health analysis skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on health analysis in place)	Expert (Health staff and leadership incorporate health analysis in their routine activities)

Inferential statistics	No knowledge or beginner	Developing (awareness of the key concepts among leadership and staff)	Competent (health analysis skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on health analysis in place)	Expert (Health staff and leadership incorporate health analysis in their routine activities)
Data visualization and exploratory data analysis	No knowledge or beginner	Developing (awareness of the key concepts among leadership and staff)	Competent (health analysis skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on health analysis in place)	Expert (Health staff and leadership incorporate health analysis in their routine activities)
Public health modeling	No knowledge or beginner	Developing (awareness of the key concepts among leadership and staff)	Competent (health analysis skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on health analysis in place)	Expert (Health staff and leadership incorporate health analysis in their routine activities)
Data science: Predictive analysis based on machine learning, deep learning neural networks; clustering, anomaly, association rule mining, prediction	No knowledge or beginner	Developing (awareness of the key concepts among leadership and staff)	Competent (health analysis skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on health analysis in place)	Expert (Health staff and leadership incorporate health analysis in their routine activities)
Health analysis approaches are applied					
Descriptive (summary) analysis	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
Inferential statistics	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
Data visualization and exploratory data analysis	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
Public health modeling	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
Data science: Predictive analysis based on machine learning, deep learning neural networks; clustering, anomaly, association rule mining, prediction	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
National Health Sector Strategic plan is based on data driven situation analysis					

	there is not current national health sector strategic plan	there is a current nat. Health sector strategic plan but data is not recent	there is a current nat. Health sector strategic plan	there is a current nat. health sector strategic plan, accessible online, which includes trend analysis	there is a current nat. health sector strategic plan, accessible online, which includes trend analysis and burden of disease analysis and health systems strength analysis
Health analysis available allow prioritization, monitoring and evaluation					
Causes of Death analysis	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)
Live births analysis	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)
Maternal and neonatal mortality analysis	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)
Non Communicable Diseases analysis	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)

Communicable Diseases analysis	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)
Vaccine preventable diseases analysis	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)
Risk factors	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)
Health Systems and Coverage analysis	irregular and isolated analysis are available but do not allow prioritization	isolated and irregular analysis are done, which are used for prioritization	analysis institutionalized but not implemented that would allow continuous prioritization/M&E	institutionalized and implemented that allow continuous prioritization/M&E but operationally issues exist (representativeness, timeliness)	Health analysis to identify vulnerable populations at national, subnational and local level are done for monitoring and targeting interventions (data flow, timeliness, representativeness optimal)
Health analysis is focused on					
	Descript of current health situation	Descript of current health situation; Cases detection	Description of current health situation, detect, monitor	Descript, detect, monitor, raise awareness, and past trends	Descript, detect, monitor, raise awareness and provide insights, past trends and forecasting
The organization has a formal mechanism for human resources development on health analysis					

	No	No formal mechanism: Some facilities/units/teams encourage their HR for development but is not formalized and is based on individual commitment	In process of implementation in entire institution that Health analysis training is included in HR policy.	Yes, but not fully implemented, implementation plan, effective resources allocation, etc.	Yes, fully implemented and resourced and staff is continuously trained

The organization has a formal mechanism for human resources development on information systems for health

	No	Some facilities/units/teams encourage their HR for development but is not formalized and is based on individual commitment	In process of implementation in entire institution, IS4H development mechanism is being included into the HR policy.	Yes, but not fully implemented, implementation plan, effective resources allocation, etc.	Yes, fully implemented and resourced and staff is continuously trained

Uses of non-conventional databases (e.g. emergency calls, absence in school, etc.) to support decision-making in public health

	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
Tools *Health analysis and business intelligence tools are available for advanced approaches to health information.*	Basic tools are routinely used for health analysis (e.g., spreadsheets, MS Access, etc.)	Basic tools are routinely used for health analysis (e.g., spreadsheets, statistical packages, etc.) and data is stored in relational databases	Advanced tools are routinely used for health analysis (e.g., spreadsheets, statistical packages, etc.) and all data is stored in relational databases	Advanced tools are routinely used for health analysis (e.g., spreadsheets, statistical packages, etc.) and all data is stored in relational databases and new approaches for non traditional databases are initiated., tools are continuously updated and improved. Online data platform are available.	Online tools and platforms for data dissemination and analysis (e.g., data repositories, dashboards, portals, visualization tools, spatial data, etc.) are appropriately and securely available for different user types, such as policy makers, managers, clinicians, and public stakeholders

Tools used to support health analysis

Spreadsheets (Excel)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis tool used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system
Data analytics tools (SPSS, SAS, R)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis tool used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system

Business intelligence tools and dashboards (e.g. Tableau)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis tool used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system
Geographic information systems (ArcGIS)	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis tool used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system
Database management systems used					
MS SQL	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis system used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system
MS Access	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis system used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system
Open source: Posgres SQL/Linux/MySQL	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis system used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system
Oracle Database	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis system used among public health system	Yes, is the stardardized and interoperable health analysis tool used among the national health system
Open source: Hadoop/Apache	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine.	Yes, is the standardized and interoperable health analysis system used among public health system	Yes, is the standardized and interoperable health analysis tool used among the national health system
Programming languages used					
Java	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, is the standardized and interoperable language used among public health system	Yes, standardized and interoperable among the national health system

PHP	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, is the standardized and interoperable language used among public health system	Yes, standardized and interoperable among the national health system
Ruby	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, is the standardized and interoperable language used among public health system	Yes, standardized and interoperable among the national health system
C++	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, is the standardized and interoperable language used among public health system	Yes, standardized and interoperable among the national health system
R, Python	No	Some facilities/units/teams do randomly	Some facilities/units/teams do as part of their routine, with their own selection criteria.	Yes, is the standardized and interoperable language used among public health system	Yes, standardized and interoperable among the national health system
Data warehouse (DWH) within the organization exists					
	No	An institutional DWH is in development but not operational	Institutional DWH exists but not regularly updated	Institutional DWH is updated, online access	A national DWH is updated, sustainable, easy access, full documentation and data can be shared across national, subnational and local levels
Organization disseminates data/information/analysis through					
	Internal reports, documents within organization	Printed, online in pdf	Printed, online interactive	Printed, online/interactive, vis tools/dashboards	All 3 with open data portal
Digital Health *Digital health tools being used to transform models of care, improve patient safety, quality of care and supporting population health approaches. Health care and service are delivered virtually.*	Health care delivery and services are largely manual processes. Assessing digital technologies in health incl health information systems at national/subnational level to identify areas of improvement	Digital health tools such as electronic records, laboratory/pharmacy information systems and electronic order entry are being implemented with a focus digitizing manual processes and operational efficiencies. Developed roadmap based on assessment to better integrate digital	There is evidence of digital health tools being used to transform models of care, improve patient safety and quality of care, or for supporting population health approaches. Appropriate legislation and data protection policies around data access, sharing, consent, security, privacy,	Digital health tools are used to facilitate targeted communications to individuals to stimulate demand for services/access to health information and digital health interventions are targeted to health workers to give them immediate access to improve decision support mechanisms /telemedicine	• Digital health technology enables population health management and the rapid response to disease incidents and public health emergencies. Citizens are empowered to manage their own health and to proactively engage with health care providers. Health care workers have access to

		technologies into existing health systems including normative and technical aspects	interoperability are being developed		data and tools that support real-time decision making.
Current digital health initiatives					
	Some isolated and fragmented, stand alone ICT solutions	At the local level Digital Health initiatives are developed or adopted with no consideration of interoperability and IT standards issues.	Starting to improve/plan a integrated digital health environment. Integration of local initiatives in progress.	Yes, tools are developed, adopted considering standards and interoperability among public health system	Standardized and interoperable among the national health system
Development of national digital health policy and strategies					
	The government plans specific digitalization actions, not focused on health, led by the technology ministry or the counterpart, such as ensuring connectivity with bandwidth according to the population size of the different places	The country has a digital strategy that does not include specific health actions led by the technology ministry or the counterpart.	The country has a specific digital strategy for health. The Ministry (authorities) of Health leads the digitalization of the health system, with actions such as the elaboration of plans for the implantation of EMR	The country has a specific digital health strategy with a multi-year budget	The country has a specific digital health strategy that is aligned with the general digital strategy and has a multi-year budget
Telemedicine					
	not on the agenda	Some isolated initiatives at the local level, most based on reference and counter reference	Under development of a telemedicine network in the entire country	In process of implementation through all the institution	fully developed, network exists
E-Government *Integration of the health sector on the eGovernment initiatives, including the adoption of standards, applications, and information services to transform transactions between government and the public, businesses, or other organizations in health.*	E-government is not on the national agenda.	E-government is on the national agenda, but there is no formal strategy or unit in place.	The government has established an e-government strategy or unit. Currently the focus is on strengthening core IT infrastructure. Health is not a core stakeholder.	There is evidence of eGovernment initiatives that are transforming transactions between government and the public, businesses, or other organizations in health (e.g. online appointment booking, patient portals, e-referral, health card registration, etc.)	The health sector is fully integrated into e-government initiatives and platforms.
E-government is on the national agenda (Citizens interaction with government)					

	No	basic services are provided with e-government but not for health sector	streamlined services are provided with e-government including health sector (Can have some interactions or communications)	e-government is implemented for the provision of public services to citizens and businesses and the health care sector	e-government is well implemented for the provision of public services to citizens and businesses that includes health care

Current e-government focus is on

	Not clear	Strengthening core IT infrastructure	Strengthening administrative process like procurement, budget, etc. Also including IT infrastructure	Strengthening management process through administrative and IT infrastructure including health sector	Transactions and relation with the public including health sector is fully implemented

Level of integration of national health authorities in e-government initiatives

	Not a core stakeholder	Slightly, health is ad hoc invited to some particular events	Moderately: in process of integrating health	Very: is a core stakeholder	Health is integrated in eGov initiative with continuous improvement of the sector

Integration of Health specific public portals or health e-service with the national e-government platform

	No public e-services	Public health e-services are available, but separate from e-government platform and services	Some isolated public health e-services from facilities facilities/units/teams are integrated with national e-government platform	Yes, Public health e-services are integrated but not with all sectors/stakeholders (correct statement?)	Yes, Public health e-services are fully integrated with national e-government platform (e.g. single point of entry; single sign-on)
Open Government *Public access and effective oversight to government documents and proceedings. Open Data principles application and data sets availability.*	The concepts of Open Government are new to leadership.	There is broad knowledge of open government principles among national health authorities, and leadership support for advancing open government policies and initiatives.	Open data principles have been formally adopted in policy.	Open data principles are fully applied, and key data sets are available for analysis by other national and international stakeholders.	Open data principles are fully applied. Full interaction with national and international partners regarding the use of data analysis to strengthen decision making.

Leadership and staff knowledge of Open Government concepts and principles

	Beginner (a few knowledge)	Developing (awareness among leadership and staff of the key concepts)	Competent (Open Government skills strengthening is part of a training program)	Advanced (Continuous capacity building framework on Open Government in place)	Expert (Health staff and leadership incorporate functionally their Open Government Knowledge in their routine activities)

There is leadership support for advancing open government policies and initiatives					
	Not at all	Slightly	Moderately	Very	Extremely
There is open data policy in government					
	no	some policies/units/areas do as part of their institutional processes	Formal process under development in the entire organization	Yes, documented and implemented at national levels	Yes, documented and implemented at the facility, region and national levels
Principles of "openness" integrated into organizational policy					
	No	Principles of openness are aware but not part of policies	Some aspects of open data/open governance are reflected in policy, but not all;	Yes, there are some isolated policies or processes that reflect the principals of openness;	Yes, policy integrates principles of "openness "throughout organization
Preparedness and Resilience Capacity of the information systems for health to operate during and after emergencies and disasters requires the development and application of special operating procedures to ensure access to the right information at the right moment in the right format.	Manual and electronic health information systems are vulnerable to failure in the event of a natural disaster or other catastrophic event. Limited data available to support disaster response.	There is evidence of approaches for ensuring business continuity in the case of disaster (e.g., routine off-site backups, downtime manual process SOPs, etc.).Some key data sets are available to support disaster response (e.g., facilities and health human resource databases, database of emergency centers, mortality data, etc.)	There is evidence that essential health information systems would continue working during disasters and will be able to able to support some health system functions and disaster response.	Health information systems would be resilient during disasters and are able to able to support essential health system functions and disaster response.	IS4H are fully resilient during disasters. The operation of information systems for health and access to information is available during and after emergencies and disasters.
There is a plan for health information recovery					
	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
There is a contingency plan to ensure basic IS4H functionality in case of emergency or disasters					
	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
Key data sets are available to support disaster response					

	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
There is a Data Backup Strategy					
	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system
Health information systems can support essential health system functions and disaster response					
	No	Some facilities/units/teams do but not routinely	Some facilities/units/teams do routinely	Fully implemented at the public health system	Yes, fully implemented at the national health system

Version History MM TOOL ENGLISH

Version	Date	Author	Description of changes	EXCEL
1.0	11/2/2017	Dr. Salm	Original document	
1.0	3/30/2018 (v. March)	Marcelo D'Agostino	Original document	
2.0	08/15/2019	Myrna Marti, Daniel Doane, Andrea Gerger	First major revision	
2.0 (November 2019)	11/12/2019	Myrna Marti, Mariel Mendiola, Andrea Gerger	Corrected algorithm in MAGO	IS4H MM TOOL COUNTRY.xls