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Ministère de la Santé



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Royaume du Maroc

Regional Health Observatory Establishment and Operation

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List of Acronyms

SCD	Severe and costly diseases
LTI	Long-Term Illness
NHIA	Agence National d'assurance maladie/National Health Insurance Agency
RTA	Road traffic accident
LHO	Bureau communal d'hygiène/Local Health Office
MHO	Bureau Municipal d'hygiène/Municipal Health Office
TRIDC	Centre de diagnostic de la tuberculose et des maladies respiratoires/Tuberculosis and Respiratory Illness Diagnostic Centre
UHC	Centre Hospitalier universitaire/University Hospital Centre
NPC	Centre National anti-Poisons/National Poison Centre
NCCP	Conseil National de l'ordre des médecins/National Counsel of the College of Physicians
NFSSO	Caisse Nationale des organismes de prévoyance sociale/National Fund for Social Security Organizations
NSSF	Caisse Nationale de sécurité sociale/National Social Security Fund
PNV	Prenatal visit
PoNV	Postnatal visit
RCCPhy	Conseil régional de l'ordre des médecins/Regional Counsel of the College of Physicians
RCCPha	Conseil régional de l'ordre des pharmaciens/Regional Counsel of the College of Pharmacists
RCCD	Conseil régional de l'ordre des médecins Dentists/Regional Counsel of the College of Dentists
RHRC	Centre de Référence de la Santé de Reproduction/Reproductive Health Reference Centre
EDCD	Direction d'épidémiologie et de lutte contre les maladies/Epidemiology and Disease Control Directorate
ACD	Direction des hôpitaux et des soins ambulatoires/Hospital and Ambulatory Care Directorate
IMD	Division de l'informatique et des methods/Infomatics and Methods Directorate
MPD	Direction des médicaments et de la pharmacie/Medication and Pharmacy Directorate
PD	Direction de la population/Population Directorate
PFRD	Direction de la planification et des ressources financières/Planning and Financial Resources Directorate
PPHD	Délégation préfectorale ou provinciale de la santé/Prefectoral or Provincial Health Delegation
HRD	Direction des Ressources humaines/Human Resources Directorate
RHD	Direction régionale de la santé/Regional Health Directorate
RAF	Forces de l'armée royale/Royal Armed Forces
HCP	Haut-commissariat au plan/High Commission Responsible for the Plan
GI	General inspection
NHI	Institut National d'hygiène/National Health Institute
MPI	Institut Pasteur du Maroc/Morocco Pasteur Institute
HINPH	Institut supérieur des professions infirmières et techniques de Santé/Higher Institute of Nursing Professions and Health Technologies
STD	Sexually transmitted infection
EEHL	Laboratoire d'épidémiologie et d'hygiène du milieu/Epidemiology and Environmental Health Laboratory
NA	Not Applicable
NGO	Non-governmental organization
NFSO	Office National de sécurité sanitaire alimentaire/National Food Security Office
RHO	Observatoire régional de santé/Regional Health Observatory
HSCN	Réseau d'établissements médico-sociaux/Health and Social Centre Network
PHCFN	Réseau d'établissements des soins de santé primaire/Primary Health Care Facility Network
HN	Réseau Hospitalier/Hospital Network
IHECN	Réseau intégré des soins d'urgence médicale/Integrated Health Emergency Care Network
SS	Support structure

IAS	Service d'accueil et d'admission/Intake and Admission Service
AED	Service administratif et économique/Administrative and Economics Service
EMAS	Service d'assistance médicale d'urgence/Emergency Medical Assistance Service
EM	Epidemiological Monitoring
EMS	Service des équipements et de la maintenance/Equipment and Maintenance Service
GS	Secrétariat general/General Secretariat
MCH-FP	Maternal and Child Health/Family Planning
MERS	Service mobile d'urgence et de réanimation/Mobile Emergency and Resuscitation Service
PCB	Service de l'offre de soins/Provision of Care Service
HFNS	Service du réseau des établissements de santé/Health Facility Network Service
FRLPS	Service des ressources financières, de la logistique et du partenariat/Financial Resources, Logistics and Partnerships Service
LHRS	Service des ressources humaines et de contentieux/Legal and Human Resources Service
MMSS	Système de surveillance des décès maternels/Maternal Mortality Surveillance System
PCS	Service des soins primaires/Primary Care Service
CFT	Collective food toxiinfection
PPU	Unité d'approvisionnement et de la pharmacie/Pharmacy and Procurement Unit
CIU	Unité de communication et d'information/Communication and Information Unit
CPME	Close proximity medical emergency
PHME	Proximity-to-Hospital medical emergency
HIV	Human Immunodeficiency Virus

Introduction

In Morocco, territorial redistribution was carried out using the advanced regionalization approach. The number of regions has gone from 16 to 12.¹ This regionalization is viewed as a reform mechanism based on new governance principles. It is an opportunity to involve regions in decision-making by decentralizing interventions and reducing regional social, economic and health disparities. Regions will be able to contribute to the development of public policies that meet the needs of the population. For the Ministry of Health, this means that Regional Health Directorates will now have more autonomy for regional planning and development, with deconcentrated functions such as surveillance and regional health and wellness planning and promotion.²

Regional Health Observatories play a crucial role in the decision-making process. They gather, analyze and synthesize health data to produce the kind of meaningful health-related information that can help inform policy and practice. They have expertise in monitoring health status and disease trends and, by converting data to “intelligence,” are able to support informed public health decision-making. Observatories identify inequalities in sub-populations by examining data from multiple sources and carrying out projects to highlight specific health issues that require action. They work with key partners and stakeholders within and outside of government to ensure that health information is utilized to its fullest potential.³

In Morocco, Regional Health Observatories (RHOs) are an integral part of Regional Health Directorates and work closely with all other health and non-health related regional services. Their mission and functions were described in *Arrêté 003.16*, dated January 4, 2016, and published in the March 31, 2016 *Bulletin Officiel*, under #6452 pursuant to the creation, organization and jurisdictional assignment of Ministry of Health decentralized services.

Purpose of the Guide

This guide aims to serve as a reference for RHOs. It provides basic standards for their establishment and operation. However, since epidemiological and socioeconomic characteristics and health profiles differ across regions, each RHO should also identify measures, innovative methods, data sources, products and means of information dissemination that go beyond the minimum standards. Effective sharing of successes among the Kingdom's different RHOs will make it possible to replicate achievements throughout the regions. This guide describes the organizational structure, goals and functions of RHOs, as well as their mission.

1. As well as Décret 2-15-40, dated February 20, 2015

2. Arrêté 003.16, dated January 4, 2016

3. WHO, Regional Office for Africa. Guide for establishment of health observatories. African Health Observatory. First Edition, 2016.

RHO Goals and Functions

Goals

Public health decision-makers need integrated, reliable and evidence-based information. Information on trends and case scenarios facilitate planning. A Regional Health Observatory serves the public health information needs of all stakeholders and users in its own region. It must be able to provide decision-makers with timely and detailed health intelligence by monitoring local trends and health inequalities with a focus on specific populations. RHOs can also report information on unexpected events or emerging risks that lead to public health interventions capable of effectively preventing or controlling disease. They play a role in promoting a research-based management culture using information obtained from multiple sources. They are uniquely situated to build relationships with regional stakeholders such as other ministry departments (local authorities from the education, interior, environment, employment, planning and youth sectors) and non-governmental organizations. Through local partnerships, RHOs are able to produce complete and responsive health information and make it accessible through print and online tools. RHOs will develop their capacities gradually and reasonably, according to national priorities and implementation capabilities.

Functions

The RHO's mission was defined through ministerial decree (see box). In this document, a chapter will be dedicated to each function.

RHO mission and functions*

1. Collect, analyse and assess health information

2. Track health indicators at the regional level

3. Manage health information at the regional level

4. Develop regional health status, provision of care and health care service interim reports

5. Contribute to regional health-related studies

6. Manage computer systems and provide equipment maintenance

7. Contribute to health professional mentoring and training efforts at the regional level

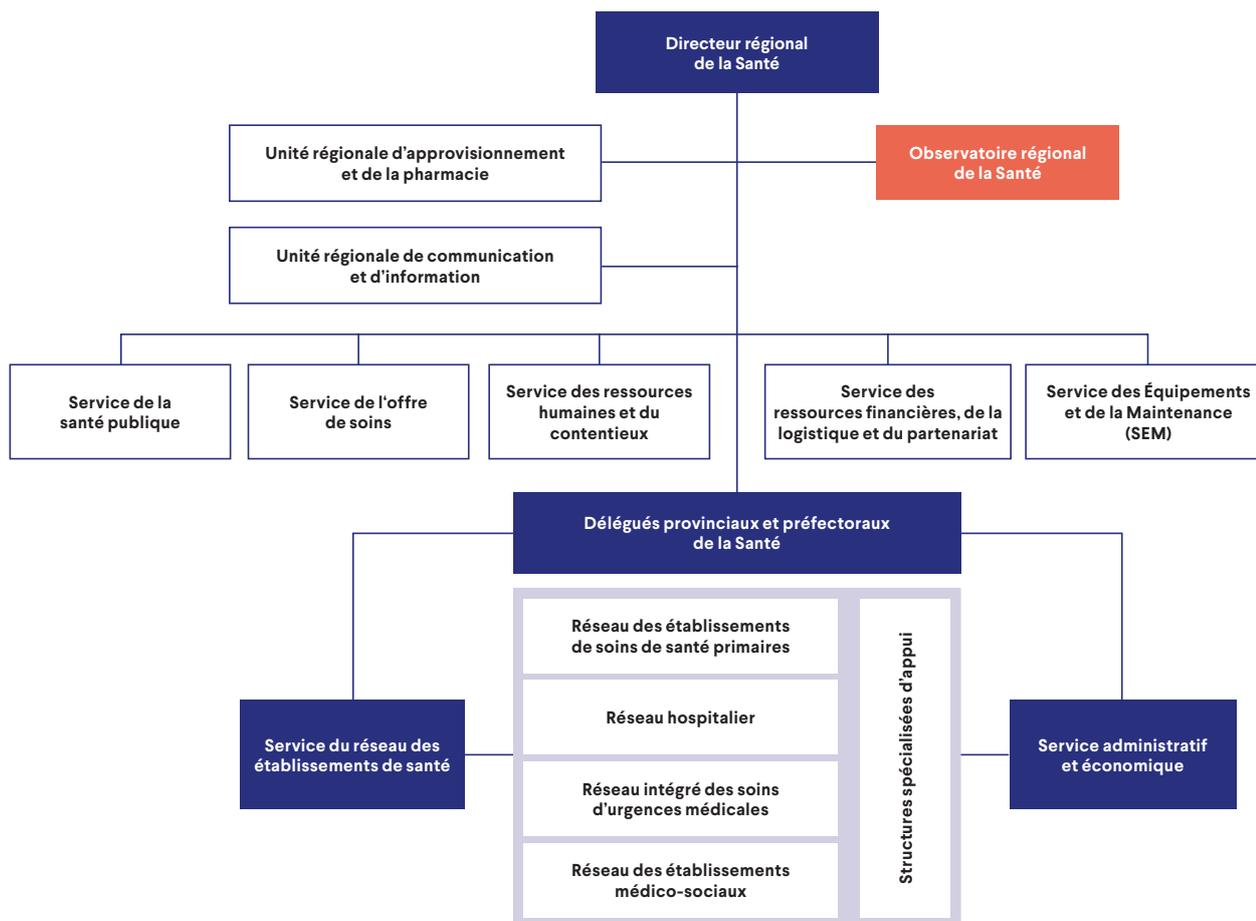
* Arrêté 003.16, dated January 4, 2016, divides the RHO's missions and functions into 7 categories.

Organizational Relationships and Skills

Organization

As one of six services of their Regional Health Directorate (see Figure 1), RHOs have a complementary relationship to the other five. They serve as a focal point for health data on core indicators and other data reported from the region according to central and regional priorities. RHOs collaborate with the five other services, although without duplicating data collection and analysis activities. Instead, RHOs complement this work, performing additional analyses, interpreting the information and making recommendations to regional decision-makers.

Figure 1. Organogram of the Regional Health Directorate



Human Resources and Expertise

For optimal performance, RHOs must have a variety of tools and expertise in place to ensure effective management of databases and proper understanding of data analysis and communication methods as well as the role of the health information system. RHOs should be staffed by a multi-disciplinary and complementary team that may take various forms depending on the availability of staff in each region. A core team of staff members with professional skills and/or experience in the following fields must be established:

- Epidemiology
- Public health
- Statistics (biostatistics)
- Data processing and information system management
- Informatics and maintenance (databases, networks and computer systems)

Epidemiologists, statisticians and data processing specialists have overlapping knowledge and skills in data management and analysis methods. Epidemiology focuses on the frequency, patterns and determinants of health-related states in populations. Statistical analysis focuses on inference, the science by which the validity of evidence-based findings is tested. Informatics includes computer sciences and management concepts. While statistics and informatics have applications that go beyond health, knowledge of data management, systems and analysis is directly relevant to the use of health information for decision-making. Interdisciplinary teams made up of representatives from each of these disciplines have the required complementary knowledge and skills to perform RHOs functions, including creating an electronic database and a dynamic dashboard with warning systems, and preparing status reports. Skills in geographic information systems, website design and communications are also useful.

In most regions, a minimum of five people is required to provide a critical level of resources for the mission and functions of the RHO. The number and type of RHO staff may increase over time and depend on the size and the needs of the region.

As the RHO evolves and matures, resources may be added internally or through additional positions, or through collaboration with partner institutions. Additional resources may include staff with more advanced skills in the areas of epidemiology, statistical and economic analysis, and informatics. Connecting with universities and other regional institutions of higher education could extend the human resources and technical capacities of a RHO.

Furthermore, cooperation between RHOs has the potential of extending each RHO's capacity and resources. Working groups or other multiregional discussion platforms could be developed to collaborate on projects of mutual interest. Examples of areas in which collaboration between RHOs could be useful include:

- strengthening technical capacity
- conducting studies, such as cause-specific mortality studies
- helping each other resolve problems related to information systems

Partnerships with organizations outside of the Ministry of Health are also an important resource. For example, connecting with universities and other regional institutions of higher education could extend the technical capabilities of an RHO. Partnerships might make human and technical resources available for specific projects such as conducting surveys. For example, environmental sector information on air pollution might be correlated with asthma rates; information from social services and corrections might provide insight on the health status of persons who are homeless or detained in prison; or a partnership with local health services might bring in information on deaths reported within each delegation by age groups and sex to complement available in-hospital mortality data.

Material and Logistical Resources

In addition to human resources, RHOs need a minimum amount of material resources to perform routine and research activities. The physical work environment must include a computer fleet comprising of one computer per user. These computers must be linked to a local network and connected to broadband Internet. The network itself must be linked to an electronic data storage server. Statistics and epidemiology software must be available in addition to Windows Office and Acrobat Pro. RHOs must also have office automation tools, a printer and a scanner. It is also advisable to have a video projector. RHOs are funded by the State through the Ministry of Health, but external resources can also be secured through the development of collaborative projects with the RHO's partners.

Operationalizing the RHO's 7 Functions

Collecting, Analysing and Assessing Health Information

At the RHO-level, data collection systems must be developed based on a reference framework capable of producing information relevant to regional planning and mandatory national and international health information reporting. This reference framework must be based on the common country monitoring and evaluation framework (see Figure 3) which helps identify indicators, links indicators to data collection methods and systems, and demonstrates the importance of analyzing and synthesizing data from multiple sources. Ideally, when the system allows for it, hospital data will be disaggregated by gender and age.

Data Collection and Transmission Channels

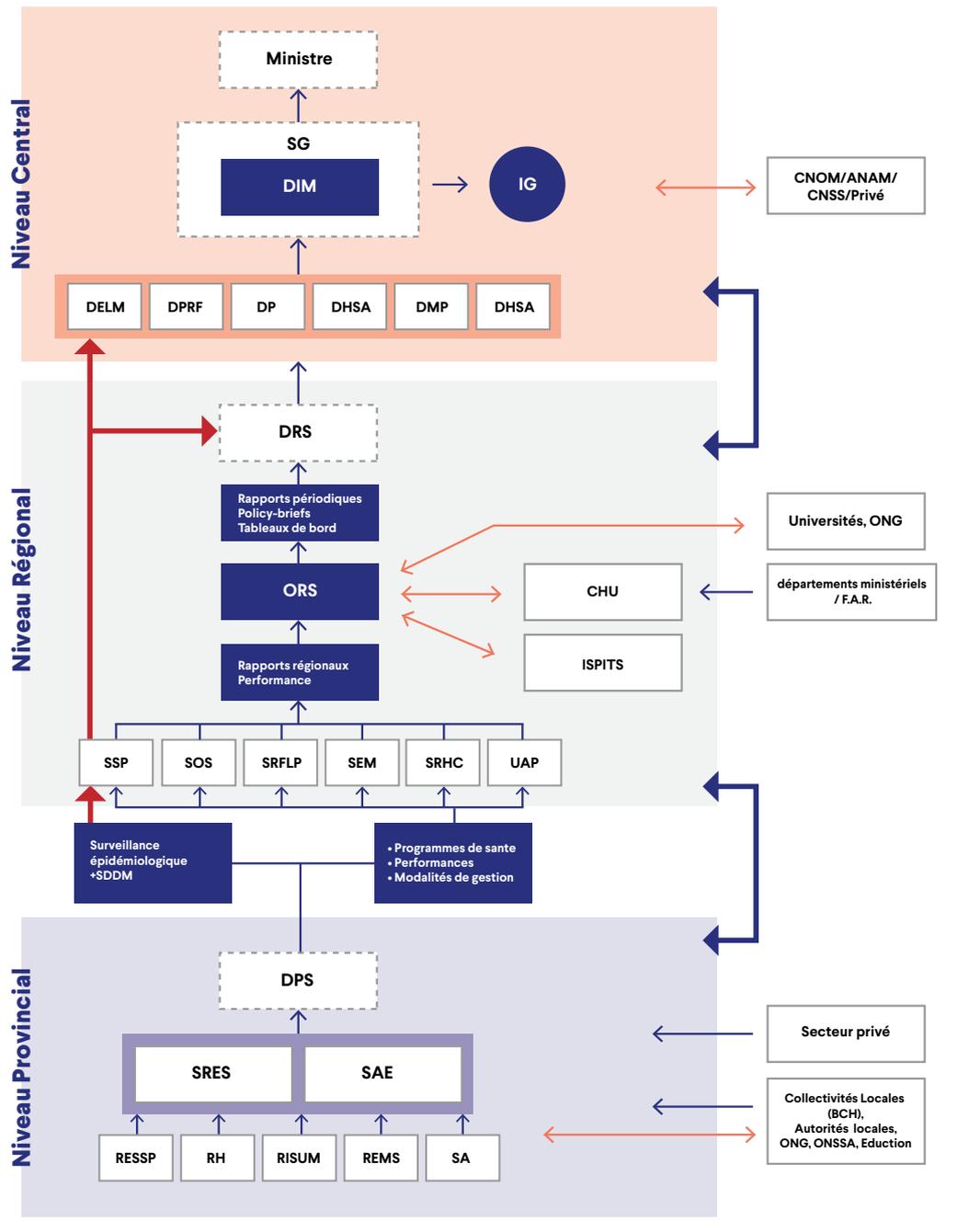
Initially, while they wait for the Ministry of Health to implement an integrated electronic information system, RHOs will collect information in three ways:

1. automatically, when information is available through computer applications
2. directly from regional institutions like HINPHT and interregional hospital centres, or from private sector organizations, other ministry departments or non-governmental organizations
3. directly from the region's regional units and services that submit information from the various provinces and prefectures' HFNBs.

Furthermore, the Public Health Service will continue collecting and analysing information produced by the epidemiological surveillance system and the maternal death surveillance system before it is sent to the RHO (Figure 2).

Within each service, health program leads will examine program-specific data to ensure their quality and completeness. When reports are missing information or appear to have errors, the relevant program will cross-check with the reporting entity to make the necessary corrections. Each RHO also monitors the completeness and coverage of the data required to calculate key indicators. In order to assess completeness, the RHO enumerates all the health facilities in the region and assesses completeness of reporting over time as a measure on how to improve the information system. Coverage is measured as the proportion of facilities reporting on a specific indicator. Completeness is measured among reporting facilities by how often data on a specific indicator are missing. Such measures will answer the following questions: Were reports received from all the entities that were expected to report? Were the reports complete? Do the reports include any values that were unexpected? The RHO may focus initially on a few key indicators or diseases. RHOs must also be able to support and inform all internal and external partners (Figure 2).

Figure 2. Pathway of RHO-collected and reported data



RHO-level data pathway

Legend

Purple arrow: Partnership relationship

Solid arrow: Information collection

Dotted arrow: Feedback

Red arrow: Epidemiological surveillance and data surveillance system information

GS: General Secretariat

IMD: Division de l'informatique et des méthodes/Infomatics and Methods Directorate

EDCD: Direction d'épidémiologie et de lutte contre les maladies/Epidemiology and Disease Control Directorate

PFRD: Direction de la planification et des ressources financières/Planning and Financial Resources Directorate

PD: Direction de la population/Population Directorate

ACD: Direction des hôpitaux et des soins ambulatoires/Hospital and Ambulatory Care Directorate

MPD: Direction des médicaments et de la pharmacie/Medication and Pharmacy Directorate

HRD: Direction des Ressources humaines/Human Resources Directorate

NCCPhy: Conseil National de l'ordre des médecins/National Counsel of the College of Physicians

NHIA: Agence National d'assurance maladie/National Health Insurance Agency

NFSSO: Caisse Nationale de sécurité sociale/National Social Security Fund

RHD: Regional Health Directorate

RHO: Regional Health Observatory

UHC: Centre Hospitalier universitaire/University Hospital Centre

HINPHT: Institut supérieur des professions infirmières et techniques de Santé/Higher Institute of Nursing Professions and Health Technologies

RAF: Forces de l'armée royale/Royal Armed Forces

PriCS: Service des soins primaires/Primary Care Service

PCS: Service de l'offre de soins/Provision of Care Service

FRLPS: Service des ressources financières, de la logistique et du partenariat/Financial Resources, Logistics and Partnerships Service

EMS: Service des équipements et de la maintenance/Equipment and Maintenance Service

LHRS: Service des ressources humaines et de contentieux/Legal and Human Resources Service

PPU: Unité d'approvisionnement et de la pharmacie/Pharmacy and Procurement Unit

CIU: Unité de communication et d'information/Communication and Information Unit

PPHD: Délégation préfectorale ou provinciale de la santé/Prefectoral or Provincial Health Delegation

HFNS: Service du réseau des établissements de santé/Health Facility Network Service

AES: Service administratif et économique/Administrative and Economics Service

PHCFN: Réseau d'établissements des soins de santé primaire/Primary Health Care Facility Network

HN: Réseau Hospitalier/Hospital Network

IHECN: Réseau intégré des soins d'urgence médicale/Integrated Health Emergency Care Network

HSCN: Réseau d'établissements médico-sociaux/Health and Social Centre Network

SS: Support structure

LHO: Bureau communal d'hygiène/Local Health Office

NGO: Non-governmental organization

NFSSO: Office National de sécurité sanitaire alimentaire/National food Security Office

Data Collection Standards

Clear data collection and feedback procedures must be established in conjunction with the region's other services and data producers. These procedures must be vertically-validated and communicated to all staff. RHOs must provide information and advice to the region's services regarding data quality standards, defining and organizing variables applicable to indicator reporting, and protecting the confidentiality of personal information.

Standard Variable Categories

Standard definitions that enable inter- and intra-regional comparisons must be implemented for variables and indicators. RHOs apply standards developed by the Central Directorates for reporting variables such as age groups, geographic units and socio-economic status. Each RHO works with central authorities to implement the national standards for managing the regional health information system. The RHO may also collect additional information that reflects the specific circumstances of the region.

Data Sources

Data source refers to the point at which data originate; there are five types of data sources:

- administrative data sources, which produce for example health facility data such as reports from the four networks (Hospital Network (HN), Primary Health Care Facility Network (PHCFN), Integrated Health Emergency Care Network (IHECN), Health and Social Centre Network (HSCN)), epidemiological surveillance reports, human and financial resource information, infrastructure and logistics data, as well as data related to medication and policy
- clinical notification systems (or surveillance systems)
- vital statistics are another source of information, namely regarding births and deaths
- demographic and health surveys
- census data are essential data sources

Data sources should provide for quantification of the population's health status and determinants of health such as risk factors and utilization of services.

Two or more sources are generally needed for a complete picture of the population's health status (reference framework, Figure 3). Each data source has its own strengths and weaknesses, described in Table 1.

It is important to document each data source and develop source-specific analytical guidelines. When common identifiers are available in more than one data source, data sources may be linked; this may occur at an individual level or at a geographic level. Linked data sources can provide additional information on health status or highlight vulnerable populations. Data linkage procedures should be clearly documented.

A list of data sources currently available to RHOs and how they can be accessed is shown in Table 2. It includes data sources within the Ministry of Health relating to health status, determinants of health, health services and human resources. Each RHO assesses the quality and coverage of the available data, including any weaknesses or gaps. Each also works with the other services to improve the quality, completeness and coverage of this data through feedback to data collectors, capacity building and modifications to the data collection forms and flow.

Initially, RHOs need to rely on existing data sources. As the capacity of the RHO grows and partnerships with other sectors are developed, the data sources can be expanded to address gaps. Periodic surveys at the regional level may also be conducted.

Table 1. Data Source Types

	Health Services	Population Based Surveys	Vital Statistics	Surveillance	Census
Definition	<ul style="list-style-type: none"> Provides information on the services that are delivered in health care institutions, as well as information on the patients and the health facilities; may include clinics, hospitals, and health care centers 	<ul style="list-style-type: none"> Representative household surveys conducted periodically in-person or by telephone 	<ul style="list-style-type: none"> Statistics that are generated from the continuous and universal collection of information about registered vital events such as births, deaths, fetal deaths, marriages, divorces 	<ul style="list-style-type: none"> Continuous, systematic collection, analysis and interpretation of health-related data needed for planning, implementation, and evaluation of public health practice; Active surveillance occurs when health authorities regularly contact health care providers to obtain information about diseases, or by systematic review of laboratory or health care facility records to identify cases Passive surveillance relies on health care providers to notify health care authorities about cases 	<ul style="list-style-type: none"> An official count of the population Provides demographic or other information for all individuals in the population at a specified time.
Uses	<ul style="list-style-type: none"> Comparison of trends over time, across geographies Assessment of services coverage Measure of access to services Can be used to measure preventable hospitalizations (ambulatory care-sensitive conditions) 	<ul style="list-style-type: none"> Used to determine the prevalence and incidence of behavioral risk factors, morbidity, health status, program coverage 	<ul style="list-style-type: none"> Provides information on the number and rates of vital events, causes of death, fertility, life expectancy, and premature mortality (mortality and natality indicators) Used to describing burden of diseases Assessment of age-, sex- and geographic-specific rates Monitoring deaths considered preventable Provides information for planning, education and workforce 	<ul style="list-style-type: none"> Provides incidence or prevalence of specific diseases, injuries and/ or risk factors in a population or a population sample Monitors health trends over time in order to detect and respond to epidemics. 	<ul style="list-style-type: none"> Planning for services and infrastructure and allocation of resources Describing the characteristics of a population and changes over time Provides denominators for key indicators
Strengths	<ul style="list-style-type: none"> Consistent source of health services data Can be disaggregated to provide data at facility level and by different geographies Potential for timely availability of data Detailed information on diagnoses, procedures and external cause 	<ul style="list-style-type: none"> Nationally representative Ideal for risk factors and risk behaviors and for morbidity data Collects data that is not available from health service systems 	<ul style="list-style-type: none"> Ongoing data collection and availability Standardized method of collection Can be disaggregated by age, sex and geography Potential for reliable, and cost effective data on causes of death 	<p>Active surveillance:</p> <ul style="list-style-type: none"> May also capture private facilities Comprehensive and specific Timely <p>Passive surveillance:</p> <ul style="list-style-type: none"> Cost effective 	<ul style="list-style-type: none"> Maximum coverage Potential to serve as a complement for information from household surveys and vital statistics data Available for small geographic areas and sub groups
Weaknesses	<ul style="list-style-type: none"> Unduplicated counts may be difficult to determine if data do not contain individual identifiers Data are limited to those who use services Potential for incomplete reporting from some facilities Geographic information about the service user may not be available 	<ul style="list-style-type: none"> Expensive, resource intensive, and usually infrequent Less timely data for planning Rarely available at sub-national levels Self-reported; subject to recall or information bias Complex sampling design must be accounted for in the analysis 	<ul style="list-style-type: none"> Many countries do not have systems to enable complete registration Cause of death may be available only for people who died in hospitals Guidelines on completing death certificates and assigning cause of death are not met in many countries Often a 1-2-year time lag in availability following data collection 	<ul style="list-style-type: none"> Identification may be incomplete if it comes from those who actively seek services Underreporting of may occur from specific health facilities or health care providers May not have relevant denominators for calculating prevalence or incidence rates Active: Collection is resource intensive and more costly Passive: May undercount cases where cases or deaths occur without entering the health care system; May be under-recognition of cases where laboratory support is inadequate 	<ul style="list-style-type: none"> Expensive May be infrequent; generally, every 10 years Response rates may be low in certain sub-populations

Understanding Biases of Data Sources

One way to think about the strengths and weaknesses of a data source is to understand its potential biases; that is, whether analyses performed using this source will give a true picture of population health. Bias is defined as the systematic difference between true value in a population and the measured value in a data source. For example, health services data provide information only about people who are receiving health care. If health services data are used to provide information about the prevalence of a condition in the general population, the information will likely be biased. Using the overall population as a denominator, the prevalence will likely be under-counted. All analyses should consider the quality and potential biases of each data source and, when communicating results, should note any resulting uncertainties.

Data Analysis and Evaluation

Data analysis is key to identifying health priorities, allocating resources, planning services and advancing policy initiatives. Each RHO must analyze data produced by the other services and work to identify areas for action by the Regional Director and other decision-makers. RHOs must collaborate with and set data standards for the five other services of the Regional Directorate, although without duplicating the services' own program-specific data collection and analysis. RHOs must complement this work, performing additional analyses and interpreting the information and making recommendations to regional decision-makers. Key to this process is making sure that RHOs have access to all data compiled in each region.

The types of analyses that are conducted include: 1) analyses conducted routinely that describe the health of the population and help diagnose health problems and identify priorities; and 2) analyses that specifically examine a particular health priority or topic in order to provide support or guidance for a program or increase resources.

RHOs must compile and analyze data to describe the burden of conditions or risk behaviors on the population and model or estimate the impact of various strategic options to address the health condition of interest. Analyses should also enable comparisons between the burdens of different health conditions and differentiate them by characteristics such as age and sex and by place and time. Comparisons that shed light on health disparities or underserved populations can be powerful motivators to action.

Table 2. Examples of available data sources

Type of data source	Primary data sources	Content	Report Frequency	Contact
Primary Health Care Facility Network (PHCFN)	Health care centres, rural dispensaries	Reproductive health, child health and curative care (PNV, PoNV, immunization, nutrition, management and referral, early screening of breast/ cervical cancers, medication management, curative care consults)	Monthly report	HFNS, PPHD
		School health: facility conditions (drinking water), visual and audio screening...	Quarterly report	HFNS, PPHD
		Epidemiological surveillance and reportable diseases	Immediate & weekly notification	PriCS, RHD
PHCFN support structure	RHRC	Reproductive health, child health and curative care (cancer screening, HIV and STD screening...)	Monthly report	HFNS, PPHD
	TRIDC	Tuberculosis and respiratory illness diagnosis	Quarterly report, semi-annual report	HFNS, PPHD
	EEHL	Food control and bacteriological testing	Quarterly reports	HFNS, PPHD
IHECN	CPME, HME, EMAS, MERS	Available resources (specialists, services, technical platform)	Daily situational report (ex: cold wave)	PPHD, RHD
			Monthly EMAS report, semi-annual booklet	RHD
HSCN	Youth health area	Type of activities and number of	Quarterly	HFNS, delegation
	Orthopaedic-fitting centre	Number of residents	Status report	HFNS, PPHD
	Addiction center	Number of residents	Status report	HFNS, PPHD
	Palliative care centre	Number of residents	Status report	HFNS, PPHD
Hospital network	Hospitals	Resources, performances, hospitalization, surgeries	Monthly report, semi-annual report	HFNS, PPHD
		Health insurance status (AMO, RAMED), quality and safety (hospital deaths...)		
HN support Structure	MPI	Endemic and Pandemic support, influenza sentinel	Sporadic	EDCD
	NHI	Program support	Annual	EDCD
	NPC	Isolated poisoning, pharmacological and toxicological vigilance	Monthly, quarterly, annually	HFNS
Population surveys	National population and family health survey	Maternal and child health, family planning	Every 5 years	PFRD
	GSHS	Global School Health Survey	Every 5 years	PD
	GYTS	Global Youth Tobacco Survey	Every 5 years	PD, EDCD
	STEPS	Non communicable Disease Risk Factor Survey	First survey conducted in 2016	EDCD
	Specific Surveys (nutrition, cohort studies, satisfaction surveys...)	Toxicovigilance	Every 5 years	PD, EDCD, HCP

Table 2. Examples of available data sources (continued)

Type de Sources de données	Sources primaires de données	Contenu	Fréquence de la collecte et rapports	Contact
Private structures	Private sector services	Human resources, performances	Annual report	PPHD, RHD
Vital Statistics	LHO and MHO	Birth and death records	Monthly reports	PPHD
Census	General housing and population census (last conducted in 2014)	Population data	Every 10 years	HCP
Administrative sources	Regional administration services, provincial AED	Infrastructure reports	Monthly	PPHD, RHD
		Resource report (human, financial, material...)	Monthly	PPHD, RHD
	Hospital IAS	Medication reports	Monthly	PPHD, RHD

Public Health Data Analysis

In the area of public health, analyses must describe the health status of the population by person, place and time to identify inequalities or vulnerable groups; geographic concentration of illness or health risk behaviors; potential risk factors associated with health status; and any outbreaks. Organizing data by personal characteristics such as age, sex and behavioral characteristics allows identification of those at higher risk for poor health status and illness. Orienting data by place identifies where disease or risk factors are more prevalent and can provide information on environmental risk factors in addition to locating the origin of an exposure.

Measures of frequency that are used to quantify the health status of a population, or its demographic and geographic characteristics, include: counts, rate, prevalence, incidence and risk. These measures form the basis of analysis of data for public health practice and are used to draw comparisons between groups, such as: exposed and unexposed, groups defined by person and place characteristics, or to compare groups across time.

Data Analysis Standards

Data Disaggregation

In order to compare measures of frequency by person characteristics, groups based on the characteristics are formed. These include age groups, sex, income, type of medical coverage (RAMED, AMO) educational status and potential risk factors. Data can also be grouped according to geographic characteristics, such as province, region, health district and urban or rural status. Stratifying data by time requires a unit of time, which will depend on both the health outcome or behavior under study and the purpose of the analysis. Once data are appropriately stratified by person, place and time, the measures are calculated within the specific characteristic, which enables comparison.

Age Standardization

When a disease, risk factor or occurrence such as death varies by age, differences in rates can be misleading. In order to remove the effect of age, population groups must be similar in their age composition. Age standardization is a useful tool for reducing the influence of age differences when comparing two or more populations. This method produces weighted rates of two populations based on the age distribution of a standard population, such as the census.

Statistical Significance

Differences in measures of frequency or relative measures might reflect true differences in health status or behavior between subgroups; however, these differences might be due to chance alone. Therefore, it is important to use statistical testing to determine whether these differences are meaningful. This is particularly important when the data represent a sample, and not the entire population. Generally, differences that are statistically significant should be reported as differences. Otherwise, the data may be reported without indicating that they are different. Analyses that can be illustrative: comparing measures of frequency.

Relative Measures

Relative measures indicate how much greater the risk in one group is compared to another. These measures are calculated by dividing the risk, or rate of a given illness or risk factor, of one group by the risk or rate in another group, the comparison group. Magnitude refers to the strength of the association between an exposure and an outcome. Differences in magnitude of relative measures between population subgroups can identify groups at higher risk of poor health status or risk behavior. However, relative risk does not indicate the overall scope of a problem.

Excess Risk or Risk Difference

Excess risk is an example of an absolute measure. In contrast to relative measures, absolute measures take into account the total public health impact of the problem of interest, not just the relative difference. Excess risk (or risk difference) measures the absolute difference in risk between groups. This is described as a measure of public health impact because it depicts the actual burden of an exposure or disease in a population. This measure is useful. For example, when the relative difference is large, but the overall risk is small, the absolute measure shows that there isn't much impact at a population level. For public health, risk difference measures are often more useful or important than relative measures.

Population-Attributable Risk

Population-attributable risk answers the question: What proportion of cases (or outcomes) in the overall population can be attributed to a specific exposure? For example, what proportion of lung cancer deaths can be attributed to cigarette smoking? It assumes that the relationship between the exposure and the outcome is causal. It is a particularly useful population health measure for estimating the number of cases that could be prevented as a result of an intervention or reduction in an exposure or risk factor. In order to calculate population attributable risk, the prevalence of a disease or outcome, the risk ratio of the exposure and disease (or outcome) and the size of the population at risk are needed.

Mortality Measures

All cause and cause-specific mortality rates are important indicators of population health. Vulnerable sub-populations have highest rates of mortality. Thus, identification of differences in mortality between groups is important for guiding health interventions and resource allocation. Age-standardized death rates measure the number of deaths among residents of a specified area and year, excluding the effect of age distribution of the population. Age-standardized mortality rates should be calculated by demographic characteristics such as sex, geographic area of residence, time period of occurrence and cause of death. Age-specific rates should also be calculated in order to describe the mortality burden in each age group. Reporting of mortality analyses should include an assessment of the completeness of death registration as well as the quality of cause of death certification and ICD coding.

Years of Potential Life Lost

Years of Potential life lost (YPLL) is a measure of premature mortality, or of dying before a pre-defined standard. It is calculated based on the difference between a standard life expectancy and the age at death. This measure weights deaths that occur at a younger age more heavily than those that occur at older ages. YPLL is useful for ranking and prioritizing causes of death.

Life Expectancy

Life expectancy is a forecast of the average number of years that a newborn is expected to live, given the current age-specific mortality rates of that population. The advantage of using life expectancy as an indicator of inequalities is that it does not require a standard population and is easily comparable between areas. It is more easily understood than measures of premature mortality. In order to calculate life expectancy, a life table is required.

Disability-Adjusted Life Years

Mortality measures, while important, provide only a partial picture of population's health, especially for diseases that are not fatal but impose significant disability and suffering, such as arthritis or mental illness. Measures of disease burden that capture the impact of morbidity are also useful. Disability-Adjusted Life Years (or DALYs) is one of the most common measures used to combine the impact of mortality and morbidity into a single measure. The years of life lost to disability are calculated based on the number of new cases of a specific condition multiplied by the following disease-specific epidemiological parameters: duration of the disability, percent of the time that is symptomatic and severity of the disability. These are added to the years of life lost measure described above. These measures are obtained from the best available epidemiologic research gathered by experts in each disease field. Calculating them is likely out of the scope of the RHO.

Geographic Analyses

At its simplest level, geographic analysis can involve grouping data by place. However, more complex analyses are also possible. Geographic Information Systems capture, store, retrieve, analyze and display information based on geographical location. In public health practice, it is a useful tool for integrating spatial and non-spatial data to produce visualizations and analyses that can aid in monitoring spatial clustering of events, and is an effective means of visualizing and communicating information that contains geographic location. Additionally, GIS can be used to visualize trends in the distribution of diseases, identify geographic inequalities, and spatial and temporal trends. Confidentiality of geographic information should be considered

as geographic coordinates may be used to identify individuals. Showing a map with the exact location of a case of syphilis would potentially identify the infected individual. Policies should be developed to ensure confidentiality of health information when distributing maps or data-sets containing spatial data. Spatial analyses require specific geographic software as well as files that delineate geographic boundaries (i.e., shape files).

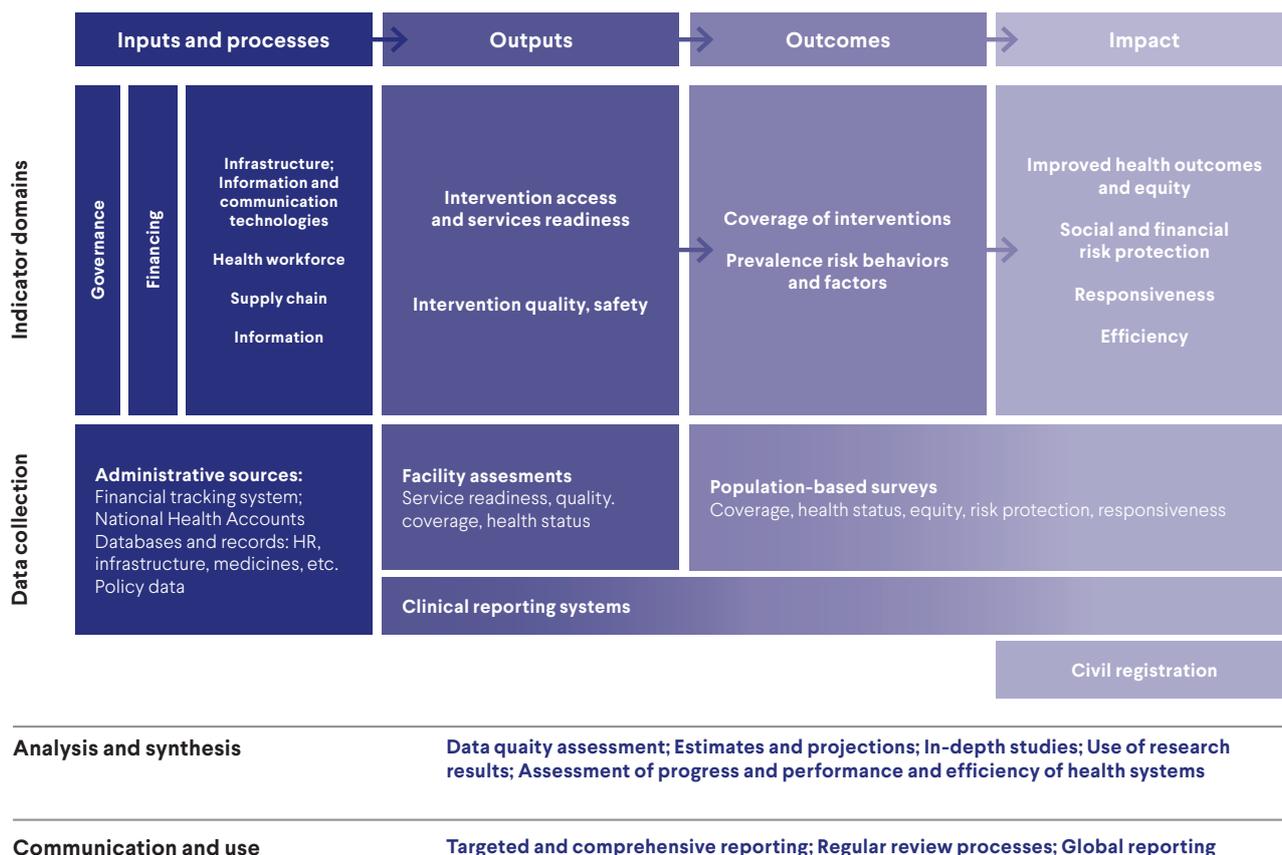
Tracking Health Indicators at the Regional Level

This mission deals primarily with tracking key indicators and their respective targets. These indicators will be defined and structured in such a way as to inform and compare trends using a chain of results.

Reference Framework

At the RHO-level, data collection systems must be developed based on a reference framework capable of producing information relevant to regional planning and mandatory national and international health information reporting. This reference framework must be based on the country’s monitoring and evaluation framework (see Figure 3)⁴ which helps identify indicators, links indicators to data collection methods and systems, and demonstrates the importance of analyzing and synthesizing data from multiple sources.

Figure 3. Common country monitoring and evaluation framework for information



This reference framework is tailored to the region’s particularities (see the document on the RHO’s minimum list of indicators).

4. Source: Figure taken from World Health Organization, Monitoring, Evaluation and Review of National Health Strategies, 2011.

An indicator matrix is defined by mutual agreement and will be completed gradually following implementation of the RHO, according to regional specificities. Each indicator must be useful, understandable and SMART (specific, measurable, achievable, relevant and time-bound). The RHO develops systems for tracking these indicators to ensure completeness, efficiency, reliability and accuracy starting from the point of data collection and continuing through its analysis and summary and finally to the review of these indicators by regional and central decision-makers.

Four indicator domains are identified:

- Health status
- Service coverage
- Risk factors
- Health system

These four domains are tied to the results chain, which is made up of traditional indicators: input, process, output, outcome and impact indicators. The chain of results indicators are populated using private and public health facility data sources or research studies. The resulting framework shows that inputs, process and outcome indicators reflect the health system's capacity, while impact indicators speak to the system's performance. Success of the monitoring and evaluation process depends on the quality and completeness of information obtained from data sources. Data analysis, summary and transmission must be performed regularly using scientific methods. Indicators must be well-defined and described according to their meta-data (see the RHO's minimum list of indicators)

These key indicators will constitute items of an interactive dashboard that will be made available to the Regional Director of Health.

Managing Health Information at the Regional Level

In order to manage all of their region's health information, RHOs must develop and implement coordination and management mechanisms for all health information sources, starting with public health facilities, followed by private health care facilities and the region's different communities.

RHOs must develop an information system management cycle which would include:

- defining an annual action plan aligned with ministry directions
- defining the raw data and indicator matrix to be collected for all levels as well as the reference system
- standards and procedures for collecting, analyzing and evaluating information
- standards for the release and dissemination of information for every provincial and regional level, as well as communities
- coordination and supervision mechanisms for managing health information
- data integration and decision-making support

In order to monitor health status effectively and adequately target programmatic resources for health promotion, prevention and treatment, it is necessary to look at data and indicators across traditionally "siloed" disease or programmatic realms. In the case of routinely reported aggregate data, this requires capacity to integrate reported data at the facility level. All reporting entities within a given facility must use the same facility code when reporting data so that it is possible to overcome data silos for the purposes of data use and dissemination. This allows data and related trends to be viewed in all forms, and not just by disease or condition, for instance TB, HIV, hepatitis or malaria outcomes (i.e., new cases, hospitalizations, mortality). It will also be possible to examine and disseminate these data and associated trends side by side in one place. This way, questions might be posed such as: What is the trend in new diagnoses of TB in facilities that have low, medium and high numbers of HIV/AIDS-related hospitalizations? Are sites that are having trouble reporting data for TB also having trouble reporting for hepatitis? Those facilities that have missing data for multiple indicators can be targeted for troubleshooting and provided support and assistance for improved reporting.

In addition, when data are integrated at the site level along with geographic information (i.e., address and/or longitude and latitude of site) or data are aggregated from the site to the regional level, it is easier to subset data geographically at the region, province and site levels and to simultaneously compare health status, disease burden and completeness of reporting for multiple diseases.

The ability to track region-wide or province-wide data and associated trends is important and may be enough for some stakeholders, but it is also critical to be able to track key metrics within geographic, sociodemographic and epidemiological subgroups of the regions and provinces using maps and other visualizations. RHOs work with the Regional Directorate leadership to assess critical information needs and translate those needs into a decision-support system. To succeed, they must evaluate existing data sources and chain of results tracking activities, identify good practices and inform reflection on informational needs and types of indicators.

Information Security and Confidentiality

Personal identifying data includes: names, month and day of birth, address, telephone numbers and email address, as well as identification numbers such as medical record numbers. Security and protection of this type of information is critical as patients and survey respondents have a right to keep their health information confidential.

Most of the data available to the RHO are in aggregated form without personal identifying information. When data do include personal identifiers, all personal information including AIDS or violence against women related systems, the RHO should safeguard its privacy. Procedures and systems should be developed to protect and monitor the integrity and security of information systems from unintended disclosure. All team members and stakeholders with whom the data might be shared should be aware of privacy laws.⁵ This may be accomplished by sharing the relevant laws or decrees with staff and following up with annual reminders. In certain situations, another way to minimize the likelihood of inadvertent disclosure of such information is to remove personal identifiers from the data.

Privacy considerations are also relevant when data are presented in aggregate form. When the number of observations in a table cell (either numerator or denominator) is small, individuals may be identifiable. For example, if there are two HIV-infected individuals in a province, publishing this number in a table with the name of that province may identify them. For this reason, establishing thresholds for suppressing cells with small numbers (i.e. <6 persons) may be required, depending on factors such as the size of the population.

Developing Regional Health Status, Provision of Care and Health Care Service Interim Reports

Status Reports

RHOs are responsible not only for producing data but for sharing it effectively and ensuring that it get used in decision- and policy-making. Using data strategically also involves communicating information to internal government audiences (leadership, other ministries, legislators) and external stakeholders (press, advocates, donors). A communication strategy should include a range of formats relevant for each of these audiences.

Health information management procedures might involve a key indicator report submitted on a regular basis to regional leadership, that consists of a data visualization tool displaying the status of key indicators (in a dashboard, for instance).

It may include data that are updated in reasonable time, or it might simply be an Excel spreadsheet that is updated at regular intervals. Reports will include graphic elements and provide an interpretation of chain of results indicators.

Printed reports may highlight particular health issues or the health status of particular populations (e.g., defined by geography or ethnicity or other characteristics). Certain reports need to be produced at regular intervals, such as annual reports on the health status of the population or progress on health indicators. Special reports on specific health issues or from specific data sources, such as population health reports, may be produced on a more ad hoc basis. Brief reports on narrowly defined topics can be very effective tools for guiding decision-making. These are concise documents geared to presenting policy-relevant findings.

However, RHOs should initially produce an annual report focused on three main areas:

1. Health status of the regional population: It could consist of the epidemiologic profile of the region that includes top causes for morbidity and mortality by age, sex and geography, and/or program performance.
2. Provision of care: detailed report on human resources, infrastructure, equipment and equipment maintenance per facility and province, and on access to health care in the region.
3. Health services: mainly information of services provided by the region's different facilities.

Visualization

Creative use of data analysis and visualization techniques can make any such reports more compelling. Data findings are generally easiest to understand visually. Visualization is useful for the analyst as well, especially in understanding relationships between variables, and identifying and illustrating patterns in the data. Among the likely visual tools for this are line graphs, bar charts, slopes, radar, trees, waterfalls and maps. The factors in deciding which kind of visualization to use will include the type of data, their structure and the purpose of the data display. For example, the purpose of the display could be to show a distribution, change over time, comparison of categories, composition or correlation.

Data Sharing

In collaboration with other Regional Directorate services, RHOs develop public messaging, create visual communication tools (such as one-pagers, slide sets, speeches, etc.) and write briefings for leadership. A diverse set of written and visual products that incorporate data and use them to justify policy decisions should be developed in support of major policy initiatives.

In addition to having access to data for their own analysis, RHOs are also in a position to respond to requests for health information. Public agencies need to balance the necessity of making information available to the public with the legal obligation to protect the confidentiality of the individuals and organizations from which the data was collected. Data-sharing policies can prevent or reduce disclosure. Underuse or unnecessary restrictions to access to the data diminish its value. Permission to access health information should be granted to authorized personnel and stakeholders for all legitimate and reasonable purposes, including:

- facilitating health services planning
- evaluating program performance
- addressing health or safety issues
- preparing administrative, program or research reports and publications.

Authorized personnel, stakeholders, producers and users of data are expected to ensure that institutional data are secure and confidential, in accordance with laws governing the protection of personal information. Always use secure modes of transmitting institutional data between MOH levels or to external stakeholders. Institutional data should be used routinely, however. This is key for understanding health determinants, improving the quality of services and improving the efficiency and effectiveness of health programs.

Institutional data can be organized into four classifications:

Internal Service: The default security level is for data accessed by authorized personnel of the institution or unit who have a “need to know.”

Limited Access: This level should be used when legal, ethical or other constraints prevent access without specific authorization; selective access may be granted.

Public, authorized users only: When data may be accessed by the general public but only after a formal request or registration accompanied by the acquisition of an individual password, this level applies. This provides traceability in case data are perceived to have been misused.

Public at large: No restriction.⁶

Data can be shared publicly when it is presented in aggregated form so that individuals cannot be personally identified or as individual-level datasets when personal identifiers have been removed. There may be times when data that includes some identifiers should be shared with other government agencies, stakeholders or researchers. Responses to requests for data should be governed by the data-sharing policy defined by the RHO and in line with relevant laws and regulations. A formal process for requesting data should be considered in order to ensure that requests for data are properly reviewed, that the data are used for legitimate and reasonable purposes and that privacy and confidentiality are maintained. Policies and procedures should

address the range of data products such as: datasets that allow further analysis, statistical tables and analytic or summary reports.

Each RHO plays an important role in the regionalization of health functions in Morocco, compiling, analyzing and communicating data on the health of its population. This is an opportunity to improve the quality of health data and the efficiency and flow of information from the point of collection to each respective regional service. It is also a chance to turn the data into meaningful information that is readily accessible to decision-makers for action on public health and, ultimately, to help improve the health of people living in each of Morocco's regions.

Contributing to Regional Health-Related Studies

By fostering collaboration with research organizations, RHOs can gradually develop a research function and conduct studies, such as surveys and impact studies (e.g. mortality studies), which can increase their understanding of the health of the region's population. RHOs could develop a research network with national and international university partners. For example, regional surveys will be required in order to estimate maternal and infant mortality at a regional level. RHOs could also take part in national studies and surveys.

Managing Computer Systems and Providing Equipment Maintenance

Computer System Management

This function implies that RHOs possess the necessary skills to:

- plan and organize the tracking and validation of computer-related developments
- evaluate computer systems and electronic data processing
- develop the physical and software infrastructure (networks, servers, enterprise resource planning (ERP), database management system (DBMS), Web site)
- develop specific applications, manage the computer network and further develop the physical infrastructure across the RHD
- manage and operate administrative and common servers
- configure the computer network
- manage directory servers and provide digital services to user (electronic messaging, wireless networks, etc)
- manage Web site
- implement computer security mechanisms and monitor evolving risks
- adopt a data backup and storage policy, and create rules and procedures for implementing computer systems throughout the region

Computer System Equipment Maintenance

This entails taking inventory of all computer hardware and software used across the region, and planning installation, configuration and troubleshooting activities available to the administration. RHOs must also ensure management of audiovisual equipment and teleconferencing systems (IP and ISDN). They must also track the availability of individual and aggregate data storage media throughout the region's provinces and prefectures.

Contributing to Regional Efforts to Mentor and Train Health Professionals

One of the RHO's essential functions should be to help train the region's health care personnel regarding the RHO's role and functions, as well as on key elements of data management, quality, analysis and interpretation. Capacity building activities can take many forms, including tutorials, informal consultations on relevant issues or the provision of topical expertise when necessary. They can target human resources at all levels of the health region, including decision-makers, service leadership and delegation staff. In collaboration with other services, RHOs must identify the need to build capacities within Regional Health Directorates and develop a training plan for staff.

Appendices

Examples of Essential Job Descriptions in RHOs

Public Health and Epidemiology

Specific duties:

- Participate in descriptive and analytic studies relating to specific diseases
- Design, manage and evaluate epidemiologic studies and surveillance systems
- Develop health status and risk behavior questionnaires
- Interpret results and adapt to relevant interventions
- Monitor indicators and proceed with assessments
- Prepare technical and scientific reports such as annual health reports and topic-specific brief reports
- Prepare communications for a range of external audiences
- Provide consultation to health care professionals, community organizations and others on specific diseases, injuries or conditions.
- Prepare data-related materials for public distribution

Knowledge, skills and abilities:

- Knowledge of epidemiology methods and experience in conducting analysis of public health data using statistical software
- Experience in interpreting and reporting on public health analyses
- Excellent written and verbal communication skills for different audiences.

Statistician

Specific duties:

- Apply statistical methods to analyze, evaluate, interpret and report conclusions from data
- Determine what data are needed to answer specific questions and design methods for collecting such data
- Develop survey methods for survey sampling and analysis of survey data (i.e., weighting)
- Obtain population estimates for the region and its constituent provinces and districts by relevant age and sex subgroups
- Plan and conduct analysis of multiple data sources to:
 - describe and monitor the health status of the population
 - investigate changes in health status, risk behaviors and service performance
 - evaluate public health programs
- Design and implement data gathering/management computer systems and software
- Consult with and advise health directorate staff on analysis of routine program data
- Present data in a variety of formats
- Prepare technical and scientific reports such as annual health reports and topic-specific brief reports
- Prepare data-related materials for public distribution
- Ensure quality control of data entry

Knowledge, skills and abilities:

- Knowledge of statistical methods and experience in conducting data analysis using statistical software
- Knowledge and experience in interpreting and reporting data analyses
- Ability to work with staff at all levels and to communicate complex technical knowledge in language that is understood by technical and non-technical audiences

Data Processing

Specific duties:

- Develop, maintain and facilitate the use of various data systems for analyzing and monitoring the health status and risk behaviors of the population, health services delivery and program performance
- Work closely with Information Technology at the Central level and with relevant professionals in various health care settings to develop and implement digital systems for health data access and management
- In collaboration with Central IT, design interfaces for accessing and manipulating data
- In consultation with Central IT, design websites for sharing information and data internally and externally to public audiences
- Perform analysis to describe and monitor the health status of the population and interpret results
- Manage various databases and systems to enable monitoring
- Consult with and advise health directorate staff on data management and systems
- Prepare technical and scientific reports such as annual health reports and topic-specific brief reports

Knowledge, skills and abilities:

- Knowledge and experience in:
 - computer data systems
 - health systems and data
 - data management and analysis
- Ability to work with staff at all levels and to communicate complex technical knowledge in language that is understood at every level

Computer Programmer

Specific duties:

- Manage and operate administrative and common servers
- Maintain computer equipment, and plan computer installation, configuration and troubleshooting activities provided to management
- Complete a full inventory of the RHD's hardware and software
- Ensure computer-related developments are organized, tracked and validated
- Develop specific applications
- Manage the computer network and grow the RHD's physical infrastructure
- Configure the computer network
- Manage directory servers and provide digital services to users (electronic messaging, wireless networks, etc)
- Manage Web site
- Manage audiovisual equipment and teleconferencing systems (IP and ISDN)
- Implement computer security mechanisms and monitor evolving risks
- Adopt a data backup and storage policy
- Computerize and maintain the information system
- Advise and inform users regarding all aspect of informatics
- Organize meetings and improve communication between informatics services and Central IT
- Provide software support to the Ministry of Health
- Provide training on NICTs to users

Knowledge, skills and abilities:

- Broad knowledge of information systems
- Knowledge of applications and technologies used by the organization, main computer languages and operating systems
- Command of safety standards and current global security risks
- Good knowledge of outsourcing market: publishers, IT companies, consulting and outsourcing relationship management firms
- Information system project management
- Command of BigData technologies
- Affinity for computer technology and tools used for data management
- Skills in computer development (C/C++/C# and Java languages....), computer security and/or interconnected systems
- Vb.net and Asp.net computer development skills
- Network and system administration



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