STRENGTHENING THE COLLECTION, ANALYSIS AND USE OF HEALTH WORKFORCE DATA AND INFORMATION

A HANDBOOK

World Health Organization

GHWN
Global Health Workforce Network

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Preface

Access to health workers who are fit for purpose, motivated and protected is a fundamental force of health service delivery and the achievement of universal health coverage (UHC) and the health and health-related Sustainable Development Goals (SDGs). Data and knowledge of the distribution, skill mix and future development needs of the health workforce can mean the difference between enabling or impeding health systems performance, inclusive economic growth and global health security preparedness and response.

This handbook is an essential resource, which brings into focus key advances, challenges and lessons learned in strengthening human resources for health (HRH) data and evidence as a strategic objective of implementing the Global Strategy on Human Resources for Health: Workforce 2030 (GSHRH), the recommendations of the United Nations Secretary-General's High-level Commission on Health Employment and Economic Growth, and in the achievement of the WHO Thirteenth General Programme of Work (2019–2023) (GPW 13) targets, for a measurable impact on population health and development. It features the committed country efforts, catalysed by networks and partner investments, in strengthening HRH information systems and their growing success in implementing WHO national health workforce accounts (NHWA).

The handbook constitutes the collaborative efforts of the six technical groups that make up the Global Health Workforce Network Data and Evidence Hub, illustrating the instrumental value of networks and partnerships in strengthening the collection, quality and use of health workforce data and evidence. Its key purpose is to reinforce a culture of data and evidence-informed policy and decision-making in the governance and management of the health workforce and the health labour market. It can be used in conjunction with the WHO Health labour market analysis guidebook and its approach to understand the forces that drive health worker shortages and surpluses, skill mix, geographical imbalances and suboptimal performance, and develop effective policies to address these issues.

The handbook is aimed at HRH policy-makers and planners, to provide a contemporary insight on data sources and information needs to address policy questions around health workforce development (such as production, financing, employment and migration), and as part of the broader intersectoral agenda to strengthening health systems resilience. The knowledge and practice shared in this handbook can support countries and partners in fulfilling the call for action articulated by the Year of Health and Care Workers campaign objectives of protecting and investing in the health and care workforce.

1 https://www.who.int/campaigns/annual-theme/year-of-health-and-care-workers-2021

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Abbreviations and acronyms

ADZU-SOM	Ateneo de Zamboanga University School of Medicine (Philippines)
AHPRA	Australian Health Practitioner Regulation Agency
AIDS	acquired immune deficiency syndrome
AMTC	accelerated medically trained clinician
AoMRC	Academy of Medical Royal Colleges (United Kingdom)
ARCP	Annual Review of Competence Progression (United Kingdom)
ART	antiretroviral therapy
ASPHER	Association of Schools of Public Health in the European Region
AWT	available working time
BMA	British Medical Association
BMAT	Biomedical Admissions Test (United Kingdom)
CE	continuing education
CfWI	Centre for Workforce Intelligence (United Kingdom)
CHE	current health expenditure
CHO	community health officer (Nigeria, Sierra Leone)
CHW	community health worker
CPD	continuing professional development
CO	clinical officers (Kenya)
COC	Clinical Officers Council (Kenya)
COG	Council of Governors (Kenya)
COPMeD	Conference of Post-Graduate Medical Deans (United Kingdom)
CRaNHR-Laurentian	Centre for Rural and Northern Health Research – Laurentian University (Canada)
DGHS	Directorate General of Health Services (Bangladesh)
DHIS2	District Health Information System
EDT	Electronic Dispensing Tool (Namibia)
EMIS	education management information system
eNHIS	national health information system (Papua New Guinea)
EIOS	Epidemic Intelligence from Open Sources
ePMS	electronic patient management system (Namibia)
EU	European Union

EWG	expert working group
FP	family practitioner
FTE	full-time equivalent
FtP	Fitness to Practise
GAMSAT	Graduate Medical School Admissions Test (United Kingdom)
GDPR	General Data Protection Regulation (United Kingdom)
GHED	Global Health Expenditure Database (WHO)
GHWA	Global Health Workforce Alliance
GHWN	Global Health Workforce Network
GPEI	Global Polio Eradication Initiative
GMC	General Medical Council (United Kingdom)
GP	general practitioner
GSHRH	Global Strategy on Human Resources for Health: Workforce 2030
HA	health assistant
HAF	HRHIS Assessment Framework
HEFCE	Higher Education Funding Council for England (United Kingdom)
HESA	Higher Education Statistics Agency (United Kingdom)
HHRDB	Health Human Resource Development Bureau (Philippines)
HICs	high-income countries
HIS	health information system
HIV	human immunodeficiency virus
HLM	health labour market
HLMA	health labour market analysis
HMIS	health management information system
HR	human resources
HRH	human resources for health
HRHIS	human resources for health information systems
HRH ICC	HRH Interagency Coordinating Committee (Kenya)
HSIGF	Health Sector Intergovernmental Framework (Kenya)
HSTP	Health Sector Transformation Plan (Ethiopia)
HTI	health training institutes
IADEx	Interagency Data Exchange Initiative
ICSE	International Classification of Status in Employment

ICSP	Integrated Community Service Program (South Africa)
IHIS	Integrated Health Information System (Serbia)
iHRIS	open-source health workforce information systems software
ILO	International Labour Organization
IPE	interprofessional education
ISCED	International Standard Classification of Education
ISIC	International Standard Industrial Classification of All Economic Activities
ISCO-08	International Standard Classification of Occupations 2008
JCU	James Cook University (Australia)
JLI	Joint Learning Initiative
JQ	Joint Questionnaire (OECD)
KHRAC	Kenya Human Resources Advisory Committee
KHSSP	Kenya Heath Sector Strategic and Investment Plan
KHWIS	Kenya Health Workforce Information System
KNBS	Kenya National Bureau of Statistics
KSG	Kenya School of Government
LFS	labour force survey
LMICs	low- and middle-income countries
M&E	monitoring and evaluation
MABEL	Medicine in Australia: Balancing Employment and Life survey
MBBS	Bachelor of Medicine, Bachelor of Surgery
MED-HIMS	Household International Migration Surveys in the Mediterranean countries
MERCOSUR	Southern Common Market (Mercado Común del Sur)
MOHFW	Ministry of Health and Family Welfare (Bangladesh)
MD	Doctor of Medicine
MDGs	Millennium Development Goals
MoH	ministry of health
MoHSS	Ministry of Health and Social Services (Namibia)
MPH	Master of Public Health
MSC	Medical Schools Council (United Kingdom)
MSCSA	Medical Schools Council Selection Alliance (United Kingdom)
MSOD	Medical Students' Outcomes Database (Australia)
MSORD	Medical Selection Outcomes Research Database (United Kingdom)
NCD	noncommunicable diseases

NCHD	non-consultant hospital doctor
NCPD	National Council for Population and Development (Kenya)
NDoH	National Department of Health (Papua New Guinea, South Africa)
NDP5	Fifth National Development Plan (Namibia)
NEA	national education accounts
NGO	nongovernmental organization
NHA	national health accounts
NHS	National Health Service (United Kingdom)
NHSS	National Health Services Standards (Papua New Guinea)
NHWA	national health workforce accounts
NHWD	National Health Workforce Dataset (Australia)
NICE	National Institute for Health and Care Excellence (United Kingdom)
NIMART	nurse-initiated and managed antiretroviral treatment (Namibia)
NMC	Nursing and Midwifery Council (United Kingdom)
NOSM	Northern Ontario School of Medicine (Canada)
NPISH	non-profit institutions serving households
NRI	National Reporting Instrument
NSO	national statistical office
NTC	national technical committee (Kenya)
NTS	National Trainee Survey (United Kingdom)
ODA	official development assistance
ODG	Overarching Data Group (United Kingdom)
OECD	Organisation for Economic Co-operation and Development
ONS	Office for National Statistics (United Kingdom)
PAHO	Pan American Health Organization
PG	postgraduate
PGY	postgraduate year
PHC	primary health care
PHO	public health officer (Ethiopia)
PMIS	pharmacy management information system
PMQ	primary medical qualification
PPE	personal protective equipment
rHRIS	regulatory human resources information systems

SAD	staff-related access deficit
SDGs	Sustainable Development Goals
SDH	social determinants of health
SES	socioeconomic status
SHS-Palo	University of the Philippines Manila School of Health Sciences, Palo
SIFIn	Sistema de Informação para Formação Inicial (Mozambique)
SIREPRO	System for the registration of practitioners (Paraguay)
SIISA	Integrated Argentina Health Information System
SoWMy	State of the world's midwifery report
SoWN	State of the world's nursing report
SROI	social return on investment
T&CM	traditional and complementary medicine
THEnet	Training for Health Equity Network
THEnet GOS	Training for Health Equity Network Global Outcome Study
TIIS	Training Institution Information System (United Republic of Tanzania)
UCAS	Universities and Colleges Admissions Service (United Kingdom)
UCAT	University Clinical Aptitude Test (United Kingdom)
UGME	undergraduate medical education
UHC	universal health coverage
UHC SCI	universal health coverage service coverage index
UKMACS	UK Medical Applicant Cohort Study
UKMED	UK Medical Education Database
UNFPA	United Nations Population Fund
UNMC	Uganda Nurses and Midwives Council
USA	United States of America
USAID	United States Agency for International Development
WAN	World AMTC Network
WHA	World Health Assembly
WHO	World Health Organization
WISN	Workload Indicators for Staffing Needs

Executive summary

This handbook offers guidance on how to strengthen human resources for health (HRH) data to inform policies that will foster the development of a health workforce fit for the purpose of delivering quality-driven services responsive to the evolving needs of countries' populations.

It begins with an introductory chapter on the health labour market (HLM) framework and the nomenclature of its core components and dimensions (stock, supply, demand and need for health workers). It provides a comprehensive orientation on how health labour market analysis (HLMA), based on solid data and information, is a fundamental tool to understand the forces that drive shortages and surpluses, skill mix and geographical imbalances and, more generally, suboptimal performance of the health workforce.

Following on, the handbook is divided into three parts – which also present the complementarity between the HLMA and the national health workforce accounts (NHWA) system strengthening approaches:

- **Part I** describes key policy questions and data requirements around the stock and supply of health workers with a special focus on the intersectoral health workforce education and training agenda, graduate tracking systems and improving the equity of access to health workers, and equity issues in health workforce development. Chapters provide new strategies, policies and measures by which policy-makers can improve their country's supply of health workers.
- **Part II**, similarly, is concerned with key questions and data requirements around the demand and need for health workers with a special focus on governance and suggested approaches to strengthening HRH macro-planning and management (with the Workload Indicators for Staffing Needs [WISN] methodology and well-illustrated country experiences). It also provides a special focus on governance and financing, a review of strategies to assess future needs and demand, and proposes a framework to identify the data and information that can help in planning the future health workforce.
- **Part III** presents the NHWA system strengthening approach and its "DNA" principles, which promote quality and country leadership and encourage the use of evidence to inform decision-making, advocacy and accountability. It contains a review of different country experiences that demonstrate the natural link between human resources for health information systems (HRHIS) and NHWA, how the implementation of the latter can be considered as an opportunity to build and expand the existing HRHIS mechanisms for a comprehensive picture of the health workforce situation. It also creates the natural linkages and triangulations of HRH data availability from population-based sources (such as labour force surveys and censuses), and the requisite importance of building capacities and good practices targeting better availability, quality and use of HRH data over time.

Contributors to the handbook shared an informative practice between them in demarcating the relevance of the NHWA indicators in the context of their presented topics and assessments. They also offered guidance on strengthening the NHWA implementation and proposed future considerations of revisions and additions to its standardized indictors.

Introduction: Health workforce data for universal health coverage

Gilles Dussault, Amani Siyam

Why this handbook is needed

Global progress towards universal health coverage (UHC) requires an optimal combination of various contributing factors. These include a clear understanding of the quantity and quality of resources available (funding, human resources for health (HRH), technology and knowledge), and a mix of policies and plans that define the organization of services, and implementation capacities. With respect to HRH, their effective contribution is a function of their availability, accessibility, acceptability, and quality (WHO, 2016).

In 2016, the *Global strategy on human resources for health: workforce 2030* (GSHRH) proposed the objective "To strengthen data on human resources for health, for monitoring and ensuring accountability for the implementation of national and regional strategies, and the Global Strategy" (WHO, 2016: 8). The GSHRH added that "Better HRH data and evidence are required as a critical enabler to enhance advocacy, planning, policy-making, governance and accountability at national, regional and global levels" (WHO, 2016:34).

To achieve this objective, WHO has actively pursued a variety of pathways, including:

- conducting health labour market analyses (HLMA) (WHO, 2021a);
- providing technical cooperation on evidence-informed deployment of health workers in areas with unmet needs (WHO, 2021b);
- offering guidance and facilitating the sharing of good practices on health workforce planning and projections;
- supporting the development and strengthening of tools and guidelines to collect and analyse data and information on HRH; and
- supporting countries to establish and strengthen standards for the quality and completeness of their national health workforce data.

This handbook and its thematic chapters encapsulate evidence around the use of HRH data to address policy challenges of health workforce development (Box 1). It provides concrete guidance on the design and implementation of more effective health workforce policies in support of progress towards UHC and the health-related Sustainable Development Goals (SDGs), and in meeting HRH needs to mitigate the global impact of the COVID-19 pandemic.

Examples of policy questions relating to supply and demand of health workers

Production of health workers:
Do education institutions train health workers in sufficient numbers and of the right kind?

Composition of the health workforce: Does the health workforce composition guarantee sustainability (age/sex structure), efficiency (adequate skill mix) and coverage?

Imbalances between supply and demand: Why are there shortages (unfilled positions) or surpluses (unemployed workers)? How to address these problems? Are health workers equipped with the competencies needed in a rapidly changing environment (demographic, epidemiological, sociocultural and technological)? How to ensure an equitable access to health workers? What is the extent of dual practice? What are its impacts? How to manage it?

How to correct imbalances in the distribution of health personnel between levels and types of services and between geographical zones and population subgroups?

Imbalances between demand and need: What will the needs be in 5–10 years? How to fill the gap between demand and need in order to progress towards UHC? How to eliminate unmet needs? How to improve fiscal space to fund more jobs? Can the public sector demand for HRH compete with that of the private sector? How to improve the attractiveness of jobs in the health sector?

A chapter-by-chapter guide to the handbook

This handbook brings together the collaboration of the six technical working groups of the Data and Evidence Hub of the Global Health Workforce Network (GHWN). It provides a thorough review of the literature on the essential elements of strengthening HRH data and information, using a mixed approach of evidence synthesis and case studies. The key objectives of the handbook are to:

- Identify data and information requirements to conduct an HLMA.
- Identify the corresponding collection tools and data sources.
- Report studies of specific health workforce policy issues (equity, the recognition of new cadres, tracking graduates, mobility and migration, the private health labour market (HLM), amongst others).

The handbook is an essential reference for policy analysts, planners and researchers in international organizations with activities in the health sector, and in national state and non-state organizations such as ministries and government agencies, education institutions and professional councils and associations. It aims to help strengthen the availability, quality, analysis, dissemination and use of HRH data and information, such as reported through the national health workforce accounts (NHWA) and other mechanisms, in support of informed decision-making and planning.

The handbook consists of 18 chapters divided in three parts preceded by Chapter 1, which presents the HLMA approach, and its core relevance. Part I (Chapters 2–9) focuses on the dynamics of health worker supply. Part II (Chapters 10–13) provides a closer look at the demand side of the HLM and at the projections of future HRH needs at global and national levels. Part III (Chapters 14–18) discusses the role of human resources for health information systems (HRHIS), the global implementation of NHWA and how HRH data quality should be viewed in the context of data use.

Country case studies and experiences that feature in this handbook include: Afghanistan, Angola, Argentina, Australia, Azerbaijan, Bangladesh, Bhutan, Brazil, Botswana, Bulgaria, Burkina Faso, Burundi, Canada, Chile, China, Cuba, Democratic Republic of the Congo, Gabon, Germany, Ghana, Guinea-Bissau, Guinea, Guyana, Eswatini, Ethiopia, India, Indonesia, Ireland, Israel, Kenya, Kazakhstan, Kyrgyzstan, Malaysia, Malawi, Mali, Marshall Islands, Mongolia, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nigeria, Oman, Papa New Guinea, Paraguay, Philippines, Russian Federation, Rwanda, Serbia, Sierra Leone, South Africa, Sudan, South Sudan, Tajikistan, Togo, Uganda, Ukraine, United Republic of Tanzania, United Kingdom, United States of America, Uruguay, Uzbekistan, Zambia and Zimbabwe..

Chapter 1 presents HLMA as an approach to inform health workforce policy development. It defines the basic labour market concepts of stock, supply, demand, need, their determinants, the dynamics of their interactions, and observed imbalances. It shows the usefulness of an HLMA for policy and decision-making, by identifying market deficiencies and policy options available to address them. It describes the process of conducting an HLMA, identifies the technical capacities and the data requirements for a comprehensive analysis.

PART I: Policy questions and data requirements: monitoring the stock and supply of health workers via their education, graduation and mobility in the health labour market

Chapter 2 is an overview of the data and information that can help policy-makers and other stakeholders assess the state of the stock and supply of HRH at a specific time, recent trends, and factors that influence these trends. This information can contribute to the design of policies and interventions with the potential to bridge the differences between the current stock and supply, and that fit better demand and needs. The chapter identifies relevant indicators from NHWA and proposes additional indicators that can complement the evidence base in support of health workforce policy development.

Chapter 3 discusses data and evidence on health workforce education, their main sources, and the challenges raised by the focus on numbers and by the fragmentation of education subsystems. The chapter puts forward how lifelong learning systems would shift the emphasis of data and evidence on health worker education from a single point to a more integrated understanding of education and training from the perspective of health service delivery and national health policy planning. It maps the pertinent NHWA indicators that can monitor such progress and, in broader terms, the SDG 4 targets (UNESCO, 2020).

Chapter 4 presents a unique tracking of graduates model, developed by the Training for Health Equity Network (THEnet), a consortium of health professions education institutions striving towards social accountability. The model employs a systematic process to collect, monitor and evaluate data on graduates from pre-admission into full practice. Results include data on practice type and location, the populations graduates serve, and the services and care they provide. The chapter offers an overview of the benefits, methodologies and questions answered by tracking studies, and presents examples from Australia, Canada and the Philippines.

Chapter 5 describes an initiative, coordinated by the Medical Schools Council of the United Kingdom, to create a single database (UKMED) bringing together a range of data sources, on pre-admission and school leaving examination results, admission tests, and postgraduate progression of medical students. It gives researchers and workforce planning analysts a single point of access to linked data on physician training pathways. The longitudinal database is growing in scope and has wide-ranging applications, from targeted support for medical students to informing interventions designed to fill shortage specialties. The chapter describes emerging evidence from research projects using the database.

Chapter 6 presents the influences of health worker mobility and migration on the supply of health professionals in destination and source countries. It describes and stresses the need to leverage multiple data sources (including institutional and population-based) to gauge temporal and comparable indicators of health worker mobility (mainly through tracking the proportions of foreign-born and foreign-trained health personnel of various occupations in a country's health workforce). The chapter also describes the diversity of interests, instruments (key of which is the implementation of the WHO Global Code of Practice on the International Recruitment of Health Personnel) and international entities set on monitoring a period of heightened migratory activity globally and the imperative of global dialogue on international cooperation.

Chapter 7 sheds light on the potential data sources and data elements that describe the private sector share of the active health workforce, which is less known in most countries due to several data constraints. It illustrates, using simple ratio-based comparisons, the degree of imbalance in HRH availability between the two sectors. The chapter projects a positive outlook suggesting the NHWA implementation efforts can orient countries to gather better data on the structures of the public sector and private providers (size, objectives and technical competence) and improve the availability and accessibility of private sector health workforce data beyond labour statistics.

Chapter 8 discusses the challenges of ensuring equitable access to needed health workers, particularly in rural, remote and deprived areas, and by vulnerable populations. It introduces the multifaceted concept of HRH equity as fair access and opportunity to enter health professions, fair treatment of all health workers, and equitable and affordable access to HRH. It discusses factors affecting HRH equity, the root causes and the intersectoral drivers of inequities, and explains why collecting, monitoring, analysing and acting on equity-related data are of critical importance for the development of the health workforce.

Chapter 9 describes an effective strategy that more than 50 countries have employed to improve access to health workers – the creation of cadres of accelerated medically trained clinicians (AMTCs). The chapter summarizes the global experience and presents country examples showing the results of such initiatives. The literature shows that the outcomes in surgical and specialty care provided by appropriately trained and supervised AMTCs is comparable with those of doctors, and that these workers contribute significantly to increasing the availability and accessibility of health services.

PART II: Policy questions and data requirements: monitoring the demand for health workers and future needs

Chapter 10 introduces the spectrum of data required for the analysis of the demand and need for health workers. It reviews the relevant NHWA indicators with suggested use, and consideration for others (and their relevant data sources) in future revisions of the NHWA.

Chapter 11 presents the data and information that can improve the analysis of two mechanisms of governance – regulation and financing – that have a major influence on the performance of the health workforce. It also emphasizes the need for qualitative information and social research tools to explain how governance is influenced by political processes in which stakeholders with opposing interests and different degrees of influence interact. It also reviews the pertinent NHWA indicators and other sources that HLM analysts may find relevant.

Chapters 12 and 13 focus on the measurement of HRH needs. Chapter 12 reviews strategies to assess future needs and demand, at global and country levels, discusses their strengths and weaknesses, and proposes a framework to identify the data and information that can help in planning the future health workforce. It gives examples of how some countries identify their workforce needs. Chapter 13 presents the Workload Indicators of Staffing Need (WISN) methodology, a tool launched by WHO in 2010 that was designed to assess workforce needs at facility level, but can be used at a broader regional, and even national, level by aggregating data from facilities. It proposes a systematic way to combine all available information to support decision-making for effective, efficient and equitable health workforce deployment. It also focuses on data-related challenges and solutions and highlights good practices in the use of WISN in health workforce management and planning at primary through to tertiary level facilities, in emergency settings, and for all health occupations.

PART III: Human resources for health data collection tools and sources

Part III brings into focus the operational aspects of HRH data collection tools and standards.

Chapter 14 highlights the key challenges in implementing or strengthening human resources for health information systems (HRHIS), such as fragmentation, incompleteness, or lack of standardization. Using different country experiences, the authors demonstrate the natural link between HRHIS and NHWA, arguing that the guiding principles and progressive implementation of the latter should be considered as an opportunity to build and expand the existing HRHIS mechanisms for a comprehensive picture of the health workforce situation. Aimed at high-level HRH managers and planners, the chapter argues that the fundamental basis of any implementation of NHWA remains "country needs first" and national dialogue between health workforce data producers and users.

Chapter 15 provides a scoping review of the last two decades in the evolution of HRHIS development, implementation and use relative to the proposed NHWA implementation structure and three phases (conceptualization, operationalization, and process revision and sustainability). It presents the case for a good number of countries with the prerequisite HRHIS assessment of their readiness to implement NHWA, and others unable to embark on theirs, naming their main challenge as the interoperability between information systems. The chapter proposes a range of strategies at different decision levels to help strengthen the development, implementation and use of HRHIS.

Chapter 16 presents different country experiences and modalities (such those with an HRH observatory, others with HRHIS) to elicit the elements of a well-functioning NHWA implementation and discusses governance structures, and strategies to increase the availability of data and to build a culture of data use. It also illustrates the challenges of implementing NHWA and presents examples of low-income country experiences (Bangladesh, Mozambique, Namibia) in addressing those. It emphasizes the importance of stakeholders engagement and a shared understanding of health workforce policy issues and planning needs, detailed through a common data language and collaborative interventions, to address the policy and planning agenda.

Chapter 17 presents labour force surveys (LFS) as a potentially rich source of data that can contribute to the contents of NHWA. These are household-based sample survey questionnaires to collect data on employment, unemployment and out of the labour force – of the working age population – and on the characteristics of jobs of employed persons (occupation, type of contract and hours of work). It identifies the type of information that LFS provide, for instance on employment estimates and working conditions, and gives examples of those which can be used in an HLMA to generate key findings for policy dialogue.

Chapter 18 is a crucial reminder that the quality of HRH data is as good as the system and sources used to gather them. It presents a series of steps to assess the strengths and weaknesses of the underlying data sources. It also stresses that periodic and joint checks of data quality would support each stakeholder to monitor, evaluate and strengthen all data sources under their responsibility or influence. It also emphasizes the importance of conducting a triangulation of data sources to improve data quality.

The **Conclusion** presents overview guidance on how to use this handbook, calls for more actions and investments to gather new types of data and overcome limitations of existing data, and gives key recommendations and guidance on how to use this handbook in conjunction with the WHO *Health labour market analysis guidebook* (WHO, 2021a).

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Chapter 1: Health labour market analysis

Gilles Dussault, Pascal Zurn, Khassoum Diallo, James Campbell

1.1 Introduction

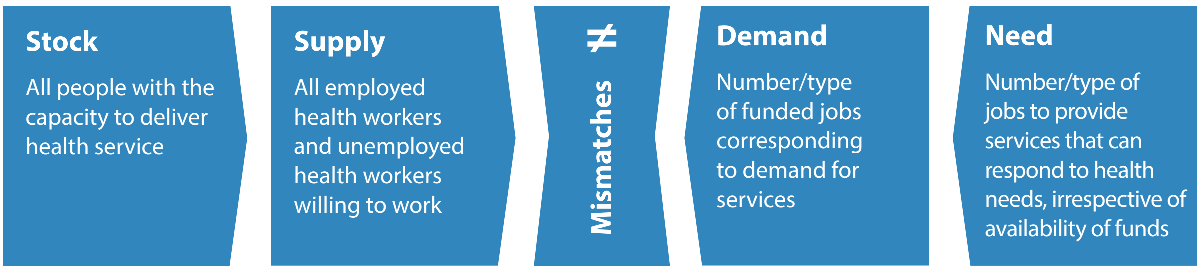
In many countries, the health workforce is the weakest link of the health services delivery system. An analysis of the health labour market (HLMA), based on solid data and information, is an essential tool to understand the forces that drive shortages and surpluses, skill mix and geographical imbalances, and, more generally, suboptimal performance of the health workforce. This chapter introduces the HLMA approach as a strategy to develop effective policies to address these typical challenges.[1] It first defines the notion of the health labour market (HLM) and its main dimensions, e.g. stock, supply, demand, need, their determinants, and the dynamics of their interactions. A second section reviews the policy options an HLMA can bring to the attention of policy-makers. The last section identifies the main data requirements for a comprehensive analysis of the HLM; it shows how national health workforce accounts (NHWA), promoted by WHO (WHO, 2017), can help build the data and evidence base for a credible analysis and thereby facilitate policy development.

1.2 Health labour market: definition of main components and dimensions

An HLM is the mechanism that facilitates the fulfilment of a demand for health labour services by those with the capacity and willingness to supply them. The dynamic relationship between the number and type of jobs offered and of health workers willing to accept them determines the configuration of the HLM and its outcomes, namely the availability, accessibility, acceptability and quality of the health workforce (WHO, 2016a). A clear conceptual vision of the HLM helps guide the collection of evidence for the development of policies addressing health workforce challenges.

Fig. 1.1 is a simplified representation of the HLM that shows the link between the stock of health workers, the supply available, demand, need, and the factors that determine the HLM directly and indirectly.

Fig. 1.1 Health labour market



Source: Akiko Maeda, OECD (2021).

1 This chapter draws on Health labour market analysis guidebook. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/348069, accessed 20 December 2021).

1.2.1 Stock

The **stock** of health workers refers to the total number of workers potentially available for work in the production of health services. It also includes trained health workers who are not in the HLM. Some may have never entered it, because they opted to work in another sector, or as observed in some countries, they have not worked at all after graduating. This has been reported in the state of Goa in India (Kamat, 2014) and in Bangladesh (Hossain et al., 2019). However, the main reasons for trained workers not being in the HLM are retirement, a career change, like moving from health to education, or a temporary exit for studies, for health or for family motives such as taking care of young children. In the United States of America (USA), 672 800 licensed registered nurses did not have a nursing related job in 2017, corresponding to 17% of the 3 957 661 registered nurses living in the country (U.S. Department of Health and Human Services, 2019). This is an example of a "reserve" of workers who can be attracted back to the HLM as suggested by the WHO in the context of fighting the COVID-19 pandemic (WHO, 2020).

A broader definition of the stock may include health workers (typically those with higher education) who emigrated and are working in another HLM. They form a diaspora that can be mobilized in certain circumstances (a health crisis) or for specific tasks (train nationals in the use of certain techniques) or to provide services at a distance (telemedicine). An example is the contribution of Sudanese emigrated doctors to their home country's health system in the form of short-term missions; even though it is on a small scale, it presents potential for expansion if well planned and coordinated (Abdalla et al., 2016). A study of emigrated doctors in Australia, Canada, the United Kingdom and the USA identified 89 medical diaspora organizations that actively contributed to health care delivery, including the transfer of technology and the building of facilities, and training in 41 countries (21 in Asia, 8 in Africa, 8 in the Americas and 4 in Europe). However, the medical diaspora remains an "underused entity in low- and middle-income countries' health system development" (Frehywot et al., 2019).

The total stock of health workers comprises of graduates from public and private education institutions that provide specialized training in health. Some programmes are mandatory to obtain a licence and access registration to deliver certain types of health care (doctors, nurses, pharmacists, dentists, etc.). Other programmes, typically shorter and less complex, enable graduates to practise without a licence (auxiliary nurses, pharmacy assistants, ambulance staff). For the same occupation, a licence may be required in one country, but not in another; in Canada, auxiliary nurses (called licensed practical nurses in most provinces) and dental hygienists need to register to use their professional title. In the European Union (EU), this is the case in 11 of the 27 member countries.

In addition to health workers graduating from domestic education institutions, the stock also includes foreign-trained ones. The proportion of foreign-trained doctors is reaching 25% or more in countries like Australia, New Zealand, the United Kingdom, Ireland, Switzerland and Israel. In countries of the Organisation for Economic Co-operation and Development (OECD), the number of foreign-trained doctors increased by 50% between 2006 and 2016 to reach nearly 500 000 in 2016 (OECD, 2019a). Not all foreign-trained are foreigners. In the EU, there is freedom of movement of persons and a directive that facilitates the mutual recognition of qualifications.[1] This has had an impact on the education of health professionals by making it possible for students unable to access a programme in their home country, to study in another EU country, return home after graduation and request the recognition of their qualification and right to practise. Many countries have created programmes, mainly in medicine, dentistry, pharmacy, and physiotherapy, specifically targeting foreigners; these include Hungary, Poland, Romania, Slovakia, Spain. Box 1.1 gives the example of Romania, which is typical (OECD, 2019a).

Box 1.1 Training foreign European medical students in Romania

After the accession to the EU of their country in 2007, 10 out of 13 Romanian medical schools developed health professional education programmes in English, and four additionally in French, targeting international students. This provided universities an important source of much needed additional income. For students, it provided an opportunity to access medical studies not available to them in their country of origin. The good reputation of the country's medical schools, relatively low tuition fees (€2000–€6250 per year) and living costs made the option of studying in Romania attractive. For students from an EU Member State (France, Germany, Italy and Sweden are the main source countries), the attraction was enhanced by the possibility to have their diploma easily recognized on returning home in order to do specialty training and practise thanks to the EU directive on the recognition of professional qualifications.

Between 2011–2012 and 2018–2019, the number of students entering foreign-language programmes increased by 75%, from 995 to 1740, of whom 1330 studied in English and 410 in French. In 2018–2019, there were 3789 students from EU countries studying medicine in Romania; the modalities of their training are the same as those of programmes in Romanian. The Cluj-Napoca Medical School offers a programme in French adapted to France's model of medical training. The school is also a member of the Conférence Internationale des Doyens et des Facultés de Médecine d'Expression Française, an international network of French-speaking medical schools which recommends education standards and supports their implementation in their member schools.

Source: Romania: a growing international medical education hub (OECD, 2019a).

In many countries, there are "alternative providers" who work in a parallel HLM because they trained in occupations not recognized by education and health authorities (traditional and complementary medicine [T&CM] practitioners, such as acupuncturists, homeopaths, ayurveda and unani practitioners). In some countries however, some of these workers are included in the formal health care system, e.g. homeopaths in France; ayurveda, yoga, unani, siddha and homeopathy practitioners in India. There are also untrained and non-recognized practitioners, for example, traditional healers, shamans or drug peddlers, who are "engaged in actions whose primary intent is to enhance health", as per the WHO generic definition of health workers (WHO, 2006) and for whom there is demand for their services. In Bangladesh, these represent 31% of the stock (MOHFW Bangladesh, WHO Bangladesh, 2021).

1 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32005L0036

A broader definition of the stock of health workers can include individuals who do not deliver clinical services but provide essential support to the functioning of health services. Some are educated specifically to work in the health sector (laboratory technicians, sanitary engineers, managers with specialized training in health administration), others have a generic education, and others have no training.

1.2.2 Supply

The **supply** of health workers is a subcomponent of the stock, corresponding to those who are currently working in the health sector, plus those who are not working but willing to work. For the purpose of an HLMA, it can be disaggregated in various ways: employed-unemployed, by age and sex structure, by occupation (including by specialty where appropriate), by level of service, by type of facility, public-private (for-profit, not-for-profit) sector, by geographical location (regions/municipalities, urban/rural), and other variables as required by the objectives of the analysis. Whenever data are available, the analysis should include trends in the evolution of the supply.

1.2.3 Demand

The **demand** for health workers reflects the capacity and willingness to pay for the purchase of health care by employers. These include national public providers (hospitals, clinics, health centres, and education and research institutions), private for-profit and not-for-profit ones, and individuals, e.g. self-employed entrepreneurs (Dussault and Vujicic, 2008; Liu et al., 2017). Employers also include international organizations and programmes, such as global health initiatives (Gavi, Stop TB Partnership, RBM Partnership to End Malaria, Global Polio Eradication Initiative [GPEI]), bilateral or multilateral actors, nongovernment organizations (NGOs) such as foundations, faith-based and humanitarian organizations, and for-profit providers, such as hospitals and clinics chains. Beyond the national HLM, there is demand from countries that cannot fill all positions they are prepared to fund and that actively recruit abroad. This is the case of many high-income countries (HICs), such as the United Kingdom, which has a chronic shortage of nurses and recruits from other EU countries (Portugal, Spain, Italy) and from lower income countries (India, Philippines, Nigeria) (Buchan et al., 2020). Some countries recruit on the international labour market through bilateral agreements, as is the case of Germany with Viet Nam[1] or Portugal with Cuba (de Oliveira et al., 2017).

1.2.4 Need

The **need** for health workers is the number and type required to produce the volume and type of services that can attend to the health services needs of the population (McPake et al., 2013; 2015). Need is a normative notion, defined without taking into account the affordability of employing the number of workers needed. For example, if the norm is for three, four or five antenatal medical consultations in a country, the corresponding need for personnel (nurses, midwives, doctors, depending on country options) can be calculated based on the estimated number of pregnancies per year. The WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) made such calculations for the need for health workers "to attain high and effective coverage of the broad range of health services necessary to ensure healthy lives for all" (SDG 3). It estimated that in 2013 the global deficit was 17.4 million workers, of whom 11.6 million were nurses, midwives and doctors; and that in 2030, it would be 14.5 million, including 9.9 million nurses, midwives and doctors, if current trends persist. This indicates a need for policy changes to improve the supply and demand to reduce the projected deficit (WHO, 2016).

1 https://www.giz.de/en/worldwide/69851.html

1.3 Factors that influence supply, demand, need and their interactions

A country's HLM is not static, and changes are context- and time-specific. No one-fits-all pattern exists for a country to use as a model, hence the importance of an analysis of the HLM based on quality data and information, to make a valid diagnosis of the situation and to identify options of corrective actions.

There are important variations globally in the stock and supply of health workers, with countries with the highest burden of disease having the lowest stock and supply. This shows the precarious relationship between need, demand and supply (WHO, 2016b). Among upper middle- and high-income countries, for example among the 37 member states of the OECD, there are important differences in the doctor and nurse ratios to population. In 2017, Greece had the highest total number of doctors per population (6.1/1000) and Türkiye, the lowest (1.9/1000). For nurses, the gap was even bigger, with Norway having a density of 17.1/1000 and Türkiye 2.1/1000 (OECD, 2019b). Such variations indicate that some external factors are at work to influence the structure and the dynamics of the HLM. These include the economic context, the political, legal and regulatory environment, historical, cultural, demographic and epidemiological factors, as illustrated by the following examples:

- The demand for health workers is highly correlated with the expenditure on health by the government, private insurance, and out-of-pocket payments (Liu et al., 2017; Scheffler et al., 2018). An economic crisis may lead to financial constraints that will negatively affect employment in the health sector, by limiting the capacity to fund jobs.
- The production capacity of private education institutions depends on funding available, either from an organization like a church or a foundation or from individuals with the capacity to pay tuition fees and other expenses.
- In the public health system, decisions to augment or to reduce the number of funded positions are political. Economic constraints or opportunities may play a role, but above all, they reflect the government's vision of its role in supporting employment in health. In addition, professional organizations and trade unions may promote more recruitment in their field to expand it or restrictions on admissions to limit competition.
- The health sector and the HLM are highly regulated. Laws, in some cases going back many years, shape the composition of the workforce by defining who is authorized to do what. For example, midwifery was not a legally recognized occupation in Canada until 1994, when Ontario was the first province to authorize its practice. To this day, the regulation of midwifery still varies from one province to another.[1] A counter example is the case of the legal recognition of non-medical practitioners with a shorter training aligned on the medical model. These deliver clinical services restricted to doctors elsewhere, under a variety of titles (health officer, medical assistant, clinical officer, physician assistant, community health officer, clinical associate, associate clinician and medical licentiate) (Cobb et al., 2015; see also Chapter 9).
- International regulations can also affect the dynamics of the HLM. The "free movement of persons" principle in the EU and the directive on the recognition of professional qualifications have an impact on the mobility of health workers within the Union.

1 https://canadianmidwives.org/about-midwifery/#midwifery-by-province-and-territory

The 2010 WHO Global Code of Practice on the International Recruitment of Health Personnel, even if not mandatory, influences recruitment practices in countries highly dependent on foreign health workers (Williams et al., 2020).

- The capacity of professional organizations to promote their interests and influence regulatory decisions is determinant in shaping the division of labour in the HLM. This influence can be informal or formal through advisory or consultative structures, as in Australia and Canada (Leslie et al., 2021). Decisions by education institutions with respect to programmes they will offer are not entirely autonomous, as they may depend on accreditation norms.
- Social and cultural factors influence various dimensions of the HLM. The mix of occupations and of specialties reflects the choices and preferences (social concern, perceived prestige of the occupation, estimated return on education investment) of candidates to health studies. For example, general medical practice tends to be less valued than hospital-based specialties, and among the latter, some are more prestigious than others (e.g. neurosurgery vs pathology). Preferences can also be linked to the requirements of working conditions, such as broken hours, physical or psychological demands which some students may decide to avoid by choosing a less stressful and demanding occupation.
- As more individuals are prepared to pay for the services of T&CM practitioners, the demand for these providers will increase and this "informal" component of the HLM will grow.

The following section presents typical HLM problems that an HLMA, based on relevant data and information, can help understand and serve to identify possible mitigating interventions.

1.4 Mismatches between the supply, demand and need for health workers

Labour markets "clear" when the supply and demand of health worker match, i.e. when the number of workers willing to work corresponds to the number jobs offered. Markets generally do not clear due to temporary or long-term structural inefficiencies/dysfunctions that result in mismatches between supply, demand and need for HRH. Examples of mismatches include:

- **Quantitative mismatches** that exist when the number of health workers is insufficient to fill available positions or is in excess, thereby producing "shortages" or "surplus". Fields of practice like mental health, rehabilitation, geriatrics or primary care typically experience shortages. Another type of quantitative mismatch occurs when the mix of occupations and specialties is inefficient. In countries, such as Bangladesh, Brazil, Colombia (and nine other countries in the WHO Region of the Americas) and Pakistan, the number of doctors is higher than that of nurses (OECD, WHO, 2020; OECD, World Bank, 2020). A higher nurse to doctor ratio could bring efficiency gains, as nurses can substitute for doctors in the performance of certain tasks, like taking a patient's history, measuring blood pressure, vaccinating, and so on (McPake et al., 2014). A country might experience simultaneously an excess of health workers in certain geographic areas, e.g. urban, and shortages in others, e.g. rural and remote. The HLMA explains paradoxes, as are observed in some low-income countries, with an important proportion of health needs not met coexisting with unemployment of health workers, because demand is insufficient.
- **Skills mismatches**, which result from a misalignment between workers' knowledge, skills, attitudes, and job requirements. This might be due to under-education, over-education, or lack of continuing education (CE) leading to the obsolescence of some competencies.

Survey results from OECD countries showed high rates of such mismatches reported by doctors and nurses. Around 76% of doctors and 79% of nurses reported over-skilling in their current job, while 51% of doctors and 46% of nurses reported some under-skilling (OECD, 2018).

- **Labour discrimination**, which also creates mismatches based on gender, race, age, religion, disability, and other forms of employment bias. Discriminatory practices can take place at various levels of the health system and can occur intentionally or unintentionally. Discrimination can manifest itself in various ways, such as through wage differentials (e.g. minorities or women receiving lower wages for similar tasks), or lower access to leadership positions. Gender biases, discrimination and inequities remain systemic across the globe, and WHO reports that the gap may be widening rather than narrowing (WHO, 2019).

1.5 Policy questions pertaining to health labour market mismatches

The GSHRH identifies **major policy areas** on which governments and other stakeholders should focus to improve the performance of the HLM. These are production, inflows and outflows, maldistribution and inefficiencies, and regulation of the private sector. Policy questions related to each area may be simple to formulate, but answers are always complex. Examples of such questions are:

The “production” of health workers

- What is the capacity (infrastructure, teaching staff, financial resources) and outputs (student selection, enrolment, attrition, graduates per cadre) of education and training institutions?
- How many health workers does the country need now, and will need in 5, 10, 15 years?
- Is the current production sufficient to meet demand or need? Is it insufficient or excessive? Can it change? How?
- Do education and training institutions produce a mix of occupations that can respond in an effective and efficient manner to population needs and demands? What level and content of training is required for each category?
- Do they produce workers with the right competencies, i.e. knowledge, skills and attitudes adapted to demand?
- Who will train them, where and how? How many of each occupation and specialty?

Inflows and outflows

- How to avoid shortages or surpluses? How to improve the match between supply and demand?
- What is the capacity of the current HLM to employ the available health workers?
- What explains unemployment?
- Why do some workers leave the HLM earlier than retirement age?
- Why do some decide to work in another sector or to leave the country?
- How to attract and retain health workers in places where they are most needed?
- Is recruitment abroad an option to augment the supply of health workers? How to regulate it?

Maldistribution and other inefficiencies

- How to distribute more equitability health workers in the different parts of the country?
- How to improve the productivity and performance of the health workforce?
- What is the optimal combination of incentives (monetary and non-monetary) to do so?
- How to regulate the quality of practice?
- How to ensure that workers maintain and improve their competencies all along their career?
- How to regulate dual practice?
- How to regulate the quality of education, in both public and private institutions?

1.6 Data requirements for a health labour market analysis

The strength and usefulness of an HLMA depend greatly on the availability of quality data and information (see Chapters 2 and 10 on data requirements to estimate the stock, supply, demand and need) and on the various dimensions and the dynamics of the HLM. A starting point is to use the NHWA indicators (see Chapters 16 and 18), and to add data that are not routinely collected. The WHO *Health labour market analysis guidebook* is a useful source (WHO, 2021b).

Estimating the **total stock** of health workers and their characteristics is a challenge because no database, if we exclude population censuses, accounts for health workers who are not in the HLM. The periodicity of censuses is typically 10 years, so such data rapidly become obsolete. In addition, they rarely provide the degree of disaggregation needed for a useful HLMA. Labour force and household surveys can provide an actual picture (see Chapter 17), but these are expensive, and not all countries can afford them. Tracking of national graduates by education institutions (see Chapters 4 and 5), and eventually by registration bodies, is another strategy to estimate numbers, who enter the national HLM, as well as their type and location of practice, but few institutions do this currently.

It is, at least in principle, easier to capture data on the sources that contribute to building the stock, e.g. the production of **education institutions** (see Chapter 4)[1] and **immigration** (see Chapter 6). Where education institutions are licensed or accredited, it is possible to require that they produce data on graduates, though collecting these data may not always be simple. Registration bodies and provider organizations are sources of data on immigrant workers, as these need some form of authorization to enter the HLM, such as a licence for the more qualified, or a work contract for others. On the other hand, it is more difficult to document emigration. Registration bodies issue "certificates of conformity" required for emigration. These numbers are available, but they only indicate an intention to emigrate. Some emigrants maintain their home country registration, which adds to the difficulty of measuring the importance of emigration.

1 The WHO Regional Office for Europe, Organisation for Economic Co-operation and Development (OECD) and Eurostat collect data, with their Joint Questionnaire on non-monetary health care statistics, from 62 OECD and European countries on the number of graduates in medicine, dentistry, nursing, midwifery and pharmacy (https://www.oecd.org/statistics/data-collection/Health%20Data%20-%20Guidelines%202.pdf).

Data on the characteristics of the **supply**, namely the density, geographical distribution, remuneration, skill mix, age and sex, and public and private sector distribution of active heath workers, are required to gain a comprehensive insight into the dynamics of the HLM. It is easier to access this information for workers employed in public services. The documentation of the private sector component of the HLM is critical to the understanding of its impact on the accessibility, acceptability and equitable distribution of health workers (see Chapter 7). It is equally important to assess how wage and working conditions differentials between the public and the private sectors affect professional decisions of workers, including those relating to the choice of a practice location and that of working in both sectors (dual practice). Specific surveys can provide this information.

The main source of data on **demand**, e.g. number and type of jobs filled or not, are employers; as for supply, it is easier to capture data from the public sector than from the private sector. Private employers, especially for-profit organizations, may not be willing to share information, such as wages and benefits, to protect their market position. Data on **need** at national level are derived from burden of disease statistics and surveys and are produced by estimating services needed and the number and type of workers required to produce these services. At the level of provider organizations, the Workload Indicators of Staffing Need (WISN) tool serves to estimate needs in function of workloads and is a useful planning and management tool (see Chapter 13).

Both **human resources for health information systems (HRHIS)** (see Chapter 15) and **NHWA** are tools for the routine data collection of such data, and they serve as a basic source for an HLMA. They allow to replicate and follow the trends of the various indicators and to facilitate HLMA updates. The analysis of these quantitative data informs on **mismatches and inefficiencies**, and qualitative research, such as interviews with students, health workers, stakeholders and key informants can document their characteristics and causes.

An HLMA can also contribute to strengthening a country's NHWA, through the process of data collection, helping update the NHWA database, and even adding to it data and information not previously collected.

1.7 Health labour market analysis and policy development

An HLMA serves to inform policy-makers on the nature and causes of health workforce inefficiencies and to identify and assess the options of action available to them. There is a broad range of possible responses among which country policy-makers can choose and adapt to their capacities and limitations. Need, demand and supply of health workers vary over time, as the dynamics of the HLM change; participation rates, mobility patterns, and aspirations and behaviours of workers and employers evolve (Araujo and Dussault, 2017). Consequently, the menu of policy options available to policy-makers differs depending on the state of their HLM. The following are examples of options of interventions:

1.7.1 Policies and interventions targeting the stock and supply of health workers

- **Measures to augment the supply:** prevent the early exit of the HLM by offering flexibility for temporary leave and re-entry, changing the retirement age, addressing the drivers of emigration.

- **Measures to augment productivity:** fight absenteeism, promote teamwork, expand the scope of practice of nurses, pharmacists, and other providers, exploit the potentialities of digitalization and of communication technologies, introduce incentives linked to performance, improve management capacity, ensure that workers have the equipment and supplies they need to perform their tasks.
- **Measures to reduce shortages of certain cadres:** design and implement marketing-type campaigns to attract more candidates, augment the production, fight attrition of students, create new cadres (e.g. non-medical clinicians, auxiliaries), recycle existing staff (specialists into family practitioners), recruit abroad, reduce the length of studies (e.g. the 3-year pre-specialty medical programmes in the USA and Canada),[1] mobilize the diaspora, improve incentives: raise the compensation of specific cadres that are in deficit, such as general practitioners (GPs) or those working under difficult conditions, such as in geriatrics or mental health services.
- **Measures to reduce/avoid surpluses:** limit production (introduce a *numerus clausus*), encourage early retirement, do not replace all leavers, limit immigration, stimulate demand (invest more in services, make services more affordable, e.g. reduce out-of-pocket spending).
- **Measures to improve accessibility:** recruit students from deficit areas, decentralize education programmes, implement packages of incentives, improve the work environment (infrastructure, access to internet, telemedicine) and supervision, promote/impose community service; recognize and support the role of carers (WHO, 2021a).
- **Measures to improve quality:** introduce/strengthen accreditation of education programmes and institutions, promote a culture of quality based on the evaluation of services, strengthen CE, introduce incentives to reward quality, develop mechanisms of surveillance of practice.

1.7.2 Policies and interventions targeting demand and need

- **Economic measures:** advocate for the benefits of increasing spending in the health sector; augment the public budget allocated to health services, which in turn will augment the demand for workers; expand insurance coverage, increase fiscal space for health.
- **Set new priorities/objectives and support them with adequate resources:** prioritize primary care, oral health, mental health, rehabilitation.
- **Make organizational access easier:** adapt hours of attendance, improve quality of first contact (welcoming environment and personnel), implement appointment systems, train staff in showing empathy, respect.
- **Promote quality:** develop/strengthen the capacity of professional councils as guarantors of the quality of services and protectors of the interests of users.
- **Implement interventions to harmonize need with demand:** for example, by investing in prevention (early detection of problems, information to persons at risk) and building the health literacy of users.

1 *Med school in 3 years: is this the future of medical education?* Stacy Weiner, 2019 (https://www.aamc.org/news-insights/med-school-3-years-future-medical-education).

As they look at available options, policy-makers need to consider whether their preferred ones pass the test of feasibility by assessing their economic affordability and efficiency, technical, organizational, and legal achievability, and political and sociocultural acceptability. All dimensions of feasibility are important and require a positive evaluation before advancing with a new policy. When looking at the different options, policy-makers will typically look at whether they can be implemented rapidly, as political cycles are short. Choosing policies that require more time needs more vision and a stronger political commitment. The same trade-off exists between policies not costly to implement and those requiring important investments.

1.8 Conclusion

Progress towards universal health coverage (UHC) depends on having an adequate health workforce. An adequate number of health workers is essential, but far from sufficient. It is necessary to have the right match between workers' competencies (technical and relational) and the demand and the needs of services, to have an equitable geographical deployment and an organization of work that is efficient and guarantees quality. This does not happen naturally or spontaneously, hence the need for well-informed policies and interventions. The development of such policies is a challenge due to at least three intrinsic characteristics of HLMs. Firstly, it is difficult to foresee what demand will be in 5–10 years, because so many factors can influence its evolution, such as the political and the economic environment, technological and organizational innovations, changing needs and expectations of populations, and unexpected health crisis. Secondly, demand and supply do not change at the same pace. A new government can decide to rapidly improve the availability and accessibility of health services and increase the number of funded positions significantly, but the production of health workers is a process that takes years to deliver the additional number needed to fill these positions. Thirdly, the HLM is a political arena where the interests of numerous state and non-state actors can clash, making difficult the definition of policies that are sufficiently consensual.

Within that context, it is essential to base the HLMA on solid and reliable data. Policy-makers need reliable data on the current workforce and on future requirements. Information on how the HLM is likely to change and on how it will likely evolve is therefore fundamental for rational decision-making (WHO, 2016a; Edwards, 2017).

A solid HLMA builds on existing data for which the NHWA are a key part. On the other hand, an HLMA through its collection of relevant and reliable data and information helps enrich and strengthen the NHWA. For example, the knowledge of what drives decisions of health workers as to their choice of practice type and location, and of factors that determine productivity serves to define interventions that can improve the coverage of services. It is just as important to know what influences demand for health workers and to be sensitive to the political dimensions of the dynamics of the HLM. An HLMA shows that building a strong health workforce requires cross-government planning and stakeholders' involvement to create conditions for the successful implementation of national health policies.

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PART I

Policy questions and data requirements: monitoring the stock and supply of health workers via their education, graduation and mobility in the health labour market

Chapter 2:
Data requirements for the analysis of the stock and supply of health workers

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2.1 Introduction

The main input for evidence-informed health workforce policies is a valid and up-to-date picture of the current stock and supply of health workers, of recent trends in their development, and of factors that influence their evolution. In most countries, data and information on these topics are incomplete. For example, data on the number and characteristics of individuals with a health worker education who are not active in the health labour market (HLM) are scarce. As for the active health workers, there is often a lack of data on those working in the private sector (including dual practitioners who also work in the public sector), on the profile of the unemployed willing to work, or on those showing intentions to leave the HLM. Questions as simple as "How many and what kind of health workers are active in the HLM?", or "How many graduates of domestic education institutions are not in the HLM and for what reason(s)?" raise major methodological difficulties to produce a full response.

This chapter identifies data and information that should help policy-makers, and other stakeholders, assess the state of the health workforce at a specific time, and design policies and interventions with the potential to bridge the differences between the current stock and supply of health workers and the desired ones. These differences may be due to quantitative and qualitative mismatches with demand and needs, such as shortages or surpluses of certain cadres, a mix of occupations and competencies not adapted to the services to be provided, or forms of discrimination that negatively impact the global performance of the workforce. Such mismatches make it difficult to adapt health care services to demographic and epidemiological changes and to pursue overarching goals such as the Sustainable Development Goals (SDGs) and universal health coverage (UHC).

The assessment of the stock and supply needs also to cover the factors or determinants which influence inflows and outflows of health workers and the composition (skill mix), deployment and performance of the health workforce. These factors include, among others, changes in the expectations and behaviours of workers; in policy choices, such as reviewing scopes of practice; in public and private sector investment decisions; in demand and needs; and on the attractiveness of working conditions in the national HLM in comparison with other markets.

The chapter successively looks at data and information that can inform on the stock and on the supply, starting with indicators included in the national health workforce accounts (NHWA) handbook (WHO, 2017). The chapter also suggests additional indicators that can complement the evidence base in support of health workforce policy development.

2.2 Data and information requirements on the stock of health workers

Data and information requirements on the stock of health workers are functions of how we define "health worker" and the HLM. WHO defines "health workers to be all people engaged in actions whose primary intent is to enhance health" (WHO, 2006). This broad definition corresponds to the stock of health workers, as it does not consider their participation in the HLM. It implies that the typology of health workers goes beyond those licensed to provide clinical care services, such as medical doctors, nurses, midwives or dentists, and in certain countries traditional and complementary medicine (T&CM) providers, such as acupuncturists, homeopaths, ayurveda and unani practitioners. There are also numerous categories of workers with a health training who do not need a licence to work, such as nursing auxiliaries or pharmacy assistants. In some countries, workers with minimal or no training, such as community health workers (CHWs) and traditional midwives are integrated in the health care delivery system. Also a range of "alternative practitioners" (naturopaths, herbalists, magnetic field therapists), and traditional healers and shamans provide services in parallel to the formal delivery system.

Box 2.1 Why it is important to know the stock of health workers: the COVID-19 pandemic

The WHO Regional Office for Europe and the European Commission COVID-19 Health System Response Monitor identified six types of policy interventions relating to the health workforce:

- Increasing the contribution of the current workforce (additional hours, new shift patterns).
- Co-opting medical and nursing students into the workforce.
- Bringing retired health professionals back into the workforce.
- Bringing inactive health professionals back into the workforce.
- "Fast tracking" foreign-trained health professionals into the workforce.
- Supporting volunteers into the workforce.

Five of these interventions consisted of using a reserve from the stock to augment the supply of health workers.

Source: Williams et al. (2020).

A broader definition of the stock includes support personnel, some trained to work in health services (managers, engineers, laboratory and other technicians, archivists, ambulance staff); others have a generic training (accountants, informaticians, back office staff); or are not or minimally trained (orderlies, cleaners, porters).

The following sections propose useful data and information that help characterize and explain the state of the stock, notably in terms of the dynamics of inflows and outflows.

2.3 Inflows (new graduates, immigrants, returners)

The education pipeline: this refers to the trajectory of future health workers from entry in a training programme to graduation, and to the institutions that offer such programmes. NHWA dedicate three of their 10 modules to education and a total of 24 corresponding indicators (Table 2.1).

Indicators

As much as possible, data should be disaggregated by occupational category (including specialties), by public/private sector (for-profit, not-for-profit), by density and geographical location, by sex and age, and by year.

When longitudinal data are available, trends over the last 10 years should be included.

Table 2.1 NHWA indicators that describe the education pipeline

Indicator number	Indicator name
Module 2: Education and training	
2 – 01	Master list of accredited health workforce education and training institutions
2 – 02	Duration of education and training
2 – 03	Applications for education and training
2 – 04	Ratio of admissions to available places
2 – 05	Ratio of students to qualified educators for education and training
2 – 06	Exit/drop-out rate from education and training programmes
2 – 07	Graduation rate from education and training programmes
Module 3: Education and training regulation and accreditation	
3 – 01	Standards for the duration and content of education and training
3 – 02	Accreditation mechanisms for education and training institutions and their programmes
3 – 03	Standards for social accountability
3 – 04	Standards for social accountability effectively implemented
3 – 05	Standards for social determinants of health
3 – 06	Standards for interprofessional education
3 – 07	Agreement on accreditation standards
3 – 08	Continuing professional development
3 – 09	In-service training

Module 4: Education finances	
4 – 01	Total expenditure on higher education
4 – 02	Total expenditure on health workforce education
4 – 03	Average tuition fee per student
4 – 04	Investment in transformative education and training
4 – 05	Expenditure per graduate on health workforce education
4 – 06	Cost per graduate of medical specialist education programmes
4 – 07	Cost of qualified educators per graduate
4 – 08	Total expenditure on in-service training and continuing professional development

Table 2.2 lists relevant additional quantitative data and qualitative information that policy-makers may find useful and for what reason(s). Some are only slightly different from NHWA indicators and others are new.

Table 2.2 Additional data and information on the education pipeline

Indicator	Justification
Quantitative data: education institutions	
Total number of institutions providing health worker education	A census of all institutions – accredited or not, public and private – to have a comprehensive picture of the supply of health worker education.
Percentage of accredited programmes with an accreditation not older than 5 years	An accreditation granted more than 5 years ago is a weaker guarantee that standards are maintained.
Percentage of full-time educators per programme	Full-time educators are more engaged and more available to support students. They are also more likely to conduct research. A small percentage may indicate quality problems.
Ratio of students to educators (number of full-time equivalent) per programme	Informs on students' access to support from educators.
Percentage of educators with a masters degree; percentage with a PhD	Informs on the level of qualification of the faculty.
Tuition fees per programme	Adds information to NHWA indicator 4 – 03.
Quantitative data: students and graduates	
Attrition/drop-out rate by cause (health problems, poor performance, other)	This specifies NHWA indicator 2 – 06.
Average cost borne by students (tuition fees, lodging, learning material)	This gives the total financial burden borne by a student, and adds to NHWA indicator 4 – 03.
Percentage of applicants/admitted/ graduates from minority groups	Informs on the diversity of the student population.

Qualitative information: education institutions	
Level of geographical decentralization of institutions/programmes	Informs on access to health education programmes outside major urban areas.
Alignment of places available on service needs	Informs on the distribution of places in function of the desired organization of services. For example, is the number of places in family medicine or nursing sufficient to meet the objective of giving priority to primary health care services.
Alignment of qualifications of educators and trainers on service needs	This adds to NHWA indicators on standards of education (Module 3).
Main challenges in the education pipeline	For example, recruitment of suitable candidates in sufficient numbers, high attrition rates, recruitment and retention of highly qualified educators, or variations in quality of programmes.
Number and characteristics of not recognized institutions	If applicable.
Qualitative information: students and graduates	
Career intentions	Informs on future decisions of graduates regarding choice of a specialty, of a practice location, to stay in the country or to leave.

If we use an extended definition of the stock to include workers out of the HLM and alternative practitioners, additional indicators are relevant (Table 2.3).

Table 2.3 Additional data and information on the stock of health workers

Indicator	Justification
Quantitative additional data on the stock	
Number of graduates who do not enter the HLM	In some countries, women who marry at the time of graduation do not enter the labour market. It is important to know the extent of this phenomenon.
Number of early leavers (temporary leavers, early retirees)	This adds information on replenishment needs, calculated on the basis of forecasted retirements.
Number of retirees below the age of 70	This is useful in case of need to recruit from the pool of retirees, for instance in an emergency situation or an epidemic (see Box 2.1).
Number of nationally trained health personnel working in a foreign HLM	Helps estimate the pool of workers with a health education who emigrated and who could be attracted back to the national HLM.
Number of trained T&CM practitioners	Completes the information on the stock and informs on patterns of demand for health services.
Qualitative additional information on the stock	
Reasons for not entering the HLM	This can help devise interventions to prevent failure to enter the HLM.
Reasons for retiring early	This can help devise interventions to prevent early retirement.

2.4 Data and information requirements on the supply of health workers

NHWA indicators cover the number of health workers available and their distribution, flows in and out of the HLM, and the composition of the workforce (Table 2.4).

Table 2.4 NHWA indicators that describe the active population of health workers (supply)

Indicator number	Indicator name
Module 1: Active health workforce stock	
1 – 01	Health worker density
1 – 02	Health worker density at subnational level
1 – 03	Health worker distribution by age group
1 – 04	Female health workforce
1 – 05	Health worker distribution by facility ownership
1 – 06	Health worker distribution by facility type
1 – 07	Share of foreign-born health workers
1 – 08	Share of foreign-trained health workers
1 – 09	Share of workers across health and social sectors
Module 5: Health labour market flows	
5 – 01	Graduates starting practice within 1 year
5 – 02	Replenishment rate from domestic efforts
5 – 03	Entry rate for foreign health workers
5 – 04	Voluntary exit rate from health labour market
5 – 05	Involuntary exit rate from health labour market
Module 8: Skill mix composition for models of care	
8 – 01	Percentage of health workforce working in hospitals
8 – 02	Percentage of health workforce working in residential long-term care facilities
8 – 03	Percentage of health workforce working in ambulatory health care
8 – 04	Specialist surgical workforce
8 – 05	Family medicine practitioners
8 – 06	Existence of advanced nursing roles
Module 10: Health workforce information systems	
10 – 05	HRHIS for tracking the number of entrants to the labour market
10 – 07	HRHIS for tracking the number of exits from the labour market

Module 1 of NHWA (Active health workforce stock), includes the dimensions "Share of foreign-born health workers" (1 – 07) and "Share of foreign-trained health workers" (1 – 08). Additionally, dimension 5 – 03 of Module 5 (Health labour market flows) is "Entry rate for foreign health workers" and the corresponding indicator is "Percentage of newly active foreign-trained health workers to total stock of active health workers". These are under the generic dimension "Migration". The notions of foreign-born and foreign-trained are used in international databases, for example OECD (2019), and by many countries. Both have limitations: foreign-born workers include workers born abroad who immigrated at a young age and later trained in the country. Foreign-trained workers include nationals who trained in another country and came back after graduating. This is very frequent in the European Union (EU), where the rules of mutual recognition of qualifications and the free movement of persons make return easy. Data on workers who emigrated to work in another HLM and decided to return to the national one is also useful, as illustrated by Table 2.5.

Table 2.5 Additional data and information on immigrants and returners

Indicator	Justification
Quantitative data: immigrants and returners	
Percentage of foreign-trained health workers who are nationals	This adds to NHWA indicator 1 – 08.
Number of returners	This is potentially useful as it may indicate a possibility to attract workers from the diaspora (for example, foreign nurses leaving the United Kingdom after Brexit). It may be difficult to collect this information as many emigrants maintain their registration after leaving the country.
Qualitative information: immigrants and returners	
Reasons for training abroad	There are programmes for foreigners in many European countries such as Hungary, Romania, Poland and others (OECD, 2019). The majority of graduates are from another EU country and they eventually return home. They are foreign-trained, but cannot be categorized as immigrants.
Reasons for returning	This information can help devise strategies to attract back workers from the diaspora.

Other indicators can complete those proposed by the NHWA, depending on the availability of data. The proposed additional data and information (Table 2.6) are principally about accessibility and quality of health workers, two dimensions of the performance of the health workforce (WHO, 2016).

Table 2.6 Additional data and information on the active population of health workers

Indicator	Justification
Quantitative data: active health workers	
Number of employed workers expressed in full-time equivalents	This information is more specific than the number of individuals (headcounts) and serves to estimate the real availability of health workers.
Ratios such as nurses per family physician, nurses per medical specialist and other ratios	Adds to the information on the composition of the supply and gives information on the efficiency of the skill mix.
Percentage of clinicians working in more than one job (Which cadres? How much of their time is spent in the public sector and how much in the private sector?)	Specifies the information provided by NHWA indicator 6 – 07. It also helps capture the numbers of workers who provide services such as education, research, management, technical and other support services in addition to clinical work.

Percentage of health care workers who work abroad for part of their time	This informs on a type of mobility (cross-border workers) frequent in zones where the freedom of movement is possible, such as in the EU, for example between France and Switzerland, Belgium and the Netherlands, Germany and Austria.
Percentage of workers from minority communities	Gives information on the accessibility of health workers to populations from minority communities.
Qualitative information: active population of health workers	
Reasons for being unemployed	Informs on whether it is because of the lack of open positions or because jobs offered do not match the preferences of workers.
Reasons for early exit of the HLM	Informs on the causes of attrition (leaving the health sector, long-term leave or temporary interruption of career, disease, deaths).

Modules 3 (Education and training regulation and accreditation), 6 (Employment characteristics and working conditions) and 9 (Governance and health workforce policies) of NHWA propose indicators that help capture policies and regulation mechanisms that help assess the quality dimension of the stock and supply of health workers (Table 2.7).

Table 2.7 NHWA indicators relating to the quality of the stock and supply of health workers

3 – 02	Accreditation mechanisms for education and training institutions and their programmes
6 – 07	Regulation on dual practice
6 – 08	Regulation on compulsory service
9 – 03	Health workforce planning processes
9 – 04	Education plans aligned with national health plan

Additional information can also be useful, as per the examples in Table 2.8.

Table 2.8 Additional data and information on the quality of the stock and supply of health workers

Indicator	Justification
Qualitative data: quality of the stock and supply	
Mechanisms of definition and regulation of scopes of practice	This information is critical as the definition of scopes of practice determines much of the division of labour in the HLM.
Activities of professional councils	Informs on the actions of councils in relation to the quality of practice of their members (monitoring of practice, discipline, periodical renewal of licence).

Policies/actions of professional associations and trade unions	Actions to influence the size and composition of the stock and of the supply (e.g. pressures to limit/augment the number of practitioners in their field, opposition to the expansion of functions of certain cadres).
Competencies mismatches (technical, social and cultural competencies)	Informs on the alignment between the knowledge, skills and attitudes of health workers and the needs and expectations of the population.

2.5 Data and information sources

A number of chapters in this handbook discuss this topic. Governments and organizations, such as professional councils, accreditation agencies and observatories, routinely collect relevant data and information. Examples such as censuses, labour and social security statistics are sources that cover all sectors of activities, whereas professional registries and tracking of graduates (see Chapters 4 and 5) are specific to the HLM. Human resources for health information systems (HRHIS) (WHO, 2015) and NHWA regroup these data, as described and discussed in Chapters 14, 15 and 18. Other sources are periodic like labour force surveys (LFS) (see Chapter 17) or household surveys. This information also serves for the assessment of future needs (see Chapters 12 and 13). Additional research, in the form of interviews of key informants, surveys or published and grey literature analysis, can provide complementary information.

Not all sources are easily accessible, and when they are, it may be difficult to extract data specific to the health workforce. The multiplicity of sources raises the issue of the comparability of data, as the definition of indicators or year of reference may differ. Chapter 18 offers a discussion of the quality of data.

2.6 Conclusion

No health care system has perfect data, and policy development must make do with some data imperfections and gaps. The information and data collected to build NHWA provide a portrait of the health workforce situation and help identify possible problems in need of policy and management interventions. Box 2.2 gives examples of measures that policy-makers can consider in order to improve their country's supply of health workers. Data and evidence are not the only factors that policy-makers consider in designing policies, but they are important to avoid making wrong choices that will have lasting undesirable effects which are difficult to correct.

Box 2.2 Policies and interventions targeting supply

- **Measures to augment productivity (to compensate the effects of shortages):** fight absenteeism, excessive attrition (exits from the sector, premature retirement) and emigration; make the organization of work more efficient (promote teamwork, integrated services); expand the scope of practice of nurses, of pharmacists, digitalization, introduce incentives for performance; improve management capacity; ensure that workers have the equipment and supplies they need.
- **Measures to augment the supply of certain cadres:** campaign to attract more candidates; augment the production; fight attrition of students; recruit abroad; raise the compensation of specific cadres that are in deficit, such as GPs or those working under difficult conditions, such as in geriatrics or mental health services.
- **Measures to reduce/avoid surpluses**: limit production (*numerus clausus*); encourage early retirement; do not replace all leavers; limit immigration; encourage emigration as occurs in certain countries; stimulate demand (invest more in services, make services more affordable, e.g. reduce out-of-pocket spending).
- **Measures to improve accessibility:** recruit students from deficit areas; decentralize education programmes; improve the work environment (infrastructure, access to internet, telemedicine) and supervision; impose community service.
- **Measures to improve quality:** create a culture of quality based on the evaluation of services provided; strengthen continuing education; introduce incentives that reward quality; develop/strengthen surveillance of practice mechanisms.

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Chapter 3: The production and development of a health workforce in support of UHC

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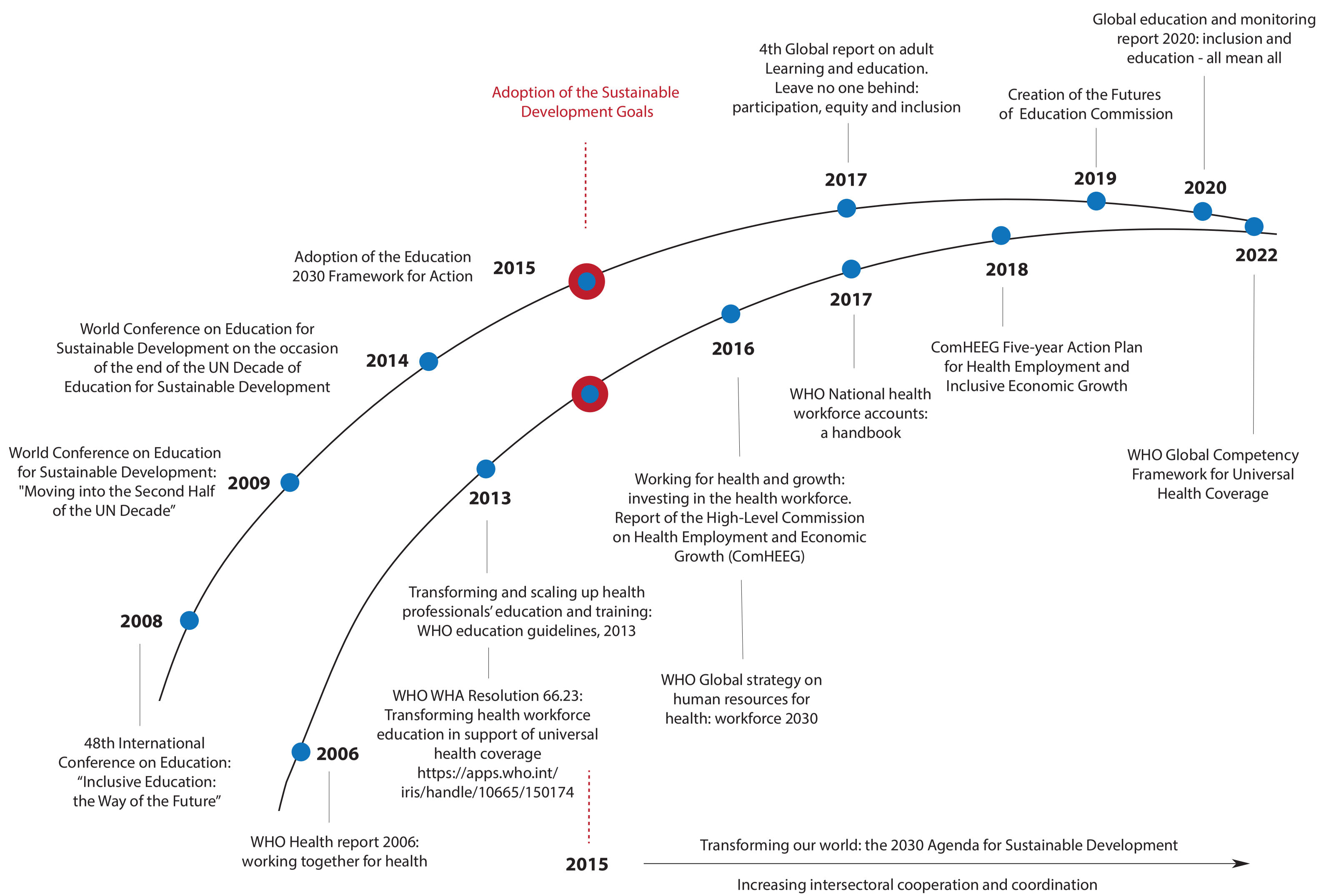
3.1 Introduction

The challenges and issues with health worker education and training are not new; successive global reports have documented them well over the last decade (Fig. 3.1). Each report described a consistent set of challenges and issues, as well as recommendations to tackle them. The United Nations 2030 Agenda for Sustainable Development is facilitating greater cooperation on education between the health and education sectors. The WHO *Five-Year Action Plan for Health Employment and Inclusive Economic Growth* calls for an intersectoral approach to the production and development a health workforce (WHO, 2018a). Such an approach can contribute to accelerating progress towards universal health coverage (UHC) and attaining the goals of the 2030 Agenda by ensuring equitable access to health workers within strengthened health systems.

Institutional mechanisms and bodies that coordinate an intersectoral health workforce agenda will require consistent and coherent approaches to data collection and analysis, and robust underlying data sources. Intersectoral policy dialogue among the relevant ministries will help in formulating and implementing evidence-informed policies and strategies to strengthen and transform health workforce education in support of UHC (WHO, 2013).

Fig. 3.1 Timeline of key reports and conferences supporting an intersectoral approach to the production and development of a health workforce



There are three modules dedicated to health workforce education in the national health workforce accounts (NHWA), with data requirements to allow governments to conduct comprehensive assessments of education and training of health workers (WHO, 2017). NHWA support the scaling-up of transformative health workforce education, including an adequate number and equitable distribution of committed and competent health workers at the primary health care (PHC) level (WHO, 2011).

This chapter draws upon a significant body of literature to make the case for an intersectoral approach to the production and development of a fit-for-purpose health workforce. It provides policy and decision-makers with an understanding of:

- Key challenges around data and evidence on health workforce education.
- How an intersectoral health workforce education and training agenda can strengthen data sources.

The chapter describes how NHWA can support comprehensive assessments for transformative health workforce education and training, including mapping of key WHO recommendations, milestones, and an action plan. The final part provides an example of the implementation of NHWA for education and training, and considerations for financing and investment.

3.2 Key health workforce education data and evidence challenges

This section summarizes the following challenges: the focus on numbers; the fragmentation of education subsystems; and the inequitable access to lifelong learning opportunities.

3.2.1 Focus on numbers

The *World health report 2006: working together for health* describes a pipeline to generate and recruit the health workforce (WHO, 2006). This conventional model for health workforce education and training is based on the concept of a foundational primary and secondary education and training generating a pool of eligible candidates who enter academic education in formal institutions, and then travel along a health workforce development pipeline.

A key data point for the conventional model is the number of graduates from formal education and training programmes, which places the emphasis on data collection from academic institutions. However, this misses important data on other pathways of health workforce production that fall outside the conventional model pipeline, such as community health workers (CHWs) and accelerated medically trained clinicians (AMTCs) (see Chapter 9).

Lifelong learning opportunities including in-service training, continuing education (CE) and continuing professional development (CPD) for health and social workers, are developed, and delivered by a wide variety of providers. Data on these activities almost exclusively focus on recording the number of hours of participation. Collecting such quantitative data is useful from an administrative and bureaucratic perspective but has limited utility in supporting health systems strengthening and responding to rapidly emerging public health challenges. The emphasis on quantity does not allow policy-makers and planners to assess how much education is necessary to acquire a set of competencies, what types of learning and teaching environments work best, who might teach and where such teaching takes place, how to support lifelong learning, or which factors affect performance (Pálsdóttir et al., 2017).

3.2.2 Fragmented education subsystems

The conventional model of health worker education includes a series of disconnected but interdependent subsystems. These subsystems are typically primary and secondary education, technical and vocational education and training, adult education, higher education, university education and in-service training, CE and CPD. Each is frequently under the remit of different government ministries and agencies, which leads to duplication of resources and missed opportunities to create alignment between and across health and social care workforce curricula (Fisher et al., 2017).

Coordination of the different regulatory bodies responsible for in-service training, CE and CPD by government agencies is often weak at a national level. As a result, there is little alignment of CE and CPD with the evolving health needs of the population, or coordination with national health plans and health service priorities. The fragmented nature of education subsystems can lead to incomplete or uneven data collection on the financing of health workforce education and training, particularly from CE, CPD and in-service training subsystems.

3.2.3 Inequitable access to lifelong learning opportunities

The COVID-19 pandemic has highlighted deep and longstanding inequalities in access to education and lifelong learning opportunities in many countries (Fisher et al., 2021). While women form 70% of workers in the health and social sector, there is gender discrimination and inequities in lifelong learning opportunities. Health worker education reforms often pay scant attention to these gender barriers (Newman et al., 2016). Attention to gender transformative policy development and implementation capacity is needed to address education inequities and eliminate gender-based discrimination in health worker development and leadership roles (Boniol et al., 2019).

The pandemic has accelerated the rapid digitalization of education delivery systems and adoption of e-learning modalities, but also exacerbated the digital divide, which is a significant barrier for many students and health workers, limiting equal access to digital education and lifelong e-learning opportunities (WHO, 2020). This situation has exposed a critical gap in health workforce education, namely the ability to develop and deliver quality training to frontline health and social care workers that responds to rapidly evolving circumstances and enhances the skill composition of teams. Inequitable access to lifelong learning opportunities is compounded by differential out-of-pocket expenses for learners and time permitted away from workplace to participate in learning activities.

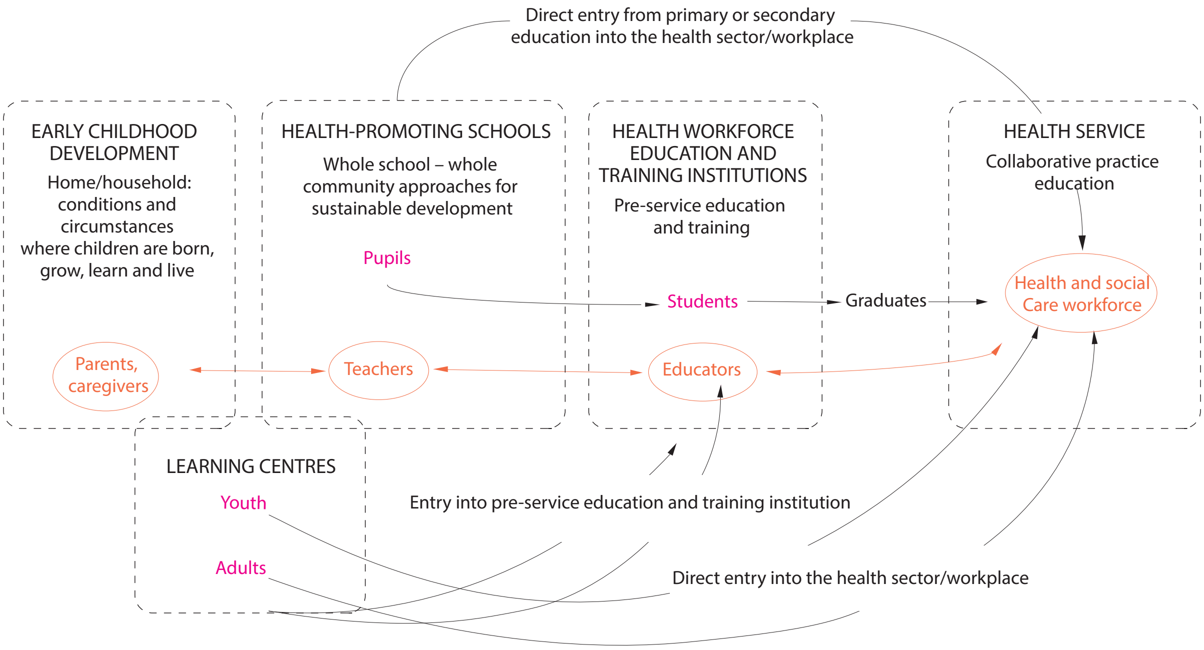
3.3 An intersectoral health workforce education and training agenda to strengthening data sources

To address data challenges and facilitate the attainment of UHC, countries will have to develop effective policies through intersectoral policy dialogue among the relevant ministries. The development and training of health workers should be framed as a lifelong learning process that requires an intersectoral approach to data collection and analysis.

This implies a reconfiguration of the institutional landscape from the conventional pipeline model to a network of many interconnected hubs supplying hybrid, formal and non-formal learning opportunities over the life course, with programmes leading to recognized and interchangeable certificates. Schools, colleges, universities and other tertiary education institutions, community-based learning facilities and health workplaces could gradually become integrated learning centres as mutually reinforcing learning networks. Flexible learning pathways could enable learners to navigate between different sites or levels to gain recognized skills and qualifications throughout the working life course.

Together, such networks and pathways could form more flexible and responsive lifelong learning systems and help to harmonize education and training for health and social occupations to achieve integrated people-centred care. Such systems would place the health service as a hub for varied education and training pathways and strengthen existing relationships with pre-service education institutions and training programmes. This would shift the emphasis of data and evidence on health worker education from a single point, i.e. the number of graduates from education and training programmes, to a more integrated understanding of education and training from the perspective of health service delivery and national health policy planning (Fig. 3.2).

Fig. 3.2 Integrated and networked lifelong learning systems model for the production and development of a health workforce



The integration and networking processes have already started as witnessed by the growing diversification of provision and trends towards hybrid institutions and programmes (Dharamsi et al., 2014). Academic community health centres could assist with the collection, analysis, and interpretation of data at primary care level, and facilitate joint planning to design appropriate, context-based solutions, which might include developmental support and community-based and health systems-based education (Park et al., 2019).

Lifelong learning systems could help challenge conventional wisdom that the emphasis for data collection for health workforce production and development should be on pre-service education, and at the same time demonstrate the value of health services as education providers. Health services providers could collectively support and develop the idea of collaborative practice education, which could help align national education plans for health workers with national health plans and apply them to a local health service context. This would enable health services data to better inform the continued development of the health and social care workforce with competencies to address health needs of the local population and tackle the social determinants of health (SDH). The idea of collaborative practice education can be extended to a global level where new and more effective methods of conveying knowledge and skills to health workers provide training organized by competencies and skills from a health service needs perspective.

This would require mechanisms and models for health workforce planning that have clear and explicit objectives of education and training set up in the national health policy with a coordinated communication and information flow among national level intersectoral stakeholders.

3.4 How NHWA can support comprehensive assessments of health workforce education and training

Integrated approaches to education and training are promoted through NHWA. They facilitate the implementation of key deliverables of the WHO *Five-Year Action Plan for Health Employment and Inclusive Economic Growth* (WHO, 2016a), and of the 2020 and 2030 milestones of the *Global strategy on human resources for health: workforce 2030* (WHO, 2016b). NHWA support World Health Assembly (WHA) Resolution 66.23: Transforming health workforce education in support of universal health coverage,[1] and the implementation of the recommendations of the WHO guidelines for transforming and scaling up health professionals' education and training (WHO, 2011; WHO, 2013).

Table 3.1 maps key WHO recommendations, milestones and action plan deliverables for health workforce education and training with the corresponding NHWA indicators.

1 https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R23-en.pdf

Table 3.1 WHO recommendations for health workforce education and training and corresponding NHWA indicators

Five-year action plan deliverables (WHO, 2016a)	WHO transformative education recommendations (WHO, 2013)	Global Strategy milestones for health workforce education and training (WHO, 2016b)	NHWA module(s)	NHWA indicator
3.1 Transform and expand education and lifelong learning and intersectoral coordination integrated in the development and implementation of health workforce strategies.	Governance and planning [good practice recommendation 1]: Government at the highest level demonstrates political commitment to reform and takes leadership of its implementation.	As partners in the UN SDGs, to make progress on Goal 3c to increase health financing and the recruitment, development, training and retention of the health workforce (2030).	9	9 – 01, 9 – 02, 9 – 03, 9 – 04
3.2 Massive scale-up of socially accountable and transformative professional, technical and vocational education and training supported with technical cooperation, institutional capacity building and financing.	Direct entry of graduates [Recommendation 6]: Health professionals' education and training institutions should consider direct entry of graduates from relevant undergraduate, postgraduate or other educational programmes into different or other levels of professional studies.		2, 3, 4, 10	2 – 03, 2 – 04, 2 – 05, 2 – 06, 2 – 07 3 – 03, 3 – 04, 3 – 05, 3 – 06, 3 – 08, 3 – 09 4 – 01, 4 – 02, 4 – 04, 4 – 08 10 – 04, 10 – 05, 10 – 7

3.3 Professional, technical and vocational education, training and lifelong learning systems strengthened for health and social occupations (including community-based health workers) to achieve integrated people-centred care.	Faculty development [Recommendation 2]: Governments, funders and accrediting bodies should consider supporting the implementation of higher education policies for mandatory faculty development programmes that are relevant to the evolving health care needs of their communities.		2, 3, 9	2 – 01, 2 – 02 3 – 01, 3 – 02, 3 – 07, 3 – 08, 3 – 09 9 – 01, 9 – 02, 9 – 03, 9 – 04
3.4 Develop skills assessment tools and approaches to evaluate the skills of the health and social workforce, including assessment of skill mix, shortages and mismatches to support greater alignment of skills with jobs and integrated people-centred care.	Curriculum development [Recommendation 4]: Health professionals' education and training institutions should consider adapting curricula to the evolving health care needs of their communities. Faculty development [Recommendation 1]: Health professionals' education and training institutions should consider designing and implementing continuous development programmes for faculty and teaching staff relevant to the evolving health care needs of their communities.		3, 9	3 – 02, 3 – 05, 3 – 06 9 – 02, 9 – 03, 9 – 04, 9 – 05
4.1 Governance, regulation, accreditation and quality improvement mechanisms improved and supported with guidance and institutional capacity building to ensure safe, ethical, effective and people-centred practice that protects the public's interests and rights.	Accreditation [Recommendation 10]: National governments should introduce accreditation of health professionals' education where it does not exist and strengthen it where it does exist.	All countries have established accreditation mechanisms for health training institutions (2020).	2, 3, 9	2 – 01, 2 – 02 3 – 01, 3 – 02, 3 – 07 9 – 01, 9 – 02, 9 – 04

4.2 Guidance developed for provision of interprofessional education and organization of multidisciplinary care, including recommendations on skill mix and competencies to achieve integrated people-centred care.	Interprofessional education (IPE) [Recommendation 9]: Health professionals' education and training institutions should consider implementing IPE in both undergraduate and postgraduate programmes.		3, 9	3 – 06 9 – 04, 9 – 05
4.3 Evidence and guidance developed on practices to ensure an adequate proportion of the workforce in PHC appropriately distributed to achieve equitable access in underserved areas and for marginalized groups (for example, recruitment practices, education methods, professional development opportunities, and incentive structures).	Faculty development [Recommendation 3]: Health professionals' education and training institutions should consider innovative expansion of faculty, through the recruitment of community-based clinicians and health workers as educators.		1, 3, 8, 9	1 – 01, 1 – 02, 1 – 04, 1 – 05, 1 – 06, 1 – 09 3 – 08, 3 – 09 8 – 01, 8 – 02, 8 – 03, 8 – 04, 8 – 05 9 – 04, 9 – 05

5.1 Efficacy and efficiency of information and communication tools with a target product profile that could enhance health worker education, people-centred health services and health information systems mapped, reviewed and disseminated for national adoption.			9	9 – 02, 9 – 03, 9 – 04, 9 – 05
7.1 National health workforce strategies and global, regional and national institutional financing reforms that identify and commit adequate budgetary resources for investments in transformative education, skills and job creation developed and supported.	Continuous professional development (CPD) for health professionals [Recommendation 11]: Health professionals' education and training institutions should consider implementing CPD and in-service training of health professionals relevant to the evolving health care needs of their communities.	All bilateral and multilateral agencies are increasing synergies in official development assistance (ODA) for education, employment, gender and health, in support of national health employment and economic growth priorities (2030).	4, 7, 9	4 – 01, 4 – 02, 4 – 04, 4 – 07, 4 – 08 7 – 01, 7 – 02 9 – 01, 9 – 02, 9 – 04

8.2 Intersectoral collaboration and coordination for the implementation of national health workforce strategies strengthened and capacity developed among relevant ministries (for instance, health, social, labour, education, finance, and gender), professional associations, labour unions, civil society including women's civil society organizations, employers, the private sector, local government authorities, education and training providers and other constituencies.	Governance and planning [good practice recommendation 2]: There is formal collaboration and shared accountability between the ministry of health, the ministry of education, and other related ministries (e.g. finance, labour, public service), at national and/or subnational level, in the education and training of health professionals.	Countries are making progress towards improving the course completion rates in medical, nursing and allied health professionals training institutions (2030).	4, 7, 9	4 – 01, 4 – 02 7 – 01 9 – 01, 9 – 02, 9 – 03, 9 – 04
10.3 An interagency global data exchange on the health labour market (HLM) with harmonized metrics and definitions established and maintained.			9, 10	9 – 01, 9 – 02 10 – 04, 10 – 05, 10 – 06, 10 – 07

Adopting a lifelong learning systems approach would support an intersectoral education agenda that strengthens policies, strategies and plans through policy dialogue among the relevant ministries. NHWA can support such dialogue with comprehensive assessments of the current situation of health workforce education and ensuring interoperability of data. This would include policy questions around SDG 3c for measuring and understanding how to attract and recruit, select and admit, educate, deploy and retain health workers (WHO, 2018b).

An integrated and networked lifelong learning systems model for the production and development of the health workforce allows policy questions for intersectoral health workforce education to draw on indicators across all NHWA modules, as well as SDG 4. For example, indicators from SDG 4, NHWA Modules 1, 2 and 8 can provide information on the educational pathways. This information can be combined with NHWA Modules 3 and 9 to guide policy questions around collaborative practice education.

Table 3.2 presents an example of the utilization of NHWA for the formulation of an intersectoral health workforce agenda.

Table 3.2 Utilization of NHWA for an intersectoral health workforce agenda

Policy question: Does health workforce planning align national education plans for the health workforce with the national health plans?		**Reporting (partly enabled)**	**Intersectoral**
Module 1 1 – 02 Health worker density at subnational level 1 – 06 Health worker distribution by facility type	**Module 2** 2 – 03 Applications for education and training 2 – 04 Ratio of admissions to available places 2 – 07 Graduation rate from education and training programmes	10 – 04 HRHIS for reporting on outputs from education and training institutions	SDG 4.1.1, 4.2.2, 4.3.1, 4.4.3
Module 8 8 – 01 Percentage of health workforce in hospitals 8 – 02 Percentage of health workforce in residential long-term care facilities 8 – 03 Percentage of health workforce in ambulatory health care		10 – 06 HRHIS for tracking the number of active stock on the labour market	

	Module 3 3 – 02 Accreditation mechanisms for education and training institutions and their programmes 3 – 03 Standards for social accountability 3 – 05 Standards for social determinants of health 3 – 06 Standards for interprofessional education 3 – 08 Continuing professional development 3 – 09 In-service training		SDG 4.7.1
	Module 4 4 – 04 Investment in transformative education and training 4 – 08 Total expenditure on in-service training and continuing professional development		SDG 3c
	Module 7 7 – 02 Total official development assistance on health workforce		SDG 4.5.5, 4b.1
Policy relevance enhancer	**Module 9** 9 – 01 Mechanisms to coordinate an intersectoral health workforce agenda 9 – 04 Education plans aligned with national health plan		SDG 4a.1, 4c.1

3.5 Implications for financing and investment

Mechanisms to coordinate a multisectoral health workforce agenda must also ensure collaboration and action supported by the necessary technical cooperation, institutional capacity building and financing. More financing is necessary along with an increase in the level and efficiency of investments within the education system and across education subsystems. Domestic public spending on education as a percentage of total public spending is below what is required in many countries. Private funding for health workforce education and training is growing rapidly, but inadequate and limited regulation hampers quality educational outcomes and relevance to the HLM needs. Ministries of finance have an important role in supporting an effective and equitable financing and investment architecture and the creation of coordinated pooling mechanisms for domestic public, private and external finance. This can enable resources and investments to increase the quantity and improve the quality and relevance of learning over the working life of a health worker. Thus, NHWA could help illustrate mismatches in funding, requirements, and outcomes of health workforce education.

Yet there is an incomplete picture of financing and investment in health worker education, tracking of expenditure, and information on the cost of health workforce development. Intersectoral coordination could support systems interoperability and enable data comparison from national education accounts (NEA) and NHWA, as well as mechanisms to track the alignment of ODA for education, employment, health and skills development with national health workforce strategies.

NEA are key in improving educational planning and policy but are currently not extended to health workforce education and training. They help draw a complete picture of how a country finances education; by implementing a structured methodology, NEA organize multiple data from key funding sources (public, private, and external donors) in a compatible, sustainable way. The information then serves to help identify gaps, overlaps or misuse in the ways in which education is funded, helping to better direct resources to policy objectives and assist in international monitoring of progress towards SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Data and information from human resources for health (HRH) graduate tracking could map and track investments, and better inform priorities (see Chapters 4 and 5).

3.6 Conclusion

Efforts to implement a transformative health workforce education in support of UHC must not only focus on an increase of the quantity of health workers, but also address issues of quality and relevance in order to address population health needs. This will require health workforce educational institutions to be reconfigured from the conventional pipeline model to a more flexible and responsive integrated and networked lifelong learning systems model. Institutional mechanisms to coordinate an intersectoral approach could catalyse and drive efforts to strengthen underlying data sources for the production and development of a health and social care workforce.

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Chapter 4: Where do graduates go? Developing a graduate tracking system: the experience of THEnet

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4.1 Introduction

This chapter describes how health worker education and training institutions can collaborate with local and national health system partners to develop and operate their own in-country tracking system to monitor where their graduates practise and the clinical activities that they undertake. Information collected by human resources for health (HRH) graduate tracking studies can provide valuable feedback to educational institutions and health planners on the proportion of graduates who are contributing to priority health workforce needs, allow identification of gaps, and inform HRH policy and planning at national and local levels.

Making changes to health worker education, training, planning and policy requires commitment by institutions, policy-makers and governments, as well as timely access to appropriate and quality data on HRH graduate workforce attributes and outcomes so that evidence-informed policies can be developed in support of health care delivery. As an example, several health professional schools with a social accountability mandate, members of the Training for Health Equity Network (THEnet),[1] have been collecting workforce outcomes data on their graduates to inform planning and policy at their schools.

HRH tracking studies employ a systematic process to collect, monitor, and evaluate data on HRH graduates over their careers (from pre-admission into full practice). Results include data on where graduates practise, the type of practice they choose, the populations they serve, and the services and care that they provide.

In 2008, THEnet established a consortium of health professions schools striving toward social accountability. At THEnet's first meeting in Havana, Cuba, (Pálsdóttir and Neusy, 2011) it was agreed to amend WHO's definition of social accountability, from:

> *"…the obligation to direct their education, research and service activities towards addressing the priority health concerns of the community, region, and/or nation they have a mandate to serve. The priority health concerns are to be identified jointly by governments, health care organizations, health professionals and the public."* (Boelen and Heck, 1995)

to have a greater focus on the underserved, defined as communities that have the least opportunity to access health services and health professionals because of geography, socioeconomic status, ethnicity, culture, or caste (Larkins et al., 2013):

> *"… The priority health concerns are to be identified jointly by governments, health care organizations, health professionals and the public (and especially the underserved)."* (Ross et al., 2014)

THEnet and member schools recognized the need for collaboration to systematically build a common evidence and knowledge base on social accountability in health professional education. The first step was to create a list of 10 key educational and social principles, aspiring towards social accountability (Table 4.1). The second was to develop the Framework for Socially Accountable Health Workforce Education[2]; Larkins et al., 2013; Ross et al., 2014) to identify key

1 https://thenetcommunity.org/
2 https://thenetcommunity.org/the-framework/

factors that affect a school's ability to educate health workers who will positively influence health outcomes and health system performance. The framework also outlined ways to measure and improve the outcomes across institutions and contexts. The third step was to collectively develop questionnaires designed for longitudinal tracking of students from intake to graduation and beyond (Larkins et al., 2015; 2018; Johnston et al., 2020).

Table 4.1 THEnet key educational and social principles, and member schools

THEnet principles	THEnet member schools
1. Education, research, and service programmes are guided by the health and social needs of targeted communities. 2. Students are recruited from communities with the greatest health needs. 3. Programmes are located in or near the communities they serve. 4. A significant part of the learning experience takes place in primary care settings. 5. The curriculum integrates basic, clinical, population, and social science, including the social determinants of health. 6. Teaching methods centre on the student, patient, and population; are service based, emphasize teamwork; and benefit from information technology. 7. Programmes are embedded in the health system in partnership with health system actors to produce locally and regionally relevant competencies. 8. Programmes recruit and train community-based practitioners as teachers and mentors. 9. Programmes emphasize a commitment to public service, with faculty members serving as role models. 10. Social accountability is reflected across all departments and in the commitment from school leadership.	**Full members** • Ateneo de Zamboanga University School of Medicine, Mindanao, Philippines • Ghent University, Ghent, Belgium • Gezira University, Wad Madani, Sudan • James Cook University School of Medicine, Townsville, Australia • Latin American School of Medicine, Havana, Cuba • Northern Ontario School of Medicine, Thunder Bay/Sudbury, Canada (now known as NOSM University) • Patan Academy of Health Sciences, Kathmandu, Nepal • Université de Sherbrooke, Sherbrooke, Canada • University of New Mexico, Albuquerque, United States of America (USA) • University of the Philippines, School of Health Sciences, Leyte, Philippines • Walter Sisulu University, Mthatha, South Africa **Collaborative partners** • University of KwaZulu-Natal, Durban, South Africa • Mzuzu University, Faculty of Health Sciences, Malawi • Imperial College of Science, Technology and Medicine, London, United Kingdom • L'Université Officielle de Bukavu, Bukavu, Democratic Republic of the Congo

Note: All THEnet member schools aspire to these key educational and social principles, adjusted to national and subnational context.

This chapter builds upon the international collaboration of THEnet schools to provide policy and decision-makers with an understanding of:

- How tracking fits into the broader context of HRH planning.
- The benefits of tracking.
- An overview of tracking methodologies.
- The planning questions that tracking can address.

The chapter describes a "ground-up" approach that can be initiated by health professional schools and can be readily scaled-up into national HRH planning frameworks compatible with the WHO national health workforce accounts (NHWA) (WHO 2017; 2018, 2019). The first part provides an overview of context, benefits, methodologies and questions answered by tracking studies. Case studies follow providing more specific details on the international tracking study led by THEnet and on selected school-based tracking studies.

4.2 The case for HRH graduate tracking in health workforce planning

The maldistribution of health workers can only be partially addressed by increasing the number of health workers; attention must be paid to the selection, education, and training of a fit-for-purpose health workforce with an approach that spans the career of the worker, and considers the subnational, national and international health labour market (HLM) context. A system- and evidence-informed approach to planning HRH is needed, coupled with an embedded process for monitoring the selection, education and training, graduate outcomes, continuing education (CE) and support needs, and retention. This approach includes a contextually based understanding of:

- The various factors that might influence practice types and locations of graduates (e.g. recruitment and retention).
- The available health workforce cadres, and their roles and proportions in health care teams.
- Applicable plans and policies.

In this chapter, **HRH tracking** is defined as a systematic process to collect, monitor and evaluate data on HRH graduates' personal, educational and career characteristics over their professional life. This takes into account that graduate career and working pathways are influenced by national HRH policies, institutional and educational strategies and experiences, national regulatory and policy environments, and other initiatives to improve universal health coverage (UHC) and strengthen health systems.

Over time, this approach can influence policy and inform educational and institutional strategies to produce a health workforce responsive to local and national population health needs.

THEnet aligned schools have come together to track their programme graduates to better understand the motivations and influences that determine their graduates' career path decisions. Having this information provides an opportunity for institutional decision-makers to determine approaches to education and training to fill gaps in local health care delivery. Making changes to subnational and national health care systems requires commitment at all levels and this commitment requires evidence from tracking studies so that governments can introduce policies to leverage change in the needed direction (Strasser et al., 2019).

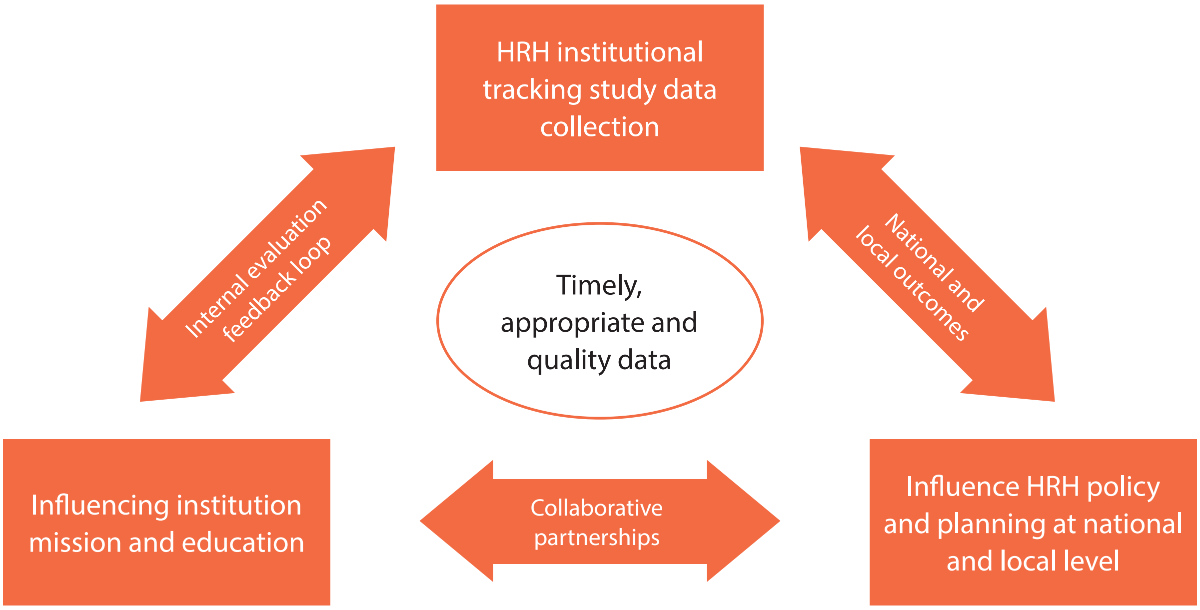
In moving beyond producing greater numbers of health care workers, countries now consider whether these health workers are practising where they are needed, delivering the services needed by the population, and contributing to UHC (OECD, 2016; WHO, 2016a; Pálsdóttir et al., 2017). HRH tracking studies provide the evidence to effect positive change in HRH planning and in the health system by explicitly aligning student selection, education, training, and continuing professional development of the health workforce with the health care needs and attributes of the population.

4.3 The benefits of HRH graduate tracking

Most evidence from tracking studies has come from medical education institutions and typically from high-income countries (HICs) (Hogenbirk et al., 2016; Woolley et al., 2019). A wider perspective is warranted to track additional cadres, to increase the coverage of low- and middle-income countries (LMICs) (Halili et al., 2017; Siega-Sur et al., 2017), and to consider other contextual and intersectoral factors that influence retention and provide support to graduates over their career (Sousa et al., 2013; Larkins et al., 2018). Including HRH tracking studies as part of the core business of health and education planners can help make explicit links between selection, education, practice, and population health.

HRH tracking studies include a longitudinal component that can contribute to the development of progressive, reliable, up-to-date HRH information systems (HRHIS) (WHO, 2017b) and strengthen institutional capacity to collect, analyse, and manage data needed to assess educational policies and strategies (Fig. 4.1). Tracking study data can also contribute directly to development and refinement of HRH planning and policy initiatives.

Fig. 4.1 The role of HRH tracking studies in influencing education institutions, and national health workforce planning and policy



Schools already invested in how their graduates perform often conduct tracking studies of their graduates and form partnerships across different cadres of health care workers to collect common data that can populate HRHIS. For example, HRH tracking studies conducted by schools can readily collect data that satisfy the minimum dataset for a health workforce registry (WHO, 2015) and span all 10 modules in the NHWA handbook (WHO, 2017).

Potential solutions to the maldistribution of the workforce may be found during systematic assessment of all stages of the health worker career path. Tracking studies provide data for this assessment and supply evidence in support of changes in education programmes (WHO, 2016b).

Common benefits to tracking studies arise from assessing the match between admissions criteria and desired outcomes such as student profile, academic performance, clinical competencies, and practice locations. For example:

- Tracking studies have been used to tweak the admission process to select students who were more representative of the local population (Mian et al., 2019).
- Schools have used tracking studies to confirm that their selection process of preferentially targeting local or rural-origin students was not having any detrimental effect on graduate quality (Strasser et al., 2013; Ray et al., 2015; Halili et al., 2017; Siega-Sur et al., 2017).
- Policies such as selecting students from rural backgrounds to attend medical school have had some success in recruiting doctors into rural areas; while other strategies, such as incentives, have little to mixed success (Grobler et al., 2015). Tracking studies have been used to assess the effectiveness of these initiatives and to suggest programme improvements (Sen Gupta et al., 2014; Larkins et al., 2015; Hogenbirk et al., 2016; Halili et al., 2017; Siega-Sur et al., 2017; Wenghofer et al., 2017; Woolley et al., 2020).

Tracking studies have also contributed to the evidence-base for broader societal impacts.

For instance:

- Tracking studies have shown that educational institutions placed close to or within underserved areas increase the applicant pool from the area (Hogenbirk et al., 2016; Woolley et al., 2020) and increase application success (Mian et al., 2019). This can have a positive effect on communities' social well-being, knowing that community members can compete with the very best for these prestigious learning opportunities (Mian et al., 2017).
- The information on placements in underserved areas collected during tracking studies has been used to demonstrate financial and social benefit to these areas (Hogenbirk, Robinson et al., 2015; Pálsdóttir et al., 2016; Mian et al., 2017; Hogenbirk et al., 2021). Findings provide evidence for contributions to the broader economy (WHO, 2017b) and the Sustainable Development Goals (SDGs) (UN, 2021).

To summarize the benefits, HRH tracking studies can provide valuable information on the characteristics of individuals who come to work in underserved areas, including the age and stage in their education journey when they make long-term career decisions, and any background information that may shape their decisions. This information can provide educational institutions, governments and policy and decision-makers with a more extensive knowledge base on which to develop policy and plans on health workforce selection, education and training to better care for all populations.

4.4 Overview of tracking approaches

This section outlines how to develop a tracking study and to collect relevant data. It is based on experiences at schools located in Australia (James Cook University College of Medicine and Dentistry: Sen Gupta et al., 2014; Woolley, Halili et al., 2018; Woolley et al., 2019; and Monash University Medical School: Strasser et al., 2010; Hogenbirk, McGrail, 2015); in Canada (Northern Ontario School of Medicine: Hogenbirk, French et al., 2015; Hogenbirk et al., 2016); in the Philippines (Ateneo de Zamboanga University-School of Medicine: Halili et al., 2017; Woolley, Cristobal et al., 2018; and the University of the Philippines Manila School of Health Sciences, Leyte: Siega-Sur et al., 2017) and as part of an international collaboration (THEnet Graduate Outcomes Study [THEnet GOS]: Larkins et al., 2015; 2018).

The proposed approach can be implemented by a single school, expanded to other schools, include multiple cadres of workers, and scaled up to form the nucleus of NHWA (WHO, 2017; 2018; 2019). Single schools can also form consortia with schools in other countries. The experience of THEnet schools is a case in point.

In a school-led approach, governance initially resides within individual schools. Properly situated within national health workforce policy and planning, HRH tracking studies conducted by individual schools can help inform workforce policy and help improve access to health care at the subnational and national level.

There are four broad and interrelated stages in a tracking study:

- Building the study team, engaging stakeholders and ensuring support.
- Planning and aligning the purpose of the study with the school's mission.
- Deciding on the approach and study design.
- Collecting and analysing data, and sharing findings with stakeholders.

4.4.1 Building the study team, engaging stakeholders and ensuring support

Institution-led HRH tracking studies may find it useful to adopt the governance and support structure of national health workforce accounting systems, and thereby contribute to the alignment of education plans with national health plans (WHO, 2017, Module 9). HRH tracking studies require appropriate resources to maximize alignments between HRH education, planning and policy. For example, institutions and national programmes may need to recruit, train, and retain personnel or engage organizations that are knowledgeable about programme evaluation and research.

In addition to mobilizing people with the requisite technical skills, early involvement, and meaningful participation of stakeholders (including potential study participants) will facilitate high participation rates, ensure good quality data, and increase the chance that study findings are used to improve education, training and workforce planning. Key stakeholders include representatives of: schools; regulatory or licensing organizations; student and worker associations; government agencies; political parties; and alumni associations. Formal collaborative agreements among stakeholders can facilitate data collection, sharing and linkage. In addition, these formal collaborations can set the groundwork for a national health workforce planning organization.

Some of the questions that a tracking study can address may take several years to be answered. In-kind support from stakeholders is crucial and can leverage other financial support. Adding tracking studies of other cadres can be cost-effective, increase funding success and enable ongoing support – which requires that study benefits are communicated frequently to stakeholders and to the public. This communication starts early with a description of the stakeholder consultation process, recruitment activities, and preliminary findings. Publishing reader-friendly summaries in newsletters, websites, or broadcast emails sent to alumni and members of professional associations can help increase study recognition and participation rates. Frequent communication via social and traditional media can help maintain public awareness and political support.

Frequent communication also allows opportunities for the public, study participants and other stakeholders to provide feedback, contribute to the design and conduct of the study, and use study findings in their planning and policy-making. This feedback is used in conjunction with regular reviews of study objectives, tools and methodologies to improve the methods of the tracking study and its alignment with the stated mandate of the school, all situated within the broader context of national health workforce planning.

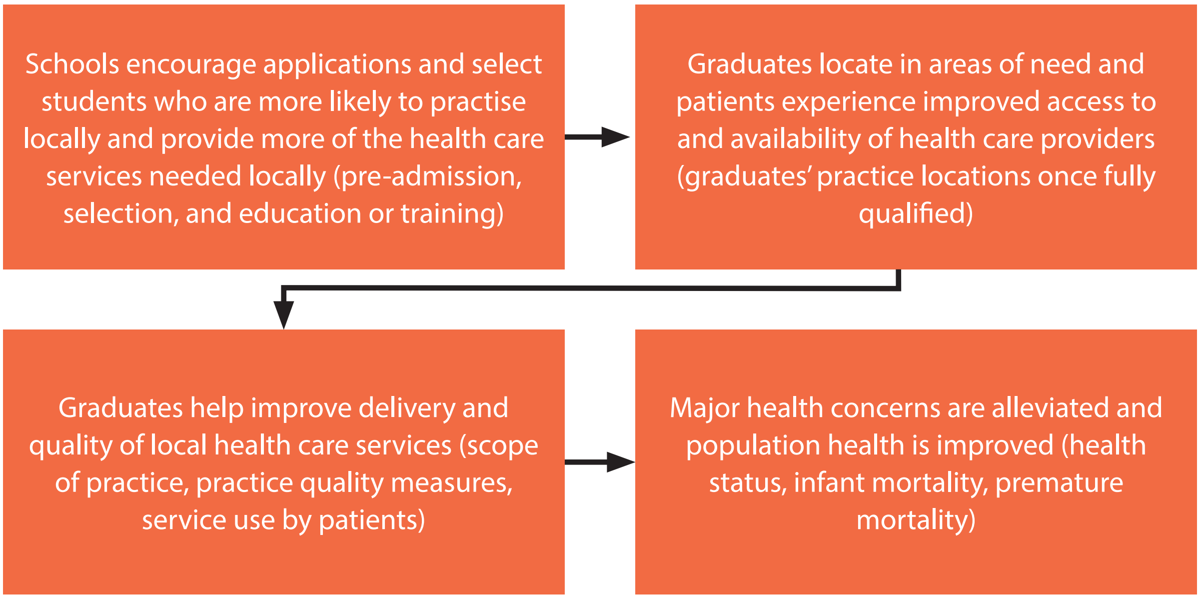
4.4.2 Planning and aligning the purpose of the study with the school's mission

Deciding why to track graduates, who to track, what data to collect, where, when, how and who should do the tracking are all directly derived from an institution's mission as well as the broader health and health workforce policy and planning context. NHWA Module 9 can help situate HRH tracking within this broader context and encourage multistakeholder dialogue, as well as support data collection in the remaining modules (WHO, 2017b).

The methods outlined below are based on tracking studies conducted by THEnet medical schools with institutional and educational strategies aligned with local, subnational, or national health care needs. The tracking study objectives of these schools follow directly from this alignment.

Developing a causal map or programme logic model can help make the alignment more explicit. For instance, a causal map can link health workers' characteristics and educational activities with desired outcomes such as improved access to appropriate health care, which can help identify the type of data to be collected (Fig. 4.2). Short-term, intermediate and long-term outcomes associated with the mission can be clarified. For example, one major intermediate outcome of schools aspiring to social accountability is to produce a significant number of graduates who choose to practise in underserviced areas and provide the health care procedures and services that are most needed by people in the area.

Fig. 4.2 Sample causal map linking major inputs and outputs of a health professional education school having a social accountability mandate to improve local population health and well-being



Note: Data types are shown in parentheses.
Source: Created by the authors.

Outcomes are then linked to specific measurements. The next task is to determine the details of data collection (e.g. from whom, by whom, when, how, where) and data analysis. For each outcome, it is important to identify how the information will be used, by whom (e.g. educators, policy-makers) and for what purpose (e.g. curriculum reform, workforce planning). Intended use should also align with the tracking study's objectives and relate to national health workforce strategies.

4.4.3 Deciding on the approach and study design

Given that students graduate in groups, it is reasonable to use any of the three types of cohort designs: retrospective, cross-sectional, or longitudinal. All cohort studies are subject to biases that can limit the ability to generalize to other schools from a single study (Mann, 2003; Mamdani et al., 2005; Normand et al., 2005; Rochon et al., 2005). For instance, students self-select or are selected into schools and this limits the ability to generalize to other schools or to establish causal relationships. Cohort studies can be improved by including comparison groups (e.g. students from other schools), multiple cohorts and documenting variables that may influence the outcome. The THEnet-GOS is one example of a multischool, multicohort and multivariate study (Larkins et al., 2015; 2018, see THEnet case study). Another example is provided by two other THEnet studies from the Philippines which compared graduates' outcomes for schools with a social accountability mandate with schools having more traditional education mandates (Halili et al., 2017; Siega-Sur et al., 2017, see the Philippines case study). Successful use of cohort study designs with careful attention to potential biases can improve the utility of study findings for health workforce planning and policy development.

The collection of quantitative and qualitative data can enhance the usefulness of study findings. For instance, counts of all graduates by practice location and services provided can be supplemented by interviews with graduates to probe the reasons why they chose that specific practice location and why they offer their chosen services. The combined statistics and stories can improve understanding, and often lead to more informed policy and decision-making by educators and health workforce planners.

Tracking studies that include core components and optional components provide the rigour and the flexibility to meet health workforce planning needs. For example, core components typically collect data on intended outcomes such as practice location and services, which are compared with actual outcomes. Optional components allow the tracking study to address emerging and urgent priorities identified by planners and policy-makers. For example, a block of questions could be added to investigate the effect of modified admissions criteria, emerging pandemics or famines, and changing economic conditions on students' career intentions. Timely analysis of data collected in these optional components can inform the development of new plans or policies to mitigate negative outcomes.

4.4.4 Collecting and analysing data

Data collection is greatly facilitated by using unique identification codes for each student or graduate, and by securely storing these data for future use in a longitudinal database (Cook et al., 2010; Gillespie et al., 2016). At a minimum, this is done by each school, but can be expanded to subnational or national levels through NHWA. These longitudinal databases enable the evaluation of educational outcomes over time and across institutions.

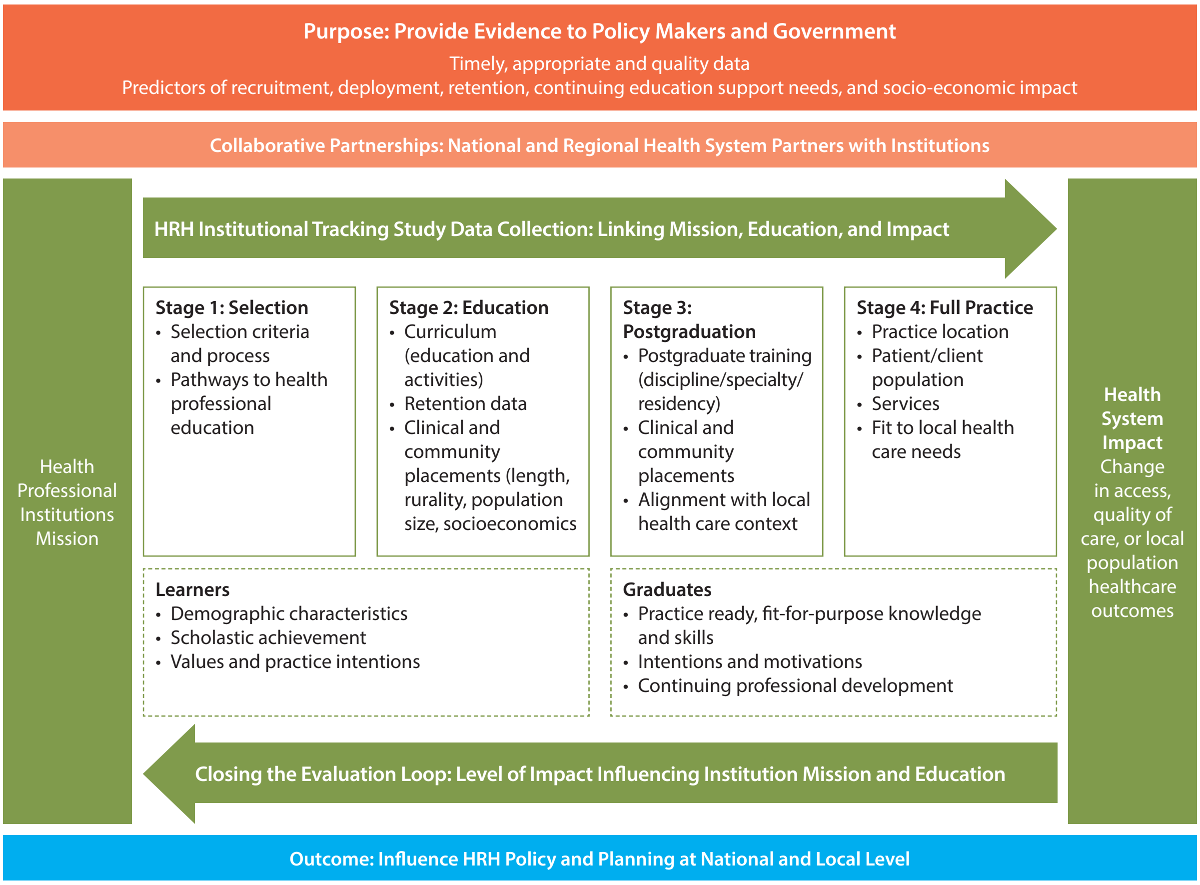
Collecting longitudinal and cross-sectional data from schools during application, education and training, and from agencies that regulate or license practice, often provides complete, accurate and reliable information. Surveys or interviews can serve to collect additional data from graduates, educators and planners, and other key informants. To ensure the follow-up needed for longitudinal data collection, it is important to ask students for their permanent contact details before they graduate and then to store this information in longitudinal databases. Alumni or professional associations are other sources of contact information for follow-up with graduates. All these efforts can help improve data quality and data coverage over the years.

Determining what data should be collected is facilitated by a framework designed for a longitudinal multiple cohort study (Fig. 4.3). This framework can be combined with a causal map (Fig. 4.2) to create a more detailed programme logic model (WK Kellogg Foundation, 2004). The data collection framework is readily adjusted to different countries, different cadres, and differing duration of education or training programmes. The framework is also consistent with and can contribute data to the NHWA modules (WHO, 2017b). THEnet schools have designed and used such an evaluation framework (Larkins et al., 2013; Ross et al., 2014; THEnet, 2021) which can be customised to specific uses (Clithero et al., 2017).

Examples of data include:

- **Stage I: Selection:** Data collected at this stage include information about learners before they begin their formal studies and about the selection or admission process (Fig. 4.3). Commonly collected data include the learners' social, economic, educational and demographic characteristics, plus similar information on parents and, if applicable, partner or spouse. Data are also collected on the selection criteria used by the school and results of the admission process. If data collection can be extended to include all applicants, then these data can be used to assess the admission process (Mian et al., 2019) and potentially adjust it to optimize the future workforce.
- **Stage II: Education:** This stage collects data on the programme and on the performance of learners (Fig. 4.3). Data collected on the programme would include the specific educational and training experiences, curriculum content, learning modalities, assessment modalities, and other attributes related to teaching and learning. Data are also collected on learners' performance during the programme as well as their perceptions about the programme. The second stage also collects information on graduates as they exit training, and includes information about their intentions and motivations at this stage in their career, as well as measures of professional competencies (clinical knowledge and clinical skills, patient-communication skills) or other desired attributes.
- **Stage III: Postgraduation:** The third stage collects data on postgraduate training similar to that collected during Stage II (Fig. 4.3). Many graduates begin limited practice during the postgraduate stage and therefore data are also collected on a broad range of practice characteristics, including geographic location, practice facility, population served, as well as procedures and services offered.
- **Stage IV: Full practice:** This stage collects data on the long-term outcomes of the educational programme namely, changes in access to and use of health care services, changes in population health and well-being, as well as changes in morbidity and mortality rates in targeted populations.

Fig. 4.3 Framework for systematic data collection during a longitudinal multiple cohort HRH tracking study



Source: Created by the authors.

Once study objectives, key outcomes and salient data are identified, it should be determined:

- How the study will be conducted (e.g. by mail, email, online, in-person, using administrative records).
- Whether new tools need to be developed for data collection.
- When the study will start (e.g. calendar year or education year) and stop (or continue indefinitely).
- Who will be studied.
- Who will conduct the study, collect and analyse data, interpret analyses and disseminate findings.
- How results will be used to inform policy and planning.

It is also important to be able to justify each of the above items to maximize the efficient use of funds and resources during the HRH tracking study.

Early identification of how data will be analysed and for which purpose(s) will help ensure that the study is meaningful to stakeholders. Ethical approval should be obtained prior to the study, in compliance with national requirements. Students and graduates should be well informed about the study and its objectives and should grant their personal consent to take part in the study and to allow future contact, thereby improving the quality, completeness, and utility of longitudinal data.

4.5 Graduate tracking in action

Longitudinal tracking of HRH students throughout their career allows for a broader range of questions to be answered at subnational and national levels about specific predictors of recruitment, deployment (practice location, discipline), retention, as well as CE and support needs. HRH tracking studies allow health workforce planners and educational institutions to identify which student characteristics and programme components influence graduate career choices, practice intentions and locations over time, and how education and training can be designed to inform these choices within a lifelong learning framework, aligned within national health workforce planning and policy directions. Four examples demonstrate HRH graduate tracking in action from different institutional environments in different parts of the world.

4.5.1 Training for Health Equity Graduate Outcome Study (GOS)

Overview: A collaboratively designed multicountry prospective cohort study, which tracks students at entry to and exit from their medical training and for up to 10 years in practice.

Context: THEnet was established in 2008 as a global community of practice of eight (initially) medical and health professional educational schools from countries from the Global South and North which shared a social accountability mandate. These schools (Table 4.1) aim to reduce health inequalities by training health workers responsive to the health and social needs of the underserved communities they serve. They do this through a range of strategies related to the selection of learners and teachers, curriculum, distributed learning and service (Pálsdóttir et al., 2008). One of the first pieces of work completed by THEnet was the development and pilot testing of a common evaluation framework so that schools could critically reflect on the degree to which they were meeting their own social accountability goals (Larkins et al., 2013; Ross et al., 2014). One important part is a longitudinal impact evaluation, which involves tracking students through their educational and training programmes and following them after graduation. Tracking will assess the degree to which the schools' activities are producing graduates who actually practise in areas of greatest need. All of THEnet's work is designed to be applicable in countries of all income group settings.

Methods: THEnet GOS is a collaboratively designed multicountry prospective cohort study, which tracks students at entry to and exit from their medical training and then for up to 10 years into practice. In 2020, it had data on over 6000 learners from nine schools in seven countries: Australia, Belgium, Canada, Nepal, Philippines, South Africa and Sudan. All students entering participating schools were invited to complete questionnaires in the first semester (entry questionnaire), and in the last semester (exit questionnaire). Questionnaires were created based on the Australian Medical Students' Outcomes Database (MSOD) questionnaires but modified for the international context through a collaborative co-design process with THEnet partners.[1]
Student sociodemographic background, practice intentions, and actual practice location and discipline are collected at entry, exit and at Years 1, 4, 7 and 10 after graduation. Responses are linked by student ID number, and de-identified with a random code by staff at the school. Data can be collected either by paper or online survey. An implementation guide for each survey is shared with each participating school to help maintain common methods and ensure comparable data.[2]

1 Australian Medical Students' Outcomes Database and Longitudinal Tracking Project (https://cdn.technologynetworks.com/ep/pdfs/australian-medical-schools-outcomes-database-and-longitudinal-tracking-msod-project.pdf).
2 THEnet questionnaires and guides are available at: https://thenetcommunity.org/graduatetracking/.

Questionnaires at each school are identical apart from variations in the descriptors for quintiles of socioeconomic status (SES) and rurality, which are developed with the assistance of local experts from each country. One school translated the survey into Flemish (using standard back-translation approaches), but the rest of the schools administered the survey in English. The same codebook is used by all schools. Data files are entered into Microsoft Excel for cleaning (either by the participating school or coordinating school), sent to the administering partner school for inclusion in the common database and then analysed using IBM SPSS statistics. Learner and graduate sociodemographic characteristics are compared with available data on the reference population and national level health workforce data.

Governance: THEnet GOS is a collaborative project that is governed by the THEnet Board and through the THEnet Evidence Group of nominated members from all schools. Whilst THEnet has in the past received funding from Atlantic Charities Trust and the Arcadia Foundation through the Build Project 501(c3), this project has largely been conducted through in-kind contributions from partner schools, and with one part-time project officer.

Methodological decisions are made with input from the Evidence Group, as are decisions about analyses and publications to arise from the combined dataset. In line with participatory principles, it supports colleagues from LMICs to analyse and disseminate findings from their own schools, in addition to the collaborative work. Ethical approval has been obtained from all participating schools. All learners provide individual informed consent.

Benefits and findings: THEnet GOS has demonstrated that it is possible to collect data and compare findings from vastly different contexts for health professional education. In 2020, response rates by school averaged 86% at entry (minimum = 67%, maximum = 100%) and 63% at exit (minimum = 30%, maximum = 99%) (Johnston et al., 2020). This grassroots school-led approach to graduate tracking could easily be linked within countries to form regional hubs that are complementary to national level planning and monitoring frameworks, such as NHWA.

To date, findings from the THEnet GOS include:

- THEnet schools use a variety of novel selection strategies to work towards representativeness of their learner population. As a result, the demographic profile of their learners is much more representative of the profile of the populations they serve than most health professional schools (Larkins et al., 2015). Details of the match between the student profile and community population are specific to each school. However, three general examples can be given: student profiles are typically close to local population income quintiles, the proportion having rural backgrounds, and the proportion with minority status.
- Learners from rural and disadvantaged backgrounds are more likely to express an intention to work in these areas, at both entry and exit from medical school. After adjusting for confounding factors, rural and low-income background and regional location of school were the strongest predictors of intent to practise in rural location (Larkins et al., 2018).
- For learners from LMICs, intention to emigrate was more likely for learners from high-income and urban backgrounds (Larkins et al., 2018); though this intention decreased from entry to exit for those at THEnet schools (Johnston et al., 2020).
- Learners at exit were more likely to plan a career in generalist disciplines than those at entry. However, a lack of supportive health policy and unclear career pathways often limits the effectiveness of educational strategies in LMICs (Johnston et al., 2020).

Enablers and challenges: THEnet GOS would not have been possible without the community of practice of THEnet schools with a shared mission. The trust and relationships built up from working together over more than a decade have made this work possible. In addition, alignment between the goals of THEnet and the individual participant schools has facilitated this approach. This is the first study to attempt to track learners and graduates beyond the single country level, and as such provides useful lessons.

Challenges included being responsive to the diversity of contexts and cultures across countries and ensuring a balance between flexibility and adaptability to differing contexts, with methodological rigour and consistency of approach. Multiple competing demands, particularly in LMICs, posed difficulties in timely completion and contacting individual graduates. In addition, this work was done with minimal funding, posing a threat to ongoing sustainability.

4.5.2 Tracking study of graduates from SHS-Palo and ADZU-SOM medical schools in the Philippines

Overview: A "snapshot" tracking study collected cross-sectional data on the current practice locations and career choices of previous graduate cohorts, and demographic, undergraduate and postgraduate variables potentially associated with choice of practice location and medical career.

Context: The University of the Philippines Manila School of Health Sciences, Palo, Leyte (SHS-Palo) was established in 1976 in the Visayas, while the Ateneo de Zamboanga University School of Medicine (ADZU-SOM) was established 1994 on the Zamboanga Peninsula, Mindanao. The two schools developed curriculum approaches for selecting and training applicants independently but began with a similar socially accountable mission: to reduce the persistent health inequities within their local reference area, in particular, high infant and child mortality. Both schools are committed to producing socially aware and medically competent graduates who stay and practise in local medically underserved and rural communities and have the clinical competencies and knowledge of preventive and population health strategies appropriate to local priorities.

Admission to ADZU-SOM requires the applicant to have graduated from a 4-year baccalaureate (bachelor's) degree. ADZU-SOM recruits graduate students from the Zamboanga Peninsula and neighbouring region based on their intention to practise after graduation, undergraduate grade point averages, and an interview by a panel that includes a representative from the community. About 35% of accepted students subsequently avail themselves of a scholarship based on financial need, with a return of service requirement of 1 year per year of scholarship. ADZU-SOM is unique relative to other medical schools in the Philippines in having a Doctor of Medicine-Master of Public Health (MD-MPH) programme and a problem-based learning teaching philosophy.

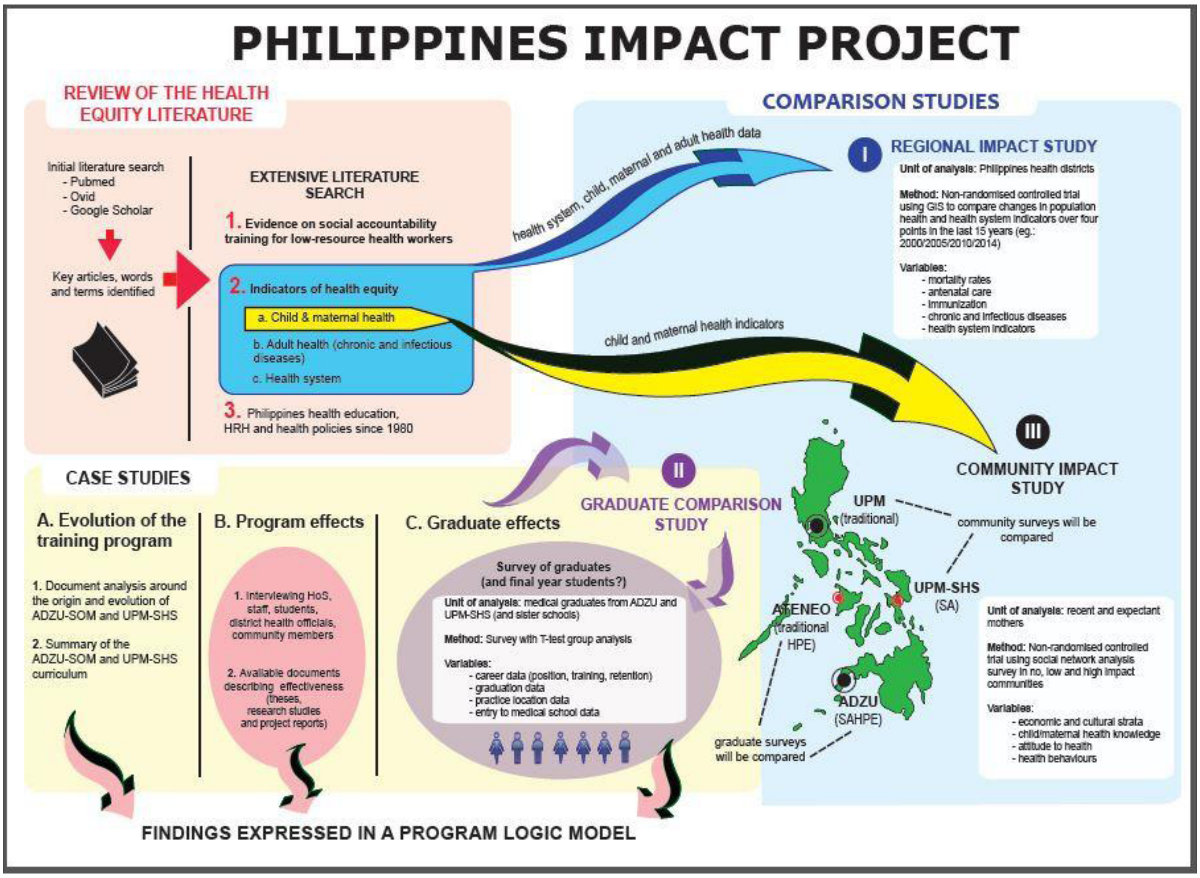
SHS-Palo Leyte offers a 5-year degree that also requires the applicant to have graduated from a baccalaureate degree. However, SHS-Palo is unique in the Philippines in having a "stepladder" curriculum that integrates the training of midwives, nurses and medical doctors into one continuous, sequential curriculum. This means students admitted into the medical programme earned their baccalaureate degree by first completing the midwifery and nursing levels of the stepladder curriculum. Emphasizing community need and the students' commitment to serve, the school de-emphasizes previous academic performance in its recruitment and admissions process. Students are nominated and endorsed by rural and disadvantaged communities in need of professional health workers, and then given scholarships by the university tied to a return of service agreement to serve the endorsing community after graduation. As a response to the urgent need for rural medical doctors, SHS-Palo also admitted, for a limited period, some students who had a baccalaureate degree outside of SHS-Palo through the Philippine Government's Medical Scholarship Programme. These students had specific return of service contracts with the Department of Health to serve in pre-identified areas.

Both ADZU-SOM and SHS-Palo have maximized their service-learning approach by basing their students in rural communities for over 1 year. ADZU-SOM students spend 1 month per semester in Years 1–3, and 10 months of community placement in Year 4 (intern). This represents 50% of their training dealing with population health care concerns while the remaining half is spent on university-based learning with a weekly exposure to a hospital bedside teaching addressing individual health conditions. Both community and hospital rotations provide an immediate contextual learning experience. Similarly, SHS-Palo medical students do a 6-month community clerkship in Year 2 and another 12 months in the final (community internship) year. This builds upon the extensive community engagement they had at the midwifery and nursing levels of the curriculum. Both schools have curriculum activities that train students in public health, community development strategies, research, and the diagnosis and treatment of key local health problems. Finally, students complete significant community service and public health activities in their community immersion year. On completion of studies, both schools expect each student to have contributed positively to the health outcomes of their community.

Methods: The two Philippines schools used a cross-sectional "snapshot" tracking study design to identify previous graduates' practice location and collect self-reported data on variables associated with graduates' demographics, postgraduate training, and current practice (Fig. 4.4). Both studies involved a "control" medical school in the same region having a more conventional curriculum. Tracking was undertaken in 2015, with ADZU-SOM tracking graduate cohorts 2003 to 2012, and SHS-Palo tracking 1989 to 2013 cohorts, with similar cohorts used for each "control" medical school. Graduates of all schools with known addresses received a request to complete a paper or online survey.

The main objective of the tracking study was to assess whether socially accountable medical education produces significantly more positive outcomes in terms of rural and remote practice, working in public health and community development, working in public health system positions and, commitment towards community service. The survey collected data on graduates' background (age, gender, gross family income, schooling), high school matriculation score, financial support during medical school, motivation for studying medicine, motivation for selecting their respective school, intentions at time of graduation (career, rural/urban practice and practice history (attitude to community service, preparedness for practice, current practice discipline, current practice location, current practice facility, length of employment, and medical specialization).

Fig. 4.4 Training for Health Equity Network Philippines Impact Study: study design



Source: Woolley, Christobal et al. (2017).

Governance: The tracking studies at both schools were managed by a team approach involving local investigators and research assistants together with co-investigators from the James Cook University and Flinders University medical schools. The Philippines' investigators and research assistants collected the data and entered it into Excel spreadsheets, and the international co-investigators imported the raw data into IBM SPSS software for analysis. Additional analysis involved geo-coding the graduates' current practice location and uploading these data into ArcGIS geospatial software. All investigators contributed towards writing reports and other publications. Funding was provided by THEnet as part of a series of multi-institutional collaborative research projects to gather evidence on the outcomes and impacts of socially accountable medical education. Ethical approval was obtained from the respective research ethics committees, as well as from the two conventional medical schools involved in the study.

Benefits and findings: The tracking studies allowed ADZU-SOM and SHS-Palo to show that their graduates, compared with graduates from nearby medical schools with "conventional" curricula are:

- Significantly more inclined towards community service and health equity; have greater preparedness for practising in local communities; more likely to work in rural health units, to work as public/municipal health officers and as government hospital medical officers and residents (Halili et al., 2017; Siega-Sur et al., 2017).
- More than four times as likely to be currently practising in smaller communities (< 100 000 population), more than three times as likely to be currently practising in lower socioeconomic

communities (income levels classified as 2 to 6), and twice as likely to be practising in rural municipalities in their respective regions (Woolley, Halili et al., 2018).

Enablers and challenges: Both schools' tracking study worked well using the strategy of local investigators and hired research assistants identifying graduate contact details, then collecting and entering graduate survey data, followed by the international co-investigators undertaking the quantitative analysis. The quality of the resulting publications was also enhanced by all investigators contributing significantly to the writing. However, without the funding from THEnet organization, hiring local researchers to collect and enter the data from all four schools would have been difficult under the usual budgetary constraints of regional medical schools.

Similarly, the guidance from the international co-investigators facilitated setting up the IBM SPSS databases and undertaking the analysis. Both medical schools had chosen to participate in THEnet GOS to overcome these sustainability issues.

An additional enabler was the graduates' enthusiasm for social media and a strong personal connection to their medical school, allowing schools to keep in touch with graduates and reducing the time and expense associated with identifying contact details and with distributing surveys. However, one barrier was that many graduates were practising in locations without reliable internet connection, which required more resource-intensive data collection strategies.

4.5.3 Tracking study of students and graduates at the College of Medicine and Dentistry, James Cook University, Australia

Overview: A longitudinal tracking system to assess key aspects of the James Cook University (JCU) medical school's mission and identify demographic, undergraduate or postgraduate factors that may be contributing to, or inhibiting, desired graduate outcomes.

Context: In 2000, JCU became the first medical school in Australia established outside of a major city. The main campus is based in Townsville, northern Australia, with a distributed network of clinical schools and other teaching sites across the region. JCU has a mission, underpinned by socially accountable principles, to address both the generalist and specialist medicine needs of Northern Australia by producing a workforce motivated and skilled to practise in rural and remote communities, including targeting underserved population groups (particularly local Indigenous peoples), and with a strong representation in the public health services system.

JCU has a selection process orientated towards attracting applicants from rural, remote, and indigenous backgrounds, and a 6-year curriculum with mandatory 20+ weeks of community placements, mostly in rural and remote northern towns.

JCU graduates undertake 1 or 2 years of clinical service as junior doctors, mostly in hospitals, followed by entry into generalist or specialist medical vocational training, then unsupervised (full) clinical practice after completing this "fellowship" training.

Methods: The main objective of the JCU longitudinal tracking system is to confirm that all key aspects of the medical school's mission are being achieved, and to identify demographic, undergraduate and postgraduate factors that may be enabling or inhibiting desired graduate outcomes. To achieve this objective, the tracking system involves three linked components:

- Exit survey for final year students administered by non-teaching staff at a time close to exit from the course to collect data on career intentions, known place of practice in postgraduate year 1 (PGY 1), course improvement suggestions, and consent to be contacted for future graduate surveys.

- A tracking database to store the final year exit survey data, plus other undergraduate data from administrative databases (sex, ethnicity, residence at application to JCU, socioeconomic level of family, high school or lateral entry, participation in rural and international placements, international or domestic students, honours programme, Indigenous versus non-Indigenous Australian). In addition, the database contains publicly available graduate practice location, data obtained yearly from the Australian Health Practitioner Regulation Agency (AHPRA) website. All data are linked using the students' ID number, and then AHPRA number after graduation. The tracking database is set up using IBM SPSS software. Geographic practice location is recorded for each PGY rather than calendar year, allowing analysis to identify trends in practice location over time and between cohorts, and any demographic, undergraduate or postgraduate factors statistically associated with practice location. Data can be manipulated to determine practice location in a given calendar year.
- A periodic (every 1–2 years) graduate survey of those who have given consent in the exit survey to be contacted for further study. Graduate surveys aim to answer specific research questions by collecting additional data directly from graduates that are unavailable in the tracking database, e.g. current scope of practice, patient populations served, suggestions on how the curricula may be improved to enhance future graduates' clinical competencies, etc.

Governance: The JCU tracking study was implemented in 2011, with ethical approval periodically obtained for 3-year periods from the JCU Human Research Ethics Committee. The process is managed by a single faculty member who administers and enters data for the exit survey, including identifying each new graduate AHPRA registration number each year, and obtaining practice location from AHPRA for each year. The faculty member also undertakes a graduate survey every 1–2 years – usually with a small advisory group of JCU academics associated with the specific research question(s) to be answered by that particular survey. The faculty member has a position dedicated to evaluating JCU medical school curricular activities, which includes the school's graduate outcomes, and has appropriate skills in database management, study design, survey design, quantitative and qualitative data analysis, and writing for publication. The JCU medical school does not provide dedicated funds to support the graduate tracking process.

Benefits and findings: Overall, the tracking study has measured progress in producing graduates choosing to practise in northern communities, as well as achieving a significant representation of graduates practising in medically underserved areas, with Indigenous peoples, and in the public health system. Using the three components in tandem (exit survey, tracking database of yearly practice locations, periodic graduate survey) allows the process to answer all potential quantitative and qualitative research questions related to graduate intentions at exit, later practice outcomes associated with the school's mission, and specific factors enabling or inhibiting these outcomes. For example, the exit survey has shown:

- JCU medical graduates are significantly more likely than other Australian graduates (National Health Workforce Dataset [NHWD]) to undertake their internship outside a metropolitan centre and to intend to choose generalist medicine careers (Sen Gupta et al., 2014; Woolley et al., 2019).
- JCU's selection process, its rurally focused curriculum supported by quality clinical training experiences in local hospitals, and the government's provision of sufficient locally available

intern places, have increased retention of interns across northern Australia (Woolley and Ray, 2019).

- Urban-origin JCU students intend to undertake periodic rural practice (locums, outreach clinics, etc.), while rural-origin students prefer more permanent rural practice. Thus, urban-origin JCU graduates may be a significant resource for non-permanent rural workforce (Woolley, 2019).
- The 6-year JCU medical curriculum has positively influenced the commitment of graduating students towards more socially accountable practice (Woolley et al., 2021).

The tracking study showed that:

- Early career (PGY1–7) JCU graduates' pattern of practice is significantly more regional, rural, and remote compared with other Australian medical graduates (NHWD data) (Sen Gupta et al., 2014).
- There are specific predictors of rural and remote practice (Woolley et al., 2014; Woolley, Sen Gupta et al., 2017; Sen Gupta et al., 2017).
- JCU's decentralized medical education model significantly increases rural recruitment and retention in local districts of workforce shortage (Woolley et al., 2016).
- JCU's selection process that takes into account rural-origin, local-origin and Indigenous Australian background in addition to high academic achievement does not negatively impact overall on the quality of graduates' clinical competencies (Ray et al., 2015).

Graduate surveys have showed that:

- JCU produces significantly more graduates with a generalist career focus (Woolley et al., 2019), compared with similarly experienced Australian medical practitioners (NHWD data).
- JCU produces significantly more graduates working in government-funded organizations, including Indigenous Australian health services, community health centres and other state-run primary health care (PHC) organizations (Woolley, Sen Gupta et al., 2018), compared with other Australian medical graduates (Medicine in Australia: Balancing Employment and Life [MABEL] survey data).
- The majority of JCU-trained generalists locate their practice in Northern Australia, but additional initiatives are needed to encourage specialists to train and later establish their practice there (Woolley et al., 2020).

Enablers and challenges: JCU's tracking process has been significantly enabled by having a faculty member capable of undertaking all aspects of the process from data collection to dissemination of findings; this has significantly reduced costs to JCU. An additional enabler is the availability of yearly practice locations for all graduates via the AHPRA database; this has allowed the database to be very complete and reduced costs associated with collecting these data. Prior to AHPRA data being available, JCU used yearly graduate surveys and social media to keep in touch with graduates to identify their practice location – a considerable investment in time and resources. Other enablers have been the availability of Australian medical graduate databases, such as MABEL and the NHWD, as comparison groups for JCU graduate outcomes, and a long-lasting personal connection of graduates to the JCU medical school that continues to provide a good graduate survey response rate.

However, the tracking process has barriers to long-term sustainability and some limitations. The key challenge is having only one faculty managing the process; if that staff member is lost, then the tracking process is at significant risk of ending. In addition, as further cohorts graduate, increasingly large numbers of individuals need to be tracked, putting significant pressure on one faculty member managing the process. As a result, practice location data are now entered only every 2–3 years. The tracking process also has the major limitation that graduate surveys only collect self-reported subjective data; thus, separate studies are needed to collect more "objective" data to answer certain research questions, for instance on the quality of graduates' clinical competencies.

4.5.4 Tracking of students and graduates of the Northern Ontario School of Medicine, Canada

Overview: A multicohort and multimethod longitudinal tracking study designed to understand the impact that the selection criteria, medical education, and residency programmes have on students' future practice choices.

Context: In Canada, medical students first complete a university degree before finishing 3 or 4 years of undergraduate medical education (UGME) at one of 17 medical schools. They then complete 2–5 years of postgraduate (PG) training in a medical school residency programme before they can be licensed for full independent medical practice. Further specialization requires additional years of residency training.

The Northern Ontario School of Medicine (NOSM) has a social accountability mandate to serve the health care needs of the people of Northern Ontario, Canada. NOSM offers a 4-year UGME programme and 2–5 years of PG residency training in anaesthesiology, family medicine, general surgery, internal medicine, orthopaedic surgery, paediatrics, psychiatry, and public health and preventive medicine.[1] NOSM also provides training opportunities in rural and Northern Ontario for those training to become medical physicists, physician assistants, dietitians, audiologists, occupational therapists, physiotherapists, speech-language pathologists, or pharmacists.

NOSM's community engaged learning uses a comprehensive life-cycle approach that begins in high school, carries on through medical school, postgraduate training, and into practice (Strasser et al., 2018). For example, NOSM:

- Offers high school students an opportunity to experience the medical school and envision a career in one of the health professions, including medicine.
- Selects medical students who reflect the population of Northern Ontario (i.e. Indigenous, Francophone, rural, northern).
- Trains students and residents in a variety of facilities in over 90 communities in Northern Ontario.
- Offers education and training to licensed MDs to improve practice and maintain professional credentials.

1 https://www.nosm.ca/education/

Methods: The objective is to understand how NOSM's selection criteria, medical education and residency programme set in the rural and underserviced communities of Northern Ontario, affect the choice of a medical discipline, practice location, medical services and procedures, inclusion of medically underserved patient populations and practice structure (e.g. solo, group, interdisciplinary).

The study follows learners from entry into the UGME programme or PG residency programme and continues into independent practice. The study compares learners who experience NOSM UGME and NOSM PG training with those who experience NOSM UGME alone or NOSM PG training alone. Within these groups, the study also compares learners in family medicine with those in other specialties offered at NOSM. Every 5 years, outcomes are compared with graduates of other Canadian medical schools. Ethical approval is granted annually by the Research Ethics Boards of Laurentian University and Lakehead University, which serve as the dual host universities of NOSM.

Governance: The tracking study, multicohort and multimethod, was started in 2005 with NOSM's charter class of medical students and PG residents. The study was conducted from 2005 to 2019 by the Centre for Rural and Northern Health Research-Laurentian University (CRaNHR-Laurentian) (Hogenbirk, French et al., 2015). In 2019, responsibility for the tracking study was transferred to the Office of Institutional Intelligence, NOSM. For the first 12 years, the study was supported by funding from the Ontario Ministry of Health and Long-Term Care and has since been supported by NOSM. An advisory committee, formed in 2005, comprises NOSM faculty members and CRaNHR-Laurentian researchers. The tracking study research team reports annually to the Ministry of Health and Long-Term Care and to NOSM.

Benefits and findings: Some notable outcomes of the tracking study include adjusting and verifying the admissions process and analysis of the association between the educational path and practice location.

- **Admissions process:** The tracking study has helped modify admissions criteria to ensure appropriate representation of minority populations.
  - Indigenous people comprise 14% of the population in NOSM's service area of Northern Ontario, compared with 2% of the population in all of Ontario; it is a socially accountable goal of NOSM to encourage and select qualified Indigenous applicants. As a component of the tracking study, 10-year analysis of the admission process (2006–2015) found that only 7% of the student population was Indigenous (Mian et al., 2019). Changes made to the admission process as a result of this finding and other studies allowed NOSM to increase the intake of Indigenous students to 12% during 2016–2019.
  - The 10-year review confirmed that NOSM's student population was representative of the Francophone population, another prominent minority population in Northern Ontario.
- **Practice locations of NOSM graduates:** Tracking study results showed that in 2018, 92% of family practitioners (FPs) who completed UGME and PG medical education at NOSM stayed to practise in Northern Ontario (Woolley et al., 2020). By comparison, only 24% of NOSM undergraduates who went elsewhere to complete their FP residency training returned to practise in Northern Ontario and 54% of FPs who completed their UGME at another medical school before coming to NOSM to complete their PG training set up their practice in Northern Ontario. Approximately 30% of those who completed PG training in other specialties (e.g. anaesthesiology) were practising in Northern Ontario. These results from 2018 confirmed earlier work on the first three cohorts of family medicine graduates (Hogenbirk et al., 2016; Wenghofer et al., 2017).

- **Graduate achievements:** NOSM's selection criteria and medical education programme ensure that appropriate diversity in the medical student population and the quality of graduates are achieved simultaneously. The academic performance and licensing rate of NOSM's medical students meets or exceeds national averages, indicating that NOSM is producing qualified MDs (Strasser et al., 2019). The tracking study has allowed NOSM to confirm its admissions criteria for one minority group and modify it for another group to select students who are more representative of NOSM's service area population. Although findings have shown that a substantial proportion of NOSM trained physicians locate their practice in Northern Ontario, it has also shown that additional initiatives are necessary to encourage FPs to locate in rural areas of the region and that work is needed to bring other specialists (e.g. paediatricians) to establish their practice there. The study substantiates NOSM's contribution to the medical workforce in underserved areas. NOSM, in conjunction with government health workforce planning agencies, is developing or supporting various initiatives, such as the rural generalist pathway programme to increase the number of physicians in rural areas, increase access to medical care, and, eventually, improve the health of the people in Northern Ontario.

Enablers and challenges: The tracking study started with the first cohort of students admitted to the newest medical school in Canada and the first school founded with an explicit social accountability mandate. There was strong student participation right from the start. The independence of CRaNHR-Laurentian from NOSM was also considered to play a role in encouraging high participation and helped provide credibility to the study methods and results.

Response rates were typically 100% for the entry survey. However, these rates declined somewhat by graduation and were as low as 30% by the time students had completed their PG training (typically 2–5 years after graduation from medical school). Tracking was more difficult for students who had completed medical school at NOSM but had gone to another medical school for their PG training. Fortunately, organizations that license medical practitioners in Canada (regulatory colleges) also keep track of medical education and residency pathways, practice locations, and other practice and personal attributes of physicians they register. The tracking study was able to fill in some of the missing data with information in the public domain or data acquired with the specific permission of regulatory colleges.

This study initially received external funding from the Ontario Ministry of Health and Long-Term Care and was financially supported by NOSM in subsequent years. Nonetheless, funding remains a challenge given economic conditions and competing priorities within the medical school. The senior leadership at NOSM continues to provide strong support for the study and recognizes the importance of the tracking study in providing the evidence needed to monitor and evaluate its UGME and PG medical education programmes.

4.6 Conclusion

HRH tracking studies, particularly those with a longitudinal component, have strengths in promoting greater understanding of the impact of learner selection criteria and admission policies on the eventual deployment and of key aspects of education and training, such as community-based engaged and distributed learning, on practice intentions and eventual choice and, on population health. These studies can also address the issues of faculty selection and the equitable access to lifelong learning opportunities for faculty and graduates to address the evolving health care needs of the communities they serve. Longitudinal, intersectoral HRH data collection and analysis can help align, develop, and monitor the impact of policies and plans on the creation and maintenance of interprofessional teams with the right competencies to address people's health needs, wherever they live.

As an integral part of national health workforce planning, tracking studies can help guide intersectoral negotiations among ministries, government agencies and health education institutions. In addition to the schools' role in educating and training the health workforce, the tracking studies play a central role in ensuring a strong link between health worker education and training, planning, and population health outcomes.

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Chapter 5: Where do graduates go? A case study of the United Kingdom Medical Education Database (UKMED)

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5.1 Introduction and background

The education and training of doctors is not only expensive but takes a considerable amount of time. It can take up to 16 years to become a fully qualified doctor in the United Kingdom, even longer when time taken out of training is considered (Rizan et al., 2019). Medicine is a highly evidence-based discipline whilst medical education is much less so. It is therefore important to have an evidence-based approach to medical education research to understand the training pathways of doctors. This chapter presents a United Kingdom-wide initiative to create a single database by taking on the challenge of bringing together appropriate data to facilitate research in medical education. The chapter describes the creation, structure and emerging evidence from research projects using the United Kingdom Medical Education Database (UKMED).

Evidence-informed policy-making has been the mantra for good practice for decades. But to what extent do policy-makers practise what they preach?

In England, the Department for Health and Social Care provides £1.7 billion annually for undergraduate and postgraduate medical education. The Office for Students allocates over £200 million for undergraduate medical education (UGME) in England and medical students themselves pay £300 million in contributions. As calculated by Brien et al. (2020), the 2019 budget for the United Kingdom's health service (National Health Service [NHS]), was £120 billion.

Fitness to Practise (FtP)
The standards of professional behaviour expected of United Kingdom doctors are set by the regulator. The data held by the GMC include concerns raised about doctors the medical regulator has investigated.

However, could the United Kingdom's health care education system perform even better? Are the correct applicants being selected, and do those chosen make the very best doctors of the future? The General Medical Council (GMC) commissioned review by Cleland et al. (2013), "Identifying best practice in the selection of medical students", discussed the "criterion problem"; "should the criterion for selection be medical school performance or subsequent performance as a doctor?". In addition, is enough being done to identify those from disadvantaged backgrounds and support them to demonstrate their full potential as doctors? Does the system produce doctors in the specialties the NHS needs – rather than the specialties in which the individuals selected choose to work? And are those chosen keen to work in remote or deprived communities?

The Medical Schools Council (MSC) – the membership organization, which supports the 41 United Kingdom medical schools – agreed that these were important questions. The opportunity to answer came when colleagues within the GMC also agreed that detailed information in this arena would help it meet its statutory duties to protect patients and promote the highest standards of medical education.

In 2011 there were a number of sources of data about applicants to medicine and the subsequent performance of those who gain entry to medical school:

- Both pre-admission and school leaving examination results, such as A-levels, required for entry to medical school through the University Clinical Aptitude Test (UCAT).
- Admission tests such as UCAT, formerly known as the UK Clinical Aptitude Test, the Biomedical Admissions Test (BMAT) and the Graduate Medical School Admissions Test (GAMSAT).
- Post-qualification survey results through the GMC's National Training Survey.
- Annual data returns from projects coordinated through the Overarching Data Group (ODG) that collected and reported on postgraduate progression data and included the Annual Review of Competence Progression (ARCP) data, Medical Royal College examinations data and specialty recruitment data.

However, there was no single United Kingdom repository of high-quality data that fully described progression from medical school to employment post-completion of training. These datasets were not linked. Nor were there arrangements in place to share data for research purposes.

A group called the Medical Selection Outcomes Research Database (MSORD) was convened by the Chief Executive of the MSC. Stakeholders included the Department of Health and the funders of medical education in the four United Kingdom nations, the Academy of Medical Royal Colleges (AoMRC), representatives of medical admission test providers, student and trainee representatives, the United Kingdom Foundation Programme, the Conference

Undergraduate pathway

The majority of medical schools use an admissions test as part of their entry requirements. Most applications are handled by the Universities and Colleges Admissions Service (UCAS). The number of medical students is capped by the United Kingdom Government due to the costs of training. There are a limited number of places for medical students each year. Graduating medical students are awarded a primary medical qualification (PMQ) by a recognized institution and are given provisional registration with a licence to practise by the regulator.

Postgraduate pathway

Newly qualified doctors undertake a 2-year training programme. They can then apply for specialty training, which can last between 3–7 years depending on the speciality. Some specialties require further core training before doctors can apply for specialty training. Throughout training, doctors are reviewed annually through the ARCP process, and awarded a training outcome. Some specialties also require the passing of Medical Royal College exams for doctors to progress or complete their training.

of Post-Graduate Medical Deans (COPMeD) and the GMC. All participants agreed that this was a timely moment to create, at reasonable cost, a powerful resource capable of informing medical education in the United Kingdom for years to come. It would enable enhanced analyses that could inform selection, UGME, postgraduate training and workforce planning. The governance of such data would clearly be complex and controversial and, therefore, it was proposed this be specifically considered in its own right.

Between 2015 and 2017, Phase 1 of the project was implemented and funded by the GMC, rather than jointly by all stakeholders, in order to facilitate legal requirements around the inclusion in the database of Fitness to Practise (FtP) data held by the GMC. Using the GMC as the data controller for UKMED allows the data to be processed under the auspices of the UK Medical Act (1983). This means that there is no requirement to obtain consent from data subjects to have their data included in the database. This allows UKMED to hold a complete dataset.

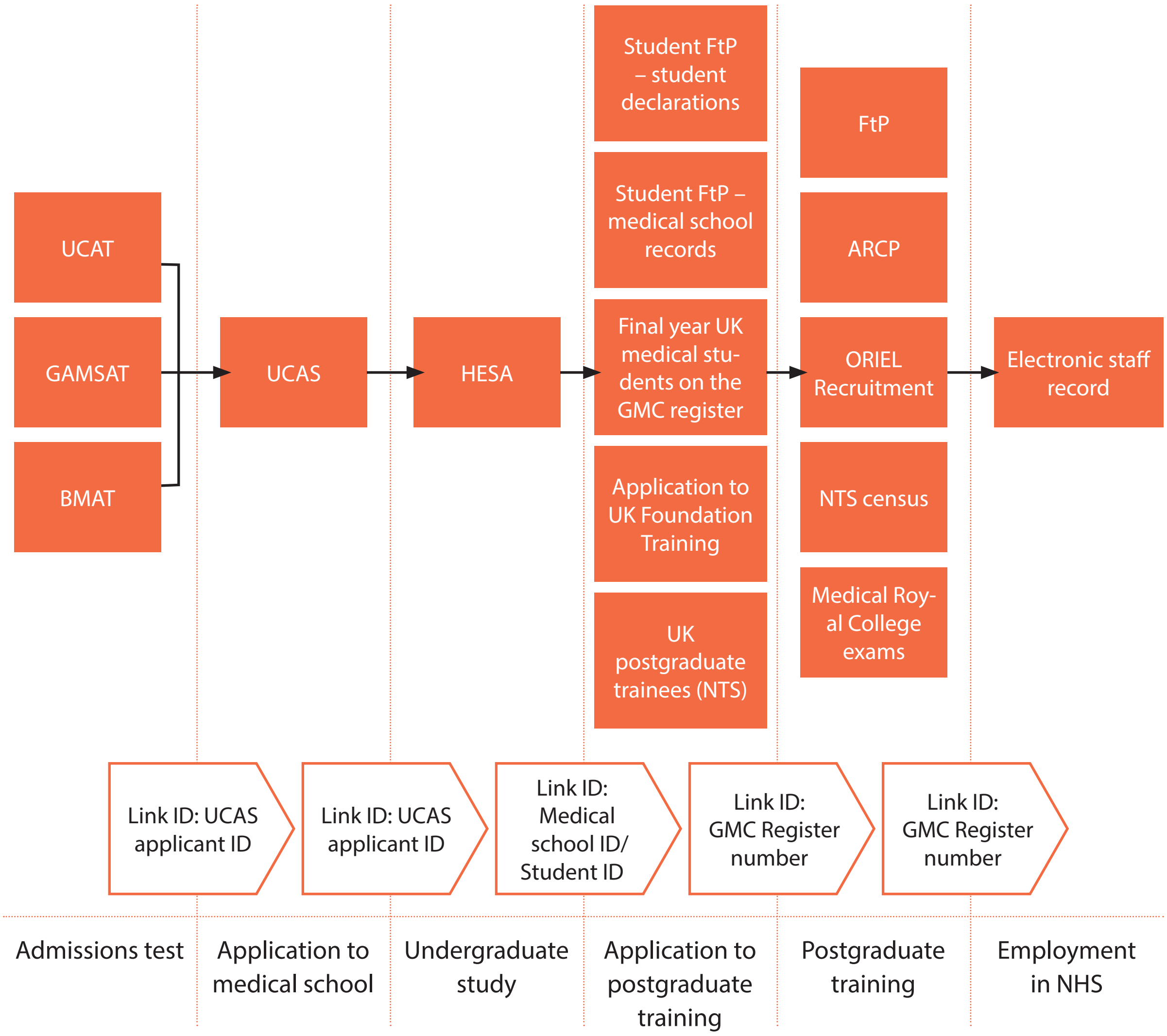
In the circumstances, it was agreed that the stakeholder group should become an advisory board to monitor the GMC's progress and that the system of rotating chairs should be replaced by a permanent chair from an organization other than the GMC.

Phase 1 required extensive consultation and legal guidance to address data protection, management and academic governance issues. However, there was real enthusiasm for the project and a willingness to address difficult issues such as data sharing agreements and privacy notices. The UKMED database supports the GMC's objectives for more effective regulation through enabling research on doctors and health care, risk and best practice. Agreement was reached that the GMC, which has a statutory responsibility to regulate all stages of medical education and training, had a legal basis for obtaining data from multiple sources, matching and de-identifying the data before they are shared with researchers. This means the GMC is acting as the "data controller" for the purposes of data protection legislation and is responsible for ensuring compliance with the United Kingdom General Data Protection Regulation (GDPR, 2018), by hosting the database, providing the Safe Haven, and providing data under contract.

5.2 A platform for research

The UKMED database is a valuable platform for enabling research on medical education. Data that were previously held separately are now brought together in one place to make research simpler. The database contains data from doctors' applications to study medicine through to their employment in health care (Annex 5.2). The UKMED Data Dictionary (UKMED, 2021a) contains the complete up-to-date list of data tables. It is the first time that data have been linked together in such an accessible way (Fig. 5.1).

Fig. 5.1 UKMED datasets stored and linked together by the GMC using common identifiers



Source: UKMED Data Dictionary (2021a).

Data are linked reliably as UKMED uses database identifiers for linkages. The designated body for collecting data from universities, the Higher Education Statistics Agency (HESA), provides data that are linked to the GMC's register of doctors using the medical school identifier and the school's own identifier for the student. The GMC receives these school identifiers from each medical school as part of the annual process to provisionally register final year medical students.

The data loaded into UKMED undergo multiple quality assurance processes. Data are deduplicated to ensure that each person only has one personal identifier. Checks are also made to ensure that the data points are in a logical order. For example, admissions tests must be dated prior to starting medical school. Where anomalies are found, the relevant identifier is added to the appropriate exclusions table.

5.2.1 Research potential

UKMED now offers an accessible linked database capable of addressing a wide range of important questions, including trends over time and relatively rare outcomes such as loss from training pathways. For example, in the United Kingdom, there is an urgent need to understand the changes in postgraduates' behaviour, with an increasing number of doctors taking a break from training after the Foundation Programme, the mandatory 2-year training programme for newly qualified doctors, as demonstrated by Moberly and Stahl-Timmins (2019). The United Kingdom already has a low doctors to population ratio compared with similar countries. The King's Fund (2018) predicts that it will fall further if current trends persist and will render any existing workforce strategy ineffective. This has also led to a reliance on doctors trained outside of the United Kingdom to maintain workforce recruitment targets despite the policies and ethical guidance established to reduce such practices (Blacklock et al., 2012).

UKMED can help contribute to reporting the issues experienced in the health workforce by providing the evidence base for medical education policies. UKMED offers researchers access to linked data extracts.

Longitudinal research: The nature of the database, which is built upon a number of routinely collected administrative datasets, enables cohort and longitudinal studies to be conducted in a way that could not have been achieved previously. The datasets from various data providers from across the education and health sectors can be linked together to provide the full picture of medical education and training. Not unlike the Millennium Cohort Study, UKMED is building the foundations for understanding doctors' careers, how these change over time, and what the societal effects are on career progression. An advantage of UKMED is that it includes the entire medical population and eliminates the risk of sampling bias. This will be important for reliably assessing the impact of policies on education and training. As a longitudinal database, the number of cases increase over time, which means that historical trends can be studied. The completeness of the database means that the magnitude of rare events or subgroups can also be considered.

Spatial research: The database holds postcodes for all stages of a doctor's progression through medical education. Understanding how doctors progress and move geographically is integral to policy development and informing decision-making on how best to allocate training posts and medical school places. A major obstacle in the United Kingdom, like in the rest of the world (GHWA, 2013), is the challenge of recruiting doctors to work in rural or less popular or deprived areas. Possible solutions such as funding to improve the workplace, or training and recruiting locally to encourage worker retention, as discussed by Verma et al. (2016), need to be tested using UKMED.

5.3 Structure and governance

The UK medical education system has many different organizations involved in teaching and training new doctors. This requires collaboration. UKMED's success lies in the collective agreement reached to match and share the data in a safe environment conducive to research.

5.3.1 Structure

UKMED Advisory Board

The UKMED project is overseen by an advisory board, which has representation from data contributors as well as key stakeholders in medical education. These include:

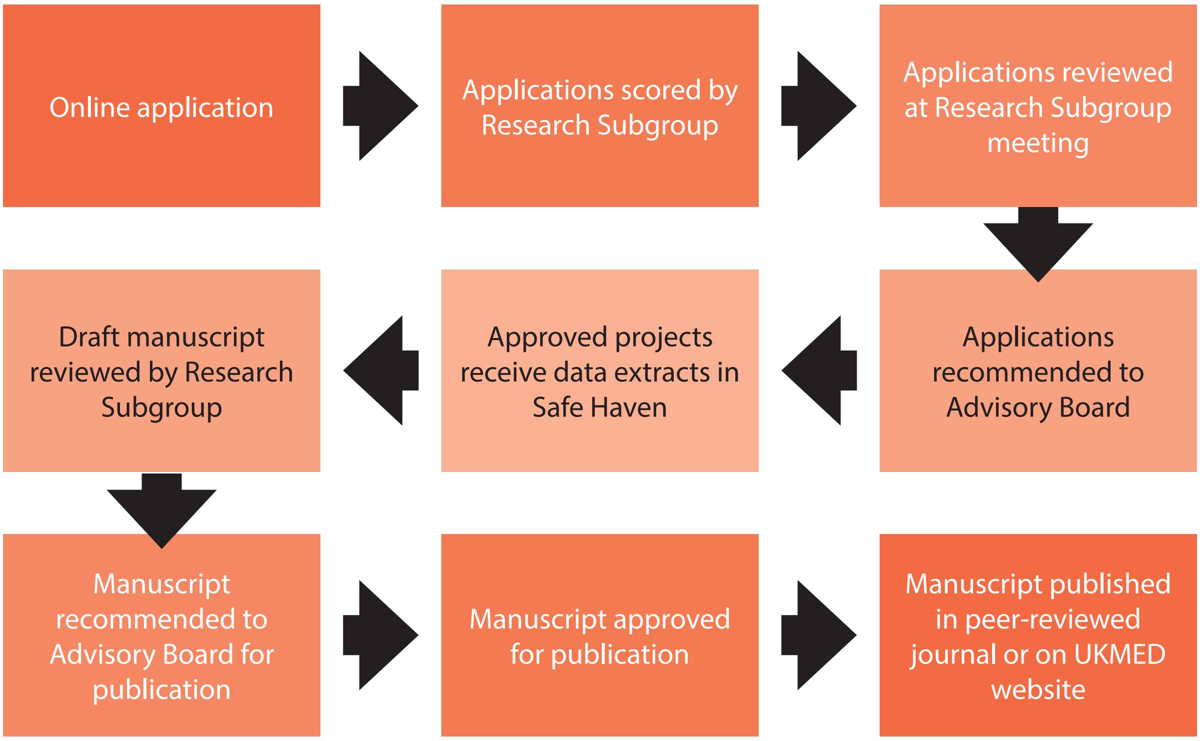
- the GMC, the sector regulator;
- the British Medical Association (BMA) on behalf of medical students, trainees and doctors;
- the MSC, representing undergraduate medical education and research;
- the United Kingdom Foundation Programme Office representing the first stage of medical training in the NHS;
- the AoMRC and COPMeD contributing towards the postgraduate perspective;
- the three providers of selection tests into undergraduate medical courses, BMAT, GAMSAT and UCAT;
- devolved health administrations which include Health Education England, NHS Education for Scotland, Northern Ireland Medical and Dental Training Agency, and Health Education and Improvement Wales; and
- the data providers, HESA and UCAS.

The UKMED Advisory Board provides strategic direction such as deciding which new datasets should be included and which research to prioritize. It is assisted by a Research Subgroup, which leads on the research aspect of UKMED. The Research Subgroup consists of academic experts who developed the UKMED application process and the criteria for assessing application quality.

Research Subgroup

UKMED data are open to researchers and access is free. UKMED does not fund research proposals; therefore, researchers must secure funding prior to application or be able to resource the project through their existing employment. Members of the Research Subgroup score and comment on proposals, which is followed by a meeting during which each application is discussed (Fig. 5.2).

Fig. 5.2 UKMED research process



While the Research Subgroup has permanent members, it does not represent all the data contributors in the same way as the Advisory Board. In cases where the Research Subgroup lacks expertise in a particular subject, a contributor can be invited to join the meeting.

Apart from guiding each project from application to output, the Research Subgroup evaluates the process and seeks improvements, such as exploring ways to encourage and share best practice. For example:

- Missing data is a common problem with routine administrative data. Because the missing data are not always missing randomly, it is not appropriate to remove cases with missing values as this can lead to bias in statistical analyses. Data imputation, replacing missing data with substituted values, is one way for researchers to perform statistical analyses without having to remove large amounts of cases (Van Buuren, 2018).
- Methods developed by completed UKMED projects are made available to other prospective UKMED researchers.

UK medical schools are free to set their own curricular and assessments. This makes it difficult to compare undergraduate educational attainment across medical schools. There is an agreed method for including assessments from multiple schools in the same study, for example when looking at predictive validity. When assessments are different, ranks or Z-scores within cohorts are used. This was the approach taken by the UKCAT-12 study conducted by McManus et al. (2013).

Subgroup members are well placed to suggest to the Advisory Board how the potential of UKMED and findings from its research can be promoted.

5.3.2 Information governance

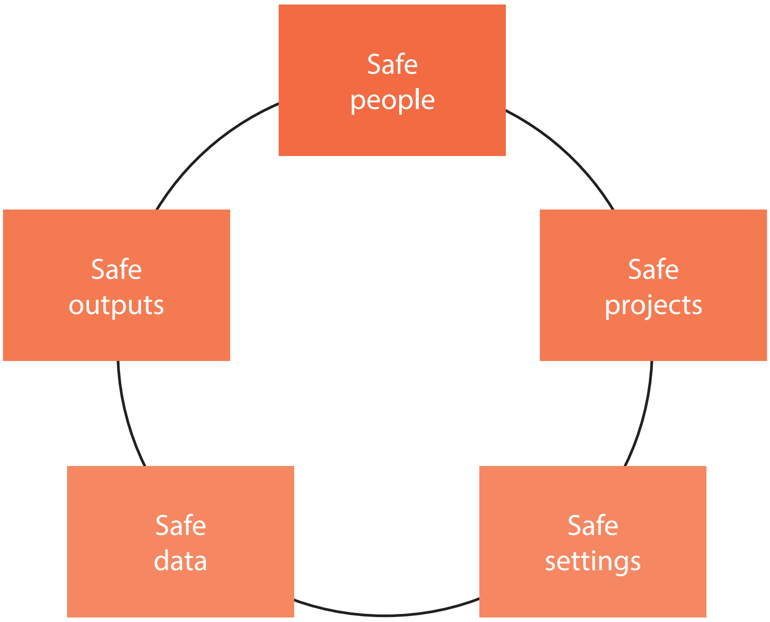
The GMC acts as the sole "data controller" for UKMED for the purpose of compliance with the GDPR. This means it is ultimately responsible for decisions regarding the use of data and ensuring compliance with security and other legislative requirements. This governance structure allows UKMED to operate using the GMC's statutory responsibilities under the Medical Act 1983, including the objective of promoting high standards of medical education and coordinating all stages of medical education, as a condition of data processing, ensuring there is a lawful basis for the database. This legal basis also means that the GMC does not have to obtain the individual consent of every person in the database. UKMED supports the GMC to fulfil this function by enabling investigation of training pathways, educational programmes, and selection and assessment tools. The GMC holds all the data collected from each participating organization and links up each dataset to create the UKMED database; individual data extracts are then loaded into a secure virtual Safe Haven for approved researchers to access.

The GMC either has a data sharing agreement in place with each UKMED data provider or, in the case of some postgraduate trainees, arrangements are documented in *The gold guide*, a reference guide for postgraduate specialty training in the United Kingdom, published by COPMeD (2017). This forms part of the project's GDPR compliance, but also gives data providers assurances on how their data will be used. The agreements mean that the GMC is only permitted to use the data for UKMED and other research and quality assurance purposes, and not for making decisions about individual doctors.

Given the scale of the database, transparency is key to reassuring data subjects. The long-term success of UKMED relies in part on medical students and doctors being comfortable with the GMC holding this level of information. UKMED achieves this by engaging with the BMA on the UKMED Advisory Board and responding to enquiries from data subjects. UKMED also encourages data providers to be as transparent as possible about the use of their data in UKMED. This means UKMED will not collect data from data providers where an appropriate data privacy notice is not in place.

UKMED takes data protection very seriously and operates under the Five Safes Framework developed by the United Kingdom's Office for National Statistics (ONS) (Fig. 5.3). The framework implements solutions for the controlled access of data, and where varying scales of each dimension can be applied to the data depending on its sensitivity. For a national database like UKMED to work, robust security and governance structures are essential to foster trust and collaboration between the various data providers. One of the difficulties of data collection that researchers and most organizations encounter is balancing the risk of data disclosure and offering the level of utility that makes meaningful research possible. The governance framework employed by UKMED seeks to achieve this balance.

Fig. 5.3 Five Safes Framework



Source: Ritchie (2017).

5.4 Impact of UKMED

The UKMED project has been building its database for 6 years and is gaining traction as more data are added (UKMED, 2021b). Projects are already helping the United Kingdom better understand medical education challenges now and for the future. As of February 2022, UKMED had 48 active projects accessing data in the Safe Haven and 27 publications, including:

Recruitment to specialties with shortages and primary care: The United Kingdom is facing a crisis in recruiting and retaining general practitioners (GPs) with the problem exacerbated by the increased demand for their services, evidenced by work of the Health Foundation (2016) and the National Institute for Health Research (NIHR, 2017). Doctors with certain demographic backgrounds and educational factors are more likely to apply for GP training, which supports the case made by Gale et al. (2017) for widening participation when selecting potential medical students. Widening participation is a potential solution to maintain the growth of the most appropriate workforce and the recent increase in medical school places in England led by the Department of Health (2017) has a focus on this. However, while widening participation was found to benefit GP recruitment, it did not assist other specialties with shortages such as psychiatry and anaesthesia. This finding helped to inform the allocation of extra medical student places in 2018 and the workforce planning strategy and curriculum review for the Royal College of Anaesthetists.

Student support: The pathway towards becoming a doctor is long and challenging. It is therefore important to ensure that medical students and doctors in training are supported effectively throughout their career. Low-confidence and coming from a non-professional background were found by Paton et al. (2018) to be associated with a higher risk of health-related FtP issues. This reinforces the need to focus on targeted support for students and develop preventive interventions before mental health issues or a FtP event occurs. This work also helped refine standards for recording student FtP data.

Admissions and selection: Careers in medicine have traditionally included large numbers from privileged backgrounds. A very small proportion of children in the United Kingdom go to independent schools, yet more than 25% of medical students come from these schools, as documented by White (2013) and the Independent Schools Council (2019). UKMED data analysed by Kumwenda et al. (2017) revealed that while students from state-funded schools generally enter medicine with lower assessment scores, by the time they complete their undergraduate studies they have caught up with their peers and finish higher in the rankings than those who attended independent schools. This is in agreement with wider higher education sector findings by the Higher Education Funding Council for England (HEFCE, 2014) that "Students who have remained in the state school sector for the whole of their secondary school education tend to do better in their degree studies than those with the same prior educational attainment who attended an independent school for all or part of their secondary education". The precision of these findings provides evidence to support enhanced selection strategies.

With the United Kingdom's higher education sector seeking to widen participation as stated by Connell-Smith and Hubble (2018), the Medical Schools Council Selection Alliance (MSCSA), a group formed to monitor and implement selection policies, developed a process for monitoring the progress of widening participation schemes in medical schools. Novel use of the UKMED data led to the development of reports linking data from application to entry to medicine courses that will enable medical schools to monitor whether schemes are successful and sustainable.

Although widening participation in medicine has been used in admissions for several years, the indicators used to determine those from disadvantaged backgrounds have varied across medical schools. The MSCSA has now developed medical school applicant and entrant profile reports to support medical schools in monitoring the impact of their widening participation activities. With widening participation one of the flagship policies in the United Kingdom, and one of the strategic initiatives designed to ensure that the United Kingdom workforce is sustainable without having to recruit from abroad, criticized previously by Parkhouse and Lambert (1997) and Goldacre et al. (2013), it is important to monitor whether policy objectives are on target.

Doctors prefer to train in foundation school locations where they have family, and this is significantly more likely for doctors who come from a widened participation background (Cleland et al., 2016, Kumwenda et al., 2019). One solution to fill geographic gaps in the workforce would be to recruit from the local population, offering an evidence-base that was lacking prior to UKMED. Several challenges make this difficult, as documented in MSCSA reports showing recruitment "cold spots" around the United Kingdom. The MSCSA has started several coordinated interventions, such as working with medical schools to run summer schools, to target students early and widen participation. UKMED is well placed to monitor and assess the outcomes of these projects.

The United Kingdom has also explored other routes of entry to medicine to expand the workforce, including the accelerated graduate-entry medicine courses introduced in the early 2000s. UKMED presented an opportunity to evaluate, at a national level, the markers of success in this type of course. Graduates entering medicine through the accelerated graduate-entry programme perform similarly to graduates taking the traditional 5-year course (Garrud and McManus, 2018).

The availability of longitudinal linked data through UKMED can enable large longitudinal studies. The UCL's UK Medical Applicant Cohort Study (UKMACS) is a United Kingdom-wide longitudinal study exploring selection and application to medical school. This project investigates how applicants' backgrounds influence their application behaviour. Prospective applicants are surveyed to measure the impact of application choices on educational outcomes, and the survey data will be linked to UKMED data. This will be important for understanding the effects of choice and selection on important undergraduate and postgraduate outcomes. The UKMACS study is the first of its kind in United Kingdom medical education to follow a cohort from before application through to entry in medicine.

Fairness in training and recruitment: As medicine begins to diversify and change, for the sector to benefit from these changes, fairness needs to be a guiding principle. There is a need to understand how fairness affects recruitment in the later stages of postgraduate training. The allocation of doctors into postgraduate training programmes has been found by to be relatively fair, with little discrimination against students from lower socioeconomic groups (Kumwenda et al., 2018).

Selection methods but not educational achievements used in the allocation for foundation training have been found to predict the successful completion of the foundation programme (Smith and Tiffin, 2018). This provides some evidence for amending the current selection method as educational achievement may indirectly disadvantage trainees from non-traditional backgrounds. They may not take time out for an intercalated degree for financial reasons, as suggested by Nicholson et al. (2010), Mahesan et al. (2011).

Further research suggests that there is an association between trainees' sociodemographic characteristics, academic ability and career choices. Trainees with lower United Kingdom Foundation Programme selection scores were less likely to apply for competitive specialties. Those from lower socioeconomic backgrounds also had lower scores, suggesting students from non-traditional backgrounds are less likely to compete for competitive specialties. This has implications for modifying selection to ensure greater fairness in postgraduate training selection.

Although there are underlying gender differences in specialty preferences, this is likely to be a result of differential application, as analysed by Woolf et al. (2019). When other factors are accounted for, women are more likely to apply, be offered and accept a place on a GP training programme. Factors that were unmeasured in UKMED were likely to explain the gender differences in specialty choices, such as exposure and personal experiences of different specialties during medical school and postgraduate training.

The full list of completed research is published on the UKMED website (UKMED, 2021c).

5.4.1 Additional impact from using the database

Other than generating research, UKMED has had an impact on the quality of data and the way they are used. For the first time, fragmented data from various organizations were linked in a systematic way that meant different datasets could be used to validate one another. At times the need to improve data quality only became apparent by linking datasets in UKMED, for example, in the case of recording reasonable adjustments for exams, where better data allow the impact of adjustments on performance to be studied. Furthermore, just by using the data, aberrant data can be identified and corrected. The MSC and GMC have helped data suppliers, HESA and UCAS, verify courses that lead to a formal qualification in medicine and ensure coding of medicine courses is consistent and complete. This in turn enabled the MSC to map different course types leading to a primary medical qualification more accurately through the development of the United Kingdom Medical Course Descriptors database. Previously, this historical information was not available in any form, and researchers needed to request information from every medical school. The GMC is now able to report postgraduate training outcomes by both the medical school the trainee graduated from and the course they were on. It is anticipated this will enable research to establish the relative "value added" by each educational provider to establish best practice in different domains.

5.4.2 Workforce planning

Evaluating progression from graduation to postgraduate training is important to assess whether interventions are effective. Most United Kingdom medical schools do not follow up cohorts of graduates or only do so by using one-off surveys. UKMED offers them a method to follow up cohorts of students' progress from undergraduate studies through to employment in the NHS.

Measuring the impact of research findings and policies is difficult through research alone. Institutions and organizations involved in medical education can help capture the impact by focusing on areas highlighted through research. Impact does not stop at the point of widespread recognition of findings or policy implementation. Measurable changes need to be observed. UKMED empowers organizations in the medical education sector to use the database for workforce planning. This is valuable to monitor how effective policy interventions have been and requires linked longitudinal data. Monitoring the impact of policy interventions and of any external factors that change the environment are key to assessing whether policies are still relevant, or whether the timely development of new policies is required. Linked longitudinal data provides an adequate feedback mechanism to answer these questions. The training pathways analysis route is available for UKMED partners and organizations involved in medical education to use UKMED data for analysing and monitoring medical training pathways. This enables the UKMED database to be used to make the information more readily interpretable.

UKMED data demonstrated that students domiciled in Northern Ireland who attended the local medical school were more likely to start foundation training at the local foundation school. This evidence base helped form a number of recommendations to the Department of Health in Northern Ireland (2019).

The Scottish Government also found UKMED to be useful for future workforce planning, as presented by MSC (2019). To assess the evidence base, linked data are required and UKMED provides the means to identify the measures required to improve the retention of Scottish medical graduates in Scotland.

5.5 Strengths and limitations

5.5.1 Strengths

The UKMED project started with the collation of various disparate data sources and by providing a secure and accessible environment for researchers and organizations involved in medical education to undertake research. A by-product of this is that it has not only managed to bring together various different data sources, it has also brought together the various organizations that are involved in medical education and the training of doctors at all stages of their career. This comes with a shared vision for taking advantage of the rich data to ensure future policies are evidence based.

As UKMED has data already available, it is, sometimes, able to respond to research questions that emerge when circumstances changes. For instance, when COVID-19 resulted in the 2020 applicants being unable to sit their A-level examinations required for entry, UKMED researchers, such as McManus et al. (2021), were able to show the risks of relying on calculated grades for admission to medical school as predicted grades do not have the same level of predictive validity as actual grades.

5.2.2 Limitations

Except for the GMC's survey of postgraduate trainees through the National Trainee Survey (NTS), the data in UKMED are administrative and only give information on *what* rather than on *why*. Through the NTS, UKMED has data on trainees' intentions at particular points in their career; but until complementary data, such as those from the UKMACS project are included, UKMED does not have information on the students' motivations.

All datasets are "left-censored" in that their collection started at a given point in time, so an event of interest may have already occurred for some individuals and will not have been recorded. For example, applicant data are available from 2007, but some of the applicants in 2007 also applied in 2006 or earlier and UKMED cannot derive the number of earlier applications. Similarly, UKMED only holds postgraduate exam data from 1 August 2013, and some exam results will not have been recorded in the database for those who graduated from medical school in 2012 and before. This means postgraduate exam results may be missing for those starting medical school in 2002 to 2008 who are included within UKMED.

5.6 Future direction

The UKMED dataset continues to grow with new cases each year, including new applicants and entrants to medical school, and new data points for existing cases. With the advent of HESA's Data Futures programme UKMED is working with HESA to obtain medical school assessment data. Data Futures will also mean HESA data could be imported more frequently than annually.

There is a process in place for UKMED to be used as a resource for researchers to combine UKMED data with data they have specifically collected for their own study. This will help enhance UKMED, which currently only contains routinely recorded administrative data, to answer more research questions.

Finally, the vision of UKMED does not end with an evidence base for doctors' training outcomes. UKMED aims to include clinical outcomes data for consultants and GPs and provide an evidence base linking medical education and clinical outcomes. Simply put, is there a relationship between doctors' medical education and a measurable change in health or quality of life as a result from doctors' care or treatment? Non-United Kingdom studies, such as Norcini et al. (2014), have linked doctors' training outcomes to clinical practice. Clinical outcomes data are held by NHS Digital, the UK's national provider of data and IT systems for NHS England. UKMED are actively pursuing linking UKMED data to NHS Digital data.

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Annex 5.1: Data sources

Academy of Medical Royal Colleges (AoMRC) www.aomrc.org.uk	Coordinating body for the medical royal colleges and faculties. Professional membership body for medical specialties, responsible for postgraduate medical qualifications and training.
Biomedical Admissions Test (BMAT) www.admissionstesting.org	Admissions test used in the selection process by universities.
British Medical Association (BMA) www.bma.org.uk	The trade union and professional body for doctors in the United Kingdom.
Conference of Post-Graduate Medical Deans (COPMeD) www.copmed.org.uk	Provides strategic overview and operational delivery of postgraduate medical training in the United Kingdom.
Data Protection Act (DPA)	The United Kingdom data protection law.
Department for Health and Social Care	United Kingdom Government department responsible for policy on health and social care matters in England.
General Data Protection Regulation (GDPR)	The regulation on data protection and privacy in the European Union and European Economic Area.
General Medical Council (GMC) www.gmc-uk.org	The United Kingdom medical regulator and public body that maintains the official register of medical practitioners within the United Kingdom.
Graduate Medical School Admissions Test (GAMSAT) www.gamsat.acer.org	Admissions test used in the selection process by universities for graduate entry programmes.
Health Education and Improvement Wales (HEIW) www.heiw.nhs.wales	Responsible for the coordination of education and training within the health and public health workforce within Wales.
Health Education England (HEE) www.hee.nhs.uk	Responsible for the coordination of education and training within the health and public health workforce within England.
Higher Education Statistics Agency (HESA) www.hesa.ac.uk	The agency responsible for collection, analysis, and dissemination of quantitative information about higher education in the United Kingdom.
Medical Schools Council (MSC) www.medschools.ac.uk	The representative body for United Kingdom medical schools that enables medical schools to work collaboratively to shape strategy and initiatives at the United Kingdom level.

Medical Schools Council Selection Alliance (MSCSA)	Responsible for the development and implementation of the Medical Schools Council's selection work.
Medical Selection Outcomes Research Database (MSORD)	The precursor to the UKMED.
National Health Service (NHS)	The United Kingdom's publicly funded health care system.
NHS Digital www.digital.nhs.uk	Provides digital services for the NHS and social care, including the management of large health informatics programmes.
NHS Education for Scotland (NES) www.nes.scot.nhs.uk	Responsible for the coordination of education and training within the health and public health workforce within Scotland.
Northern Ireland Medical & Dental Training Agency (NiMDTA) www.nimdta.gov.uk	Responsible for the coordination of education and training within the health and public health workforce within Northern Ireland.
Office for National Statistics (ONS) www.ons.gov.uk	The United Kingdom statistics authority.
Overarching Data Group (ODG)	Working group with representatives from NHS postgraduate training bodies responsible for improving data standards related to trainee doctors.
United Kingdom Foundation Programme (UKFPO) www.foundationprogramme.nhs.uk	Two-year training programme for newly qualified doctors.
Universities and Colleges Admissions Service (UCAS) www.ucas.com	Operates the application process for British universities.
University Clinical Aptitude Test (UCAT) www.ucat.ac.uk	Admissions test used in the selection process by universities.

Annex 5.2: Data available in UKMED (as at February 2022)

Data source(s)	Description of data	Years available	Database coverage
Admissions test provider – BMAT	United Kingdom medical school admissions test results	For those entering medical school in 2004 and for those applying for entry in 2015 who applied to one or more schools requiring BMAT for entry.	For pre-2015 cases, data are only available for those who took the test and successfully completed medical school due to a restrictive privacy notice shown to BMAT candidates at the time. Data subjects offered the opportunity to opt out of UKMED holding their BMAT data. Post-2015 cases include all students who applied to a school requiring a BMAT test for admission.
Admissions test provider – GAMSAT	United Kingdom medical school admissions test results	For those entering medical school in 2005 and for those applying for entry in 2007.	Data are available for all cases who applied to a school requiring GAMSAT for entry, regardless of which school they eventually entered.
Admissions test provider – UCAT	United Kingdom medical school admissions test results	For those applying for entry from 2007.	UKCAT changed its name to UCAT in 2019. It was first used for entry to United Kingdom medical school in the 2007 UCAS entry cycle. Data are available for all cases who applied to a school requiring UKCAT for entry, regardless of which school they eventually entered.
UCAS	Applicant data with all applications to United Kingdom medical schools and the outcome of the applications	From 2007.	All applications to courses that lead to a primary medical qualification without reapplying via UCAS.

Data source(s)	Description of data	Years available	Database coverage
HESA	Student records collected by the university during undergraduate studies for all United Kingdom medical schools	All cases who started medical schools from 2002.	All student records pertaining to an instance that leads to a primary medical qualification (PMQ), including for the academic year(s) in which the student intercalated.
Student FtP – student declarations	Student character declarations sent to the medical regulator during application for provisional registration on the GMC's register	Only available for provisional registration cases from 2008 onwards. Collection started in November 2007 when the GMC started recording applications in their Siebel CRM system.	68.1% (N = 99 425/146 000) United Kingdom medical school students in UKMED (those starting their PMQ from 2002 onwards) provisionally registered with the GMC from the point these declarations were collected.
Student FtP – medical school records	Medical school records of student FtP	Medical schools have returned these data to the GMC since the academic year 2017/2018. The return covered all students in medical school during the academic year 2017/2018 through to academic year 2019/2020. Coverage is therefore calculated (number of cases with records for academic years from 2017/2018 through to 2019/2020)/(number of cases starting at a United Kingdom medical school since 2002).	28.9% of cases are included in this collection.

Data source(s)	Description of data	Years available	Database coverage
GMC register	All doctors registered by the GMC – United Kingdom graduates are given GMC numbers in their final year as part of the data load from UK medical schools	Taking all cases with a United Kingdom PMQ since 2002 on the GMC's register, excluding those on foreign campuses that are not in the HESA data.	99.9% of cases from HESA data are matched to the GMC register (N = 780 079/780 215).
Application to UK Foundation Training	Application data for Foundation Training in the United Kingdom and the recruitment outcomes; this includes assessment outcomes that are required for an application to the United Kingdom Foundation Programme	All applications received from United Kingdom medical students from 2012. From 2015 onwards the data also included applications from non-United Kingdom primary medical qualification holders.	98.7% of cases have a foundation application record (N = 72 122/73 090 cases with a United Kingdom PMQ from 2012 onwards).
National Training Survey Census	A census is conducted to run the National Training Survey – United Kingdom postgraduate training organizations list all the trainees they have responsibility for on the census date in order for the GMC to administer the survey	From 2012 all cases in UKMED have an entry as the survey was run using GMC systems. A reduced dataset is available for years 2009 to 2011: not the entire population only those who responded to the survey (response rates were 85% [2009], 87.5% [2010] and 87% [2011]).	The UKMED population is in part defined by the NTS census, all cases in the NTS census from 2012 are included in UKMED.

Data source(s)	Description of data	Years available	Database coverage
FtP data	Doctor's FtP allegations as recorded by the medical regulator	FtP events are recorded from March 2006 in the UKMED database.	Available for all doctors in UKMED who graduated since February 2006 and match to the GMC register – see GMC Register match rate above.
ARCP	Training outcomes provided by the deaneries and local education training boards from the annual review of a doctor's competency to progress through their postgraduate training programme	ARCP outcomes are available for all outcomes awarded by deaneries and reported to the GMC from 5 August 2009. ARCPs were not used to monitor foundation training until the training year that commenced on 1 August 2012. At the point of calculating the coverage, UKMED held ARCP outcomes records up until 4 August 2020. Note that data for the training year 2020/21 were collected in November 2021 and have not been loaded yet.	82.1% (N = 86 855/105 765) cases who started in a United Kingdom medical school from 2002 to 2019 and have graduated, have data in the ARCP table.
ORIEL re-cruitment	Postgraduate recruitment data from recruitment to specialty training programmes United Kingdom-wide, including interview scores from specialty recruitment assessment centres	The GMC started collecting recruitment outcome from 2012 onwards. At the point of calculating the coverage, UKMED held ORIEL outcomes records up until the 2020 recruitment cycle. Note that data for the training 2021 cycle were collected in November 2021 and have not been loaded yet.	57% (N = 41 795/73 090) cases with a United Kingdom PMQ who graduated from 2012 onwards and could have applied to specialty training have data in the ORIEL table.

Data source(s)	Description of data	Years available	Database coverage
Medical Royal College exams	Results from the United Kingdom Medical Royal College postgraduate exams and the Prescribing Safety Assessment sat in the final year of medical school	The GMC started collected these data from 1 August 2013. At the point of calculating the coverage, UKMED held Exam data records up until 31 July 2020. Note that data for the training year 2020/21 were collected in November 2021 and have not been loaded yet.	90.5% (N = 95 735/105 765) cases who started in a United Kingdom medical school between 2002 to 2019 and graduated and could have taken one of these exams have data in the exams table.
Electronic staff record	Doctors' practice history and employment in the United Kingdom	These data were collected by the GMC from various points from 2012/2013 onwards across United Kingdom workforce systems. The GMC collects these data for the revalidation doctors.	92.2% (N = 97 470/105 765) cases who started in a United Kingdom medical school between 2002 to 2019 and graduated and therefore could be working in the NHS have data in the doctor's practice history table.

Note: UKMED statistical disclosure rule applied to N – rounded to nearest 5.

Chapter 6: Leveraging multiple data sources to monitor health worker mobility and migration

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6.1 Introduction

Health worker mobility and migration are fundamental and increasingly important features of national, regional and global labour markets (Chen et al., 2004; Stilwell et al., 2004; Dumont and Zurn, 2004; Ahmad, 2005; Dovlo, 2007; Robinson and Clark, 2008). Migration is an "individual, spontaneous and voluntary act" that is motivated by the perceived net gain of migrating (Zurn et al., 2004). Regardless of economic or social context, health worker emigration (exit from country of origin) is commonly considered as a loss of skilled human capital, with a mixed impact in the context of low-resource settings. Conversely, immigrating health workers are considered as a "natural if not cheap" replenishment to the supply side of the health labour market (HLM) where unmet demand persists. Whether it is temporary mobility or permanent migration, a wide range of factors interplay and result in opportunities or adversities for source and destination countries. The objectives of this chapter therefore are focused on health worker international mobility (emigration and cross-border), starting with an overview of the global entities, interests and instruments concerned with its measurement and monitoring over time, the complementarity of data sources and the policy changes overtime. The chapter however does not discuss other forms of health worker mobility (such as those between rural and urban areas, nor between sectors from public to private, or formal to informal).

In 2010, following several years of technical negotiations and political dialogue, the WHO Global Code of Practice on the International Recruitment of Health Personnel ("the Code") was adopted by 194 WHO Member States as a universal ethical framework that elaborated the linkage of the international recruitment of health workers and the strengthening of health systems (WHO 2010; Taylor and Dhillon, 2011; Siyam et al., 2013). A broad range of studies have shown that migrants follow different trends and pathways of mobility, depending on ease of movement (between borders and/or by removing regulatory and administrative hurdles) and economic opportunities (see Box 6.1) (Glinos and Buchan, 2013).

A decade on since the adoption of the Code, monitoring its implementation through country reporting to WHO and review mechanisms have possibly become a pulsation point to assess and reflect on the influence of health worker migration on health systems performance and practice. The status quo in the pre-COVID-19 years consistently showed that the global demand for health workers continued to increase steadily, despite the 2007–2008 financial crisis (Sumpton and Fix, 2014, Liu et al., 2017) especially in countries facing an ageing population and health workforce. In 2016, the WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) forecast a substantial increase in demand for health workers in upper middle- and high-income countries, which rigid supply systems might fail to meet, contributing to increased reliance on international migration (WHO, 2016a). This unrelenting demand is only expected to increase, especially as countries signed up to their renewed commitments to achieve universal health coverage (UHC), and a broader package of service provisions for the health and health-related Sustainable Development Goals (SDGs) by 2030 (UN, 2019a). Explicitly, the United Nations General Assembly reiterated the impending demand for skilled and motivated health workers (UN, 2019a) as a key determinant of ensuring access to quality essential health care services.

Box 6.1 The archetypes of internationally mobile health professionals

1. The **livelihood migrant** leaves the home country for better earnings and better living standards (for the individual but often also for the family).
2. The **career-oriented migrant** moves to develop their career and/or to receive training and/or education abroad, or in mid-career to (further) specialize or to accelerate professional development. Some destination countries, for example the United Kingdom, appear to have a certain appeal, including as a stepping stone for those wishing to move further afield, such as to the United States of America (USA), Australia and New Zealand.
3. The **backpacker** is usually relatively young, works to travel and sees mobility as an opportunity to experience other countries' (work) cultures and health systems.
4. The **commuter migrant** commutes across borders to work at regular and planned intervals but is unlikely to settle down in the "host" country either temporarily or permanently.
5. The **undocumented migrant** is motivated by better earnings and a better life in the host country but works in the informal sector. They fill a gap in service provision with a significant overlap with health care functions (e.g. nursing for handicapped and/or elderly with chronic conditions) and are usually hired privately. The work is characterized by a high turnover and data collection on these is a considerable challenge.
6. The **returner migrant** intentionally goes abroad for a defined length of time or specific goal and returns home once that is accomplished.

Source: Adapted from Glinos and Buchan (2013).

The demand for health workers is occurring during a period of heightened global migratory activity and is at the centre of a prolific global dialogue and international cooperation. In 2018, a non-binding Global Compact on Safe, Orderly and Regular Migration ("Global Compact") was endorsed by the United Nations Member States (UN, 2019b) and the United Nations Network on Migration was established. A powerful advantage of the Global Compact is that it can be deployed as a cooperative framework to leverage the potential of migration for the achievement of all SDGs, as well as the impact this achievement will have on migration in the future (see Box 6.2) (UN, 2019b).

Box 6.2 Objectives for safe, orderly and regular migration

1. Collect and utilize accurate and disaggregated data as a basis for evidence-based policies.
2. Minimize the adverse drivers and structural factors that compel people to leave their country of origin.
3. Provide accurate and timely information at all stages of migration.
4. Ensure that all migrants have proof of legal identity and adequate documentation.
5. Enhance availability and flexibility of pathways for regular migration.
6. Facilitate fair and ethical recruitment and safeguard conditions that ensure decent work.
7. Address and reduce vulnerabilities in migration.
8. Save lives and establish coordinated international efforts on missing migrants.
9. Strengthen the transnational response to smuggling of migrants.
10. Prevent, combat and eradicate trafficking in persons in the context of international migration.
11. Manage borders in an integrated, secure and coordinated manner.
12. Strengthen certainty and predictability in migration procedures for appropriate screening, assessment and referral.
13. Use migration detention only as a measure of last resort and work towards alternatives.
14. Enhance consular protection, assistance and cooperation throughout the migration cycle.
15. Provide access to basic services for migrants.
16. Empower migrants and societies to realize full inclusion and social cohesion.
17. Eliminate all forms of discrimination and promote evidence-based public discourse to shape perceptions of migration.
18. Invest in skills development and facilitate mutual recognition of skills, qualifications and competences.
19. Create conditions for migrants and diasporas to fully contribute to sustainable development in all countries.
20. Promote faster, safer and cheaper transfer of remittances and foster financial inclusion of migrants.
21. Cooperate in facilitating safe and dignified return and readmission, as well as sustainable reintegration.
22. Establish mechanisms for the portability of social security entitlements and earned benefits.
23. Strengthen international cooperation and global partnerships for safe, orderly and regular migration.

Source: UN (2019b).

In the latest periodic evaluation of the Code's relevance and effectiveness, the Expert Advisory Group articulated three key elements related to **Global Compact Objective 1** on data collection and utilization that are advantageous to strengthening the monitoring of health worker migration and mobility (WHO, 2020a):

- **Health workforce density and distribution** for informed-based policy has been identified by the United Nation Secretary General's Report on International Migration and Development (A/RES/71/159) as one of six tier 1 migration-related data indicators.
- The importance of **government-to-government agreements** and improved recognition of qualifications is reflected in the Global Compact under the broader aim of facilitating highly skilled mobility, ensuring employment and addressing demographic-related global labour market challenges. The health sector is key to this effort.
- One idea in the Global Compact was the creation of **global partnerships to invest in skills development in countries of origin to better meet global labour demand**. Nursing was the example given during deliberations, with investments in nursing education in countries of origin to help meet nursing shortages in others.

The GSHRH (WHO, 2016a) stipulated the importance of monitoring the situation of health workforce migration as a cross-cutting priority of its four-pillar objectives. It introduced globally a new tenet of global human resources for health (HRH) data collection – national health workforce accounts (NHWA) – to collate health workforce mobility data globally (WHO, 2017a). The *State of the world's nursing (SoWN) 2020* report identified that about one in eight of all nurses globally is practising in a country different from where they were born (WHO, 2020b). At the time of writing this chapter, the latest NHWA data available from 111 WHO Member States show that the overall (unweighted) proportion of foreign-trained and/or foreign-born health personnel is around 15% (18% for medical doctors, 17% for pharmacists, 14% for dentists, 13% for nurses and midwives) (WHO, 2022a).

Globally, demand for foreign health workers is likely to continue growing. Estimates from Germany, as an example, point to a potential shortage of approximately 500 000 health workers by 2030, with shortages particularly prominent in nursing and elder care personnel (Rothgang et al., 2012). In the United Kingdom, the Health Foundation, Nuffield Trust and King's Fund have identified current shortages of 100 000 staff across the NHS, with the number to potentially rise to 250 000 health workers by 2030 (Beech et al., 2019). Moreover, the movement of health workers is not solely or primarily from the Global South to the Global North. The Brain Drain to Brain Gain project, implemented by WHO with support from the EU and Norway, highlighted substantial intraregional, South-South, and North-South movements (WHO, 2017b).

It is also important to recognize that new prospects and stakeholders are watchful of the health worker migration trends to advance different objectives and policies. The International Labour Organization's (ILO) most pressing current concern is to identify and measure stocks and flows of international migrant workers, and to promote measures to protect them through a rights-based approach (ILO, 2018).

A recent study by the World Trade Organization (WTO) and WHO showed that trade in services frameworks (global, regional, bilateral) contain flexibility to strengthen and advance ethical health worker mobility as well as empowering health stakeholders to strategically leverage trade dialogue and agreements to meet health system needs (Carzaniga et al., 2019). Such agreements can create measurable if not sustainable returns in strengthening health systems, particularly in countries facing the most pressing health workforce challenges related to achieving UHC (WHO, 2020c).

The demand for quality data on health worker migration therefore will continue to increase, especially in the context of the COVID-19 pandemic, a protracted public health crisis that is bound to affect health systems everywhere.

6.2 Strengthened data and tools

The United Nations recommends the measurement of international migrants as "all persons who are usual residents of that country and who are citizens of another country (foreign population) or whose place of birth is located in another country (foreign-born population)".[1] Additional to those is the concept of foreign-trained workers, which simply indicates those currently active in the workforce who acquired their training in a country other than where they are currently employed.

There are many concepts describing the movements of skilled migrants: summarized in Box 6.3 (ILO, 2012; 2018; IOM, 2019). These have been used in different studies to describe the mobility of highly skilled migrants, such as medical doctors, nurses, midwives, dentists and pharmacists amongst others. Countries can draw on several data sources (Table 6.1) of variable strengths and limitations, to characterize health workforce mobility.

1 https://ilostat.ilo.org/resources/concepts-and-definitions/indicator-description-international-labour-migration-statistics/

Box 6.3 Comparing the concepts, classifications and measurements of skilled health worker migration

<table>
<tr><th>Concepts of skilled health worker migration (extracts from IOM, 2019)</th><th>Classification
Who are skilled health migrants?
A selective listing (ILO, 2012)</th><th colspan="2">Monitoring of national statistics on international labour migration (ILO, 2018)</th></tr>
<tr><td rowspan="7">Brain circulation: The effect of the movement of skilled migrants among their countries of origin and other countries, bearing their knowledge and skills which can benefit countries of origin as well as countries of permanent or temporary destination. The exchange of knowledge and skills of migrants with communities and institutions in their country of origin and destination that allow migrants to apply the benefits of the knowledge and skills they have gained while living and working abroad.

Brain drain: Depletion of human capital in a specific occupation or economic sector resulting from the emigration of skilled workers engaged in this occupation or sector from the country of origin to another country (or from one region of a country to another – internal migration).</td><td rowspan="7">22 Health Professionals

221 Medical Doctors

2211 Generalist Medical Practitioners

2212 Specialist Medical Practitioners

222 Nursing and Midwifery Professionals

2221 Nursing Professionals

2222 Midwifery Professionals

226 Other Health Professionals

2261 Dentists

2262 Pharmacists

32 Health Associate Professionals

321 Medical and Pharmaceutical Technicians</td><td colspan="2"></td></tr>
<tr><td colspan="2">Resident population (country of measurement)</td></tr>
<tr><td>Labour force (employed + unemployed)</td><td></td></tr>
<tr><td>a. Usual residents in country of measurement</td><td>International migrants</td></tr>
<tr><td>b. Not usual residents in country of measurement (non-resident foreign workers)</td><td>Rest of the world</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">International migrant workers present in the country (or equivalently, international migrant and non-resident foreign workers)</td></tr>
</table>

Brain gain: From the perspective of a country of destination, immigration of skilled workers into the country resulting in the acquisition of human capital. From the perspective of a country of origin, the positive spill-over effects of the emigration of highly skilled workers such as brain circulation, or the motivational effects of migration that spur aspiring migrants to acquire further skills. Brain gain also occurs when migrants return back to their country or communities of origin and bring back with them new skills and knowledge acquired in migration. **Brain waste:** In the migration context, the under-employment or unemployment of migrant workers who are unable to find jobs matching their skill level, owing to, for example, the lack of skills recognition, informality of employment relations or discrimination. **Skilled migrant worker:** A migrant worker who has the appropriate skill level and specialization to carry out the tasks and duties of a given job. **Highly skilled migrant worker:** A migrant worker who has earned, by higher level education or occupational experience, the level of skill or qualifications typically needed to practise a highly skilled occupation.	3212 Medical and Pathology Laboratory Technicians 3213 Pharmaceutical Technicians and Assistants 3214 Medical and Dental Prosthetic Technicians 322 Nursing and Midwifery Associate Professionals 3221 Nursing Associate Professionals 3222 Midwifery Associate Professionals 325 Other Health Associate Professionals 3251 Dental Assistants and Therapists 3255 Physiotherapy Technicians and Assistants	

Table 6.1 Potential sources of health workforce mobility data: a comparative overview

Source	Key concept	Measures of stocks, inflow	Education, migration		Employment status (to distinguish active/inactive)
			Foreign-trained	Foreign-born	
Surveys of health personnel	In some countries, the MoH or other bodies regularly conduct (or commission) surveys on health personnel, usually separately by occupation type. These surveys can provide a broad set of data on the education, migration and employment, with variable frequency (ranging from annual surveys, to once every 3 to 5 years).	Yes, Yes	Yes	No[a]	Yes
Labour force surveys	These are implemented globally to collect data on labour market participation, covering all sectors and all occupations in the economy.	Yes[a], No[a]	No[a]	Yes	Yes
International migration household surveys	An example of these is the MED-HIMS (Household International Migration Surveys in the Mediterranean countries) – a regional programme of coordinated international migration surveys requested by the national statistical offices of most of the countries of the European Neighbourhood Policy – South Region.	Yes[b], Yes[b]	Yes[b]	Yes[b]	Yes[b]

Population censuses	Conducted once every 10 years, censuses provide nationally representative information on health workers' country of birth, nationality/citizenship, previous place of residence and/or place of residence at a given time in the past (e.g. 5 years) as key information on the migration status among medical, nursing and other health professionals.	Yes, No	No[a]	Yes	Yes
Work permit issuing entities including ministry of interior	Except within free movement areas, migrants intending to move to another country to work or settle usually need to apply for and be granted a work permit.	No, Yes	No	No	No
Recognition of foreign qualifications	Qualification recognition is one of the requirements for health workers to be able to practise. The MoH, ministry of education, regulatory authority for health practitioners or a commissioned entity[2] could be responsible for recognition of qualifications acquired outside of the country.	No, Yes[c]	Yes	Yes[c]	No
Professional registries maintained by regulators	Regulators maintain a registry of health workers who have been authorized to enter into practice. The information on the registry varies between countries and regulators. In some countries the registration or licensure of health workers is time-limited and requires periodic renewals while in others it can be valid for life.	Yes[d], Yes	Yes	Yes[e]	No

Government registries on HRH and/or information systems (national/ subnational)	Information on employed health workers are captured and documented in human resources records and may include "country of birth", "citizenship at birth", "country of present citizenship", "country of residence", as well as "country of professional training". HRHIS data are commonly used as a "stock only" source; however, increasingly, more countries are investing in using unique identification numbers for their health workers, which could be an opportunity for the "the inflow" aspect to be addressed.	Yes, Yes	Yes	Yes	Yes

Notes: [a] Limited capacity; [b] Conducted in source countries with the potential to include HRH data; [c] Not all those requesting qualification validation may actually move (e.g. some may not meet other requirements, others may change their mind). It is more of a measure of intention of inflow than actual inflow; [d] Depends on how the registry is maintained. Data on stock could be valid if registries include data on entry and exit. When exit data are not included, the stock data are not accurate since they may include deceased and retired workers and those who have moved to another country or jurisdiction; [e] May capture nationality instead of place of birth.

Since the adoption of the Code in 2010 and the GSHRH in 2016, notable improvements have been achieved in the availability of health worker migration data at the national, regional and global levels. Those could be broadly attributed to three main data collection mechanisms:

1. In 2010, the Joint Questionnaire (JQ) was rolled out by the trilateral partnership of the Organisation for Economic Co-operation and Development (OECD), Eurostat and the WHO Regional Office for Europe to collect internationally comparable data on non-monetary health care statistics to reduce the data collection burden on national authorities and improve consistency of data across international databases (OECD, 2020). Sixty-one countries receive and respond on an annual basis to the JQ, 53 in the European Region and 8 OECD countries outside Europe (Australia, Canada, Chile, Japan, Mexico, New Zealand, Republic of Korea and the United States of America (USA)). In 2015, the JQ introduced the collection of migration data requested and used by the trilateral partnership; the main purpose is to improve the monitoring of international health workforce migration through the collection of a minimum dataset that is relevant to both source and destination countries (Box 6.4) (OECD, 2020).

Box 6.4 Health workforce migration data in the JQ

- Foreign-trained doctors (stock, annual flow)
- Foreign-trained nurses (stock, annual flow)

The key features are:

- To focus mainly on the **place of training** (defined as the place of first qualification)
- To collect **immigration data** from destination countries by all countries of origin, based on available national sources (examples are in Table 6.1)
- To avail the **list of countries/places of training** (with ISO codes for automated completion)

Source: OECD (2020).

2. At the global level, the National Reporting Instrument (NRI) (WHO, 2022) was devised by the WHO Secretariat to monitor the implementation of the Code and started data collection in 2012/2013 requesting the same minimum dataset as that of the JQ on the stock and annual flow of foreign-trained and, in addition, foreign-born health professionals in support of two core principles of the Code implementation on data gathering (eighth principle) and information exchange (ninth principle) (WHO, 2013). Table 6.2 illustrates the progress in the collaboration between WHO and its Member States in the exchange of information on monitoring the implementation of the Code. During the four rounds of reporting (between 2012 to 2022), the number of designated national authorities increased from 85 Member States to 158 (86% improvement) and the number of countries responding to the NRI from 56 to 77 (38% improvement). Noteworthy is the engagement of key destination countries such as Canada, the United Kingdom, Germany, and the Gulf countries. Notably, there has been a slow pace of reporting from the African Region, which may be partially due to the voluntary nature of the Code or could be primarily attributed to the perception that the Code principles are geared towards the bigger economy destination countries than those found in the African Region.

Table 6.2 An overview of progress in the designation of national authorities and reporting (2012–2022)

	Number of countries with designated national authorities				Designated national authorities that reported to WHO			
WHO Region	First round (2012–2013)	Second round (2015–2016)	Third round (2018–2019)	Fourth round (2021–2022)	First round (2012–2013)	Second round (2015–2016)	Third round (2018–2019)	Fourth round (2021–2022)
African Region (n=47)	13	14	17	24	2	9	7	8
Region of the Americas (n=35)	11	15	15	28	4	9	8	12
South-East Asia Region (n=11)	4	7	10	9	3	6	9	6
European Region (n=53)	43	43	42	49	40	31	31	24
Eastern Mediterranean Region (n=21)	8	14	20	22	3	7	15	15
Western Pacific Region (n=27)	6	24	18	26	4	12	10	12
Global (N=194)	85	117	122	158	56	74	80	77

Source: WHO (2022a).

3. Following the global adoption of the GSHRH (WHO, 2016a), the implementation of the NHWA gained pace through concerted efforts of technical support and capacity building activities by the WHO Secretariat. A purpose-built platform was developed that facilitates the annual tracking and reporting by nationally nominated focal points across the 10 NHWA modules. Countries are offered technical support on how best to collect and report the numbers of foreign-born and foreign-trained health professionals (Box 6.5), in tandem with data mining and triangulation efforts by the WHO Secretariat from published data (described in Table 6.1). One key advantage of the NHWA mechanism is in how it expands the scope of reporting migration data beyond medical doctors and nursing personnel to progressively include other occupations, such as dentists and pharmacists among others. There are also the opportunity aspects of enhancing/strengthening/streamlining the underlying data sources and mechanisms used to collect and report the data. Figure 6.2 (on foreign-trained health workers) provides an overview of how data are collected across data sources and by engagement with multiple stakeholders at the national level as well as global partnerships,

such as those with the OECD and Eurostat via the JQ (OECD, 2020), with the United Nations Population Fund (UNFPA) via the *State of the world's midwifery (SoWMy) 2021* report (UNFPA, 2021), and the Global oral health survey (WHO, 2022b). The overarching objective of improving the knowledge and evidence base of health workforce migration data (as described in Boxes 6.2 and 6.3) is therefore harnessed by the NHWA approach of implementation and data intelligence.

Strengthening investments into these mechanisms will be crucial to serve the two data-driven recommendations of the Expert Advisory Group (WHO, 2020a) in support of the Code implementation activities in 2020–2023:

(2) To strengthen the Member State reporting processes related to the fourth round of national reporting, including improved synergy with NHWA.

(8) To regularly update the list of countries with critical health workforce shortages, with the Secretariat encouraged to explore analysis that considers the full dynamic of the HLM in determining health workforce vulnerability.

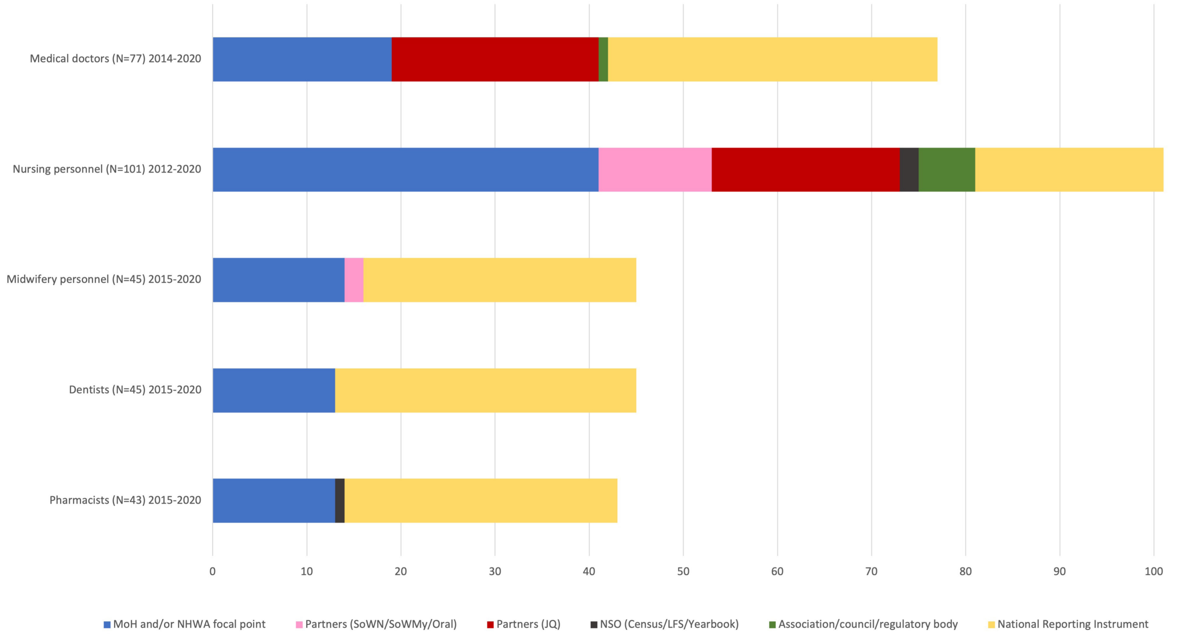
In terms of global policy and health development assistance, the benefits of improved health workforce data availability (funnelling into the NHWA) was further underscored by the Expert Advisory Group's endorsement (WHO, 2020a) of the use of the association between the UHC service coverage index (UHC SCI) (WHO, 2017e:10) (the official indicator for SDG 3.8.1) and the health worker density (the official indicator for SDG 3.c.1) to identify countries with the most pressing health workforce challenges in relation to UHC and where special caution in terms of active international recruitment is warranted (WHO, 2020a:Fig. 1; WHO, 2020c).

Box 6.5 Monitoring HRH migration through the NHWA

Indicator number	1 – 07	1 – 08
Abbreviated name	Share of foreign-born health workers	Share of foreign-trained health workers
Indicator name	Percentage of active foreign-born health workers	Percentage of active foreign-trained health workers
Numerator	Number of active foreign-born health workers	Number of active foreign-trained health workers
Denominator	Total number of active health workers, defined in headcounts	Total number of active health workers, defined in headcounts
Disaggregation	By occupation	By occupation, by occupation and country of training
Definition	This indicator will capture the information on health workforce coming from abroad	Percentage of active foreign-trained health workers in the active health workforce
Data reporting frequency	Annual	Annual
Potential data sources	• Health workforce registry or database • Professional council/chamber/association registers • Health facility data • Population census data (data mainly available on place of birth, not place of training)	• Health workforce registry or database • Professional council/chamber/association registers • Health facility data

Source: WHO (2017a).

Fig. 6.2 Number of countries providing data (at least 1 year) on foreign-trained health workers by occupational group and data sources (2012–2020)



Source: NHWA Data Platform (accessed 27 October 2021).

6.3 Data successes, innovations and limitations

An increasing number of countries globally have been tracking their reliance on international health workers. Using data from the Nursing and Midwifery Council (NMC) in the United Kingdom, recent analysis indicates that about 15% of registered nurses in the United Kingdom are foreign-trained – more than double the average for high-income OECD countries (Buchan and Shembavnekar, 2020). It is arguable however whether such a pattern can sustain itself in the coming years beyond the COVID-19 pandemic.

In measurement terms, the concept of "foreign-trained" health personnel is not simple and requires attention in measurement not to include nationals of the host or destination country. In 2017, a study linking data between the Irish Medical Council on country of qualification and nationality with the profiles of non-consultant hospital doctors (NCHDs) showed that graduates from central European medical schools (including nationals of these countries, Irish nationals and non-EU nationals) were increasingly found working in Irish hospitals (WHO, 2017c). It can also be anticipated that the concept of "foreign-trained" health providers may become more elusive to standardize and use in the new age of tele-medicine service provision.

Though destination countries robustly document the details of immigrant health workers who are registered by professional councils, they are bound to miss foreign health workers whose qualifications are not recognized. These workers may work in the health sector in lower qualified occupations (Bruyneel et al., 2013), or not work in the health sector at all.

Conversely, the concept of internationalized education shows that education and training of foreign students is likely to provide a pathway of employment in countries of medical education and training. An analysis of OECD countries' health worker migration data revealed that the proportion of health workers trained abroad is lower than that of health workers born abroad, indicating that host countries provide part of migrants' education and training (Dumont and Lafortune, 2017). Increasingly, migrants seeking medical education and training present a dual economic benefit to the host country education and health labour markets. A new and replicable type of private-public global skill partnership could facilitate mid-level technical training (for example of Syrian nurses displaced to Türkiye) to fill the labour gap in Western Europe (for example in Germany) (Clemens and Gaugh, 2017). A gain that can be captured either by destination-country governments, by the employers, by the migrants (as a kind of student loan), or some combination of these (Clemens and Gaugh, 2017).

A third concept difficult to foresee and measure is that of temporary mobility in terms of duration (commonly for limited periods of employment) and patterns. For example, in Australia, between 2008 and 2016, the number of doctors and nurses granted work visas through temporary skilled worker schemes surpassed the number of permanent migrant doctors and nurses (Hawthorne, 2017). In the USA, in 2016, 10 500 physicians were employed on temporary visas (or H-1B visas), representing 1.4% of the total physician workforce (Kahn and Gardin, 2017). In 2012, more than 62 000 health workers from Cuba were deployed in 66 countries across the globe on a temporary basis (Lipszyc et al., 2016). In Japan, a trainee visa programme was launched in 2019 to address labour shortages, with up to 60 000 nursing care workers expected to take temporary jobs (Shiraiwa, 2018). Whether or not these policies are considered as Code-friendly remains difficult to judge, given that recruitments under those schemes may or may not target specific countries or economies (as discussed in Chapter 1).

Source countries require innovative approaches to build the knowledge base of their health workers' mobility: postgraduation surveys or graduate tracking mechanisms (as presented in Chapters 4 and 5) are useful tools to capture trends of professionals' mobility patterns. For example, a Kerala-based retrospective study of medical graduates collected information on the location and career trajectory of the 2010 Bachelor of Medicine, Bachelor of Surgery (MBBS) graduating class (WHO, 2017d) 6 years after graduation. Of the 481 graduates, 75% practised in Kerala State, 20% moved internally to work in other parts of India and 5% emigrated to work abroad (primarily to the USA). Mid-stage health professionals can be studied better using household panel surveys such as the MED-HIMS (Eurostat, 2021). Such surveys could be well-adapted to provide data on current and returning migrants employed in health occupations.

6.4 Policy relevance and future directions

While governments remain in pursuit of UHC, a leading investment of their limited resources is that related to the health workforce (Stenberg et al., 2017). In the latest report of the Expert Advisory Group, evaluating the implementation of the Code, a key concern expressed is that the Code's principles, objectives and articles are needed to ensure that progress.

The unmistakable reality is that destination countries, whether in OECD countries or elsewhere, recognize reliance on international health workers and are pursing different approaches to ensure appropriate production and quality of select health workers.

In global terms, the rising demand for quality health workers is gradually shaping the incoming supply. A key recommendation of the High-Level Commission on Health Employment and Economic Growth (WHO, 2016b) remains highly relevant to every country context: "Every country can advance the international recognition of health workers' qualifications to optimize better skills use, increase the benefits from and reduce the negative effects of health worker migration, and safeguard migrants' rights".

The partners of the Global Compact recognized that migration has been part of the human experience throughout history, and acknowledge it as a source of prosperity, innovation and sustainable development in a globalized world. While there is an opportunity for trade in services agreements to enrich the flow of investments in source countries, it remains disconcerting to observe how those are expected to strike a balance between the outmigration of their qualified and regulated health workers against the seemingly less qualified or lower quality remaining supply of health workers. A complex structure of health care markets in terms of quality and cost of care has been observed in India, a country considered among the largest source of health worker migrants globally, with most health care providers accessible in the private sector (86%) and, within the private sector, the majority are "informal providers" without any formal medical training (Das et al., 2020).

The Commission (WHO, 2016b) called on ILO, OECD and WHO "to establish an international platform on health worker mobility" that can host the evidence and expand the dialogue on the concepts, options and solutions on the anticipated increasing trend of mobility globally. This chapter shows the importance of concerted, well-defined measurements of health worker mobility to be collected and exchanged between different stakeholders.

Clear progress has been achieved in terms of improved availability, quality and use of health worker mobility data in the past decade with expanding evidence generated on the trends and pathways. Key of which is the willingness of countries (destination and, with a lesser capacity, source countries) to collect and analyse health workers migration data in the search for more effective health workforce planning and policies.

The momentum gained in improving health worker migration data could increase if countries were to institute the key metric discussed in this chapter (the numbers of foreign-trained health professionals by country of training) to be consistently measured with quality and completeness in their regular health workforce data tracking channels. This could be a central starting point in supporting countries implement the Code. During the fourth round of reporting (2021–2022), 58 countries (a quarter of WHO Member States) requested technical support to implement the Code, predominantly to strengthen data and information systems, enhance policy dialogue and develop bilateral agreements (WHO, 2022a).

With improved and reliable data, source and destination countries can forge better negotiations for stronger bilateral agreements or, when necessary, resort to protective self-regulation mechanisms, such as adopting a quota system of outmigration, to reduce the risks of their own health system disruptions due to health worker migration.

This chapter has also demonstrated that global partners hold different global policy goals and prospects that influence the study of migration trends. Therefore, with all good intentions and collaborative efforts, the development of efficient and equitable accessible health systems remains a core and ethical responsibility for the decision- and policy-makers. Measuring and understanding the main drivers of health worker mobility are indispensable elements of this responsibility especially in the post pandemic recovery and renewal phase.

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Chapter 7: Measuring the private sector's share of the active health workforce: the importance of differential data sources and regular monitoring

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7.1 Introduction

The private sector plays a significant role in health system development, management and effectiveness. Some governments, by a conscious decision or due to lack of control, have shifted health sector development funding to investors seeking viable returns on investments, driven by population and economic growth and health needs. However, the growth of the share of the private sector in health service delivery and in the employment of health workers has come with significant challenges, particularly in low- and middle-income countries (LMICs). There is a current of thinking that proposes that it is a legitimate question to ask, "what is the best and most efficient mix (of private and public services) for the local context?" (Hsu, 2010). This chapter sheds light on the importance of measuring and profiling the active health workforce engaged in the for-profit and not-for-profit private sector in health care and discusses the strengths and limitations of the available key sources of information.

The chapter, however, does not address the complexity of the private sector share of health professionals' education (discussed with some detail in Chapter 3). The chapter concludes by proposing a range of actions for consideration by governments and global partners to improve the generation and use of health workforce metrics in the private sector for a better understanding of its contribution to achieving universal health coverage (UHC).

7.2 Defining the private sector in the mix of health system models

An equitable access to quality health care is a fundamental concern of all governments who are accountable in ensuring how best to achieve a proper balance between the demand and supply of different categories of health workers (Ono et al., 2013). Health systems are expected to vary in their structure relative to four widely accepted models (Box 7.1) which determine, to a degree, the employability and distribution of health workers within them. However, regardless of the model or mix of models dominant in a country, it remains important to regularly assess and monitor how the distribution of health workers in the private sector affects the geographical accessibility of health care services, and how wage differentials and differences in working conditions between the public and private sectors affect the mobility and professional decisions of workers (WHO, 2021: Module 10).

Intuitively, the information necessary to profile and enumerate health workers is best captured relative to the type of ownership of the health facility or workplace where they are employed and contracted to work. Most commonly, health workers are enumerated via their primary site of employment either in facilities funded through public sector spending, or privately funded, usually through user fees and insurance schemes.

Privately funded service providers or facilities are commonly divided into two main categories (WHO, 2021: Module 10):

- Private for-profit providers include health centres, clinics, general and specialized hospitals (on some occasions offering highly specialized care) and nursing homes. The formal private for-profit providers include self-employed doctors, dentists, pharmacists, nurses providing home care, and a range of specialized practitioners, such as physiotherapists, audiologists, speech therapists, nutritionists and chiropractors. The practice of these workers is normally regulated; there are also requirements to regularly update their knowledge and skills to keep their licence to practise. Informal private for-profit providers are those without any formal medical training and are usually unlicensed and unregulated (Das et al., 2020).

- Not-for-profit providers include nongovernmental, humanitarian, national, international, charitable and faith-based organizations which usually target primary health care (PHC) service delivery and societal benefits in developing health systems (Smith et al., 2001). These tend to be well-operated and moderately regulated by national health authorities.
- There are also public-private partnerships, or collaborations between for-profit and government/non-profit entities to deliver services, with varying user fees for patients and varying levels of public subsidization for delivering health services (Basu et al., 2012).

It is important to note that there is no standard benchmarking regarding how health services should be split between public and the private sector provision, regardless of the health system financing model.

Box 7.1 Types of health systems financing models

1. The **Beveridge model** is a health financing model established as a national health service; the national government acts as the single payer, eliminating competition in the market and generally keeping prices low. Health care is funded through government revenues (mostly income taxes) and free of charge (with little to no out-of-pocket fees) at the point of health care. Under this system, a large majority of health workers are **government employees.** A central tenet of this model is to guarantee universal coverage to all citizens and residents. It has been adopted by countries of varying income levels including the United Kingdom, New Zealand and Cuba. Over the years, the private sector has become accepted within Beveridge model health systems to leverage additional resources. In the United Kingdom, services such as dental care, optical care and pharmacy, have been provided for decades by the private sector and most general practitioner (GP) practices are private partnerships funded by the National Health Service (NHS). While difficult to quantify, approximately 25% of NHS spending goes to private sector provision (The King's Fund, 2021).
2. The **Bismarck model** (or social health insurance model) guarantees health care coverage to employers and employees who contribute to a health insurance fund created by compulsory payroll deductions. Health providers are generally **private institutions**, albeit the social health insurance funds are considered public. Private insurance plans cover employed individuals, through either a single insurer (France and the Republic of Korea); multiple, competing insurers (Czechia and Germany); or multiple, non-competing insurers (Japan). Regardless of the number of insurers (and profit margins), the government controls prices tightly, allowing it to exercise a similar degree of control over health services pricing as in the Beveridge model.
3. The **national health insurance model** incorporates aspects of both the Bismarck and Beveridge models. Similar to the Beveridge model, the government acts as the single payer for medical procedures, and like the Bismarck model, providers are generally **private institutions**. Here, the universal insurer does not make profit. In countries, such as Canada, private insurance contracting is permitted. Like the Beveridge model, the public insurance system covers most procedures regardless of patient income level.

4. **Out-of-pocket financing** is prevalent in countries with insufficient public health care infrastructure and low public spending on health. However, it exists in all countries to the extent of the use of private services. Private health care providers thrive in this model leaving governments in LMICs with major challenges (Clarke et al., 2019). Private for-profit providers may not be properly managed or regulated, resulting in behaviours that threaten the UHC objectives of equity and quality (McPake and Hanson, 2016), and often governments lack the governance tools to help align the activities of these providers with national priorities (Bloom et al., 2011). Considering the rapid rate of development of the private sector, these countries require special assistance to develop and implement context-specific, appropriate policy and regulatory instruments and to establish a competently qualified workforce to implement them (Clarke et al., 2019).

Source: Updated and adapted from Chung (2017).

Table 7.1 Comparing the number of hospitals by ownership model, 2017 (or most recent year) in selected OECD countries

Country	Total	Public	Private		Percentage of private for-profit hospitals (%)
			Not-for-profit	For-profit	
Australia	1353	696	114	543	40%
Austria	271	147	39	85	31%
Belgium	175	40	135		0%
Canada	722	715		7	1%
Chile	358	210		148	41%
Colombia	10 140[a]	1011	1088	8041	79%
Costa Rica	43	30	0	13	30%
Czechia	258	161	3	94	36%
Estonia	30	20	3	7	23%
Finland	247	168		79	32%
France	3046	1364	680	1002	33%
Germany	3084	785	970	1329	43%
Greece	277	125	5	147	53%
Israel	83	37	25	21	25%
Italy	1063	431	32	600	56%
Japan	8412	1538	--	--	0%
Republic of Korea	3887	221	3666	0	0%

Latvia	63	45	0	18	29%
Lithuania	93	85	0	8	9%
Luxembourg	12	5	6	1	8%
Mexico	4538	1380	18	3140	69%
Netherlands	546	0	135	411	75%
New Zealand	162	84	26	52	32%
Poland	1274	748	26	500	39%
Portugal	225	111	58	56	25%
Spain	779	342	122	315	40%
Sweden[b]	83	77	3	3	4%
Switzerland[b]	293	61	82	150	51%
Türkiye	1518	929	0	589	39%
United Kingdom	1920	1920			0%
United States of America	6210	1427	3133	1650	27%

Notes: Public: hospitals that are owned or controlled by a government unit or another public corporation. Private not-for-profit: hospitals that are legal or social entities created for the purpose of producing goods and services, whose status does not permit them to be a source of income, profit, or other financial gain for the unit(s) that establish, control or finance them. Private for profit: hospitals that are legal entities set up for the purpose of producing goods and services and are capable of generating a profit or other financial gain for their owners.

[a] Total is the sum of public and private compared with that reported to OECD (10 560); [b] Esmail and Barua (2018).

Sources: OECD Statistics (accessed 25 January 2022).

7.3 Health worker distribution between sectors

Broadly speaking, there is considerable variation across countries in the distribution of the private for-profit and not-for-profit health care services in countries with the same level of income or in the same geographical region. For example, for the United States of America (USA), Table 7.1 shows that 27% of hospitals are in the private for-profit sector, while the latest national health workforce accounts (NHWA) data indicate 62.7% of the nursing personnel belong to the same sector (NHWA Portal, 2021). While in Czechia, the percentages are more balanced, indicating that 36% of hospitals (Table 7.1) and 39.8% of nursing personnel (NHWA Portal, 2021) belong to the private for-profit sector. In the case of Türkiye, Table 7.1 shows that 39% of hospitals are private for-profit but only 1 in 10 medical doctors are reported to be working in that sector (NHWA Portal, 2021).

The distribution of health professionals between sectors is complex and difficult to measure. The concept of dual practice (explained in Box 7.2) can take different forms and most likely presents with variable impact in all countries regardless of income, even in settings where there are major regulatory restrictions, such as China (Ferrinho et al., 2004). However, recent evidence indicates that dual practice is increasingly authorized in many countries as a measure to improve recruitment, retention and service provision (WHO, 2021: Module 10). In some countries, however, where dual practice is prohibited (and may nevertheless exist informally), the evidence on the effectiveness of regulatory alternatives remains inconclusive (González and Cuadrado, 2019). It is therefore accepted that the implications of dual practice are likely to be context-specific and would require different regulatory options to mitigate the adverse effects over time (McPake et al., 2016).

A large body of evidence describes the pull-push factors health workers face between the two sectors across different economies, particularly for more specialized health professionals. A common view is that the private sector will usually be based on fee-for-service payments where the volume of care is related to income, thereby providing incentives to see more patients and to have higher productivity levels than in the public sector (McPake et al., 2014).

A career progression pattern observed in some countries is that health professionals begin their training attached to a publicly funded teaching facility or hospital (traditionally linked to public training institutions) until full qualification, then stay in public service practice but with time find employment in the private sector (either partially or fully). This pattern may result in a distorting effect whereby health professionals initiate their practice and gain proficiency in the public sector and later are lured into the private practice or sector (a "skill drain" rather than "brain drain") especially for professions with limited public sector availability (such as pharmacists, dentists, audiologists, physiotherapists and medical prosthetists).

Box 7.2 Health professionals in dual practice

Health professional globally may undertake different forms of dual practice between the public and private sectors in regulated as well as unregulated ways (Russo, McPake et al., 2014), and in an authorized or informal manner as well.

Health professionals can work in a public service provision role and take up other roles (McPake et al., 2014):

- **Outside:** in a completely separate private environment;
- **Beside:** in a private ward or clinic physically associated with a public facility but run as a separate business;
- **Within:** where private services are offered inside a public facility but outside public service operating hours or space; or
- **Integrated:** where additional fees are charged for services offered alongside standard public ones, often informally, on the understanding of a faster – or higher quality – service.

In an ideal world, countries can track health workers through institutions, which entails enumerating every health facility and counting the number of workers by occupation – the equivalent of a census. Though it can be a challenge to accurately measure the headcount as many physicians and specialists share their working time between facilities (and most likely across sectors) or can be present predominantly in one sector (such as the case of pharmacists and dentists in some settings).

It is important to also acknowledge that in many LMICs the composition of the health workers providing care in the mixed public–private health systems can be dazzling. A conceptual mapping can be made relative to four overlapping dimensions: ownership (representing a continuum from public to private); recognition (from formal to informal); knowledge system (from Western or modern medicine to traditional medicine); and cadre (from specialized to lay), which may entail balancing acts between divergent (corrective) policy priorities (Sheikh et al. 2017).

7.4 Capturing data on the private sector share of the active workforce

The quest for data on the private sector's active workforce is complex. Direct sources exist through institutional records of employment as part of regulation and licensure. However, such data are difficult to access and are likely to vary in terms of quality and comprehensiveness, particularly in countries where a multisectoral governance mechanism for human resources for health (HRH) data is absent or poorly functioning (WHO, 2018). Public sector managers would face difficulties when extracting and testing the accuracy of information provided by the private for-profit sector, mainly because routine data return systems involve transactional and opportunity costs and a reluctance to divulge data on charges and service user volume for fear of state interference (including taxation and income) (Smith et al., 2001).

At a global level, the *World Health Report 2006: working together for health,* with limited available data, reported that over 70% of medical doctors and over 50% of other types of health workers in LMICs indicate their primary site of employment as the public sector. Ironically, insufficient data were available at the time from high-income countries (HICs) and for faith-based organizations and non-governmental organizations (NGOs) (WHO, 2006).

It is therefore necessary to bring together data from multiple resources to build estimates of the size and sociodemographic characteristics of the active health workforce in the private sector. Table 7.2 provides a selection of potential sources of data and compares their relative merits and limitations. Advisably, those should be used jointly to compile a comprehensive picture of the employment situation and to mutually improve the quality of the data. Key among the sources are the labour force surveys (LFS), which are a standard household-based survey of work and industry-related statistics, which target the measurement of economic activity in populations and cover a wide range occupational groups by industry (see Chapter 17).

Labour statistics on employment are also available from establishments (such as hospitals and health facilities) surveys and censuses as well as from administrative systems such as social security records, tax records, and public sector payrolls (ILO, 2016). Administrative systems data can extend to include educational and training health employees and those working in private practice (such as pharmacists, dentists) (ILO, 2016). These sources can produce different estimates for the same phenomenon; for example, different estimates of employment from an LFS and from a health facility survey, could be partially attributed to whether headcounts, or full-time equivalents (FTEs) are used to estimate employment. It is therefore important to use methods of triangulation to assess the quality of data obtained from different sources (see details in Chapter 18). Also, many countries collect market information through household and establishment surveys, population censuses and administrative records, so that the main problem is not the lack of information, but the technical guidance and capacity to generate estimates and communicate results to national policy-makers (ILO, 2016).

Table 7.2 Selective sources of data on the private sector share of the active health workforce – a comparative overview

Source of data	Strengths	Limitations
Population census	• Provides nationally representative data on the head count of all occupations (including public and private sectors, management and support staff, health occupations in non-health sectors). • Data can be disaggregated for demographic characteristics (e.g. age, sex, educational attainment) and at lowest geographical level. • Rigorous collection and processing procedures help ensure data quality.	• The periodicity (usually every 10 years). • The sheer size of the data/ database management can be computationally cumbersome. • The micro-data that would allow for in-depth HRH analysis are often not released and must be purposely requested. • Usually, no information is gathered on productivity and earnings which by and large depends on whether interviewers are trained well enough to probe on the labour market activities of respondents. • The labour statistics are not detailed enough to track multiple occupations and working hours in each for example, nor the level of employment facility.
Labour force surveys (household)	• Encompass a comprehensive coverage and a greater range of jobs and workers than establishment surveys. • Considered as an independent measurement in line with international industrial and occupations standards. • Benefit from joint data on employment, unemployment, and economic inactivity. • Possibility of other data on labour productivity, for instance on multiple employment, which can be used to derive hours of work in each facility. • Record the facility ownership and the sector where the worker is employed. • Periodicity, often annual or even conducted on quarterly basis.	• Require a strong and dedicated statistical infrastructure. • Could be costly, especially if conducted with high frequency. • Subject to bias from non-response. • Sampling variability could limit geographical representation and other key disaggregation (e.g. a sample size too small to represent the spectrum of health occupations). • Collect information on main and second job, but no information is collected on individuals who have three or more jobs.

Surveys of establishment/ workplace (e.g. hospitals, health facilities) conducted either on a sample or a full census of all establishments	• More accurate information based on establishment records. • Detailed industry data (and occupation at 4-digit codes). • Varied types of wage data (wage rate, earnings, labour cost). • Varied types of hours data (hours paid for, normal hours of work, overtime hours). • Various information that allow for complex situations to be assessed, such as publicly paid for positions in privately operated facilities.	• By nature, provide data only on employed health workers. • Samples are usually drawn from an establishment register which may not include fully private facilities and practices, may exclude the informal sector, and could also miss many small (unregistered) establishments from the sampling frame. • Multiple counting of those with more than one place of employment. • Non-response could be relatively high and could be biased toward better reporting from large infrastructure and less from smaller (e.g. private clinics, laboratories) and primary health care centres. • The level of detailed information could be limited to items available in establishment employment records.
Administrative records (e.g. social security records, tax records and public sector payrolls)	• Overall, lower cost. • Provides full counting of all health workers with detailed biodemographic and socioeconomic information. • Little to no reporting burden. • Possibility of detailed geographical and other disaggregations. • Timeliness.	• Highly dependent on the degree of legislation in a country. • Records vary in scope and could suffer coverage problems. • Could suffer issues of stability over time. • Could contain false or unverified data. • Limited auxiliary data (e.g. on full employment history). • Susceptible to inadequate data protection and confidentiality. • Cannot cover the informal sector.

Human resources for health registries and/ or information systems (national/ subnational)	• If well built on strong principles of multi stakeholder engagement and governance mechanisms and supported by well-legislated implementation could cover all employed health workers in different types of establishments and sectors. • Provide an opportunity for unique identification numbers for each health worker that can be tracked in more than one establishment.	• In practice, the registry or information is sometimes designed to only capture the information on employees in the public sector, and/or, there is little motivation from the private sector to register their employees in what is commonly perceived as a public service system. • Highly dependent on the degree of legislation backing the implementation of human resources for health registries and/or information systems.

Source: Updated and adapted from WHO (2010), ADB (2012) and ILO (2016).

7.5 Strengthening data generation and monitoring metrics

At the global level, the WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) (WHO, 2016a) placed considerable emphasis on strengthening country data to monitor the SDG Target 3.c ("Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States"). At the centre of operationalizing the GSHRH is the progressive implementation of NHWA as a means to the measure indicator 3.c.1 ("Health worker density and distribution"). Countries receive regular guidance on how best to collate and report data on the numbers of health workers employed in public, private not-for-profit, private for-profit health facilities and establishments (Box 7.3), in conjunction with continuing data mining and triangulation efforts undertaken by the WHO Secretariat from published data sources (namely, those described in Box 7.3).

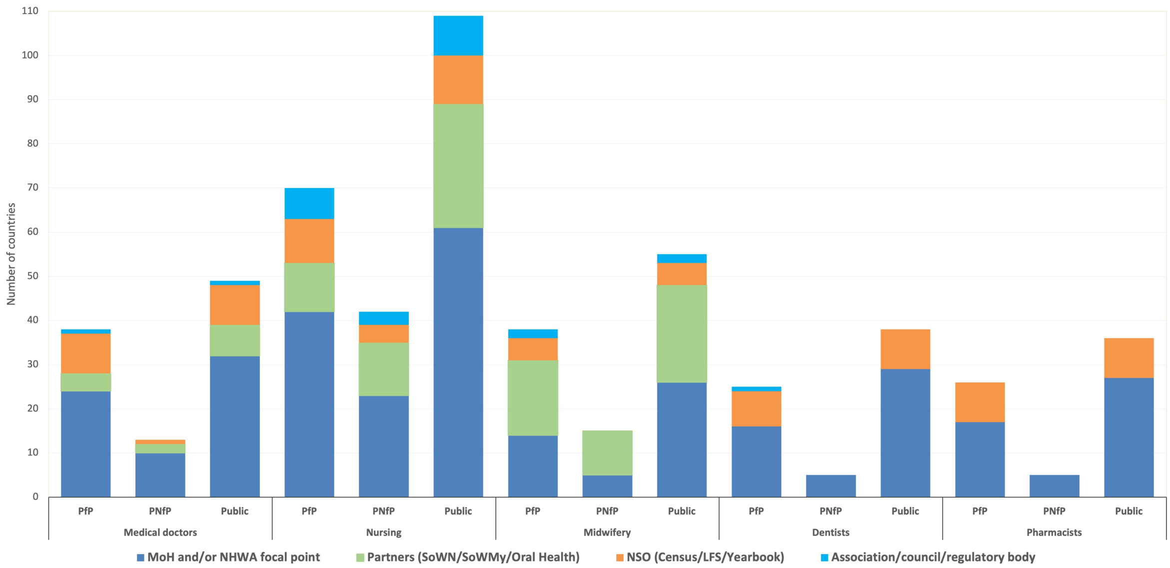
Box 7.3 Monitoring the private sector share of the health workforce using NHWA indicator 1 – 05

Indicator number	01 – 05
Abbreviated name	Health worker distribution by facility ownership
Indicator name	Percentage of active health workers employed by type of facility ownership
Numerator	Number of active health workers, defined in headcounts, working in facilities owned by the given institutional sector
Denominator	Total number of active health workers, defined in headcounts
Disaggregation	By occupation and facility ownership
Definition	Percentage of active health workers employed in facilities by type of ownership (public, private not-for-profit, private for-profit). The categories of facility ownership can be aligned to institutional sector definitions of the system of national accounts (OECD, Eurostat and WHO, 2011)
Data reporting frequency	Annual
Potential data sources	Health workforce registry or database Aggregate data from health facilities (routine administrative records, HMIS, DHIS2, census and/or survey)

Source: WHO (2017).

Fig. 7.1 provides an overview of how data are collected across data sources and by engagement with multiple stakeholders at the national level as well as global partnerships such as those with the United Nations Population Fund's *State of the world's midwifery 2021* report (UNFPA, 2021) and the *WHO Global oral health status report* (WHO, 2022), which show that data on the private not-for-profit exist minimally, especially in the case of dentists and pharmacists.

Fig. 7.1 Number of countries with data (latest available year) on the public and private sector health workforce by occupational group and channels of data collection (2010–2019)



Notes: NSO – National statistical office/bureau; PfP – private for-profit; PNfP – private not-for-profit; SoWMy – *State of the world's midwifery 2021* report; SoWN – *State of the world's nursing 2020* report.

Source: NHWA Platform, reflecting the best available data as reported through the implementation of the NHWA process, may not necessarily portray an accurate picture of the evolving country situation (accessed 27 October 2021).

As data quality and completeness improve over time, countries can gain a better understanding of key dimensions such as the skills distribution between sectors (WHO, 2007). Using latest NHWA data, Table 7.3 describes the ratio of the public to private health providers across two occupational groups (medical doctors and nursing personnel). While there are no guidelines for this ratio, it may be important in determining the policy options for improving access to care, regulating quality of services, and determining subsidy policies (WHO, 2007). For example, in the cases of Brazil and the Philippines, the ratio of public to private providers is 1.1:1; 1.1:1, respectively for medical doctors and 1.4:1; 1.6:1, respectively for nursing personnel. This may not readily accord with the share of private expenditure on health, which is 59%. An interesting case is that of Ethiopia where the public to private ratio indicates medical doctors and nursing personnel are mainly in the public sector (14.2:1, 26.1:1, respectively), in contrast to the 43% share of the domestic private expenditures of the total current health expenditures (see Annex 7.1 for the calculation of private expenditure on health). This feature suggests that there is a prevalence of dual practice.

Table 7.3 A selective country comparison of the ratio of public to private health providers among medical doctors and nursing personnel, 2021

WHO Region	Country	Medical doctors (% employed)				Nursing personnel (% employed)				Domestic private expenditures on health as a percentage of the total current health expenditures
		PfP (A)	PNfP (B)	Pub (C)	Approx. ratio of public to private providers	PfP (A)	PNfP (B)	Pub (C)	Approx. ratio of public to private providers	% PVT-D (D)
African Region	Benin	18.4	10.6	71.0	2.4 :1	1.5	4.2	94.3	16.5 :1	53.0
	Ethiopia	6.6	0.0	93.4	14.2 :1	3.7	0.0	96.3	26 :1	43.2
	Mauritius	48.3	0.0	51.7	1.1 :1	9.7	0.0	90.3	9.3 :1	52.7
	Niger	15.9	0.0	84.1	5.3 :1	13.2	0.0	86.8	6.6 :1	49.1
	Rwanda	38.4	8.4	53.2	1.1 :1	13.4	17.0	69.6	2.3 :1	26.3
	South Africa	55.8	0.0	44.2	0.8 :1	25.0	0.0	75.0	3 :1	40.1
	Togo	24.5	0.0	75.5	3.1 :1	21.6	0.0	78.4	3.6 :1	23.0
	Zimbabwe	14.2	2.5	83.3	5 :1	14.7	11.3	74.1	2.9 :1	52.8
Region of the Americas	Brazil	23.6	24.9	51.4	1.1 :1	15.9	26.3	57.8	1.4 :1	59.1
	Ecuador	39.4	0.0	60.6	1.5 :1	45.3	4.7	50.0	1 :1	38.1
	Panama	15.5	0.0	84.5	5.5 :1	8.4	0.0	91.6	10.9 :1	33.8
	Suriname	65.3	0.0	34.7	0.5 :1	17.3	0.0	82.7	4.8 :1	27.4
	Uruguay	18.7	56.1	25.2	0.3 :1	2.7	58.8	38.5	0.6 :1	33.4
South-East Asia Region	Bangladesh	75.5	0.0	24.5	0.3 :1	42.1	0.0	57.9	1.4 :1	75.3
	India	84.3	0.0	15.7	0.2 :1	38.1	0.0	61.9	1.6 :1	66.4
	Maldives	13.2	0.0	86.8	6.6 :1	13.1	0.0	86.9	6.6 :1	19.1
	Sri Lanka	3.7	0.0	96.3	26 :1	9.1	0.0	90.9	10 :1	51.4
	Thailand	43.1	0.0	56.9	1.3 :1	13.8	0.0	86.2	6.2 :1	28.2
European Region	Albania	6.1	0.0	93.9	15.4 :1	3.8	0.0	96.2	25.3 :1	44.7
	Türkiye	9.7	0.4	89.9	8.9 :1	19.4	0.0	80.6	4.2 :1	22.1
Eastern Mediterra-nean Region	Iran (Islamic Republic of)	0.0	54.1	45.9	0.8 :1	0.0	24.0	76.0	3.2 :1	50.5
	Oman	27.7	0.0	72.3	2.6 :1	21.0	0.0	79.0	3.8 :1	13.6
	Saudi Arabia	29.3	0.0	70.7	2.4 :1	24.0	0.0	76.0	3.2 :1	30.8
	Tunisia	54.7	0.0	45.3	0.8 :1	1.9	0.0	98.1	51.6 :1	42.5
	United Arab Emirates	65.4	0.0	34.6	0.5 :1	63.6	0.0	36.4	0.6 :1	47.7

Western Pacific Region	Australia	51.3	0.0	48.7	0.9 :1	38.4	0.0	61.6	1.6 :1	28.3
	Papua New Guinea	7.2	2.2	90.5	9.6 :1	3.9	24.0	72.1	2.6 :1	9.9
	Philippines	50.2	0.0	49.8	1 :1	38.7	0.0	61.3	1.6 :1	59.0

Notes: PfP – private for-profit; PNfP – private not-for-profit; Pub – public; PVT-D – private domestic expenditure.
Sources: NHWA Portal (2021), reflecting the best available data as reported through the implementation of the NHWA process, may not necessarily portray an accurate picture of the evolving country situation (GHED, 2021a).

Key metrics on population coverage and service delivery can complement metrics as those displayed in Table 7.3 to better understand the size and market importance of the private health sector. Ongoing research and consultations by WHO and partners identify a selection of metrics to capture the private sector's contribution to UHC:

- outlets (number of hospitals, private pharmacies or drug sellers);
- capacities (number of beds);
- providers (health professionals registered or licensed by speciality);
- utilization (proportion of care sought in the private sector, by disease condition, proportions of inpatient/outpatient care sought in the private sector);
- expenditure (household health expenditure in the private sector, domestic private health expenditure per capita); and
- revenue (total revenue of private sector outlets, by outlet type) (WHO, 2020).

However, the extraction of these data from multiple sources requires great effort, time and human and financial resources. These different sources should be compared and assessed to define, through triangulation and expert assessment, how they can respond to the question of the extent to which the private sector workforce can contribute to achieving UHC.

7.6 Conclusion and recommendations

The debate on the health workforce distribution between the public and private sectors is not only a conceptual one. In all economies, health workers make monetary and non-monetary decisions on employment opportunities. It is critical to identify the factors that influence these decisions, and those of employers. In LMICs, an empirical mixed-methods study shows that private-only physicians are predominantly older professionals, working fewer hours, and dedicating more time to managerial functions, which seems to be at the root of their preference for private sector employment (Russo, de Sousa et al., 2014). It is therefore important to understand the relationship between health professionals' characteristics, motivations and practice patterns to develop effective policies to regulate the market of health professionals and achieve universal access to medical services (Russo, de Sousa et al., 2014).

The contribution of the private sector, and potential rising trend of public-private partnerships, to UHC is yet to be determined. To illuminate this question, better knowledge of health workforce profiles and demographics is required. This warrants a range of actions by multiple stakeholders:

- Global and local efforts in designing administrative and survey tools so that datasets can match to each other and, ideally, to data on health care utilization and health system outcomes (McPake et al., 2014).

- Renewed research and guidance on health labour market analysis (HLMA) (WHO, 2021), aimed at building capacity in health workforce research, namely, to meet the demand for private sector data on HRH.
- Use all opportunities to promote an open data-sharing policy dialogue as an essential health system strengthening intervention during key strategic exercises, such as the situational analysis of the health sector (WHO, 2016b).

To conclude, it is promising to see the proactive efforts made by countries implementing NHWA to provide data on a growing number of occupations employed by the private sector. The evidence generated through NHWA will provide an introspective view of the evolution of private sector occupations over time. As countries continue to draw on the resources and capacity of the private sector to provide health services, more scrutiny will be needed to understand how it performs.

NHWA can contribute to responding to that need. In all likelihood, it will be possible to collect more data on the structures of the public sector and private providers (size, objectives and technical competence) and on the regulation of the sector. To do so, policy-makers must convince individual health workers in the private sector and their employers, that it is in their interest, and of course of the whole population. This is in the spirit of NHWA implementation guidance, which recommends the multistakeholder, multisectoral approach to shared governance of HRH data.

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Annex 7.1 Monitoring the domestic private expenditures (PVT-D) of the total current health expenditure (CHE) through the NHA

PVT-D refers to private domestic sources and encompasses compulsory prepayment (FS.4), voluntary prepayment (FS.5), other domestic revenues (FS.6) and unspecified revenues of health care financing schemes (FS.nec).

There is an intermediary step for the calculation of PVT-D, in which out-of-pocket spending (FS.6.1) is calculated separately from the other private domestic revenues (the two are thereafter summed up as PVT-D for publication).

$$PVT\text{-}D = FS.4 + FS.5 + FS.6 + FS.nec; \qquad \%\ PVT\text{-}D = PVT\text{-}D\ /\ CHE$$

SHA 2011 classification of revenues of financing schemes (FS)	Description
FS.4 Compulsory prepayment (other than FS.3 [social insurance contributions])	FS.4.1 Compulsory prepayment from individuals/ households FS.4.2 Compulsory prepayment from employers FS.4.3 Other compulsory prepaid revenues
FS.5 Voluntary prepayment	FS.5.1 Voluntary prepayment from individuals/ households FS.5.2 Voluntary prepayment from employers FS.5.3 Other voluntary prepaid revenues
FS.6 Other domestic revenues (unspecified) n.e.c.	FS.6.1 Other revenues from households n.e.c. (equivalent to out-of-pocket spending) FS.6.2 Other revenues from corporations n.e.c. FS.6.3 Other revenues from non-profit institutions serving households (NPISH) n.e.c.

Current health expenditure (CHE) is the total of government schemes and compulsory contributory health care financing schemes (HF.1), voluntary health care payment schemes (HF.2), household out-of-pocket payment (HF.3), rest of the world financing schemes (non-resident) (HF.4), and unspecified health financing (HF.nec).

Notes: n.e.c. – not elsewhere classified. More details available in GHED (2021b).

Chapter 8: Health workforce access: opening an HRH equity assessment lens

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8.1 Introduction

Ensuring equitable access to relevant HRH is a challenge in most countries, particularly in rural, remote and deprived areas. The challenges are especially critical in countries experiencing or recovering from conflict or natural disasters, in those with large refugee or internally displaced populations, and in those affected by and at risk from climate change (WHO, 2016). The development of a competent and resilient health workforce is a pre-requisite to ensure that all communities have equitable access to health workers that possess the right skill mix and competencies to provide quality care. To address these challenges and design evidence-informed HRH policies and interventions, decision-makers need reliable, relevant, and timely data on the health workforce situation in their country. However, most national and local authorities lack the necessary information to effectively address current needs, prepare for surges and plan the future workforce (Buchan et al., 2017).

The WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) stressed that policy-makers need data and information that provide context-specific understanding of what drives and affects the broad range of people that constitute the health workforce and the dynamics of the health labour market (HLM) (WHO, 2016). This includes the education, recruitment, motivation, distribution, retention, management and mobility of HRH.

This chapter focuses on why it is critical for countries to capture data related to equity issues within HRH. It builds on a purposive non-systematic review of published and unpublished literature related to HRH equity, with a focus on its overall importance and its metrics. References from retrieved papers were searched for additional relevant documents. A consultation by experts complemented the literature search. These sources of information helped define HRH equity as the outcome of policies and actions at multiple levels and across sectors that ensure:

- fair access and opportunity to enter health professions;
- equitable and fair treatment of all health and care service providers; and
- equitable and affordable access to HRH who provide the needed quality and quantity of services.

Findings suggest a need for more data collection and analysis to understand the complex factors affecting HRH equity, its root causes and intersectoral drivers of inequities. When designing HRH-related interventions, policy-makers should examine how a proposed policy or programme might impact or be impacted by other elements related to HRH.

The chapter introduces key concepts related to HRH equity and explains why collecting, monitoring, analysing and acting on equity-related data strengthens decision-making. It identifies some of the key equity-related policy issues and the types of data that may be useful. It also highlights elements from the national health workforce accounts (NHWA) and the HLM framework that inform the GSHRH and relate to equity. NHWA encompass several indicators related to HRH equity (WHO, 2017). The chapter also highlights some equity-related issues not adequately or clearly covered by the NHWA indicators. The subsequent sections introduce different HRH-related policy areas where equity issues need examination: education, skill mix composition, supply, health worker flow, employment and working conditions, financing, and governance. The last section highlights key messages and calls for additional research and analysis to strengthen the evidence to guide policy-making to maximize the health, social and economic return on investment in the HRH.

8.2 Why is HRH equity important?

United Nations Member States committed to "leaving no one behind", by signing up to the 2030 Agenda for Sustainable Development (World Bank, 2010). With that in mind, HRH policies need to consider a broad range of equity-related elements such as gender, age, sociocultural factors, race, ethnicity, and geographical location. While many countries are progressing towards universal health coverage (UHC), they frequently overlook data collection regarding HRH access for poor, marginalized, and rural populations (Campbell et al., 2013). Focusing only on increasing the number of health workers does not ensure that they will end up working where needs are greatest. Countries and institutions need to collect data to understand the drivers of inequitable access to HRH and track progress towards reducing it. This implies ensuring:

- fair access and opportunity to enter the health professions;
- decent and quality jobs for all health workers, including their safety, remuneration, elimination of all types of discrimination, including through gender-transformative change, social protection, social dialogue, and positive practice environments, ultimately contributing towards a sustainable workforce, greater job satisfaction and better health outcomes; and
- an equitable provision of quality health services, provided by a fit-for-purpose, fit-for-practice workforce, which is accessible and acceptable to the populations served.

If governments and other stakeholders do not explicitly measure, monitor, and act upon indicators related to all three requirements, they are unlikely to achieve UHC in an equitable and sustainable way. A focus on HRH equity in data collection and analysis moves beyond the goal of increasing the availability, distribution, and density of health workers. It calls attention to better understanding the broader environment of HRH planning and management. This includes, for example, the need for long-term investment and reform in health workforce education or the effect of HRH management and policies on whether and how marginalized populations access and use services.

8.3 HRH equity data challenges

The basic task of assessing and estimating how many health workers from which cadres are required to meet the short- and long-term needs is a challenge everywhere. Many countries struggle with obtaining reliable HRH data due to a multitude of reasons, including resource and capacity limitations, fragmentation of data and data sources, and incompatibility of data collection systems (Dal Poz et al., 2009; WHO, 2021a). For example, countries receiving external aid funds may spend scarce human and material resources on collecting and reporting data on specific diseases to different funders sometimes using different systems and indicators, yet lack basic HRH data (De Maeseneer et al., 2008; Boone and Cloutier, 2015).

While significant data have been gathered on health inequities and their causes in the last decades, there is limited information on which interventions or strategies reduce inequities and how (Rasanathan and Diaz, 2016). The same goes for HRH interventions. For example, while it is known that low health worker density is linked to poorer health outcomes, HRH data are often limited to some HRH categories, namely doctors, nurses, midwives, dentists and pharmacists. These are not always disaggregated by sex, age, ethnicity, socioeconomic background or geographic location (WHO, 2019). Additionally, while countries may gather and publish data and perform data analysis related to equity, planners and policy-makers do not always use HRH data and research findings (Craveiro et al., 2018). Disaggregated HRH equity data and research into enabling factors and barriers are essential to designing effective and cost-efficient policies, programmes, and systems. For example, decisions around HRH production should consider the ageing of the health workforce to avoid shortages or surpluses of specific cadres that contribute to achieving HRH equity (Silver et al., 2016).

To assess HRH equity, different frameworks and methodologies can provide valuable information that complement each other. Quantitative analysis of large datasets from censuses and labour force, household or health facility surveys, can offer periodic snapshots of the HRH situation. Coupled with data with indicators related to the social determinants of health (SDH), they help assess the numbers and competencies required to meet evolving population needs (Greenwell and Salentine, 2018), while qualitative information from interviews can identify underlying causes of inequities, and document experiences of health workers (Lewin and Glenton, 2018).

Policy-makers and researchers need to engage with a broad range of stakeholders to examine and identify how best to obtain data and prioritize actions that result from obtaining HRH equity-related data and evidence. Given the complexity of addressing inequities and limited resources, gathering data at national level may not be realistic and may not yield detailed enough information. Subnational level focus and small-scale qualitative studies may be necessary to obtain useful data. It is important that stakeholders and governments streamline data collection and track key indicators that help understanding what works, how and in what context. By using them to measure progress and performance towards HRH equity and health equity, countries can identify which policies and actions provide the greatest returns on investment in HRH.

8.4 Key policy areas and data requirements for HRH equity

The following sections address typical health policy questions from the HRH equity perspective, illustrated by some examples of how the data can inform policy and practice. Sources include: literature review, case studies and examples provided by key informants. We examine the NHWA list of indicators with an equity lens, and identify equity elements as well as gaps. The main areas covered are: education and training, skill mix composition, supply and health worker flows, working conditions, financing and governance of the health workforce. Understanding root causes and drivers of inequities as well as tracking and using equity-related data are highly dependent on cultural, political and policy contexts as well as on resources available.

8.4.1 Education and training

In many countries, there is underinvestment in HRH education (Frenk et al., 2010). Australia, Brazil, Canada and Thailand have invested in education (infrastructure, technology, training of clinical preceptors and student accommodation) in rural and remote settings and have seen increased deployment and retention of health workers in those areas (Paek et al., 2016; Pálsdóttir et al., 2017). In Northern Ontario (Canada), institutional decision-makers, in collaboration with community members and other stakeholders, designed strategies of recruitment into health professional education that increase the likelihood that graduates choose to practise in the region and have the competencies to care for underserved populations. Some parts of the region require French-speaking service providers, as well as health workers with the background, competencies and resilience to work with First Nations communities (Strasser et al., 2018) (see Chapter 4). In the United Republic of Tanzania, a social return on investment (SROI) study that assessed the value of education and training as perceived by stakeholders including learners and patients led to moving clinical training programmes to small regional hospitals, which decreased costs for patients, saved lives and increased the willingness of students to work in remote areas (Woolley et al., 2019). These examples show that data collection and analysis to track additional elements such as ethnic, geographical and linguistic backgrounds of the HRH help design strategies to ensure that the composition and competencies of the HRH addresses needs.

The mushrooming of private sector education institutions and programmes can contribute to scale up the production of the HRH and contribute to HRH equity if they are equitably distributed. However, it is important that governments ensure the quality and relevance of such education, track graduate outcomes, and assess their impact on HRH equity and the quality of health service delivery. Comprehensive graduate tracking and evaluation to identify what works can optimize the positive impact of health worker education on HRH equity (Hamed et al., 2015). This is demonstrated in graduate outcome studies that collect and analyse demographic and socioeconomic data on learners, data on the selection criteria, the curriculum, competencies attained, and effect on learners' career intention (Larkins et al., 2018). These studies also track career choices in terms of practice location, type of practice and field of practice. For example, cross-sectional entry and exit data tracking graduates in Australia, Belgium, Canada, Philippines, South Africa and Sudan showed that those with a lower socioeconomic or rural background, who trained in underserved regions, were more likely to work in those areas and less likely to seek work abroad (Larkins et al., 2018).

Several World Health Assembly (WHA) resolutions and global policy guiding documents have recognized the importance of scaling up and transforming HRH education to increase health equity and achieve UHC (Frenk et al., 2010; WHO, 2013; 2016). This requires data to determine how education strategies, policies and regulations can increase HRH equity. Students from poor or rural communities often do not have access to high-quality secondary education making it harder for them to get into health professions education programmes. Focusing on HRH equity implies that all capable individuals, regardless of the group, class, or category they are perceived to belong to, are given fair and equal access and opportunities to enter education and training pathways, are treated fairly and without discrimination during the education process and in employment and have equal access to professional and career development.

Several NHWA education-related indicators help measure the capacity of education institutions, their output, the mechanisms that regulate the quality and relevance of programmes, financing and data sources (Fig. 8.1).

Fig. 8.1 NHWA indicators with an equity dimension related to HRH education

Impact on health workforce distribution	Measuring education characteristics			
Module 1: Active health workforce stock 1 – 01: Health worker density 1 – 02: Health worker density at subnational level 1 – 04: Female health workforce 1 – 06: Health worker distribution by facility type	**Module 2: Education and training** 2 – 03: Applications for education and training 2 – 05: Ratio of students to qualified educators for education and training	**Module 3: Education and training regulation and accreditation** 3 – 03: Standards for social accountability 3 – 04: Standards for social accountability effectively implemented 3 – 05: Standards for social determinants of health 3 – 09: In-service training	**Module 4: Education finances** 4 – 01: Total expenditure on higher education 4 – 02: Total expenditure on health workforce education 4 – 03: Average tuition fee per student 4 – 04: Investment in transformative education and training	**Module 8: Skill-mix composition** 8 – 05: Family medicine practitioners 8 – 06: Existence of advanced nursing roles 8 – 07: Availability of human resources to implement the International Health Regulations

Policy alignment	Reporting enabled
Module 9: Governance and health workforce policies 9 – 03: Health workforce planning processes 9 – 04: Education plans aligned with national health plan	**Module 10: Health workforce information systems** 10 – 04: HRHIS for reporting on outputs from education and training institutions 10 – 05: HRHIS for tracking the number of entrants to the labour market

Source: NHWA (WHO, 2018a).

NHWA modules propose that education data be incorporated in HRH information systems (HRHIS) and track whether graduates enter the workforce, their type of practice and location, and whether they update their skills, acquire the relevant competencies, and provide quality care throughout their career. NHWA also call on countries to track accreditation indicators, some of which have an equity dimension. Many countries lack adequate education standards, quality assurance systems and regulatory frameworks to ensure that students receive the education and training required to meet the needs of all populations (WHO, 2013). Others have standards, but not the resources to enforce them. NHWA Module 3, which is related to regulation and accreditation, includes two indicators to monitor social accountability of institutions. Accreditation standards and quality assurance systems must have specific equity measures incorporated, and mechanisms and resources to enforce compliance with those standards; resource constraints can mean that quality assurance mechanisms for clinical training sites are non-existent, not enforced or do not adequately cover rural and remote regions (Pálsdóttir et al., 2017).

Tracking HRH equity can ensure that everyone with the required capabilities has equitable access and opportunities to enter education and training pathways and is treated fairly and without discrimination during the education process. A study in Timor-Leste, showed that applicants belonging to social elites enjoy significantly more access to health education, which was deemed inequitable (Bertone et al., 2018). Addressing inequities in education, including in faculty recruitment and promotion, requires disaggregated data on learners and faculty, monitoring discrimination and harassment as well as studies to explore root causes and challenges.

Monitoring investment in HRH education, continuing professional development (CPD) and in-service training is also important. Professional organizations involved in CPD or re-licensing can contribute data. For example, the CPD online programme in Eswatini, run by its nursing council tracks nurses' CPD courses, ensures consistent registration and renewal of licences, promotes opportunities for career pathway mobility, and maintains up-to-date information on the status of the current nursing workforce (Msibi et al., 2014). It is equally required to track who has access to CPD and in-service training in terms of gender, ethnic background and geographic location and to examine whether the educational content covers topics relevant to all populations, including those most marginalized.

8.4.2 Skill mix composition

Skill mix is a broad term that refers to the combination of different HRH cadres within a country, region or facility, and their roles and activities. It is optimal when it meets the needs of all the populations served (Buchan et al., 2000). Skill mix plays a significant part in determining the cost, quality and equity of health care, as well as the level of efficiency and effectiveness of interventions (Bourgeault, 2008). This raises questions about the right proportion of each cadre (e.g. nurses vs physicians, generalists vs specialists); countries need to find their own response in function of their context, needs, objectives and resources.

NHWA track skill mix composition across types of facility and the distribution of skills according to specific needs, such as addressing the increasing burden of chronic diseases, and emerging public health threats (Fig. 8.2) – as in the case of COVID-19 (illustrated in Box 8.1). This can lead to demand for additional support or specialized personnel, such as teams for palliative care, primary care or surgery or for monitoring and responding to disease outbreaks (Homer et al., 2015; Kushitor and Boatemaa, 2018; Varghese et al., 2019).

Fig. 8.2 NHWA indicators with an equity dimension related to skill mix

Impact on health workforce distribution

Module 1: Active health workforce stock
1 – 05: Health worker distribution by facility ownership
1 – 06: Health worker distribution by facility type
1 – 09: Share of workers across health and social factors

Impact of education and training on skill-mix

Module 3: Education and training regulation and accreditation
3 – 03: Standards for social accountability
3 – 04: Standards for social accountability effectively implemented
3 – 05: Standards for social determinants of health
3 – 06: Standards for interprofessional education
3 – 08: Continuing professional development

Measuring motivational employment characteristics

Module 8: Skill-mix composition for models of care
8 – 01: Percentage of health workforce working in hospitals
8 – 02: Percentage of health workforce working in residential long-term care facilities
8 – 03: Percentage of health workforce working in ambulatory health care
8 – 04: Specialist surgical workforce
8 – 05: Family medicine practitioners
8 – 06: Existence of advanced nursing roles
8 – 07: Availability of human resources to implement the International Health Regulations
8 – 08: Applied epidemiology training programme

Policy relevance enhancer

Module 9: Governance and health workforce policies
9 – 03: Health workforce planning processes
9 – 05: Institutional models for assessing health care staffing needs

Reporting (partly) enabled

Module 10: Health workforce information systems
10 – 03: HRHIS for reporting on skill attendance at birth requirements
10 – 08: HRHIS for producing the geocoded location of health facilities

Source: NHWA (WHO, 2018a).

Box 8.1 The implications of the COVID-19 pandemic for the equitable access to health services and to HRH

Evidence is emerging that poor, marginalized and vulnerable communities are the worst affected by COVID-19. In the United States, in Chicago, where black people represent 30% of the population, they constitute 70% of deaths from COVID-19 (Bauer, 2020), and according to preliminary data from New York, Latino and black people were twice as likely to die from COVID-19 than white people (Mays and Newman, 2020), especially those living in poor neighbourhoods. Collecting data on HRH equity, might in this case, focus on whether these disparities had something to do with black and Latino patients' access to relevant health service providers, where and when they needed them, and if not, why. Interventions could range from changing policies around health insurance coverage, creating new training programmes for health workers, to community-based interventions related to SDH.

The pandemic also highlighted the need for countries to build health workforce surge capacity to respond to disasters and disease outbreaks, for a health system to prepare and respond. To develop resilient health systems, countries need to improve health workforce management, including the ability to facilitate task-shifting and rapid reallocation of specific cadres during emergencies (WHO Regional Office for Europe, 2020). Governments need to explore how to scale up rapidly their response to an outbreak, without negative impact on other health interventions and how other domains might be affected (Bong et al., 2020). This should include coordination of strategies, such as creating a task force with all relevant stakeholders and a whole-of-government approach (Scheerens et al., 2020).

Equity within HRH is also important. For example, evidence from COVID-19 suggests that health workers in low-income countries and those serving vulnerable communities are often the most exposed to risk and hazards. They are also more likely to lack access to personal protective equipment (PPE) and in some countries more health workers from ethnic minorities have died (Berg, 2020; Marsh and McIntyre, 2020). COVID-19 had a disproportionate effect on women health workers. They were more likely to get infected, expected to manage higher professional and personal workloads, and often excluded from decision-making, all the while being paid on average 28% less than their male peers (Keeling, 2020).

In high-income countries, health workers providing care to underserved populations are often members of marginalized groups themselves, and sometimes lack the resources to provide patients with the care they need (Schwirtz, 2020). This can affect the motivation and mental health of care providers, and the lack of PPE could result in health workers not providing services for fear of becoming ill (Chersich et al., 2020). Collecting data on access to specific resources and the challenges health workers face can help government mitigate risks and minimize negative impact.

COVID-19 also offered a glimpse of the issue of fair access to becoming a health professional. Learners from poor or marginalized communities faced additional hurdles to studying during COVID-19, as some of them did not have stable electricity or internet services to access online courses or continue their education due to economic stress (Romm, 2020).

8.4.3 Size, composition and distribution

The size, composition and distribution of the HRH is key to monitoring and evaluating equity in access to health workers with the right competencies to meet needs. NHWA help track health worker density by occupation and activity levels. Information about where health workers are deployed both geographically and within the health services delivery system highlights whether areas that are more deprived or more difficult to reach are being adequately staffed. It also helps governments develop education and HRH policies and plans as well as appropriately allocate resources to ensure HRH equity in alignment with population needs.

Namibia applied the Workload Indicators of Staffing Need (WISN) method to identify the needed balance between the workload and staff composition in facilities such as hospitals and health centres. It revealed a skewed nursing workforce distribution in hospitals adequately or slightly overstaffed relative to nurses' workloads compared with health centres and clinics. The health centres therefore were faced with an inappropriate skill mix (McQuide et al., 2013). Using this data, the Ministry of Health and Social Services is revising norms to improve staffing equity across regions and facility types, ensure an appropriate skill mix and estimate workforce requirements for new cadres.

8.4.4 Supply of health workers, flows, employment characteristics and working conditions

To plan their health workforce adequately, countries need to be able to assess the HLM situation. WHO suggests that countries track the health workforce size and composition by cadres, age group, sex, and workplace, type of facility and geographical location. However, there are limited data in many countries on HRH cadres beyond medicine, nursing and midwifery, particularly in low- and middle-income countries (LMICs). Ensuring that all health workers are included as a part of the health system is important. Some countries use community health workers (CHWs), at low or no cost, to fill in HRH gaps "…to maximize the benefits of a workforce in the absence of adequate government expenditure on healthcare" (Vaughan et al., 2015). These should be included in the supply of health workers, whether they are formally recognized as public employees, as in Pakistan (Aye et al., 2018), or not.

The sex composition of the health workforce can affect service delivery in certain cultural contexts and can influence the acceptability of some services among certain groups of users. It can also affect maldistribution of the HRH as practising in rural or remote areas can be particularly challenging or perceived as inappropriate for a woman (Safi et al., 2018). Women, representing 70% of the workforce, are more likely to occupy lower status jobs with lower pay and to work part time (WHO, 2019; WHO, 2021b); in some countries, access to maternal and/or paternal leave also impacts the HRH (WHO, 2019; WHO, 2021b). To ensure well-informed decision-making, more women, people from marginalized communities and under-represented health cadres need to be in leadership roles (WHO, 2021b).

It is important to track the – mostly female – unpaid health workers, who step in to take care of sick relatives or address the lack of long-term care. Understanding the impact of this unpaid work on the health system and its impact on the employment, health and well-being of caregivers is important to get a full picture of the HRH situation and of equity issues (Horton et al., 2016).

In most countries, health workers concentrate in urban areas, higher income communities, and in hospitals (WHO, 2016). This is revealed by indicators of density, by type of facility and by geographical area. The analysis of this dimension of the supply of health workers is critical to ensuring effective planning and policy-making. The analysis of inflows and outflows of different cadres of health workers is also of prime importance. The quantity, quality and accessibility of health services might deteriorate with unforeseen outflows of one or more cadre of health workers. For example, most recent figures from Jamaica indicate that since 1991 close to 50% of all doctors trained there have emigrated. This has not only affected access to highly trained health professionals, but also increased workload and burnout and therefore the well-being of the remaining health workers. As a result, patients are likely to receive lower quality of care (Tomblin Murphy et al., 2016). Individual health workers who emigrate have the opportunity to improve their economic situation and their competencies, but HRH inequities in source countries are likely to be reinforced by emigration if it is on a large scale (Glinos et al., 2015).

NHWA call for monitoring entry and exit rates from the labour market as well as both vacancy and unemployment rates (Fig. 8.3). However, more research is needed to understand the complex factors that drive and influence those flows. The HLM framework provides countries with a lens to understand the impact of labour market dynamics on the supply and demand for health workers. It is important to remember that demand is not just defined by the health needs, but more importantly by financial constraints (at least in the public sector), demand being the jobs that the government can offer within their fiscal space constraints.

Fig. 8.3 NHWA indicators of supply and flows of health workers, employment characteristics and working conditions with an equity dimension

Impact on health workforce distribution	Measuring flows	Measuring relevant employment characteristics
Module 1: Active health workforce stock 1 – 01: Health worker density 1 – 07: Share of foreign-born health workers 1 – 08: Share of foreign-trained health workers	**Module 5: Health labour market flows** 5 – 02: Replenishment rate from domestic efforts 5 – 03: Entry rate of foreign health workers 5 – 04: Voluntary exit rate from health labour market 5 – 05: Involuntary exit rate from health labour market	**Module 6: Employment characteristics and working conditions** 6 – 01: Standard working hours 6 – 02: Health workers with a part-time contract 6 – 03: Regulation on working hours and conditions 6 – 04: Regulation on minimum wage 6 – 05: Regulation on social protection 6 – 06: Health worker status in employment 6 – 07: Regulation on dual practice 6 – 08: Regulation on compulsory service 6 – 09: Measures to prevent attacks on health workers 6 – 10: Attacks on health-care system

Assessing policy environment	Relevance of tracking mechanisms (local and global)
Module 9: Governance and health workforce policies 9 – 03: Health workforce planning processes 9 – 05: Institutional models for assessing health care staffing needs	**Module 10: Health workforce information systems** 10 – 01: HRHIS for reporting on International Health Regulations 10 – 02: HRHIS for WHO Code of Practice reporting 10 – 06: HRHIS for tracking the number of entrants to the labour market 10 – 07: HRHIS for tracking the number of exits from the labour market

Source: NHWA (WHO, 2018a).

In most countries, better data are available on immigration through mandatory registration than on emigration. NHWA suggest two indicators to monitor inflows of health workers – share of foreign-born health workers and foreign-trained health workers. These have known limitations that need to be taken into consideration: foreign-born may include workers trained in the country, and foreign-trained may include nationals who trained abroad and returned after graduation. Other indicators are required to monitor equity within this area. For example, it would be important to identify factors that influence an individual's decision to emigrate, and track whether immigrants were recruited by an agency or a provider organization, or if they moved spontaneously. Routine data collection will not provide this information, so planners will need to rely on labour force, household, or facility surveys. Establishing and maintaining a database on migration and compliance with the WHO Global Code on the International Recruitment of Health Personnel can help identify inappropriate HRH migration policies, detect where SDH influence migration and help maintain an equitable HRH (Siyam et al., 2013; Bourgeault et al., 2016).

Employment characteristics and working conditions present two important aspects that affect HRH equity. First, every worker should have the right to a decent job in terms of working hours, social protection, type of contract and a working environment free of harassment, abuse, violence and discrimination. These factors can influence the levels of satisfaction and motivation and hence performance, attraction and retention of health workers (WHO, 2010; Wiskow et al., 2010). Secondly, employment and working conditions overall can impact the availability and accessibility of health workers and consequently the equitable delivery of health services (WHO, 2016), quality of care and patient safety (Hickam et al., 2003). A study in long-term care homes in the United States revealed that when the employer provided additional work-family support, the incidence of injuries and pressure ulcers dropped (Okechukwu et al., 2016). Therefore, influencing individual working conditions can have an individual and systemic impact (Okechukwu et al., 2016).

Heavy workloads, inconvenient shift work, low pay and poor career opportunities may contribute to dissatisfaction or low motivation that in turn may result in recruitment and retention challenges as well as inadequate or low-quality services (Manongi et al., 2006). NHWA encourage countries to collect information on measures in place to protect all health workers, in particular those practising in areas of insecurity or conflict zones and especially women who are often exposed to harassment, violence, and abuse (Bodenheimer and Sinsky, 2014; WHO, 2019). The Global Health Workforce Network's (GHWN) Gender Equity Hub called for gender transformative policies to "create decent work environments and opportunities for women and close gender gaps in leadership and pay" (WHO, 2019). However, the study also called for additional data and research to identify and guide successful policy and strategy development. There is a need for implementation research on impact of policy change or gender transformative approaches in different cultural settings to ensure equitable treatment of minorities and/or other marginalized populations (WHO, 2019).

The NHWA guidelines suggest tracking employment and working conditions. This includes working hours, the level of equality of employment opportunities, treatment and social protection, pay, safety and healthy working conditions, appropriateness of training, CPD and career opportunities of diverse workers (WHO, 2018a). Data gathering and analysis should determine whether every worker is treated equitably, and should evaluate the effect of measures taken to address inequity. This likely requires qualitative research in addition to routine data collection. Another important equity-related issue is the career development of migrant workers who may suffer discrimination and experience a slower career development than native or "non-ethnic" colleagues (Alonso-Garbayo, 2007). An indicator of expected versus actual professional category for a given period can be developed.

8.4.5 Health workforce financing

How much countries invest in health workers does affect HRH equity. NHWA track the total HRH expenditures and, in countries receiving development aid, how much it covers. There are indicators that document entry level and regular remuneration by cadre, wage gaps between men and women, the proportion of public funding and policies on wage ceilings (Fig. 8.4). Understanding how much a country or region spends on HRH as a percentage of the total health budget correlated with HRH needs can help governments to better allocate resources. For example, Zambia assigned 15% of international donor budgets to support 65 health centres across the country; by tracking numbers, the government was able to confirm that the funds provided 1.3 million people with access to improved primary health care (PHC) (De Maeseneer, 2020).

It is important to pay attention to funding patterns by region and in areas where marginalized and underserved populations live. When countries conduct financial reforms to reduce costs, an HRH equity analysis can ensure that they do not include measures that compromise the fair and equitable treatment and remuneration of health workers. Some changes may negatively affect the mobility of health workers – both domestically, from primary to better-paid specialist care and from rural to urban areas, and externally, by incentivizing emigration.

Box 8.2 Policy questions related to workforce financing

1. How to prioritize investments in the health workforce according to population needs rather than political or economic or criteria?
2. Are all workers in similar positions paid equally?
3. Are migrant workers able to progress on the salary ladder equally as local workers?
4. Is funding for primary health care prioritized?
5. Is the distribution of financial resources across the health care system and across geography monitored? Are resources distributed equitably according to the needs of the population served?
6. How effective are existing financial incentives in attracting and retaining HRH to less attractive areas?
7. Are there financial incentives to compensate health workers exposed to higher risks or special circumstances such as epidemics?
8. Are lower level health workers considered equally for special allowances for risk factors to which all workers are exposed?

Conducting SROI studies provides evidence to assess if investments have positive effects on HRH equity. An SROI study evaluated the Touch Foundation's Treat & Train external clinical rotations programme for strengthening the quality of health workforce training and patient care in low-resourced rural health facilities in the United Republic of Tanzania's Lake District. The analysis showed an SROI of around US$1.65 by the year 2020 for every US$1.00 invested (Woolley et al., 2019). Another example is from Thailand, where health workforce financing accounted for about half of all public hospital non-capital expenses in 2012, a 30% increase from the level of spending in 2008. Almost 33% of the workforce financing came from hospital revenues, an increase from 25% 5 years earlier. The financing of the hospital workforce was higher per capita in lower resource provinces, leading to improved equity across provinces from 2008–2012 (Ruangratanatrai et al., 2015).

Fig. 8.4 NHWA indicators with an equity dimension related to health workforce financing

Impact on health workforce distribution

Module 1: Active health workforce stock
1 – 04: Female health workforce
1 – 05: Health worker distribution by facility ownership
1 – 06: Health worker distribution by facility type
1 – 09: Share of workers across health and social factors

Measuring impact of health education and workforce spending

Module 4: Education finances
4 – 01: Total expenditure on higher education
4 – 02: Total expenditure on health workforce education
4 – 04: Investment in transformative education and training
4 – 08: Total expenditure on in-service training and continuing professional development

Module 7: Health workforce spending and remuneration
7 – 01: Total expenditure on health workforce
7 – 02: Total official development assistance on health workforce
7 – 03: Total expenditure on compensation of health workers
7 – 04: Public expenditure on compensation of health workers
7 – 05: Entry-level wages and salaries
7 – 06: Policies on public sector wage ceilings

Impact funding on skill-mix

Module 8: Skill-mix composition for models of care
8 – 01: Percentage of health workforce working in hospitals
8 – 02: Percentage of health workforce working in residential long-term care facilities
8 – 03: Percentage of health workforce working in ambulatory health care
8 – 04: Specialist surgical workforce
8 – 05: Family medicine practitioners
8 – 06: Existence of advanced nursing roles
8 – 07: Availability of human resources to implement the International Health Regulations
8 – 08: Applied epidemiology training programme

Policy relevance enhancer

Module 9: Governance and health workforce policies
9 – 01: Mechanisms to coordinate an intersectoral health workforce agenda
9 – 05: Institutional models for assessing health care staffing needs

Reporting (partly) enabled

Module 10: Health workforce information systems
10 – 01: HRHIS for reporting on International Health Regulations
10 – 08: HRHIS for producing the geocoded location of health facilities

Source: NHWA (WHO, 2018a).

8.5 Governance

Governance in the health sector consists of designing, planning, regulating, managing and monitoring resources, functions and systems related to delivering the services that populations need to achieve UHC (WHO, 2014). The focus of good governance is on:

- “maintaining the strategic direction of policy development and implementation;
- detecting and correcting undesirable trends and distortions;
- articulating the case for health in national development;
- regulating the behaviour of a wide range of actors – from health care financiers to a full spectrum of health care labour force; and
- establishing transparent and effective accountability mechanisms”.[1]

1 https://www.who.int/health-topics/health-systems-governance

Often health system governance is fragmented and excessively hierarchical, with a lack of coordination across sectors. Limited alignment between HRH education, planning and national health staffing policies leads to a siloed approach in health workforce management (Kuhlmann, 2018). This results in inefficient use of scarce resources (WHO, 2018b).

NHWA Module 9 proposes five indicators that help qualify governance of a country's health workforce (Table 8.1):

Table 8.1 NHWA indicators that describe the governance of a country's health workforce

Indicator number	Indicator name
9 – 01	Mechanisms to coordinate an intersectoral health workforce agenda
9 – 02	Central health workforce unit
9 – 03	Health workforce planning processes
9 – 04	Education plans aligned with national health plan
9 – 05	Institutional models for assessing health care staffing needs

Regulation is an important tool of governance that Module 3 (Education and training regulation and accreditation) and Module 6 (Employment characteristics and working conditions) cover. Module 10 on HRHIS brings together data and information useful to improve health workforce governance. Designed to generate, record, collect, monitor and synthesize HRH data, well-functioning HRHIS support the planning, implementation and evaluation of HRH policies and interventions. Data collected through Modules 3, 6, 9 and 10 can assist countries in addressing equity in workforce availability, accessibility, appropriateness and quality through indicators that include data on worker education, deployment, performance and productivity, ideally with relevant disaggregation by cadre, sex, ethnicity, age and geographic location. In Kenya, a study showed that the improved availability of HRH data on planning and development increased relicensing and equitable HRH distribution (Waters et al., 2013). By analysing data on clinical officer capacity from training through to retention and specialization, the Government of Kenya was able to identify the most underserved areas which helped guide its investments in regional training for clinical officers.

The impact assessment of governance structures and processes, and stakeholder engagement and accountability on HRH equity, is critical to guide future policy-making. The challenge of increasing HRH equity calls for a close engagement with stakeholders across sectors and communities, comprehensive and multisectoral data collection action at all levels of governance, and the development and enforcement of accountability and sustainability mechanisms. Analyses in Brazil, Ghana, Mexico and Thailand showed that HRH strategies support UHC, when health and non-health actors work together.

It is also important to monitor whether an unregulated private sector undermines equitable production, recruitment, and distribution of HRH, and access to health care for vulnerable populations. For example, in post-conflict settings, private providers, such as non-profits, paying higher salaries, may influence health worker mobility and may generate outflows from the public to the not-for-profit private sector, affecting equity in the provision of essential public health services (Namakula et al., 2016).

Box 8.3 Policy questions related to governance

1. Is there broad multistakeholder, multi-sector and civil society participation in HRH planning, policy implementation and assessment?
2. How can governance structures, processes and tools be implemented and assessed to maximize the impact on HRH equity?
3. How does the role of the private sector impact HRH equity?
4. What is the impact of dual practice regulation on equitable access to HRH?

8.6 Conclusion

Current HRH data challenges include fragmentation of data collection, lack of interoperability of information and data systems, lack of standardization, unclear data flows, multiplicity of sources and data gathering. While not perfect, NHWA enable countries to develop or improve the systematic collection, analysis and use of relevant data from multiple sources in a multisectoral, streamlined, standardized and sustainable manner. This, in turn, contributes to a better understanding of progress towards increasing equity in access to HRH and how to achieve it.

HRH equity-related data should be based on the local context, data needs, capacity and key health workforce policy questions. To identify successful strategies and interventions related to HRH equity, researchers must employ a combination of quantitative and qualitative approaches, and in-depth studies such as key informant interviews and participatory action research that involves beneficiaries, stakeholders and policy-makers. As an example, interviews with regulatory officials and government bodies in Uganda concluded that the impact of strengthened HRHIS data on health workforce policy planning, including on HRH equity, was improved data management, contributing to more informed decision-making and tailored policies (Driessen et al., 2015).

This chapter provides a glimpse into the complex challenges of ensuring equitable access to HRH, addressing inequities in the treatment of workers, and in their access to education. It is only a small step in exploring how to make health equity a reality for all. It highlights the importance of focusing on equity in HRH data collection, analysis, and use, and it inspires further investigations and investments.

The COVID-19 pandemic demonstrates the urgency of preparing health systems and the health workforce to respond to disease outbreaks and disasters and to the terrible consequences of inequitable PHC service provision. This calls for investing in the health workforce and strengthening and scaling up HRH data systems to support evidence-informed policy-making with a strong equity focus to develop strong and resilient health systems that leave no one behind.

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Chapter 9: Strategies to improve access to health workers: the role of accelerated medically trained clinicians

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9.1 Introduction

The *Global Strategy Human Resources for Health: Workforce 2030* and the High-Level Commission on Health Employment and Economic Growth call for the expansion of the health workforce to progress towards universal health coverage (UHC), including by the optimization of skill mix (WHO, 2016a; WHO, 2016b; 2018; Dussault et al., 2018). Many countries are doing so by using high-level health professional cadres referred to as accelerated medically trained clinicians (AMTC). The objective of this chapter is to document this phenomenon, through relevant data and evidence. It first starts by providing a global overview of the composition and distribution of this workforce, of its various scopes of practice and education modalities.

AMTC is a descriptive classification of cadres trained in compressed and context-specific medical education models. This global workforce is over 1 million strong. These cadres have evolved independently, out of the need to increase access to health care at the community level.

78% of low-income, 73% of lower middle-income and 50% of upper middle-income countries' AMTCs report working primarily in rural areas.

AMTCs provide high-level medical care in at least 53 countries, under 61 titles (Annex 9.1) in fields of practice spanning from primary care to surgery, anaesthesia, ophthalmology, emergency care, psychiatry, and dermatology (Mullan and Frehywot, 2007; Lehmann et al., 2009; Cobb et al., 2015; WHO, 2016c; Dovlo et al., 2017; Dussault and Cobb, 2017; Gajewski et al., 2017; Sudhakar et al., 2017; Federspiel et al., 2018; Lian et al., 2019; Matinhure and Chimbari, 2019; Ngcobo, 2019; Berkowitz and Hoffmann, 2020; Hix and Fernandes, 2020; Merdler et al., 2020). Data from the World AMTC Network Data Collection 2020 shows that the majority work in low- and lower middle income countries, serving rural populations. The expanded or specialty skill focus has developed in a context-specific manner, so that the historical evolution of each country's AMTCs is unique.

Annex 9.1 lists countries with different income levels where AMTCs are recognized, with cadre title, year established, type of care provided, years of post-secondary training required, accreditation, existence of a regulatory body, access to continuing professional development (CPD) and number of clinicians practising in the country.

AMTCs' scope of practice aligns with the International Standard Classification of Occupations' (ISCO-08) Health Professional sub-major group 22. This includes medical doctors, nursing and midwifery professionals, traditional and complementary medicine professionals, veterinarians, and paramedical practitioners (ILO, 2008). Although AMTCs' scope of practice aligns with the definition of paramedical practitioners, the majority of AMTC professional titles are not listed.

The Lancet Commission Global Surgery 2030 recognizes the contributions of trained surgical and anaesthesia providers, and endorses the scaling up of collaborative teams including medical doctors and these other cadres (Meara et al., 2015). It further emphasizes that training should be adapted to local resources and health needs. In turn, these should be reflected in competencies necessary for the providers to acquire the appropriate knowledge and skills that address the needs of their population (Meara et al., 2015). Data supports that the outcomes in surgical and specialty care provided by AMTCs is comparable to medical doctors (Cumbi et al., 2007; Kruk et al., 2010; Henry et al., 2015; Schneeberger and Mathai, 2015; Ellard et al., 2016; Gobeze et al., 2016; Gajewski et al., 2017; Cornelissen et al., 2018; Federspiel et al., 2018; Iverson et al., 2019; Matinhure and Chimbari, 2019; Falk et al., 2020).

Using the national health workforce accounts (NHWA) Module 8's (Skill-mix composition for models of care) indicators 8 - 04 and 8 - 05 with AMTC data stratified by country income level, gives a broad overview of how these cadres have developed. AMTC cadres and advanced practice nurses have long histories in primary care, with evidence supporting good patient care outcomes (Liu et al., 2017; Heath, 2018; Jackson et al., 2018; Bitton et al., 2019; Sarzynski and Barry, 2019; Schwarz et al., 2020). Medical doctor scarcity has led to increased AMTC surgical specialty mobilization in low, low-middle and upper-middle income countries (Table 9.1). Evidence has shown that retention in the rural areas is 7+ years for AMTCs after specialty training (Schneeberger and Mathai, 2015).

Table 9.1 AMTC cadres reporting surgical speciality and primary care

	Surgical specialty	Primary care
AMTC Overall	37%	75%
Low income	39%	65%
Lower middle income	20%	87%
Upper middle income	8%	83%
High income	82%	73%

Source: https://www.worldamtcnetwork.org/

The majority of low- and lower middle-income countries' cadres are separated by cadre title based on primary or surgical specialty care. High-income countries do not separate titles in terms of competencies acquired, so that the percentages reflect the *option* to practise in primary or surgical specialty care. The United States model historically has embraced such flexibility for the physician assistant workforce. A generalist model allows for on-the-job training, enabling clinicians to work in a variety of areas over the course of their career. Box 9.1 gives examples.

Box 9.1 Examples of AMTC working at different levels of care

Primary care case: Ethiopia

Ethiopia's AMTCs are public health officers (PHOs) and integrated emergency surgical officers. Ethiopia has been lauded for its > 90% primary care coverage, despite 80% of its population living in rural and remote areas. PHOs are the primary care clinicians in the health centres and primary health care (PHC) units. They also oversee the health posts, and a vast network of community health workers (CHWs) who connect service delivery at the household, family network, and health development team levels (Sudhakar et al., 2017). PHOs' leadership covers programmes that require understanding population health and how to monitor, evaluate, plan, organize, direct and supervise services. They are also responsible as frontline health workers for responding to cholera, measles, COVID-19 and other epidemics. The catchment area of PHC units in rural locations is 15 000–25 000 patients, and 40 000 patients for urban locations, respectively. The next level in the care pathway is the primary hospital, which provides ambulatory, emergency surgical services and inpatient care. At that level, PHOs provides primary care as well as community-based outreach services. The integrated emergency surgical officers perform emergency surgery and emergency obstetric and neonatal care.

Primary care/surgery/anaesthesia case: Malawi
With a population of 19 million (~75% rural) and less than 750 medical doctors, of whom about 100 practise in rural areas, the health workforce challenges are great. Malawi's first medical school opened in 1991. With limited specialty training, low resources and constrained opportunities for progression, attrition of physicians is high. Optimization of the existing health workforce, and skill mix team use has been developed. Malawi's AMTCs are medical assistants and clinical officers.

The medical assistant cadre was established as the community based primary care clinician in the 1960s. The shortage of surgeons, anaesthetists, obstetricians and physicians led to the development of the clinical officer cadre in 1979. The government expanded the skill set with a bridge of 18 months of training (from the basic 2 years) of medical assistants. There are also direct entry programme options with 6 years of training. PHC centres and district hospitals are largely comprised of teams of medical assistants, clinical officers, nurses, environmental and administrative staff. It is estimated that 85% of anaesthesia and 88% of surgeries in Malawi are performed by clinical officers (Henry et al., 2015).

Surgical subspecialty case: India
The development of the AMTC in India is very different from that of other countries. Most AMTC cadres grew out of a need for primary care providers and later, specialist tracks were developed. In 1992, a USA-trained Indian cardiac surgeon, Dr KM Cherian, introduced the concept of the physician assistant in cardiovascular surgery, after having worked with them in the United States. Since that time they have expanded to most surgical/subsurgical specialties including transplant, nephrology, gastroenterology, orthopaedics, as well as other specialties such as cardiology, neurology, oncology, to name a few.

Depending on specialty, they work as first/second surgical assistant, harvest vessels/organs, establish cardiopulmonary bypass, help manage postoperative and critical care patients, administer interventional testing and treatments, and are engaged in high level care. They are also recruited to work in clinical research in these areas (Meckel, 2015; Dharaniprasad et al., 2019).

9.2 Scope of practice

The description of the scope of practice of AMTCs shows variations among countries, driven by geographic, epidemiological and demographic factors. This reflects education and training that are dynamic and responsive.

Table 9.2 presents examples of AMTCs' scope of practice areas, showing high levels of medical clinical skill requirements, as well as the similarities and differences. All three countries have regulatory bodies that oversee the practice of these cadres.

Table 9.2 Examples of AMTCs' scope of practice areas

Cadres	**Uganda** Clinical Officer					**Malaysia** Assistant Medical Officer	**Bangladesh** Medical Assistant
SPECIALTIES SCOPE OF PRACTICE	Primary care	Ophthalmology	ENT	Psychiatry	Anaesthesia	Emergency/trauma pre-hospital	Primary care
Patient assessment (history, physical examination, laboratory, imaging)	✓	✓	✓	✓	✓	✓	✓
Clinical decision-making	✓	✓	✓	✓	✓	✓	✓
Diagnosis	✓	✓	✓	✓	✓	✓	✓
Treatment	✓	✓	✓	✓	✓	✓	✓
Therapeutic procedures	✓	✓	✓	✓	✓	✓	✓
Disease management • Acute	✓	✓	✓	✓		✓	✓
• Chronic	✓	✓	✓	✓		✓	✓
Referral along care path	✓	✓	✓	✓	✓	✓	✓
Preventive care Promotion/prevention	✓	✓	✓	✓			✓
Community outreach	✓	✓	✓	✓			✓
Clinical site leadership	✓	✓	✓	✓			✓
Administrative head	✓	✓	✓	✓			
Management of supplies/ facility	✓	✓	✓	✓			
Management of new initiatives	✓	✓	✓	✓			

9.3 AMTC capacity and contribution

Table 9.3 gives examples of the density of AMTCs, doctors, and nurses in low- and lower middle income countries, in line with NHWA Module 1 – 01. In each of these countries, the need for community-based rural primary care services was the impetus for the training of the AMTCs, such as in Papua New Guinea and Zambia, where the rural population was 87% and 56% respectively in 2018 (World Bank, 2018). AMTC education prepares them to be the frontline health workers in resource-limited settings, and as such they are the first to be impacted by epidemics such as Ebola, COVID-19 and measles (Kebede et al., 2010; McMahon et al., 2016; Gwaikolo et al., 2017; Sanyahumbi et al., 2017; Squire et al., 2017; Witter et al., 2017; Drevin et al., 2019).

Table 9.3 Density of AMTCs, doctors and nurses in some low- and lower middle-income countries

	AMTCs	Medical doctors	Nurses/ midwives
Low-income	Per 10 000 population		
Ethiopia	1.08	0.77	7
Malawi	1.76	0.36	4
Sierra Leone	2.89	0.24	2
United Republic of Tanzania	1.76	0.14	6
Lower middle-income			
Bhutan	8.04	4.24	19
Kenya	3.1	1.57	12
Papua New Guinea	1.16	0.7	5
Zambia	4.9	2.0	13

With global climate change, continued social and political upheaval, and economic instability affecting population health, AMTCs provide for the broad aspects of "health" care, in addition to providing "medical" care. Box 9.2 gives illustrations from three countries.

Box 9.2 Country examples of AMTCs' engagement beyond medical care

Sierra Leone
Sierra Leone's population is 7.7 million with approximately 70% living below the poverty line. Since 2014 infrastructure recovery has slowed after the 11-year civil war due to the Ebola epidemic. The AMTC cadre is made up of community health officers (CHOs) who provide primary care at government-supported peripheral health units. The CHOs oversee community health posts and maternal child health posts. They serve catchment areas of 10 000–30 000 people – within 10 km of community health centres.

During the Ebola epidemic, as frontline health workers, they were not only the first impacted, but also continued delivering primary care while caring and managing Ebola patients and victims.

Lessons learned post-Ebola include improved communication strategies and dissemination of information to the public. The importance of maintaining trust within communities while implementing strategies to break the route of transmission is also seen as paramount.

It is estimated that there are 150–200 medical doctors in Sierra Leone and 2175 CHOs. The CHOs work under the Ministry of Health and Sanitation and continue to pursue support for parliamentary enactment of a regulatory body.

Bhutan
Bhutan's geography is largely mountainous. Around 70% of the population live in rural areas. This has shaped the national health policy calling for access to care within a 3-hour walk. Bhutan's PHC workforce are the health assistants. They work in the basic health units (mostly grade II with two to five beds) serving catchment areas of 1500 to 3000 people (Bhutan MoH, 2011; 2016; Tobgay et al., 2011; Adhikari, 2016). Some of their communities are only accessible via multiple day yak journey in certain seasons.

Health assistants provide primary care, conduct deliveries, provide antenatal/postnatal care for mothers and babies, deliver community-based education and monitoring sanitation, water, nutrition and noncommunicable diseases (NCD) programmes. With changing global temperatures, water supplies and conditions for nutritional sources have changed; these frontline workers are trained to consider climate change as a factor in their care. They maintain records and submit reports to the higher authority. They are also in constant interaction and coordination with individuals, families, local leaders and other service sectors in the community.

Myanmar
From 1999–2018, Myanmar was ranked second of 187 countries in the Global Climate Risk Index (Eckstein et al., 2020) plagued with cyclones, storm surges, flooding, earthquakes and landslides. Around 70% of its population live in the rural areas.

Since 1953, health assistants have provided primary care at the rural community level. Because of the environment and geography, they often reach patients and communities by walking, riding motorcycles, boats, as well as ox pulled carts. In addition to primary care, they manage clean water, sanitation, nutrition, prevention and control measures against communicable diseases, as well as community engagement and education.

9.4 AMTC pipeline: from matriculation to practice

9.4.1 Matriculation

AMTC education is customized to local population health needs (Dovlo, 2004; Mullan and Frehywot, 2007; Lehmann, 2008; Muula, 2009; Bangdiwala et al., 2010; Doherty et al., 2013; GHWA, 2013; Lassi et al., 2013; Couper and Hugo, 2014; Cobb et al., 2015; GHWA, 2010; 2016b; Dovla et al., 2017; Dussault and Cobb, 2017; Fisher and Holmes, 2017; Pálsdóttir et al., 2017; Dussault et al., 2018; Puras, 2019). Candidates are usually post-secondary completers and in low- and lower middle-income countries the majority come from rural communities. In some countries, candidates include nurses, midwives, paramedics, physiotherapists and others. Those with a health professional background have an accelerated educational process, or direct entry into specialty training (Lehmann et al., 2009; Bangdiwala et al., 2010; GHWA, 2010; 2015; Cobb et al., 2015; Dussault et al., 2018; Bitton et al., 2019; Puras, 2019).

9.4.2 Training

Much of the training of AMTCs takes place in an interprofessional setting, or by a variety of health professional educators/clinicians, including medical doctors. This is a reflection of the medical model, but also of the collaborative team-based practice that the AMTCs integrate. Table 9.4 gives examples of training characteristics.

Table 9.4 Examples of education and assessment methods

Country	Students	Training model	Assessment method	Accreditation
Canada	Graduate students	Problem-based learning Simulation lab Interprofessional education	Objective structured clinical examination	Nationally accredited training programes
Netherlands	Practising nurses	Competency based Dual approach curriculum[b]	Portfolio Competency based: medical expert, communicator, collaborator, health advocate, leader, scholar, professional	Nationally accredited training programes
South Africa	Rural high school leavers English second language[a]	Problem-based learning Community-based learning	Case write-ups Objective structured clinical examination	Nationally standardized competency-based curriculum

Notes: [a] Often rural students have an educational background that is disadvantaged, or are not native speakers of the language of the training. Training programmes have developed mechanisms and educational process to ensure competency and proficiency.
[b] Dual approach curriculum: students employed in a medical specialty as physician assistant throughout the training (apprenticeship model).

Longer duration of training is associated with higher degree granting or specialization. Degree opportunities were noted in 43% of low-income, 47% of lower middle-income, 50% of upper middle-income, and 90% of high-income countries.

Diploma versus degree has been increasingly debated in the AMTC and health professional education literature (Roets et al., 2016; Kibe and Cawley, 2017; Weggemans et al., 2017; Hall, 2019; Heide et al., 2019; Wangaria and Okunya, 2019). Questions around the clinical benefit of a degree, the associated financial burden, barriers to accessing education, the impact of absence of health workers pursuing education, unclear value of variable degree requirements, and "degree creep" have been identified as challenges. On the other hand, benefits have been observed, such as expanded roles, higher compensation, and educational and research career opportunities.

Career advancement as an AMTC cadre varies, depending on the country, with opportunities as clinician, researcher, in academia, consulting, administration, leadership and in policy to name a few. There can be professional clinical title hierarchy within the AMTC cadres. In Kenya, for example, the clinical officer moves from junior to mid and senior level status, based on expanded training and years of practice (Mbindyo et al., 2013).

There is growing literature and focus on accreditation (Batalden et al., 2002; Curran et al., 2006; Greenfield and Braithwaite, 2008; Boelen and Woollard, 2009; Moote et al., 2011; Alkhenizan and Shaw, 2012; WHO, 2013; Boulet and van Zanten, 2014; National Academies of Sciences, Engineering, and Medicine, 2016; Australian Healthcare and Hospitals Association, 2018; Blouin and Tekian, 2018; Boelen et al., 2019; Hall et al., 2019; Shiffer et al., 2019; Tackett et al., 2019). The wide variability in accreditation mechanisms supports embracing the flexibility in regionally specific education. However, there is a paucity of literature on methodologies to evaluate the clinical outcome implications. The World AMTC Network (WAN) 2020 Data Collection[1] identified 61 discrete cadres, and found evidence for accreditation of training in 91% of cadres.

9.5 Data collection on AMTCs

Evidence from published literature was retrieved utilizing health professional education, medical education, degree versus diploma, accreditation, task shifting, primary care, AMTC and specific professional titles. The NHWA Portal was accessed. Additional online searches for grey literature, such as newspaper articles and other local communications, were performed. In addition to identification of the professional title, confirmation of the presence of a professional regulatory agency or association will contribute to the survey. Professional associations are key stakeholders to engage in the accounting and integration process. With these initial identification steps taken, the authors identified further directions for the NHWA to be utilized for AMTC descriptors. The NHWA offers guidance for the collection of data that will help describe the ATMC workforce in a country. Table 9.5 lists relevant questions adapted from the different modules of the NHWA.

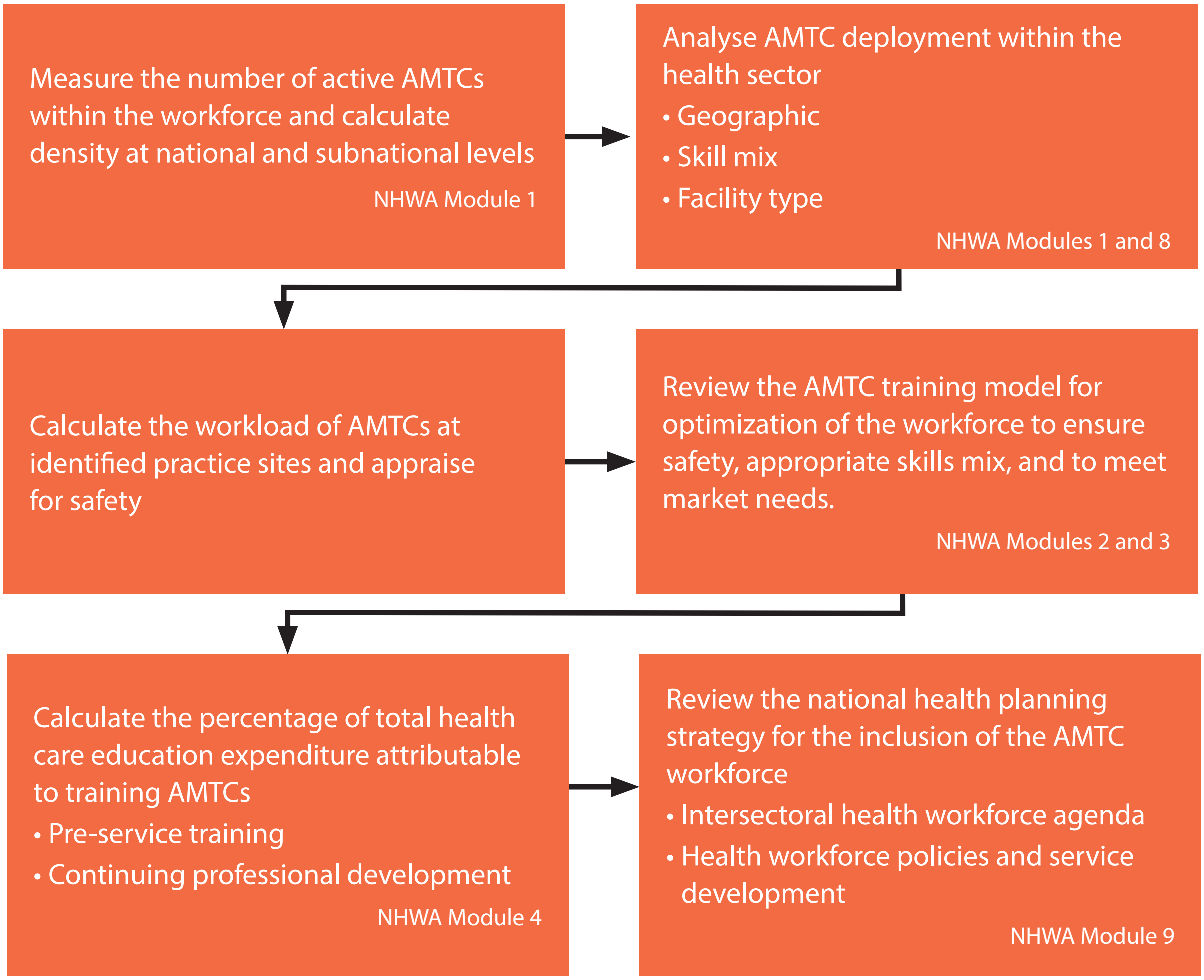
1 WAN 2020 Data Collection provided data, including yet to be published, through collaboration with a global network of health professional practitioners, educators, researchers and experts. Some country data were provided by WHO country representatives. The data gaps in Annex 9.1 are due to the inability to verify data, or lack of data availability; in specific cases (India, New Zealand, Sierra Leone) the data collection structures are not yet in place.

Table 9.5 NHWA questions useful to describe the AMTC workforce

Module 1	Which AMTCs are active in the health sector? How many AMTCs are active in the health sector and what is their density at national and subnational levels? What is the distribution of AMTC by facility type, ownership, geography? What population groups are served by AMTCs?
Modules 2 and 3	What is the national AMTC training model and how does it align with transformative education and optimization of the workforce?
Module 4	What is the total expenditure on AMTC training?
Module 6	What are the staffing needs of AMTCs to ensure safety and how does this compare with current workloads?
Module 8	What competencies do the AMTC cadre(s) contribute to the existing skill mix?
Module 9	How is the AMTC workforce included in the national health planning strategy?

Fig. 9.1 illustrates one approach for a national AMTC workforce audit. The process is grounded in the framework provided by the NHWA modules and provides a comprehensive overview of the country's AMTC capacity. Annex 9.2 provides an application of this approach to the case of clinical officers.

Fig. 9.1 AMTC Health Workforce Audit using NHWA



Conclusion

Historical data collection, analysis and reporting mechanisms, including those of the Organisation for Economic Co-operation and Development (OECD), have reported human resources for health (HRH) statistics utilizing only data collected on physicians, nurses, midwives, dentists and pharmacists. This pattern is based on the ISCO-08 (ILO, 2008; WHO, World Bank, 2017). ISCO-08 classification of paramedical professionals, Unit Group 2240, aligns well with components of AMTC scope of practice. With the continued expansion and integration of AMTCs globally and as ISCO classifications are revised in the future, the categorization of AMTC cadres specifically will come into practice. Including AMTC cadres in data collection, education planning and policy development at subnational, national, regional and global levels, serves to inform better strategic planning of health systems.

The health workers shortages predicted by 2030 are dire. The high-level calls for a paradigm shift away from tertiary care and toward primary care that is integrated, and people centred, demand recognition and accounting of all existing HRH. Context-specific educational strategies and life-long learning that are culturally appropriate and socially accountable must be driven by data and analysis to optimize health care for current and future population needs.

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Annex 9.1: AMTCs in countries of different economic development level

	Low-income							
Country	**Cadre title** (year established)	**Type of services provided**	**NHWA 2 - 02** (post-secondary school)	**NHWA 3 - 02** (accreditation)	**Regulatory body/ oversight**	**NHWA 3 - 08** (CPD)	**Practicing AMTCs** (2018–2020)	**AMTC density per 10 000**
Afghanistan	Physician assistant (2012)	Work limited to the Afghan National Army	2 years	✔	✔			
Burkina Faso	Attaché de Santé (1942)	Primary care	2 years	✔	✔	✔	3600[b]	1.83
	Attaché de Chirurgie (1965)	Emergency obstetric and newborn care (EmONC), Anaesthesia, Emergency surgery	2 years	✔	✔	✔	1571[b]	0.80
Burundi	Sciences et Technique Paramedicale (2001)	Primary care	3 years[a]	✔		✔	2000[b]	1.79
Ethiopia	Public Health Officer (1954)	Primary care, Clinic leadership	4 years[a]	✔	✔	✔	10 953[b]	1
	Integrated Emergency Surgical Officer (2009)	EmONC, Emergency surgery	Above + 3 years [a]	✔	✔	✔	830	0.08
Guinea-Bissau	Clinical Officer	Primary care	4 years				[b]	
Liberia	Physician Assistant (1960s)	Primary care, Clinic leadership	3 years	✔	✔		532[b]	1.1
Malawi	Medical Assistant (1890s)	Primary care, Clinic leadership	2 years	✔	✔	✔	3201[b]	1.76
	Clinical Officer (1979)	EmONC, Anaesthesia, Emergency surgery, Ophthalmology	3–6 years [a]	✔	✔	✔	2414[b]	1.33

Mozam-bique	Tecnicos de Medicina (1975)	Primary care, Clinic leadership	3 years	✓	✓		[b]	
	Tecnicos de Cirurgia (1984)	EmONC, Anaesthesia, Emergency surgery	Above +2–4 years [a]	✓	✓	✓	[b]	
Nepal	Health Assistant (1970s)	Primary care, Clinic leadership	3 years	✓	✓	✓	16 000[b]	5.7
Rwanda	Clinical Officer (2011)	Primary care	4 years[a]	✓	✓	✓	[b]	
	Non-Physician Anaesthesia (1997)	Anaesthesia	4 years[a]	✓	✓	✓	277	0.23
Sierra Leone	Community Health Officer (1980)	Primary care, Clinic leadership	3–6 years[a]	✓			> 2175[b]	2.84
	Surgical Community Health Officer (2014)	EmONC, Emergency surgery	Above +3 years	✓			35	0.05
South Sudan	Clinical Officer (1998)	Primary care, Clinic leadership	3 years	✓		✓	~2000[b]	1.82
Tajikistan	Feldsher	Primary care	4 years					
	Assistant Medical Officer (1960s)	EmONC, Anaesthesia, Emergency surgery, Ophthalmology	Above +2 years	✓	✓	✓	> 2000[b]	0.35
Togo	Medical Assistant (1972)	Primary care, Anaesthesia, Ophthalmology, ENT, Radiology	3 years[a]	✓	✓		1390[b] (12/14)	1.76
Uganda	Clinical Officer (1918)	Primary care, Clinic leadership, Ophthalmology, ENT, Anaesthesia, Clinical psychiatry, Medical education	3 years[a]	✓	✓	✓	15 000[b]	3.51
United Republic of Tanzania	Clinical Officer		4 years	✓	✓	✓	> 10 000[b]	1.76

Notes: [a] Degree granting; [b] Primarily rural practice; ✓ Present; Blank: data not able to be verified/no data

Lower middle-income

Country	**Cadre title** (year established)	**Medical care provided**	**NHWA 2 - 02** (post-secondary school)	**NHWA 3 - 02** (accreditation)	**Regulatory body/ oversight**	**NHWA 3 - 08** (CPD)	**Practicing AMTCs** (2018–2020)	**AMTC density per 10 000**
Angola	Clinical Officer	Primary care, Minor surgery	3 years	✔			[b]	
Bangladesh	Medical Assistant (Sub-Assistant Community Medical Officer) (1976)	Primary care	3 years	✔	✔	✔	30 000[b]	1.86
Bhutan	Health Assistant (1974)	Primary care, Clinic leadership	3 years	✔	✔	✔	620[b]	8.04
Ghana	Physician Assistant (1969)	Primary care, Clinic leadership	4 years[a]	✔	✔	✔	> 2500[b]	0.84
India	Physician Assistant (1992)	Cardiothoracic and vascular surgery, Cardiology, Nephrology, Pulmonology, Oncology, Endocrinology, Neurology, Transplant	4–6 years[a]	✔			2500	0.02
Kenya	Clinical Officer (1928)	Primary care, Clinic leadership, Anaesthesia, Paediatrics, Lung and skin disease, Ophthalmology, ENT, Cataract surgery, Oncology, Orthopaedics, Reproductive health, Venerology, Psychiatry	3–5 years[a]	✔	✔	✔	22 162[b]	4.31
Kyrgyzstan	Feldsher	Primary care, Pre-hospital emergency						
Mongolia	Baga Emch/ Feldsher (1931)	Primary care	2 years	✔	✔	✔	2526[b]	7.97
Myanmar	Health Assistant (1953)	Primary care, Clinic leadership	4 years[a]	✔	✔	✔	2125[b]	0.4

Papua New Guinea	Medical Assistant/ Health Extension Officer (1910)	Primary care, Clinic leadership	4 years[a]	✓	✓	✓	1000[b]	1.16
Sudan	Medical Assistant (1923)	Primary care, Clinic leadership, Ophthalmology, ENT, Emergency, Dentistry	3 years	✓	✓	✓	> 2000[b]	0.48
Ukraine	Feldsher	Primary care, Pre-hospital emergency	3 years	✓	✓	✓		
Uzbekistan	Feldsher	Primary care, Pre-hospital emergency	3 years	✓				
Zambia	Clinical Officer (1960s)	Primary care, Clinic leadership	3 years[a]	✓	✓	✓	> 8000[b]	4.61
	Medical Licentiate (1989)	Emergency surgery, EmONC, Anaesthesia, Ophthalmology, Dermatology, Psychiatry	Above + 4 years[a]	✓	✓	✓	500[b]	0.29

Notes: [a] Degree granting; [b] Primarily rural practice; ✓ Present; Blank: data not able to be verified/no data

Upper middle-income								
Country	**Cadre title** (year established)	**Medical care provided**	**NHWA 2 - 02** (post-secondary school)	**NHWA 3 - 02** (accreditation)	**Regulatory body/ oversight**	**NHWA 3 - 08** (CPD)	**Practising AMTCs** (2018–2020)	**AMTC density per 10 000**
Azerbaijan	Feldsher	Primary care, Emergency care	3 years[a]	✓	✓	✓	2987	2.9
Botswana	Doctor Assistant (2015)	Primary care	4 years[a]	✓	✓		8	0.05
Bulgaria	Physician Assistant (2014) Feldsher (1879–1999)	Primary care	4 years[a]	✓				
China	Assistant Doctor – Assistant General Practitioner (2016)	Primary care	5 years	✓	✓	✓	596 780[b]	4.28
Gabon	Assistant Medical Officer	Primary care	Trained in Togo		✓		[b]	

Guyana	Medex (1977)	Primary care, Medical education	3.5 years[a]	✓	✓		75[b]	0.96
Kazakh-stan	Feldsher	Primary care, Emergency						
Malaysia	Medical Assistant/ Assistant Medical Officer	Emergency/ trauma, Pre-hospital ambulance	3 years[a]	✓	✓	✓	17 895	5.68
Marshall Islands	Medex (1970s)	Primary care	3 years	✓			[b]	
Russian Federation	Feldsher (1816)	Primary care, Pre-hospital emergency	3 years 10 months	✓	✓	✓	185 031[b]	
South Africa	Clinical Associates (2008)	Surgery, Anaesthesia	3 years[a]	✓	✓	✓	1200	0.21
Tonga	Health Officer (1977)	Primary care	2 years	✓	✓		[b]	

Notes: [a] Degree granting; [b] Primarily rural practice; ✓ Present; Blank: data not able to be verified/no data

	High-income							
Country	**Cadre title** (year estab-lished)	**Medical care provided**	**NHWA 2 - 02** (post-secondary school)	**NHWA 3 - 02** (accredi-tation)	**Regu-latory body/ over-sight**	**NHWA 3 - 08** (CPD)	**Prac-tising AMTCs** (2018–2020)	**AMTC density per 10 000**
Canada	Physician Assistant (1984)	Primary care, All specialties	2 years[a]	✓	✓	✓	1000	0.27
Germany	Physician Assistant (2005)	Primary care, Emergency, Orthopaedics, Urology, Cardiology, Surgery	3 years[a]				~1000	
Ireland	Physician Associate (2018)	Surgical: Orthopaedics, Vascular, Colorectal, Breast, ENT, Neurosurgery – training allows for medical areas	2 years[a]	✓		✓	31	0.06
Israel	Physician Assistant (2016)	Emergency	~2 years	✓	✓		~60	0.06
Nether-lands	Physician Assistant (2001)	Almost all specialty areas	2.5 years[a]	✓	✓	✓	1350	0.78

New Zealand	Physician Associate	Primary care, Urgent care	US	✓			8	0.02
United Kingdom	Physician Assistant (2005)	Primary care, Almost all specialty areas	2 years[a]	✓	2021	✓	2000	0.30
United States of America	Physician Assistant (1965)	Primary care, All specialty areas	4–6 years[a]	✓	✓	✓	122 555	3.73

Notes: [a] Degree granting; [b] Primarily rural practice; ✓ Present; Blank: data not able to be verified/no data

Source: https://www.worldamtcnetwork.org/

Annex 9.2: The analysis of the clinical officer workforce in Kenya, using the NHWA framework

The Government of Kenya aims to focus on preventive and promotive PHC, improving access and coverage of health services to all Kenyans, while also avoiding financial hardships and achieve UHC by 2022. Central to this goal is the availability of HRH in adequate numbers to ensure both safety and quality health care. As an important first step, the MoH implemented a comprehensive regulatory HRIS (rHRIS) and monitors the status of HRH at various stages of the workforce pipeline; it uses this data to inform policy development and targeted scale-up strategies. The MoH works collaboratively with the eight key health professional regulatory agencies. While there are differences among them, the general regulatory functions include: accreditation of training institutions, enrolment of new students, internship and licensing, and regulation of registered professionals.

The Clinical Officers Council (COC) uses the rHRIS to regulate training and practice through training institutions' accreditation, student progress tracking, internship, examination and private practice management, registration, licensure, CPD. Analysis of data from 2015 through 2020 has provided a comprehensive view of the capacity of clinical officers in the country.

The following presents data corresponding to indicators of Modules 1, 4 and 9 of the NHWA to illustrate the type of information accessible to policy-makers.

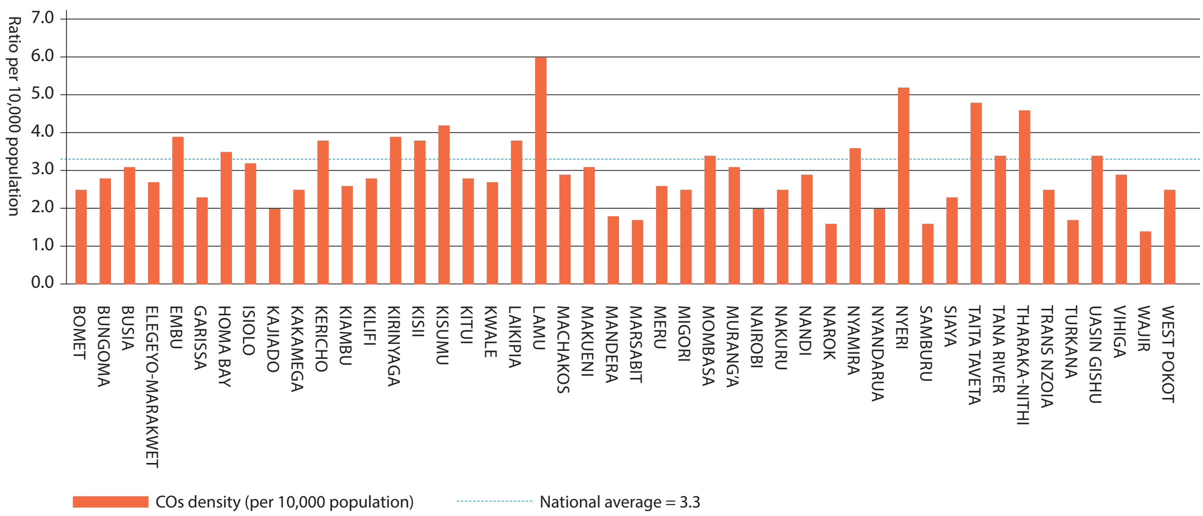
Module 1: Active Health Workforce Stock

1 – 01 Health worker density

- 22 115 clinical officers ever registered
- 15 865 active clinical officers
- 3.3 per 10 000 people

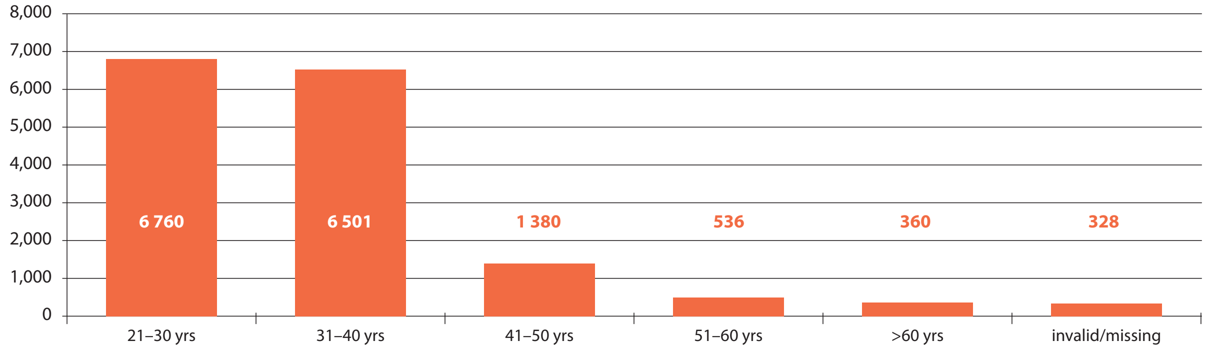
1 – 02 Health worker density at subnational level

Distribution and density of clinical officers per 10 000 population by county



1 – 03 Health worker distribution by age group

Age distribution of clinical officers in Kenya (N = 15 865)

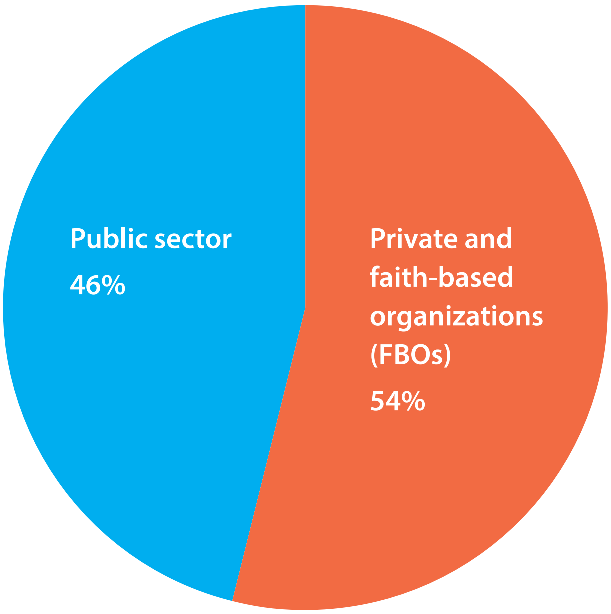


1 – 04 Female health workforce

Female: Male ratio is 1 : 1.3

1 – 05 Health worker distribution by facility ownership

Active clinical officers distribution by facility ownership (N = 13 223)



1 – 06 Health worker distribution by facility type

Not available

1 – 07 Share of foreign-born health workers

0.08% (9 of N = 11 250) of the active clinical officers are foreign born

1 – 08 Share of foreign-trained health workers

4.2% (464 of N = 11 048) of the active clinical officers are foreign trained

1 – 09 Share of workers across health and social sectors

Not available

Registration began in 1989 and as of September 2020, the COC had registered 22 115 clinical officers. Their scope of practice includes routine medical, emergency and surgical care. Biannual licence renewal implemented in 2013 requires the attainment of 60 CPD points. Since implementation, renewals increased from 3345 to 15 865 in 2020. The all-time retention rate is 71.7%, thanks to facilitated career progression through the upgrading of diploma to degree level training, options for in-service education and training in specialty fields. Improvements in the provision of regulatory services has decreased licensure wait times by up to 3 months, improved enforcement of licence renewals, and increased overall retention rates.

Training occurs at either the diploma or bachelor level, requiring 4–5 years of post-secondary schooling, including a 1-year mandatory internship. From 2015 through 2019, the COC reported a 189% increase in accredited training institutions with an increase of new student admissions for diploma programmes from 1253 to 2699. Additionally, the number of bachelor-trained increased more than two-fold; 77% of counties now have at least one training institution. Clinical officers have the option to pursue a higher diploma or master's degree with a further 1.5–3 years of training within a specialty field. 16% have a specialty in anaesthesia (820), paediatrics (462), lung and skin disease (249), ophthalmology and cataract surgery (171), ear nose throat (234) and orthopaedics (115). In addition to specialty training, BSc Clinical Medicine holders can conduct public health research at the PHC levels, and hold educational roles across all health training.

Data-driven HRH planning enables the equitable and responsive distribution of clinical officers, to improve access and coverage for the delivery of UHC. The identification of the most underserved areas based on clinical officer density guided investments in training institutions across the country resulting in a broader geographic distribution of clinical officers. Training programmes have been scaled-up, leading to an increase of newly registered professionals entering the workforce annually. Data on expenditure on clinical officer education shows the financial commitment to develop and maintain this profession.

Module 4: Education Finances

4 – 01 Total expenditure on higher education

- 13.1% of government expenditure

4 – 02 Total expenditure on health workforce education

- Not available

4 – 03 Average tuition fee per student

- Average annual tuition fee per Clinical Officer student:
  - Public colleges: Ksh. 500,000 ($5000 USD)
  - Public university: Ksh. 900,000 ($9000 USD)

4 – 04 Investment in transformative education and training

- Capacity building for all public servants in managerial positions, including in health management teams at national and county levels:
  - Health systems management
  - Kenya School of government

4 – 05 Expenditure per graduate on health workforce education

- Total expenditure for Clinical Officers
  - Annually: Ksh. 500,000 ($4609 USD)
  - Four years: Ksh. 2 million ($18436 USD)

4 – 06 Cost per graduate of medical specialist education programmes

- Clinical Officers specialize at Higher Diploma or Master's level training
  - Higher Diploma: Ksh. 250,000 ($2305 USD)
  - Master's: Ksh. 750,000 ($6914 USD)

4 – 07 Cost of qualified educators per graduate

- Public Colleges
  - Masters: Ksh.1000/hr ($9 USD)
  - Degree: Ksh. 900/hr ($8 USD)
  - Diploma: Ksh.750/hr ($7 USD)

  *Payment for lecturers — depends on the Job group

- Public Universities
  - Assistant lecturer: Kshs 80,000 – Kshs 120,000 ($737–$1106 USD)
  - Lecturers: Kshs 120,000 – Kshs 140,000 ($1106–$1291 USD)
- Per hour: Kshs 2,300 ($21 USD)

4 – 08 Total expenditure on in-service training and continuing professional development

- Short courses, less than 6 months, of training - Kshs. 80,000 ($737 USD)

Clinical officers in Kenya have strong representation through the COC and are active participants in the coordination of health workforce agenda, planning processes, policy development, health sector assessment, and implementation of innovative practices.

Module 9: Governance and health workforce policies

9 – 01Mechanisms to coordinate an intersectoral health workforce agenda

- Chief Clinical Services Office
- Kenya Human Resources Advisory Committee (KHRAC)
- Council of Governors (COG)

Agenda

- Health Workforce 2030
- Universal Health Coverage (UHC)
- Kenya Heath Sector Strategic and Investment Plan (KHSSP)
- Kenya Health Policy (2014–2030)

Approval

- The Chiefs Clinical Officer's office, Clinical Services was involved in the formulation of UHC, KHSSP, and Norms and Standards for HR

9 – 02 Central health workforce unit (Contribution by the COC)

- Joint workforce inspections
- Development of accreditation tools
- Development of strategic plans including CO strategic plan with monitoring and evaluation (M&E) framework
- Involvement in HRH norms and standards and other norms development and implementation
- Development of scope of practice

Intersectoral coordination mechanisms (CO representation)

- HRH Interagency Coordinating Committee (HRH ICC)
- County Government Health Committee
- Health Sector Intergovernmental Consultative Forum – Health Sector Intergovernmental Framework (HSIGF).
- Membership of the technical committee

9 – 03 Health workforce planning processes

Objective 4: Providing essential healthcare:

- COs oversee primary health services in the Healthcare Service Delivery System
- advocates for an adequate, productive, and equitably distributed pool of health workers (includes COs), who are accessible for the effective delivery of healthcare.
- proposes labor development programme to ensure a continuous supply of health workers to the sector

Coordinated communication

- Chief COs office communicates to the County COs in charge directly
- Communication through the Associations and Unions

HRH Planning Committee

- HRH Division
- Human Resources Management/Development (HRM/HRD) unit

Methodology for HWF planning

- Norms and Standards for HRH
- KHSSP

Sustainable data collection (contributors)

- Information Systems (regulatory HRIS and integrated HRIS)
- Kenya National Bureau of Statistics (KNBS)
- Kenya Health Master Facility List
- The Kenya health professional regulatory agencies (including COC)
- The county health management teams

Implementation

- Combined HWF Planning Committee recommendations and needs based
    - Specialization in Nephrology by COs to manage new equipment installed at the county hospitals through the devolved system
    - Cancer screening in primary care to ensure early diagnosis and decrease severity

9 – 04 Education plans aligned with national health plan

Alignment

- Introduction of novel programs in the training institutions based on gaps identified through data to cater for maldistribution or emerging diseases
- COC provide essential resources for the development of co-curriculum for innovative programs

Transformative Education

- Requirement for all health officers in the public sector to undertake leadership and management program offered at the Kenya School of Government (KSG)
- Relevant for COs who, according to Health Act 2019, oversee primary health services

Health in All Policies

- Part of the leadership and management courses offered by the KSG for those in public sector and Strathmore University for all others

- Taught as a module in the Clinical Officer curriculum dealing with health services management

Expansion

- Skills mix
  - Bachelors level in Clinical Medicine
  - Specialized skills training
  - Upgrades for scarce skills
- Services readiness and availability by National Council for Population and Development (NCPD) in 2018.

9–05 Institutional models for assessing health care staffing needs

Responsible body

- KHRAC
- Department of standards in the Ministry of Health
- By facility type and required skills

Mechanism

- Workload Indicators of Staffing Needs (WISN)
- Norms and standards for HRH

Key features of the Kenya case

- A system of HRH councils representing the existing skill mix; with structures empowering them to oversee training, accreditation and regulation of their workforce.
- Engagement of AMTC professional council within the governance structure of the health sector ensuring a coordinated health workforce agenda.
- Population health needs, labour force and existing HRH were assessed to determine educational capacity development.

PART II

Policy questions and data requirements: monitoring the demand for health workers and future needs

Chapter 10: Data requirements for the analysis of the demand and need for health workers

Gilles Dussault, Amani Siyam

10.1 Introduction

This chapter identifies data and information that can contribute to the analysis of demand and need for health workers, and thereby provide evidence for the development of health workforce policy. A better understanding of demand helps address issues such as the existence of shortages, of unemployment, or of unmet needs. Following the model of Chapter 2, we propose a review of national health workforce accounts (NHWA) indicators (WHO, 2017) that help capture data and information on demand and on need. We also add some other potentially relevant indicators and their respective sources.

10.2 Data and information requirements on the demand for health workers

Demand is "the number of health workers that the health system (both public and private) can support in terms of funded positions or economic demand for services" (Scheffler et al., 2016). This definition suggests that to characterize demand, it is necessary to have data on the number and type of jobs available to health workers. Additional information is needed on who are the employers (public and private), where the jobs are offered, in what type of provider organization, and on terms of employment and working conditions. Individuals "operating as self-employed entrepreneurs" are included in private for-profit employers (Dussault and Vujicic, 2008). There are also international employers who offer jobs to health workers, such as global health initiatives (Gavi, the Vaccine Alliance, Stop TB Partnership, RMB Partnership to End Malaria), multi- and bilateral agencies, nongovernmental organizations (NGOs) (foundations, faith-based and humanitarian organizations) and for-profit providers like hospitals and clinics chains.

International demand also includes that from countries' public and private employers who actively recruit abroad. England is a textbook example: it has a chronic shortage of nurses and a history of recruiting large numbers from the European Union (EU) countries (Italy, Portugal, Spain) and from low- and middle-income countries (LMICs) (India, Philippines, Nigeria) (Buchan et al., 2020). Some countries "import" foreign health workers through bilateral agreements, like Portugal with Cuba (de Oliveira et al., 2017).

In economic terms, demand for workers derives from the demand for health services. The shape of the demand for health workers depends on health policies, on financial resources available, and on the preferences and needs of employers and of consumers. For example, the commitment to universal health coverage (UHC) implies the creation of a sufficient number of jobs to make services accessible to all, based on need rather than only on capacity to pay. If a country chooses to prioritize the development of primary care services to progress towards UHC, demand for workers with a primary care education will increase. Public and private financial resources available for health determines how much of the total expenditure will go to employing workers. In the public sector, this decision is typically the responsibility of a combination of ministries, namely health, public administration and finance. In the private sector, employers decide how many and what type of workers they are prepared to employ. Users of services, as consumers, are "buyers" of the services of self-employed workers.

As for data on supply, it is easier to capture data from the public than the private sector, as the latter does not have the same legal obligations to account for their activities as employers. NHWA propose a series of indicators that help meet the data and information requirements on demand needs. These cover the active stock of health workers (Module 1), unemployment and vacancies (Module 5), employment and working conditions (Module 6), expenditure on the health workforce (Module 7), and where jobs are available (Module 8) (see Table 10.1).

Indicators

As much as possible, data should be disaggregated by occupational category (including specialties), by sector (public, private for profit, private not for profit), by density and geographical location, by sex and age, and by year.

When longitudinal data are available, trends over the last 10 years should be included.

Table 10.1 NHWA indicators relevant for the analysis of demand for health workers

Indicator number	Indicator name
Module 1: Active health workforce stock	
1 – 05	Health worker distribution by facility ownership
1 – 06	Health worker distribution by facility type
Module 5: Health labour market flows	
5 – 06	Unemployment rate
5 – 07	Vacancy rate
Module 6: Employment characteristics and working conditions	
6 – 01	Standard working hours
6 – 02	Health workers with a part-time contract
6 – 06	Health worker status in employment
Module 7: Health workforce spending and remuneration	
7 – 01	Total expenditure on health workforce
7 – 02	Total official development assistance on health workforce
7 – 03	Total expenditure on compensation of health workers
7 – 04	Public expenditure on compensation of health workers
Module 8: Skill mix composition for models of care	
8 – 04	Specialist surgical workforce
8 – 05	Family medicine practitioners
8 – 06	Existence of advanced nursing roles

Indicators 1 – 05 and 1 – 06 inform on numbers of workers, by occupation, employed in different categories of public-private (for-profit/not-for-profit) facilities.[1] Assuming that each individual employed corresponds to a job, these indicators inform on the proportion of demand that is met. Vacancy rates (5 – 07) represent the proportion of unmet demand. Total demand comprises filled jobs, plus the vacant ones. Indicator 5 – 06 (Unemployment rate) may mean that demand is insufficient to provide employment to all health workers willing to work, or, if it exists simultaneously with vacancies, it may indicate that the preferences of workers and jobs available do not match.

Indicators 6 – 01 and 6 – 02 help estimate demand in terms of full-time equivalent (FTE) jobs. Indicator 6 – 06 adds the number of self-employed, each corresponding to one job. Expenditure on compensation of health workers (7 – 03, 7 – 04) serves to estimate the number of funded jobs by dividing by the average compensation. This gives an estimated total number of jobs, but does not specify how many per occupational category. Public expenditure is likely easier to capture than total expenditure because of the difficulty to collect data on private expenditure, including on the revenues of the self-employed. Indicators 8 – 04 and 8 – 05 give the densities of two categories of physicians; assuming that they are employed, these data inform on the component of demand for these professionals that is satisfied. To have a full picture of demand, data on unfilled positions must be added. Finally, the existence of advanced nursing roles is not a quantitative indicator, but it is useful to inform on a type of demand that exists in certain countries, but not in others.

Table 10.2 presents suggestions of additional indicators to characterize demand for health workers.

Table 10.2 Additional data and information on the demand for health workers

Indicator	Justification
Quantitative data: demand	
Utilization rates of alternative practitioners	This can be estimated through household or consumer surveys. Demand for workers who are not part of the formal health sector, such as "alternative" practitioners (acupuncturists, homeopaths, herbalists or healers) can be derived from that information.
Qualitative information: demand	
Policy decisions relative to the public sector health workforce	In the context of the recent economic crisis in Europe, many countries imposed measures that had a direct impact on demand. Examples are the non- or partial replacement of retirees and recruitment freezes (Correia et al., 2015).
Decision-making process relative to recruitment, postings, transfers, promotions, firing	This informs on who has the capacity to create or abolish jobs, i.e. to generate or reduce demand for health workers. It can help understand the dynamics of the evolution of demand.

1 Hospitals, residential long-term care facilities, providers of ambulatory health care, ancillary services (including transportation, emergency rescue, laboratories and others), retailers (including pharmacies, providers of preventive care).

Differences in working conditions between public and private sectors, including remuneration and non-monetary aspects of working conditions	This helps identify mismatches between workers preferences and jobs offered. It provides information on the attractiveness – or the lack of it – to explain unmet demand. Individuals seeking employment are sensitive to job characteristics such as access to health insurance, maternity leave, vacation time, flexible working hours, or the physical work environment, e.g. infrastructure, equipment and location. They may even accept jobs with lower remuneration, but with benefits and conditions that meet their preferences.

10.3 Data and information requirements on the need for health workers

Need is the number and types of health workers required to deliver all the services corresponding to the burden of disease and to population expectations and utilization patterns. The need for health workers can be assessed as a function of specific health service priorities and objectives. For example, if the objective is to give access to a family physician to all households and if the planning of services is that each physician will take responsibility for 2000 persons, the number needed can be calculated by dividing the total population by 2000. A similar calculation can be done for other objectives, such as immunizing X% of children, giving pregnant women access to a prescribed number of antenatal consultations, or the ambitious general goal of UHC.

It would be easier to define need if there existed internationally recognized benchmarks for deciding how many health workers a country requires, what competencies they should have, or how they should be distributed. No such recommendations exist: to recommend health worker density benchmarks, such as one physician per 1000 population or two nurses per physician, one would need to assume that the numerator and the denominator of these ratios are the same everywhere. This is far from being the case in view of very significant variations between countries, and even within countries (Box 10.1). In federal countries where health is a subnational responsibility, definitions of scopes of practice may vary. For example, in Canada there are significant differences in the scope of practice of nurse practitioners from one province to another.[1] However, a country can compare itself with other countries with a similar demographic and epidemiological profile, and then estimate its needs on that basis.

1 https://www.cihi.ca/en/nurse-practitioner-scopes-of-practice-in-canada-2020

Box 10.1 Variations between countries make international standards inappropriate

Numerator level: Physicians are not equal from one country to another, and even within the same country. Competencies vary according to training received, to access to continuing education; definitions of specialties vary; and productivity varies according to sex and age, to access to equipment, to how work is organized, and to incentives.

The definition of what is a nurse also varies, ranging from an auxiliary who provides basic bedside services and assistance to a physician, to an autonomous professional with the right to prescribe medicines, analyse, examine and work independently. There are similar variations for all other professional categories.

Denominator level: The burden of disease can vary significantly from one country to another, because of differences in the age structure, ethnic composition and geographical distribution of the population, in the environment and climatic conditions, in the economic situation, and in the organization and functioning of the health care system.

For example, though Portugal and Tunisia have approximately the same population, teamwork is dominant in Portugal, but not in Tunisia. The productivity of one physician in Portugal is not equal to that of one in Tunisia. Portugal has one of the oldest populations in the world (19.4% over the age of 65 years) while Tunisia has a younger one (8% over 65), which implies that the burden of chronic diseases is different. It is therefore inappropriate to use the same numerator and denominator to estimate human resources for health (HRH) requirements in these two countries.

Source: Gedik and Dussault (2021).

The definition of need does not take into account the capacity to pay for the education and employment of additional workers. It has quantitative (insufficient supply or demand or both) and qualitative (skill mix not aligned on service needs) dimensions. Need may be expressed in global terms (so many more health workers), but preferably disaggregated by occupation or specialty, and by geographical zone. In many countries, some services (primary care, mental health, geriatrics) and some zones (rural, remote, poor urban) suffer from unmet needs, even if the total workforce seems sufficient and adequate.

The assessment of future needs is a difficult exercise also because needs change; for instance, the increase of the prevalence of chronic diseases requires a quantitative and qualitative adjustment of the health workforce (Dussault and Buchan, 2018). Chapters 12 and 13 discuss various strategies to assess future needs and demand, including the use of thresholds as in the WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) (WHO, 2016). Table 10.3 lists NHWA indicators that can help estimate needs.

Table 10.3 NHWA indicators relevant for the analysis of the current need for health workers

Module 1: Active health workforce stock	
1 – 02	Health worker density at subnational level
Module 5: Health labour market flows	
5 – 07	Vacancy rate
Module 9: Governance and health workforce policies	
9 – 03	Health workforce planning processes
9 – 04	Education plans aligned with national health plan
9 – 05	Institutional models for assessing health care staffing needs

There is no specific NHWA module on need for health workers, but a number of indicators are useful for its assessment. The analysis of indicators 1 – 02 (density at subnational level) and 5 – 07 (vacancy rate, an indicator of unmet demand) can inform on shortages of health workers in certain geographical zones and in specific occupational categories. This information about the current market situation can be useful in estimating the gap between the available workforce and the one needed to achieve health policy objectives. Module 9 identifies mechanisms that serve to define the desirable workforce in quantitative and qualitative terms. Indicator 9 – 03 leads to sources that identify health workforce objectives set by national policies. These can serve as a reference to calculate the gap between the current workforce and the desired one, and thereby estimate need. Indicator 9 – 04 can inform on qualitative needs, both in terms of the mix of occupations that the education institutions produce, and of the competencies students acquire. Indicator 9 – 05 addresses the following question that is directly relevant to the identification of needs: "Is there a mechanism and/or responsible body in charge of determining the number of health workers of a particular occupation required to effectively and safely deliver health services in health facilities?"

Need is a normative notion, contrary to demand which is an operational one that can be measured objectively by counting the number of jobs available. For specific services, such as HIV treatment, diabetes or maternal and child health, need for health workers may be easier to measure, because there is a fairly broad consensus on which services are recommended and on who can provide them, and because the estimates of number of persons needing these services are fairly accurate. For other health conditions, like mental disease or disabilities, the prevalence is not well known, and there is less consensus on services needed. Need is always greater than demand, the more so in poor countries with high burdens of disease and limited resources to employ health workers. Table 10.4 suggests other potentially useful indicators.

Table 10.4 Additional data and information on the need for health workers

Indicator	Justification
Quantitative data: need	
Percentage of households reporting not having access to a family practitioner	This indicates that the available number of family practitioners is insufficient to cover the whole population, and therefore there is an unmet need.
Waiting times for access to certain services (specialty consultation, exams, surgical procedures)	Specific ambulatory or hospital procedures can be used as proxy to estimate the need for specific types of health workers (by controlling for other factors that would explain waiting times).
Proportion of people in need of health care reporting delay in getting health care in the previous 12 months for reasons of availability of health workers	Same as above – adapted from the European Health Interview Survey indicator of unmet needs (https://ec.europa.eu/eurostat/web/microdata/european-health-interview-survey).
Percentage of people living in medical deserts	Medically underserved or health care "medical deserts" (USA; "déserts médicaux" in France) are severely medically understaffed geographic zones; some even with no health workers based in the zone (https://www.trinityschoolofmedicine.org/blog/the-shortage-of-medical-doctors-grows-practicing-medicine-in-a-rural-area-alleviates-more-than-the-doctor-shortage; https://drees.solidarites-sante.gouv.fr/sites/default/files/2020-08/dd17.pdf).
Qualitative information: need	
Review of staffing needs studies	This can add information to that reported by NHWA indicator 9 – 05. There is research-based literature on staffing levels needed to maintain a certain level of coverage or of safety and quality of services. An example is the work of the National Institute for Health and Care Excellence (NICE) in the United Kingdom (https://www.nice.org.uk/guidance/sg1/resources/illustration-of-process-pdf-11945197).

The need for health workers derives from the need for services, which is influenced by a range of factors pertaining to the environment in which policy is defined. These factors include:

- Demographic and epidemiological profile of the population: the burden of disease of an older population tends to include a greater proportion of noncommunicable diseases (NCDs) and of disabilities. Services needed require specific types of workers (e.g. oncologists, psychiatrists, rehabilitation professionals) in numbers corresponding to the prevalence of these conditions.
- Health emergencies and crises, such as epidemics, generate new needs in quantitative and qualitative terms. The recent Ebola and COVID-19 crises have highlighted the issues of insufficient numbers of health workers in general and with certain competencies to cope with a sudden surge of need for services (McPake et al., 2019; WHO, 2020).

- Technology can generate the need of new types of workers, and augment or reduce the need of current ones. New diagnosis and treatments, telemedicine, e-health, m-health affect the provision of services, creating new ones, rendering others obsolete, and eventually affecting health workforce needs.
- Cultural factors: a population with a higher level of health literacy has higher expectations regarding health services; this may translate into different and greater health workforce needs. As to health workers, younger ones may be looking for better work-life balance and limit their working time, which reduces the supply and augments needs.
- Some regulations also impact need. An example is the EU Working Time Directive that establishes a maximum of weekly working hours. It limits the time medical residents can work and thereby creates a need for more if the same level of services is maintained.[1]
- Political factors: many actors with a stake in the health labour market (HLM) try to influence demand and need for health workers. These actors have different objectives, interests, preferences and degrees of influence. It is important to understand the political environment that shapes demand.

The information on these factors serves to understand how health worker needs are created and change.

10.4 Data and information sources

For the 78 indicators of the NHWA, WHO gives potential sources of data. These include repositories of routinely collected data by government ministries and agencies, professional councils and associations, accreditation bodies, education institutions, trade unions, employer organizations, or human resources for health (HRH) observatories. Some sources collect data on all sectors of activities (census, labour and social security statistics), others are specific to the health sector (professional registries, HRH information systems (HRHIS)). Chapters 14, 15 and 16 of the Handbook present and discuss these sources.

Punctual actions are useful to complement the data and information basis. Examples are labour force studies (Chapter 17), household and facility surveys, interviews of key informants and of users of services, and documentary search. Using multiple sources allows for the triangulation of information and thereby contributes to improving the validity and reliability of the analysis of demand and need.

10.5 Conclusion

Understanding the dynamics of the HLM requires the analysis of both the supply and the demand side. In order to address challenges like reducing shortages or making access to health workers more equitable and better aligned to service needs, focusing only on how to increase supply is not sufficient. HLM inefficiencies are basically mismatches between supply and demand and therefore both components of the equation need to be analysed. The literature on HRH has given more attention to gaps between supply and estimated needs, for example, the *World health report 2006: working together for health*, which identified 57 countries with needs-based shortages that amounted to a health workforce crisis (WHO, 2006). Demand has tended to receive "scant attention" (McPake et al., 2013). This chapter emphasizes the importance of documenting demand and need and gives orientations on relevant data and information requirements. The list is not exhaustive, but it can serve as a broad basis for the analysis.

1 https://ec.europa.eu/social/main.jsp?catId=706&langId=en&intPageId=205

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Chapter 11: Governance and financing of supply and demand

Gilles Dussault, Amani Siyam

11.1 Introduction

Objective 3 of the WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) (WHO, 2016) is "to build the capacity of institutions at subnational, national and international levels for effective leadership and governance of actions on human resources for health (HRH)" (WHO, 2016:8). The recurrent observation that many health workforce inefficiencies, particularly in accountability mechanisms, result from "weaknesses in governance" motivated the inclusion of this objective in the GSHRH (WHO, 2016). Hence the need for "… adequate fiscal space and strengthened governance of health systems in order for the HRH investments required to meet population needs and guarantee universal access to care" (WHO, 2016: 24). A health labour market analysis (HLMA) is a useful tool to inform policy and decision-makers on the state of governance in their country and on changes that can make it more effective (see Chapter 17).

This chapter focuses on two main mechanisms of governance, regulation, and financing; these are among the most important determinants of the functioning of health labour markets (HLMs). Their design and use vary from one country to another, even within the same country, and across time, and therefore influence differently the inter- and in-country performance the health workforce. The objective of this chapter is to identify data and information that enable the analysis of governance, regulation, and financing of the health workforce at country level. A first section proposes definitions of governance and its main dimensions, and the second identifies data and information useful to characterize them. It reviews indicators already recommended in the national health workforce accounts (WHO, 2017) and others that HLM analysts may find relevant.

11.2 Governance and its main dimensions

There are numerous definitions of governance in the health sector as illustrated in Box 11.1. Despite variations in their formulation, most tend to emphasize the mechanisms and processes of decision-making and implementation. In general, the focus of the literature on governance in health is on defining "good governance".

Box 11.1 Selective definitions of governance

"The process and institutions through which decisions are made and authority in a country is exercised", is a definition proposed by the World Bank and adopted by European Observatory on Health Systems and Policies as it covers decision-making, from legislative procedure and judicial review to appointment procedures and professional regulation (Greer et al., 2015).

"A wide range of steering and rule-making related functions carried out by governments/decision-makers as they seek to achieve national health policy objectives that are conducive to universal health coverage" (WHO, 2016).

"The rules that distribute roles and responsibilities among government, providers and beneficiaries and that shape the interactions among them. Governance encompasses authority, power and decision-making in the institutional arenas of civil society, politics, policy, and public administration" (Dieleman et al., 2011).

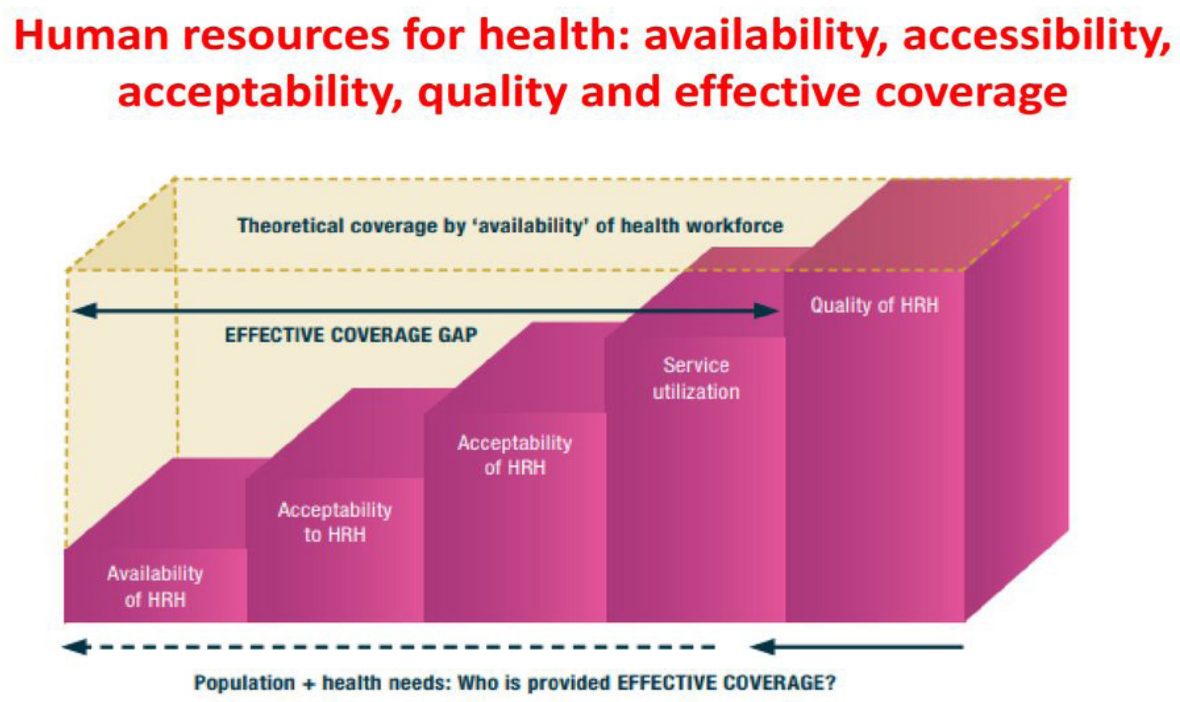
"The set of rules that define the responsibilities of health system actors, how they operate, and how they relate to one another" (Kaplan et al., 2013).

"The indisputably difficult assignment to bring better alignment between the day-to-day functioning of services delivery and the health system" (Barbazza et al., 2015).

"The collection of mechanisms, structures, processes and influences for a system's oversight, policies, planning and accountability" (Rees, 2019).

Here, governance refers to structures, mechanisms and processes of making and implementing decisions that influence the various dimensions of the performance of the health workforce, e.g. its availability, accessibility, acceptability, quality and effective coverage, as per Fig. 11.1 from the GSHRH. It also refers to the accountability requirements corresponding to health workforce related decisions and actions.

Fig. 11.1 The dimensions of the performance of the health workforce



Source: WHO (2016:11).

The study of governance covers the actors involved, e.g. who decides and who influences decisions. Decisions that impact the health workforce take place at the level of provider organizations, of the health services system, of the broader national environment, and beyond. National actors include state ones, e.g. ministries and public agencies, and non-state ones, e.g. professional councils, associations, trade unions, accreditation bodies, employers, education institutions, facility managers. Not all state actors with an influence on governance of the health workforce belong to the health sector. Many decisions that affect the HLM originate from ministries whose area of intervention is other than health. In most countries, the Ministry of Education or its equivalent is responsible for universities and vocational schools, including those that train health workers. This ministry may adopt and implement generic rules applicable to all areas of education, independently of their specificities. There are few exceptions, like the Islamic Republic of Iran, which in 1985 created the Ministry of Health and Medical Education, with a view to better align the training of health professionals with national health policies (Pourabbasi et al., 2019). Morocco's Ministry of Health manages the network of public schools training nurses and technicians, whose graduates are the only ones who can access a public service job. It is also responsible for the National School of Public Health, but not for medical, dental and pharmacy schools, which are under the Ministry of Higher Education (Ministère de l'Enseignement Supérieur, de la Recherche Scientifique et de la Formation des cadres). Ministries in charge of public administration may adopt procedures of recruitment, posting and transfer in public services that apply across the board, including in the health services. Other ministries, such as labour, planning and above all finance, make decisions that affect the health workforce, without necessarily intending to do so. In some countries, there is even a ministry or state agency with a mandate to attract back or obtain the collaboration of expatriate health workers, mainly physicians. Examples are the Ministry of Pakistani Overseas, the Ministry of Foreign Affairs, Undersecretary for Peruvians Abroad and the Ministry of Senegalese Abroad (Frehywot et al., 2019). At subnational level, depending on the degree of decentralization or of devolution of decision-making, regional, district, even municipal authorities may take decisions that will eventually impact the health workforce.

There are also actors at international level whose decisions can affect the national health workforce. This is the case. in countries that receive official development assistance (ODA), for example through loans or grants from the World Bank or regional development banks, the Global Fund to Fight Tuberculosis, AIDS and Malaria, global health initiatives like Gavi, Stop TB Partnership, and through bilateral aid agencies and foundations (Bill & Melinda Gates Foundation). Even high-income countries (HICs) can see their health workforce affected by decisions or actions of supranational entities, as in the case of Cyprus, Greece and Portugal, which received external emergency aid from the International Monetary Fund, Central European Bank and European Commission during the 2008 financial crisis. The adjustment programmes targeted the public health sector, as a major employer, and imposed measures such as salary reductions, recruitment freezes and partial replacement of leavers (Correia et al., 2015).

Areas of decision-making and regulation include the education pipeline and the employment of health workers. In relation to education, examples of significant decisions are: to open or close an education institution or programme, to choose their location, to define selection of students and of educators' criteria and processes; to define the number of places per professional pathway; and to design the content and methods of delivery of curricula. As to employment, decisions regard principally the conditions of entry in the HLM (registration, licensing), the recognition of specialties, the definition of scopes of practice, the creation of jobs, types of contract, recruitment, postings, transfers, firing, wages, working conditions, compulsory service, and retirement age, among others.

Structures are entities that design, make and implement health workforce policy decisions. Some target more sectors than the health sector or the health workforce, such as parliament and its various committees that discuss and adopt policies covering a broad range of areas of state intervention. In the health sector itself, there are structures dedicated to planning and policy development in general, and some to health workforce issues specifically, such as an HRH department, directorate or unit, an intersectoral coordination unit, advisory boards, or an observatory. For instance, the Pan American Health Organization (PAHO) has supported a network of HRH observatories for more than 20 years (Gedik and Dal Poz, 2012). The organization, structure, composition and mandate of these HRH structures vary considerably and their performance has a direct impact on the quality of health workforce policy development and implementation (Cometto et al., 2019).

Mechanisms and processes to arrive at decisions range from the elaboration of health workforce national policies, plans, strategies, legislation and directives to consultation of stakeholders and policy dialogues. Health workforce education and employment regulation and financing are the main tools of implementation of health workforce policy decisions. Their influence on the HLM is determinant as they define who enters the market, the required competencies, how many and what type of jobs are created, deployment by type of facility and geographical location, wage levels, and work conditions. The state and its agencies (ministries, accreditation boards), non-state organizations, benefiting from a delegation of responsibilities (professional councils, registration bodies), and voluntary organizations have the responsibility to apply these rules.

At the different levels of governance, rules are mandatory or simply recommendations, depending on the legal status of who formulates them. At the supranational level, European Union (EU) directives are mandatory for the 27 Member States. Examples are the Working Time Directive[1] that establishes a weekly limit of 48 hours of work, which increased staffing requirements in health facilities, where it was common for medical residents to work 60 hours and more per week. The Directive on Mutual Recognition of Diplomas[2] is another example of a rule that has an impact of the national HLMs, as it facilitates the mobility of health professionals in the context of the freedom of movement of persons guaranteed by the EU Treaty on Freedom of Movement.[3]

There are numerous examples of international organizations' recommendations intended to influence countries' HLM:

- WHO Global Code of Practice on the International Recruitment of Health Personnel.[4]
- ILO Decent Work Agenda.[5]
- Standards of competency requirements defined by international professional associations such as the International Council of Nurses,[6] the World Federation for Medical Education[7] or provider organizations associations (International Hospital Federation's "global competency directory for healthcare leadership and management").[8]
- Requirements for the accreditation of education institutions and programmes (Association of Schools of Public Health in the European Region [ASPHER] for public health schools and programmes),[9] or of provider organizations (Joint Commission International).[10]

1 https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32003L0088
2 https://www.europarl.europa.eu/factsheets/en/sheet/42/the-mutual-recognition-of-diplomas
3 https://www.europarl.europa.eu/factsheets/en/sheet/147/free-movement-of-persons
4 https://www.who.int/hrh/migration/code/practice/en/
5 https://www.ilo.org/global/topics/decent-work/lang--en/index.htm
6 https://www.icn.ch/nursing-policy/regulation-and-education
7 https://wfme.org/
8 https://www.ihf-fih.org/activities/special-interest-groups/healthcare-management/
9 https://www.aspher.org/
10 https://www.jointcommissioninternational.org/

At national level (and at subnational level where legislative power exists), examples of mandatory rules are professional laws that define the powers and duties of professional councils, such as registration, certification of specialties and discipline. They also define scopes of practice that, in turn, shape the division of labour in the HLM. For example, the definition of what a nurse can do varies; the recognition of extended practice rights enables some forms of substitution of doctors by nurses and, as a result, affects the productivity of the health workforce and the accessibility of services (Maier and Aiken, 2016). In some countries, national legislation imposes compulsory service to some categories of new health professional graduates (Antonio et al., 2020). State accreditation agencies can impose standards for the education of health workers or for working conditions. Collective labour agreements between trade unions and employer organizations or government as an employer have binding effects that define aspects of the demand for health workers, such as working hours, wages, minimum staffing and so on. As regards forms of regulation that do not have legal force, examples are voluntary accreditation, such as that offered by Accreditation Canada, an organization with a long history of support to self- and external peer assessment of health and social services provider organizations,[1] and professional associations' quality standards.

The analysis of the financing of the health workforce serves to assess how governance works in practice. The allocation of financial resources to education and employment of health workers shows the extent to which health workforce policies translate into reality. Financing, from public and private sources, determines access to health worker education programmes, job creation, working conditions, in fact all aspects of the performance of the health workforce. It is the tool by which governance can produce the desired effects of a country's policies. Its analysis covers the process of mobilizing financial resources from different sources (government budget, external aid, private organizations, individuals), and the process of allocation of these resources.

11.3 Data and information to assess governance, regulation and financing

The GSHRH states "Better HRH data and evidence are required as a critical enabler to enhance advocacy, planning, policy-making, governance and accountability at national, regional and global levels" (WHO, 2016:34). This raises the question of data and information requirements to describe and assess governance, regulation and financing, identify their strengths and weaknesses, and indicate how to improve their effectiveness. The NHWA provide a number of indicators, which Tables 11.1–11.3 list.

Table 11.1 NHWA modules: governance

Indicator number	Indicator name
Module 9: Governance and health workforce policies	
9 – 01	Mechanisms to coordinate an intersectoral health workforce agenda
9 – 02	Central health workforce unit
9 – 03	Health workforce planning processes

1 https://accreditation.ca/

9 – 04	Education plans aligned with national health plan
9 – 05	Institutional models for assessing health care staffing needs

Table 11.2 NHWA modules: regulation

Indicator number	Indicator name
Module 2: Education and training	
2 – 01	Master list of accredited health workforce education and training institutions
2 – 02	Duration of education and training
Module 3: Education and training regulation and accreditation	
3 – 01	Standards for the duration and content of education and training
3 – 02	Accreditation mechanisms for education and training institutions and their programmes
3 – 03	Standards for social accountability
3 – 04	Standards for social accountability effectively implemented
3 – 05	Standards for social determinants of health
3 – 06	Standards for interprofessional education
3 – 07	Agreement on accreditation standards
3 – 08	Continuing professional development
3 – 09	In-service training
Module 6: Employment characteristics and working conditions	
6 – 03	Regulation on working hours and conditions
6 – 04	Regulation on minimum wage
6 – 05	Regulation on social protection
6 – 07	Regulation on dual practice
6 – 08	Regulation on compulsory service

Table 11.3 NHWA modules: financing

Indicator number	Indicator name
Module 4: Education finances	
4 – 02	Total expenditure on health workforce education
4 – 03	Average tuition fee per student
4 – 04	Investment in transformative education and training
4 – 05	Expenditure per graduate on health workforce education

4 – 06	Cost per graduate of medical specialist education programmes
4 – 07	Cost of qualified educators per graduate
4 – 08	Total expenditure on in-service training and continuing professional development
Module 7: Health workforce spending and remuneration	
7 – 01	Total expenditure on health workforce
7 – 02	Total official development assistance on health workforce
7 – 03	Total expenditure on compensation of health workers
7 – 04	Public expenditure on compensation of health workers

Module 9 informs on the existence of various mechanisms of the governance of the health workforce, such as coordination of the different actors from various sectors (9 – 01), of a dedicated unit (9 – 02) and planning process (9 – 03) for the development of relevant policies, like in relation to the education of health workers (9 – 04), and assessment of staffing needs (9 – 05). Table 11.2 lists indicators of regulation that focus on education and employment respectively. They inform on the existence of regulatory mechanisms and standards and on their functioning, e.g. who regulates what. Finally, Table 11.3 includes indicators of financing that capture sources and allocation of expenditure on education (Module 4), employment and remuneration of health workers (Module 7).

NHWA provide an extensive set of data and information for the analysis of the HLM that analysts can complement in accordance with their needs and in function of their resources. Table 11.4 offers examples of potentially useful indicators.

Table 11.4 Additional data and information on governance, regulation and financing of the health workforce

Indicator	Justification
Quantitative data: governance, regulation and financing	
Percentage of education programmes, by occupation, with an accreditation not older than 5 years	This disaggregates indicator 2 – 01 between programmes that have an accreditation granted more than 5 years ago from those with a more recent one. The reason is that an "older" accreditation is less of a guarantee that quality standards are maintained.
Total expenditure on health workforce education by occupation	This adds a level of disaggregation to indicator 4 – 02.
Percentage of private provider organizations expenditure on health workforce	Complements indicator 7 – 04.
Data on hours of work lost to unjustified absenteeism (including to dual practice) or on the prevalence of informal payments in public facilities	This would indicate the extent of the effectiveness of the regulation of work in public health facilities. High levels of loss would suggest weak regulation.

Qualitative information: governance, regulation and financing	
Mapping of the actors involved in making decisions on the education of health workers and of those affected by them	Helps inform who decides the number of places per programme, selection criteria, recruitment of educators and trainers, etc., who owns the data and controls access) technical expertise, data, research, observatories.
Mapping of the actors involved in making decisions on the employment of health workers and of those affected by them	Contributes to the analysis of the political environment of the HLM.
Mapping of accountability mechanisms and assessment of their functioning	This informs on how health workforce policy-makers and implementers are expected to justify their decisions and actions. The analysis should also document how these mechanisms work in practice (see https://www.who.int/health-topics/health-systems-governance).
Frequency and conditions of the renewal of the accreditation of education institutions and programmes	Adds information on the requirements (more or less demanding) of the accreditation.
Accreditation of provider organizations	This process normally covers the various aspects of the employed health workforce that interest the HLMA.
Information on the activities of professional councils, such as the management of user complaints or the exercise of discipline	This indicates the effectiveness of councils as regulators.
The existence of systems of incentives, by occupation (public-private sectors) to influence decisions of workers and employers	Incentives (monetary and non-monetary) are tools to: • attract students to train in an understaffed specialty; • convince workers to accept work in a difficult area; • prevent attrition/improve retention (offering flexibility of hours to workers with young children or less demanding tasks to older workers).

Interviews of key informants can serve to assess the functioning of structures and mechanisms of governance, by asking questions about the appropriateness of their design, e.g. their compatibility with the objective of improving the performance of the health workforce and about the available expertise to implement health workforce related policy decisions and monitor their effects. Information on facilitators and obstacles to "good governance" of the health workforce is also useful. Examples of facilitators are a tradition of public accountability and participation of civil society organizations in the formulation of policy decisions and effective professional bodies. Typical obstacles are a lack of technical and financial capacity to implement rules, or the actions of powerful professional groups that influence the definition of rules to protect their own interests. An example of a framework to analyse governance in the health sector is the TAPIC model proposed by the European Observatory on Health Systems and Policies that defines five dimensions on which governance should be assessed: transparency, accountability, participation, organizational integrity and policy capacity (Greer et al., 2015).

11.4 Conclusion

While the importance of the influence of governance on the HLM is broadly recognized, its analysis is a difficult task. Quantitative data are needed, but they may not be sufficient, Governance has technical aspects that can be measured, like the existence of regulations or the volume and allocation of financial resources, but it is above all a political process in which stakeholders with opposing interests and different capacity of influence interact (Khulmann et al., 2016; Lim and Lin, 2021). The characterization and understanding of this dimension of governance require qualitative information that social research tools like stakeholders analysis can help produce.

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Chapter 12: Assessing current and future needs (1): projections and planning

Gilles Dussault

This chapter discusses efforts to estimate future needs and demand for health workers, in terms of density, by occupation, by type and level of service, and by geographical area. The information from such estimates is critical, because today's decisions will produce their results in 5, 10 or 15 years, when the health context may be different. Failure to address this question adequately may have major negative consequences in terms of the capacity of the health service system to respond to the needs of the population. Policy-makers need to make informed decisions to avoid future mismatches between supply and demand and need for health workers, such as an inefficient mix of occupations, shortages or surpluses, competency gaps, or an inequitable geographical distribution. Mismatches will result in the provision of services being less effective and efficient, and in the waste of valuable financial resources to train and employ workers at high cost. In addition, because populations give high value to access to quality health services, a poor response to this expectation may cost political capital.

The objective of this chapter is to review the literature on strategies to assess future needs and demand, at global and country levels. It discusses their strengths and weaknesses and proposes a framework to identify the data and information that can help in planning the future health workforce. The first section presents a brief background to efforts to identify future needs. A review of published projections of global needs of health workers follows. A third section gives examples of how some countries identify their workforce needs. The fourth section is about the process of planning of a workforce that can meet the future needs of services.

12.2 Background

The adoption by the United Nations General Assembly of three health-related Millennium Development Goals (MDGs) in 2000,[1] and then of Sustainable Development Goal 3 (SDG 3) to "Ensure healthy lives and promote wellbeing for all at all ages" by 2030 and the commitment to universal health coverage (UHC) in 2015, defined a consensus on "what to do". The questions of "how to do it" and "with what resources" are now the most challenging ones that policy-makers face. In the early 2000s, international organizations and countries focused on financing issues raised by these commitments, giving scant attention to the critical question, "which workforce is needed to achieve these goals?". The publication, in 2004, of *Human resources for health: overcoming the crisis* by an international group of more than 100 health leaders forming a Joint Learning Initiative (JLI), raised the alarm by concluding that a "massive global shortage" of health workers, estimated at 4 million, was the most important obstacle to the achievement of the three health MDGs. The authors arrived at that estimate by postulating that a minimum threshold of 2.5 workers per 1000 population would be required to achieve 80% coverage of immunization and maternal health services – an indicator used as a proxy to illustrate the challenge (JLI, 2004:33). The JLI message to the international health community was: "The only route to reaching the health MDGs is through the worker; there are no short-cuts". The *World health report 2006: working together for health* (WHO, 2006), using the same indicator, identified 57 countries "in crisis", because they did not reach a threshold of 2.28 doctors, nurses and midwives per 1000 population. In the following years, there were various estimates of health workforce global current and future needs, some of which the following sections present.

12.3 Projections of global shortages of health workers

International technical and financial agencies are interested in forecasting global, regional and country needs to adapt their decisions and interventions, such as choosing which countries should receive support to meet their workforce needs. Table 12.1 presents a selection of projections of global needs and demand-based shortages of health workers, published from 2004 onwards.

Table 12.1 Estimates of global health workforce needs or demand-based shortages

Source (year)	Estimated needs (N) or demand (D)-based shortage	Basis of calculation	Results
JLI (2004)	(N) 4 million (doctors/ nurses/midwives) in 2000.	2.5/1000 needed to cover "key health services linked to immunization and maternal health".	75 out of 118 countries for which data were available did not reach that threshold.
WHO (2006)	(N) 2.4 million doctors, nurses and midwives in 2004 (4.33 million including other health workers).	2.28 threshold in "workforce density below which high coverage of essential interventions, including those necessary to meet the health-related MDGs.	Achievement of MDGs is very unlikely – 57 countries did not reach that threshold.

Scheffler et al. (2008)	Based on observed trends, there would be between 11.4 million to 14.3 physicians by 2015 globally. (D) Global demand would be 10.8 million. According to the demand-based model, 37 countries would experience a shortage (15 in the WHO African Region, 10 in the WHO Eastern Mediterranean Region, and 7 in the WHO Western Pacific Region). (N) According to the needs-based approach, 45 countries would experience a shortage in 2015, 32 of them in the WHO African Region.	Projections take into account historical trends in the supply of physicians, in needs (ratio of physicians required to achieve 80% coverage of live births by a skilled attendant) and demand and economic growth of 158 countries. Data are from World Bank databases.	Needs-based shortages mostly affect countries of the WHO Africa Region, whereas demand-based shortages affect countries with strong economic growth. The model predicts a global surplus of physicians by 2015, with major regional variations: 45 countries experiencing needs-based shortages and 37 experiencing demand-based shortages.
Campbell et al. (2013)	(N) 12.9 million skilled health professionals (midwives, nurses and physicians) by 2035.	• Calculations based on three different bases: • WHO threshold of 22.8 per 10 000 population • ILO threshold of 34.5 per 10 000 population[a] • Mexico threshold of 59.4 per 10 000 population[b]	• 83 countries fall below the WHO threshold • 100 countries fall below the ILO threshold • 118 countries fall below the Mexico threshold.

Scheffler et al. (2016); WHO (2016)	(N) The estimated global needs-based shortage for 2013 was 17.4 million (2.6 million doctors, 9 million nurses and midwives, 5.8 other cadres). In 2030, the estimated shortage will be approximately 14.5 million (2.3 million doctors, 7.6 million nurses and midwives, 54.6 other cadres).	Based on a threshold of 4.45/1000 to deliver 12 SDG-related interventions and estimates of gap between existing stock and expected needs in 2030.	Globally, there are enough health workers to meet the health SDGs, but they are unevenly distributed, with the larger needs-based shortages in the WHO South-East Asia and African Regions, at 6.9 million and 4.2 million respectively. When accounting for population size, Africa has the most severe forecasted shortages.
Liu et al. (2017)	(D) Global demand in 2030 will be for 80 million physicians, nurses and midwives, and all other health workers, but only 65 million will be available in 2030 for 165 countries.	Based on the WHO threshold of 4.45/1000. Demand, needs, supply are assumed to grow at current (2013) rates. Demand for nurses and midwives calculated assuming a ratio of 2.517 nurses and midwives per physician. Demand and supply of all other health workers calculated assuming a ratio of 3.517 to doctors and nurses and midwives.	87 countries will experience shortages of 19.3 million health workers, 78 countries a surplus of 3.8 million.

Scheffler et al. (2018)	(N) Needs-based shortage estimated at 14.2 million in 2030 (D) Estimated demand-based shortage at 15.5.	This paper adds to Liu et al., 2017; Cometto et al., 2016 and WHO, 2016. The authors used a composite index of 12 tracer health indicators as proxies of health needs for UHC and the targets of SDG 3. They applied the threshold of 44.5 health workers per 10 000 to 2013 data and made projections to 2030 for 165 countries, regrouped by level of income and by WHO regions.	Demand is projected to increase most significantly in the WHO European and Western Pacific (mainly in China) Regions. Needs-based shortages will grow more in Africa.
WHO (2020)	(N) 5.7 million nurses by 2030.	Simulation of projection of the stock of nursing personnel from 2018 to 2030 by WHO region under three scenarios, with different trends in the age distribution of the profession and in the production of new graduates Shortages are estimated using the methodology of WHO (2016).	The model projects higher increases in the WHO Regions of the Americas, South-East Asia and Western Pacific, and 88% of the increase in middle-income countries when level of income is considered. Shortages continue to affect more low-income countries (LICs).

Boniol et al. (2022)	(N) A revised global health workforce shortage (from that estimated by Scheffler et al., 2018) to 15 million health workers in 2020 decreasing to 10 million health workers by 2030.	The analysis applies a stock and flow model on the latest national health workforce accounts (NHWA) data to estimate projections for the years 2020 and 2030 and the estimated shortages.	Progress is noted in the increasing size of the health workforce globally, albeit masking considerable inequities, particularly in WHO African and Eastern Mediterranean regions, and alarmingly among the 47 countries on the WHO Support and Safeguards List. Progress should be acknowledged with caution considering the immeasurable impact of COVID-19 pandemic on health workers globally.

Notes: [a] Staff-related access deficit indicator (SAD). The SAD measures the relative difference between a particular country's health workforce density and the population-weighted median health workforce density in a group of countries defined by the ILO as having low vulnerability (Scheil-Adlung, 2013).

[b] The 59.4 skilled health professionals per 10 000 population is the skilled workforce configuration Mexico uses to achieve the maternal mortality ratio of 50/100 000 live births (Bustreo et al., 2013).

These projections have the following characteristics:

- They are typically needs-based; they use one care need (e.g. pregnancies and deliveries by a skilled birth attendance) or set of needs (e.g. maternal and child health services) as a proxy for all health care service needs. The services corresponding to these needs and the population of potential users are easier to estimate, which is not the case for most other health service needs. Demand is more difficult to assess because of the difficulty to forecast future health services and workforce policies and their funding.
- They assume that future service needs will be similar to current ones, adjusted for demographic change (mainly population growth).
- They focus mainly on physicians, nurses and midwives; this is because data for other occupations are less available and there are missing data from a number of countries for some years. The projections assume that competencies, scopes of practice, activities and productivity are the same everywhere and remain constant.

- They do not account for differences in the organization of health care delivery system systems, in financing, in availability of equipment, infrastructures, medicines, in new technology, in the climatic and geographical characteristics of countries, or in labour market dynamics.
- They use the WHO database, which contains data provided by countries themselves. Reliability and availability of data are variable.
- They produce global, regional, and country forecasts. Available data do not allow for forecasts at subnational level.

The authors of these projections acknowledge their limitations and recommend care in interpreting them. For instance, they recognize that there are no international benchmarks and that requirements vary according to the type of services and of the distribution of the population (Scheffler and Fulton, 2013). Their value resides in giving a broad idea of the magnitude of gaps between future needs and future availability of health workers, if current trends continue unchanged.

12.4 How some countries identify their future workforce needs

The most basic way to estimate future needs is to calculate the number of health workers needed to replace those who retire, plus a certain percentage to account for those who leave the health labour market (HLM) before reaching retirement age. Many countries have a more refined strategy, in particular those with a public health service system accessible to all. In those countries, the whole population can in principle demand services; the estimate of future needs is therefore an important information for policy-makers.

Table 12.2 presents a selection of country experiences in assessing their future needs of health workers. Some countries project needs for the whole health workforce, some only for public services, and others only for some specific categories, like medical specialists.

These examples show the difficulty policy-makers face. They have limited information to make decisions now on how many health workers to train by type of occupation and specialty (even including some that do not presently exist), by level of care, type of facility, and by geographical areas. Beyond numbers, they need to identify the competencies these health workers should acquire and estimate the human, physical and financial resources to educate and to employ the desirable quantity of health workers. Ideally, the following information will help answer such questions:

- Baseline workforce situation in terms of its availability, accessibility and quality.
- Future service needs, given the trends of demographics (ageing) and of the burden of disease (prevalence of noncommunicable diseases (NCDs), epidemics).
- Vision of the response to these service needs: how delivery will be organized (will primary health care (PHC) be a higher priority; will there be more integration of services; will access to services be more equitable?).
- Future division of labour between physicians and other occupations (task-sharing, task-shifting).
- Impact of technology (telemedicine, e-health, m-health, precision medicine, new drugs).
- Behaviour of current and future workers (work preferences and expectations, mobility).
- Trends in the evolution of demand by the public and the private sectors.

- Behaviour and expectations of users (utilization of services rates by type of services, by social groups, social norms, health literacy, representations of health, disease, medicine, drugs etc.).
- Macro-factors (state of the economy, disposable income), political choices (utilization target rates, e.g. UHC, SDGs), regulatory environment.

Table 12.2 Examples of projections/planning strategies from different countries

Country	Strategy	Comments
Chile (Ono et al., 2013)	Projections of the supply of medical specialists (34 specialties) in public hospitals and demand using a model generating various types of scenarios, by setting up different assumptions on retirement age and recruitment patterns.	The model used physician densities in Spain, adjusted for economic and health variables, as a benchmark. The projections were only short term (4 years).
England (CfWI, 2014; Edwards 2017)	Method called "robust workforce planning" using horizon scanning, workforce modelling and scenarios developed with experts using a Delphi method. Future drivers of change are identified and their impact on each professional group is assessed. Demographic change, mobility of patients and of health workers, productivity and new competencies needs and new roles are factored in.	Requires an extensive data collection and investment in technical expertise to analyse data, conduct consultations and design scenarios. Produces rich information.
England (Buchan and Seccombe 2012)	Scenarios (n=8) of the evolution of inflows (training, international recruitment) and outflows (retirement, attrition) to assess the future supply of nurses, midwives and health visitors over a period of 10 years.	Limited to three cadres in England's NHS. Conclusion: "…it is unwise to base policy decisions on a single projection".
Namibia (McQuide et al., 2013)	Application of the Workload Indicators of Staffing Need (WISN) methodology (WHO, 2010) to doctors, nurses, pharmacists, pharmacy assistants of public facilities (clinics, health centres, district hospitals, intermediate hospitals).	Limited to four cadres and to public facilities. Access to good data on workloads is critical.

Netherlands (Van Greuningen et al., 2012; Malgieri et al., 2015)	Mathematical and policy model for supply and demand of general practitioners (GPs) based on six scenarios built on demographic, epidemiological, sociocultural, technological labour market projections and expert opinion.	Complex tool requiring high-level technical expertise, applied every 3 years to physicians. Results are used by an Advisory Committee on Medical Manpower that makes recommendations to the government. Planning projections are made at national level, while recognizing that regional requirements vary. Results are credible (databases are reliable) and have been used to set the numbers of places for training.
Oman (Ghosh, 2009; Sultanate of Oman, 2014)	A series of successive national plans aimed at increasing self-reliance and resulted in increasing the proportion of nationals in the health workforce. The latest plan took high-income country high-income country (HIC) ratios to set Oman's health workforce requirements.	Covers physicians, dentists, pharmacists and nurses. Planning is based on a detailed vision statement and corresponding objectives and strategies. There has been continuity in the process of planning (facilitated by a favourable political and economic environment).
Spain (Barber and Lopez-Valcarcel, 2010)	Simulation model of future need/demand/supply for 43 medical specialties. Scenarios are developed in accordance to possible changes in government regulation, demography, technology, and are discussed by experts using a Delphi method with the objective of defining future requirements.	Planners can use the results to set the number of places in specialty training with a view to avoid shortages or surpluses. First used in 2007, it led to a change of the *numerus clausus* in medical schools and of the number of training positions of medical specialties with larger shortages.

12.5 Data and information requirements

Future health workforce requirements correspond to the quantitative and qualitative difference between the current supply of health workers and the desired one in a determined future. The information on the state of the current workforce situation is often incomplete. For example, the private sector workforce (including dual practitioners), or the pool of the unemployed willing to participate in the HLM, are typically less well known than the workforce in public services. The national health workforce accounts (NHWA) can provide a solid basis to characterize the existing workforce and trends of its recent evolution (WHO, 2017). Chapters 2 and 10 discuss data requirements for the analysis of the main dimensions of the HLM and identify additional information that can usefully complement the NHWA indicators.

The characterization of the future health workforce presents the obvious difficulty of "predicting" the evolution of numerous factors endogenous to the HLM, and of others in its environment. The knowledge of recent trends in the behaviours of students, workers and employers is determinant. Similarly, information on economic, social and political trends, and on policies, is critical. In a context of uncertainty, the best strategy to project future needs and demand is to build scenarios. The reference scenario, even though it is little probable, is that trends will remain constant. Policy analysts or researchers can develop scenarios in isolation, an exercise that consists of extrapolating from the existing. However, scenario building strategies that engage stakeholders, key informants, experts, through policy dialogues, workshops, Delphi surveys, are likely to be better accepted by policy-makers.

Table 12.3 presents examples of information useful for the design of scenarios of the possible evolution of the health sector and relevant for the assessment of future health workforce needs and demand.

Table 12.3 Relevant information for the assessment of future health workforce needs and demand

Information	Sources	Comments
Vision – policies, strategies	Policy documents, national health plan, health workforce plan, political parties' programmes and statements	Indicates orientations and possible changes in the organization of services, priorities, objectives, strategies.
Demographic and epidemiological trends, behaviour of users	Population data, burden of disease data, consumer surveys	Analysis of trends in ageing of the population, in the size of the recruitment pool of future students, in NCDs, in disabilities, in utilization of services. Assessment of the evolution of health literacy, of acceptance of new types of services (e.g. teleconsultation, home care).
Political environment (role of professional associations, trade unions, other interest groups)	Stakeholder analysis, consultation of key informants, policy dialogues	Serves to identify the objectives and interests of the various actors (educators, students, workers, employers, regulators) and the political feasibility of different scenarios of change. This is important because the future health workforce will be the result of negotiations between the various stakeholders.

Intentions of students/future health workers	Opinion surveys of representative samples, online surveys, focus groups, discrete choice experiments	Information on intentions in relation to choice of specialty, of practice location, on mobility, to stay in the profession, allows assessing if these are consistent with the future needs and demand. Studies show that students often have biased perceptions of their future work that can influence their career choices (Ferrinho et al., 2011; HakemZadeh et al., 2020; Sela et al., 2020).
Behaviour of workers	Analysis of trends, opinion surveys of representative samples, online surveys, focus groups	Analysis of trends in relation to working hours, to temporary exits of the HLM, to intentions of mobility (career change, rural to urban, emigration), to work-life balance expectations.
Behaviour/ expectations of employers	Analysis of trends, opinion surveys	Expectations regarding changes in the health care delivery system (strengthened primary care, home care), intentions of private providers to expand their services.
Technology	Key informants, Delphi study, interviews	Experts can inform on the impact of the generalization of innovations such as the use of artificial intelligence in health care, precision medicine and others, in terms of new competency needs and of old ones that will become obsolete. This may require the creation of new occupations and render others less needed, or no longer needed.

12.6 Conclusion

In the design of HLM policies, errors have effects for many years and are not easy to correct. Projections are a critical ingredient in the formulation of policies to respond to future needs and demand. They inform the development of policies; in combination with the collection of information from various sources about trends affecting the multiple factors that influence the HLM dynamics, they help reduce the uncertainty and contribute to designing policies with a higher probability of effectiveness.

Projecting future health workers needs and demand is not an exact science. The quality of data and the soundness of assumptions are determinant in building realistic scenarios. There are efforts to standardize health workforce data and of tools for their collection, such as the definition of minimum datasets (WHO, 2015; Scheffler et al., 2016) or information systems such as NHWA. In spite of the existence of an International Standard Classification of Occupations

(ISCO),[1] there are still major variations in the definition of health occupations among countries; an emblematic example is nursing personnel. In most countries, there are only a few occupations that are accounted for separately, namely physicians, nurses, midwives (though the last two are sometimes merged in a single category), dentists and pharmacists. Other health workers are often aggregated in broad categories, such as technicians or assistants. This explains why most projections are for single occupations rather than for the whole workforce. Another difficulty is translating needs and demand into number of workers, taking into account that part of their time will not be available for the delivery of services, due to absenteeism generated by annual and sick leave, participation in training activities, and other causes. In addition, variations in productivity, for example due to differences in the mix of occupations or in the division and organization of work, translate into different numbers needed. Finally, the longer the time horizon, the greater the probability that the economic, political and social environment changes and affects needs and demand in a manner difficult to foresee.

The involvement of stakeholders in the definition of future needs and demand helps assess the possible impact of these changes. In a changing environment, the implementation of health workforce policies needs to be carefully monitored and stakeholders should be informed and consulted on a regular basis, as projections may have to be adjusted to new circumstances. In a word, well-crafted projections help planners, policy- and decision-makers in government and other stakeholders, like education institutions, professional councils and associations, ensure that health workforce policies are informed by solid data and knowledge.

1 https://www.ilo.org/public/english/bureau/stat/isco/

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Chapter 13: Assessing current and future needs (2): estimating staffing needs at facility level – the WISN approach

Deki, James Asamani, Maritza Titus, Mollent Okech, Pamela McQuide, Teena Kunjumen

13.1 Introduction

The Workload Indicators of Staffing Need (WISN) is a tool to help identify and gather information to assess the workload pressure on health workers in a service delivery facility. The WISN methodology is a systematic way to combine and review available information about the health workforce in order to support decision-making for effective, efficient and equitable health deployment of workers for quality person-centred health service delivery. Numerous countries across the globe have used WISN in various ways: by doing "small" WISN (e.g. a facility study) or "big" WISN (e.g. national study that aggregates results from smaller studies) (WHO, 2010).

This chapter presents an overview of the uses of WISN and describes the steps of a WISN study – planning (defining objectives), organizing the governance and management structure, identifying data sources and requirements, collecting and analysing data. The chapter uses examples of country experiences in applying the WISN methodology to highlight good practices and show how some common challenges have been addressed.

13.2 Overview of the usefulness of WISN studies

The launch of the revised WISN user's manual and the first version of the WISN software by WHO in 2010 (WHO, 2010) triggered an abundance of experience, as reported in a recent scoping literature review that identified 367 WISN studies (Doosty, 2019). The literature is helpful in showing how the WISN tool can be used to estimate staffing needs. Findings show that WISN studies can serve to:

- Characterize/describe the health worker staffing situation at national, subnational or facility levels.
- Document potential imbalances in staff distribution and skill mix in relation to workload.
- Estimate staffing needs created by anticipated workloads of newly established health services and plan future staffing accordingly.
- Determine the best way to allocate new functions and transfer existing functions among health occupations.
- Review and assess the reasons why a health facility is providing lower quality health services compared with similar facilities.
- Assess the impact of different conditions of employment on staff requirements and service provision.

The WISN method does not assess health worker performance or productivity, but when applied in health facilities that present varying health achievements vis à vis health targets, the results can help to identify the underlying reasons for such differences and to suggest corrective interventions to improve the performance of low performers. By using a representative sample of health facilities at the various service delivery levels, a nationwide WISN study can serve to estimate the required number of health workers in the country. WISN studies can take place in decentralized (federal) systems, as well as in centralized ones, or both. The principles of the WISN methodology are applicable to all types and levels of facilities, in the public and private health sector.

13.3 Conducting a WISN study

13.3.1 Planning: defining the objectives of the study

An initial step for successful implementation of a WISN study is to define clear objectives, as stakeholder engagement and resource mobilization will depend on them. The objectives of a WISN study can range from a need to revise old staffing norms, estimate current staffing needs, assess the feasibility of a new health services package, or improve poor health outcomes. In all cases, the alignment of objectives with the needs of those commissioning the study (whether facility managers or a ministry) is critical; they need to be shared by the staff who will eventually be affected by the results. Box 13.1 lists a variety of objectives and selected countries that adopted those.

Box 13.1 Examples of countries that adopted different WISN study objectives

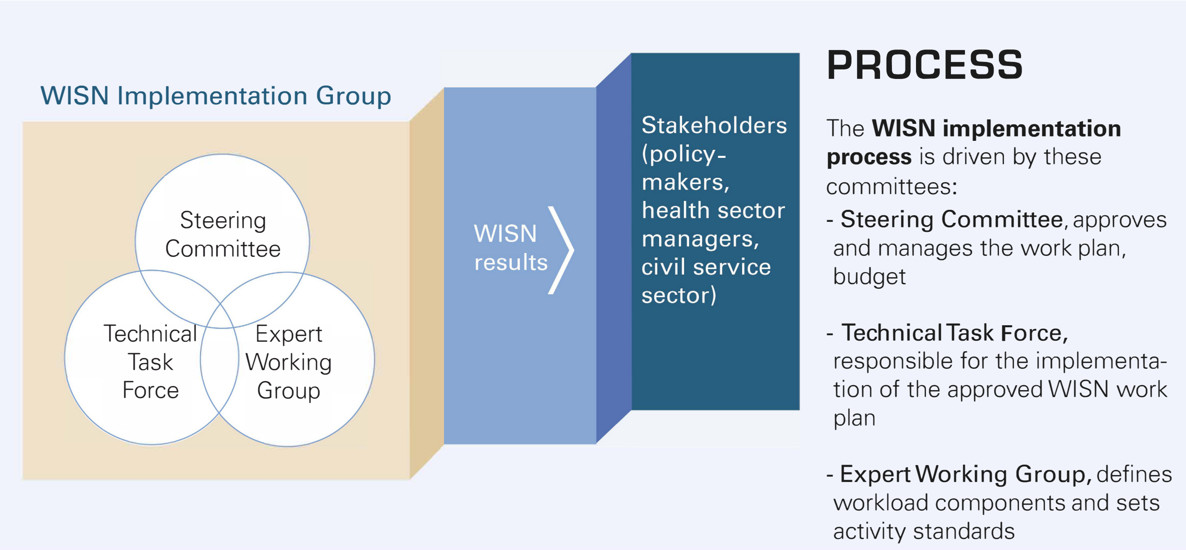
- **Assess health workers requirements to deliver a specific health service package and to improve poor health outcomes:** Bangladesh, Nigeria, Oman, Papua New Guinea, Peru, Trinidad and Tobago, Zimbabwe.
- **Restructuring/reforms, change in service delivery models:** Ghana, Kenya, Namibia, Oman, Philippines.
- **Updating of existing staffing norms:** Democratic Republic of the Congo, Ghana, Kenya, Namibia, Nigeria, Oman, Philippines.

13.3.2 Establishing governance and management structure

Fig. 13.1 illustrates a typical governance structure of a WISN study. It consists of a steering committee, tasked with the overall guidance of the study, i.e. formulating the objectives, overseeing the planning and implementation process, and mobilizing the required financial resources. A technical task force conducts the study, with the support of an expert working group (EWG) responsible for the establishment of the workload components and activity standards for the specific cadres. All along the process, and particularly when results become available, the engagement of stakeholders (policy-makers, managers, staff representatives) is of critical importance. The WISN user's manual explains the implementation steps in further detail (WHO, 2010).

For example, when Kenya applied the WISN methodology, the national priority was to restructure the health workforce in the devolved governments and to revise staffing norms and standards. The Ministry of Health (MoH) established a national steering committee headed by a permanent secretary, with representation from all health cadres. Then it formed a national technical committee (NTC) composed of representatives from the provinces and the MoH. In the counties, the committees were independently established, with different priorities depending on specific county needs.

Fig. 13.1 Governance structure of a WISN study

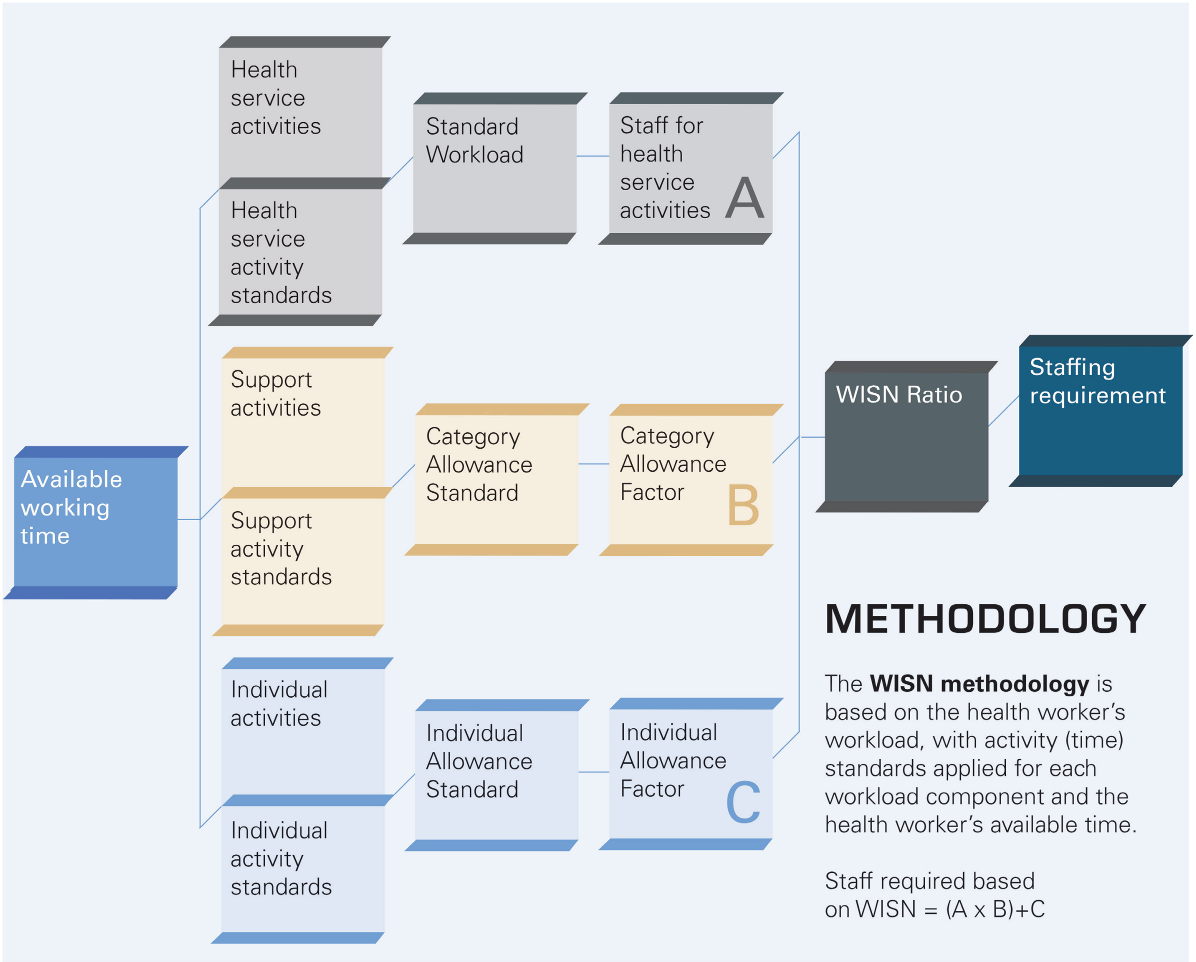


Source: WHO (2010).

13.3.3 Data requirements

Fig. 13.2 shows the typical data required to conduct a WISN study, even though there might be minor variations depending on the objectives. WISN studies produce estimates for staffing by measuring the total time needed to deliver health services in relation to the total available working time (AWT), considering the time the relevant health workers have available for work, and the time they are absent from work for one reason or another. The estimate includes both health-related and non-health related activities. For example, health-related activities of a medical doctor include patient consultation and ward rounds; non-health related activities include writing reports, participation in staff meetings, and continuing education. The time spent on health, support and individual activities is factored separately with the total number of cases managed in the previous year to meet the workload-based staffing needs. This helps identify facility or aggregated facilities shortages or surpluses of health workers by occupation. Annex 13.1 presents examples of how countries assess AWT.

Fig. 13.2 Data requirements for a WISN study



Source: WHO (2010).

13.3.4 Data sources and collection

Data collection is by sampling relevant facilities, cadres and functions. Countries can opt for different sampling techniques and various criteria such as health needs challenges, the availability of representative facilities, availability and retrievability of data, available budget, or best performing districts in achieving set targets. The WISN user's manual recommends a stratified multistage sampling to select health facilities complemented by a mix of data collection methods such as interviews, observation and data extraction from existing databases and collation tools. Table 13.1 illustrates data sampling methods and management processes that selected countries adopted.

Table 13.1 Data sampling and management processes: country examples

Country	Data sampling strategy
Bangladesh	The best performing four districts in terms of higher bed occupancy rate, better health performance with lower death rates (i.e. maternal and child mortalities compared with other districts).
Democratic Republic of the Congo	Sample of health zones representative of the country reality, facilities with good a database; cadres include nurses, midwives, doctors and laboratory technicians.
Ghana	A nationally representative sample of health facilities belonging to various agencies of the MoH randomly selected across nine regions.
Kenya	A pilot study involved all public health facilities (dispensaries, health centres, district hospitals and the provincial hospital in Coast Province). Results then served to set country norms and standards.
Namibia	All public health sector services (hospitals, health centres and clinics) for doctors, nurses, pharmacists and dentists.
Nigeria	Study to determine staffing requirements of frontline health workers in primary health care (PHC) facilities. Sample included nurses, midwives, community health officers, community health extension workers and junior community health extension workers.
Oman	Selected facilities (hospitals and PHC centres) across the three levels of care.
Papua New Guinea	Selected health facilities across seven levels of care from four provinces selected as representative of the country.
Philippines	Purposive sampling of 9 regions and 18 provinces that were United States Agency for International Development (USAID) project sites that only focused on physicians, nurses, midwives and medical technologists.
Zimbabwe	All public health facilities across all levels in one province.

In most countries, there is no consolidation of data in a single database, which raises the challenge of bringing together data from sources that have different objectives and collection methods. It is then important that a technical task force conducts a thorough scoping review of existing information systems and other sources of data.

For example, in Papua New Guinea, workload components for all primary health care (PHC) services were available from the national health information system (eNHIS), which was accessible at provincial and national levels. For hospital data, especially inpatient services, workload components were available from hospitals, but were not compiled at the national level. Accordingly, the WISN study used the "Master Link File", an Excel file with inbuilt formulae that derived the required values from multiple files extracted from eNHIS and hospital records. Human resources for health (HRH) records were collated from the centralized HRH information database, and cross-validated against health facilities and provincial records.

In Nigeria, information on working hours and leave entitlements was first obtained from a review of the national and subnational public service rules; subsequently, there was a validation during field visits to primary level facilities. The national District Health Information System (DHIS2) database provided data on health services. This was triangulated with data extracted from the primary sources – the national health management information system (HMIS), daily registers and monthly summary forms. HRH data from the states' health workforce registries were triangulated with the source nominal rolls. A first EWG defined the workload components and activity standards during a workshop. A second group of cadre-specific experts validated these in subsequent workshops, before entry into the WISN tool.

In Namibia, health services data were collected from five different databases, DHIS2, Electronic Dispensing Tool (EDT), pharmacy management information system (PMIS), electronic patient management system (ePMS) and HRH records from an HRH database. Even then, it was still necessary to collect primary data from other data sources, such as theatre registers since the data in DHIS2 were an underestimate. A sample of the collected health services was validated with the primary data source at facility registers. As databases were incompatible for data exchange, all the information was exported to .xml format which allowed to align the information in a single standardized file that could be uploaded into the WISN software (Box 13.2) (MoHSS, Namibia, 2015).

Box 13.2 Data entry into the WISN tool

Data entry into the WISN tool is time consuming as it has to be done manually without an option of batch upload. In Namibia the national information systems personnel converted WISN wat files to .xml files. A small linking program was developed to upload service statistics directly from national databases into the WISN software. This approach saved considerable time on data entry, enabling small refinements in activity standards without having to re-enter service statistics and prevented potential manual data entry errors (MoHSS, Namibia, 2015). As the management of the .xml files required specific IT skills, support from skilled IT personnel was indispensable throughout the data entry process and much care had to be taken to ensure the mapping in the .xml files. Another drawback of this data entry method was the complete replacement of the in-built WISN Data Dictionary and hard coding with data elements programmed in .xml files. This meant the Data Dictionary had to be reconstructed in .xml for a new study.

13.3.5 Data validation

A WISN study requires a considerable amount of data which could be time consuming and expensive to collect. In some cases, numerous information sources are available for similar indicators. Mismatches of data for similar indicators from different sources, and data elements stored in information systems not aligned with the WISN activity standards established by an EWG are some of the common challenges.

It is important that a dedicated data collection team conduct a triangulation exercise to ensure data quality. Information collected from different sources should be verified against actual data from primary facility records. In addition, an assessment of data comprehensiveness and of the accessibility of existing data sources is critical to assess data quality and identify indicators relevant for the WISN study. Due care should be taken that data collected align with the activity standards; where there are gaps, the use of proxy indicators or data sources to estimate service statistics is an option. In Namibia, where a facility did not collect data for the number of antimalarial injections, pharmacy data served to extrapolate the number of injections by applying the number of injections from each vial to the number of vials dispensed as per pharmacy records (MoHSS, Namibia, 2015).

The WISN methodology uses service statistics of the previous year, as workload is usually quite consistent from year to year. In the case that the current year's workload has either increased or decreased considerably, a percentage correction can be applied to reflect this change. Data entry should be standardized as much as possible; the entry of activity standards data should follow the same order in all facilities and be reviewed to ensure that there are no errors and anomalies in results.

The WISN implementation groups responsible for data collection, validation and entry into the WISN tool should consist of trained analysts who understand the data and will be available for the whole process. The lack of a skilled, dedicated team for data collection and scattered data pockets may require some degree of manual data collection. To do a triangulation, a minimum sample of 30 data points is suggested over a wide spectrum of activity standards to ensure statistical significance.

In Kenya, WISN studies conducted pre-devolution relied on a national team of data collectors who took a month to collect the data. The subsequent study conducted post-devolution benefited from a standardized data collection tool from the previous exercise and took fewer days to collect all the data required (Government of Kenya, 2010) (Table 13.2).

Table 13.2 Implementation of WISN studies before and after devolution in Kenya

Kenya – before devolution	Kenya – 5 years after devolution
Workloads and activity standards developed by the centralized teams yielded the same activity standards and allowance factors for all the workload groups.	Training of the committees was decentralized to the counties, thereby yielding different activity standards for the similar workloads from the same cadre in different counties. For example, a nurse in Machakos takes 5 minutes per patient assessment, while a nurse in Turkana states that she takes 7 minutes per patient assessment.
It was easier to validate standards due to the presence of a centralized EWG.	Each county had its specific EWG which made the validation of standards a longer process considering the differences recorded from the counties. Through a national level expert consensus, it was unanimously agreed that different activity standards be accommodated for the different counties due to contextual differences and the uniqueness of certain circumstances (cities/urban, rural, remote, underserved and hard-to-reach areas) as well as availability of equipment.

In Namibia and the United Republic of Tanzania, quality assurance was conducted by triangulating data from the DHIS2 systems with primary records from facilities through random sampling of service statistics and data indicators. Namibia found that the electronic DHIS2 data were generally accurate, with the exception of human immunodeficiency virus/antiretroviral therapy (HIV/ART) data and theatre cases. For theatre cases, the primary register data had to be used and, for HIV/AIDS, a separate database for electronic patient records was used (MoHSS, Namibia, 2015). In most Namibian hospitals, specific service statistics do not account for much of routine nursing care. Time motion studies in a sample of general hospitals served to identify the type of work and time it takes to care for patients, both self-care and dependent. On average, routine nursing care for self-care patients took 2 hours per 24 hours and for dependent patients it took 6 hours per 24 hours. At district hospitals, 75% of patients were self-care compared with 25% who were dependent. Routine nursing activities were added to the activity standards using the 2 hours per day for 75% of patient days and 6 hours per day for 25% of patients using the midnight census service statistic (MoHSS, Namibia, 2015). In an iterative process of activity standard validation, the EWG of health professionals set the standards which were then validated by a second EWG from regulatory bodies, tertiary educators and other senior policy representatives, i.e. chief nurse, quality assurance nurse, etc. (MoHSS, Namibia, 2015).

Unlike AWT or service statistics, information on activity standards is not captured nor usually documented within routine information systems. Setting activity standards is an important consensus building exercise pivotal to the success of the WISN methodology. It is always best to validate the activity standards with time motion studies.

In Ghana, a pilot WISN study in 19 facilities collected baseline data and assessed the feasibility of using the tool. The data were used to develop service standards (workload components and activity standards) (WHO, 2016a). These were later validated in almost all 173 Christian Health Association of Ghana facilities, which used the WISN tool to develop their HRH plans. The results from this validation were consistent with that of the pilot. Subsequently, the data collection was scaled up with concurrent re-validation of the service standards in facilities to augment the data already collected. Extensive stakeholder validation followed in all the regions involving participants from the concerned agencies and labour unions. In one of the tertiary facilities, nurses had to validate the activity standards set by another tertiary facility of similar standard. To make it easier for them, they were asked to consider the tasks they perform on inpatients during each shift (in Ghana nurses run three shifts) and the time they spend on each task. Another challenging area was setting activity standards for laboratory tests. Most laboratories are automated and do batch testing. Samples (specimens) are put together (batched) and run in the equipment. This made it difficult to determine the time per test. The WISN software provided for time per test. To get that, the laboratory scientists and technicians were asked to consider the tasks they perform on each sample from the time they receive it until the results are dispatched (MoH, Ghana, 2014).

13.4 Analysing, interpreting and using WISN results

There are two strategies to analyse WISN results: determining the difference between the current and required number of staff, which helps in identifying health facilities that are under- or overstaffed; and using the ratio of these two numbers to assess the workload pressure experienced by health workers. However, the numerical results of WISN are not sufficient to guide decision-makers in developing HRH plans and policies, because several health services data are not captured in the national HMIS, which may overestimate or underestimate requirements; also because HRH information is not always up to date. Therefore, it is recommended to analyse WISN results beyond the numbers and use the knowledge of the local situation gained from the discussions, observations and interactions with health workers, communities served and management to interpret the results.

In Papua New Guinea, WISN results were initially used to revise the deployment of health workers. The results identified health facilities with health worker surpluses, shortages and balances or normal levels (National Department of Health, Papua New Guinea, 2017).

WISN results provide health workforce data analysts with evidence that helps policy-makers to understand the actual HRH situation, and weigh the options for an equitable and efficient distribution of health workers. Box 13.3 provides the example of how WISN results influenced health workforce policy decisions in Kenya (MoH, Kenya, 2012; 2014).

Box 13.3 How WISN results can influence policy decisions: Kenya

The results of WISN studies led to:

- Revision of the 2006 national staffing norms (2014–2018).
- Development of task-shifting/sharing guidelines (2017).
- Provided information on HRH that informed the review and development of a National HRH Strategic Plan 2019-2023.
- WISN results identified management gaps and thus developed and institutionalized a health leadership, management and governace course for health managers.
- Revision of job descriptions for cadres like public health officers to improve preventive and promotive care as supervisors of community health extension workers.
- Establishment of an HRH training and development committee and a training policy to ensure equal opportunities are offered to all cadres.
- Revision and standardization of data collection tools for services provided in the health facilities.

In Namibia, the WISN results were used in many ways, such as estimating and updating staffing norms, redeployment of staff, scarce skill allocation, task sharing, and health worker projections. In terms of redeployment of staff, the study revealed that one district hospital had more staff than required while another, less than 40 km away in the same region, had a shortage of staff. The results illustrate how the two hospitals could meet their staffing requirements with relatively little effort. The results also served to calculate requirements for pharmacy cadres to identify where they should be allocated when newly qualified pharmacists become available (MoHSS, Namibia, 2015). In addition, the WISN results showed that task sharing for delivering HIV services produced efficiency and cost gains, which led policy-makers to implement nurse-initiated and managed antiretroviral treatment (NIMART) services and improve the reach of HIV/AIDS services. Lastly, the WISN results, along with data on epidemiological and demographic trends, were used in a modelling exercise to estimate future health workforce requirements (MoHSS, Namibia, 2015).

In Papua New Guinea, in addition to developing redeployment priorities, the WISN results led to actions such as strengthening of the HRH information database, delineating roles for some cadres like nursing officers and community health workers (CHWs) based on updated scopes of practice, tracking prolonged absenteeism, reviewing training curricula for some cadres and improving performance management. The WISN results provided the country with the opportunity to improve reporting of health services data and the revision of the National Health Service Standards (NHSS) (National Department of Health, Papua New Guinea, 2017).

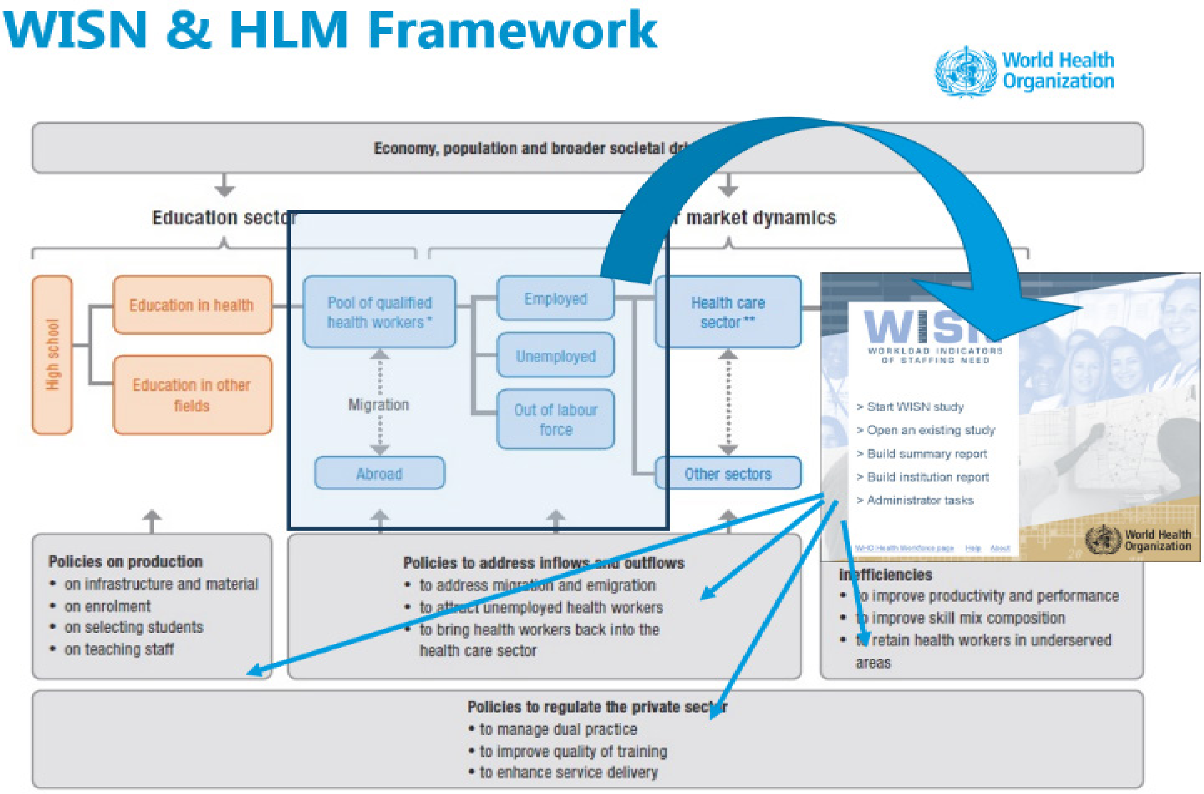
In Nigeria, the WISN findings were used to advocate for the recruitment of an additional 1000 health workers to improve staffing distribution in PHC in the Cross River State. Additionally, the staffing norm in the state's minimum primary care package was revised based on the new evidence. In the two states that piloted the WISN tool, findings now guide the deployment of new staff. In 2018, the success of pilot experiences led the National Council on Health to request all 36 states and the federal capital territory to adopt WISN for the assessment of HRH needs and distribution at all levels of the health system (Okoroafor, 2019).

13.5 Conclusion: how a WISN study contributes to implementation of NHWA

The implementation of the national health workforce accounts (NHWA) aims at strengthening health information systems (HIS) and increasing multistakeholder collaboration. This is in line with the basic principles outlined by the WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) (WHO, 2016b) and the World Health Assembly (WHA) Resolution WHA69.19 (WHO, 2016c), which call for empowering countries to assess and strengthen data governance mechanisms. The WISN methodology requires detailed information on the distribution of health personnel and further disaggregated data on health and non-health related service statistics, underlining the need for comprehensive and sustainable HIS. The interpretation and use of WISN results are always complemented by additional information on the health workforce in evidence-informed policy discussions.

Several data elements captured in a typical WISN study are directly aligned with NHWA indicators (Fig. 13.3). Countries that have conducted a WISN study use the basic NHWA indicators on stock and distribution, working conditions and pay. Conversely, a country that has initiated the NHWA implementation would have already mapped their national HMIS to provide the basic data needed for a WISN study. Both NHWA indicators and the WISN methodology build on data elements across the HLM framework (WHO, 2017).

Fig. 13.3 NHWA indicators inform WISN studies



Source: WHO (2010).

The implementation of evidence-informed policy changes based on WISN results requires multistakeholder engagement and collaboration. The findings of any given WISN study contribute to attaining the objectives laid out in the GSHRH, on employment, education and equitable distribution. WISN results can provide evidence to optimize performance, quality and impact of the health workforce. The steps in Phase 2 of the NHWA implementation approach, namely data compilation, analysis and multistakeholder engagement, coincide with those of data triangulation, establishment of steering committees and working groups, and the information system strengthening outlined throughout this chapter (WHO, 2017; 2018).

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Annex 13.1: Examples of the calculation of available working time (AWT) and workload components

In principle, the core elements (working hours, annual leave etc.) needed to estimate AWT, are the simplest to acquire and must be in alignment with the norms set by the civil service commission or equivalent authority in the country (Box 13A.1 gives the example of maternity leave). Differences can be observed among health occupations, for example, training days or special leave. AWT can differ from one facility level/type to another and across states or regions in a federal system and by sector (e.g. private or NGO may offer different number of leave days).

Box 13A.1 How to account for maternity leave?

Countries have taken different approaches appropriate to their national context. For example:

- In the Philippines, maternity leave (105 days) was omitted as it accounts for almost half of AWT and including it would skew the results. The concerned staff were excluded from the number of existing staff for the year under study (USAID, 2019).
- In Kenya, the EWG reached a consensus that staff away from work for over 3 months (e.g. maternity leave of 91 days, long training), should be omitted from the count of existing staff in the WISN calculations (Ministry of Health, 2012: Workload Indicators of Staffing Needs: a pilot for Coast Province-Kenya).
- In Ghana, maternity leave (90 days minimum) was standardized to an average of 3 days per annum per staff and put under "special notice leave" (Ministry of Health, Ghana, 2014).

AWT must be carefully studied from a representative sample of reliable sources before including in WISN studies. In Namibia, a mixed approach was adopted where statutory working hours and leave were used for all cadres (Table 13A.1). The differences in the AWT for cadres resulted in the variable components of leave, such as sick leave, special notice leave and training days, calculated by using the average of the specific leave type for each cadre (MoHSS Namibia, 2015).

Table 13A.1 AWT for selected occupations in Namibia

Cadre	Days/week	Hours/day	Leave	Holidays	Sick	Special notice	Training	Non-work days	Work weeks	Work days	Work hours
Doctor	5	8	25	12	2	3	5	47	42.6	213	1704
Nurse	5	8	25	12	7	5	5	52	41.6	208	1664
Pharmacist	5	8	25	12	2	6	15	60	40	200	1600
Pharmacy assistant	5	8	25	12	2	8	15	62	39.6	198	1584

Source: MoHSS, Namibia (2015).

In Kenya, AWT for a given health occupation varied depending on the level of health facility per cadre, for example in the case of medical officers at three different facility levels (Table 13A.2).

Table 13A.2 AWT of medical officers in Kenya

Facility level	Cadre	Day/week	Hours/day	Annual leave	Public holiday	Sick leave	No notice leave	Training days	Non-work days	Non-work weeks	Working weeks	Work days	Work hours
Health centre	Medical officer	5	8	15	12	0	0	2	29	5.8	46.2	231	1848
Sub-county hospital	Medical officer	5	8	25	10	4	2	5	46	9.2	42.8	214	1712
Country referral hospital	Medical officer	5	8	30	12	2	6	12	62	12.4	39.6	198	1584

Source: USAID, IntraHealth-Kenya (2018).

In Papua New Guinea, AWT for all health workers remains the same across occupations and facilities as mandated by the country's public service general order (Table 13A.3).

Table 13A.3 AWT for all cadres in Papua New Guinea

Cadre	Day/week	Hours/day	Annual leave	Public holiday	Sick leave	Compassionate leave	Training days	Work weeks	Work days	Work hours
All cadres	5	8	15	12	10	10	5	52	260	2080

Source: National Department of Health, Papua New Guinea (2020).

Data on health service activities and support activities

The varying quality and availability of health service statistics from one service area to another, even within the same facility, poses a challenge. Even, when standardized information is available through existing systems, there is the possibility of mismatch when cross-referencing with the services as listed by the EWG consultation. The best way to execute this step is to approach the process systematically, triangulating the data from existing information systems and the outputs from the EWG. It is quite easy to ignore the supportive contributions to a particular health service activity. For example, surgery may appear as the main task of a surgeon, but it cannot be carried out without the collective effort and time of theatre nurses, scrubbing helps, anaesthetists, etc. The technical task force should follow through the breakdown of activities into subactivities and the assignment of health workers to each subactivity rigorously. The granularity and the detail of activities listed reflect the quality of the WISN study, engagement of EWGs and, eventually, on the credibility of the WISN study results.

In Ghana, to determine the workload components and activity standards, the technical task force collected data using interviews, questionnaires and observations from 54 randomly sample health facilities and institutions and validated the data through another set of 138 health facilities and institutions. The professional expertise and insights of the EWG were instrumental in developing the workload components and determining the activity standards (MoH, Ghana, 2014).

Accounting for routine nursing activities is often challenging to itemize and count. Table 13A.4 shows how Namibia managed this issue. To account for routine nursing care in hospitals, a self-administered time motion study served to identify the subactivities that form part of routine nursing care, and estimate the time for each activity. Responses were obtained for self-care patients and high-dependency patients for routine nursing over a 24-hour period, and were categorized accordingly (MoHSS, Namibia, 2015).

Table 13A.4 Accounting for routine nursing activities in Namibia

Self-care patients	High-dependency patients
Bed-making Taking vital signs Health education Medication rounds (including IVs) Recording (charting, etc.) Daily assessment and evaluation Conducting a daily ward round (with doctors) Individual and group therapy Shift handover (between nurses)	Full wash (nail care, mouth wash, shaving, general grooming/hygiene) Bed pans/incontinent Feeding (spoon/tube feeding) Turning and pressure point care Mobilizing/ambulating Range of motion Suction (airway and oxygen management) Catheter Dressing (pressure sores, etc.) Additional medications (sedation/pain, etc.) Additional monitoring of vital signs Also includes all self-care activities
Total time per 24 hours: 2 hrs/inpatient day	**Total time per 24 hours: 6 hrs/inpatient day**

In Kenya, two methodologies were used to calculate staffing requirements for inpatient nursing care.

Methodology 1

The wards operate three shifts in 24 hours with different nurses offering the same total nursing care. Table 13A.5 shows two methods used to develop activity standards in the unique county circumstances.

Table 13A.5 Two methods to develop activity standards in Kenya: a ward with 20 beds and a bed occupancy rate of 100% with 10 nurses

Workload component	Subtasks/specific activities	Time taken in minutes
Nursing care	Task 1: Creating rapport with patient Task 2: Review of patient records Task 3: Taking history and vital signs Task 4: Dispensing treatment as prescribed by physician Task 5: Ordering further tests/collecting sample from patient Task 6: Revising treatment plan Task 7: Documentation	2 mins 2 mins 5 mins 15 mins 5 mins 3 mins 2 mins
	Total time in Shift 1	**34 mins**

Item	Shift 1	Shift 2	Shift 3	Sources of data
Nurse per shift in facility	4	4	2	HRIS/nursing roster
Average time of care per patient per consultation	34	25	10	Experts/time motion
Number of consultations per shift/day	2	2	2	Experts/time motion
Total time per shift per day	68 mins/ patient	50 mins/ patient	20 mins/ patient	Calculated
Average length of stay	3	3	3	HIS/HRIO records
Unit time per inpatient per shift	204 mins/ inpatient	150 mins/ inpatient	60 mins/ inpatient	Calculated
Total unit time for total patient care per inpatient day	Add the time per shift to get the total inpatient day 204 + 150 + 60 = 414 mins/inpatient day			Calculated per service area
Annual statistics for admissions	7200	7200	7200	DHIS2, ward records, daily registers/ HRIOSs records

Note: HRIO – Health Records and Information Officers.
Source: Expert opinion during WISN EWG training on 2–5 July 2018.

Methodology 2

The Technical Task Force (TTF) adopted the use of the patients' dependency levels. These indicate the requirements of nurses and the extent to which patients will need the nurses for their continuous care. The more critical a patient's condition is, the higher the requirement. Thus, patients' conditions were grouped as critical, moderate, or mild, leading to patients' dependency levels being categorized as high, moderate, or low. This information was confirmed during interviews and review of patient registers during the health facility visits. The total staff number from health services was then added to support and additional activities to get the staffing requirements per shift and the staffing requirement for each service area (see Table 13A.6).

Table 13A.6 The definition of nursing requirements for inpatient services, Kenya

Patient dependency	No. of patients	Ratio inpatient/nurse/shift	Required nurse per shift
Low dependency	8	4	8/4 = 2
Moderate dependency	10	2	10/2 = 5
High dependency	2	1	2

Source: Expert opinion during WISN EWG training on 2–5 July 2018.

Table 13A.7 presents an example from Kenya, illustrating how the workload components that involve different cadres undertaking the same intervention was addressed. The experts provided time taken per cadre and their specific task that contributes to the overall intervention.

Table 13A.7 Example workload components for similar intervention by different cadres

Workload component	Subtasks	Cadre	Time taken	Each cadres time
Ward round		**Nurse**	**10 mins/ patient**	**10 mins/ patient**
		Clinical officer	10 mins/ patient	10 mins/ patient
		Medical officer	10 mins/ patient	10 mins/ patient
		Nutritionist	10 mins/ patient	10 mins/ patient
Consultation	**Registration**	**Medical records officer**	**2 mins/ patient**	**2 mins/ patient**
	Registration	Nurse	2 mins/patient	7 mins/ patient
	History taking		2 mins/patient	
	Vital signs		3 mins/patient	
	History taking	Medical officer	2 mins	15 mins/ patient

	Physical examination		5 mins	
	Ordering investigations/ diagnosis		3 mins	
	Treatment plan and counselling		5 mins	
			24 mins/ patient	24 mins/ patient

Source: Expert opinion during WISN EWG training on 2–5 July 2018.

PART III

Human resources for health data collection tools and sources

Chapter 14: From HRHIS to NHWA: a system strengthening approach for better health workforce data

Khassoum Diallo, Aurora Saares

14.1 Introduction

The Sustainable Development Goals (SDGs), the WHO *Global strategy on human resources for health: workforce 2030* (GSHRH) (WHO, 2016) and the call for universal health coverage (UHC) have repositioned health workforce issues at the top of the global public health agenda. It is now accepted that "there is no health without motivated health workers", in adequate numbers, profiles and distribution. Understanding the health workforce is crucial for policy development, planning and service delivery. The COVID-19 pandemic and the earlier Ebola crisis highlighted the need for countries to have resilient health systems and sufficient and adequately trained, motivated and well distributed health workers to respond to public health threats and emergencies. In recognition of the dedication and central role of the health and care workers at the forefront of the response to the pandemic, WHO declared 2021 the "Year of Health and Care Workers". There is also growing awareness that "planning and managing health workers require quality data and evidence". Such data and evidence contribute to evidence-informed advocacy, planning, policy-making, governance, and accountability at national, regional and global levels. The GSHRH called to invest in the analytical capacity of countries for human resources for health (HRH) and health system data, using policies and guidelines for standardization and interoperability of HRH data through a progressive implementation of the national health workforce accounts (NHWA).

Decades of designing and implementing human resources for health information systems (HRHIS) resulted in diverse evidence of their strengths and challenges (discussed in Chapter 15). The implementation of NHWA is a critical step towards achieving Objective 4 of the GSHRH, "To strengthen data on HRH for health, for monitoring and ensuring accountability for the implementation of national and regional strategies, and the Global Strategy". Indeed, through their principles and conceptualization, NHWA overlap with two of the six health system building blocks: the health workforce and the health information system (HIS). NHWA adopt a system strengthening approach, are in alignment with the health labour market (HLM) framework (WHO, 2017), promote quality and country leadership, and encourage the use of evidence to inform decision-making, advocacy and accountability.

There are different ways to present countries' experiences in strengthening HRHIS or implementing NHWA: by data sources, by the list of indicators, by the governance mechanisms used (e.g. HRH observatories) or by the recommended implementation phases and steps (WHO, 2018). This chapter presents the key principles of NHWA implementation, also called "NHWA DNA". These include:

- inclusive multisectoral governance mechanism;
- diversification of data sources;
- system strengthening approach;
- countries' needs and interests first: policy-driven data collection and use; and
- partnerships for improving health workforce data and evidence.

The chapter first highlights some of the key challenges faced by countries when implementing or strengthening their HRHIS, such as fragmentation, incompleteness, or lack of standardization, before presenting the key NHWA DNA principles and selected examples of how countries adopted or implemented these principles and some the challenges they faced in doing so.

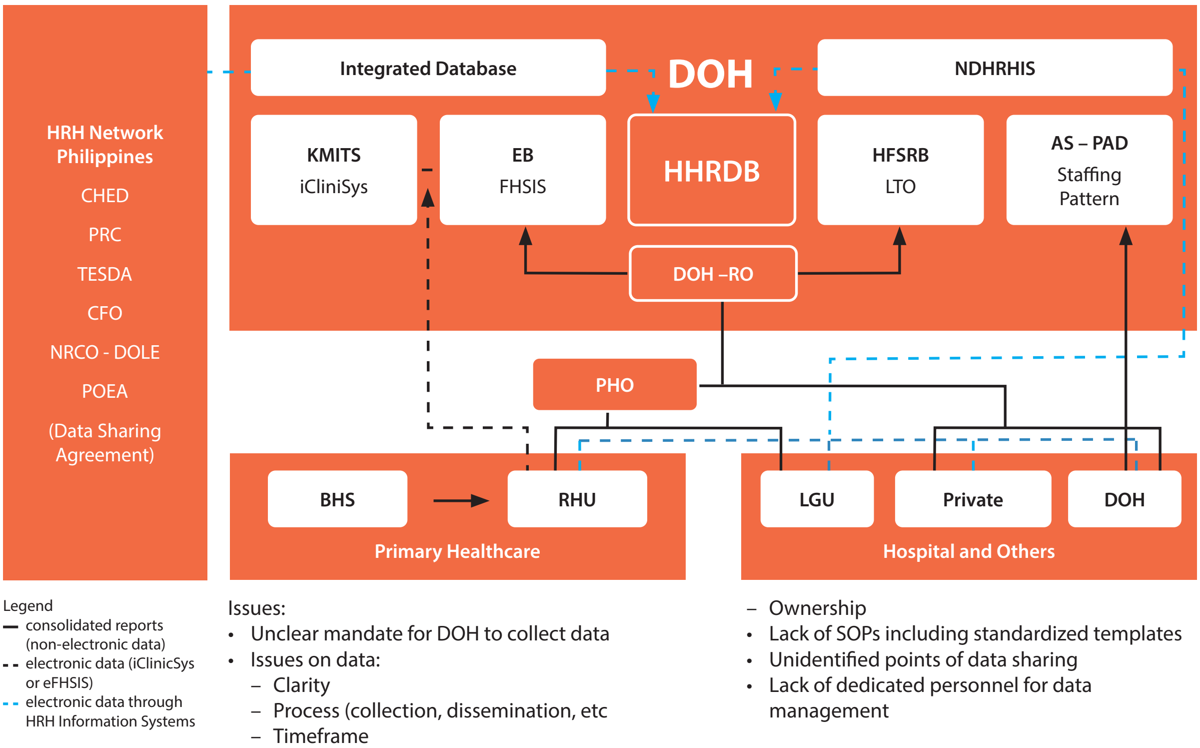
This chapter also serves as an introductory and umbrella chapter to the topics in Part III of the handbook: challenges in HRHIS development, implementation and use in accordance with the NHWA (Chapter 15); country experiences in NHWA implementation, focusing primarily on data quality and governance issues (Chapter 16); and concrete examples of the data sources and quality as well as the system strengthening approach proposed as a key feature of the NHWA (Chapters 17 and 18).

14.2 Challenges in operationalizing HRHIS

There are several barriers and bottlenecks impeding the adequate and comprehensive implementation of HRHIS, principally in low- and middle-income countries (LMICs). These include:

- **Poor data governance characterized by fragmented systems:** the exclusion or partial involvement of potential key stakeholders, such as the private sector, ministry of education or finance, or national statistical offices (NSOs), poor coordination with unclear roles, responsibilities and accountability of multiple stakeholders, and parallel data reporting processes that create duplication and overlaps.
- **Lack of standardization:** national HRHIS of many countries suffer from a lack of standardization of concepts, indicators, and interoperability of tools for monitoring and reporting of HRH data. Often, the private sector is not adequately involved and uses different mechanisms and tools for collecting or reporting health workforce data. The existence of official or informal dual practice in many countries, implies that there is potentially double counting of workers delivering services in both public and private facilities. Many countries implementing District Health Information System (DHIS2) tend to limit the coverage to public facilities alone (Dehnavieh et al., 2019).
- **Unclear data flows:** as illustrated by the example of the Philippines (Fig. 14.1). There are in general two types of data flows: vertical ones from subnational entities to the centralized national or federal databases; or horizontal flows between key stakeholders at national or federal levels. All these flows should lead to a central repository capable of assessing quality, analysing and disseminating the data, using scorecards, dashboards or visualization options.

Fig. 14.1 HRH data flow in the Philippines



Issues:
- Unclear mandate for DOH to collect data
- Issues on data:
  - Clarity
  - Process (collection, dissemination, etc
  - Timeframe
  - Ownership
- Lack of SOPs including standardized templates
- Unidentified points of data sharing
- Lack of dedicated personnel for data management

Source: Health Human Resource Development Bureau (HHRDB), Department of Health (DOH), Philippines. Presentation made in 2018 NHWA and WISN mission, and in the NHWA regional workshop in 2019.

- **Multiplicity of data sources without a proper triangulation mechanism:** data from public sector routine sources (e.g. DHIS2-based public sources or registries), professional associations, regulatory bodies etc., all report on active staff. For instance, public sector data might exclude private sector workers, professional councils' data might include them; professional association registries are not regularly updated. Other data source challenges relate to the level of comprehensiveness of each source to assess the wide spectrum of NHWA indicators. Routine sources might be good at providing stock data, but labour market dynamics information is best obtained from sources such as labour force surveys (LFS) (discussed in Chapter 17) or population censuses that use a standard classification of occupations.
- **Heavy burden of data collection at subnational or facility levels:** there are multiple requests and reporting forms; this results in duplication and overloading of the few people in charge of collecting and reporting health and health workforce data, who do not always understand the importance of what they do, and do not receive regular feedback on their work. HRHIS assessments in many countries show that those in charge of data collection are poorly trained in statistics or in data collection methodologies. This limits the effective use of the data to inform local decisions.
- **Limited policy- and need-driven data:** a good HRHIS should generate data needed or requested by decision-makers to inform policy development, advocacy and planning. In many countries, there is a disconnect between policy-makers and HRHIS experts, and a lack of understanding of the scope of the data collection by decision-makers. In some cases, they are not aware of the information collected and have limited leverage to influence data collection. The lack of cooperation and feedback loop between the different actors involved in collection, analysis and use of data can result in mismatches between information produced and needed. Instead of routine data production on key indicators, health workforce information often comes from ad hoc data collection initiatives.

The lack of a comprehensive understanding of the scope of HRHIS and failure to include the various relevant stakeholders and data sources are often the reasons behind challenges in data availability and quality. Chapter 15 proposes three phases (conceptualization, operationalization and process revision and sustainability) to strengthening HRH data monitoring and to report on HRH data at the national and international levels.

14.3 Understanding NHWA through its DNA

Several public goods have been developed to support the national NHWA implementation efforts. These include tools and guidance documents, such as the NHWA handbook and implementation guide (WHO, 2017; 2018), the NHWA online data platform and a public NHWA web portal.[1] A series of regional and national training workshops took place to capacitate countries and designate focal points in implementing NHWA principles, concepts and methodology. These include promoting country-led activities, based on their own needs and priorities. Four years since its launch, several countries are already successfully implementing NHWA. Countries with more success have focused on one or a few of the following key (DNA) principles.

1 https://apps.who.int/nhwaportal/

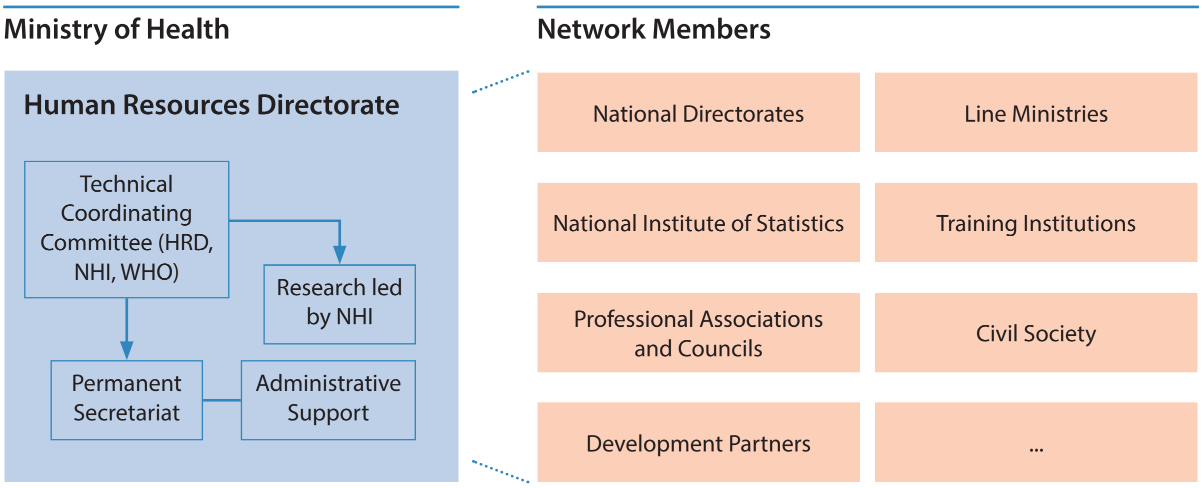
14.3.1 Inclusive multisectoral governance

The required data for planning and monitoring health workforce rarely comes from a single source or provider. Rather, given the wide and multisectoral scope of the HLM framework from which NHWA indicators are derived, several stakeholders should be involved at national and subnational levels for a comprehensive assessment of the health workforce situation. These include various ministries (e.g. education, health, labour, finance), the private sector, regulatory bodies, professional associations and councils, NSOs, HRH observatories, to name a few. An adequate governance structure for NHWA implementation should include representatives from these stakeholders, for at least three reasons:

- enable a comprehensive capture and assessment of the potential data sources;
- ensure a national validation and buy-in of the data and findings of any HRH assessment; and
- strengthen country leadership through the nomination of a focal point for NHWA and ownership of data.

Managing such a network of partners requires decision-making and operational bodies as well as operating procedures and work plans with clear activities, roles, responsibilities, and accountabilities as presented in the NHWA implementation guide (WHO, 2018). Fig. 14.2 presents the multistakeholder and multisectoral governance mechanism of the HRH observatory in Mozambique that has been adapted to implement NHWA in the country.

Fig. 14.2 Governance of the Mozambique HRH Observatory

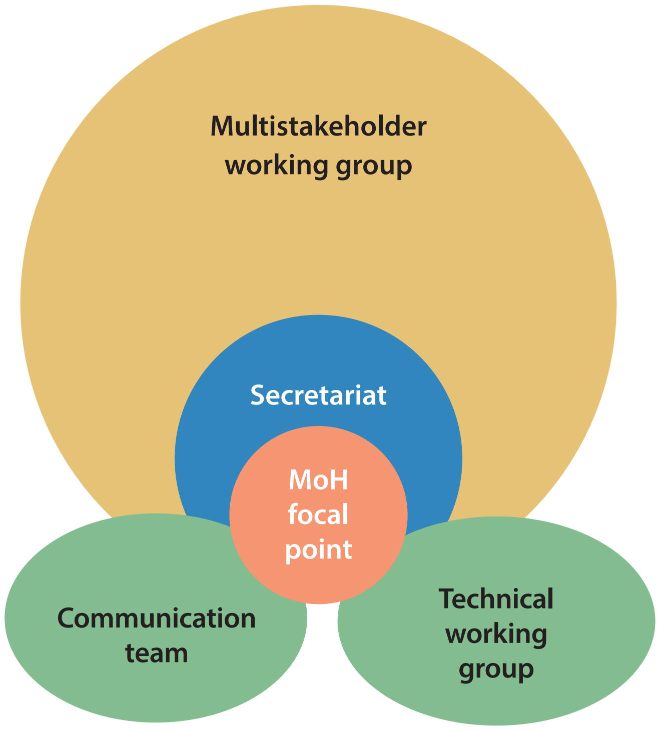


Notes: HRD: Human Resources Directorate, NHI: National Health Institute.
Source: MiSAU (Ministry of Health), Mozambique, presentation made at the NHWA training of trainers workshop in Harare, 2018.

The first or "management" body, composed of senior managers or decision-makers, will support the advocacy, national buy-in and mobilization of data and expertise from all relevant stakeholders. It defines the overall vision and mechanism for data collection and analysis, as well as the relevant analytical topics and type of outputs needed to support the decision-making. Ideally, a senior government official should lead and there should be at least two meetings per year. The first meeting should focus on the mobilization of data sources and expertise from the key stakeholders, the definition of an analytical and data use plan with a clear list of deliverables and timelines. The second meeting should focus on the review of the data and findings and the definition of a work plan for implementing the recommendations of the technical or operational group.

The second or "operational" body should be composed of data and IT experts from the ministries and other stakeholders (Chapter 16). Its role consists of operationalizing the decisions taken by the management body, through clear operating procedures and data sharing mechanisms. The experts gather, triangulate, validate, analyse and report data, using the format and guidance provided by the management body. The data dissemination should include clear and actionable recommendations to the country on various policy-related issues, such as education and training, recruitment, deployment and retention, migration of health workers, and gender issues. Given that in some countries there is a large number of relevant stakeholders, a subgroup or "secretariat" of the operational group can be created to conduct the day-to-day work and report regularly to the bigger group (Fig. 14.3).

Fig. 14.3 Example of a governance mechanism for NWHA implementation



Source: NHWA implementation guide; presentation made at the NHWA workshop in Miami for PAHO countries, 2019.

The NHWA focal point can be a person or a body, ideally an appointed manager within the Ministry of Health (MoH) (e.g. HRH director or unit, or the national HRH observatory or its director). The focal point should be a member of both the management and the operational bodies. Focal points and other stakeholders have key roles to play in the NHWA implementation. First, by supporting national decision-making through the provision of quality data and evidence. Second, by promoting national ownership of existing data through an all-inclusive governance mechanism. Third, by guiding and supporting the use of the data and evidence by decision-makers through adequate dissemination mechanisms. Fourth, by ensuring sustainability of the system by advocating and securing predictable resources. Finally, focal points' roles and responsibilities include the overall coordination of the NHWA implementation work and stakeholders and the reporting of NHWA data to WHO through the online platform. Focal points should have a good understanding of the International Standard Classification of Occupations (ISCO) and other international standard classifications (e.g. International Standard Industrial Classification of All Economic Activities (ISIC), International Standard Classification of Education (ISCED)).

The implementation of NHWA does not require to set up new governance systems if functioning mechanisms already exist. Where they exist, HRH observatories are an excellent governance platform for the coordination of NHWA implementation. These observatories can be expanded and adapted to align progressively with NHWA implementation principles and requirements. While HRH observatories already rely on the involvement of multiple stakeholders, experience shows that these stakeholders primarily include MoH, other health experts and academics. Implementing NHWA requires broadening the scope of stakeholders by including additional players such as the private sector, NSOs, regulatory bodies, ministries of education and finance, and others. The NHWA implementation guide (WHO, 2018) describes the composition and respective roles of various stakeholders, and the tasks of the established bodies.

14.3.2 Diversification of data sources

The NHWA handbook (WHO, 2017) includes 78 health workforce indicators based on harmonized and internationally accepted definitions of data, organized in 10 modules, aligned with the HLM framework and covering three labour market components: education, labour force, and population health needs. The NWHA handbook gives detailed definitions, numerator, denominator, disaggregation level, references, and potential data sources for each indicator, both numeric and capability, as applicable.

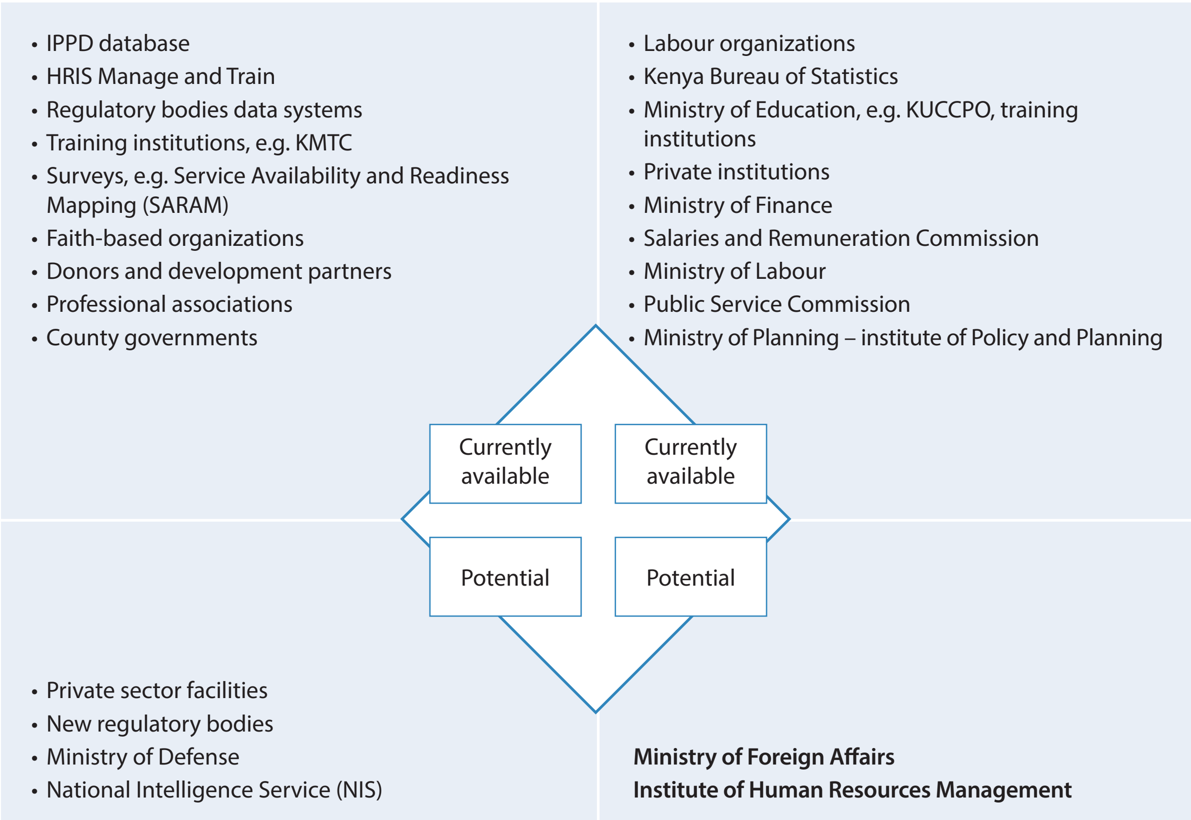
The list of NHWA indicators derives from the HLM framework for UHC, which provides a comprehensive perspective on the dynamics affecting health workforce production, availability, distribution, management, regulation and mobility. No single source can provide all the necessary indicators for HRH planning. Rather, a wide range of sources should be consulted to inform HRH indicators. Traditional sources of HRH information and evidence such as health workforce registries, MoH databases and regulatory bodies or professional associations and councils' records usually face some or most of the challenges described above, especially in LMICs.

For a more adequate and comprehensive assessment of HRH levels, trends and dynamics, other data sources should be considered. Chapter 18 provides a more comprehensive assessment of data sources, quality and triangulation methods. Other important data sources, beyond health workforce registries include population censuses, LFS, private sector HRH records, payroll, budget and fiscal space data from the national health accounts (NHA) or national education accounts (NEA). Each of these sources contributes unique, yet complementary data; for example, LFS are instrumental to understanding the patterns of employment and unemployment of health workers.

NHWA capability indicators from various national reports can monitor non-quantitative information, such as policies, regulations, accreditation mechanisms, and institutional models for assessing staffing needs, or governance. Once pooled and triangulated, data from these various sources can provide a comprehensive illustration of the key health workforce indicators and underlying data sources, and their strengths and weaknesses.

The scoping and planning (Step 3) and the data compilation (Step 5) steps of the NHWA implementation guide (WHO, 2018) provide guidance in terms of process, activities and tasks for adequate implementation of data sources diversification. In cases of multiple sources of information, a hierarchy should be established for each indicator, which will guide the prioritization of data selection. Central to this diversification of data sources is the concept of triangulation and the need to adopt a proper method validated by all stakeholders (Chapter 18). For each indicator, there should be a categorization of sources with priority/preferred and secondary sources. The use of data quality assurance methodologies should be the standard for the triangulation. Fig. 14.4 presents the data source identification sheet used in Kenya, based on a comprehensive mapping of existing and potential data providers and sources.

Fig. 14.4 Data source identification sheet in Kenya



Source: MoH, Kenya; presentation made at the NHWA workshop in Maputo, Mozambique, 2016.

In countries implementing iHRIS (an open-source health workforce information systems software[1]), health workforce registries or other data collection and management mechanisms, focal points are concerned about the potential overlap or conflict with NHWA implementation. In fact, given its flexibility and comprehensive approach, NHWA implementation through its DNA, which includes data source diversification and the multistakeholder multisectoral governance mechanism, provides an opportunity to build and expand the existing mechanisms in order to obtain a comprehensive picture of the health workforce situation.

1 More details available on: https://www.ihris.org/about

14.3.3 System strengthening approach

An HRHIS is a subsystem of an HIS, composed of various subsystems such as the payroll information system, education management information system (EMIS), and councils' and professional associations' records and information systems. Mainstreaming NHWA implementation into the routine and regular health workforce monitoring processes requires adopting system strengthening and progressive implementation approaches. The main objectives of such approaches are to ensure:

- monitoring health workforce indicators uses existing and predictable sources;
- progressive improvement in the availability, quality and use of data; and
- progressive expansion and diversification of the scope of health labour market analysis (HLMA) related indicators and occupations for which regular monitoring is possible.

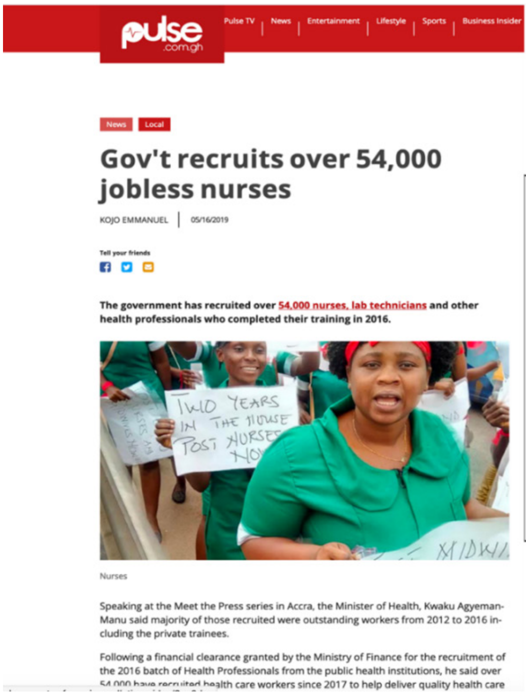
Sustainability of the system should start with avoiding systematically resorting to costly ad hoc surveys for monitoring health workforce indicators. Developing an HRHIS that applies the principles of NHWA implementation is the most appropriate and cost-effective option. A system through which proper data governance is established will also maximize the potential of existing data sources beyond traditional health workforce or MoH sources. A mapping of key stakeholders, and of existing databases' operating procedures for data quality assurance and sharing, should be conducted to establish a sustainable mechanism to report on relevant health workforce indicators routinely or regularly, in support of decision-making.

Implementing a system strengthening approach also requires a strong capacity-building programme for national and subnational data officers and the creation of a pool of health workforce data experts able to address the various challenges, conduct triangulation and maintain the system despite turnover of staff, as often observed in many LMICs. Sufficient and predictable technical, human and financial resources should be devoted to maintaining and expanding the system. Finally, a regular dialogue is necessary between NHWA focal points and other data stakeholders and decision-makers as users of the data and knowledge products generated by the first group.

14.3.4 Countries' needs and interests first: policy-driven data collection and use

Countries are at different maturity stages of development of their HRHIS and have specific data needs. The implementation of NHWA should be a country-led activity, based on national and subnational operational needs and priorities. The concept of progressive implementation of NHWA calls for comparing each country with itself, not with another country. Using the existing HRHIS and improving its functionality, stakeholder composition, data sources and governance should be the norm. As the country strengthens its system, it could expand the list of indicators routinely monitored; this "additional" list should emerge from a dialogue between data experts and decision-makers. The prerequisite of the progressive implementation is government buy-in and understanding of the importance and challenges of the health workforce in the country. Health workforce data requirements and priority indicators should have as a starting point the key policy questions resulting from a national dialogue. A successful stakeholder involvement will support all the areas of NHWA implementation. The processes related to NHWA implementation (e.g. data collection, stakeholders, dissemination) should be regularly revised to ensure sustainability.

Fig. 14.5 Policy decisions: from bad data to good press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News Local

Gov't recruits over 54,000 jobless nurses

KOJO EMMANUEL | 05/16/2019

Tell your friends

The government has recruited over 54,000 nurses, lab technicians and other health professionals who completed their training in 2016.

Nurses

Speaking at the Meet the Press series in Accra, the Minister of Health, Kwaku Agyeman-Manu said majority of those recruited were outstanding workers from 2012 to 2016 including the private trainees.

Following a financial clearance granted by the Ministry of Finance for the recruitment of the 2016 batch of Health Professionals from the public health institutions, he said over 54,000 have recruited health care workers since 2017 to help deliver quality health care

- During the HRH Forum, MOF, PSC participated for dialogue
- In November 2018, the MOF/PSC adopted the analysis and granted approval for the recruitment of additional 54,000 health workers in the 2019 budget.
- Over 30,000 have since started work as of the end of April, 2019

Source: Ghana's experience on NHWAs presentation by James Avoka Asamani, NHWA workshop, June, 2019, Harare, Zimbabwe.

14.3.5 Partnerships for improving health workforce data and evidence

Because of the diversity of the domains and indicators essential for monitoring the HLM framework, the number of reporting requests tends to be high. Many countries complain about the reporting burden resulting from requests from different organizations, sometimes on the same topics and indicators. Minimizing reporting requests requires a greater synergy between organizations to align their objectives, tools and reporting requirements. A good example is the joint data collection between Eurostat, the Organisation for Economic Co-operation and Development (OECD) and the WHO European Region. To avoid the multiplication of data requests on the same indicators and countries, the three organizations decided to establish the Joint Questionnaire (JQ) on non-monetary health care statistics to collect internationally comparable data to monitor key aspects and trends in health workforce employment, education and migration indicators among others. In addition to reducing data collection burden on national authorities, the JQ improves consistency and comparability of data in international databases. There are guidelines for reporting the data and for clear mechanisms and operating procedures, with clear roles and responsibilities, to rationalize data requests and reporting.[1]

Another example is the Working for Health Interagency Data Exchange Initiative (IADEx), a joint ILO-OECD-WHO programme, which aims to consolidate and maximize the value of existing data and information, ensuring greater consistency and reducing data collection burden on countries.[2] Key activities include secondary data analyses of non-traditional health workforce data such as the joint analysis of labour force surveys or population censuses to generate data and evidence on topics such as equity and distribution, gender pay gaps, ageing of the health workforce, migration flows and other labour dynamics.

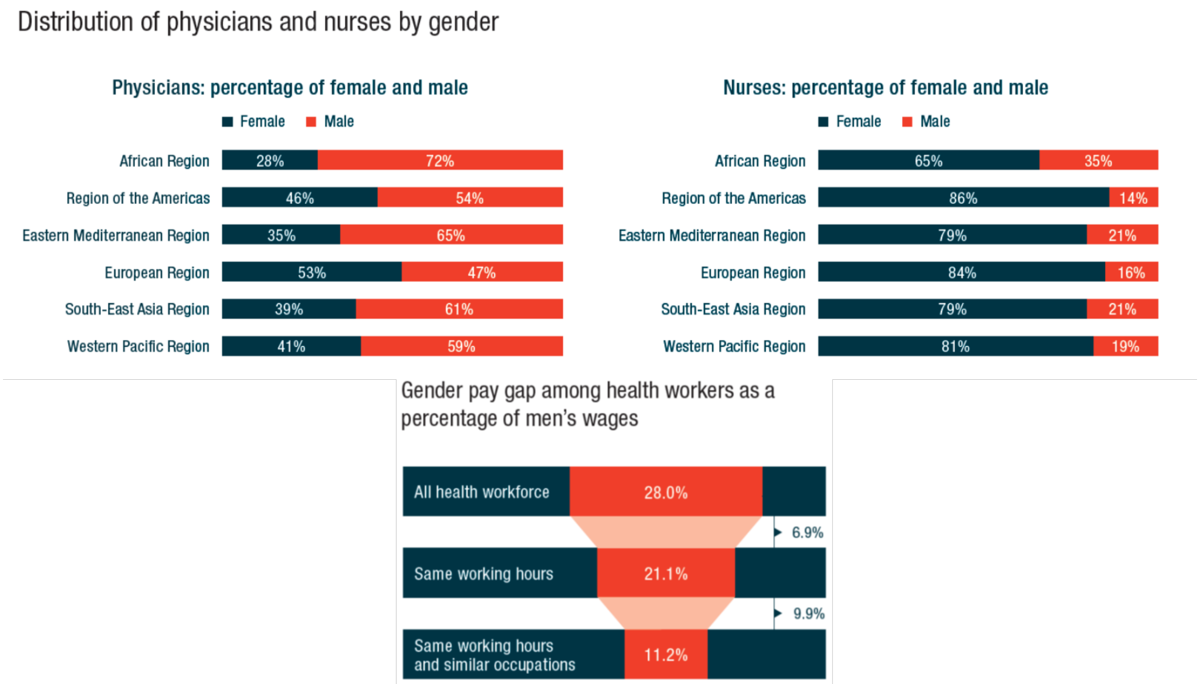
1 https://www.oecd.org/statistics/data-collection/Health%20Data%20-%20Guidelines%202.pdf
2 https://www.who.int/publications/m/item/w4h-action-plan-2022_2030

In the WHO African, Americas and South-East Asia regions, several countries mutualize forces through HRH observatories to collect, analyse and disseminate health workforce data. These initiatives resulted from understanding that no single organization or body can compile all the relevant health workforce indicators without overburdening countries and duplicating efforts already conducted by others.

14.3.6 Data use for decision-making, advocacy and resource mobilization for HRH

Another key DNA principle of NHWA implementation is understanding the purpose of any data collection: analysing the data and translating, disseminating and using its findings to support decision-making, policy development, planning, resource mobilization and monitoring and evaluation. NHWA is more than a database and a list of indicators. It is a system through which countries can progressively improve the availability, quality and use of health workforce data and evidence to support decision-making. International reporting to WHO and other stakeholders should be a by-product of national data requirements and use. Fig. 14.6 presents a concrete example of how NHWA data can inform key policy issues such as gender, ageing and equity at national, regional and global levels. Such exercises should be conducted at national level to inform planning and country health workforce standards.

Fig. 14.6 Application of NHWA data in informing policy issues



Source: Boniol M, McIsaac M, Xu L, Wuliji T, Diallo K, Campbell J. Gender equity in the health workforce: analysis of 104 countries. Working paper 1. Geneva: World Health Organization; 2019;2:4.

14.4 Conclusion

As countries progressively implement NHWA, good practices and concrete country examples become evident. Once understood and adopted, the key NHWA implementation principles guide national efforts and promote a smooth process and country ownership. WHO and its partners have generated a series of tools, training and guidance material to support national efforts. The fundamental basis of any implementation of NHWA remains "countries' needs first" and national dialogue between health workforce data producers and users. The international cooperation and collaboration around health workforce data generation is progressing and improving. Countries are not alone in this journey. Adequately implemented, NHWA provide an in-depth understanding of health workforce issues and challenges through more and better data on the size, distribution and characteristics, and insights into a country's needs and possible interventions for strengthening their HRHIS. NHWA can also help identify linkages between health workforce and service coverage. Finally, NHWA can be a basis for guiding and informing health workforce education and training, management, finance and intersectoral policy dialogue.

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Chapter 15: Human resource for health information systems: development, implementation and use

Amanda Cavada Fehn, Mario Roberto Dal Poz, Aizhan Tursunbayeva, Verona Mathews, Desak Ernawati, Sherly Meilianti

15.1 Introduction

The health workforce is obviously a critical factor in the progress towards universal health coverage (UHC) everywhere, but particularly in low- and middle-income countries (LMICs). To ensure that the right personnel are in the right place with the right skills, up-to-date and accurate data on the health workforce are an absolute requirement to inform policy development. A human resources for health information system (HRHIS) is the basic tool that can provide data and information on the health workforce situation and its evolution. (Dal Poz et al., 2009; WHO, 2010; Ledikwe et al. 2013). This chapter considers the challenges of HRHIS development, implementation and use present in accordance with the national health workforce accounts' (NHWA) proposed implementation structure and three phases (conceptualization, operationalization, and process revision and sustainability) to strengthen human resources for health (HRH) data monitoring and to report on HRH at national and international level (WHO, 2018).

HRHIS empower decision-makers and help ministries of health to orient their policies to address the health needs of their population. Countries which have fragmented and unreliable data and information are those most in need of strengthening their HRH (Dal Poz et al., 2009). Quality information is an indispensable condition for improving the efficiency, accountability and good governance of a health services system (WHO, 2011; 2012; Riley et al., 2012).

Although the benefits of HRHIS are advocated by software developers and policy-makers, there are many unsuccessful experiences, especially in the implementation process, often due to poor interoperability with existing information systems (including clinical ones), overspending, resistance to change, lack of knowledge on information systems, weak planning and fragile organizational strategies (Thite and Sandhu, 2014; Tursunbayeva et al., 2015; 2017). Much of the information available on HRH comes from diverse and mixed data sources not originally designed for the specific purpose of supporting an HRHIS. Examples are population censuses, health facility assessments, administrative data from professional councils, and labour force and employment surveys (Riley et al., 2012). This fragmentation and incompleteness of HRH data associated with the scarcity of human, financial and infrastructure resources available to collect, compile and analyse health workforce data are critical weaknesses (WHO, 2010). Following the increasing necessity of an HRHIS, ministries of health and health organizations are requesting guidance on what works and what does not work, especially in the implementation process (Riley et al., 2012; Tursunbayeva et al., 2017). Also, there is a need for a better understanding of how to evaluate the usefulness and effectiveness of an HRHIS. The awareness of HRH shortages and other challenges is not new and in the last 15 years there have been numerous international calls to strengthen HRHIS and an increasing number have been implemented, many in alignment with NHWA (WHO, 2018).

Most progress in strengthening health workforce data takes place in high-income countries (HICs). Many LMICs face challenges such as technical difficulties, lack of financial resources, unavailability of technically skilled personnel, and low management support and commitment, which have slowed the implementation process (Ishijima at al., 2015; Dilu et al., 2017). In Latin America, for example, analysis of the situation in six countries (Argentina, Paraguay, Uruguay, Brazil, Chile and Cuba) illustrates the diversity of information systems that offer data on HRH (Annex 15.1). There are structural differences and similarities among these countries, as is the case in other regions of the world. Understanding the local reality of existing information systems, identifying the type and the availability of data, the possibilities of interoperability and interfaces with other health information systems (HIS) are an essential step to start a process of analysing and evaluating HRHIS.

15.1.1 Factors shaping the development, implementation and use of an HRHIS

Success in the development, implementation and use of HRHIS is facilitated primarily by project-related factors, including governance structure, approaches to project management quality of execution, stakeholders' political behaviours and user involvement. Significant barriers are organizational factors, including organizational size, diversity, culture, degree of centralization, and availability of resources. Technological barriers include the breadth of system functionality, the complexity of local configuration and interoperability.

15.2 Development phase

The development phase corresponds to the NHWA conceptualization phase (WHO, 2018) and sets the scene for HRHIS implementation. There are few published studies on this topic; most discuss the expected benefits of HRHIS, and facilitators and barriers that can influence successful implementation (Tursunbayeva et al., 2017), institutional pressures, institutional logics, or other sociotechnical factors (Tursunbayeva et al., 2018). A wide diversity of supportive guidance to overcome such challenges is available from academic research (Tursunbayeva et al., 2018), from professional associations (Employee Connect 2022), and from international nongovernmental organizations (NGOs).

An example is the HRHIS Assessment Framework (HAF) applied by the HRH2030 Program in Indonesia, which provides a systematic format for assessing the development stage of an HRHIS by measuring the functionality and capacity of the HRHIS. Figure 15.1 provides an overview of the HAF assessment process using an example from Indonesia.

Fig. 15.1 HRHIS status review process in Indonesia (2019)

HRHIS status review team	• In coordination with the MoH, identified members of the review team, including those tasked with conducting or coordinating HRHIS enhancements in the future.
Identification of stakeholders	• Reviewed key documents to understand HRH stakeholders and landscape. • Reviewed HAF tool and HRH lifecycle, and held in-depth discussions to understand who "owns" what information systems.
HAF tool and questionnaire adaptation	• Based on identification of key stakeholders, adapted the questionnaire to the local context (such as minor modifications of questions and country-specific reference changes).
In-depth interviews	• Held meetings with key stakeholders at central and site level to understand the functionality and capacity of HRH Directorate information systems, in terms of standard operations as an HRHIS and as a key component of NHWA. Meetings also discussed flows of data and motivations/barriers to data entry and use.
Information system(s) reviews	• Reviewed information systems to better understand back-end functionality of the software and standards to support information exchange/interoperability.
Recommendations and next steps	• Met with HRHIS status review team to review findings from the HRHIS status assessment, develop recommendations for improvements and prioritize.

Source: HRH2030 Program (2019).

15.2.1 HRHIS status review team

The process begins with the formation of the HRHIS status review team to evaluate the status of the HRHIS. The recommendation is to include two or three individuals who meet the following criteria (HRH2030 Program, 2020):

- understand the country health care ecosystem;
- know HRH requirements;
- have a minimal involvement with components of the current HRHIS;
- are able to think critically and are available to collect data; and
- have a role within future HRHIS implementation team.

Formalizing (preferably in writing) responsibilities and accountabilities of the team, as well as for individual team members, and establishing a clear communication structure enables cooperation between team members and efficient functioning.

15.2.2 Stakeholder identification and engagement

The HRHIS status review team identifies relevant stakeholders who may own, enter, collect, manage and use HRH data. This process is complex, yet critical to ensure that all relevant stakeholders are included. Stakeholders can come from academic institutions, private and public health organizations, health professional associations. These stakeholders may have different needs. Thus, their requirements must be mapped to identify data ownership of important information to be included in the HRHIS. Overall, it is crucial to balance the number of potential parties to be involved in this phase. For example, the United Kingdom workforce planning involves 40 national statutory bodies, 15 royal colleges, 18 trade unions, and over 100 professional bodies. This approach to workforce planning has been challenged and referred to as one to "make sure nothing changed" (Britnell, 2019). Indeed, having such a high number of stakeholders in the national workforce planning or national HRHIS conceptualization can make this process more complex by adding extra time necessary to achieve an agreement between all stakeholders. It can also be challenging to fully understand and satisfy the needs of all parties (Tursunbayeva, 2018).

Annex 15.2 describes a case study in Mozambique that illustrates the importance of the identification of stakeholders and of obtaining their engagement.

15.2.3 HAF adaptation and adoption

The HAF adoption can involve a series of semi-structured interviews, roundtables or workshops with key stakeholders, conducted or coordinated by an HRHIS assessment team using the HAF Excel-based scoring system (Edwards et al., 2003), which contains a set of scoring descriptions across eight levels of functions and eight levels of capacities (Fig. 15.2). The data collection stage can include hands-on demonstrations of the systems identified, so that the team can assess the full depth and capability of each HRHIS. Note that the questionnaire may first need to be adapted to the country context, such as minor modifications of certain questions and/or referring to country-specific guidelines or benchmarks.

Fig. 15.2 Elements of functionality and capacity of HAF

FUNCTIONALITY

1. Pre-service education
2. Registration and licensure
3. Staffing gaps and needs
4. Payroll information
5. Personnel actions
6. In-service training
7. Exit/attrition
8. Registry

CAPACITY

1. Technology/infrastructure
2. Decentralization
3. Use of standards
4. Data quality
5. Sustainable financing
6. Human capacity
7. Interoperability
8. Use of data

Source: HRH2030 Program (2019).

Each functionality and capacity of the HRHIS is assigned a maturity level, ranging from 1 to 5 (Table 15.1).

Table 15.1 Descriptions of level of HRHIS functionality

Level	Function description
0	Function does not exist.
1	Function is not in place or not uniformly used. Paper-based system are sometimes used instead of electronic systems. Data collection and management are ad hoc.
2	Function exists in basic form and is used or is being piloted. Limited use of computerized systems. Relevant data are collected and disaggregated by cadre, sex, geography.
3	Function is well-established and used widely. Function is fully supported using electronic systems (spreadsheets and databases). Data elements collected meet national requirements and reports are appropriately disaggregated.
4	Function is comprehensive, utility is high, and it influences the respective HRH process performance in a measurable way. The function is fully computerized and web-based applications used to ensure wide access. Data collection in HRHIS is systematic and reflects compliance with national requirements and advanced queries are used to summarize and analyse HRH data.
5	Function is a professional best practice through high utility, influences HRH processes and is aligned with global standards and guidelines. The HIS function is fully computerized, web-based and implements WHO minimum dataset for HRH and other international standards (ISCO, HL7, etc.). Data collected are compliant with national HRH data needs and continually improving through the use of advanced queries.

Source: HRH2030 Program (2020).

15.2.4 In-depth interviews

The team holds meetings with key stakeholders at national and facility level to understand the functionality and capacity of HRHIS. During these meeting, flows of data and motivations/barriers to data entry and use are also discussed. The in-depth interviews with stakeholders also serve to identify standards, development frameworks, architecture, mechanisms in place for interoperability, and expectations of improvement to ensure sustainability of HRHIS.

15.2.5 Review of information systems

The team obtains information on the HRHIS from the data collected from relevant stakeholders. The team assesses flows of data, documents the system and associated human resources (HR) processes, motivation in participating in HRHIS implementation and barriers to data input and sharing across institutions. A thorough review of the HRHIS is done to better understand back-end functionality of the software and standards to support information exchange/interoperability.

15.2.6 Recommendations

At this stage, the HRHIS review team elaborates its recommendations for implementation in collaboration with stakeholders who own, enter, manage and use the data. The team provides a report with actionable recommendations on the priority functions (e.g. suggestions for data inputs and updates, and specific system functionalities), on the capacity developments (e.g. for technology/infrastructure, for policy development, for system interoperability), and on other relevant areas such as data governance, data collections roles and responsibilities or data analysis and reporting. Recommendations are made by mapping elements of HRHIS functionality and capacity. The team assesses each element of functionality and capacity and scores each element to determine overall stages. The team also reports on lessons learned from HRHIS conceptualization that can be used by other countries.

15.2.7 Application of HAF for obtaining political commitment

An assessment of the HRHIS using the HAF can help to identify the gaps and understand and define the hierarchy of the existing data sources and data lacking to answer policy questions and fulfil the requirements of NHWA (WHO, 2018). It also reveals potential divergences in information when different sources estimate the same indicator.

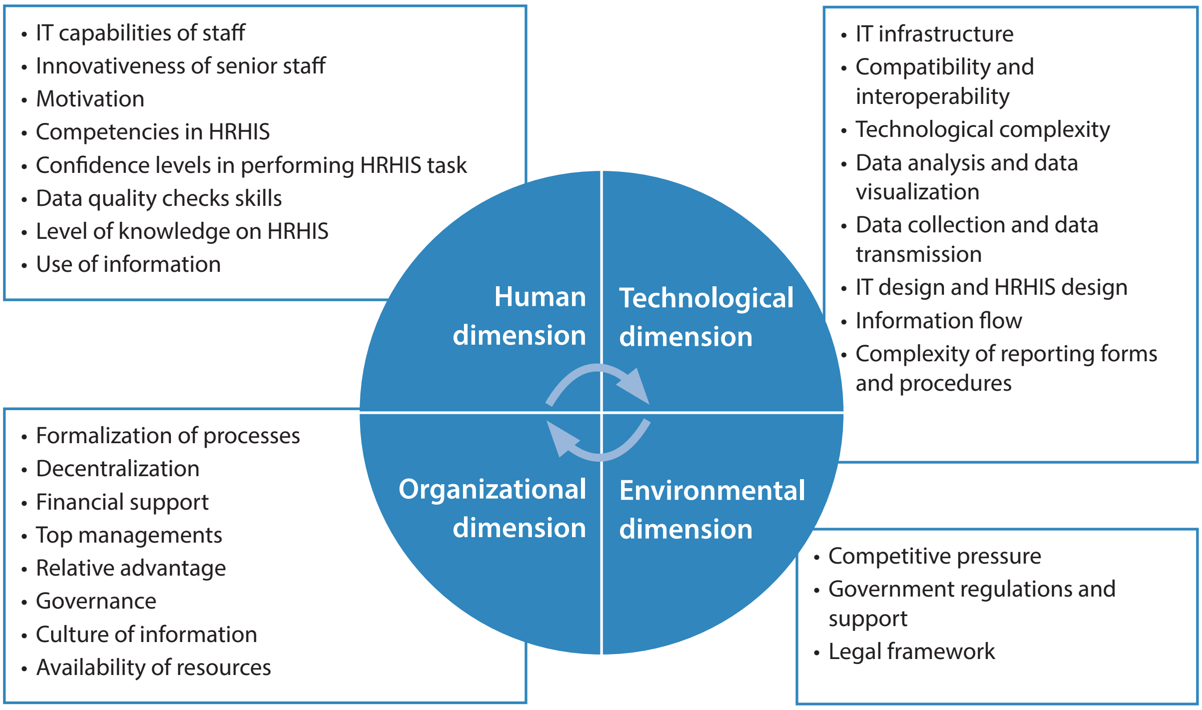
15.2.8 Building the HRHIS business case

The outcomes of the HAF assessment can be used to build a comprehensive business plan to gain government buy-in. This plan can include the economic case for an HRHIS, an evaluation of all of the commercial options considered and of the expected benefits from the HRHIS selected, risks that can potentially hinder the HRHIS project, and strategies on how to mitigate them. It should also propose a communication plan between stakeholders that takes into account local context and cultural norms.

15.3 Implementation phase

The implementation of an HRHIS faces the similar challenges of implementing any HIS. The literature on HRHIS implementation suggests that several variables have to be taken into consideration when a country decides to adopt an information technology to address the need for human resource information for management, planning and decision-making (Fig. 15.3).

Fig. 15.3 HRHIS implementation model



Source: Adapted from Aqil et al. (2009) and Chakraborty and Mansor (2013).

Several LMICs have adopted iHRIS (an open-source health workforce information systems software)[1] as a technological solution to develop a national HRHIS: these include Botswana, Chad, Democratic Republic of the Congo, Ghana, Guatemala, India, Kenya, Lesotho, Liberia, Malawi, Mali, Namibia, Rwanda, Senegal, Sierra Leone, Togo, Uganda and the United Republic of Tanzania. These countries are using an HRHIS to track, manage and plan their health workforce. They have moved beyond inefficient paper-based filing systems in favour of electronic records, which allow users to easily find, share, organize and manage information. Table 15.2 provides an overview of the HRHIS adoption in LMICs.

1 More details available at: https://www.ihris.org/about

Table 15.2 HRHIS adoption in selected low- and middle-income countries

Country	Year Initiated	Name of system	Description	Outcomes
Botswa-na	2009	iHRIS Manage iHRIS Qualify iHRIS Train	The MoH is using iHRIS Manage, iHRIS Qualify and iHRIS Train. In the process of developing a standardized list of job titles that will facilitate interoperability among the HR and payroll systems as well as iHRHIS.	To inform policy, planning, and HR management.
Guinea	2015	iHRIS	To track and manage health workers.	Produce a number of graphic reports on the health workforce, type of health workers available and identify need gaps.
India	2012	iHRIS Manage	Ensure staff capacity for data entry, verification and use.	iHRIS now provides a comprehensive picture of the state's public sector health workforce, including each worker's current posting, employment and training history, specialization, and projected retirement date.
Kenya	Initiated in 1997 began tracking the supply and deployment of Kenya's nursing workforce in 2002	Kenya Health Workforce Information System (KHWIS) iHRIS software Customized iHRIS Train	The KHWIS is comprised of workforce supply and deployment databases for four distinct health professional councils. iHRIS Train to track in-service trainings for the MoH.	Timely and accurate workforce information. Payroll efficiency through the elimination of payments to "ghost workers". HR planning and management.
Malawi	2012	iHRIS Manage	To capture data for use in planning, recruitment, deployment and other HRH decisions.	An assessment at five pilot sites identified gaps and determined district needs and readiness.
Mali	2014	iHRIS Manage	iHRIS Manage is used to manage health workforce information and was selected by Mali to replace paper-based management and tracking of HRH.	Responding to identified needs and is allowing decision-makers to better plan for adequate and equitable workforce distribution.
Namibia	WISN iHRIS Manage 2006	WISN iHRIS Manage in three faith-based organizations	The WISN method calculates the number of health workers per cadre, based on health facility workload. It provides two indicators to assess staffing: gap/excess between current and required number of staff; and WISN ratio, a measure of workload pressure.	The utility of the WISN findings has prompted the MoHSS to seek approval for use of WISN in HRH policy decisions and practices.

Nigeria	2010	iHRIS Train iHRIS Qualify iHRIS Manage	A single system to coordinate and track health worker trainings through a customized version of iHRIS Train – eliminating paper files and duplicated efforts at the same time. iHRIS Qualify for registration, certification, and licensing of selected health professionals. iHRIS Manage deployment of State health workforce registries for three USAID priority states.	These functional HRHIS feed into the national health workforce registry, for which the project developed standard operating procedures.
Uganda	2005	HRHIS was built on iHRIS Qualify and iHRIS Manage	The Uganda Nurses and Midwives Council (UNMC) database serves as a repository of information, including licensure and registration data for nurses and midwives.	iHRIS Train is used to monitor student performance, faculty qualifications and health workers' training histories, from preservice education to in-service trainings.
United Republic of Tanzania	National rollout of HRHIS and Training Institution Information System (TIIS) was carried out in four phases during (2009–2014)	Two HRHIS: HRHIS TIIS	HRHIS is a web-based software that enables a health system to collect, validate, analyse and present raw and statistical HRH information for reporting, analysis and decision-making. TIIS is a web and enterprise information system for health training institutions on the mainland.	HRHIS has made it possible for each council health management team to realize its actual HRH needs, to allocate and reallocate personnel to health facilities based on demand and expertise and to manage day-to-day HR activities based on valid information. TIIS serves as a one-stop shop for information necessary for monitoring enrolment, production and projection of the health workforce.
Zambia	South-South collaboration: 2015–2017 Integrating administrative databases: 2018	The data model and software developed for the Kenyan HRHIS with minimal customization for Zambia	HRHIS: The MoH HRHIS provides information on staffing levels across all government health facilities by cadre and position.	Increase in health professional licensure compliance, efficiency in delivery of regulatory services, reduced service client waiting times, timely generating of accurate HRH reports.
Zanzibar	2008	Zanzibar HRHIS iHRIS Manage	To help managers and policy makers to answer quick questions on health care delivery in their respective authorities.	Enables employers to design and manage a comprehensive HR strategy.

Sources: Baker et al., 2012; Ministry of Medical Services, Kenya, 2011; Spero et al., 2011; Walter McQuide et al., 2013; IntraHealth, 2015; Ishijima et al., 2015; Waters et al., 2016; Walter, 2018; Were et al., 2019.

The experience of South Africa highlights an alternative pathway to implementing an HRHIS. In this case study the HRHIS innovation process is described as developing a unified HRHIS by linking existing information systems through a data warehouse (Annex 15.3). The United Republic of Tanzania offers an example of customization of existing technological solutions to address the HRH information needs in the country (Annex 15.4).

15.3.1 Facilitators for successful HRHIS implementation

The case studies in the annexes provide a summary of implementation facilitators and barriers from individual country experiences:

- Adopting a health system strengthening approach.
- Strong involvement of the different departments of the Ministry of Health (MoH) at the different levels of the health system.
- The absorption of costs has to be planned to sustain expansion, training and management requirements.
- A South-South collaboration for implementing an HRHIS can contribute to reduced time and financial cost.
- Active promotion of team cohesion.
- A willingness to learn and commitment to the process.
- Routinize the system rather than centralize management of HRH information.
- Training on HRH planning, development and management specifically on using data to inform decision-making in practice.
- Stakeholder and system user involvement in the software development process to understand the realities on the ground.
- Using local experts for developing software applications and providing technical support.
- Homogeneity of the systems.
- Integrating related operations support system which will enable users to monitor, control, analyse and manage the services on its network reduces the total cost of ownership.
- Increase efficiency, eliminating bureaucracy and ensure data quality.
- Using a data warehouse comprising of an integrated information storage area that consists of a data repository bringing together multiple systems to provide easy and equal access to relevant information for all stakeholders.
- Reliable technical support for the system users.

15.3.2 Barriers to successful HRHIS implementation

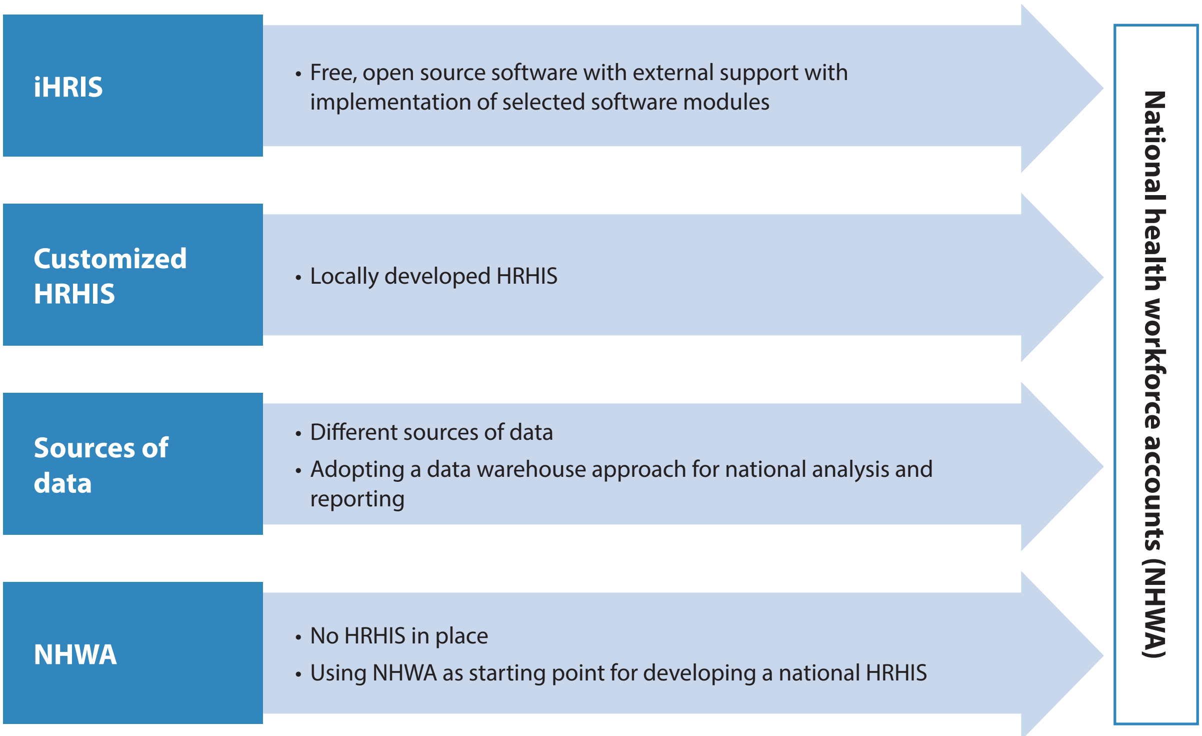
- Lack of capacity in terms of numbers of dedicated people with competencies in managing software.
- Weak capacity for using information for operational and strategic planning needs at subnational management level.
- Interoperability challenges between systems not addressed.
- Passive resistance from stakeholder groups.

15.4 Use phase

To date, several countries have committed to implementing NHWA. In 2020, the HRH2030 Consortium participated in the first Global Digital Development Forum and in the session titled "*Building a Dynamic Ecosystem of Health Workforce Data to Achieve the SDGs*", Indonesia, Ethiopia and the Philippines highlighted their progress in implementing NHWA, presenting their country's data-driven initiatives addressing health workforce challenges and the lessons learned. In South Africa, the first two NHWA modules are directly linked to the HRH registry and there are plans to develop a data warehouse which will meet the information requirements for complete utilization of NHWA. In summary, each country's national HRHIS has a different configuration and takes a specific pathway in the adoption of NHWA (Fig. 15.4).

A few countries have completed HRHIS assessments of their readiness for NHWA, but the majority have not yet embarked on this critical stage that is a prerequisite to addressing the main challenge of interoperability between information systems. In fact, interoperable information systems are still a challenge for most countries due to lack of standardization, national unique identifiers, adequate infrastructural capacity, skilled personnel, financial resources, and legal and organizational concerns.

Fig. 15.4 Country pathways for HRHIS implementation towards NHWA

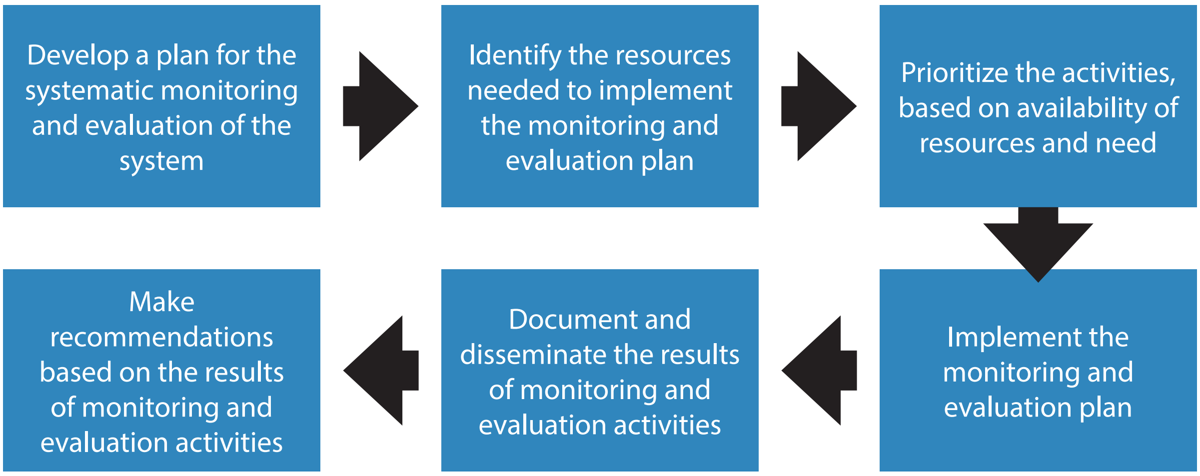


Source: Authors.

Another important aspect is the monitoring and evaluation of the programmes. There are three general strategies for evaluation: goal-based, process-based and outcome-based (Edwards et al., 2003). The objective of monitoring and evaluation is to identify what contributes to a successful implementation and what does not (CapacityPlus, 2022). In a goal-based framework, the evaluation focuses on the understanding of how well the operation and maintenance of the HRHIS match a set of predetermined goals. It is also possible to assess the degree to which the actual benefits of the HRHIS are those predicted in the original plan. In a process-based framework, the focus of the evaluation is on the activities and the workflow in the HRHIS, rather than on its status at one point in time. This framework is useful for systems that have evolved over a substantial period of time. The process-based framework will provide documentation to ascertain what the HRHIS does and how it does it. For instance, a data error log may also act as a starting point for later improvements in training methods, data collection forms or software modifications. In the outcome-based framework, the focus is on the value obtained by stakeholders. They may have different demands, and in some cases, this can raise some conflicts. Therefore, a recommendation is to conduct these strategies to monitor and improve the system to achieve the initial goals, to have a quality-assured process (WHO, 2010). The early engagement of stakeholders through continuous collection of the feedback about changing data needs and improvement will ensure that the HRHIS meets their needs, and will encourage their sense of ownership (CapacityPlus, 2022).

Another recommendation is to have a working group responsible for managing the generic steps necessary to implement the HRHIS monitoring and evaluation plan (see Fig. 15.5).

Fig. 15.5 Steps to implement an HRHIS monitoring and evaluation plan



Source: CapacityPlus (2022).

Questions for the working group include which indicators to include in the monitoring and evaluation, how these processes will be conducted, by whom, and how frequently. One example of strategies for evaluation is conducting a focus group or qualitative interviews focusing on key stakeholders, i.e. those involved in the development and management of the HRHIS and its users at different levels of the health system (CapacityPlus, 2022). The evaluation plan must also state how the results will be disseminated in a way that will lead to actions to improve the performance of the HRHIS. Annex 15.5 presents the experience of Serbia as an illustration of an evaluation.

15.5 Conclusion

There are several strategies for the development, implementation and use of HRHIS. WHO developed the NHWA to help countries ensure that information about health workers is available and updated; an indispensable condition for governance, quality and resilience of health systems. At different decision levels, the following strategies can help strengthen the development, implementation and use of HRHIS:

- Advocate for dedicated HR and financial resources for the development and implementation of HRHIS at national level.
- Advocate for the development and use of a data exchange policy and agreement amongst the different stakeholders.
- Use local and external professionals in the information systems development process.
- Promote environments and spaces for cooperation between countries, such as South-South cooperation.
- Involve different actors from various stakeholder groups in the development/improvement of the HRHIS.
- Clearly define the objectives, the type of data and information and the desired results.
- Formulate clear and measurable indicators to track the progress of HRHIS implementation on an annual basis.
- Promote information transparency tools, such as dashboards to stimulate scientific research with local data, and the production of evidence that facilitates planning actions.
- Develop a monitoring and evaluation framework at the different levels in the health system.
- Invest in the training of professionals responsible for capturing data and using information systems.
- Advocate for the use of NHWA by involving different sectors, stakeholders and academic institutions and by developing supportive tools.

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Annex 15.1: HRHIS in six Latin American countries

This case study looks at why and how countries have developed their information systems for the implementation of public health professional records. Country selection considered the availability of public information that would allow learning from successes and failures. This is the case of the MERCOSUR countries – Argentina, Brazil, Paraguay and Uruguay – and of Chile and Cuba, which have comparable public health outcomes, regardless of differences in the organization of their health care systems, and in the allocation of available resources for health care.

Table A15.1 Design of HRHIS in six Latin American countries

Attributes	Argentina	Paraguay	Uruguay	Brazil	Chile	Cuba
Legal regulation	Laws, plans and resolutions	Laws	Laws and regulations	Laws, decrees, ordinances and regulations	Laws and regulations	Laws and decrees
Main purpose	Planning and validation of MERCOSUR data	Planning and validation of MERCOSUR data	Planning, control and validation of MERCOSUR data	Planning, information and control	Planning and assurance of rights on health (GES or AUGE)	Planning, information and control
Adminis-tration and management	MoH and Super-intendence of Health Services	Ministry of Public Health and Social Welfare	Ministry of Public Health	MoH and Ministry of Education	Superinten-dence of MoH of Health	Ministry of Public Health
IT support	Integrated Argentina Health Information System (SIISA)	System for the registration of practitioners (SIREPRO)	National information system	National and regional information systems	National and regional information systems	National information system
Licence to practice	Licence for professional practice	Licence for professional practice	Licence for professional practice	Licence for professional practice	No licence but mandatory for GES plan	Licence for professional practice
Public information	Web-based system, no access for public information	Web-based system, no access for public information	Web-based system being designed, the information is not public	Web-based system, with public access	Web-based system, with public access	Web-based system, no access for public information

The analysis concluded that the design and implementation of HRHIS can be summarized as follows:

- The countries operate under public policy models whose vision is social protection, set in different systems for assurance and provision of health services. Information systems are developed as instruments to improve the management of health services.

- There is an increasing awareness of the importance of information systems for HRH management and planning at national and regional levels.
- The public dimension of information, e.g. free access, is still limited, and of minor importance for most countries.
- There is a still incipient institutional framework of resources, tools and sources of information built on basic or minimum data, and managed as repositories – which, to date, except for Chile, are not directly available to the population. Those that exist have an institutional character, and are managed by health ministries or superintendencies, and their primary purpose is health services planning.
- The countries are still at a very embryonic stage of the development of common strategies for the assessment and systematization of data and information on HR in general – and health workers in particular – and to take advantage of good practices that allow moving more rapidly in the development and maintenance of uniform and reliable public repositories of data on health personnel.
- The efforts and resources invested by countries not only help planning processes, but also have the potential to contribute to the transparency of information and the confidence of the population in the management of basic data, particularly, public trust in the recognition and demand of citizens' rights to health.
- Recommendations for advancements are made regarding:
  - design of public policies on information on HRH;
  - technical considerations for the validation of data;
  - standardization of contents of information systems at a regional level;
  - organization and management of the sources and uses of information;
  - definition of criteria for the disclosure of data;
  - diagnosis and use of information technologies;
  - minimum contents for a regional repository of HRH data; and
  - systems for the periodic auditing of HRHIS.
- The situation of the countries under study shows that there are still problems about the diversity of sources of data and information; lack of technologies, and professional and technical skills in the institutions responsible for the records; and insufficient financial resources to support the organization and management of information systems on HRH.
- It is possible to substantiate a basic and primary focus in terms of information systems that places higher emphasis on HRH planning and management within the national framework of training practitioners and technicians. This model is reinforced in those situations where international agreements are in place in which the countries are committed to validate their information.
- However, a new focus has been gradually taking place to organize the information systems, its purpose being the development of public trust and security in the provision of health services.

Notes: AUGE – Universal Access with Explicit Guarantees (Acceso Universal con Garantias Explicitas); GES – Explicit Health Guarantees (Garantías Explícitas de Salud); MERCOSUR – Southern Common Market (Mercado Común del Sur); SIISA or SISA – Integrated Argentine Health Information System (Sistema Integrado de Información Sanitaria Argentino); SIREPRO – System for the Registration of Practitioners (Sistema de Registro de Profesionales).
Source: Góngora (2014).

Annex 15.2: Role of stakeholder engagement and user-centred design in scaling up pre-service training for Mozambique's information system (SIFIn)

What is the impact of stakeholder involvement and policy change on scale-up and sustainability of SIFIn?

Mozambique faces a chronic shortage of trained HRH; it also lacks HRH training data from health training institutes (HTIs) and training facilities. The Mozambique MoH has established a network of 18 HTIs (WHO African Region, 2018), with at least one in each of the 11 provinces of the country. These institutions provide middle-level specialty clinical training. The pre-service training information system is called Sistema de Informação para Formação Inicial (SIFIn).

Development and adoption

The development of SIFIn involved integrating an agile methodology with a user-centred design approach. It was divided into short cycles; iterations of development and testing with continuous feedback from end users. Critical elements identified included user groups, user workflows, and required data elements. SIFIn was required to function at two levels:

- HTI level: to enter demographic and academic data on students, data on assessments and results from academic work including internships. Detailed data elements would include current enrolled and graduating students including admission exam, classes taken, grades attained, tutor profiles, teaching quality, and staffing projections (Waters, 2016).
- Central level (MoH): to aggregate data supplied by the individual HTIs.

Implementation challenges

SIFIn faced challenges in the beginning owing to the complexity of the academic functions, missing functions around existing HTI workflows, and limited engagement from HTI directors and MoH staff. This impacted uptake of SIFIn by HTIs and hence data quality. To overcome these challenges the MoH implemented new directives/policies that mandated the use of SIFIn, with emphasis on incorporating the needs of HTIs into the system. A new version of SIFIn was developed, involving stakeholders from all HTIs to ensure all their workflow needs were met, providing an end-to-end web-based online system. SIFIn was adopted by all 18 major MoH HTIs by the end of 2017. This led to increased efficiency of HTI workflows, decreased burden on the staff, faster processing times at HTIs and more reliable data available for decision-making at the MoH.

Conclusion

SIFIn provides a powerful example of how stakeholder (i.e. MoH, HTI staff) involvement at different levels impacts a system's adaptability and sustainability.

Sources: Waters et al. (2016); WHO Regional Office for Africa (2018).

Annex 15.3: The current and future HRHIS in South Africa

Recent developments and strategic processes in South Africa to guide the revitalization of the health system have important implications for the development and conceptualization of information systems. The two processes specifically relevant to the development of the HRHIS are: the Presidential Health Compact emerging from the Presidential Health Summit 2018; and the National Digital Health Strategy 2019–2024. Both embrace a vision of healthy South Africans and address aspirations for the country's development as it navigates the Fourth Industrial Revolution.

The MoH appointed a ministerial task team with wide-ranging expertise to support the National Department of Health (NDoH) in the development of an HRH strategy for 2030 and an associated strategic plan for 2020/21–2024/25. The task team commenced its work in April 2019 undertaking: a literature review of global, African and South African development policies and strategies for health, health systems and HRH; a series of stakeholder consultations; key informant interviews; and technical analyses. One of the five work streams focused on planning, monitoring and evaluation capacity regarding the use of data and associated information, decision-making, research and innovation (technology/tools). This case study presents excerpts of the findings of the work stream on information, monitoring and evaluation for the HRH in South Africa.

Integrated community service programme

The Integrated Community Service Programme (ICSP) was instigated in 2018 and comprises four core web-based applications (modules) to support the community service policy which requires health professionals to complete 12 months' community service in the public health sector. The system supports the application, selection and placement process. The data collected are exported to a DHIS2 tracker reporting system and disseminated to relevant stakeholders, ensuring a transparent application and allocation process supporting efficient health resource allocation in the country. The system is completely online; students apply for a placement indicating their preferred institutions and then a selection process follows with negotiations with the provinces. There is an appeals process to ensure satisfaction with placements for both students and receiving institutions. Finally, placements are offered and students placed. There is a workflow chart with timelines, responsible people and real-time updates.

Key elements of the HRHIS

South Africa's HRHIS consists of several information systems:

- Personal and Salary Administration System (PERSAL), Basic Accounting System (BAS), Financial Management System (FMS) and Logistical Information System (LOGIS).
- Statutory Councils are regulatory entities independent of government. Four such councils are responsible for registration, licensing and certification data of health-related professionals.
- The HRH Registry provides accurate health worker information for optimum workforce management using a minimum dataset from various source data systems.

Main challenges in implementing a unified national HRHIS

- The absence of an HRH coordinating structure within the NDoH and poor communication between different HRH stakeholder groups, specifically the Statutory Councils.
- Technical and behavioural challenges include the absence of standardized and explicit HRH standard operating procedures and reporting formats in the public sector.
- In addition, there are several misalignments:
  - Mismatch between the priorities and objectives of the public and private health sectors; this needs to be addressed for the successful adoption and implementation of a national health insurance and to ensure compliance with both governance structures and reporting requirements.
  - Between the objectives of the health and higher education sectors, leading to a gap between the needs of the population in terms of numbers and the skill mix required.
  - Absence of standard operating systems has given rise to uncoordinated activities, non-compliance to HRH processes and suboptimal use of electronic systems.
  - Poor availability and functionality of infrastructure – hardware, software, connectivity and bandwidth requirements – to implement and operationalize a system based on e-technology. Further, the capacity of end users to successfully use the technology is a concern.

Source: Mathews (2019).

Annex 15.4: HRHIS national rollout: United Republic of Tanzania

The United Republic of Tanzania embarked on a national rollout of HRHIS and its Training Institution Information System (TIIS) between 2009 and 2014 capturing information from both public and private sectors. The HRHIS is a generic web-based software that allows customization to fit organizational requirements. The software enables implementers to collect, validate, analyse and present information in raw and statistical analysis formats. Outputs of the software includes reports that can be exported in different formats providing flexibility in sharing information and interoperability with other applications. TIIS is a web-based and user-friendly enterprise system for health training institutions in Tanzania Mainland consisting of several modules and functions for managing information on institutions, academic programmes and courses, students' academic records, employees, assets, projects and budgets.

The development phase consisted of workshops for the coordination and design of the HRH information system with relevant stakeholders defining data elements, data collection methods and information flow. The outputs of the workshops were verified with a situational analysis to clarify business practices and HRH planning and management administration at different levels in the health system.

The pilot phase allowed for the testing of tools and software where challenges such as weak internet connectivity, poor computer literacy as well inadequate power supply were identified. The pilot phase provided the flexibility to modify the data elements, rollout strategy and address users' needs leading to improvements the system and increased user-friendliness.

The rollout phase included operational training, supportive supervision, data utilization training and data capturing coverage. The increased knowledge gained through the rollout phase had a positive influence on achieving a good data coverage. However, the system unfortunately indicated a data coverage rate of more than 100% when comparing information captured via the electronic system and the paper-based records, indicating duplicated records.

The maintenance and sustainability phase is ongoing, integrating the HRHIS and TIIS within the strategies and guidelines of the ministries and national e-health strategy, the national HMIS database (DHIS2), and enhancing ownership of the system through regular supportive supervision.

The two systems increased data coverage and generated information that was utilized at different levels and by multiple stakeholders for decision-making for planning, determining personnel needs, allocating and re-allocating personnel and, finally, managing day-to-day HRH activities.

Source: Ishijima et al. (2015).

Annex 15.5: What works and what does not in the HRHIS in Serbia

Currently, almost all health centres and hospitals in Serbia are equipped with the IT necessary for operating the Integrated Health Information System (IHIS) that is regulated by various laws (2019 Health Care Law and 2014 Law on Health Records and Reporting in the Field of Health) and other bylaws. The IHIS is based on electronic health records and includes e-prescriptions, e-appointments with physicians, and e-referrals.

The main challenges for full implementation are related to the shortage of IT staff. In addition, parallel paper-based workforce documentation is kept for several different and unlinked electronic databases, sometimes run by the same health care institution at national, regional and local levels. For example, pursuant to the official legislation, the Institute of Public Health of Serbia collects and reports data on health care institutions and personnel gathered from those belonging to the national Network of Health Institutions Plan, along with the health workforce register and other health-related data (e.g. for the national health accounts, health services utilization, health surveys, equipment, etc.). Then, for the purpose of remuneration, there is a register of contracted workers linked to the type of institution in the national health insurance fund. The MoH has budget items for public health programmes and has set up separate systems for tracking the supply of health workers, and for dual practice. The Ministry of Education determines data collection on the education and training of future health workers. The National Employment Service reports on vacancies in the health sector and on unemployed workers, while the registers of the health professional chambers contain some data on licensed workers.

All data of public importance are accessible free of charge, but are scattered and incomplete; the hard to link data hamper conducting credible rapid assessments. Regarding the health workforce, time and resources are wasted in the HRHIS administration, and there is insufficient administrative capacity to respond timely to requests for valid and useful data for planning and evidence-informed decision-making.

The HRHIS works better at the institutional level for workforce planning and performance assessment. However, for regional or national level development and for international cooperation, a precondition is that Serbia requires a health workforce strategy aimed at sustainability and strengthening of the health care system nationwide. The 2019 Health Care Law foresees an opportunity to align planning and development of the health workforce with the envisioned progress in the population's health needs and changes in the socioeconomic, technological and political context of the health system. For that, the NHWA guidance can provide useful directions for both technical administration and policy-making.

Sources: Gacevic M et al. (2018); Šantrić MilićevićŠantrić Milićević M et al. (2009); Santric-Milicevic M et al. (2015).

Chapter 16: NHWA implementation: key country experiences

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16.1 Introduction

Quality data are key to evidence-informed health workforce policy development. This chapter discusses how countries can use the national health workforce accounts (NHWA) lens lens to increase the availability of quality data and improve strategic decision-making to better build, manage and optimize their health workforce. The chapter first presents an overview of the health workforce challenges countries face and of the importance of reliable and up-to-date human resources for health (HRH) data to develop adequate responses. It then presents the elements of well-functioning NHWA, and discusses governance structures, strategies to increase the availability of data, and strategies to build a culture of data use. Some experiences of implementing NHWA are included in Annexes 16.1–16.3.

16.2 The importance of quality data

As countries progress toward achieving universal health coverage (UHC), having health workers with the right skills in the right place, to deliver the right services at the right time is fundamental to build a resilient health system (OECD, 2016). The COVID-19 pandemic provides a dramatic demonstration of this requirement. However, even if progress has been made in recent years, many countries continue to experience major challenges, such as shortages and inequitable geographical distribution of health workers, skill mix inefficiencies, regulating the private sector and dual practice, and management of health migratory flows (Zurn et al., 2004; Fulton et al., 2011). These health workforce issues are multidimensional (Marchal and Kegels, 2003; Wismar et al., 2011; Dussault and Buchan, 2014) and require complex multisectoral collaboration and decisions informed by good data (Dal Poz et al., 2006; Kingue et al., 2013; WHO, 2016). For example, in many low-income countries, shortages of health workers in rural and hard-to-reach areas are typically due to professional isolation, inadequate schools for children, a lack of housing, poor communication infrastructure, and a lack of basic services, such as water, electricity, and public transportation (McPake et al., 2016; Moghri et al., 2017). Addressing these shortages therefore requires interventions from many actors in the health sector and beyond.

Though there is an understanding of how to respond to this type of challenge, misaligned policy agendas and weak governance structures contribute to perpetuating the problem. For example, in Serbia, where there is a combination of various health workforce problems, such as inequitable distribution of health workers, inefficient skill mix, and high losses to emigration, the lack of policy, strategy and data are barriers to change. Poor quality, out-of-date, inaccurate, duplicative, inconsistent or difficult to access data are useless to inform health workforce policy and planning. On the other hand, the availability of HRH data of reasonably good quality, even if not perfect, helps make strategic decisions that would not be made otherwise. The Ministry of Health (MoH) in Serbia envisages the implementation of NHWA and eventually an HRH observatory (Šantrić Milićević et al., 2015)

In Mozambique, analysis of the primary health care (PHC) workforce data revealed that access to the PHC workforce was inequitable between rural and urban areas; as a result, the MoH revised staffing norms based on the improved availability of data (Annex 16.1). In Bangladesh, a strong HRH information system (HRHIS) has improved transparency and accountability in decision-making as HRHIS dashboards have been made public for use by policy-makers and civil society (Annex 16.2). In addressing HRH challenges, NHWA are a powerful tool to help countries improve the availability of quality data, and facilitate their use.

16.3 NHWA: governance structures

A health workforce policy agenda based on evidence requires, in addition to data on numbers of health workers, data on education, financial information, and the existence of and adherence to certain policies. The WHO developed NHWA as a mechanism by which countries can progressively improve the quality, availability and use of health workforce data and information. Guidelines to implement NHWA define a roadmap for the conceptualization, operationalization and process revision, and for the engagement of stakeholders in the sharing, analysis and use of standardized data to make decisions.

As more countries begin to conceptualize and operationalize NHWA, discussion is needed on how they can learn from the experiences of others in the critical areas of multisectoral governance, availability of quality data, and data use. Past and ongoing experiences show that the role of the MoH is vital, as well as that of other stakeholders (e.g. other ministries, professional organizations, educational institutions). Reports on the follow-up on commitments to strengthen their HRHIS made at the Third Global Forum on Human Resources for Health by Indonesia, Sudan and the United Republic of Tanzania show the benefits of cooperation with and support from non-health actors, in government and beyond (Dussault et al., 2016). In Ethiopia, a first step in the conceptualization of NHWA was a mapping of stakeholders across the health labour market (HLM) to understand the broad diversity of interest involved. The MoH held consultations to identify each stakeholder's role, motivation, and difficulties in data collection, management and use. Then stakeholders received orientations and training on NHWA to ensure a common understanding on what needed to be done to improve the availability and use of health workforce data and to get the buy-in of their leaders (NHWA implementation guide Step 1: Government "buy in"). This led to defining clear terms of reference to guide implementation (HRH2030 Program, 2021).

In the Philippines, a strong governance structure was established to initiate the implementation of NHWA, clarifying roles, responsibilities and relationships, building on existing structures. This structure prescribes the flow of data between stakeholders and defines data standards. It is composed of existing committees and networks, such as the Department of Health Steering Committee for HRH Initiatives and the multisectoral HRH Network. The governance structure is embedded in a NHWA roadmap developed to serve as a guide to stakeholders for operationalizing NHWA (HRH2030 Program, 2020a).

Once a governance structure is established, a common agenda must be developed to engage and motivate stakeholders. This can be done by examining national strategic HRH planning documents, by building on existing policies and on a health labour market analysis (HLMA), if possible. The Government of Ethiopia adopted the Health Sector Transformation Plan (HSTP) that indicates several health workforce priorities: strengthening regulation, planning and partnerships, scaling-up education, training, leadership, and management capacity and finally, optimizing availability, retention and performance of health workers (Federal MoH, Ethiopia, 2015). In Namibia, a different approach was used, using NHWA as the basis of the development of a national HRH strategic plan (Annex 16.3).

Equally important is the building of consensus on the management to clarify who will oversee the process of storing and sharing data, and who will have access to what data. The legal framework for data sharing and privacy is another important issue that the governance structure needs to settle. While establishing a governance structure on paper can look simple, there are many challenges in making it work. Many countries have developed clear governance structures, but carrying out of all the intended actions prescribed proved difficult due to competing priorities, existing legal frameworks that inhibit or complicate change, or lack of interest or understanding of the benefits by some stakeholders. It is important that whoever develops governance structures understands that taking a progressive approach, and continuously learning from the process to improve, is a good strategy.

16.4 Strengthening the availability of quality data

The development of mechanisms to strengthen the availability of data entails understanding the flow of data from decentralized to centralized levels and between stakeholders, setting standards and common definitions of indicators, developing data sharing agreements, and building the capacity of HRHIS. Data for NHWA can be derived from a variety of sources, including but not limited to payroll, financial management information and health management information system (HMIS), professional council registers, databases of education and training programmes, labour force surveys and population censuses. It is important to consider these various sources when planning how to strengthen the availability of quality data. Mapping flows of data is critical to understand where data come from, where they go, and who owns which data.

Data flows mapping supported Indonesia in understanding the stakeholders involved in the management of health workforce data within the MoH and in the whole HLM. This allowed a better understanding of what was, or was not, working in the exchange of data. In Indonesia, the mapping identified stakeholders in the Ministries of Culture and Education, Manpower and Home Affairs, in the social insurance administrative organization, in professional organizations, in local governments, and in the private sector. It also helped to identify high-level leaders who needed the data, and which incentives could motivate data owners to collaborate, and the value stakeholders gave to autonomy to make decisions on how to use the data. Finally, the mapping contributed to the identification of potential barriers to implementation, namely the lack of understanding of how to use information systems, the perception that NHWA data will not be useful, fatigue from multiple requests to provide data, and the absence of tools for the interpretation of the information (HRH2030 Program, 2019).

When flows of data are known and roles defined, stakeholders must develop standards for data. Different stakeholders may have different definitions for the same indicator, which can complicate the sharing and analysis of data. For example, in the Philippines, there are two agencies tracking health workers serving overseas: the Commission on Filipinos Overseas and the Philippine Overseas Employment Administration. One uses the generic category "health and social services", and the other counts those who have a contract through a bilateral agreement, producing two different totals (HRH2030 Program, 2020b). Regarding definitions of who is a health worker, a multistakeholder group used the WHO minimum dataset for health workforce registries (WHO, 2015), and agreed on the following definition: "A doctor of medicine, nurse, midwife, dentist or other allied professional or practitioner licensed to practice in the Philippines" to be used when sharing data in the future (HRH2030 Program, 2020b). The use of a standard terminology also facilitates comparisons between countries and between local governments, as suggested by the NHWA implementation guide Step 5: Data compilation and analysis. Sharing agreements determine what data are shared, by what data owner, the format for sharing of data, who is allowed access to the data once shared, actions in case of breach of the agreement, privacy and security measures, quality standards and the duration of the agreement. For example, in the Philippines, the HRH Network has a formal memorandum of understanding and data sharing agreement that support the exchange of data. When data use becomes a common agenda for all stakeholders, there is an emphasis on ensuring the availability of quality data so that the policy and planning agenda will have the strong evidence base needed to make decisions.

As countries invest in building and strengthening their e-health architecture, building in mechanisms, such as interoperability for the exchange of data between information systems is critical. A 2018 review of HRHIS in Indonesia showed that interoperability allowed for the exchange of data between the MoH HRHIS and other information systems that "owned" different health workforce data, such as the national ID, thus reducing the potential for human error in data entry (HRH2030 Program, 2019). HRHIS should not only serve to store data, but be a tool to analyse data for use by stakeholders. In Senegal and Indonesia, the MoH put a particular emphasis on the analysis and use of data. In Senegal, this included investment in training all regional health offices on how to extract data from the HRHIS and to conduct analysis using other tools. In Indonesia, the MoH focused on the development of dashboards using data from the central HRHIS, and training of stakeholders at all levels of the health system on the use of these dashboards for decision-making. Investments in these HRHIS led to more rapid planning for the COVID-19 response.

Building a culture of use of data to make decisions is a way to ensure an enabling environment for the implementation of NHWA. It involves engaging stakeholders to use data for regular operational decision-making, policy and planning to achieve strategic objectives, and eventually respond to health emergencies. Decision-makers need access to accurate, complete and up-to-date data on the workforce to make informed decisions. This can include identifying gaps in staffing, skill mix needs and planning to meet future workforce requirements. To prepare for health emergencies, such as outbreaks, epidemics and pandemics, quality data from all levels of the health system must be readily available. Knowing where health workers are, their employment, registration and licensure status, and past training among other information can assist decision-makers in rapidly taking action. WHO's operational guidance for maintaining essential services during an outbreak calls for rapid re-distribution of health workers, including re-assignment of staff from non-affected areas and task sharing. Registration and licensure records can serve to identify non-active qualified workers, such as retirees, who can be mobilized. Through data from multistakeholder collaboration, the nongovernmental health workers can also be mobilized through temporary deployment (WHO, 2020).

16.5 Conclusion

Information systems should always be designed in collaboration with users, and not only serve as a database, but rather facilitate the exchange of data and use of data for effective policy and planning. The HLM is not only composed of the MoH, but also of those involved in building the health workforce in the education sector, and those involved in employing, managing, paying and tracking health workers, whether active, inactive or outside of the country. Developing a common understanding of health workforce policy issues and planning needs, speaking a common data language and developing collaborative interventions to address the policy and planning agenda with all stakeholders are key.

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Annex 16.1: Using HRHIS in support of universal coverage of primary health care: Observatory of Mozambique

Background

Mozambique laid out its commitments to accelerate progress on universal coverage of PHC in the MoH's Sector Strategic Plan 2014–2019. A resilient health workforce is central to attain, sustain and accelerate progress on PHC coverage. The HRH Observatory of Mozambique analysed the dimensions of availability and accessibility of the PHC workforce in 2014 (adapting the WHO framework on availability, accessibility, acceptability and quality of health services) to stimulate policy dialogue about the needed skill mix at PHC level and how to equitably distribute the existing workforce to cover basic health needs.

Methods

Availability of the existing PHC workforce was measured in terms of skill mix and numbers, by comparing them with staffing norms established by a ministerial decree in 2002 before the decentralization of HIV care and treatment services to PHC level. Competencies for the implementation of the minimum PHC services package were mapped out for different health professionals and workloads were measured for physicians, nurses and midwives. Accessibility was measured by density ratios of PHC health centres and of PHC health workers per 100 000 population per district and by the distribution of services per health centre type.

Results

In 2014, 96% of 1491 health facilities were at the PHC level, but with only 44% of the health workforce. The size of the PHC workforce was twice the one defined by the 2002 ministerial decree. The most represented health worker categories were: nurses (49%); clinicians – medical doctors, mostly mid-level clinicians (22%); and public health mid-level technicians (10%). Other personnel (pharmacy and laboratory) represented less than 10% each and personnel from nutrition, oral health, radiology or health centre management less than 5% total. However, the analysis of the PHC workforce composition in the rural type II health centres, which are closer to the population, showed shortages of nutritionists, technicians and midwives. 78 (53%) districts had no midwife or mid-level clinician in more than 50% of their rural type II health centres. The team composition and size varied from health centre to health centre and the recommended skill mix was only observed in three health centres. Access to the PHC workforce was not equitable between the urban and rural zones and districts of 3 out of 11 provinces due to lack of infrastructure.

Conclusion

The findings highlighted that the ministerial decree no longer responded to the current needs of the population. This strategic information was used for the revision of staffing norms in the new HRH Strategic Plan 2016–2025. It formed the basis of the definition of a disbursement link indicator in the preparation of a World Bank Primary Health Care Strengthening Program in 2017, to ensure the deployment of an increasing number of health professionals at PHC level and, more specifically, of midwives at the rural type II health centre level.

Annex 16.2: Strategic health workforce information in the public sector: Bangladesh

Background

The Government of Bangladesh is giving high importance to improving the management of its health workforce. The Directorate General of Health Services (DGHS) has introduced an electronic platform[1] in its health information system (HIS), a digitization initiative to maintain a real-time dashboard accessible to the public, in addition to policy-makers and health managers. This website provides the health workforce data on all the public health worker positions under the DGHS. This website also reports on the distribution of workers at subdistrict (*upazila*) level and the combined availability of obstetrician and anaesthetist at subdistrict health complexes and information on essential staff for providing obstetric care services at district hospitals. DGHS is promoting this website as an electronic tool for improved management of the health workforce in the public sector as well as to enhance accountability of the public health sector to the citizens.

As of June 2019, of the total 131 103 sanctioned positions, 89 104 (67.8%) were filled and 41 999 (32%) were vacant. Among the filled positions, 58 187 were male and 30 917 were female. The spectrum of these positions ranged from high-level officials and administrative staff to clinical staff and support staff at central level, teaching hospitals, district hospitals, subdistrict health facilities and community level. There were 1458 sanctioned positions of anaesthesiologists, anaesthetists, junior consultants or medical officers (anaesthesia), anaesthesia technicians, etc. Only 659 were filled. Given that the current population of Bangladesh is about 169 million, the density of anaesthesia staff in the public health sector per 100 000 population is 0.39. Even with all the sanctioned positions filled it would only increase to 0.87. With regard to sanctioned positions for surgeons, from senior surgeons to specialized surgeons to junior level assistant surgeons/medical officers, there are 3912 positions within the DGHS system; of these 3264 (83%) are assistant surgeon positions. Only 32% of the positions were filled. Taking out the assistant surgeons/medical officers from this equation, the density of trained surgeons in the public health sector per 100 000 population is 0.23.

The website also provides the distribution of obstetrician-anaesthetists at subdistrict health complexes. The interactive map allows hovering over the health unit to obtain the staff status at that particular health facility.

Conclusion

The Bangladesh Government has advanced establishing a real-time data system for the health workforce in the public sector. This system is accessible to the public and reflects an effort by the government to ensure accountability of the public health sector. This website serves as an important tool for policy-makers and civil society to improve the availability of appropriate skilled health staff at health facilities and community levels.

1 http://103.247.238.81/webportal/pages/index.php

Annex 16.3: Implementation of NHWA: Namibia

Background

Namibia was selected as one of the pilot sites for implementation of NHWA in the WHO African Region. The Ministry of Health and Social Services (MoHSS) followed the WHO NHWA implementation guide's three phases, i.e. conceptualization, implementation and process revision and sustainability. The steps in the first phase include governmental buy-in, governance, and scoping and planning. The steps in the second phase consists of legal framework, data compilation and analysis, validation and dissemination. Steps in the last phase involve process revision.

The MoHSS requested IntraHealth (with USAID support) and WHO to assist in the implementation of NHWA. The approach was to start with the development of a national HRH strategic plan. The rationale was that most of the data collected through the situation analysis and HRH projections would speak to the indicators required for NHWA. This approach enabled the buy-in from the MoHSS, as the development of a national HRH strategic plan was one of the ministry's national development objectives for the fifth national development plan (NDP5). The governance structures were established through the HRH Technical Advisory Committee, a multistakeholder, multisectoral and multidisciplinary working group to oversee the establishment and development of NHWA. The HRH Technical Working Group was established to act as a secretariat to conceptualize and implement NHWA and a focal point for the NHWA was designated. The HRH strategic plan was the culmination of an HRH situation analysis and projections.

One advantage of this approach gave Namibia an updated HRH strategic plan with staffing needs projected until 2030, while meeting national development goals. Data collected for the HRH strategic plan were useful for some NHWA indicators. However, the biggest advantage was the creation of the HRH Technical Advisory Committee. The development of the HRH strategic plan created an opportunity to demonstrate the usefulness of data for decision-making. A disadvantage of this approach is that NHWA implementation proved to be a lengthier process than expected due to the drafting of the HRH strategic plan.

Some strengths of this approach are that outcomes are aligned with governmental goals and more political will and commitment was apparent. Also, a platform has been created to demonstrate the usefulness of data for decision-making and policy change.

The implementation of NHWA is still a work in progress since the HRH strategic plan has yet to be validated and NHWA indicators could not be uploaded without validation. The impact on the country is significant since it is estimated that there would be a shortage of health workers overall; it also helped to quantify this number and the country's capacity to employ them. Namibia is facing a paradoxical surplus in the production of health workers compared with the limited fiscal capacity to employ them. Having quantified these numbers, the country is in a better position to plan.

Conclusion

Political will and governmental buy-in are key to advance the implementation of NHWA. Even if one starts with an HRH strategic plan, the outcomes are useful to drive NHWA. The way forward for Namibia would include validation of the HRH strategic plan and prioritizing those indicators the country would include in the initial NHWA reporting.

Chapter 17: Labour force surveys: a critical source of health workforce data for health labour market analysis

Juana-Paola Bustamante Izquierdo

17.1 Introduction

Identifying and understanding the main issues leading to shortages or oversupply of human resources for health (HRH), inefficient skill mix and geographic maldistribution, is important to develop policy recommendations aimed at overcoming mismatches and health labour market (HLM) failures in the health worker education and employment sector. By applying a set of analytical tools and theories to understand current gaps in the availability, distribution and quality of the health workforce, health labour market analysis (HLMA) supports informed decision-making. As a result, it provides a diagnosis and alternatives to problem solving to elaborate a country strategy for workforce solutions.

HLMA requires the use of relevant data and indicators to identify and analyse the demand and supply of health workers. Labour force surveys (LFS) provide key information for that purpose. The aim of this chapter is to illustrate how to use LFS in HLMA. The chapter comprises three sections:

- Definition of LFS, the type of information that they provide and the periodicity of surveys.
- Brief explanation of the HLM framework and the labour market issues that can be informed by using LFS.
- Use of the HLM framework to show, with examples, how LFS are key data sources for HLMA and provide information on employment estimates and working conditions.

17.2 What are labour force surveys?

LFS are household-based sample survey questionnaires to collect data to derive labour statistics (ILO, 2017). They focus on labour force status – employment, unemployment and out of the labour force – of the working age population and characteristics of the jobs held by employed persons (occupation, type of contract and hours of work). In addition, LFS report the socioeconomic characteristics of respondents such as sex, age and educational attainment. Furthermore, it is possible to disaggregate the employment characteristics by economic sector, and estimate health and social sector indicators.

LFS collect information in a periodic manner, ideally annually, contributing to characterize the supply side of the HLM by providing information on occupation, working conditions, and personal characteristics, by sectors of the economy. This allows comparison of employment in the health sector with that in other sectors.

Box 17.1 Examples of indicators from LFS (depending on the questionnaire and survey sample)

- Density of health workers per 10 000 population.
- Percentage of health workers by occupation, sex, age and regions.
- Percentage of people working in the health and social sector.
- Percentage of health workers by status in employment.

Details of the information collected from LFS depend on the design of the questionnaire. Even though LFS collect data on core questions related to employment, it is possible to add specific questions, such as information on secondary employment.

The size of the sample is important since it indicates if the LFS is representative enough to analyse the data by occupation, region and city level, wages, etc. Since this is a self-reporting survey, responses may not be reported correctly. For example, wages can show under reporting when comparing results from LFS to income and expenditure surveys.

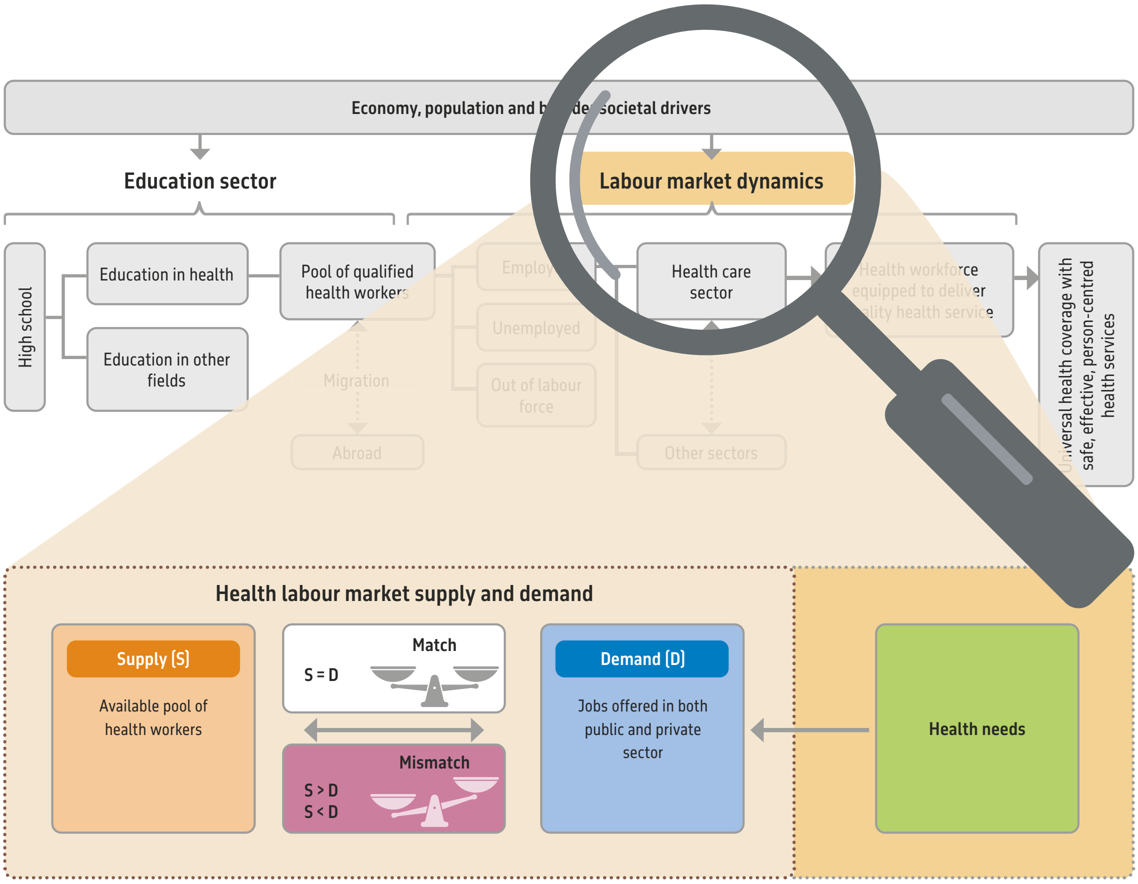
17.3 LFS and the HLM framework

Fig. 17.1 illustrates factors shaping the supply and demand of health workers as well as mismatches affecting the equilibrium between them. On one side, the supply depends on the entry and exit of workers through the education sector and migratory flows. On the other side, demand is shaped by health services demand and budget to finance HRH. In this framework, the LFS can be useful to identify trends and key issues affecting the supply of health workers since it provides a general overview of the size and characteristics of the workforce, status of employment and distribution in the country. However, further investigation, complementary data and advanced analytical tools might be needed to complete the identification of potential causes of mismatches.

For example, mismatches between supply and demand can be due to a shortage of workers; but what kind of shortage? Is it in specific occupational categories? Or is it a regional shortage? And what is causing this shortage? Is it about wages and working conditions? Is it a mismatch in skills? Is it a lack of financed job positions? A first approach is to look at trends in employment. Since LFS provide information on the proportion of workers in the health and social sector, data serve to study the trends in growth of the workforce by occupation and region across time.

Supplementary analysis on working conditions, the role of public and private sectors and HRH skills can help explain these mismatches. Depending on the sample, LFS can be useful to compare working conditions across sectors and, in some cases, estimate the proportion of workers with health education having jobs in other sectors of the economy. This information points to better working conditions and/or opportunities for HRH in other sectors in the economy.

Fig. 17.1 Demand and supply of the health labour market



Source: WHO (2021).

17.4 Labour force surveys in an HLMA

In the framework of HLMA, LFS are useful to:

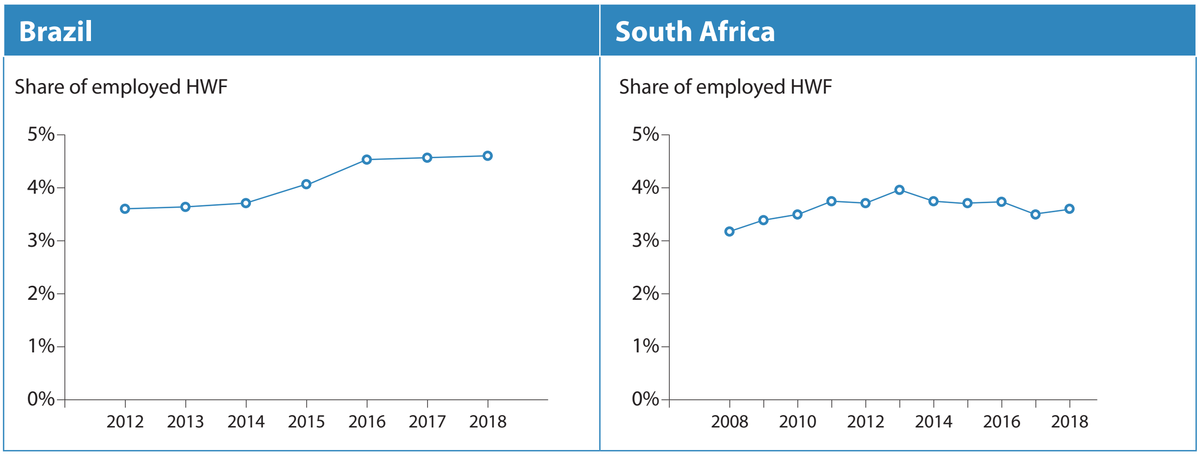
- Understand the importance of the health and social sector as a driver of employment in the economy, by comparing the proportion of jobs in the health and social sector to other sectors.
- Characterize the supply side of the HLM: number of health workers, age, education level, sex, full-time or part-time jobs, occupation mix, regional distribution, etc. In particular, the use of the International Standard Classification of Occupations (ISCO) in the LFS allows us to study the health workforce by occupation.
- Study differences in working conditions across occupations

17.4.1 Importance of the health and social sector as a driver of employment

LFS information is useful to study the role of the health workforce as a source of employment and to look at the evolution of the share of health workers across time.

The health and social sector is a substantial source of employment in many countries and a growing sector in low- and middle-income countries (LMICs). LFS can estimate the share of health and social employment to total employment and compare this share over time. Fig.17.2 shows an increase from 3.6% to 4.7% in the share of jobs in the health and social sector to total employment between 2012 and 2018 in Brazil. South Africa showed a lower increase, from 3.10% to 3.67%, between 2008 and 2018. The trend of growth in the two countries is different and might be related to macroeconomic factors as well as to policy decisions to further investigate. To do so, we could: compare the trend of the proportion of employment in health to total employment with macroeconomic variables, such as gross domestic product growth and current health expenditure; and identify key policies that could have affected the health workforce the year before the trend changed.

Fig. 17.2 Share of health and social employment to total employment



Sources: HRH country profiles, statistics from LFS Brazil (2012–2018) and South Africa (2008–2018), Data, Evidence and Knowledge Management Unit, Health Workforce Department, WHO (2021).

17.4.2 Characterizing the supply side of the HLM

Analysing the supply of health workers requires information on:

- employment to illustrate the number of jobs in the sector;
- occupation, to assess the distribution of health workforce across cadres;
- sex distribution of HRH, to identify possible inequalities between men and women; and
- other workers' characteristics (i.e. age, working conditions, etc).

While administrative sources might be more precise than LFS on the total number of HRH by occupation, LFS have the advantage that they usually include more information on individual characteristics of health workers (McPake et al., 2014), which allows to combine information related to the job with individual characteristics.

How to use the LFS to assess the distribution of HRH by occupation? The use of ISCO allows comparison of the share of the health workforce by occupation over time. Different health occupations, such as physicians and nurses, are identifiable at the three- or four-digit level (Diallo et al., 2003; Dal Poz et al., 2009). Occupations and qualifications are the most common ways to measure skills. The percentage of health workers by occupation is one of the main indicators that one can calculate from LFS. This indicator is useful to assess possible shortages by occupation; and a mismatch of qualifications vs occupation, which happens when qualified health workers are currently employed in other sectors of the economy.

As an example of describing the supply of health workers with LFS, Table 17.1 shows that nursing and midwifery represent 33% of the health workforce in South Africa while the share of physicians is 6.6%, dentistry personnel is 2.1% and pharmaceutical personnel is 3%. These percentages are useful to compare the actual supply with the estimated need and thereby identify gaps. Moreover, looking at the evolution of these percentages across time can illustrate the creation of jobs in this sector. LFS brings a first picture of the health workforce situation in the country and highlights issues that require further analysis, such as financing job positions, skills or geographic maldistribution of workers.

Another important indicator is the density of health workers, which is useful to monitor national targets and to make comparisons with a peer country. In the case of South Africa, the density is 7.4 per 10 000 inhabitants for physicians and 48.4 per 10 000 for nursing and midwifery personnel. The estimated density can be compared with the minimum density of health workers required to provide basic health care services.

Table 17.1 Distribution of health workers by occupation in South Africa

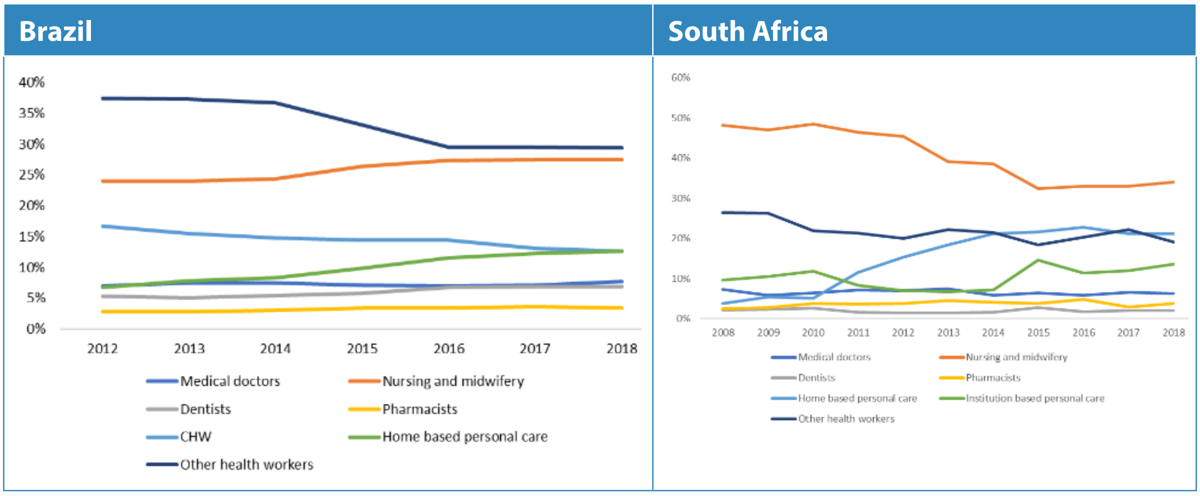
Occupation	Percentage (number in survey)	Estimated national stock[a] (95% CI)	Estimated density[a] per 10 000 inhabitants (95% CI)	Density per 10 000 (estimated[b])
Physicians (generalists and specialists)	6.6% (182)	51 600 [44 400, 59 700]	9.1 [7.8, 10.5]	7.4
Nursing and midwifery personnel (P&A)	33.0% (914)	199 000 [187 000, 213 000]	35.2 [32.9, 37.5]	48.4
Dentistry personnel (P&A)	2.1% (57)	15 500 [11 800, 20 100]	2.7 [2.1, 3.5]	
Pharmaceutical personnel (P&A)	3.0% (82)	20 400 [16 200, 25 300]	3.6 [2.9 ,4.5]	
Home-based personal care (5133)	21.2% (589)	116 000 [107 000, 125 000]	20.5 [18.9, 22.2]	
Institution-based personal care (5132)	12.0% (334)	71 200 [63 800, 79 300]	12.6 [11.2, 14.0]	
Other health workers	22.2% (615)	136 000 [125 000, 147 000]	24.0 [22.1, 25.9]	

Notes: [a] representing 610 000 health workers; [b] triangulation (data from WHO 2010–2015); P&A – professionals and associates.
NB Cells with less than 5 respondents not reported.
Source: HRH country profiles based on LFS South Africa (2017).

Periodic collection of information from LFS can serve to monitor trends and changes in the composition of the supply of health workers by occupation and other selected characteristics. Fig. 17.3 presents the employment of health workers by occupation across time and shows two different dynamics in its growth by occupation. For instance, nursing and midwifery shows an increase in Brazil but it drops in South Africa. These figures signal issues in the HLM that need further study.

Also, this analysis could be complemented with density by occupation. The estimated density for nursing and midwifery personnel in Brazil (2018) was 59.8 per 10 000 inhabitants, while in South Africa it was 48.4 (2017). In this case, it would be good to have a time series of the densities to have a more complete descriptive analysis. Then, the next step, should be to identify a few research or policy questions to strengthen the HLMA to further study issues that may be driving the changes in employment in the health sector.

Fig. 17.3 Health worker employment by main occupations



Sources: HRH country profiles based on LFS Brazil (2012–2018); LFS South Africa (2008–2018).

Additionally, information from LFS can highlight potential issues affecting the supply of health workers. For instance, estimating the percentage of health workers with health-related education in the public and private sectors, or with a job in other sectors of the economy can indicate a mismatch between qualifications and occupations, which will require further analysis.

One of the issues affecting the quality of health services and shortages is the number of workers with appropriate education attainments. Information from LFS allows the identification of differences in the level of education of workers by public and private sector. Depending on the country, these differences can show that workers are more educated in the private sector than in the public one or vice versa. For instance, in Brazil and South Africa, health workers employed in the private sector had a lower education level compared with those in the public sector. To put this result into context, first, one would have to understand the institutional framework of the public and private health sector in the country. Second, since this result can affect the provision of health services, it should be further investigated to understand why one sector (public or private) is attracting more educated workers.

A breakdown of HRH by sociodemographic characteristics brings a better understanding of imbalances in the HLM. This is important to assess both equity in sex and geographical availability of health workforce. In South Africa, LFS data show that 78.8% of health workers are in urban areas and only 21.2% are in rural areas whereas two thirds of the population live in urban areas.

Similarly, one could look at the maldistribution of health workers to compare the geographic supply with demand. To do so, one needs to complement the LFS data on urban and rural distribution of health workforce with administrative information on the geographic distribution of job positions.

Disaggregating information on health occupations by sex can be useful to identify gender biases and wage gap in earnings. For instance, data from LFS in South Africa show that 77% of health workers are women. However, this percentage varies by occupation: 55% of physicians and 87% in nursing and midwifery personnel are women. This shows that women are underrepresented among physicians compared with their overall share in the HLM. Further research questions can look at the sex distribution in the number of students enrolled in medical and nursing education programmes and at cultural characteristics that may influence decisions on career choices. It is also important to have data separately for the nursing and midwifery occupation groups.

Understanding the sex distribution by occupation is important since wages and hours of work by men and women can vary. In some countries, LFS provide information on occupational categories and wages. In Brazil, 87% of nurses and midwives are female while for physicians this share is only 42% and the median of the monthly earnings for physicians is more than six times the median monthly earnings of nurses and midwives (Table 17.2).

Moreover, there are differences in earnings of men and women in the same occupational category. In Brazil, the pay gap by occupation is 20% for physicians, 12% for nursing and midwifery personnel, 10% for dentists and 5.7% for pharmacists.

17.4.3 Differences in working conditions across occupations

The dynamics of the overall labour market in the country and the interactions among economic sectors will affect the HLM. In theory, the factors that influence the behaviour of the labour supply include preferences on consumption and leisure subject to a budget constraint. Therefore, the level of wages and working conditions will affect the supply of health workers.

Lower wages and working conditions in the health and social sector compared with other sectors in the economy have consequences in the HLM since they provide incentives to students and future workers to look for jobs in other economic sectors, and thereby generate recruitment problems. LFS can estimate average wages by occupation and compare them with average wages of workers trained in health-related areas but working in other sectors of the economy.

As for working conditions, the focus of analysis using the LFS is on working hours. LFS data for Brazil show that 88% of health workers are employees and 67% worked full-time. Table 17.2 presents estimates for working hours and earnings. The first column shows the estimates of part-time workers, and the second column shows the percentage of workers that are employees. These percentages vary by occupation, with a higher percentage of physicians (42%) working part-time compared with nurses and midwives (34%). Further analysis could look at other work-related activities of part-timers. Average working hours in the main occupation can give hints on dual practice: data indicate that even though there is a relatively high percentage of physicians working part-time, the average working hours per week is higher than in the other occupational categories. For example, the average working hours per week for physicians is 42, even though 42% of physicians declared working part-time. This could be related to physicians having jobs in different facilities (public or private). Further analysis of information declared in the LFS related to the second job can help understand if the physicians are working in other public or private facilities.

Table 17.2 Working hours and earnings for health occupations in Brazil

Occupation	Part-time workers (%)	Employees ICSE 93 (%)	Average working hours per week	Median monthly earning (BRL)	Median hourly earning (BRL)
Physicians (generalists and specialists)	42%	73%	43	10 000	52.9
Nursing and midwifery personnel (P&A)	34%	99%	40	1600	9.5
Dentistry personnel (P&A)	33%	59%	38	4000	26.4
Pharmaceutical personnel (P&A)	21%	90%	41	3000	17.4
Community health workers	16%	100%	37	1200	7.2
Home-based personal care	33%	96%	40	937	5.4
Other health workers	38%	80%	36	2400	13.2

Notes: BRL – Brazilian real; ICSE – International Classification of Status in Employment; P&A – professionals and associates.
Source: HRH country profiles based on LFS Brazil (2017).

In some countries, one of the characteristics of the HLM is that health workers have jobs in private and public facilities. Sometimes workers move from one sector to another one and in other cases workers divide their time combining public and private practice.

The private sector plays an important role in health service provision in many countries. Depending on the country, regulation on dual practice might be in place, which will affect health services in different ways. Data on dual practice are usually difficult to obtain. Data from LFS generally include questions on place of work, share of time in the occupation and secondary employment. These data can be useful to identify if the health worker has a job in the private and public health sector. However, the interpretation of this information should consider the regulatory and institutional framework of the country; if dual practice is not regulated, respondents will tend to avoid answering these questions in the survey.

Around 62.2% of health workers provide their services in the private health sector in Brazil and 53.7% in South Africa. Working conditions as well as the characteristics of the health workforce in the public sector can differ from those in the private sector. In turn, this may influence the geographical distribution of HRH, access and quality of health services.

Moreover, information on working hours can contribute to discussions on management practices to favour retention of health workers (Dal Poz et al., 2009). If possible, one could estimate the average working hours and average wages in the public and private sector. This can improve the understanding of differences in working conditions in public and private providers of health services.

Further analysis using LFS can consider informal employment in the health sector. Depending on the sample of the survey, one could disaggregate the health and social workforce by informal and formal employment characteristics. However, this disaggregation will not be possible at the occupational level due to lack of significance of the sample size. One common feature of informal employment is whether the employment relationship entitles workers to social protection. For instance, and depending on the legislation, in many LMICs physicians may offer private consultations as self-employed workers but not necessarily pay social contributions. This has consequences both on accessing a pension in the future and on access to other employment benefits (sick leave, unemployment insurance, etc).

17.5 How to make better use of LFS in HLMA

To make better use of information in LFS, it is important to:

- periodically analyse the microdata;
- revise and discuss possible improvements to the survey;
- explore ways of using information from LFS to apply advanced economic tools; and
- use information for policy dialogue.

Doing periodic estimates and analyses of LFS requires having access to the microdata, hence the importance of having a constant dialogue with the ministry of labour and the national statistical office (NSO) to have continuous access to surveys. In addition, establishing these channels of collaboration allows the MoH to revise and discuss possible improvements to the survey. For instance, it is important to use standard classifications to make the data comparable to other databases and countries. Also, it creates an opportunity to propose new questions to include in the survey to better study employment in the health sector.

Usually, research institutions and national observatories of labour markets have access to LFS data, and they can use advanced analytical techniques to understand better the characteristics of the supply of workers. Therefore, it is strategic to partner with these research centres to promote continuous analysis of the health workforce. Even though LFS are cross-sectional in most countries, and it is not possible to track individual observations across time, the number of observations allows the data to be pooled and some of the characteristics and correlations to be considered.

17.6 Conclusion

In the framework of HLMA, LFS are a source of useful information to identify key issues affecting the supply of health workers and analyse the HLM in terms of shortages and mismatches. They provide information on occupational groups, working conditions, and characteristics of the health workforce. Key indicators that could be estimated include density of health workers, percentage of health workers by occupation and sociodemographic characteristics as well as percentage of health workers by status of employment. This can bring a better understanding of imbalances in the HLM since gender and geographical availability of health workforce can be assessed.

LFS can be particularly useful to study working conditions in the health sector such as full-time or part-time jobs, type of contracts and informal employment. In addition, LFS including information on place of work and secondary employment can contribute to identify jobs in the private and public sector.

At a macro level, LFS can provide information on the importance of the health and social sector as a driver of employment when comparing the share of employment with other economic sectors.

It is important to bear in mind that, to provide a full picture of the issues affecting the HLM, LFS should be used together with complementary data (such as administrative information) and advanced analytical tools.

Finally, doing periodic estimates and analyses of LFS requires having access to microdata, use of standard classifications, and exploring ways of using this information to apply advanced economic tools.

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Chapter 18: Health workforce data quality, sources and triangulations

Mathieu Boniol

18.1 Introduction

All aspects of decision-making regarding the health workforce require data for planning, advocacy purposes, resources mobilization and ensuring an adequate distribution of health workers. This need for data goes beyond the classical health sector; it is also critical for the education sector when planning resources for the education of future health workers; for foreign affairs when dealing with mobility regulations; and for other sectors that influence the health labour market (HLM).

The need for human resources for health (HRH) data is not limited to understanding the stock of health workers in a country. Several challenges need to be documented, such as shortages, skill mix imbalances, health workforce migration, skewed geographical distribution with difficulties of retention, evolving demography, suboptimal productivity, and other challenges related to the education of health workers, to regulations and to working conditions. To understand these challenges and to identify adequate policy measures to improve the performance of the health workforce, diverse data and indicators of good quality, i.e. comparable, available timely, comprehensive, are needed.

Several health systems experience difficulties in monitoring their health workforce because of the fragmentation of information, interoperability issues of subsystems, an inward-looking approach (health alone), difficulty in accessing disaggregated data (at subnational level, for the private sector, by sex), weak data governance, lack of standardization of tools and definitions across countries, or uncoordinated data collection efforts. A change in data culture is often necessary to switch from a simple reporting system to full use of data.

This chapter presents an overview of strategies to improve the quality of health workforce data and data sources, and how to conduct triangulation of data.

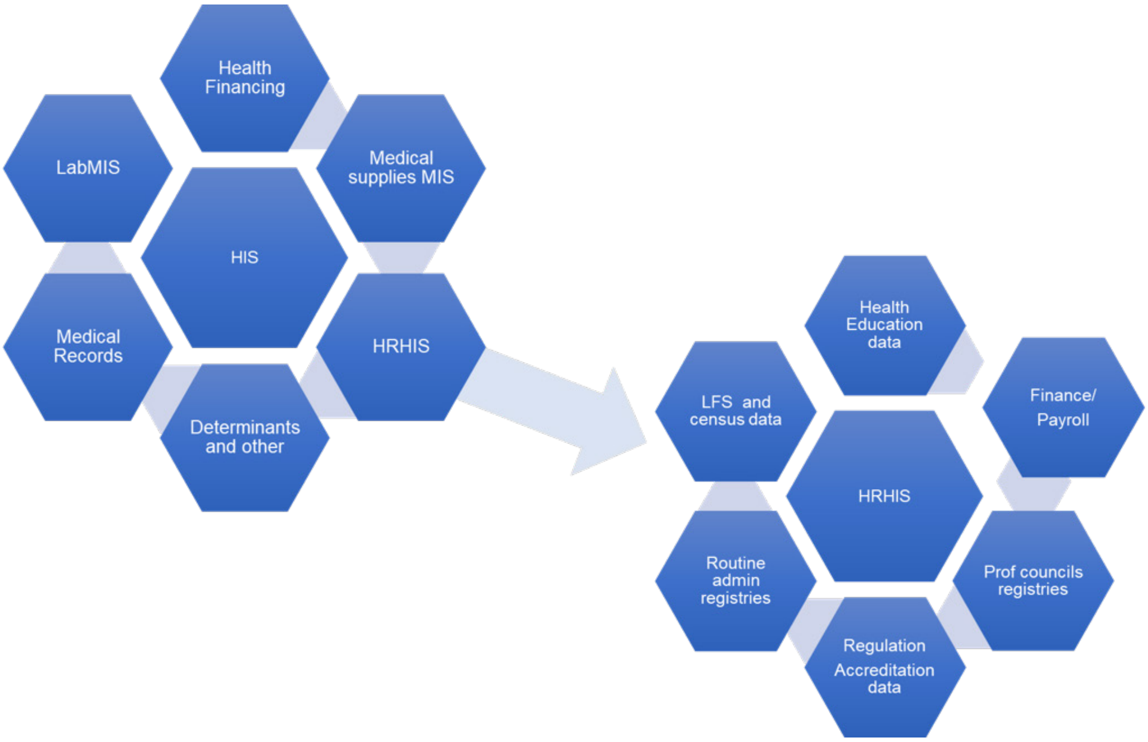
18.2 Health workforce data: understanding the context

The quality of data is as good as the system and sources used to gather them. Health information systems (HIS) provide policy-makers with key information to take informed decisions on the various aspects of health. In most HIS, the health workforce is a subcomponent, called the human resources for health information system (HRHIS), with specific indicators based on the needs of decision-makers. Each information system needs to be adapted to the context of the country and based on a good initial understanding of its specific challenges. In other words, a one-size-fits-all HIS is not appropriate, although major functions are always present in HIS and HRHIS.

18.2.1 Role of HRHIS

An HRHIS enables the monitoring of key information on HRH, such as stock and demography, education, finances, regulations, etc. (Fig. 18.1). It is an integrated element of the broader HIS, not an isolated subsystem. For example, while the HRHIS would enable monitoring of HRH financing, these data would be compatible with the broader health financing subsystem of the HIS. This implies the need to connect the HIS finance data to the finance data of the HRHIS, and as a result would require interoperability with shared definitions and compatible databases, to have a properly functioning system. This implies the definition and sharing of standard operating procedures by all operators of subsystems.

Fig. 18.1 HRHIS as a subsystem of HIS



Source: Private communication, Khassoum Diallo (WHO, 2019).

To guide the type of information monitored within an HRHIS, the domains relevant for HRH can be summarized in the HLM framework that describes the challenges of HRH through an economic lens (Sousa et al., 2013). The framework explains the dynamic of the health workforce taking into account the supply, demand, need for health workers and the various drivers of their dynamic relations, e.g. the education system, employment characteristics, mobility, financing, regulations, and other working conditions.

To facilitate the improvement of HRHIS, WHO proposed the national health workforce accounts (NHWA) as a systematic approach to progressively improve quality, availability and use of HRH data. The NHWA handbook provides a list of 78 indicators covering various domains of the HLM framework (WHO, 2017). These indicators provide standards to enable good comparability within and between countries. They are based on international definitions and systems such as the International Standard Classification of Occupations (ISCO) maintained by ILO, national education accounts (NEA), national health accounts (NHA), and other norms and standards.

18.3 Assessing data quality

The quality of data in HRHIS should be assessed to measure their degree of confidence. No data can be considered perfect as several problems can occur, such as missing data, systematic biases or measurement errors. Several human errors can occur in data entry – random errors, codification errors and data used in HRHIS that are not designed primarily for the purpose of HRH monitoring but included as a secondary use.

There is no standard approach to data quality assessment in health as the quality depends on the purpose of the data use. For example, when planning the finances required for new jobs in nursing, if two data sources on graduates are available, one with less accuracy but very recent, and another one with high accuracy but older data, it might be more important to privilege the first. Indeed, some inaccuracy in the number of graduates would be manageable as long as the order of magnitude of the number of graduates is acceptable as other factors could impact the number of nurses to recruit, hence a very precise value is not needed. On the other hand, timeliness of the data would be critical as the graduation rate could vary substantially from one year to another so the better precision of the second data source would not compensate for the potential problems associated with using older data.

The following dimensions of data can guide the assessment of their quality:

- **Coverage:** This measures the population captured by the data. The data can be limited to a geographical area, specific sector, excluding some particular populations. For example, the stock of health workers can be available only for publicly employed workers, only for regulated occupations, only for individuals residing in the mainland of the country, or not available for health workers employed in the private sector or in military and police services.
- **Completeness:** This measures how well the data are registered. For example, what percentage of records provides the occupation title, or the information on retirement. The lack of information is very often a non-random phenomenon. Hence, checking the distribution of missing values, in which subpopulation they are more frequent, is necessary to see if a lower completeness is creating a biased assessment, i.e. less information or distorted information on certain subpopulations.
- **Consistency:** For each indicator measured, discrepancies could occur at different levels of a data source. For example, the change in a classification system for occupations can affect the way individuals are allocated to a specific occupational category and create breaks in time series (CEDEFOP, 2014). With experience and comparative studies, the classification used can evolve through time. External consistency is also important, in particular when different data sources are used for computing an indicator, using a numerator from one source and a denominator from another source. The alignment of definitions is crucial to avoid the computing of a biased indicator.
- **Outliers and error checking:** Any data collected requires human intervention in the reporting, conversion, analysis. While data entry automation can reduce the number of errors such as in patient data (Bauer et al., 2020), it cannot eliminate all errors. The use of automated systems, or of semi-automated ones, with statistical software or a manual check, enables the identification of outliers and aberrant values. For example, health workers active in a dataset while aged over 70 years old can be marked for further investigation. These would usually be actual errors in the initial entry. If a large number of potential errors is identified, it is good practice to check if these occur more in specific subpopulations and create distorted statistics.

- **Data flows:** The flow of data is less a data issue than a process one, but it can potentially impact data quality. The data used in an HRHIS usually go through several steps, in particular as most data used are secondary data not collected for the purpose of the HRHIS. The source of data could come from various stakeholders outside of the Ministry of Health (MoH). For example, a labour force survey (LFS) could be available, but originally collected by an a national statistical office (NSO). Accessing this data within an HRHIS would require several steps from the data extraction, and a conversion of data. Sometimes, data come from a decentralized system, like a regional information system, and the retrieval of data from each region could be done with different methods and timing. The extracted data might be pre-processed or not; this could therefore result in carrying over data "glitches" that might not be identified later in the HRHIS. Because there is a possibility of introducing errors at each step of the data flow, careful scrutiny is necessary to ensure the minimization of biases.
- **Periodicity and timeliness:** Even if a database displays no errors, covers the whole population with no missing information, captures properly and consistently the indicator of interest, this database could be available only rarely. Timeliness is often an important factor to derive useful information on the current situation. The best data could be available in a study conducted only once, and although perfect, would have limited utility for regular monitoring. The quality of data is also linked to their use and more frequent information, even of lower quality, could be preferable. Censuses, usually conducted every 10 years, have an excellent coverage and good quality of information, but they are not frequent enough for deriving timely information.

18.4 Data sources: strengths and weaknesses

18.4.1 The need to diversify data sources

Health workforce data are available from a large variety of stakeholders who collect potentially useful data initially for other objectives than monitoring health workforce challenges. Because of the broad scope of information on health workers, with data needs in the domains of education, labour, migration, regulation and finance, several stakeholders could potentially have access to useful databases to derive comprehensive statistics on the health workforce.

The selection of data should be open to many potential sources. Not only could multiple sources exist for the same indicator, but also several additional and complementary information can be available from multiple sources. The NHWA implementation guide suggests the involvement of multiple stakeholders from multiple sectors, with governance of the implementation of NHWA (WHO, 2018). This diversification of sources is also justified by the shared interest of various stakeholders in having better statistics on the health workforce. For example, joining data on education, employment and regulation, from the private sector, would benefit the MoH for its planning of recruitment; the Ministry of Education for the scaling of training in universities (seats, educators, etc.); and the Ministry of Labour when designing regulations.

18.4.2 Main data sources

Because of its design, each data source has strengths and weaknesses. There is no perfect database or data source, but a compromise on which source provides the best statistics required on each indicator is always possible. The impact of the quality of the data from each source could be compared. Table 18.1 provides an overview of key attributes for common data sources.

Table 18.1 Key attributes for common data sources on health workforce

Attribute	Census	Labour force surveys	Health facility surveys	Routine administrative sources (payrolls, HRH registries)
Complete count of health workforce	***	*	**	**
Across sectors coverage (public, private)	***	***	*	**
Disaggregated data (age, sex, geographical)	***	**	**	**
Capturing unemployment	*	***	-	*
Rigorous data collection/ management	***	***	**	**
Periodicity and regular updating	*	**	**	**
Occupational data coding	*	**	**	**
Sampling errors	***	**	*	**
Tracking of workforce entry-to-exit	*	**	-	*
Tracking of in-service training/productivity	-		***	*
Accessibility to microdata	**	***	**	*
Relative cost	*	**	***	**

Notes: *** most favourable; ** moderate; * least favourable; - not available.
Source: Siyam et al. (2019).

While a census provides the best coverage to monitor the stock of health workers with minimal errors, a routine administrative database with some imperfections might be preferable, as it would provide an up-to-date count of workers. This implies that when comparing sources, the attribute of timeliness would be critical for measuring the stock. For monitoring another indicator such as unemployment, an LFS, even if not comprehensive and based on a sample, could be preferable.

Countries are at different stages of their data availability on health workers and have different data needs. Based on the understanding of the country context and main domains to monitor, the policy-makers' role is to classify sources of information by order of priority. This selection of data sources can be revised over time. A data source can change its design and codification, it can improve its quality and become the best to measure an indicator previously extracted from another database and included in the HRHIS.

In many cases, the bridging of different sources of data is needed, such as bringing together stock statistics from the public and private sectors. The key attributes of each source should be checked, and attention should be given to data consistency, in particular in the classification system for health workers. Table 18.2 gives examples of data sources.

Table 18.2 Examples of data sources for three dimensions of the health workforce

Data need for each occupation	Potential data sources	Disaggregation/details
Active health workforce stock	Health workforce registry MoH (registry/payroll) Professional councils and associations Health facilities (public and private) Tax authorities Census Surveys (e.g. LFS) Other ministries (e.g. defence)	By age, sex, country of training
Production	Ministry of education Training institutes (public and private, academia) Ministry of finance	Duration, seat numbers, applicants, admissions, exits and graduates by age, sex and training programme
Labour market flows	Health workforce registry MoH (registry/payroll) Professional councils and associations Health facilities (public and private) Tax authorities Other ministries or authorities monitoring immigration and emigration, retirement, social security and civil registration	Entry: newly active domestic and foreign-trained health workers Voluntary exit: emigration, temporary leave, change of sector, early retirement Involuntary exit: death, retirement, suspension, long-term illness By sex

18.5 Triangulation of data

With increasing availability of data, sharing of information, and the implementation of multiple stakeholder governance of the health workforce, multiple data sources provide information for the same indicator. Policy-makers and analysts need to define which data to use for their reporting and have a better understanding of "how solid" the data are. A triangulation by weighting objective criteria is necessary before choosing data providing the best quality.

18.5.1 Guiding principles

Triangulation is the synthesis and integration of similar data from multiple sources through collection, examination, comparison and interpretation. Triangulation could improve the accuracy and assure the quality of data. As the information is collected by different methods, by different persons and in different populations, findings cross-validate conclusions and corroborate interpretations. The process thereby reduces the effect of systematic bias and random error that may be present in a single study.

Additionally, triangulation can answer questions ranging from explaining the trends and distribution of health workers, reflecting the active stock of health workers, to assessing the skill mix. In practice, triangulation can use pre-existing/routine data sources. This allows for the rapid understanding of the situation and facilitates timely and appropriate decisions during health crises. Moreover, data from different sources may provide complementary information.
The triangulation can be on data themselves, but can also be conducted solely on methodologies, when comparing best approaches for computing an indicator.

18.5.2 Step-by-step triangulation

There is no standard approach to triangulation, but a series of key steps are needed:

- **Search data sources:** Identify data sources through involvement of stakeholders in sharing the data they have, and through literature search. Common sources of stock and distribution are: routine registries, facility registries, health facility surveys, census and LFS.
- **Allow broader definition:** The search for data should not be too specific to avoid missing key data sources. For example, data on several years within a time range could be searched such as stock measured between 2010 and 2020. Alternatively, instead of searching specifically the stock of generalist doctors, a broader definition of medical doctors (and other terminology such as physicians) can be used.
- **Evaluate the strengths and weaknesses of sources:** For each data source, evaluate the data quality and select which key attributes would be particularly important for the indicator under consideration. The evaluation of strengths and weaknesses is beneficial if done jointly with various stakeholders as all can bring expertise on the quality of the various sources.
- **Compare the statistics derived from each source:** This enables to see the deviation when using one source vs another one. This also provides a better understanding of the trust one can place in each data source. These statistics can be reported with a confidence interval if they are derived from a sample.

Note on triangulation of stock of health workers

When doing data triangulation of stock, it is important to distinguish issues such as health workers in the private sector, workers who are unpaid or unregulated but performing health care tasks, potential double counts of workers holding two or more jobs at different locations, or trained health service providers not currently working in health facilities or other service delivery points.

Example of triangulation

With the implementation of NHWA, the WHO Health Workforce Department receives data from many countries with different sources, and sometimes data from partners and stakeholders. In addition to data submitted to WHO, data analysts also search the literature, analyse census data from large databases and conduct cross-agency comparisons.

Table 18.3 shows an example of a triangulation of health workforce density statistics for a Member country of the Organisation for Economic Co-operation and Development (OECD).

Table 18.3 Example of triangulation of physician, and nursing and midwifery personnel density for one OECD Member country

Year	Medical doctors[a]	Nursing and midwifery[b]	Sources
	Density per 1000	Density per 1000	
2016	3.01 [2.65, 3.41]	9.69 [9.03, 10.39]	Labour force survey
	3.35	10.19	OECD
2015		10.61	WHO regional office
2014	3.60	8.96	Census
	2.81		Atlas of medical demography
2013		8.87	National organization in charge of labour

Notes: [a] Generalists and specialists; [b] Professionals and associates.

In this example, the LFS gave a density in the same order of magnitude as the other sources, but the confidence interval is large for medical doctors. This indicates that this source, even if from a representative sample of workers, could induce large variations in the estimation of the density from one year to another. The data from the census are robust in principle but would only be available every 10 years. An atlas of medical demography could be used, but in this example, it shows values much lower than in representative samples, such as in an LFS. Therefore, the OECD data, reported from the country on a regular basis, and based on a registration system, was preferred as giving reliable statistics from one year to another and for comparable populations.

The advantage of having conducted a triangulation of data is that it shows that no data are fundamentally wrong; rather that some could be considered as more robust than others for the envisaged use. It also enables discussion with various stakeholders who might want to challenge the use of a specific source as the decision derives from an evidence-based approach, with rational and clearly defined criteria.

18.6 Conclusion

There is an intrinsic link between the improvement in the health of populations and in information systems capable of providing the right and reliable data for policy-makers to take evidence-informed decisions. Policy-makers, database managers, statisticians, researchers and other stakeholders using health workforce data benefit from access to common definitions, standard indicators, within a multistakeholder/multisectoral data governance structure.

This requires a paradigm shift, moving from an HRH database approach used only for the sole purpose of managing publicly employed health workers, to a systems approach where different stakeholders have access to useful information. By confronting different data, assessing their quality, strengths and weaknesses, with the necessary humility and acknowledging that perfect data do not exist, better information will progressively become available. Change will not happen overnight, given the need to overcome several data governance challenges. The progressive engagement of stakeholders will facilitate the comparison of data, make them more accessible and easier to analyse, thereby making the most of the potential of HRHIS.

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Conclusion: strengthening health workforce data

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What the handbook delivers

The creation in 2016 of the Global Health Workforce Network (GHWN) was aimed at promoting the implementation of the WHO *Global strategy on human resources for health: workforce 2030* (GSHRH). It established a Data and Evidence Hub, an intersectoral and interprofessional multistakeholder network, in support of Objective 4 of the GSHRH, "the need to strengthen data on HRH for monitoring and ensuring accountability of implementation of both national strategies and the Global Strategy itself" (WHO, 2016). It consists of six technical working groups, with a remit to improve the availability, quality, analysis, dissemination and use of health workforce data and evidence and thereby serve to inform decision-making and planning in countries. This handbook is a key resource and output of the Hub's efforts to gain a better understanding of the data required to address policy questions relating to the production, financing, employment, deployment and mobility of health workers, as well as the regulation and management of these processes. The handbook takes stock of significant advances in strengthening health workforce data to achieve the core objective of universal health coverage (UHC) and sheds light into the outstanding agenda to improving the availability and quality of human resources for health (HRH) data needed to better understand and analyse a country's health labour market (HLM).

In order to help the development of evidence-informed health workforce policies, the handbook presents tools and examples of good and promising practices to collect relevant data, to assess and improve their quality, to analyse them, and to extend their use and dissemination. It first stresses the importance of health labour market analysis (HLMA) as an indispensable process to understand a country's public and private health labour markets, including the education submarket. The companion HLMA guidebook (WHO, 2021) details how to measure health worker stock, supply, demand and need, and to identify the factors that influence their interactions and their evolution. The handbook goes further in identifying the relevant data requirements and in showing how to make best use of the national health workforce accounts (NHWA), a systems approach developed by WHO to help countries improve the systematic gathering and use of HRH information, to inform the planning of their health and care workforce (WHO, 2018). It also proposes additional indicators that can usefully complement those of NHWA and other sources of data such as HRH information systems (HRHIS) and labour force surveys (LFS).

In addition, the handbook presents examples of specific data gathering strategies, such as tracking graduates of medical studies, documenting the population of non-medical providers of clinical services, and importantly, assessing the equity in access to health and care workers and labour markets.

Limitations in the availability of health workforce data

There are currently major efforts to build comprehensive health workforce information systems (beyond databases); yet more are necessary to overcome the limitations of available data. The following is an indicative list of data that would significantly improve the knowledge of the HLM:

- Densities expressed in terms of full-time equivalents (FTEs). This is necessary to produce a realistic picture of the availability of health services by discounting time health workers are absent from services for training, holidays, sick leave, and other reasons.
- Disaggregation by occupation groups others than physicians, nurses, midwives, dentists and pharmacists. This concerns allied health professionals, such as physiotherapists, occupational

therapists, nutritionists, clinical psychologists and others that databases often aggregate in a single category.

- Disaggregation by gender is fundamentally important to address key issues around gender equity and the profound impact of occupational segregation on service delivery and the health system (WHO, 2019).
- Characteristics of the private (for-profit and not-for-profit) and the informal (including non-regulated practitioners and traditional ones) HLM, using the same indicators that characterize the public HLM (densities, profile of workers, skill mix, distribution by type of capacities and services, by geographical area, working conditions).
- The prevalence of dual practice authorized and non-authorized. It concerns mainly physicians and nurses. This serves to estimate the capacity of the public sector to retain its workers.
- The prevalence of multiple employment, e.g. number of workers formally occupying more than one job. This indicates a level of precarity in employment.
- Emigration of health workers, e.g. the number of those who left the domestic HLM to work in another country. This supposes the existence of a mechanism of tracking of those who requested a certificate of conformity that destination countries require.
- Cross-border practitioners who practise in one country and live in their country of origin. These are often registered in both countries. Countries such as Switzerland and Luxembourg have an important proportion of their physicians and nurses in that situation.
- Foreign and national students in health professional schools. This helps adjust projections of future entrants in the domestic HLM.
- Number of nationals trained abroad active in their country of origin. This indicator serves to adjust data on immigration of health workers.
- Variations in scopes of practice to help interpret international comparisons. For example, nurses may have a quite different degree of autonomy of practice from country to country, which warrants care in interpreting international figures, say of nurse to physician ratios.
- The organization of work, in teams for example, and the degree of integration of services can be indicators of productivity and of effectiveness.

Routine data collection does not typically cover these dimensions of the health workforce, but countries can support research, in the form of surveys or case studies, to document those. They can also help data owners, such as professional councils, accreditation bodies, education institutions, improve their data collection capacity and provide some of these indicators.

The handbook's key messages

This handbook builds on and promotes broader efforts to enhance country capacities to generate, analyse and use data to assess health workforce development and track progress towards their HRH-related goals (Dal Poz et al., 2009). It documents a continuum of the story in strengthening HRH data collection, analysis and use with some key messages to follow:

- No single data source will be sufficient and comprehensive enough to capture all the dynamic features of the HLM. National HRH planners, researchers and information system developers need to collaborate to strengthen the interoperability of the various sources of relevant data.
- It is critical to build effective governance structures, in which key stakeholders – e.g. the

different levels of government, professional councils, trade unions, associations of employers, international development partners and education and research institutions, among others – agree on their respective roles and responsibilities in the process of collecting, analysing, using and sharing data for HRH decision-making. The conceptualization phase of implementing NHWA is a key opportunity to review and adapt existing governance structures, and to engage stakeholders in support of an intersectoral health workforce policy agenda (WHO, 2018).

- HRH planners and policy-makers should clearly communicate their interest and data requests to the principals governing those sources, inside and outside the health sector (such as entities in charge of the census of population and housing, household and labour surveys, professional registries, health facility information systems).
- HRH planners and policy-makers must regularly monitor data sources for quality assurance and adherence to international standards (such as those defined by the NHWA tracer indicators related to SDG 3.c.). Annual evaluations conducted by the NHWA multistakeholder group provides feedback on the strengths and weaknesses of governance, legal environment, on data gaps and information flows, and data analysis and communication plans. Corrective actions can then follow to improve performance (and extend data collection beyond core indicators) and ensure continued political commitment and sustainable funding.
- The progressive implementation of NHWA (WHO, 2018) creates an opportunity to strengthen institutional capacity in data collection, management, analysis, use and dissemination. Institutional capacities are defined by the human capital behind HRH data (data analysts, system analysts, amongst others). They should have the capacity and technological means to undertake thematic analysis of key topics (such as gender equity, distribution, ageing and projections); they should be able to communicate and disseminate HRH data (for example by using data visualization techniques and dashboards to assess the HRH equitable distribution); and they should practise triangulation of data to ensure quality. Investments must be harnessed within the broader health information system (HIS) strengthening agenda to ensure alignment and sustainability.
- The pace at which digital transformation is taking place will increasingly change health workers skills and occupation mix – more data will be used in patient care, which is bound to increase the availability of data and information on the health workers themselves.
- In the coming years, post COVID-19, health workforce data requirements will be influenced by the changing needs of health systems – more data will be needed to identify, measure and monitor a health and care workforce that can deliver the full range of essential public health functions, including emergency preparedness and response (WHO, 2022).
- The public health community has begun to recognize the scope of data and information sources that are openly available, including media sources that can be accessed instantly, and the potential use in emergency alerts, such as the Epidemic Intelligence from Open Sources (EIOS[1]) initiative. These intelligence tools can be leveraged to gather data on health workers and improve the information based needed for planning and policy-making if key questions of concern on governance and ethics (Bernard et al., 2018) are clearly laid out and multilaterally addressed.

1 https://www.who.int/initiatives/eios

Health data provide powerful means to identify and prioritize health issues, to develop policies and plans for adequate responses, to monitor impact, and to communicate with multiple stakeholders thereby improving the well-being of populations and saving lives. Access to reliable and up-to-date data and their competent analysis can serve to design policies that will foster the development of a health workforce fit for the purpose of delivering quality-driven services responsive to the evolving needs of countries' populations. This handbook is a key resource aimed at strengthening a culture of data and evidence-informed policy- and decision-making in the governance and management of the health workforce and the health labour market.

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