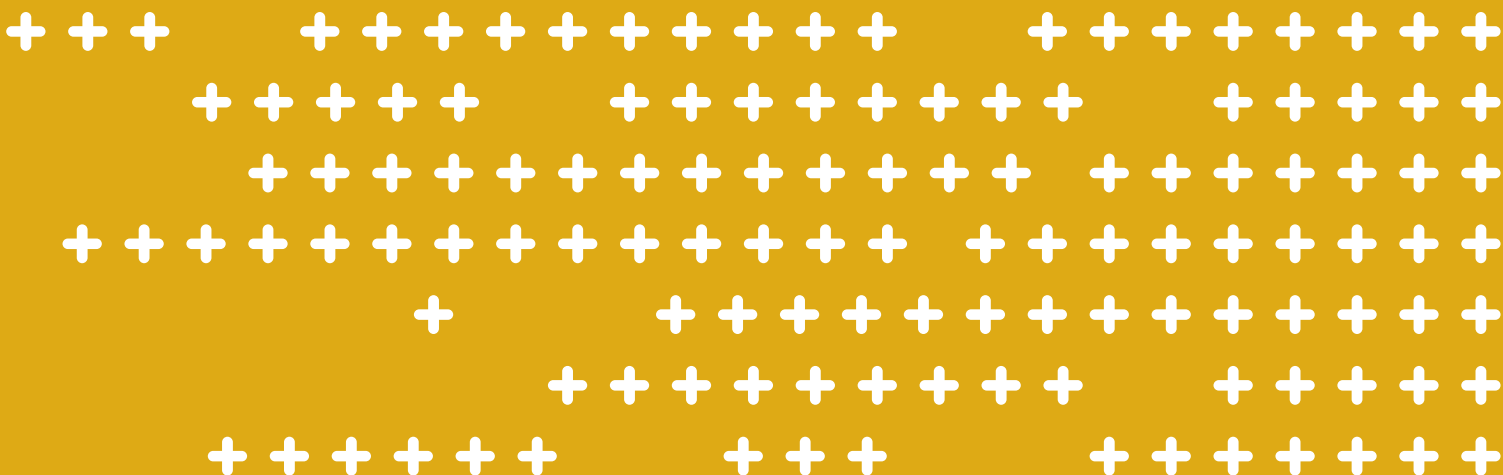


Essential public health functions

A guide to map and measure national workforce capacity



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Essential public health functions: a guide to map and measure national workforce capacity

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Declarations of interests

All external experts who participated in the Roadmap Steering Committee meetings and contributed inputs to inform the finalization of the guidance completed and submitted their duly completed declarations of interest and confidentiality agreements, which were assessed by the WHO secretariat. The interests declared were considered not to represent a conflict of interest that would preclude their participation.

Abbreviations

AFENET	African Field Epidemiology Network
AMR	antimicrobial resistance
CDC	Centers for Disease Control and Prevention (United States of America)
COVID-19	coronavirus disease
EPHF	essential public health function
EPR	emergency preparedness and response
FETP	Field Epidemiology Training Program
FTE	full-time equivalent
HLMA	health labour market analysis
HRH	human resources for health
IHR 2005	International Health Regulations 2005
ILO	International Labour Organization
ISCO	International Standard Classification of Occupations
JEE	Joint External Evaluation
NCD	noncommunicable disease
NAPHS	national action plan for health security
NHWA	national health workforce accounts
NIT	national implementation team
SPAR	States Party self-assessment annual reporting
TEPHINET	Training Programs in Epidemiology and Public Health Interventions Network
ToR	terms of reference
UHC	universal health coverage
WHO	World Health Organization
WISN	Workload Indicators of Staffing Need

+ Executive summary

Background

Monitoring the composition of the workforce that delivers the essential public health functions (EPHFs), including a specific function and focus on emergency preparedness and response (EPR), is a key element of public health workforce planning to ensure the development of a capable and competent workforce at national level. It can enable countries to meet the challenges brought about by the COVID-19 pandemic as well as improve preparedness to avert future public health emergencies that could have significant impact on economies and social development (e.g. zoonotic spillover, noncommunicable diseases [NCDs], antimicrobial resistance [AMR], climate-related hazards).

This document belongs to the National Workforce Capacity for Essential Public Health Functions Collection, which includes an operational handbook and guidance on functions, competency-based education and workforce enumeration.

Composition of the workforce that delivers the EPHFs

The workforce that delivers the EPHFs comprises all individuals who contribute to the delivery of at least one of the functions as part of integrated services and systems. It comprises a heterogeneous grouping of diverse occupations, from both the health and non-health sectors, and can be conceptually framed as three overlapping groups:

- **Core public health personnel** who work exclusively on the EPHFs.
- **Health and care workers** who spend a share of their time in the delivery of the EPHFs while performing their usual clinical/social care tasks.
- Personnel from **occupations allied to health** who play critical roles in addressing the determinants of health outside of the health and care sector, such as the personnel engaged in water and sanitation, food supply chains and road safety.

What is mapping and measurement of occupations?

Mapping and measurement of occupations refers to a process by which countries can:

- identify the various personnel (their job titles and occupations) who deliver the EPHFs including EPR;
- map these national job titles with the occupational groups listed in the International Labour Organization's International Standard Classification of Occupations (ISCO);
- map out the EPHFs and subfunctions being performed by the respective occupations; and
- estimate the size of occupations engaged in the delivery of the EPHFs (in terms of headcount or "stock") and their workload engagement (in terms of share of time or full-time equivalents [FTEs]).

Objective of this technical guidance

This guidance aims to:

- Provide a standardized approach which countries can adopt and adapt to comprehensively map and measure the key occupations involved in the delivery of the EPHFs including EPR.
- Enable countries to benchmark themselves and develop action plans to address the identified gaps in their workforce capacity.

The four phases of mapping and measurement of occupations

This approach consists of four broad phases:

- **Phase 1 – Governance:** Country ownership is established through a multisectoral governance mechanism by constituting a national implementation team (NIT) with representation from various stakeholders. The NIT is in charge of adaptation of methodology and tools based on country context, and needs to conduct mapping of all relevant stakeholders to help identify the major sectors involved in delivery of the EPHFs.
- **Phase 2 – Scoping:** Key occupations involved in delivery of the EPHFs are identified and their stock and their share of time spent in delivery of the EPHFs are estimated. This is done through the identification of priority subfunctions relevant for the national context, listing of key national job titles involved in delivery of the EPHFs and mapping them with ISCO occupational groups, mapping of occupations against the subfunctions they contribute to the delivery of, assessment of stock of each occupation through a review of appropriate data sources, and estimation of share of time spent by each occupation in the delivery of the EPHFs.
- **Phase 3 – Field validation and analysis:** The share of time spent by various occupations in delivery of the EPHFs is validated and FTEs are computed. This can be done by visiting selected health facilities of different service delivery levels to conduct interviews with selected personnel from different occupations to validate their share of time spent in delivery of the EPHFs, and then computing FTEs (product of stock and share of time) using these validated estimates.
- **Phase 4 – Codifying learnings and use:** The implementation process is documented – methodological adaptations (if any), lessons learned and challenges. The NIT is able to identify gaps in national workforce capacity and propose strategies to address training needs, and to use these data to inform public health workforce planning and policy-making processes.

Expected outcomes

- Countries use this standardized measurement approach to understand the heterogeneity of their public health workforce, map the national job titles with the ISCO occupational groups, and monitor this workforce periodically in terms of both stock and FTE.
- Countries use the findings from mapping and measuring their public health workforce to identify gaps in their national workforce capacity, conduct evidence-based planning and policy-making to better manage this workforce, and create projections for future needs.
- Countries utilize the results from mapping and measurement of occupations to report on the human resources technical area of the Joint External Evaluation (JEE) and States Party self-assessment annual reporting (SPAR) tools, and develop/update their national action plans for health security (NAPHS), their national public health strategies and national human resources for health (HRH) strategic plans.

Background

Why the roadmap?

The COVID-19 pandemic has exerted unprecedented and impactful pressures in health systems globally. It has underscored the urgency to strengthen health systems, revitalize the essential public health functions (EPHFs) and enhance emergency preparedness and response (EPR) capacities (7). Attaining universal health coverage (UHC) with investment in the EPHFs and ensuring health security through the implementation of the International Health Regulations (IHR 2005) are interconnected goals; however, the essential role and impact of the workforce involved in these functions is somewhat obscure and often overlooked.

Monitoring the composition of the workforce that deliver the EPHFs (which includes a specific function and focus on EPR) is a key element of public health workforce planning to ensure the development of a capable and competent workforce at national level. It can enable countries to meet the challenges brought about by the COVID-19 pandemic as well as improve preparedness to avert future public health emergencies that could have significant impact on economies and social development (e.g. zoonotic spillover, noncommunicable diseases [NCDs], antimicrobial resistance [AMR], climate-related hazards).

To that end, WHO, in collaboration with leading public health organizations, associations and networks¹ developed a roadmap to support countries to benchmark themselves and assess their current situation; facilitate provision of guidance and tools; and support progress to full implementation of an integrated multisectoral and multidisciplinary public health workforce that is capable of delivering all EPHFs for attaining UHC, health security and improved health and well-being (2).

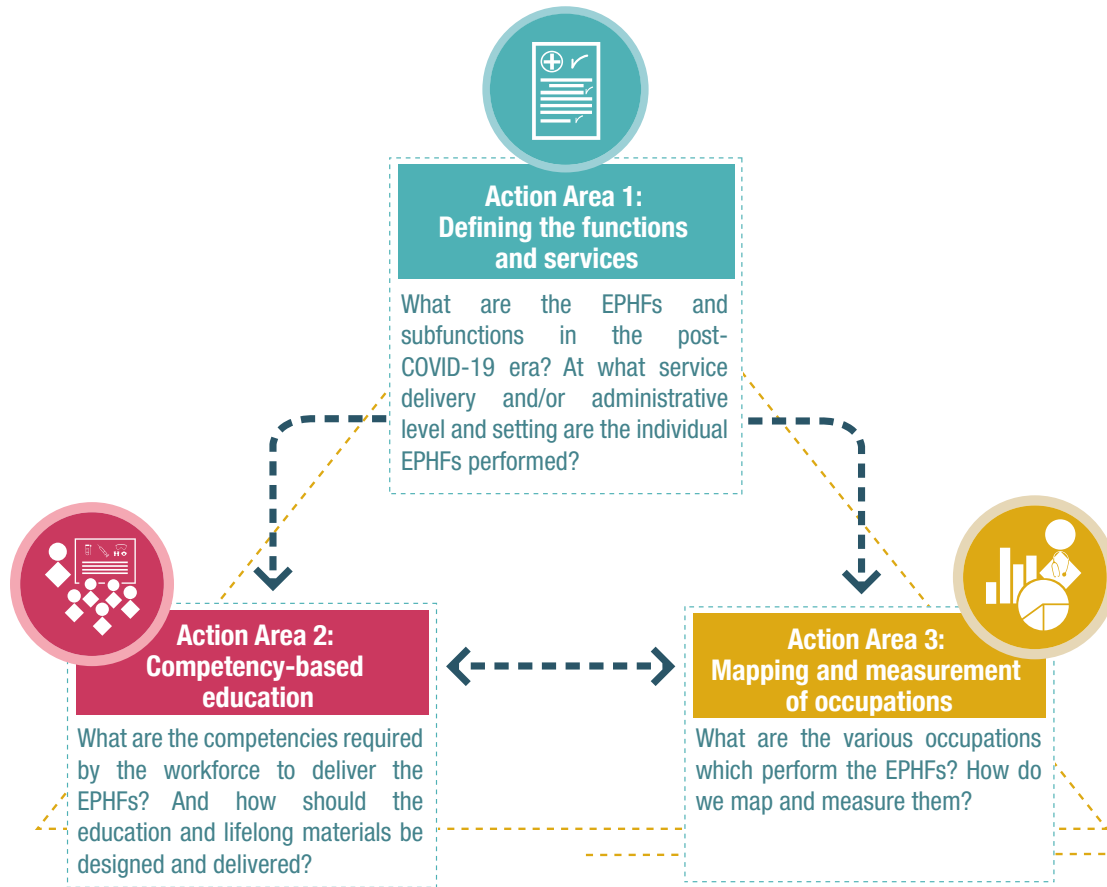
Conceptual approach of the roadmap

The proposed conceptual approach to scoping, defining and building the capacity of the public health workforce (Fig. 1) is to:

1. Define the EPHFs (including EPR), their subfunctions and services that are most relevant in national contexts.
2. Identify the skills and competencies required to deliver these functions and strengthen competency-based education oriented towards the delivery of the functions and services relevant to the scope of practice and context.
3. Map and measure the occupations engaged in the delivery of these functions and services to estimate their size and profile.

¹ The Global Network for Academic Public Health, Global Outbreak Alert and Response Network, International Association of National Public Health Institutes, Training Programs in Epidemiology and Public Health Interventions, College of Public Health Medicine of the Colleges of Medicine of South Africa, Faculty of Public Health and the United Kingdom Health Security Agency.

■ Fig. 1. Conceptual approach of the Roadmap



The action areas are interlinked and not strictly sequential, and build upon existing national policies, plans, investments and capacities.

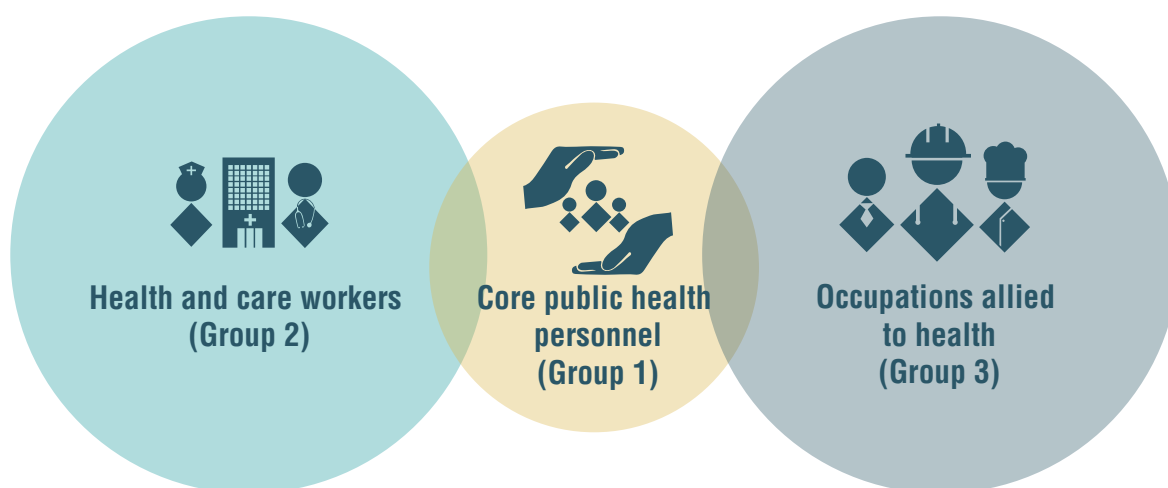
Understanding the workforce that delivers the EPHFs

The workforce that delivers the EPHFs comprises all individuals who contribute to the delivery of at least one of the functions as part of integrated services and systems. It comprises a heterogenous grouping of diverse occupations, from both the health and non-health sectors.

It can be conceptually framed as three overlapping groups (Fig. 2):

- **Group 1: Core public health personnel:** These personnel work exclusively on the EPHFs. They may be from either a health or non-health background, and may either have undergone specialized professional training or be registered with professional bodies in public health. Their work may contribute to multiple EPHFs or it may be specialized towards a particular EPHF. This is referred to as “Group 1” in the document.
- **Group 2: Health and care workers:** This group includes those personnel from the health and care workforce who spend a share of their time delivering the EPHFs while performing their usual clinical/ social care tasks. This is referred to as “Group 2” in the document.
- **Group 3: Occupations allied to health:** The personnel from a wide group of allied occupations outside the health and care sector who play critical roles in addressing the determinants of health. These personnel are considered to be in non-health occupations, and include personnel engaged in water and sanitation, food supply chains, transport, road safety, urban planning, animal health and human security. This is referred to as “Group 3” in the document.

■ **Fig. 2. Understanding the workforce that delivers the EPHFs**



What is mapping and measurement of occupations? Why is this important?

Mapping and measurement of occupations refers to a process by which countries can:

- identify the various personnel (their job titles and occupations) who are delivering the EPHFs including EPR;
- map these national job titles with the occupational groups listed in ILO’s International Standard Classification of Occupations² (3) (ISCO);

² The latest version of the International Standard Classification of Occupations is ISCO-08. Note that this classification is currently undergoing review and revisions.

- map out the EPHFs and subfunctions being performed by the respective occupations; and
- measure the size of occupations engaged in the delivery of the EPHFs (in terms of headcount or “stock”) and their workload engagement (in terms of share of time or full-time equivalents (FTEs)).

All countries have a public health workforce and in most of them the public sector – usually ministries of health and education and local authorities – has the responsibility for their training, employment, performance and quality assurance (4). However, a number of key challenges and considerations remains to be taken into account:

- **Enumeration:** The size and profile of this workforce is unknown. While varied approaches to measure the workforce and quantify its size have been documented in the literature (5–16), the evidence indicates a gap in the use of standardized definitions and limited data availability, even in high-income countries.
- **Heterogeneity:** Commonly, personnel performing the EPHFs are multiskilled and perform multiple functions, from management to clinical roles (4), which may hinder attempts to profile them. They can have differing educational backgrounds, job titles, skills and responsibilities, may work at different levels of care, and can even be located outside the traditional health and care sector (e.g. occupations involved in preparedness for and protection against hazards, emergencies and zoonotic diseases, One Health³, and environmental and planetary health).
- **Intercountry variability:** Widespread variations exist across countries regarding which occupations and individual job titles are involved in the delivery of the EPHFs (7,17). Variations are also underpinned by the scope of EPHFs practised in each country context.
- **Employment and labour market perspective:** To date, the occupational classification of the workforce which delivers the EPHFs remains unaligned with ISCO in many countries. This implies a fundamental measurement gap in terms of the basic principles of occupational classification (18).

Thus, there is a need to understand the composition of this workforce delineated by the three groups (Fig. 2). In particular, countries need to gain the following knowledge: what are the health and non-health occupations involved in the delivery of the EPHFs; how to map their national job titles with the occupational groups listed in ISCO (to facilitate the exchange of statistical and administrative information); and how to measure the number of personnel in each occupation as well as assess the extent of their workload engagement. The results from this process would provide countries rich data and evidence on the national workforce delivering the EPHFs, and inform workforce planning and policy-making processes.

3 One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes the health of humans, domestic and wild animals, plants and the wider environment (including ecosystems) are closely linked and interdependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for healthy food, water, energy and air, taking action on climate change and contributing to sustainable development. One Health High-Level Expert Panel (OHHLEP), Adisasmito WB, Almuhairi S, Behravesh CB, Bilivogui P, Bukachi SA, et al. One Health: a new definition for a sustainable and healthy future. *PLoS Pathog.* 2022;18(6): e1010537 (<https://doi.org/10.1371/journal.ppat.1010537>).

Objectives of this technical guidance

This guidance aims to:

- Provide a standardized approach that countries can adopt and adapt to comprehensively map and measure the key occupations involved in the delivery of the EPHFs including EPR.
- Enable countries to benchmark themselves and develop action plans to address the identified gaps in their workforce capacity.
- Assess the stock of key occupations in the national workforce that contribute to the delivery of the EPHFs.
- Identify the various EPHFs and their subfunctions that are being delivered by the three workforce groups.

Globally, by implementing the standardized approach outlined by the technical guidance, countries can generate much needed evidence to inform the ongoing ISCO revisions and the evolution of the National Health Workforce Accounts (NHWA) (19). This exercise will also generate evidence that can advance the work of the CDC, TEPHINET and the Field Epidemiology Training Program (FETP) Enterprise Strategic Leadership Group on field epidemiology workforce planning and development, in particular.



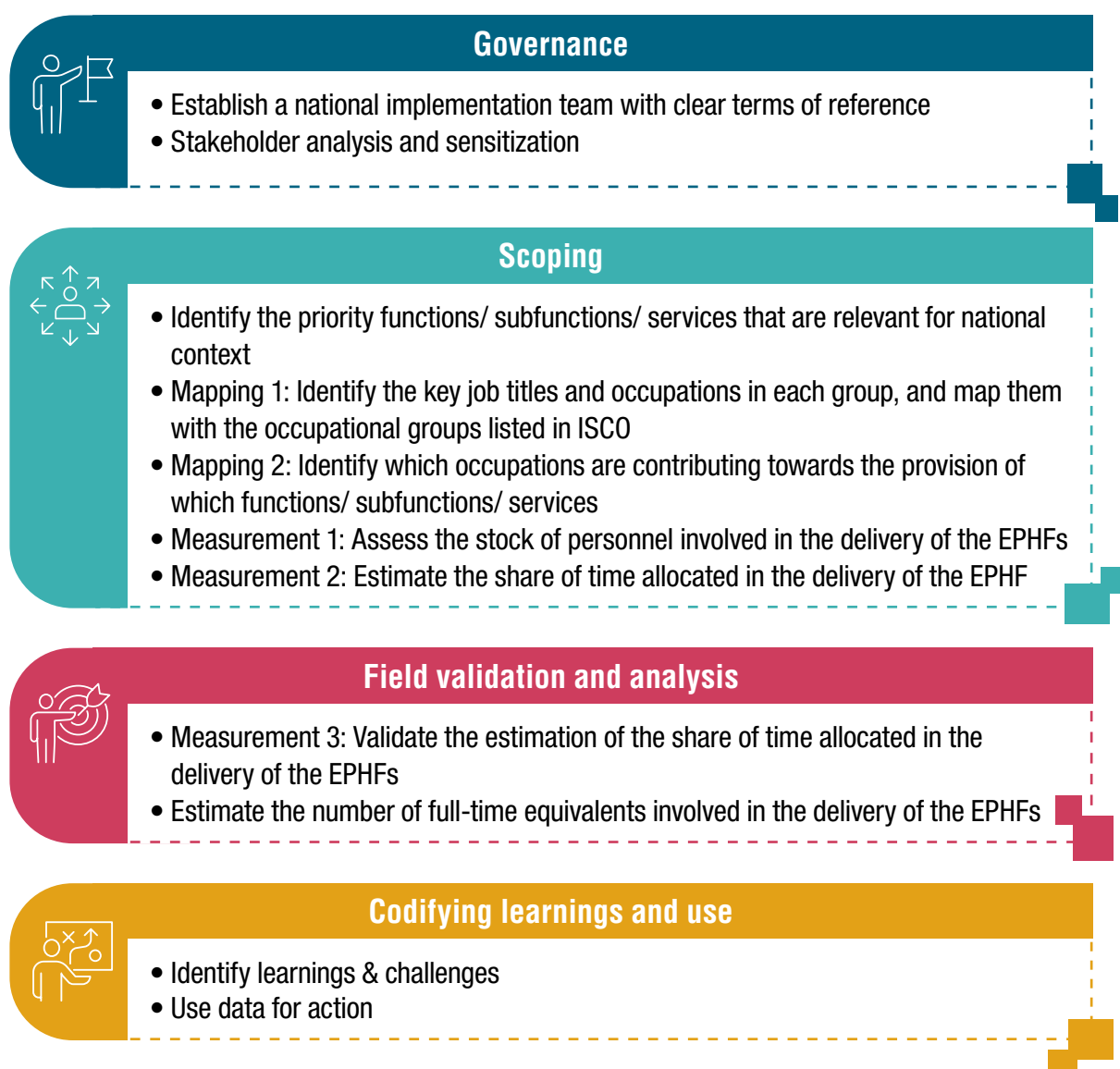
Methodology for mapping and measurement of occupations

The approach to map and measure the workforce delivering the EPHFs has been developed by WHO in consultation with CDC and TEPHINET, and builds on established methodologies (20,21) and ongoing public health task analysis initiatives (22,23). This approach consists of 4 broad phases:

- 1) Governance
- 2) Scoping
- 3) Field validation and analysis
- 4) Codifying learnings and use

Fig. 3 depicts the key steps under each phase of the process.

■ **Fig. 3. Phases and key steps of the approach to mapping and measurement of occupations**



This section provides detailed information on the proposed methodology, aiming to outline the key steps under each phase. Note that the steps may not necessarily be sequential or mutually exclusive.



Phase 1 – Governance

During this phase, country ownership is established through a multisectoral governance mechanism by constituting a national implementation team (NIT) with representation from various stakeholders. The NIT can define the objectives of mapping and measurement of occupations, review and adapt the methodology and tools according to the country context, and conduct mapping of all relevant stakeholders to help identify the major sectors involved in the delivery of the EPHFs.

Step 1. Establish a national implementation team with clear terms of reference

A NIT needs to be constituted in each country as the key coordination and governance mechanism to conduct the mapping and measurement. It should contain representatives from the ministry of health, national public health institute, national association of public health, schools of public health, district health management teams, national FETP experts, representatives from WHO, CDC and TEPHINET (if possible), and the NHWA focal point (if appointed), as well as experts from other sectors and representatives from other ministries/departments whose occupations are involved in the public health and emergency workforce (such as agriculture, animal husbandry and veterinary services, climate change and environment, water sanitation and hygiene, road safety, food safety, housing and urban affairs, rural and community development, etc.). Representatives from the private health sector as well as non-health sectors should also be included. While constituting the NIT, in addition to the technical expertise of the members, due consideration must be given to gender and diversity, in order to ensure the representativeness of the NIT.

The NIT is charged with the responsibility of conducting the mapping and measurement exercise. Clear terms of reference (ToR) should be established so that NIT members understand and accept their roles and responsibilities and can devote sufficient time to ensure the successful completion of this activity. An indicative list of key representatives to be included in the NIT and the ToR is presented in **Annex 1**.

A thorough assessment of the national context, including the country's governance structure for the oversight and delivery of the EPHFs including EPR, must first be conducted in order to ensure that all key representatives are included in the NIT. For example, if the public health workforce and emergency management workforces are under different ministries/departments, then a representative of the emergency/disaster management team should also be included in the NIT. If the country already has an existing governance mechanism for the health workforce (e.g. a technical advisory group or council or steering committee), then this mechanism can be utilized, by either expanding its composition and including relevant members, or by creating a separate working subgroup which would focus on the mapping and measurement of occupations.

The NIT can be trained through face-to-face or virtual sessions on the methodology, tools and technical guidance for mapping and measurement of occupations, with support from WHO and partners. A 1-day workshop can be convened for this orientation. At the end of the workshop, the NIT members would be well-versed in the Roadmap (2) and the technical guidance, and jointly prepare a national action plan for implementing the technical guidance.

Step 2. Stakeholder analysis and sensitization

The NIT should then conduct the stakeholder analysis and identify the key stakeholders who need to be involved in this activity. This analysis helps to identify the major sectors involved in the delivery of the EPHFs and thus facilitate the mapping of the key occupations. It involves a full-scale mapping of all relevant stakeholders in the country related to the delivery of the EPHFs and ranking their involvement in this exercise after assessing their level of interest and level of influence (Fig. 4). Conducting this exercise ensures that the mapping and measurement of occupations can occur in a comprehensive manner through the engagement of these key stakeholders and by securing buy-in from a broad-based leadership team.

■ Fig. 4. Stakeholder analysis tool



Once the key stakeholders are identified, they need to be briefed on their roles and responsibilities in this endeavour. The NIT can then consult with these stakeholders by convening a stakeholder workshop, conducting key informant interviews, or using the Delphi technique. If needed, key stakeholders who are deemed to be critical and are interested to play a more active role may subsequently be officially included in the NIT. Stakeholders may be consulted by the NIT at different steps of the process, such as identification of priority subfunctions, identification of key national job titles that deliver the EPHFs, mapping these job titles with ISCO, identification of diverse data sources for collecting stock data for these occupations, estimating the share of time spent in delivery of the EPHFs, etc.



Phase 2 - Scoping

In this phase, the key occupations involved in delivering the EPHFs are identified and their stock and their share of time spent in delivery of the EPHFs are estimated. This is done by identifying priority subfunctions relevant to the national context, listing key national job titles involved in delivery of the EPHFs and mapping them with ISCO occupational groups, mapping occupations against the subfunctions they contribute to the delivery of, assessing stock of each occupation through review of appropriate data sources, and estimating share of time spent by each occupation in delivery of the EPHFs.

Step 1. Identify the priority functions/subfunctions/services that are relevant for national context

Based on the IHR 2005 (24), a core list of functions and subfunctions were identified by WHO, in consultation with CDC and TEPHINET as well as the members of the Strategic Leadership Group for field epidemiology. Initially this list was designed by considering the central role in EPR of field epidemiologists who are a critical component of the core public health personnel (Group 1) in many countries across the world. Subsequently, based on the global consolidated list of 12 EPHFs (25), a comprehensive list of subfunctions, public health services and system enablers to operationalize each EPHF was unpacked, by considering the overall workforce which delivers the full range of EPHFs, including the health and non-health sectors. Finally, services and system enablers which were crosscutting across more than one EPHF were then repackaged into a consolidated list of essential public health services and system enablers (26). The process of unpacking the subfunctions, services and system enablers and amalgamating the crosscutting services and system enablers into a consolidated list is described in detail elsewhere (27).

The NIT can decide whether they would like to use the list of functions, subfunctions or services to map and measure their national public health workforce (Annex 2). If the country has already developed a national framework/standard of public health functions/services that is comprehensive and well aligned with the EPHFs, then the NIT could choose to use that as the frame of reference for the mapping and measurement of occupations. The NIT can also review the list in consultation with key stakeholders and choose to adapt it, based on the country's context-specific priorities and health system needs. The prioritization of functions/subfunctions/services can be guided by a desk review of national health policies strategies and plans (28) and other key official documents, a situation analysis of the national public health governance structure, system and institutions/actors that play key roles for the delivery of

the EPHFs, as well as consultations with various stakeholders. It is important for NIT members to have a good understanding of the national public health system and the various functions and services that are being delivered by personnel at its different levels. A strategic review of the delivery of the EPHFs in the country could be an opportune modality for the NIT to assess the status of implementation of the EPHFs, determine the available capacity of the stakeholders involved in delivery of the EPHFs, and develop recommendations to strengthen delivery (26).

As a starting point, the NIT could attempt to prioritize selected functions out of the 12 EPHFs or some of the subfunctions/services (e.g. 15-20) to proceed with the mapping and measurement of occupations, in alignment with the national context and priorities. Subsequently, the NIT could choose to expand the focus to all the functions/subfunctions/services in a phased manner.

Step 2. Mapping 1: Identify the key job titles and occupations in each group, and map them with the occupational groups listed in ISCO

Based on consultations with key stakeholders, the NIT is able to list the principal job titles and occupations under the three groups of the workforce which need to be mapped and measured. An illustrative list of occupations is presented in Table 1 (not exhaustive).

In the case of Group 3 occupations, the key sectors of non-health occupations involved in the delivery of the EPHFs need to be identified.

As a starting point, the NIT could attempt to identify 10 occupations under Group 2 and five occupations each under Group 1 and Group 3 involved in the delivery of the EPHFs. Subsequently, according to the national priorities and depending on the key objective(s) of the country for mapping and measurement of occupations, the NIT could choose to increase the number of occupations or focus in greater detail on a particular occupational group.

Table 1: Examples of occupations in each workforce group that delivers the EPHFs

Group 2 [health and care workers]	Group 1 [core public health personnel]	Group 3 [occupations allied to health]
Medical doctors Nursing personnel Midwifery personnel Dentists Pharmacists Community health workers Medical & pathology laboratory technicians Paramedical personnel Traditional and complementary medicine personnel Ambulance workers Environmental and occupational health personnel	Epidemiologists* Public health managers Public health researchers Public health educators District surveillance officers Chief public health officers	Water sanitation and hygiene (WASH) personnel Road safety personnel Food supply chain and food safety personnel Public works and housing personnel Civil defense and disaster management personnel Animal health personnel

*This would include those who work in health, nutrition, agriculture, animal health, climate, etc

National job titles are not readily compatible with the listing of occupations in ISCO (Box 1). For example, a district health manager could be a doctor, nurse, dentist, etc. Hence, the NIT must list all the key job titles involved in the delivery of the EPHFs including EPR, and then map these job titles against the list of occupational groups in ISCO (3) based on consultations with stakeholders, in order to have cross-national comparability. The NHWA focal point (if appointed) can play a vital role in this step.

In some countries, a national list of job titles along with job descriptions may be available. Other countries may have developed their own national standard classification of occupations in alignment with ISCO. These resources, if available, would also be useful for the NIT to refer to during this step. The ministry of labour representatives (if present) would also be able to assist the NIT in the mapping of national job titles with ISCO and/or with the national standard classification of occupations.

For Group 2 occupations, a detailed list of health and care workforce occupations listed in ISCO is presented in **Annex 3**. An illustrative table of mapping job titles with the occupations listed in ISCO is presented in **Annex 4**. An example of mapping job titles to ISCO occupations from a health labour market analysis (HLMA) can be viewed elsewhere (29).

Box 1: Considerations while conducting the mapping exercise

1. Group 1 occupations may not be comprehensively listed in ISCO. In such a scenario, please map the specific job title to a broad occupation (eg – epidemiologist, public health specialist, etc) and leave the ISCO code cell blank.
2. Personnel with different job titles but the same graduate training may be classified under different workforce groups, depending on their subsequent training and/or current scope of practice. Some illustrative examples are presented below:

Medical doctors:

- A “district manager” who is a medical doctor delivering EPHFs as part of their clinical care role will be classified under **Group 2**.
- A ‘public health specialist’ who is a medical doctor trained in public health or registered with a professional body in public health and exclusively engaged in the delivery of EPHFs (without performing any clinical services) will be classified under **Group 1**.

Engineers:

- A ‘road safety expert’ who is an engineer engaged in infrastructure development to ensure road safety can be classified as **Group 3**.
- A ‘vaccine cold chain equipment inspector’ who is an engineer involved in the oversight and maintenance of vaccines cold chain equipment can be classified as **Group 2**.
- A ‘public health specialist’ who is an engineer trained in public health or registered with a professional body in public health and exclusively engaged in the delivery of EPHFs will be classified under **Group 1**.

Step 3. Mapping 2: Identify which occupations are contributing towards the provision of which functions/subfunctions/services

Based on consultation with key stakeholders, the NIT can then map the key occupations from each of the three groups of the workforce against the prioritized functions/subfunctions/services. This will provide information on the various occupations which are involved in the delivery of each function/subfunction/service. If any occupation is found to be not involved in the delivery of EPHFs, then it can be excluded at this stage. An illustrative table is presented in **Annex 5**.

The output from this activity is a grid of occupations and functions, which becomes the frame of reference for subsequent steps. It can also be useful as an evidence base for the country to holistically plan its workforce needs as well as inform a training needs assessment of these key occupations in terms of these functions (both pre-service and in-service).

Step 4. Measurement 1: Assess the stock of personnel involved in the delivery of the EPHFs

The NIT needs to conduct an extensive review of all available data sources (e.g. ministry of health, regulatory bodies, professional associations and councils, other ministries, census, labour force surveys, etc.) to compile data on the estimated stock of the personnel for various occupations, as well as conduct key informant interviews with staff from the ministry of health and other relevant ministries/departments and national experts in public health and emergency response, etc.

An illustrative table is presented in **Annex 6** for reference.

- For Group 2 occupations (health and care workforce), the latest available data from the NHWA could be extracted. If more recent data are available from the ministry of health, the NIT can rely on that dataset.
- For Group 1 and Group 3 occupations, analysis of secondary data sources may be required such as census data, labour force surveys, professional associations, regulatory bodies, etc. The most appropriate data source can be selected for each occupation based on consultations with stakeholders. A snowball sampling approach can be used, for consultations with technical experts from the Group 3 occupations as well as those Group 1 occupations that are outside the health sector to identify potential data sources and extract the data from these sources.

The role of the NHWA focal point (if appointed) is critical for the successful completion of this step.

In countries which are federal in nature, there might be a need to develop subnational estimates and then aggregate them to generate national estimates. Such an approach would be helpful to assess the level of inequity in the subnational distribution of this workforce. National estimates can also be presented disaggregated by the three workforce groups (Fig. 1).

Along with the stock, the NIT can also conduct further analysis using available data to assess the demographic distribution of the various occupations in this workforce (by sex and by age group) as well as their distribution within the country at subnational level.

Step 5. Measurement 2: Estimate the share of time allocated in the delivery of the EPHFs

Initially, the NIT needs to estimate the proportion of time spent by these personnel in the delivery of these functions/subfunctions/services. These estimates can be collected through facilitated discussions by key national stakeholders such as technical experts at a stakeholder workshop, or through a structured questionnaire.

Thus, the average percentage of time spent by personnel of each occupation in the delivery of the EPHFs can be computed at country level, along with a range of the time spent (minimum – maximum). An illustrative table is presented in **Annex 7** for reference.

- For Group 2 occupations, the share of time will be less than 100% (since their primary role is clinical/social care). This also needs to be stratified by the service delivery level for these occupations.
- For all occupations in Group 1 and Group 3, the share of time spent will be assumed to be 100%.



Phase 3 – Field validation and analysis

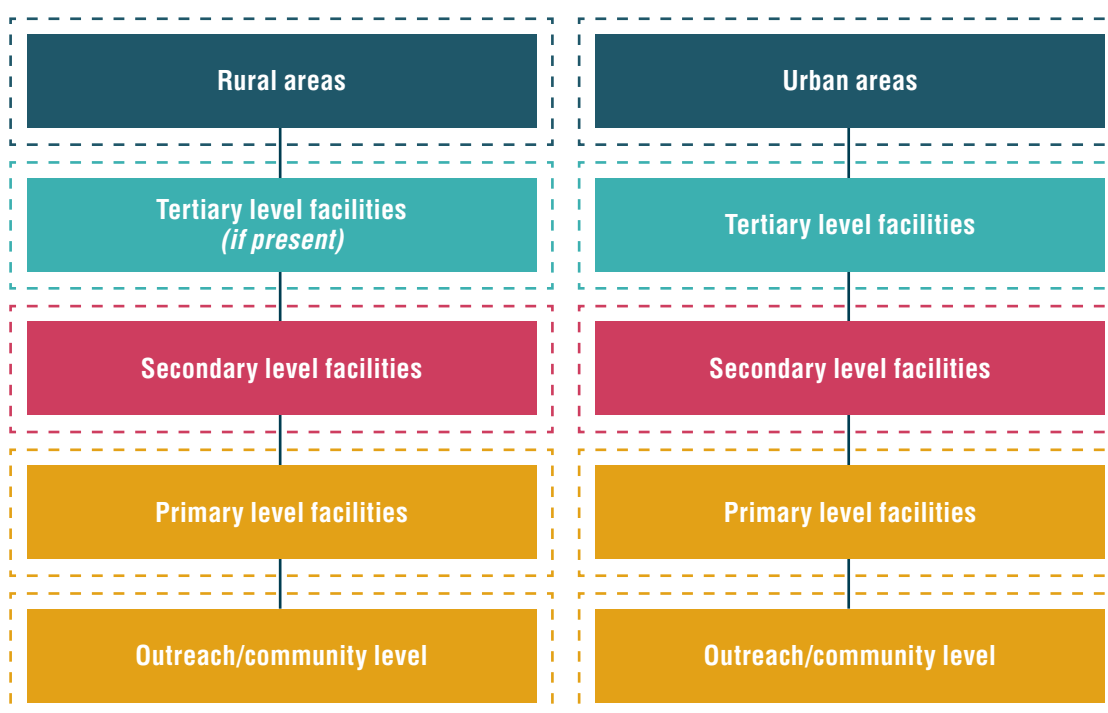
The share of time spent by various occupations in delivery of the EPHFs is validated and FTEs are computed. This can be done by visiting selected health facilities of different service delivery levels to conduct interviews with selected personnel from different occupations to validate their share of time spent in delivery of EPHFs, and then computing FTEs (product of stock and share of time) using these validated estimates.

Step 1. Measurement 3: Validate the estimation of the share of time allocated in the delivery of the EPHFs

The NIT can then conduct field visits to validate the share of time being spent by personnel (occupations, job titles) identified under the three groups involved in delivering the EPHFs, in alignment with the Workload Indicators of Staffing Need (WISN) methodology (20).

Stratification: For Group 2 occupations, a stratification approach can be adopted by the NIT according to their country's health system hierarchy. For example, the NIT can visit two health facilities each at the tertiary level, secondary level and primary level and interview two personnel from each of the identified key occupations at each facility as well as two community health workers to ascertain the share of time they actually spend in delivering the EPHFs. In addition, the NIT could also decide to conduct the field validation in rural and urban areas if there are differences in the way public health functions and services are delivered between areas. An illustrative model of stratification is presented in Fig. 5.

■ Fig. 5. Stratification based on health system levels



In countries which are federal in nature, the NIT could also consider conducting field visits to two or three different subnational units in order to account for subnational differences in the workforce capacity to deliver the EPHFs.

This could also be conducted by convening representatives of various job titles and occupational groups together for a consultation on the share of time spent by them in the delivery of various activities related to the EPHFs, as is done in the WISN methodology (20), or by conducting a survey of personnel from various occupations.

It is important to note that the EPHFs may not be easily comprehended by personnel of some health and care worker occupations. Hence, due care must be taken by the NIT to tailor the questionnaire and pre-test it with respondents of various occupations. This would help ensure that the questionnaire is easily understood and contains language that the workforce can relate to, and thus improve its validity and reliability.

Thus, the illustrative table presented in **Annex 7**, which contains the initial results from stakeholder consultations, can be updated with the results from field validation.

During field validation, personnel can also be asked to select the functions/subfunctions/services that they contribute to delivering. The findings from this self-assessment can be compared with the findings from stakeholder consultations and can then be used to update the grid of occupations vis-à-vis functions. The field validation exercise is also an opportune moment for the NIT to assess the training needs of the workforce by enquiring if the personnel have received adequate training to contribute towards the delivery

of these functions/subfunctions/services (either through pre-service education or in-service training or both). This could highlight the gaps in training for personnel of various occupations, and subsequently could also inform curricula review and revision. A mapping of the subfunctions with the practice activities to operationalize them has been developed, as part of efforts to develop a competency and outcomes framework for the workforce delivering the EPHFs (30), and this list of practice activities could be used as the reference frame for training needs assessment, alongside other information about the competence of the workforce.

Step 2. Estimate the number of full-time equivalents involved in the delivery of the EPHFs

Robust monitoring of the public health workforce is essential to analyse the current situation and to plan for addressing future challenges. Since the headcount measures the stock of available personnel, it reveals the maximum capacity of a particular country, territory or area. However, it does not factor in the share of time spent by the personnel in the delivery of the EPHFs, which may differ between countries and personnel of different occupational groups. Hence, it is recommended to estimate the number of workers in terms of FTEs. This information is more specific than the number of individuals (headcount) and serves to produce a realistic picture of the actual workforce capacity available to deliver services, which can then be compared across countries (31).

By multiplying the estimated headcount of the personnel of each occupation with the average share of time spent by them in the delivery of the EPHFs, the number of FTEs can then be computed. Thus, the national estimate would be generated for a country, which can be disaggregated by the three workforce groups (Fig. 1). The national estimate can then be aggregated at the global or regional level. An illustrative table is presented in **Annex 8** for reference.

The NIT can use these data to define national standards for the public health workforce or for key occupations of the workforce, and initiate routine monitoring to periodically compare the workforce with national/global standards.



Phase 4 - Codifying learnings and use

During this phase, the implementation process is documented – methodological adaptations (if any), lessons learned and challenges. The NIT is then able to identify gaps in national workforce capacity and inform training needs assessment, and use these data to inform public health workforce planning and policy-making processes.

Step 1. Identify learnings and challenges

The mapping and measurement of occupations can provide the NIT with valuable insights on the size, profile and capacity of the national workforce that contributes to the delivery of the EPHFs. Finally, the

NIT must document their experience – the implementation approach, adaptations to the methodology and key results from the exercise as well as highlighting the lessons learned, challenges encountered and recommendations for future action. The appropriate format for process documentation can be decided by the NIT, i.e. report, working paper, research brief, manuscript for submission to a peer-reviewed journal, good practice reviews, etc.

Step 2. Use data for action

Based on the findings from mapping and measurement of occupations, the NIT can assess the baseline capacity of the public health workforce and identify the gaps in the national workforce capacity. This could be done by occupation, by function or by both. The gaps may not necessarily be quantitative (e.g. shortage of staff), but could be related to system-level factors, such as education capacity, assessment of training needs (32), stakeholder roles with regard to the EPHFs (33), workforce retention, etc. The NIT could also adopt a mixed methods approach and complement these results with evidence from surveys of employers or senior managers (34,35), self-assessment by public health personnel of various occupations (36), in-depth interviews with key stakeholders (37), the Delphi method or a review of existing literature. An indicative template for gap assessment is presented in Annex 9 for reference. Based on the identified gaps, the NIT might also recommend further analysis to generate more information on the status of the national workforce delivering the EPHFs. An HRH situational analysis may need to be conducted to generate evidence on how the availability of appropriate quality and quantity of this workforce can improve delivery of the EPHFs (38). An HLMA may be required to analyse and understand labour market dynamics, identify supply-demand imbalances, and answer key policy questions relating to this workforce (39). Gaps in workforce data availability might indicate a need to strengthen the capacity of HRH information systems to routinely collect these data, or identify diverse data sources that could potentially provide these data on a regular basis. Other gaps in workforce capacity may require strengthening of workforce regulation, accreditation of education programmes, review of education curricula (both for pre-service education and for in-service trainings), establishing standards of practice and monitoring adherence to these standards, or strengthening national governance mechanisms to coordinate an intersectoral workforce agenda.

Through stakeholder consultations, the NIT can then identify the appropriate strategies to address these gaps in a progressive manner and develop a comprehensive action plan to strengthen the public health workforce. The findings could also inform the development or revision of the country's national health policy, strategy or plan (28), the national HRH strategic plan (40), as well as the national action plan for health security (NAPHS) (41). In addition, the findings could inform the development of national proposals for global or regional initiatives to strengthen the public health workforce as well as national reporting on the human resources capacity to the Joint External Evaluation (JEE) tool (42) and the States Parties States Party self-assessment annual reporting (SPAR) tool (43).

Table 2 provides a consolidated summary of the methodology for mapping and measuring the workforce delivering the EPHFs.

Table 2: Summary of the methodology for mapping and measurement of occupations

Phase	What	Who	How	Outcome	Remarks
1. Governance	Step 1. Establish a national implementation team with clear ToR	Policy-makers in charge of HRH in the ministry of health with support from WHO and partners	Identify key representatives who can be part of the NIT with technical support from WHO country office and draft ToR. A 1-day workshop can be conducted to familiarize the NIT members with the technical guidance, its tools and methodology, and the expected outcomes.	NIT is established with clear ToR, roles and responsibilities. NIT is oriented on the technical guidance and develops a national action plan for implementing mapping and measurement of occupations.	Ensure that the NIT has adequate representation from the three workforce groups (Fig. 2), as well as in terms of gender and diversity. Indicative composition of the team and ToR is mentioned in Annex 1. During this training, the NIT can review the guidance and tools and adapt them to suit the country context. The NIT can also define the objectives of mapping and measurement, in alignment with national priorities or initiatives.
	Step 2. Stakeholder analysis and sensitization	NIT	Conduct a stakeholder analysis to map all the relevant stakeholders involved in the delivery of EPHFs, assess their level of interest and level of influence, and identify key stakeholders who need to be involved in this exercise (Fig. 4).	Key stakeholders are identified for consultations and sensitized.	Based on the stakeholder analysis, critical key stakeholders can be included in the NIT, or some stakeholders may be dropped from the NIT. If needed, go back to step 1 (revise the composition of NIT and orient the new NIT members).
2. Scoping	Step 1. Identify the priority functions/ subfunctions/ services that are relevant for national context	NIT + key stakeholders	Key informant interviews/stakeholder workshop/Delphi technique	List of prioritized functions/ subfunctions/services is finalized, based on the country's context-specific priorities and health system needs.	The NIT can review the list of functions/ subfunctions/ services (Annex 2) and adapt it according to the country context. If necessary, the NIT can either expand or reduce the list. Review of national health policies, strategies and plans and other key official documents can help in the prioritization of functions/ subfunctions/ services.
	Step 2. Mapping 1: Identify the key job titles and occupations in each group, and map them with the occupational groups listed in ISCO	NIT + key stakeholders	Key informant interviews/stakeholder workshop/Delphi technique	Principal occupations which are involved in the delivery of EPHFs are identified from each group of the workforce. National job titles are mapped with the occupational groups in ISCO.	The NIT can identify the key occupations from Group 1 (core public health personnel), Group 2 (health and care workers) and Group 3 (occupations allied to health) which are involved in the delivery of the EPHFs, based on stakeholder consultations and internal discussions. Efforts also need to be made to explore the personnel who work outside the health sector.
	Step 3. Mapping 2: Identify which occupations are contributing towards the provision of which functions/ subfunctions/ services	NIT + key stakeholders	Key informant interviews/stakeholder workshop	Key informant interviews/stakeholder workshop	Mapping of key occupations with the functions/ subfunctions/ services is conducted.

Phase	What	Who	How	Outcome	Remarks
2. Scoping, cont.	Step 4. Measurement 1: Assess the stock of personnel involved in the delivery of the EPHFs	NIT + key stakeholders	Group 2 – extraction of latest available data from NHWA or ministry of health registries or records. Groups 1 and 3 – analysis of secondary data sources (census, labour force surveys, professional associations, regulatory bodies etc.) or key informant interviews with national policy-makers/officials or technical experts.	Number of personnel is estimated for each of the identified key occupations which contribute to the delivery of the EPHFs.	NIT may need to consult with key stakeholders to validate the data collated through diverse sources. A snowball sampling approach may be adopted (e.g. in consultation with technical experts from the private health sector or the non-health sectors). If the country has an NHWA focal point, then that person has a central role in this step. The NIT can also conduct further analysis to assess the workforce's demographic distribution and distribution at subnational level.
	Step 5. Measurement 2: Estimate the share of time allocated in the delivery of the EPHFs	NIT + key stakeholders	Assessment by NIT and key stakeholders, relying on expert opinion and/or review of existing literature.	Estimates for average share of time spent in delivery of EPHFs are generated for all key occupations, along with range of time.	
3. Field validation and analysis	Step 1. Measurement 3: Validate the estimation of the share of time allocated in the delivery of the EPHFs	NIT	Conduct field visits to validate the share of time by conducting interviews with selected personnel from each occupation.	Average share of time spent in delivery of EPHFs is updated for each key occupation, along with range of time, based on the results from field validation.	Purposive sampling can be adopted for selection of facilities/sites for validation. Stratified sampling for Group 2 occupations: assessment and validation needs to be done for personnel at different service delivery levels. This could be done separately for urban and rural areas.
	Step 2. Estimate the number of FTEs involved in the delivery of the EPHFs	NIT	Product of the estimated headcount and the average share of time spent in the delivery of EPHFs.	The number of FTEs is estimated for each key occupation involved in the delivery of EPHFs.	
4. Codifying learnings and use	Step 1. Identify learnings and challenges	NIT	Documentation of the entire process and key results. Also highlight lessons learned from implementation, good practices and challenges.	The NIT disseminates the key findings at the national level and catalyses the use of these data for evidence-based planning and policy-making.	The NIT can decide the appropriate format for process documentation. Any context-specific adaptations to the methodology need to be documented along with the rationale for adaptation.
	Step 2. Use data for action	Policy-makers in charge of HRH in the ministry of health with support from NIT, WHO and partners	Learnings are used to inform the development or revision of national health policies strategies and plans, national HRH strategic plans and NAPHS.	Evidence-informed plans and policies for the health workforce are developed.	Using the grid of occupations versus functions/subfunctions/services, countries can conduct holistic planning by function as well as by occupation.

General considerations for country contextualization and implementation

It is anticipated that the results from this mapping and measurement exercise might underestimate the total national workforce contributing to the delivery of the EPHFs, given the focus on only key occupations from each of the three broad workforce groups and the fact that they are being mapped against a subset of prioritized functions/subfunctions/services. However, the findings will help countries to develop a good understanding of the characteristics (size, demographic profile, distribution, etc.) of their national workforce and, when combined with the data generated from the NHWA, this can be used for evidence-based workforce planning and policy-making. Countries can also assess the size of their core public health personnel (Group 1) estimate and benchmark themselves according to their current or future needs, or to global or regional standards.⁴

Country-led contextualization and operationalization is a key principle of the methodology espoused in this technical guidance. The Roadmap recognizes that countries may have different contexts and capacities, and hence a differentiated approach is critical (2). Countries can choose to adapt the methodology according to their contexts and priorities. Some potential examples of country contextualization are listed below:

- In countries with diverse public health needs and disease burdens, review and prioritization of the functions/subfunctions/services and key occupations could be done at the subnational level in order to account for this heterogeneity.
- Countries which would like to adopt a phased approach to implementation may choose to do so, by focusing on Group 1 or Group 2 first and subsequently expanding their frame of reference to all the three groups.
- Depending on their level of interest, countries may opt to assess the workforce capacity of key national institutions that are responsible for focusing on the major public health issues faced by the country and addressing them, such as national public health institutes, before expanding to the entire national workforce.
- Interested countries could also undertake the process as comprehensively as possible, by opting to assess all the functions/subfunctions/services and all the identified occupations that contribute to the delivery of the EPHFs, thus ensuring that the grid of functions and occupations is all-encompassing.
- Countries could also choose to apply this methodology to assess segments of the workforce that contribute to the delivery of certain public health functions/subfunctions/services, and strengthen

⁴ The IHR standard of one epidemiologist per 200 000 population could be considered as an indicative target for core public health personnel (Group 1). However, WHO encourages countries to define national targets according to their specific health system context and needs.

them as well as better align the capacities of these personnel with national population health contexts.

One of the key strategies emphasized in this technical guidance is the need for a comprehensive multisectoral multistakeholder governance mechanism for the public health workforce. This is important, given that the public health workforce goes beyond the health sector. It is acknowledged that many countries already have some sort of governance mechanisms in place for the health workforce. The Roadmap advocates for these mechanisms to be strengthened to better manage the public health workforce in its entirety.

Many countries across the world have initiated attempts to classify and enumerate their public health workforce, post the COVID-19 pandemic. This technical guidance provides a systematic approach that follows the best practices of occupational mapping, as exemplified in the NHWA (44), and builds on and leverages existing data sources and ongoing national public health initiatives to strengthen the public health workforce.

For optimum results, ideally countries should initiate the mapping and measurement of occupations in alignment with their national health systems or public health planning cycles. This would enable the data generated through this process to inform policy dialogues at the national level among stakeholders, catalyse evidence-informed decision-making, and enable the mobilization of financial resources to ensure the implementation, monitoring and evaluation of national action plans to invest in and strengthen the public health workforce.

Expected benefits and uses at national level

- 1) **Benchmarking:** Countries use this standardized measurement approach to understand the heterogeneity of their public health workforce, map the job titles with the occupational groups, and monitor this workforce in terms of both stock and FTEs. Thus, they are able to assess themselves, generate strategic intelligence on this workforce, and can institutionalize this in routine monitoring in order to measure progress.
- 2) **Identification of gaps and strategic actions to address them:** Through this process, countries identify gaps in their national workforce capacity and develop appropriate strategies to close these gaps in a time-bound manner.
- 3) **Evidence-informed planning, policy-making and financing to strengthen the public health workforce:** The results from this process inform the development or revision of national health policies strategies and plans, national HRH strategic plans and NAPHS as well as the development of national proposals for global or regional initiatives to strengthen the public health workforce. Planning can be conducted not only by occupations, but also in terms of functions. Thus, countries are better equipped to effectively plan for this workforce according to their health system needs and contexts, create projections for future needs, and deploy the required technical and financial resources to develop and manage this workforce in a holistic manner.
- 4) **Evidence-informed reporting:** Countries utilize these results to report on the human resources capacity of the JEE and SPAR tools.

References

1. Building health systems resilience for universal health coverage and health security during the COVID-19 pandemic and beyond: WHO position paper. Geneva: World Health Organization; 2021 (<https://iris.who.int/handle/10665/346515>, accessed 9 November 2023).
2. National workforce capacity to implement the essential public health functions including a focus on emergency preparedness and response: Roadmap for aligning WHO and partner contributions. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/354384>, accessed 9 November 2023).
3. International Standard Classification of Occupations: ISCO-08. Geneva: International Labour Organization; 2012 (<https://www.ilo.org/public/english/bureau/stat/isco/docs/publication08.pdf>, accessed 9 November 2023).
4. Beaglehole R, Dal Poz MR. Public health workforce: challenges and policy issues. *Hum Resour Health*. 2003;1(1):4. doi: 10.1186/1478-4491-1-4.
5. Watts RD, Bowles DC, Ryan E, Fisher C, Li IW. No two workforces are the same: a systematic review of enumerations and definitions of public health workforces. *Front Public Health*. 2020;8:588092. doi: 10.3389/fpubh.2020.588092.
6. The wider public health workforce: a review. London: Public Health England; 2019 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/783867/The_wider_public_health_workforce.pdf, accessed 9 November 2023).
7. Jambroes M, van Honschooten R, Doosje J, Stronks K, Essink-Bot ML. How to characterize the public health workforce based on essential public health operations? Environmental public health workers in the Netherlands as an example. *BMC Public Health*. 2015;15:750. doi: 10.1186/s12889-015-2095-5.
8. Mapping the core public health workforce. London: Centre for Workforce Intelligence; 2014 (https://assets.publishing.service.gov.uk/media/5a74e93bed915d502d6cbfe6/CfWI_Mapping_the_core_public_health_workforce.pdf, accessed 9 November 2023).
9. Understanding the wider public health workforce. London: Centre for Workforce Intelligence; 2015 (https://assets.publishing.service.gov.uk/media/5a757a1040f0b6360e4746c4/CfWI_Understanding_the_wider_public_health_workforce.pdf, accessed 9 October 2023).
10. The public health knowledge and intelligence workforce. London: Centre for Workforce Intelligence; 2015 (https://assets.publishing.service.gov.uk/media/5a7f230be5274a2e8ab4a570/CfWI_PH_Knowledge_and_Intelligence_Workforce.pdf, accessed 9 October 2023).
11. Rethinking the public health workforce. London: Royal Society for Public Health; 2015 (<https://www.rsph.org.uk/our-work/policy/wider-public-health-workforce/rethinking-the-public-health-workforce.html>, accessed 9 October 2023).

12. Merrill J, Btoush R, Gupta M, Gebbie K. A history of public health workforce enumeration. *J Public Health Manag Pract*. 2003;9(6):459-70. doi: 10.1097/00124784-200311000-00005.
13. Sumaya CV. Enumeration and composition of the public health workforce: challenges and strategies. *Am J Public Health*. 2012 Mar;102(3):469-74. doi: 10.2105/AJPH.2011.300388.
14. Beck AJ, Boulton ML, Coronado F. Enumeration of the governmental public health workforce, 2014. *Am J Prev Med*. 2014;47(5 Suppl 3):S306-13. doi: 10.1016/j.amepre.2014.07.018.
15. Public Health Workforce in Switzerland: A National Census. Swiss School of Public Health and Federal Office of Public Health; 2013 (<https://ssphplus.ch/assets/downloads/publications/public-health-february-2013b.pdf>, accessed 9 November 2023).
16. Leider JP, McCullough JM, Singh SR, Sieger A, Robins M, Fisher JS, et al. Staffing Up and Sustaining the Public Health Workforce. *J Public Health Manag Pract*. 2023;29(3):E100-E107. doi: 10.1097/PHH.0000000000001614.
17. Bhattacharyya DS, Shafique S, Nowrin I, Anwar I. Challenges of performing essential public health functions by the physicians at leadership positions in peripheral level government health system in Bangladesh: A qualitative exploratory study. *PLoS One*. 2022;17(5):e0268026. doi: 10.1371/journal.pone.0268026.
18. Basic principles of an occupational classification [Internet]. Geneva: International Labour Organization; 2004 (<https://www.ilo.org/public/english/bureau/stat/isco/docs/intro2.htm>, accessed 9 November 2023).
19. National health workforce accounts: a handbook, second edition. Geneva: World Health Organization; 2023 (<https://iris.who.int/handle/10665/374320>, accessed 28 November 2023).
20. Workload indicators of staffing need: user's manual, second edition. Geneva: World Health Organization; 2023 (<https://iris.who.int/handle/10665/373473>, accessed 27 October 2023).
21. Hart LJ, Carr C, Fullerton JT. Task Analysis as a Resource for Strengthening Health Systems. *J Midwifery Womens Health*. 2016;61(2):257-62. doi: 10.1111/jmwh.12410.
22. Towards a new European public health action plan. In: CPH: Certified in Public Health by National Board of Public Health Examiners [website]. Washington, D.C.: National Board of Public Health Examiners; 2023 (<https://www.nbphe.org/job-task-analysis-data/>, accessed 9 November 2023).
23. Robins M, Leider JP, Schaffer K, Gambatese M, Allen E, Hare Bork R. PH WINS 2021 Methodology Report. *J Public Health Manag Pract*. 2023;29(Suppl 1):S35-S44. doi: 10.1097/PHH.0000000000001632.
24. International Health Regulations (2005), third edition. Geneva: World Health Organization; 2016 (<https://iris.who.int/handle/10665/246107>, accessed 9 November 2023).
25. 21st century health challenges: can the essential public health functions make a difference?: discussion paper. Geneva: World Health Organization; 2021 (<https://iris.who.int/handle/10665/351510>, accessed 9 November 2023).

26. Defining essential public health functions and services to strengthen national workforce capacity. Geneva: World Health Organization; 2024 (<https://iris.who.int/handle/10665/376579>, accessed 22 April 2024).
27. Application of the essential public health functions: an integrated and comprehensive approach to public health. Geneva: World Health Organization; 2024 (<https://iris.who.int/handle/10665/375864>, accessed 31 January 2024).
28. Schmets G, Rajan D, Kadandale S, editors. Strategizing national health in the 21st century: a handbook. Geneva: World Health Organization; 2016 (<https://iris.who.int/handle/10665/250221>, accessed 23 October 2023).
29. Okoroafor SC, Kwesiga B, Ogato J, Gura Z, Gondi J, Jumba N, et al. Investing in the health workforce in Kenya: trends in size, composition and distribution from a descriptive health labour market analysis. *BMJ Glob Health*. 2022;7(Suppl 1):e009748. doi: 10.1136/bmjgh-2022-009748.
30. Competency and outcomes framework towards the delivery of the essential public health functions. Geneva: World Health Organization; 2024 (<https://iris.who.int/handle/10665/376577>, accessed 22 April 2024).
31. Dussault G, Siyam A. Chapter 2: Data requirements for the analysis of the stock and supply of health workers. In: Strengthening the collection, analysis and use of health workforce data and information: a handbook. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/365680>, accessed 9 November 2023).
32. Czabanowska K, Rodriguez Feria P. Training needs assessment tools for the public health workforce at an institutional and individual level: a review. *Eur J Public Health*. 2023;ckad183. doi: 10.1093/eurpub/ckad183.
33. McNicholas T, Hendrick L, McDarby G, Mustafa S, Zhang Y, Saikat S, et al. A novel approach to utilizing the essential public health functions in Ireland's health system recovery and reform. *Front Public Health*. 2023;11:1074356. doi: 10.3389/fpubh.2023.1074356.
34. Bashkin O, Otok R, Kapra O, Czabanowska K, Barach P, Baron-Epel O, et al. Identifying the Gaps Between Public Health Training and Practice: A Workforce Competencies Comparative Analysis. *Int J Public Health*. 2022;67:1605303. doi: 10.3389/ijph.2022.1605303.
35. Leider JP, Coronado F, Bogaert K, Gould E. Public Health Workforce Development Needs: A National Assessment of Executives' Perspectives. *Am J Prev Med*. 2019;56(5):e153-e161. doi: 10.1016/j.amepre.2018.10.032.
36. Bogaert K, Castrucci BC, Gould E, Rider N, Whang C, Corcoran E. Top Training Needs of the Governmental Public Health Workforce. *J Public Health Manag Pract*. 2019;25 (Suppl 2):S134-S144. doi: 10.1097/PHH.0000000000000936.
37. Priyadarshi M, Mishra SS, Singh A, Singhal A, Hashmi M, Neogi SB. Assessment of needs and gaps in public health cadre in India – a situational analysis. *BMC Health Serv Res*. 2023;23(1):1162. doi: 10.1186/s12913-023-10132-3

38. Nyoni J, Gbary A, Awases M, Ndecki P, Chatora R. Policies and plans for human resources for health: guidelines for countries in the WHO African Region. Brazzaville: WHO Regional Office for Africa; 2006 (<https://iris.who.int/handle/10665/358816>, accessed 28 November 2023).
39. Health labour market analysis guidebook. Geneva: World Health Organization; 2021 (<https://iris.who.int/handle/10665/348069>, accessed 28 November 2023).
40. Nyoni J, Christmals CD, Asamani JA, Illou MMA, Okoroafor S, Nabyonga-Orem J, et al. The process of developing health workforce strategic plans in Africa: a document analysis. *BMJ Glob Health*. 2022;7(Suppl 1):e008418. doi: 10.1136/bmjgh-2021-008418.
41. World Health Organization strategy (2022-2026) for National Action Plan for Health Security. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/365581>, accessed 23 October 2023).
42. Joint external evaluation tool: International Health Regulations (2005), third edition. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/357087>, accessed 9 November 2023).
43. International Health Regulations (2005): state party self-assessment annual reporting tool, second edition. Geneva: World Health Organization; 2021 (<https://iris.who.int/handle/10665/350218>, accessed 10 October 2023).
44. Classifying health workers: mapping occupations to the international standard classification. Geneva: World Health Organization; 2019 (<https://www.who.int/publications/m/item/classifying-health-workers>, accessed 23 October 2023).

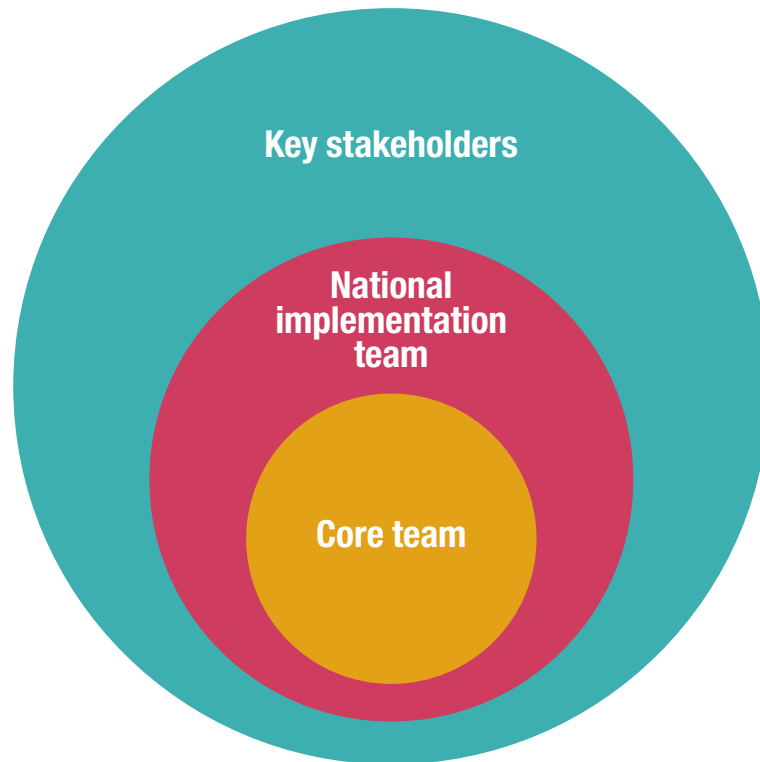
Annex 1: Indicative composition and ToR of national implementation teams

Indicative composition

The NIT is the key coordination and governance mechanism to conduct the mapping and measurement of occupations. It should contain the following:

- representative from the ministry of health
- representatives from other ministries/departments whose occupations are involved in the public health and emergency workforce (such as agriculture, animal husbandry and veterinary services, climate change and environment, water sanitation and hygiene, road safety, food safety, housing and urban affairs, rural and community development, emergency/disaster management, etc.)
- representative from the national public health institute
- representative from the national association of public health
- representative from the national association of schools of public health
- representatives from subnational/district health management teams
- national FETP expert
- representative from WHO country office
- representatives from CDC and TEPHINET (if possible)
- NHWA focal point (if appointed)
- representative from the national statistical office
- representatives from selected occupations of the health and care workforce
- technical experts on the non-health sectors
- representatives for the private health sector

A core team may be established from this overall composition in order to conduct the mapping and measurement exercise under the leadership of the ministry of health and the WHO country office, based on the availability and interest of key personnel.



Indicative elements of ToR – to be updated locally

A suggested list of ToR for the NIT:

1. Conduct a stakeholder analysis to identify who else needs to be invited
2. Understand the methodology for mapping and measurement of occupations
3. Establish a core implementation team for conducting the exercise
4. Orient the core team on the technical guidance, methodology and tools with support from WHO headquarters and regional offices
5. Update/adapt tools and guidance based on the country's specific context
6. Define the extent and levels of data collection
7. Supervise the data collection process and review progress periodically
8. Review and validate key results
9. Identify lessons learned and challenges
10. Disseminate key findings at the national level with all stakeholders
11. Catalyse use of these data for evidence-based workforce planning and policy-making

Annex 2: Lists of essential public health functions, subfunctions and services

Box A2.1: List of essential public health functions

- **Public health surveillance and monitoring:** monitoring and surveillance of population health status, risks, protective and promotive factors, threats to health, and health system performance and service utilization.
- **Public health emergency management:** managing public health emergencies for international and national health security.
- **Public health stewardship:** establishing effective public health institutional structures, leadership, coordination, accountability, regulations and laws.
- **Multisectoral planning, financing and management for public health:** supporting effective and efficient health systems and multisectoral planning, financing and management for public health.
- **Health protection:** protecting populations against health threats, for example environmental and occupational hazards and communicable and noncommunicable diseases, including mental health conditions, food insecurity, and chemical and radiation hazards.
- **Disease prevention and early detection:** prevention and early detection of communicable and noncommunicable diseases, including mental health conditions and prevention of injuries.
- **Health promotion:** promoting health and well-being as well as actions to address the wider determinants of health and inequity.
- **Community engagement and social participation:** strengthening community engagement, participation and social mobilization for health and well-being.
- **Public health workforce development:** developing and maintaining an adequate and competent public health workforce.
- **Health service quality and equity:** improving appropriateness, quality and equity in provision of and access to health services.
- **Public health research, evaluation and knowledge:** advancing public health research and knowledge development.
- **Access to and utilization of health products, supplies, equipment and technologies:** promoting equitable access to and rational use of safe, effective and quality-assured health products, supplies, equipment and technologies.

Source: (26).

Table A2.1: List of subfunctions

EPHF 1: Public health surveillance and monitoring
1.1: Planning for public health monitoring and surveillance
1.2: Routine and systematic collection of public health data
1.3: Analyzing and interpreting available public health data
1.4: Communicating public health data, information and evidence with key stakeholders, including communities
EPHF 2: Public health emergency management
2.1: Monitoring and analyzing available public health information to identify and anticipate potential and priority public health risks, including public health emergency scenarios
2.2: Planning and developing capacity for public health emergency preparedness and response as part of routine health system functioning in collaboration with other sectors, including development of a national health emergency response operations plan
2.3: Carrying out and coordinating effective and timely public health emergency response activities while supporting the continuity of essential functions and services
2.4: Planning and implementing recovery from public health emergencies with an integrated health system strengthening approach
2.5: Engaging with affected communities and stakeholders in the public and private sectors and health and allied sectors as part of whole-of-government and whole-of-society approaches to public health emergency management
EPHF 3: Public health stewardship
3.1: Advocating public health-oriented planning, policies and strategies
3.2: Strengthening institutional public health structures for the coordination, integration and delivery of public health functions and services in the health and other sectors
3.3: Developing, monitoring and evaluating public health regulations and laws that act as formal, regulatory, institutional frameworks for public health governance, functions and services
3.4: Maintaining and applying public health ethics and values in governance

EPHF 4: Multisectoral planning, financing and management for public health

4.1: Conducting evidenced-based health system planning and prioritization for managing population health needs, including alignment of national strategies, policies and plans for public health

4.2: Promoting integrated cross-sectoral prioritization and planning for public health with intersectoral accountability mechanisms and a Health in All Policies approach to manage population health needs

4.3: Promoting sustainable and integrated financing for public health by improving the generation, allocation and utilization of public and pooled funds to strengthen health system foundational capacities in all contexts

4.4: Planning and developing appropriate infrastructure for meeting population health needs, including key services in health facilities (water, sanitation, waste, energy)

4.5: Monitoring and assessment of policies and plans, financing of health systems, and multisectoral efforts for health that improve public health, promote equity and inclusion, and strengthen resilience

EPHF 5: Health protection

5.1: Developing, implementing, monitoring and evaluating regulatory and enforcement frameworks, including compliance with international legislation, and mechanisms for the protection of specified populations (for example, workers, patients, consumers) and the general public from health hazards

5.2: Conducting risk assessments, risk communication and other risk management actions needed for all manner of health hazards

5.3: Monitoring, preventing, mitigating and controlling confirmed and potential health hazards

EPHF 6: Disease prevention and early detection

6.1: Designing, implementing, monitoring and evaluating interventions, programs, services and platforms for primary, secondary and tertiary prevention, including consideration of equity

6.2: Integrating consideration of prevention and early detection into service delivery platform design or redesign

6.3: Working with partners to support the development, implementation, and monitoring of legislation, policies and program activities aimed at reducing exposure to risk factors and promoting factors that prevent disease

EPHF 7: Health promotion

7.1: Designing, implementing and evaluating specific interventions or programs to promote health, including changes in behavior, lifestyle, practices, and the environmental and social conditions that promote health and reduce health inequities

7.2: Taking and supporting action, with partners, to address wider determinants of both communicable and noncommunicable diseases through a whole-of-government, whole-of-society approach, including increasing individual and community participation in health-impacting decisions

7.3: Advocating, developing and monitoring legislation and policies aimed at promoting health and healthy behaviors and reducing inequities

7.4: Undertaking evidence-based advocacy and health communication to promote healthy behaviors and socioecological environments and build community trust

EPHF 8: Community engagement and social participation

8.1: Promoting participatory decision-making and planning for health and the promotion of societal change that enhances, promotes and protects health and well-being

8.2: Building community capacity for participating in public health planning, interventions, services, and preparedness and response measures

8.3: Monitoring and evaluation of community engagement in public health planning, interventions, services, and preparedness and response measures to promote equity and inclusion

8.4: Mobilizing and collaborating with communities and civil society groups in health services, interventions and programs as part of a whole-of-society approach

8.5: Engaging communities in health preparedness, readiness, response and recovery

EPHF 9: Public health workforce development

9.1: Undertaking planning and regular monitoring and evaluation of the public health workforce in relation to density, distribution and skills mix required to meet population health needs

9.2: Assessing and developing the education and training of the public health workforce, encompassing the full spectrum of public health competencies (for example, technical, strategic and leadership skills), including development of essential competencies for intersectoral work for health and for emergency response

9.3: Promoting the sustainability of the public health workforce by developing appropriate career pathways and assessing and creating safe and dignified working conditions

EPHF 10: Health service quality and equity

10.1: Assessing and improving the quality and appropriateness of health services and social care services as delivered to meet population health needs

10.2: Assessing and promoting equity in the provision of and access to health and social care services

10.3: Aligning the planning and delivery of health services and social care services with population health needs and priority risks

EPHF 11: Public health research, evaluation and knowledge

11.1: Strengthening and broadening the capacity to conduct and promote research in order to enhance the knowledge base and inform evidence-based policy, planning, legislation, financing and service delivery at all levels and in all contexts

11.2: Supporting knowledge development and implementation, including the translation of public health research into decision-making based on the best available evidence and practices for addressing population health needs

11.3: Promoting the inclusion and prioritization of public health operational research within broader research agendas

11.4: Promoting and maintaining ethical standards in public health research that promote a human rights-based approach to health

EPHF 12: Access to and utilization of health products, supplies, equipment and technologies

12.1: Developing and implementing policies, laws, regulations and interventions that promote the development of and equitable access to essential medicines and other medical products and health technologies in both national and international contexts

12.2: Developing and implementing evidence-based standards, laws, regulations, policies and interventions that ensure the safety, affordability and efficacy of essential medicines and other medical products and health technologies

12.3: Working with partners to manage the inclusion of evidence-based essential medicines and other medical products, health technologies and non-pharmacological interventions into clinical and public health practices

12.4: Managing supply chains for essential medicines and other medical products and health technologies in support of their rational use and equitable access in both national and international contexts, including stockpiling and prepositioning essential medicines, equipment and supplies

12.5: Monitoring and assessing the safety, effectiveness, efficacy, and utilization of, and access to, essential medicines and other medical and surgical products, health technologies and non-pharmacological interventions, in clinical and public health settings

Source: (26).

Table A2.2: List of public health services

Domains	Public health services
Public health information management services	<ol style="list-style-type: none"> 1. Ongoing and systematic surveillance and monitoring of public health-related data, including population health status, health-related behaviors, disease incidence and prevalence, and health risks and hazards 2. Monitoring and evaluation of health systems, services and interventions, including health system performance, the health workforce, health service utilization and user satisfaction, and health system threats and vulnerabilities 3. Population health needs assessment and risk profiling to inform policies and planning, and financing and management of population health 4. Syntheses and analyses of available data and evidence (including health, behavioral and social, and other multisectoral data and information) to inform decision-making
Health protection services	<ol style="list-style-type: none"> 1. Emergency, contingency and incident planning for public health incidents and emergencies with an all-hazards risk management approach 2. Prevention, mitigation, management and control of health hazards in a defined population 3. Incident response actions
Health-promoting services	<ol style="list-style-type: none"> 1. Development, implementation, and monitoring and evaluation of health literacy interventions and programs enhancing the accessibility of health information and empowering communities to participate in public health planning and services 2. Development, implementation, and monitoring and evaluation of health-promoting activities, programs, services and interventions targeting determinants of health 3. Priority health promotion programs and services targeting specific risks, settings or populations, based on population need and priority risks 4. Working within the health sector, with partners and allied sectors, to develop environments that support health and healthy behaviors and reduce inequities through actions on the wider determinants of health
Disease prevention services	<ol style="list-style-type: none"> 1. Development, implementation, and monitoring and evaluation of actions, programs and interventions that aim to prevent adverse health outcomes, based on population need and equity (primary prevention) 2. Development, implementation, and monitoring and evaluation of actions, programs and interventions that support early identification and appropriate management of health risks to minimize their impact based on population need and equity (secondary prevention) 3. Development, implementation, and monitoring of actions, programs and interventions that minimize disease progression, complications or impacts (tertiary prevention)
Cross-cutting services	<ol style="list-style-type: none"> 1. Development, implementation, and monitoring and evaluation of public health institutional structures and capacities, including legislation, regulations, policies, institutions and workforce 2. Promotion and development of cross-organizational and multisectoral responsibility and accountability for health and well-being 3. Advocating, implementing and evaluating a community participatory approach to public health planning, including health system planning and health service design that centers around the values of inclusion and equity 4. Communication between relevant stakeholders that ensures the timely exchange of appropriate and accessible information relating to actual and potential public health issues 5. Working with partners in the health sector and allied sectors to provide high-quality health services to all populations in all contexts 6. Ensuring the availability and appropriate use of safe medicines and other medical products and health technologies in health services in support of better health outcomes and equity

Source: (26).

Annex 3: Occupational group titles related to health according to ISCO

ISCO-08			
Group code			Occupational title
Sub-major	Minor	Unit	
22			Health professionals
	221		Medical doctors
		2211	Generalist medical practitioners
		2212	Specialist medical practitioners
		2211	Generalist medical practitioners
	222		Nursing and midwifery professionals
		2221	Nursing professionals
		2222	Midwifery professionals
	223		Traditional and complementary medicine professionals
		2230	Traditional and complementary medicine professionals
	226		Other health professionals
		2261	Dentists
		2262	Pharmacists
		2263	Environmental and occupational health and hygiene professionals
		2264	Physiotherapists
		2265	Dieticians and nutritionists
		2266	Audiologists and speech therapists
		2267	Optometrists and ophthalmic opticians
		2269	Health professionals not elsewhere classified
32			Health associate professionals
	321		Medical and pharmaceutical technicians
		3211	Medical imaging and therapeutic equipment technicians
		3212	Medical and pathology laboratory technicians
		3213	Pharmaceutical technicians and assistants
		3214	Medical and dental prosthetic and related technicians

ISCO-08			
Group code			Occupational title
Sub-major	Minor	Unit	
	322		Nursing and midwifery associate professionals
		3221	Nursing associate professionals
		3222	Midwifery associate professionals
	323		Traditional and complementary medicine associate professionals
		3230	Traditional and complementary medicine associate professionals
	325		Other health associate professionals
		3251	Dental assistants and therapists
		3252	Medical records and health information technicians
		3253	Community health workers
		3254	Dispensing opticians
		3255	Physiotherapy technicians and assistants
		3256	Medical assistants
		3257	Environmental and occupational health inspectors and associates
		3258	Ambulance workers
		3259	Health associate professionals not elsewhere classified
53			Personal care workers
	532		Personal care workers in health services
		5321	Health care assistants
		5322	Home-based personal care workers
		5329	Personal care workers in health services not elsewhere classified
			Additional health-related unit groups
		1342	Health service managers
		1343	Aged care service managers
		2634	Psychologists
		2635	Social work and counselling professionals
		3344	Medical secretaries

Note: The complete list of occupational groups present in ISCO is available at [International Standard Classification of Occupations: ISCO-08 \(3\)](#).

Annex 4: Template for mapping national job titles to occupational groups listed in ISCO, with illustrative examples

National job title	Occupation group	ISCO-08 code	Group
Epidemiologist (exclusively delivering EPHFs, no clinical role)	Epidemiologist	-	Group 1
District surveillance officer (exclusively delivering EPHFs, no clinical role)	Epidemiologist	-	Group 1
National public health manager (exclusively delivering EPHFs, no clinical role)	Health services manager	1342	Group 1
District manager – public health (exclusively delivering EPHFs)	Health services manager	1342	Group 1
Pediatrician	Specialist medical practitioner (medical doctor)	2212	Group 2
District manager – doctor (delivering EPHFs in addition to clinical role)	Generalist/specialist medical practitioner (medical doctor)	2211/ 2212	Group 2
Medical officer	Generalist medical practitioners	2211	Group 2
District manager – nurse (delivering EPHFs in addition to clinical role)	Nursing professional	2221	Group 2
Health facility manager – doctor (delivering EPHFs in addition to clinical role)	Generalist/specialist medical practitioner (medical doctor)	2211/ 2212	Group 2
Primary care nurse (delivering EPHFs in addition to clinical role)	Nursing professional	2221	Group 2
Road safety expert	Civil engineer	2142	Group 3
Road safety expert	Traffic planner	2164	Group 3
Food safety inspector	Environmental and occupational health inspectors and associates	3257	Group 3
Sanitarian	Environmental and occupational health inspectors and associates	3257	Group 3

Note: Group 1 occupations may not be comprehensively listed in ISCO. In such a scenario, please map the specific job title to a broad occupation (e.g. – epidemiologist, public health specialist, etc.) and leave the ISCO code cell blank.

An example for mapping national job titles to occupations listed in ISCO, from an HLMA in Kenya is depicted in Table 1 of (29).

Annex 5: Template for mapping the occupations with the functions/ subfunctions/services they deliver, with illustrative examples

National job title	Occupational group	SF 1.1	SF 1.2	SF 2.1	SF 2.2	SF 2.3	SF 3.1	Etc	Eligible to be grouped under the workforce delivering the EPHFs? (Yes/No)
Group 1									
Epidemiologist	Epidemiologists	√	√			√	√		Yes
District surveillance officer	Epidemiologists			√	√		√		Yes
<i>(Add as necessary)</i>									
Group 2									
District manager – doctor	Generalist/specialist medical practitioner (medical doctor)			√		√			Yes
Medical officer	Generalist medical practitioners						√		Yes
District manager – nurse	Nursing professionals					√	√		Yes
Primary care nurse	Nursing professionals			√	√		√		Yes
Optician	Dispensing Opticians								No
<i>(Add as necessary)</i>									

National job title	Occupational group	SF 1.1	SF 1.2	SF 2.1	SF 2.2	SF 2.3	SF 3.1	Etc ...	Eligible to be grouped under the workforce delivering the EPHFs? (Yes/No)
Group 3									
Road safety expert	Civil engineers						√		Yes
Food safety inspector	Environmental and occupational health inspectors and associates				√		√		Yes
Sanitarian	Environmental and occupational health inspectors and associates						√		Yes
Police officer	Police inspectors and detectives								No
<i>(Add as necessary)</i>									

Note: If the occupation is not delivering any of the functions/subfunctions/services prioritized for the mapping and measurement exercise, then select “No” in the final column. SF – subfunction.

Annex 6: Template for estimating the stock, with illustrative examples

National job title	Occupational group	ISCO-08 code	Estimated headcount	Source and remarks
Group 1				
Epidemiologist	Epidemiologists	–	1500	National association of public health (working at ministry of health, agriculture, climate, national public health institute, etc.)
District surveillance officer	Epidemiologists	–	500	Ministry of health
<i>(Add as necessary)</i>				
Group 2				
District manager – doctor	Generalist/specialist medical practitioner (medical doctor)	2211/ 2212	200	Ministry of health
Medical officer	Generalist medical practitioners	2211	4524	NHWA data reported by focal point in 2021
District manager – nurse	Nursing professionals	2221	50	Ministry of health
Primary care nurse	Nursing professionals	2221	9864	Ministry of health
<i>(Add as necessary)</i>				
Group 3				
Road safety expert	Civil engineers	2164	7500	Based on consultations with technical experts
Food safety inspector	Environmental and occupational health inspectors and associates	3257	800	Based on consultations with technical experts
Sanitarian	Environmental and occupational health inspectors and associates	3257	2000	Labour force survey data from national statistical office
<i>(Add as necessary)</i>				

Note: Data shown in the template are mock data. Stock data for occupations may be extracted from various sources such as the NHWA (if updated), or from the ministry of health, other ministries/departments, regulatory bodies, professional associations and councils, other ministries, census, labour force surveys, etc. The appropriate data source can be selected based on the consultations with stakeholders. A snowball sampling approach can be used, for consultations with technical experts from the Group 3 occupations as well as those Group 1 occupations which are outside the health sector. The appropriate source needs to be mentioned in the table, along with remarks about the source/data (if any).

Annex 7: Template for estimating the share of time spent in delivery of EPHFs, with illustrative examples

National job title	Occupational group	Share of time spent in delivery of EPHFs (unweighted average)				
Group 1						
Epidemiologist	Epidemiologists	100%				
District surveillance officer	Epidemiologists	100%				
<i>(Add as necessary)</i>						
Group 2		Overall	Tertiary level	Secondary level	Primary level	Community level
District manager – doctor	Generalist/specialist medical practitioner (medical doctor)	80%	–	–	–	–
Medical officer	Generalist medical practitioners	30%	10%	20%	50%	–
District manager – nurse	Nursing professionals	80%	–	–	–	–
Primary care nurse	Nursing professionals	25%	15%	25%	35%	–
<i>(Add as necessary)</i>						
Group 3						
Road safety expert	Civil engineers	100%				
Food safety inspector	Environmental and occupational health inspectors and associates	100%				
Sanitarian	Environmental and occupational health inspectors and associates	100%				
<i>(Add as necessary)</i>						

Note: Data shown in the template are mock data.

Annex 8: Template for estimating the FTEs, with illustrative examples

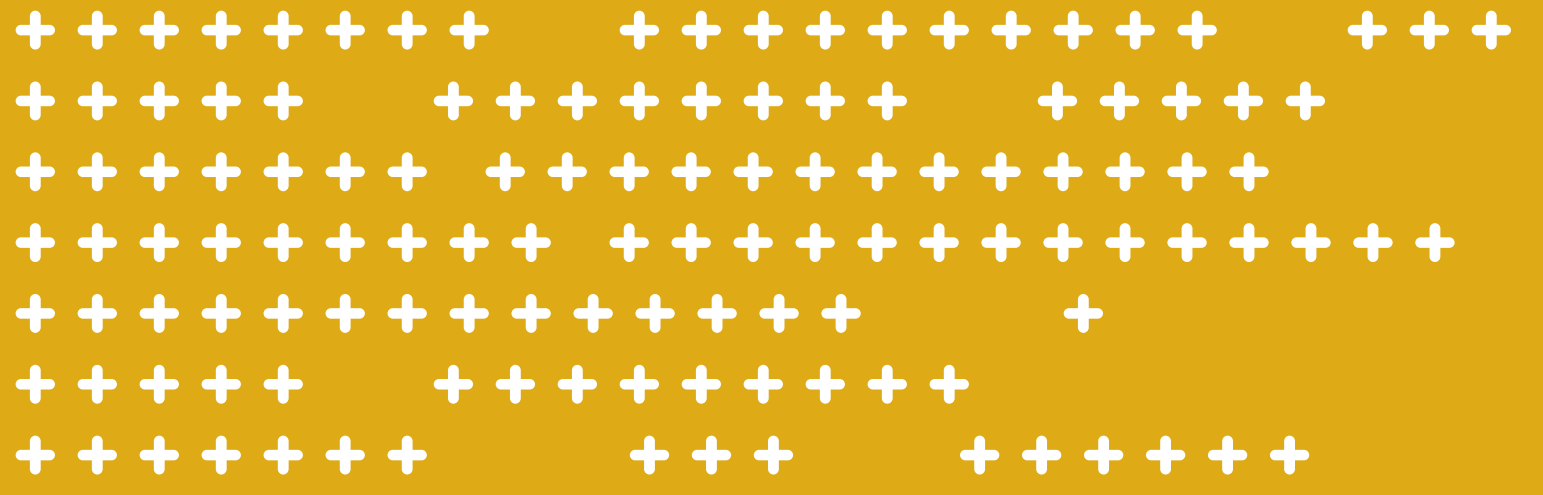
National job titles	Occupational group	Number of FTEs (product of the stock and the average share of time)
Group 1		
Epidemiologist	Epidemiologists	1500
District surveillance officer	Epidemiologists	500
<i>(Add as necessary)</i>		
Group 2		
District manager – doctor	Generalist/specialist medical practitioner (medical doctor)	160
Medical officer	Generalist medical practitioners	1357
District manager – nurse	Nursing professionals	40
Primary care nurse	Nursing professionals	2466
<i>(Add as necessary)</i>		
Group 3		
Road safety expert	Civil engineers	7500
Food safety inspector	Environmental and occupational health inspectors and associates	800
Sanitarian	Environmental and occupational health inspectors and associates	2000
<i>(Add as necessary)</i>		

Note: Data shown in the template are mock data.

Annex 9: Template for gap assessment, by function/subfunction/service and by occupation

Function/ subfunction/ service	Current status	Desired/ideal status	Nature of the gap	Size of the gap (if relevant)

Occupation	Current status	Desired/ideal status	Nature of the gap	Size of the gap (if relevant)



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