

Is there a golden recipe? A scoping review of public health workforce development

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Is there a golden recipe? A scoping review of public health workforce development

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Background: This study intended to design a suitable and comprehensive approach for a public health workforce development plan with the ultimate goal of meeting the health objectives in different European Region countries. **Methods:** We performed a scoping review, including an accurate and exhaustive country-specific hand-search process, mapping the key concepts and practices used in public health workforce development based on the available evidence worldwide. **Results:** We identified nine comparative measures, based on common features from a scoping literature review, for the assessment of public health workforce development plans available in selected countries. This list of nine comparative measures includes: (i) Alignment between the 10 Essential Public Health Operations (EPHOs) or core public health functions and organizational resources and public health priority areas; (ii) Regulations and Norms; (iii) Capacity Assessment; (iv) Datasets and Databases; (v) Workforce Development Strategies, Planning and Management; (vi) Education, Training, Core Competencies and Models; (vii) Licensing, Accreditation and Credentialing; (viii) Forecasting Strategies for Enumerating and Quotas and (ix) Ethical and Professional Codes of Conduct. These measures are essential to develop, sustain and modernize the public health workforce effectively. **Conclusion:** We propose a well-balanced set of measures for countries aiming to improve or develop their public health workforce based on instruments that are successfully used and applied in a wide range of countries with different public health systems. However, the implementation should be tailored and adopted according to the specific country context and available recourses.

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Introduction

Health systems nowadays are ‘awakening’ to the pressing need to assure, develop and support an effective public health workforce (PHW), and adequately address current challenges and risks related to health care and population health. Indeed, there is sufficient evidence to ‘sound the alarm’ over the seemingly lethargic health systems governance and structure. We are confronted with many health-related factors, challenges and uncertainties affecting the PHW: non-communicable diseases, globalization, ageing, social and health inequalities, demographic shifts, migration, unfavourable epidemiology, cultural and social population profiles and continuously changing population needs.^{1–5} All these challenges need to be met by a PHW with sufficient capacity and qualifications.

Multi-professional, inter-disciplinary and inter-sectoral public health (PH)-related activities require a wide range of professional groups, with diverse knowledge, qualifications and skills drawn together in order to provide PH services.^{6,7} The PHW represents a broad range of health professional groups, with various curricula, knowledge, qualifications and skills, which differ in each country. The PHW can be described as all staff engaged in PH activities for whom PH is the primary part of their role, and who are ‘primarily involved in protecting and promoting the health of whole or specific populations’.⁸ Due to this multi-professional, multidisciplinary, as well as inter-and trans-disciplinary nature, the professionals can be represented in layers, dividing PHW into the ‘core’ and the ‘wider’ PHW.^{9,10} The PHW, depending on the specific country, has different quality of life expectations, type of job, available career path and amount of remuneration. Even between bordering countries, the impact on labour market participation and recruitment in the PH sector is not comparable.^{11–13} These and many other related challenges are accentuating the need for a flexible and responsive PHW, as increasing the number of PH workers and professionals alone will not address the abovementioned challenges.^{13,14}

From the perspective of Health 2020: the European policy for health and well-being, one of the most important goals is ‘preserving health and productivity of all citizens’³¹ in countries of the European Region. However, each country may have very different focus on disease treatment, prevention and health promotion, etc., which partially or entirely influences competencies and capabilities of the entire PHW. Also, the structure of the health care systems (national, regional, local levels) may cause a discrepancy in responsibilities, planning and forecasting of PHW needs. Moreover, The Ten Essential Public Health Services or The Ten Essential Public Health Operations (EPhOs), as defined by the World Health Organization (WHO) should be considered in order to ensure proper financing and resource mobilization, adequate and well-trained human resources and an effective governance and leadership in order to protect and promote the health and well-being of all citizens.^{15,16} The challenge is thus, to develop a comprehensive and responsive PH system able to fulfil all the EPhOs, to support the development of a competent and sustainable PHW and address the current burden of disease.²

To date, only some modest efforts have been made to develop the PHW.^{6,17–20} Although, the available documents, such as the WHO’s Global strategy on human resources for health (Workforce 2030)²¹ and the contribution of the Board of the Global Health Workforce Alliance,²² were developed with the health workforce in mind, they undoubtedly present useful solutions to support the PHW.

Despite the urgency of PHW development, little work has been done so far to ‘institutionalize’ and professionalize workforce development in Europe and, to our knowledge, there is no uniform tool for effective PHW development available in the European Region.^{6,21} Therefore, recognizing the absence of a ‘golden recipe’ for PHW development, the aim of this study was to (i) identify the measure for PHW development, based on the available international evidence; and (ii) propose a novel but practical and uniform approach supporting PHW planners at different administrative

levels in the European Region. We sought to achieve these aims by conducting a detailed analysis of existing PHW development plans.

Methods

The methodology of this analytical work consisted of an extensive scoping review²³ which is a powerful instrument for providing an initial overview of complex research topics, which have not been comprehensively reviewed to date. The methodology of this review focuses on five sequential stages:^{24,25} (i) identification of the research question, (ii) identification of relevant studies, (iii) study selection, (iv) data presentation and (v) collating the results.

The review was carried out by two reviewers (O.G. and G.B.) focussing on the literature published in English between 1 January 2000 and 30 October 2016. The research question we are trying to answer is: what are the different PHW development strategies/plans/frameworks used worldwide and what common traits do they share? Two types of documents were reviewed: scientific and grey literature. PubMed and Google Scholar were accessed together with grey literature from a variety of PH institutions in searching for scientific and grey literature, guidelines, primary research studies and systematic reviews. The (MeSH) terms used were as follows: ‘public health’ and ‘manpower’ or ‘workforce’, combined with ‘competencies’. This strategy yielded 449 hits. Second search resulted in 105 hits using the following terms: ‘public health’ combined with ‘human resources’ or ‘manpower’ combined with ‘work plan’. Lastly, the combination of the following terms: ‘public health’ and ‘manpower’ or ‘human resources’ or ‘workforce’ and ‘development plan’ or ‘development’ resulted in further 48 hits. The searches were limited by language of publication and not limited by study design. The same two researchers independently screened the titles and abstracts of the identified articles. We used EndNote reference management system to identify duplicate publications. Application of the aforementioned searching criteria resulted mostly in the identification of general materials related to public sector workforce, and only 17 publications, which were related to PHW, met our inclusion criteria.

Further sources were identified by hand-searching relevant websites such as WHO²⁴ and the EU Joint Action on Health Workforce Planning and Forecasting.²⁵ Also, all available national PHW plans in the European Region countries, North America and Trans-Tasman countries were identified by hand-searching through Google Web Search using the same search terms. For the Netherlands, we also used Dutch language for the hand-search. Three authors (K.C., G.B. and O.G.) independently assessed the lists of potentially relevant sources. After comparing the results and eliminating the duplicates, these three authors reached consensus on the included material. The hand-search process resulted in 39 sources that were mainly web publications.

Results

We retrieved in total 56 publications from the scoping review from fourteen countries with available strategies, plans, or models for PHW development (table 1). We have grouped the countries based on six geographical clusters: (i) Western Europe (Netherlands, France, Germany, Switzerland); (ii) Northern Europe-Scandinavia (UK, Norway, Denmark); (iii) Mediterranean (Italy, Spain); (iv) Central-Eastern Europe (Estonia); (v) Trans-Tasman (Australia, New Zealand) and (vi) North America (the USA, Canada). By analyzing the content of the literature, the authors identified the most common reoccurring factors characterizing PHW development planning in different countries worldwide. They constituted nine comparative measures (table 2). Table 3 summarizes the consensus reached by three researchers (K.C., G.B. and O.G.) regarding the total score per measure. If the specific measure was discussed in selected sources related to the

Table 1 The overview of the resources retrieved from the scoping review

Academic sources (17)	Grey literature (39) ^a
1. Van Greunigen M, Batenburg RS, Van der Velden LF. Ten years of health workforce planning in the Netherlands: a tentative evaluation of GP planning as an example. <i>Hum Resour Health</i> . 2012; 10: 21.	1. Handbook on Health Workforce Planning Methodologies Across EU Countries. (2015) http://healthworkforce.eu/wp-content/uploads/2015/11/50306_WP5_D052-Handbook-on-HWF-Planning-Methodologies-across-EU-Countries_Release-1_Final-version.pdf
2. 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. <i>BMC Public Health</i> . 2015; 15: 750.	2. The Health Care Workforce in Europe Learning from experience (2006) http://www.euro.who.int/_data/assets/pdf_file/0008/91475/E89156.pdf
3. Paccaud F, Weihoefen A, Frank M. Public Health Workforce in Switzerland: are public health workers lacking? <i>Int J Public Health</i> . 2013; 58: 799–800.	3. Capaciteit van de beroeps groepen in de publieke Gezondheidszorg. https://www.nvng.nl/system/files/publications/a4529.pdf
4. Vicarelli G, Pavolini E. Health workforce governance in Italy. <i>Health Policy</i> . 2015; 119: 1606–12.	4. Handboek Moderniseren Medische Verpleegopleidingen Sociale Geneeskunde (2007) http://www.nvawg.nl/afbeeldingen/StukkenVereniging/Opleiding%20en%20registratie/2008%20KNMG%20HandboekMedischeVerpleegopleidingen.pdf
5. Murphy M, Fernandez A, Daponte A. The Spanish public health workforce: Perspectives in public health. 2014; 134: 257–8.	5. Health Systems in Transition. France: Health System Review (2015) http://www.euro.who.int/_data/assets/pdf_file/0011/297938/France-HIT.pdf
6. Gebbie K, Goldstein BD, Gregorio Di, et al. The National Board of Public Health Examiners: Credentialing Public Health Graduates. <i>Public Health Reports</i> . 2007; 122: 435–440.	6. Public Health in Germany Structures, Developments and Global Challenges (2015) http://www.akademienet.de/fileadmin/redaktion/user_upload/Publikationen/Stellungnahmen/3Akad_Stellungnahme_Public_Health_EN_web.pdf
7. Dean HD, Myles RL, Spears-Jones C, Bishop-Cline A, Fenton KA. A strategic approach to public health workforce development and capacity building. <i>Am J Prev Med</i> . 2014; 47 Suppl 3: S288–96.	7. Public Health Workforce in Switzerland: A National Census (2013) http://www.sshplus.ch/MG/pdf_public_health_february_2013b-4.pdf
8. Drehoobi P, Stover BH, Koo D. On the Road to a Stronger Public Health Workforce: Visual Tools to Address Complex Challenges. <i>American Journal of Preventive Medicine</i> . 2014; 47 Suppl 3: S280–55.	8. Fit for the Future – Public Health People A review of the public health workforce (2016) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/524599/Fit_for_the_Future_Report.pdf
9. Lichtveld MY, Cloffi JP. Public health workforce development: progress, challenges, and opportunities. <i>Journal of public health management and practice</i> : JPHMP. 2003; 9: 443–50.	9. Healthy Lives, Healthy People: Our strategy for public health in England (2010) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216096/dh_127424.pdf
10. Ruderman M, Grason H. Health Workforce Development: Keeping Population Health Goals in Mind. <i>J Public Health Management Practice</i> . 2002; 84–86.	10. Forecasting the adult social care workforce to 2035: workforce intelligence report (2016) https://www.scie-socialcareonline.org.uk/forecasting-the-adult-social-care-workforce-to-2035-workforce-intelligence-report/r/11G000000CEP4FIAV
11. Erwin PC, Hamilton CB, Welch S, Hinds B. The Local Public Health System Assessment of MAPP/The National Public Health Performance Standards Local Tool: a community-based, public health practice and academic collaborative approach to implementation. <i>Journal of public health management and practice</i> : JPHMP. 2006; 12: S28–32.	11. Understanding the wider public health workforce (2015) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/50752/CWU_Understanding_the_wider_public_health_workforce.pdf
12. Corso LC, Lenaway D, Beitsch LM, Landrum LB, Deutsch H. The national public health performance standards: driving quality improvement in public health systems. <i>Journal of public health management and practice</i> : JPHMP. 2010; 16: 19–23.	12. Mapping the core public health workforce Final report (2014) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584408/public_health_skills_and_knowledge_framework.pdf
13. Potter MA, Barron G, Cloffi JP. A model for public health workforce development using the National Public Health Performance Standards Program. <i>Journal of public health management and practice</i> : JPHMP. 2003; 9: 199–207.	13. Public Health Skills and Knowledge Framework (2016) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584408/public_health_skills_and_knowledge_framework.pdf
14. Beck AJ, Boulton ML, Coronado F. Enumeration of the governmental public health workforce, 2014. <i>Am J Prev Med</i> . 2014; 47 Suppl 3: S306–13.	14. Impact of Ageing on Curative Health Care Workforce in Selected EU Countries (2013) https://www.researchgate.net/publication/315059995_Impact_of_Ageing_on_Curative_Health_Care_Workforce_in_Selected_EU_Countries
15. Merrill JA, Keeling JW. Understanding the local public health workforce: labels versus substance. <i>Am J Prev Med</i> . 2014; 47 Suppl 3: S324–30.	15. Estonian Health System: Analysis of the Strengths, Weaknesses, Opportunities and Threats (2005) http://www.rahvatervis.ut.ee/bitstream/11361/1/Atun2005.pdf
16. Boulton ML, Beck AJ, Coronado F, Merrill JA, Friedman CP, Stamas GD, et al. Public health workforce taxonomy. <i>Am J Prev Med</i> . 2014; 47 Suppl 3: S314–23.	16. Publications/public-health-in-estonia-2008-an-analysis-of-public-health-operations-services-and-activities http://www.euro.who.int/en/countries/estonia/publications/public-health-in-estonia-2008-an-analysis-of-public-health-operations-services-and-activities
17. Hilliard TM, Boulton ML. Public Health Workforce Research in Review: A 25-Year Retrospective. <i>Am J Prev Med</i> 2012; 42(Suppl 1): S17–528.	17. Building Public Health Workforce Capacity in Australia (n.d.) http://capia.com.au/documents/Building-PH-Workforce-Capacity-Australia.pdf

a: The sources used in the right column (Grey literature) are presented only by the name of the publication and the respective URL address. The full version of the list is available in the Supplementary File.

Table 2 List of comparative measures

No	Comparative measure	Description
1	The alignment between the 10 Essential Public Health Operations (EPHOs) or Core Public Health Functions and Organizational Resources and Priority Areas	The EPHOs are separated into 10 broad categories: (1) surveillance of population health and well-being; (2) monitoring and response to health hazards and emergencies; (3) health protection, including environmental, occupational and food safety and others; (4) health promotion, including action to address social determinants and health inequity; (5) disease prevention, including early detection of illness; (6) assuring governance for health; (7) assuring a competent PHW; (8) assuring organizational structures and financing; (9) information, communication and social mobilization for health; (10) advancing public health research to inform policy and practice. Organizational Resources and Priority Areas provide information on infrastructure (financial, human and technical resources, development of the PH system in a certain country or organization. Priority areas would correspond to the country's PH strategic priorities and problems.
2	Regulation and Norms: National/Regional levels	The country has to assure an effective PH governance and legislation, financing and institutional support. National strategies, policies and plans for PH on each level must be in place.
3	Public Health Capacity Assessment	A PH capacity assessment measures the ability and degree of achievement of the PH system for its national/regional/community health-related goals.
4	Data, Datasets and Databases on PHW	Datasets/databases: a centralized source(s) containing statistical information for and from PH agencies across the country on the number of available (currently active or not active) PH professionals in a country, recorded in a registry or database.
5	Workforce Development Strategies, Planning and Management	Development Strategies, Planning and Management: a strategic approach is needed in order to attract, recruit and retain a PHW; to provide the available PHW with development opportunities to ensure effective and innovative delivery of public health-care related goals; to recognize the performance and achievements of the PHW.
6	Public Health Education, Training, Core Competencies, Competency Models	PH training and investments in public health personnel sector must be linked with general population needs and a country's health care demands. The Core Competencies or Core Competencies for PH Professionals (defined by the ten Essential Public Health Services) support PHW development and planning. PH organizations/agencies can use these competencies as a tool for performance improvement, preparation for accreditation and in order to meet training needs in PH practice.
7	Licensing, Accreditation and Credentials	Both governmental and private health agencies are responsible for developing and maintaining consistent credentialing standards. Credentialing covers a broad interval of terms used for the many existing programmes, such as licensure, certification, accreditation, recognition designation and certificates. The credentials might be very different depending on PH disciplines and national regulatory systems.
8	Forecasting Strategies for Enumerating and Quotas	Forecasting Strategies for Enumerating and Quotas are very useful tools for effective delivery of public health services. Such tools are based on reliable and updated health workforce information also including the numbers of graduates from PH and health-related programmes, labour market analyses, and scanning of future health scenarios. Forecasting strategies for PHW requirements are very much related to PHW development-planning-management strategies as they should monitor the whole process and provide up-to-date information on development and implementation.
9	Codes of Ethics and Professional Conduct	Such codes should be used principally for PH professional practice within institutions providing PH services and fulfilling PH functions. They should explain and define the key principles of the ethical practice and conduct of PH. The key assumptions of such codes built-in a PH perspective are values and beliefs. The elements of ethical codes of conduct should already be introduced at the PH undergraduate and graduate levels in order to develop and sustain good PH practice.

country under review, a 'positive score' was assigned irrespective of the quantity, breadth and depth of the information available. Of note, not all countries addressed an equal number of measures and not all measures were covered by each country (table 3).

Below, we present a brief description of how countries with PHW development plans or models are engaged in the nine identified comparative measures.

Alignment between the 10 essential public health operations (EPHOs) or core public health functions and organizational resources, priority areas

There is evidence of employment of the ten EPHOs and a proper linkage in place in several Western European countries (cluster 1). Nonetheless, different countries make reference to different 'nuances' of the EPHOs.²⁶ Regardless of these differences, all countries are engaged with this fundamental measure, which they tailor according to their specific systems and organizational contexts. With the exception of Italy (cluster 3), the organizational resources,

priority areas and the core PH functions are explicitly envisaged in all countries with available plans for PHW development. At a national level, this measure implies the existence/availability of a number of institutions and agencies that provide multidisciplinary and multi-professional expertise in different PH fields. At a regional and local level, it consists of the existence/availability of different regional/local institutions or different companies, firms, professional associations or non-governmental organizations.

Regulations and norms: national/regional levels

It should be noted that 'technically', PH is a not a regulated profession in the EU region.¹⁰ However, this measure is properly implemented in all countries with available plans/models for PHW development. Regulations and norms in each country are structurally based and geared towards their respective health system models and are effective on the respective territorial units/administrative divisions. The existence of PH law or regulation indicates proper functioning and financing of the PH system.

Table 3 Cross-comparison of core features for countries with available public health workforce development plans/models

Country	Comparative measure									Score
	1	2	3	4	5	6	7	8	9	
Cluster 1: Western Europe										7.3 ^a
Netherlands	V	V	V	V	V	V	V	V	V	9
France	X	V	V	V	V	V	V	V	V	8
Germany	V	V	X	X	X	V	V	V	X	5
Switzerland	V	V	V	V	X	V	X/?	V	V	7
Cluster 2: Northern Europe-Scandinavia										8
UK	V	V	V	V	V	V	V	V	V	9
Norway	V	V	V	V	V	V	X/?	V	X	7
Denmark	V	V	V	V	V	V	V	V	X	8
Cluster 3: Mediterranean										6
Italy	X	V	X	V	V	V	X/?	V	X	5
Spain	V	V	V	V	V	V	X/?	V	X	7
Cluster 4: Central-Eastern Europe										8
Estonia	V	V	V	V	V	V	X/?	V	V	8
Cluster 5: Trans-Tasman										9
Australia	V	V	V	V	V	V	V	V	V	9
New Zealand	V	V	V	V	V	V	V	V	V	9
Cluster 6: North America										9
USA	V	V	V	V	V	V	V	V	V	9
Canada	V	V	V	V	V	V	V	V	V	9

Note: The scores presented in this table indicate the judgment based on the agreement of three independent researchers. The measures' terminology and definitions may vary according to the respective identified sources. V: measure is addressed in identified/relevant sources. X: measure is not addressed in identified/relevant sources. V: measure fulfilled, but has a different terminology/definition. X/? : not positive or negative judgments can be made due to insufficient information and incomparable formulations.

a: Mean score for each cluster.

Public health capacity assessment

The capacity assessment was similarly in place as the main characteristic of PHW development plans in most countries. In some countries, capacity assessment is conducted by independent Committees/Boards whose scope of work is to determine the required/necessary training capacity and expertise, in order to meet the (continually growing), demand of the population for high-quality health care services. In other countries, the Ministry of Health is responsible for the overall PH capacity assessment along with other core functions including the preparation of government PH policies and organization and financing of the health care system.

Data, datasets and databases on PHW

There are databases related to health workforce (HW) in general (including PHW), but fewer for PHW in particular in most of the countries, regardless of the heterogeneity of the quantity and quality of the indicators provided. Notwithstanding the absence of uniform data sources in several countries, there is information for all the countries in terms of e.g. the number of physicians, nurses, pharmacists, midwives, etc. There are no specific indicators regarding PHW as such and, hence, a proper assessment of this measure should be customized in accordance to the specific context and circumstances of each country with consideration for the specificities and the wide range of health information systems in place.

Workforce development strategies, planning and management

With the exception of Germany and Switzerland (cluster 1), there was evidence of a clear PHW development strategy and proper planning and management in all the available models/frameworks. The implication might be due to federal states division and that the PH Systems in these countries have a complex structure organized on different levels of governance. In some countries, different simulation and forecasting models are used to project the required workforce supply for meeting all health-care related needs at a

population level.²⁷ Conversely, in other countries, the Ministry of Health is in charge of projecting the PHW capacity, and in still others, regional and local authorities support the national authorities in charge of projecting/forecasting the required PHW.

Public health education, training, core competencies and competency models

Many countries have academic PH education programmes at the bachelor, master and post-graduate levels. There is a model of Core Public Health Competencies developed by the Association of Schools of Public Health in the European Region (ASPHER)^{28,29} to support PH education in Europe. Some countries exhibited well-structured and explicit competency-based frameworks for capacity building and continuous professional development of the PHW.

Licensing, accreditation and credentials

Several countries have already established clear procedures in terms of licensing, accreditation, credentials and quality assurance in the PH field. However, the issue of licensing, accreditation, credentials and quality assurance are not straightforward or well-established in many countries of the European Region. Indeed, in several European countries, there are no clear professional category boundaries. Furthermore, professional credentialing is not a core requirement and there is lack of a clear professional licensing system, or formalized career ladder/path.

Forecasting methods/strategies for enumerating and quotas

Enumeration and allocation of the PHW is properly implemented in countries with available plans/models for PHW development. Nonetheless, some countries have a broad-based forecasting capacity, whereas others have limited capacities or none. For some countries, there is little information available regarding PHW forecasting. Regardless of the specific current status of each European country and beyond, comprehensive inventories and evidence-based

allocation of PHW capacities should also be deemed a core characteristic for a successful strategy of PHW development planning. Ultimately, the governments and their related agencies should have the core function of controlling and preventing PHW shortages or oversupplies.

Codes of ethics and professional conduct

There was evidence of the implementation of ethical and professional codes of conduct in the Netherlands, Switzerland and France (cluster 1) and in the UK but not in Norway and Denmark (cluster 2). In addition, this measure was met in all countries pertinent to clusters 4–6, but not in countries of cluster 3 (Italy and Spain). The US employs the American Public Health Association Code of ethics which defines the distinctive elements of PH and related ethical principles.³⁰ New Zealand has a solid ethical expertise for PH practitioners for specific areas,³¹ in Canada, the Public Health Agency is in charge, whereas in the UK the respective code of conduct focuses on professional behaviours, principles, values and ethical practices.

Discussion

The study identifies a set of common elements based on plans or tools that are successfully used and applied in a wide range of countries with different PH systems. The framework created by these nine measures can begin to approach a ‘golden recipe’ for PHW development and planning. Such tool may be adopted in accordance with the specific statutory environment and circumstances of a particular country, its health system organization and structure, as well as the current burden of disease and population health profile. Overall, all of these measures are essential ingredients to cultivate or modernize the PH system and ensure successful development of an effective PH workforce.

While recent systematic review³² confirms the descriptive nature of the majority of studies focussing on PHW sustainability and progress, it also calls for more practical and model-based attempts in order to address current uncertainty regarding PHW demand and development. This is in line with the results of our study, which attempts to provide a more systematic and pragmatic approach. Keeping diversity of health systems in mind³³ and in order to meet the needs of a diverse population,^{34,35} it is highly recommended to make an assessment and structuring of all factors and specific items which might be affecting PHW development. For example, ‘The Fishbone’, or Ishikawa diagram^{36,37} can be used to present a detailed overview of possible influencing factors related to, among others, the composition of PH workers, competency of the PHW, assessment of the contextual environment and circumstances, and assessment of the work environment.

The inconsistency of PHW definition in EU might have influenced, at least to a certain extent, the outcomes of this work. For the purpose of this paper, we have not accounted for the educational background and the layer division within PHW in core and wider workforce^{9,10} which should be definitely considered during the implementation process.

Different countries make reference to different ‘nuances’ of the EPHOs.¹⁵ Also, the organizational resources, priority areas and the core PH functions were explicitly envisaged in 13 out of 14 countries with available plans for PHW development. Despite the heterogeneity of the quantity and quality of the indicators provided, there was evidence of available databases related to health workforce in general. Also clear development strategies, planning and management strategies and models were available. In some countries, different simulation and forecasting models are widely applied to calculate PHW supply and demand.³⁸ Many countries have academic PH education programmes at the bachelor, master and post-graduate levels and a model of Core Public Health Competencies (ASPHER) is used to support PH education in

Europe.^{28,29} We have found a number of successful examples licensing, accreditation procedures and credentials in the field of PH.³⁹ There was also evidence of the implementation of ethical and professional codes of conduct in some European countries, however the North American and Trans-Tasman regions have successfully implemented a considerably more solid ethical framework for the PHW.^{31,40} Even though all selected countries could be compared in terms of presence or absence of certain measure, all 14 countries have certainly different approaches for presentation, depth and consistency of information regarding PHW.

Study limitations

There are limitations to the current study which should be carefully considered. This work was a scoping review only, whereas a systematic review would help to bring more findings into evidence. PRISMA statement (a minimum set of items for reporting in systematic reviews and meta-analyses) was not employed because our study was a scoping review rather than a conventional systematic review. It should also be pointed out that only English language sources were used in this analysis and there was no access to national sources of information, except the Netherlands, which might have caused more favourable outcomes compared to other countries included in this analysis. Furthermore, Asia’s geographical sub-regions were not included in this scoping review due to disproportionate economic stages and especially PH systems including also a lack of available documents on this matter in the English language. Furthermore, some valuable information from selected countries (such as Germany and Switzerland) could have been ignored due to federal states division and absence of reliable sources, which might have caused lower scores and eventually an overall lower result. More importantly, the synthesis and accuracy of the information provided in this report should be verified and amended by country experts. Hence, we suggest approaching authoritative experts in each country included in this assessment to check and verify the quality of information pertinent to their respective settings. Furthermore, we suggest an update of the search of the sources provided, as many of the websites are frequently updating their information and also they are permanently replacing older reports with newer versions.

Notwithstanding these limitations, this study provides important insights for the establishment of a successful PHW development plan. This work should inform a broad audience including policy-makers and decision-makers of the Ministries of Health, PH professionals, higher education PH specialists and PH researchers at large.

Conclusion

Findings from this scoping review suggest the need for the following: increasing the capability of the current PHW through continuing education, retraining, and cross-training; improving the educational system through the academic preparation of PH professionals at community colleges, undergraduate and post-graduate education; improving pathways for PH careers for new workers and retaining existing workers; and strengthening organizational capacity in order to support the PHW. In addition, policy analysis would be a useful practical step to be conducted in line with the recommendations of the literature and best practices used elsewhere in order to suggest a clear and structured strategy for facilitating and supporting an effective implementation of PHW development plans.

In conclusion, this study suggests a valuable framework with a list of comparative measures applicable to a wide range of PH organizations in the European Region addressing the existing PHW needs/gaps and supporting planning with the ultimate goal of meeting each country’s health reform objectives.

Supplementary data

Supplementary data are available at *EURPUB* online.

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Conflicts of interest: None declared.

Key points

- This study aimed to design a suitable and comprehensive approach for public health workforce development planning with the ultimate goal of meeting the health objectives in different European countries.
- The study establishes nine comparative measures, which can be used for the assessment of public health workforce development based on the common features identified by a scoping literature review.
- We propose a well-balanced set of measures for countries aiming to improve or develop their public health workforce based on instruments that are successfully used and applied in a wide range of countries with different public health systems.
- The implementation of the proposed framework should be tailored and adopted according to the specific country context and available resources.

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Effect of lifestyle counselling on health-related quality of life in women at high risk for gestational diabetes

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Background: The incidence of gestational diabetes (GDM) is increasing and interventions to curb the detrimental effects of GDM are needed. We have previously reported that a combined diet and physical activity intervention has the potential to reduce GDM among high-risk women. It is also important to know whether the intervention affects health-related quality of life (HRQoL). **Methods:** A total of 378 women at high risk for GDM were randomized into an intervention (lifestyle counselling four times during pregnancy, $n=192$), or a control group ($n=186$) before 20 gestational weeks. HRQoL was assessed with the 15D-instrument six times: once during each trimester and at six weeks, six months and 12 months postpartum. **Results:** In this study population, the cumulative incidence of GDM was similar in the intervention and the control group (45.7 vs. 44.5%). There was no difference between the 15D scores of the control and intervention groups at any of the time points. **Conclusions:** Combined diet and physical activity intervention did not provide HRQoL benefits in the study. A high prevalence of GDM in both study groups may have confounded the effect of the intervention.

Introduction

Gestational diabetes (GDM), defined as a glucose metabolism disturbance that is first detected during pregnancy, is increasing globally. As GDM is associated with short- and long-term complications for both the mother and the child, it is desirable to find strategies to prevent GDM. Studies assessing the efficacy of lifestyle interventions (mixed diet and physical activity) in preventing GDM and associated pregnancy complications have however been heterogeneous, and the results somewhat inconclusive with some positive results.^{1–3}

WHO defines quality of life (QoL) as ‘individuals’ perceptions of their position in life in the context of the culture and value systems in

which they live and in relation to their goals, expectations, standards, and concerns’.⁴ Health-related quality of life (HRQoL) can be defined as ‘The (mainly) subjective quality of life of the individual in relation to health or in response to the onset of disease’ including the individual’s physical and mental health perceptions together with health risks and conditions, functional status, social support, socioeconomic status and also the factors of health care.^{4,5} As such, compared to clinical parameters, HRQoL introduces a more holistic and subjective, yet quantifiable measure to estimate individual’s functional health-status also in therapeutic and research settings.

Measures of HRQoL can be divided into two groups according to their content, either generic or specific. Generic measures produce health profiles and utility measures, as specific measures focus on the