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Defining and Assessing Public Health Functions: A Global Analysis

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Keywords

assessment tools, essential public health functions, essential public health operations, essential public health services, health systems strengthening

Abstract

Given the broad scope and intersectoral nature of public health structures and practices, there are inherent difficulties in defining which services fall under the public health remit and in assessing their capacity and performance. The aim of this study is to analyze how public health functions and practice have been defined and operationalized in different countries and regions around the world, with a specific focus on assessment tools that have been developed to evaluate the performance of essential public health functions, services, and operations. Our review has identified nearly 100 countries that have carried out assessments, using diverse analytical and methodological approaches. The assessment processes have evolved quite differently according to administrative arrangements and resource availability, but some key contextual factors emerge that seem to favor policy-oriented follow-up. These include local ownership of the assessment process, policymakers' commitment to reform, and expert technical advice for implementation.

INTRODUCTION

Most modern-day definitions of public health can be traced back to Charles-Edward Amory Winslow, who in 1920 wrote,

> Public health is the science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for the sanitation of the environment, the control of community infections, the education of the individual in personal hygiene, the organization of medical and nursing service for the early diagnosis and preventive treatment of disease, and the development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health. (69, p. 30)

Over the past century, this description—and the many that have been adapted from it—has given rise to intense debates over the precise boundaries of public health practice, in relation both to medical practice (55) and, more recently, to other sectors whose activities affect population health, such as urban development, education, industry, transport, and environment, to name just a few. Central questions include the responsibilities of public, private, and individual actors; the governance structures needed to formulate and oversee policies both within and outside the health system; and the integration of primary care and public health services. As our understanding of factors such as the social determinants of health has deepened, public health research has widened its focus. However, the broader academic perspective has not always been easily translated into practice.

Indeed, public health remains a somewhat ambiguous concept for most nonspecialists, including policy makers, medical professionals, and the public. Moreover, its crowning achievements, such as safe food and water or the control of communicable, vaccine-preventable diseases, have paradoxically reduced its perceived value among voters and politicians, making it vulnerable to budget cuts and weakened governance structures, even as changing market dynamics and globalization increase the need for strong public health services and quality assurance (7).

Public health associations have tackled the public awareness side through communication campaigns (4), and their technical work has included efforts to define precisely which services are included under the public health remit and to assess their performance. Because this exercise is heavily dependent on administrative and resource-driven contexts, these assessment processes have evolved quite differently throughout the countries that have employed them, with mixed results and uptake.

Study Aim

The aim of this study is to analyze how public health functions and practice have been defined and operationalized in different countries and regions around the world, with a specific focus on assessment tools that have been developed to evaluate the performance of essential public health functions, services, and operations. Although nomenclature has varied [quite often due to the influence of other analytical frameworks that make use of a similar terminology, such as the core functions of public health (23) or the health systems framework functions (34)], these tools share the common aim of establishing a practical inventory of competencies and capacities in public health, and they have usually been developed for use in the policy arena. In this, they differ from other approaches that have sought to strengthen health systems research at a more theoretical level (51), to map capacity rather than assess it (27), to evaluate health system performance in general (66), and to establish a minimum level of health care (not public health) services (24, 38).

Although these assessment tools have been used to evaluate public health services in nearly 100 countries across the globe, and a few older comparative analyses are available as gray literature

(32, 44), no comprehensive review analyzing their components has ever been published in an indexed journal, and none has examined the most recent iterations. This greatly hinders the participation of the wider academic community in the refinement and further development of the core functions of public health.

WHO: World Health Organization

EPHF: Essential Public Health Functions

Methodology

We conducted an exploratory literature review in both peer-reviewed journals indexed in PubMed and the gray literature published in English and Spanish by national and international bodies that have carried out assessments on public health services and capacities, including the World Health Organization (WHO) and the World Bank. This review was complemented by our team's experience in specific WHO projects taking place in Europe and the Eastern Mediterranean. Most of the lists of essential functions were later developed into specific assessment tools, which are the main object of our investigation. However, in a few cases only the list itself could be identified. Nevertheless, we included these lists in the results to present a more comprehensive picture of how public health is operationally defined and practiced globally.

We first analyze the variations in basic core functions and identify whether there are any accompanying assessment tools. Using an inductive approach, we then examined the assessment tools to identify their main differences. Principal features included (*a*) the nature of the assessment (quantitative, qualitative, or mixed); (*b*) the conceptual approach; (*c*) the content and level of detail in the questions; (*d*) the geographical scope of the assessment (subnational, national); (*e*) the format, methodology, and scoring system used; and (*f*) the subsequent application of the assessment findings, including linkages with public health training and other policy and nonpolicy contexts. After presenting these characteristics, we conduct a descriptive analysis by regions, exploring how political, economic, and social forces have influenced the context of the assessment and the implementation of systemic reforms. We conclude by discussing the practical implications of our analysis for current and future assessments.

DEFINING PUBLIC HEALTH ACROSS THE GLOBE

Some of the first contemporary efforts toward clarifying exactly what public health entails on a practical level were sparked by the Institute of Medicine's 1988 report, *The Future of Public Health* (23), which denounced the dilapidation of public health services in the United States and made a call to action for their improvement along three core functions: assessment, policy development, and assurance. The response from the public health community in the United States culminated in the publication of *Healthy People 2000*, which set a new course for public health management in the United States (31, 47). Over the next decade, public health agencies and researchers have proposed different ways of articulating these functions into practice-based measurements, including the 10 organizational practices of public health (15), the Miller/Turnock 20 (54), and the Essential Public Health Services (EPHS) (8). On the other side of the Atlantic, the dissolution of the Soviet Union and the resulting disarray of public services in the New Independent States (NIS) led the WHO Regional Office for Europe to develop its own Essential Public Health Functions (EPHF) (5) as a way to assist new states in establishing a minimum portfolio of public health services.

Globally, the delineation of public health functions took a new turn in 2000, when the WHO headquarters published the highly influential *World Health Report 2000: Health Systems, Improving Performance* (64), which advocated for reforms that took into account the interaction between different functions, levels, and services within the health system. Since then, and complementing this view with an intersectoral perspective, a number of international, national, and subnational

EU: European Union

agencies have adopted a functional, system-wide approach to defining and assessing public health in Latin America (40), the Western Pacific (63), the Eastern Mediterranean (WHO Eastern Mediterranean Regional Office, unpublished information), the European Region (62), the European Union (2), Australia (37), the United Kingdom (13), India (11), New Zealand (39), Israel (48), and British Columbia (44).

Table 1 shows the different essential functions as defined by public health organizations around the world and notes the existence of assessment tools to support them. Although highly synergistic, the lists illustrate a few important divergences. The number of essential functions ranges from just 5 in New Zealand to 12 in India and British Columbia. A few lists contain explicit references to context-specific functions (for example, Australia's mention of Aboriginal and Torres Strait Islander health), whereas the most recent lists (from Europe and the Eastern Mediterranean) incorporate a function for health communication and social mobilization. Notably, several lists do not include emergency preparedness and response as a separate function. McCracken (32) first analyzed the five frameworks that existed as of 2004 (developed by the United States, Australia, the WHO European Region, the WHO Western Pacific Region, and the Pan-American Health Organization). The main differences among these iterations reside in the study methodology (working parties or Delphi consensus), the geographical scope of application (international, national, or subnational), the notion of essential (whether the lists aim to establish a minimum general capacity building), and the notion of function (inclusion or exclusion of vertical programs).

With regard to these points of analysis, we identified only two versions that use Delphi methodology: the lists developed by WHO in 1998 and by the National Public Health Partnership in Australia in 2000. In addition, the 1998 WHO version is the only one whose aim was primarily to establish a minimum set of vertical public health programs; indeed, it is the only list that contains exclusively vertical program functions. This philosophy underpins later versions produced by the European Regional Office in 2007–2014 and the Eastern Mediterranean Regional Office in 2013, but these iterations also incorporate horizontal functions, such as governance, infrastructure, and financing, which are more clearly directed toward capacity building efforts.

Most lists use a combination of different horizontal (e.g., financing) and vertical (e.g., health promotion) elements, but a few present conceptual (rather than service-based) frameworks that increase their applicability in different contexts. This is apparent in both the EU and the US tools. For its part, the regional Ministry of Health of British Columbia divided its 12 core functions into 4 overlapping categories, to be understood through a study design matrix: core programs, public health strategies, systems capacities, and lenses.

FROM CONCEPTUAL FRAMEWORKS TO MEASUREMENT-BASED TOOLS

Of the 13 lists of core functions we have identified, assessment tools were developed for 8 [plus the adaptation of the Western Pacific tool by Sri Lanka (16)]; the main characteristics are shown in **Table 2**. Below, we highlight the two most significant differences in strategies: the analytical approach and the level of detail chosen.

Analytical and Methodological Approaches

For the most part, the assessment tools are embedded into an action research strategy, that is, they are clearly intended to stimulate reflection and discussion among policy makers. Four tools depart from this basic approach: the Australian and Sri Lankan tools (created ad hoc within a research context), the Indian tool (with anonymized, individual responses to favor candid opinions), and

Table 1 Lists of essential public health services, functions and operations used worldwide, in chronological order of development

Essential Public Health Services, CDC (USA, 1994)	Essential Public Health Functions, WHO (European Region, 1998	Essential Public Health Functions, CDC, CLAISS and PAHO (Latin America, 2001)	Core Public Health Functions, NPHP (Australia, 2000)	Essential Public Health Functions, WHO (Western Pacific, 2000)	Scope of modern public health system, National Health Service (UK, 2001)	Essential Public Health Functions, World Bank (India, 2004)
Offers assessment tools	**No assessment tools offered**	**Offers assessment tools**	**Offers assessment tools**	**Offers assessment tools**	**No assessment tools offered**	**Offers assessment tools**
1. Monitoring, evaluation, and analysis of health status 2. Diagnosing and investigating health problems and health hazards in the community 3. Informing, educating, and empowering people about health issues 4. Mobilizing community partnerships to identify and solve health problems 5. Developing policies and plans that support individual and community health efforts 6. Enforcing laws and regulations that protect health and ensure safety 7. Linking people to needed personal health services and assure the provision of health care when otherwise unavailable	1. Assessment, analysis, and communication of population health needs and community expectations 2. Protection of the environment (safe water, food quality and safety, sewerage, drainage, waste disposal, hazardous substance control) 3. Health promotion (community involvement in health, information and education for health and life skill enhancement) 4. Prevention, surveillance, and control of communicable diseases (immunization, disease outbreak control, disease surveillance) 5. Legislation and regulations related to public health	1. Health situation monitoring and analysis 2. Surveillance, research, and control of the risks and threats to public health 3. Health promotion 4. Social participation in health 5. Development of policies and institutional capacity for public health planning and management 6. Strengthening of public health regulation and enforcement capacity 7. Evaluation and promotion of equitable access to necessary health services 8. Human resources development and training in public health 9. Quality assurance in personal and population-based health services	1. Health surveillance, monitoring, and analysis 2. Preventing and controlling communicable and noncommunicable diseases and injuries through risk factor reduction, education, screening, immunization, and other interventions 3. Promoting and supporting healthy lifestyles and behaviors among individuals, families, communities, and the wider society 4. Promoting, developing, and supporting healthy public policy, including legislation, regulation, and fiscal measures 5. Planning, funding, managing, and evaluating health gain and capacity building programs designed to achieve measurable improvements in health status and to strengthen skills, competencies, systems, and infrastructure	1. Health situation monitoring and analysis 2. Epidemiological surveillance/disease prevention and control 3. Development of policies and planning in public health 4. Strategic management of health systems and services for population health gain 5. Regulation and enforcement to protect public health 6. Human resources development and planning in public health 7. Health promotion, social participation, and empowerment 8. Quality assurance in personal and population-based health services	1. Health surveillance, monitoring, and analysis 2. Investigating disease outbreaks, epidemics, and risks to health 3. Establishing, designing, and managing health promotion and disease prevention programs 4. Enabling and empowering communities and citizens to promote health and reduce inequalities 5. Creating and sustaining cross-governmental and intersectoral partnerships to improve health and reduce inequalities 6. Ensuring compliance with regulations and laws to protect and promote health 7. Developing and maintaining a well-educated and trained, multidisciplinary public health workforce	1. Health situation monitoring and analysis 2. Epidemiological surveillance/disease prevention and control 3. Health promotion 4. Regulation and enforcement in public health 5. Social participation and empowerment 6. Development of policies and planning in public health and steering role of the Ministry of Health and Family Welfare 7. Evaluation and promotion of equitable access to health services 8. Human resource development and training in public health 9. Quality assurance in personal and population-based health services 10. Research, development, and implementation of innovative public health solutions

(*Continued*)

Table 1 (*Continued*)

Essential Public Health Services, CDC (USA, 1994)	Essential Public Health Functions, WHO (European Region, 1998	Essential Public Health Functions, CDC, CLAISS and PAHO (Latin America, 2001)	Core Public Health Functions, NPHP (Australia, 2000)	Essential Public Health Functions, WHO (Western Pacific, 2000)	Scope of modern public health system, National Health Service (UK, 2001)	Essential Public Health Functions, World Bank (India, 2004)
Offers assessment tools	**No assessment tools offered**	**Offers assessment tools**	**Offers assessment tools**	**Offers assessment tools**	**No assessment tools offered**	**Offers assessment tools**
8. Assuring a competent public and personal health care workforce 9. Evaluating effectiveness, accessibility, and quality of personal and population-based health services 10. Searching for new insights and innovative solutions to health problems	6. Occupational health 7. Public health services (including school health, laboratory services, emergency disaster services) 8. Public health management (international collaboration, health policy, planning and management, use of scientific evidence, research) 9. Care of vulnerable and high-risk populations (maternal health care, family planning, infant and child care)	10. Research in public health 11. Reduction of the impact of emergencies and disasters on health	6. Strengthening communities and building social capital through consultation, participation, and empowerment 7. Promoting, developing, supporting, and initiating actions that ensure safe and healthy environments 8. Promoting, developing, and supporting healthy growth and development throughout all life stages 9. Promoting, developing, and supporting actions to improve the health status of Aboriginal and Torres Strait Islanders	9. Research, development, and implementation of innovative public health solutions	8. Ensuring the effective performance of NHS services to meet goals in improving health, preventing disease, and reducing inequalities 9. Researching, developing, evaluating, and innovating 10. Ensuring the quality of the public health function	11. Management capacity to organize health systems and services in public health 12. Reduction of the impact of emergencies and disasters on health

Core Functions Framework, Ministry of Health (British Columbia, 2005)	Core Public Health Functions, Public Health Clinical Network (New Zealand, 2011)	Essential Functions of Public Health, Israeli Association of Public Health Physicians (Israel, 2012)	Essential Public Health Functions, WHO (Eastern Mediterranean Region, 2013)	Essential Public Health Operations, WHO (European Region, 2007–2014)	Domains of PH capacity (European Commission, 2014)
No assessment tools offered	**No assessment tools offered**	**NA**	**Offers assessment tools**	**Offers assessment tools**	**Offers assessment tools**
Core programs 1. Health improvement 2. Disease, injury, and disability prevention 3. Environmental health 4. Health emergency management **Public health strategies** 5. Health promotion 6. Health protection 7. Preventive interventions 8. Health assessment and disease surveillance **Systems capacity** 9. Health information system 10. Quality management capacity **Lenses** 11. Population lens 12. Inequality lens	1. Surveillance and assessment of the population's health and of health hazards in the community 2. Public health capacity development: ensuring the effectiveness and efficiency of the services 3. Health promotion: enabling people to increase control over and improve their health 4. Health protection: protecting communities against public health hazards 5. Preventive interventions: population programs delivered to individuals	1. Leadership in public health policy and management 2. Monitoring and evaluation of population health 3. Evaluation of efficiency, effectiveness, and quality of health services 4. Environmental health protection 5. Research 6. Health promotion and disease prevention 7. Preparedness for and mitigation of public health emergencies 8. Development and training of public health workforce 9. Partnerships to promote knowledge, coordination, and optimal use of resources 10. Public health legislation, control, and enforcement	1. Surveillance of population health and well-being 2. Preparedness and public health response to disease outbreaks, natural disasters, and other emergencies 3. Health protection, including management of environmental, food, toxicological, and occupational safety 4. Health promotion and disease prevention through population-based interventions, including action to address social determinants and health inequity 5. Effective health governance, public health legislation, financing, and institutional support 6. Sufficient and competent workforce for effective public health delivery 7. Communication and social mobilization for health 8. Public health research to inform and influence policy and practice	1. Monitoring, evaluation, and analysis of health status 2. Monitoring and response to health hazards and emergencies 3. Health protection, including environmental, occupational, 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. Governance for health and well-being 7. Sufficient and competent public health workforce 8. Sustainable organizational structures and financing 9. Information, communication, and social mobilization for health 10. Public health research to inform policy and practice	1. Leadership and governance 2. Organizational structures 3. Financial resources 4. Workforce 5. Partnerships 6. Knowledge development

Data taken from References 2, 5, 8, 11, 13, 37, 39, 40, 44, 48, 62, and 63.

Abbreviations: CDC, Centers for Disease Control and Prevention; CLAISS, Centro Latino Americano de Investigación en Sistemas de Salud; NA, not available; NPHP, National Public Health Partnership; PAHO, Pan-American Health Organization; WHO, World Health Organization.

Table 2 Assessment tools based on essential public health functions, operations, and services

	Essential Public Health Services, CDC (United States)	Essential Public Health Functions, CDC, CLAISS, and PAHO (Latin America, Caribbean)	Core Public Health Functions, NPHP (Australia)	Essential Public Health Functions, WHO Western Pacific Region	Essential Public Health Functions, World Bank (India)	Essential Public Health Functions, WHO Eastern Mediterranean Region	Essential Public Health Operations, WHO European Region	Domains of public health capacity (European Commission)
Assessment tools based on framework (period of assessment)	National Public Health Performance Standards (3 versions from 2002 to present)	Instrument for Performance Measurement of Essential Public Health Functions (2000–2007)	Australian Core Functions of Public Health Survey (2004)	Case-study assessment tool (2000–2003, 2006)	Indian Public Health System Assessment (2004)	WHO-guided assessment: Essential Public Health Functions for the Eastern Mediterranean Region (2013–present)	WHO self-assessment of the Essential Public Health Operations, 2007–present (3 versions)	Public Health Capacity Assessment Tool (2013–2014)
Description of analytical and methodological approach	Performance standards; state/county conferences between relevant public health partners, who discuss performance of EPHS according to the assessment instrument and provide consensus responses	Questionnaire covering horizontal functions and capacities, but not vertical programs. Multiple assessments carried out by country teams, including national and subnational governments and partners as well as international facilitators, who formulate consensus responses	Cross-sectional surveys and semistructured key informant interviews with public health practitioners, around public health practices described in NPHP document. Assessment carried out only once by ad-hoc team	Structured, descriptive, case-study approach, carried out by a WHO country team in collaboration with national and regional health authorities to provide consensus responses. Each country devised its own methodological approach	Adaptation of questionnaire from PAHO, US, and Western Pacific models, to include 12 EPHF plus a section on organization. 2–4 questionnaires per geographical level, eliciting quantitative and qualitative responses from key informants in different professional categories	In-depth, qualitative questionnaire on both horizontal and vertical aspects of public health practice; items based on recommendations from WHO guidelines and topic-specific sources. Assessment carried out in coordination with national health authorities, WHO team, and international consultants, in policy workshops with key stakeholders	Highly detailed questionnaire on both horizontal and vertical aspects of public health practice, with items based on WHO guidelines and topic-specific sources. Self-assessment by national health authorities, with some support from WHO consultants. Recommended methodology is an assessment lasting several months, with an oversight committee made up of key partners, a core secretariat to coordinate work, and specialized working teams to cover each operation. Web-based tool under development	EU-funded study to map public health capacity in member states. Questionnaire based on conceptual framework; one key expert was identified for each country to lead national assessments with support of literature and 6–10 person focus groups. Survey results analyzed by main research team using descriptive statistics and country-aggregated data, then validated by national policymakers and experts

Geographical scope	State and local public health systems and public health governing entities	Member states of PAHO Region, with adaptations for national, state, and local health departments	Subnational, rural region	Member states of Western Pacific Region	National, state, and district level	Member states of Eastern Mediterranean Region	Member states of European Region	Member states of European Union
Number and description of items and/or subitems	Both local and state tools are divided by EPHS, with 2–4 model standards each. Assessment tool includes discussion questions, a limited number (2–3) of scoring prompts, and discussion and summary notes. The governance tool contains definitions of the EPHS and a limited number of scoring prompts	Approximately 5 main indicators per EPHF, with 15–25 measures and submeasures corresponding to each indicator	A total of 79 items divided by 9 core functions	51 component tasks, divided by EPHF. Each task is broken down into items and subitems, including: description of service and system responsibilities, workforce and practice resources, and organizational issues (linkages and relationships). Using this basic template, country teams devised their own assessment methodology and questionnaires	Each section of the questionnaire includes ~3–6 main indicators, with a varying number (~4–8) of subitems	4 level questionnaire: Level 1, 8 EPHF; Level 2, 2–4 sections per EPHF; Level 3, 2–6 subitems per section; Level 4, detailed table eliciting specific quantitative and qualitative data	4 level questionnaire: Level 1, 10 EPHO; Level 2, 2–4 sections per EPHO; Level 3, 5–10 subitems per section; Level 4, detailed tables eliciting specific quantitative and qualitative data	3 level questionnaire: Level 1, domains of PH capacity; Level 2, 1–5 items per domain (21 subdomains); Level 3, approx. 5–10 indicators per subdomain (128 total)

(*Continued*)

Table 2 (*Continued*)

	Essential Public Health Services, CDC (United States)	Essential Public Health Functions, CDC, CLAISS, and PAHO (Latin America, Caribbean)	Core Public Health Functions, NPHP (Australia)	Essential Public Health Functions, WHO Western Pacific Region	Essential Public Health Functions, World Bank (India)	Essential Public Health Functions, WHO Eastern Mediterranean Region	Essential Public Health Operations, WHO European Region	Domains of public health capacity (European Commission)
Scoring system	5 scores: no activity, minimal, moderate, significant, optimal	Questions on measures and submeasures elicit a score of 1 (yes) or 0 (no); final score for each indicator is the average corresponding to the measures	4 possible scores: 2 (practice is always or usually carried out), 1 (sometimes undertaken), 0 (never or seldom performed), and ? (unable to answer due to lack of information). Respondents' individual score assignments are calculated as an average for final score	Fiji: Likert scale 1–5; Malaysia: scale of 1–10; Vietnam: no formal scoring system; Sri Lanka: scale of 0–5	Questions on items and subitems elicit a score of 1 (yes) or 0 (no); final score for each indicator is the average score from all respondents' answers to subitems, expressed as a decimal (e.g., 0.57)	None, descriptive analysis	Ad-hoc 0–10 scoring system based on level of EPHO performance: 0 (unable to evaluate), 1 (no activity), 2 (rudimentary work), 3 (policy commitment to improve, but no practical developments), 4 (some antecedents for policy improvements), 5 (existing conceptual framework), 6 (specific experience and evidence on how to improve performance), 7 (reasonably acceptable level), 8 (solid and well-developed operation), 9 (particularly effective), 10 (excellent, best practice)	1–6 Likert scale
Locations where tool has been applied	1,500+ assessments across the United States	41 countries and subnational regions pertaining to PAHO	21 rural health services in Western Australia	Fiji, Malaysia, Vietnam (in the main study period) and Sri Lanka (2006)	At the national level in India, and at state and community levels in Karnataka	Qatar and Morocco, with other WHO member states in the Eastern Mediterranean also showing interest	Since 2007, some version of the EPHO tool used in at least 20 countries in South East Europe and Central Asia	25 EU member states

Formal linkages and applications in other policy or nonpolicy settings (educational, regulatory, etc.)	Linked with national strategy on strengthening public health infrastructure (Healthy People 2020), Public Health Department Accreditation Board, state legislation, and workforce development (through the Core Competencies for Public Health Professionals)	Linked to national health strategies and workforce development to varying degrees throughout the region	No; tool was created ad hoc for one study	No significant linkages identified	Assessment informed a World Bank initiative, the Karnataka Health Systems Project, aimed at improving EPHF throughout the state	None identified	Well-integrated into WHO Regional Office's policy documents and guidelines, particularly the European Action Plan on Public Health Capacities and Services. Also a key source for work on developing a European Public Health Curriculum (ASPHER)	None identified
Description of supportive and/or follow-up resources	Wide variety of resources, including training resources for evaluators, implementation guides, and policy and planning tools	Some resources for implementing the assessment tool from PAHO; also used as a basis for a World Bank e-course	None	None	Technical assistance from World Bank health policy team; over US$200 million in credits provided to state health system	Subitems within questionnaire contain links to WHO policy guides, making the assessment tool a kind of clearing house for WHO resources	A variety of tools have been created in the last decade, including toolkits for implementation, and other WHO guidelines are integrated as references within the questionnaire itself. A web-based tool has been planned to allow customized partial assessments	None identified

Data taken from References 2, 9, 30, 40, 62, 63 and 77.

Abbreviations: ASPHER, Association of Schools of Public Health in the European Region; CDC, Centers for Disease Control and Prevention; CLAISS, Centro Latino Americano de Investigación en Sistemas de Salud; EPHF, Essential Public Health Functions; EPHS, Essential Public Health Services; NPHP, National Public Health Partnership; PAHO, Pan-American Health Organization; PH, public health; WHO, World Health Organization.

the EU tool (which provides a comparative picture of public health capacity across the European Union). Even in these tools, though, there is a strong emphasis on collaborative work between policy experts and public health agencies; globally, qualitative responses (usually in consensus) represent an important share of the outputs, proportional to their value in providing information on issues such as governance when no quantitative data are available (25).

NPHPS: National Public Health Performance Standards

PAHO: Pan-American Health Organization

CDC: Centers for Disease Control and Prevention

At the same time, most tools elicit quantitative data as well. The WHO tools created recently by the Eastern Mediterranean and especially the European Regional Offices include highly specific questions on surveillance systems, health services, institutional arrangements, and availability of health systems resources; in Europe this approach is supported by a regional action plan to strengthen capacities and services. This procedure necessitates a comprehensive and relatively lengthy assessment period, which can last up to 4–6 months [compared to the 2- to 3-day workshops needed for the National Public Health Performance Standards (NPHPS) in the United States (9, 22)], and it potentially involves dozens of professionals and administrators. Most of the other tools fall somewhere in between these two extremes. The Western Pacific tool uses a descriptive, case-study approach, whereas the Pan-American Health Organization (PAHO) and the World Bank tools ask detailed but mainly qualitative questions. It is also important to note that in several assessments (Australia, Sri Lanka, and the European Union), the questionnaire was only one of several data collection methods used.

Level of Detail

The NPHPS, the Western Pacific tool, and the Indian tool all hinge on descriptive responses structured around a few key (but somewhat generic) questions; for the most part, a consensus score is assigned following a group discussion. In the case of the NPHPS, the third version of the tool has marked a shift in strategy: Whereas the second version had 466 and 326 questions for state and local levels, respectively, the third version reduced these numbers to 115 and 108. Participants in the assessments lauded this change, finding that a discussion-oriented assessment allowed a more substantive exchange on strengths and weaknesses (12). On the other side of the spectrum lie the WHO tools for the Eastern Mediterranean and Europe; the latter, in particular, elicits the most comprehensive and detailed information, both quantitative and qualitative, from respondents. For its part, the PAHO tool actually resembles the 2002 version of the NPHPS to a great degree, in that it elicits yes/no responses to a large number of questions covering key aspects of public health functions and services. This similarity is logical in light of the tools' shared institutional authorship [the Centers for Disease Control and Prevention (CDC)] and their almost simultaneous launch under the impetus of the Public Health in the Americas Initiative (42). Finally, the Australian tool (30) elicits short answers on a Likert scale, and the EU tool elicits both short responses and brief qualitative descriptions. These studies, which are more strongly rooted in a research rather than a policy context, have opted to elicit subjective opinions through questionnaires and to collect quantitative data by other means (e.g., by reviewing annual reports or registry data).

CONTEXTUALIZING COUNTRY ASSESSMENTS OF PUBLIC HEALTH FUNCTIONS

Although all public health reforms must logically begin with an assessment of the current situation, it does not follow that all assessments will inevitably lead to reforms. Below, we discuss where assessments have taken place and to what extent they have been integrated into programs related to public health reforms, regional action plans, systemic monitoring and evaluation, professional training, and other policy levers.

North America

Of all of the assessment tools we identified in our study, the NPHPS is probably the most deeply embedded within public health agencies and services, due to its early implementation, the leadership exercised by a national organization (the CDC), and the solid partnerships that have been established over the years with local and state agencies, public health institutes, and nongovernmental organizations (NGOs). The three editions of the NPHPS have been used in more than 1,500 assessments since 2002, and implementation of improvements is supported by a variety of technical resources, including the MAPP (Mobilizing for Action through Planning and Partnership) guides for community health improvement planning (36). The latest version of the NPHPS, released in 2013, aims to streamline the assessment process, enhance systems building features, promote performance and quality improvement, and strengthen the linkages with the Public Health Accreditation Board (9).

MAPP: Mobilizing for Action through Planning and Partnership

EPHS: Essential Public Health Services

PAHO: Pan-American Health Organization

Above all, the NPHPS is a technical tool, applied primarily in a policy setting by public agencies. In that sense, and as is the case with the other assessment tools we have identified, there is a dearth of scientific literature examining the tool or the assessment process itself, although there are a number of articles that apply the general framework of the EPHS or specific state and local tools to different systems and areas within public health, including correctional health care (70), epidemiological capacity (20), tobacco control (29), and homelessness and mental illness (56), among others. This suggests a reasonable degree of awareness of and support for the approach used by the CDC, as well as a general integration of practice-based indicators within the study of public health services and functions in the United States.

Latin America and the Caribbean

The PAHO tool was widely used upon the WHO's launch of the Public Health in the Americas Initiative (2001–2002), when it was applied in 41 countries of the region under the leadership of PAHO but in conjunction with country teams and national institutions and counterparts. A 2008 report (42) details the work undertaken after that, including the adaptation of the tool to subnational regions, its integration into a regional action plan to strengthen the public health workforce (41), and several follow-up assessments throughout the countries making up the region.

However, since then, work on the EPHF seems to have continued only in a few countries. For example, Argentina has worked with the World Bank under two successive EPHF programs (in 2007–2010 and 2010–2016) (71, 74), in close collaboration with regional authorities and the national health system. There, the EPHF assessment tool continues to be used to evaluate capacity and performance. Mexican public health institutions have also made efforts to use the EPHF assessment tool to evaluate public health capacities and services in several countries of Meso America (18), and the World Bank has assisted the Unified Health System (SUS) in Brazil with an offshoot of the EPHF program (VIGISUS) specifically concerned with strengthening surveillance systems (73, 76). However, on the whole, and at the regional level, the considerable momentum gathered under the Public Health in the Americas Initiative seems to have largely dissipated, and PAHO has shifted its focus toward other priorities. A workshop was held in El Salvador in 2011 to try to incorporate these lines of work into an adaptation of the EPHF assessment tool (43); however, our review was not able to identify any products generated from this exercise, and to our knowledge there has not been any revision of the tool at a supranational level since 2001.

Australia and New Zealand

Although both Australia and New Zealand have defined a set of core public health functions (37, 39), our review has identified only one tool that assesses capacity and performance (30). This

exercise takes place in a rural regional setting (Western Australia), outside the national policy context in which the functions were originally defined. Although the methodological approach to the assessment is strong, including the participation of the most relevant public health agencies and actors, there is no evidence of systematic uptake in Western Australia. Indeed, a review published just three years later uses a different and less systematic methodology to assess public health in Perth, based only loosely upon the core functions first defined in 2000 (46).

The Western Pacific

Concurrently to the work on EPHF in the Americas, the WHO Regional Office for the Western Pacific launched its own program to assess EPHF, conducting three case studies in Vietnam, Fiji, and Malaysia (63). This project differed from previous WHO assessments in that its primary aim was to help the Regional Office identify options for structuring EPHF on a functional level, and not to evaluate public health capacity or performance within a nationally based policy cycle. In that sense, the assessments were not explicitly linked to any reform process in the countries under study, which probably decreased the uptake of the findings.

Southeast Asia

Other countries in Asia followed with their own assessments of EPHF. In India, the World Bank's Governance Knowledge Sharing Program adapted the PAHO tool to the national, state, and district levels of India, and more specifically to Karnataka (77). The national assessment involved 119 respondents at the central, state, and district level and concluded with several concrete recommendations for improving public health in India (11). There seems to have been little follow-up from the Ministry of Health and Family Welfare; however, the initial assessment of EPHF in Karnataka did lead to a six-year loan project to strengthen public health capacities and services in that state (72). The significant and tangible improvements across a number of health and health system indicators have subsequently led to an extension of the project, which is now set to expire in 2016.

In 2006, Sri Lanka also embarked on an assessment of its EPHF (16). The Sri Lankan team (supported by the WHO Regional Office for South-East Asia) took the Western Pacific iteration of the EPHF as a loose model, but it also added disaster and emergency preparedness and response as a tenth function (reflecting an intense concern for this area in the wake of the 2004 tsunami). As in many of the cases described previously, the EPHF assessment in Sri Lanka did not seem to have direct and significant policy repercussions, either in terms of the Country Cooperation Strategy with WHO (57) or with regard to the 10-year Health Master Plan published the year following the assessment (33). In part, this may be because of the rapid nature of the evaluation and the relative vagueness of the recommendations, or because the Ministry of Healthcare and Welfare and its institutional partners never achieved a sufficient degree of ownership. In any case, public health, and particularly disaster management (10), has continued to develop within the framework of the Millennium Development Goals and the Development Policy Framework for Sri Lanka (19), although this has basically occurred outside the EPHF framework.

European Region

Work on creating an assessment tool for EPHF in the European region did not begin in earnest until 2007, when the South-Eastern Europe Health Network (SEEHN) began a regional initiative to reform and modernize its health systems. Within this context, the WHO Regional Office for Europe commissioned an update of the EPHF, renamed Essential Public Health Operations

(EPHO) to differentiate it from the health system framework functions developed elsewhere (34). Ten Southeastern European countries piloted a web-based self-assessment tool (17, 50), laying the foundation for significant reforms in South-Eastern Europe and setting an important precedent for the European region as a whole. In parallel, the Tallinn Charter on Health Systems for Health and Wealth, adopted by the 53 WHO European member states in 2008, recognized that health systems are more than health care and also encompass disease prevention, health promotion, and efforts to influence other sectors to address health concerns in their policies (58).

EPHO: Essential Public Health Operations

ASPHER: Association of Schools of Public Health in the European Region

Significantly, development of the EPHO was intensified after the regional directorship changed in 2010, becoming an important pillar of the European Action Plan for Strengthening Public Health Capacities and Services (59) and the broader health policy for Europe called Health 2020 (61). Up to 2014, an additional nine countries of the European region conducted an assessment based on the tool. The Association of Schools of Public Health in the European Region (ASPHER) has also incorporated the EPHO into its European Public Health Core Competencies Program, matching each EPHO and subfunction to the corresponding professional competence through the European Public Health Reference Framework (6).

The latest version of the assessment tool was released in 2014 (62) and has already been used in six additional countries as a precursor to major public health policy reforms (WHO Regional Office for Europe, unpublished information). Among the innovations incorporated into the most recent version is a system-wide comprehensiveness as well as the synthesis and citation of all major WHO guidelines and policies on specific vertical and horizontal programs [for example, the Health Metrics Network Framework (67) and the Framework Convention on Tobacco Control (65)]. Whereas the paper-based version of the tool is quite long, a computer program slated for release in 2016 will allow users to customize assessments to institutional competencies and program targets, which should facilitate the organization and distribution of tasks among different agencies and departments. This revised tool also has the potential to solve one of the major dilemmas encountered in other EPHF assessments (30, 53): assessing intersectoral competencies and services outside the health system.

Parallel to the WHO assessment process, a consortium of six European institutions carried out a study commissioned by the European Commission to evaluate public health capacity in EU member states (2, 3). The researchers undertook a systematic methodological approach based on a purpose-designed questionnaire, case studies, and appreciative inquiries, and then they engaged in policy dialogues with national decision makers to discuss the findings and options for improvement. The leaders of EU institutions, together with major institutional stakeholders, have ensured the high visibility and influence of the final report. Indeed, the European Center for Disease Prevention and Control (ECDC) has already adopted the six capacity domains to analyze health communication in the prevention and control of communicable diseases (49), and the WHO Regional Office for Europe has also analyzed the results of the European Commission study in conjunction with the results of the EPHO assessment (60). Although it is too soon to understand the long-term effects of the European and the WHO assessment processes, it is clear that public health services and capacities are receiving considerable policy attention in the region, and that this strategy is underpinned by a commitment to base policy improvements on situational analyses and periodic monitoring.

Eastern Mediterranean

The WHO Eastern Mediterranean Regional Office has been working on developing an assessment tool for EPHF since 2013 (WHO Eastern Mediterranean Regional Office, unpublished information). Inspired by the European tool, the pilot version shares many characteristics with

the latter, including a focus on collecting qualitative information based on explicit WHO guidelines. However, rather than as a self-assessment tool, the Eastern Mediterranean instrument is conceived as a WHO-guided assessment, with significant technical assistance from the Regional Office during the assessment process. The tool is still under development, but pilot assessments have been completed in Qatar and Morocco, and other countries in the region have also expressed interest.

DISCUSSION AND CONCLUSIONS: ALIGNING ASSESSMENTS WITH SYSTEM-BASED OBJECTIVES AND POLICY ACTION

The effectiveness of any assessment must be understood in terms of not only the quality of the evaluation, but also the uptake of the findings and the systemic inclusion of monitoring and evaluation into the larger public health policy cycle. For this to happen, three key conditions must be in place. First, the ownership of the assessment must be shared among local decision makers and partners. This will ensure not only the tailoring of the evaluation to specific institutional competencies and aims, but also the ability to track progress beyond a single political cycle by using repeated assessments based on a common framework. Second, and not less important, the evaluation process must be explicitly integrated into the wider policy cycle from the outset, with support from high-level policy makers and resource mobilization from across the health system. Finally, policy makers must receive expert technical assistance to implement improvements, from either domestic agencies (e.g., the CDC, academic partners) or international organizations (WHO, World Bank). Our review of EPHF assessments confirms that these conditions are currently fully in place at least in the United States, Southeastern Europe, Argentina, and Karnataka (India).

The assessments we have reviewed use a variety of approaches. Those originating in a research context (the EU, Australian, Indian, and Sri Lankan tools) are more likely to use other data collection methods in addition to assessment questionnaires, whereas those based in a policy sphere (WHO or CDC tools) opt for internal evaluation strategies. The questionnaires themselves also vary, particularly with regard to their specificity and sensitivity. Given the sheer volume of public health services and functions, any system-wide assessment must grapple with the question of how to balance comprehensiveness with ease of use, particularly when so many areas of the public and sometimes private sector are involved. Diverse solutions to this dilemma are apparent in the construction of the tools.

Interestingly, the WHO tool for Europe has expanded to become the most functionally comprehensive, whereas the US tool has been streamlined. This divergence is rooted in the difference between the basic capacity-building objective that underlies the American tool and the fundamental services approach followed by the WHO Regional Office for Europe. Whereas the American tool may be adapted in whole to different services and systems, the European tool can be more easily divided or configured into smaller sets of subfunctions that enable a rapid, systems-based assessment of virtually any area, structure, or program that provides public health services (e.g., primary health care, child nutrition, occupational health, road safety, regulatory framework, etc.). The current development of a computer program based on the EPHO will be important in facilitating this methodology.

At the heart of all the assessment tools identified in our study is the idea that each function is truly essential, and none can be understood in isolation from the others. This philosophy is very much aligned with academic research on health systems strengthening (52), which defines the health sector as a complex adaptive system characterized by multidimensional interactions, constant change, and contextual levers that can produce unintended and sometimes unpredictable consequences (14). It is also consistent with a whole-of-government, whole-of-society approach

that extends the scope of public health action well beyond the strict boundaries of the health sector (61). Overcoming the inherent challenges associated with reforming these systems hinges on strengthening human and institutional relationships, synthesizing diverse contributions from specialized branches of the system, and matching problems with the right methodologies to study them (28). In this sense, many of the assessment processes identified in the present study constitute excellent strategies for evaluating public health services, because they stimulate collaboration among dozens and even hundreds of professionals across and beyond the system, generate consensus around the problems hindering performance, and take into account the complex contributions of different inputs to develop solutions. They also build capacity, allow professionals to update their knowledge of contemporary public health functions, and provide a possible basis for public health curricula development.

LMICs: low- and middle-income countries

We identified nearly 100 countries where an assessment of EPHF has taken place, and we do not discount the possibility that other countries have undertaken similar evaluations using a different terminology or without publishing reports in English. Still, the literature on health systems strengthening, particularly in low- and middle-income countries (LMICs), suggests that the evaluation of health interventions is currently far from being comprehensive and could benefit from the use of planning tools that take a wider system view (1). In that sense, the organization of an EPHF assessment constitutes one promising avenue to embed health policy and systems research into the policy cycle (26).

Although health systems and public health must ultimately be strengthened from within, global actors have an important stake in supporting LMICs (21), a point that has been unequivocally made by the 2014 Ebola outbreak in West Africa. However, it is telling that only one African nation (Morocco) is among the countries that have undertaken an assessment of public health capacities and services. This by no means signifies a complete absence of work on strengthening public health services (35, 45), but it does draw attention to the relative underdevelopment of public health on the continent.

Interestingly, research on health systems strengthening also makes little mention of the EPHF, underscoring a persisting division between the spheres of policy and academia, and indeed between the areas of health systems strengthening and public health capacity building. Although public health assessment tools have been used extensively all over the world, few articles in peer-reviewed publications have reported on the results or process. Not only has this hampered the independent review and refinement of the assessment tools, but it may have also contributed to their short-lived use, which has often been limited to a single election cycle.

Fortunately, some promising initiatives are currently underway to institutionalize the EPHF. In Europe, ASPHER's work to link public health competencies and curricula to the European EPHO represents an important step toward increasing the presence of such tools in the public health profession; in the United States, the efforts to link the NPHPS to public health accreditation are also worth highlighting. Globally, the World Federation of Public Health Associations is working on a Global Public Health Framework that unites different versions of the EPHF into a single framework for international application (68), and the World Bank runs a free e-course based on the EPHF for technical professionals working at the national level or in development agencies (75). However, a greater presence of these frameworks in the literature and within national institutes, schools, and agencies dedicated to public health training and practice is necessary to ensure the continuity of this approach.

As we devise methods to strengthen public health both nationally and globally, the EPHF represent a valuable tool to define and assess capacities and services. Over the past 20 years, this framework has proven flexible enough to work in a wide variety of contexts and to capture the complexity of providing a comprehensive package of public health services. However, renewed

attention should be paid to developing, and disseminating, assessment tools that contribute to policy-oriented and evidence-based solutions for populations and individuals.

SUMMARY POINTS

1. The concept of Essential Public Health Functions (EPHF) has been used in nearly 100 countries worldwide to indicate the services and operations included under the public health remit.
2. A number of measurement-based tools have been designed to assess health system capacity and performance with regard to the EPHF, and these constitute a valuable instrument to improve public health services through a holistic and comprehensive approach.
3. Three conditions must be in place to ensure that the assessment is followed by policy improvements: shared ownership among local and national stakeholders, including institutions; integration into the health policy cycle from the outset; and the availability of national or international experts to guide assessments and implement reforms.

DISCLOSURE STATEMENT

The authors disclose their involvement in the development and implementation of the EPHO assessment tool for the WHO Regional Office for Europe.

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