

# A Conceptual Framework to Measure Performance of the Public Health System

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During the past decade, increasing attention has been focused on performance measurement in the delivery of medical care. This attention has centered on the various relationships between organizational structure, clinical practices, and patient outcomes, with the strong recognition that the practice of medicine should be evidence based. The movement toward evidence-based medicine has been accompanied by a research agenda supported by public agencies such as the Agency for Healthcare Research and Quality as well as efforts toward performance measurement supported by accrediting bodies such as the National Committee for Quality Assurance and the Joint Commission on Accreditation of Healthcare Organizations.

The activities of these accrediting bodies, other private research institutes, and the federal government have not led to a unified conceptual framework for assessing medical care system performance per se. However, health services researchers who focus on the performance of the medical care delivery system understand that their efforts are part of a larger strategy to enhance the quality of medical care and thus improve individual patient outcomes.

Unfortunately, there has been no parallel movement, research agenda, or conceptual framework to allow for an examination of the performance of the public health delivery system and the relationship between the practice of public health and population outcomes. This lack of a focus on public health system performance has stemmed partly from a lack of consensus on how to operationalize the mission of public health. During the 1990s, however, the public health community moved to redefine the operational aspects of its mission in light of the Institute of Medicine's *Future of Public Health* report, which described the broad functions of public health as assessment, policy development, and assurance.<sup>1</sup>

Researchers and practitioners interested in the science base of the public health delivery

**Objectives.** This article describes a unifying conceptual framework for the public health system as a way to facilitate the measurement of public health system performance.

**Methods.** A conceptual framework for the public health system was developed on the basis of the work of Donabedian and a conceptual model previously developed by Bernard Turnock and Arden Handler.

**Results.** The conceptual framework consists of 5 components that can be considered in relationship to each other: macro context, mission, structural capacity, processes, and outcomes. Although the availability of measures for each of these components varies, the framework can be used to examine the performance of public health systems as well as that of agencies and programs.

**Conclusions.** A conceptual framework that explicates the relationships among the various components of the public health system is an essential step toward providing a science base for the study of public health system performance. (*Am J Public Health.* 2001;91:1235-1239)

system began to use this core function framework to conceptualize the practice of public health and to assess aspects of public health performance.<sup>2-10</sup> These efforts, however, were of limited value for several reasons, including their focus on only one aspect of public health system performance, the key processes associated with public health practice. With one notable exception,<sup>11</sup> they were also largely focused at one level of the public health system, local public health performance. Most important, without a conceptual framework that described the components of the public health system, there were few attempts to understand the effects of external forces on the overall public health system or its subsystems or to examine the relationships among the different system components.

To provide a science base for the study of public health system performance, it is necessary to articulate a conceptual framework that explicates the various components of the public health system and the relationships between them. In this article, we propose such a framework.

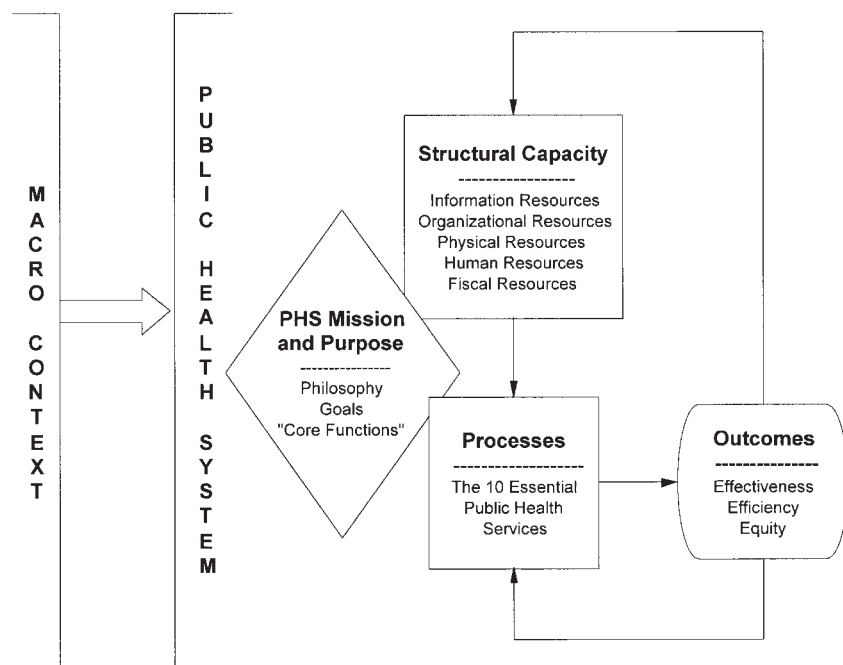
## OVERVIEW

The proposed conceptual framework for the public health system as a foundation for measuring performance is based on the work

of Donabedian,<sup>12</sup> which links structure, processes, outputs, and outcomes in a model for quality assessment and systems monitoring. Bernard Turnock and Arden Handler advanced a similar model as the basis for examining public health system performance during the mid-1990s.<sup>13</sup> In their earlier effort, these authors examined the history of attempts to measure public health performance in the United States and concluded that these past efforts lacked an adequate conceptual framework for defining the public health system.

The framework proposed in this article was developed in conjunction with an expert panel as well as the Public Health Practice Program Office of the Centers for Disease Control and Prevention (CDC). Figure 1 depicts the main components included in the proposed framework. As shown in the figure, the public health system includes 4 components: mission, structural capacity, processes, and outcomes. These system components are affected by a fifth component, the macro context.

Measuring public health system performance—the extent to which the system achieves its mission—requires the ability to measure each of the components of the system and their relationships with each other. Although each component is described and



**FIGURE 1—Conceptual framework of the public health system (PHS) as a basis for measuring system performance.**

discussed separately, the public health system is assumed to be an open system with relationships that lead to interaction and mutual adjustments among the components. Likewise, numerous feedback loops are assumed to exist between components; most of these loops are not explicated here, in order to keep the framework as parsimonious as possible.

This framework can be used as the basis for measurement of the performance of the public health system as a whole (the variety of agencies and organizations engaged in the practice of public health) or of a specific public health organization. It can be applied at multiple levels to examine the national public health system, state and local public health systems, or community public health systems. While the model can be applied to examine the performance of a specific public health intervention or program, the focus here is on more complex systems.

As shown in Figure 1, the mission, structural capacity, processes, and outcomes of the public health system are affected by the social, economic, and political milieu in

which the system operates. If the mission and functions of the public health system are to be achieved, the appropriate structural capacity (e.g., human and information resources) must be in place. The resources and relationships that constitute this capacity are used to carry out the processes of public health, those that identify and prioritize population health needs and determine how they will be addressed, as well as those that represent the outputs of these more fundamental processes, public health services, policies, and interventions. These system processes constitute public health practice. The ultimate results of public health practice are system outcomes, typically measured as improvements in population health status.

Descriptions of the components of the conceptual framework and the relationships among them are provided subsequently. While there are clearly a multitude of research- or practice-based questions that can be addressed with this framework, these are not offered here. In meaningful instances, however, some examples are included, and a

discussion of issues related to measurement is provided for each component.

## FRAMEWORK COMPONENTS

### Macro Context

*Macro context* represents the supra-system level and the milieu that directly or indirectly affects the existence and functioning of the public health system. It incorporates phenomena such as the social, political, and economic forces operating in the overall society (e.g., the national economy at any given point in time); the extent of demand and need for public health services within the population; social values and preferences for the products of the public health system (e.g., clean water); and forces external to the public health system that exert pressure on it to function in particular ways (e.g., the medical delivery system, technologic advances, and the nature of federal–state–local relationships).

Inclusion of the macro context in the model demonstrates that the public health system is engaged in a dynamic relationship with a host of factors external to its own mission and purpose. The macro context can affect the performance of the public health system through its impact on the system's mission (e.g., changes in the medical care system may affect how public health defines its role), on capacity (e.g., only a limited amount of fiscal or human resources may be available for the public health system), on processes (e.g., technologic advances may affect the efficacy of interventions), and on outcomes (e.g., the relevance of particular health status outcomes is dependent on social values and need at any point in time).

To date, questions about the context in which the public health system operates, as well as its impact on system components and relationship to system performance, have not been well formulated. However, researchers and practitioners interested in understanding the impact of the social, economic, and political milieu on public health system performance will probably be able to obtain measures of specific macro context variables from a variety of public and private sector data sources. A host of possible questions and measures exist; however, for many of the macro context constructs of interest (e.g., soci-

etal values), there currently may be insufficient measures or no measures at all.

### Mission

The *mission* of the public health system includes its goals at any point in time and how, at the conceptual level, these goals are operationalized. At the beginning of the 21st century, the mission of public health is to ensure conditions in which people can be healthy.<sup>1</sup> This mission is conceptualized as being carried out through the performance of the core functions of assessment, policy development, and assurance. These functions have been defined and described in various ways since they were characterized in the Institute of Medicine report; however, they have come to represent the general ways in which public health problems are identified and addressed through organized, collective efforts.

Measuring the “mission” of the public health system as distinct from its other components may be possible. One could imagine an examination of the impact of changes in the public health mission during the 20th century on system capacity or processes with “time” as a surrogate for mission. Likewise, if the aim is to examine mission or purpose across systems (e.g., international comparisons), it may be possible to operationalize whether the mission of a particular public health system is “population based” or focused on “personal health services.”

### Structural Capacity

The *structural capacity* of the public health system is the cumulative resources and relationships necessary to carry out the important processes of public health. Structural capacity includes the following elements: information resources, organizational resources, physical resources, human resources, and fiscal resources. More detailed descriptions of the elements of structural capacity can be found in earlier work by Turnock.<sup>14</sup>

Measures of the structural capacity of the public health system exist in many forms and are available from many sources. The National Association of County and City Health Officials has published several national profiles<sup>15,16</sup> of local health departments, with an extensive assessment of public health infrastructure currently under development. These

are among the most useful single sources of information about the structural capacity of local public health systems. Similar information had been available on state public health agencies until the mid-1990s through the Association of State and Territorial Health Officials reporting system, operated by the Public Health Foundation.

The Lewin Group<sup>17</sup> compiled an extensive inventory of data sources related to obtaining information on public health infrastructure. While this inventory demonstrates that there is no single, complete source of data on the structural capacity of the public health system, the conceptual model presented here provides an opportunity to identify a coherent set of questions in order to draw upon existing data sets and begin to systematically generate knowledge about structural capacity vis-à-vis other system components. These efforts may lead to a demand for the creation of more complete and consistent measures of the structural capacity of the public health system and may also assist practitioners in identifying areas of capacity that require strengthening.

### Processes

The practice of public health can be thought of in terms of the key *processes* through which practitioners seek to identify, address, and prioritize community or populationwide health problems and resources and the *outputs* of these more fundamental processes, public health’s interventions, policies, regulations, programs, and services. The processes of public health are those that identify and address health problems as well as the programs and services consistent with mandates and community priorities. At the beginning of the 21st century, the processes of public health are expressed as “essential public health services”<sup>18</sup> and represent the core of public health practice. These essential services are as follows:

- Monitor health status to identify community health problems.
- Diagnose and investigate health problems and health hazards in the community.
- Inform, educate, and empower people about health issues.
- Mobilize community partnerships to identify and solve health problems.

- Develop policies and plans that support individual and community health efforts.
- Enforce laws and regulations that protect health and ensure safety.
- Link people with needed personal health services and ensure the provision of health care otherwise unavailable.
- Ensure a competent public health and personal health care workforce.
- Evaluate the effectiveness, accessibility, and quality of personal and population-based health services.
- Conduct research to produce new insights and innovative solutions to health problems.

These essential public health services can be viewed as partly cyclic. The cycle begins with the identification and investigation of health problems. These initial processes, in conjunction with the process of mobilizing and educating communities, lead to the development of policies and plans for interventions. Through the activities of a competent workforce, these policies and plans are translated into the outputs or interventions of the public health system, the enforcement of regulations and laws, and the development of other interventions and services to which individuals and populations are linked. Although research can contribute at several points in this cycle, evaluation creates the feedback loop from the public health system’s outcomes to planning. However, the results of evaluation activities clearly add to the research findings in any particular area.

It is very likely that there are alternatives to the feedback loops described here. This description represents only a portion of the relationships that might be explicated and potentially considered by those interested in the role of public health practice in public health system performance.

Historically, the majority of efforts to measure public health practice have been focused on the measurement of exposure to categorical public health interventions (outputs). Over the past decade, however, with the explication of public health’s core functions through the essential public health services framework, there have been several efforts to develop generic measures of public health practice that have gone beyond the focus on

categorical interventions. Increasingly, the unit of measurement for public health practice is shifting from the categorical program to the community and organization. Because public health practice is more than the sum of categorical programs, efforts to measure its processes must transcend programs even as it includes them.

In collaboration with staff from the CDC's Public Health Practice Program Office, researchers based at the University of Illinois at Chicago and the University of North Carolina developed and tested a variety of measures of public health practice performance. These efforts sought to answer questions about performance of core function-related processes by local health agencies within the communities they serve,<sup>3-9</sup> resulting in the development of 20 consensus measures of core function-related local public health performance based on field tests conducted between 1991 and 1995.<sup>19</sup>

The CDC is developing a more extensive set of performance measures for state and local public health practice as part of the National Public Health Performance Standards Program. These performance standards will be included in revisions to the Assessment Protocol for Excellence in Public Health<sup>20</sup> as a new self-assessment and capacity-building tool for community public health systems, Mobilizing for Action through Planning and Partnerships (MAPP). These performance measures may also be useful as part of a voluntary national accreditation program for state and local public health organizations.

Likewise, these national performance measures have the potential to provide researchers as well as practitioners with the first nationally agreed-upon indicators of public health practice performance. However, the measures' potential in regard to answering questions about public health practice performance will depend on the prevalence and timeliness of their implementation. If their use is widespread (or even mandatory), and if data are collected at regular intervals, there may finally be a nationally agreed-upon set of measures that will allow comparisons in public health practice performance over time and will enable examination of the relationship of public health processes to structural capacity and outcomes, as well as mission.

## Outcomes

Ideally, carrying out the system's planning and policy development processes generates interventions (outputs) intended to improve health status, the bottom line of the public health system. These immediate and long-term changes experienced by individuals, families, communities, providers, and populations are the system's *outcomes*, the cumulative result of the interaction of the public health system's structural capacity and processes, given the macro context and the system's mission and purpose. Outcomes can be used to provide information about the system's overall performance, including its efficiency, effectiveness, and ability to achieve equity between populations.<sup>21</sup>

Measurement of the structural capacity of the public health system (e.g., dollars spent, number of adequately trained personnel) and even the processes of public health might be undertaken with a relatively limited set of measures. It is more difficult to imagine using a limited set of measures to assess system outcomes, particularly because each unique intervention or output may be linked to a multitude of outcomes.<sup>22</sup> To guide the assessment of public health system performance with respect to outcomes, the nation has established national health objectives every decade since 1990. For most but not all of these objectives, adequate surveillance systems (e.g., vital records) are in place that allow easy access to data to track changes in outcomes over time. If these outcome measures are linked to information on the capacity or generic processes of the public health system, researchers and practitioners may then begin to develop a better understanding of the particular contribution of the public health system to changes in health status beyond the benefit typically derived from an evaluation of a specific public health program or intervention.

## RELATIONSHIPS BETWEEN COMPONENTS

To date, the majority of published research on public health system performance has focused on the implementation of a specific categorical public health intervention (output)

and its potential or actual impact on 1 or more health status outcomes (e.g., immunizations and infectious diseases, prenatal care and adverse pregnancy outcomes). However, very little of this work has also linked public health system outcomes to public health system processes such as assessment and planning or to the structural capacity of the system (e.g., human resources or information resources).

Likewise, research on generic public health practice<sup>2-9,11,19</sup> has primarily focused solely on the performance of public health practice (processes) rather than on the relationships between practice performance and other system components such as structural capacity. For example, whereas some researchers have examined expenditures with respect to essential public health services,<sup>23-28</sup> they have not focused on the relationship between these expenditures and actual public health practice performance. However, others have attempted to examine the relationship between public health practice and structural capacity<sup>29,30</sup> and, in one instance, between public health practice and aspects of the macro context as well.<sup>30</sup> Only 1 report has examined the relationship between process performance and measures of community health status, and it revealed no consistent relationship between process performance and outcomes.<sup>31</sup>

It is likely that the explication of a conceptual framework for the public health system as the basis for measuring public health performance will encourage researchers to examine relationships between the different components of the model. Similarly, such a framework could support performance management and improvement efforts in the practice sector. Over the past decade, state and local public health improvement plans have struggled to consider how the effects of enhanced resources and relationships can be measured and linked to the performance of public health processes and, ultimately, outcomes. As a result, efforts in the practice community have promoted rebuilding the public health infrastructure (e.g., Health Alert Network funding), organizing state and local public health practice around the essential public health services framework (e.g., the National Public Health Performance Standards Initiative), and achieving common health objectives

(e.g., Healthy People 2010). Although these activities are often conducted simultaneously in the practice community, their links and interrelationships have never been explicitly acknowledged. Both the CDC Public Health Practice Program Office and the National Turning Point Program, a major initiative to reform public health systems sponsored by the Robert Wood Johnson Foundation and the Kellogg Foundation, have recognized the importance of using a common framework for research and performance management to enhance the science base of modern public health practice.

## FUTURE OF THE FRAMEWORK

Researchers as well as practitioners interested in the public health delivery system have been slowly generating a body of work that examines aspects of public health system performance. However, these efforts have been undertaken without a unified conceptual framework and without an agreed-upon set of measures. As we move further into the 21st century and endeavor to improve the performance of the public health system and its ability to respond effectively, it is essential that public health researchers and practitioners undertake their efforts with an agreed-upon framework that specifies the components of the public health system and how these components interact.

The conceptual framework described here can guide the development of strategies and research tools for monitoring public health system performance and the generation and funding of research and other efforts designed to make system improvements. The model will allow public health researchers, practitioners, and policymakers to more effectively examine the relationship between the practice of public health and population outcomes and will contribute to the development of a science base for the public health system. ■

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## Contributors

All of the authors contributed to the development of the conceptual model. A. Handler had major responsibility for preparation and writing of the paper. M. Issel and B. Turnock contributed specific sections and provided editorial comments on all drafts.

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