



Priority Areas for Improvement of Quality in Public Health

*U.S. Department of Health and Human Services
Office of the Assistant Secretary for Health*

Public Health Quality Forum

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Vision for Public Health Quality



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Assistant Secretary for Health



November 6, 2010

Priority Areas for Improvement of Quality in Public Health

Improving the health of our nation remains a noble societal goal. Yet, for too long, people across America have not reached their full health potential. We need revitalized efforts to move toward a healthier nation. The advent of the Affordable Care Act serves as a catalyst for such change by promoting quality, access to care, and community and clinical prevention. We should maximize this transformative opportunity to elevate the health of our society.

Improving quality lies at the heart of the Affordable Care Act. At this critical time, we should synthesize lessons learned from the seminal work in quality initially established in the healthcare arena and also broaden quality improvement efforts that can apply to populations. This will require commitment and coordination from many sectors of society, an approach requiring “health in all policies”. It will also require a vision that links quality, prevention, treatment and access to care. Public health professionals can help coordinate all these critical efforts. Strengthening the foundations for quality will surely help us fulfill our collective mission of ensuring conditions for a healthy population.

As Assistant Secretary for Health, I believe our vision for public health quality is to focus on *building better systems to give all people what they need to reach their full potential for health*. This report represents a *call to action* for public health. The priority areas presented here represent important steps toward fulfilling that vision. Together, we can give priority to improving quality in the areas identified, raise quality and transform opportunity into actions that make a difference in the lives of all Americans.

/Howard K. Koh/
Howard K. Koh, MD, MPH

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Executive Summary

With the passage of the Affordable Care Act (2010), momentum for improving quality and population health has accelerated. Quality is in fact prominently positioned in the opening title of the law—*Quality, Affordable Health Care for All Americans*. Quality in patient care and increased emphasis on prevention are consistent themes throughout the law, as exemplified by the strong emphasis on population-based prevention and other community-based initiatives to promote population health.

The Affordable Care Act also provides an incentive for greater integration between health care and public health. Mandates for community health needs assessments by certain hospitals, a traditional public health activity, provides an opportunity for greater coordination between health care and public health on quality and population health issues (Patient Protection and Affordable Care Act [Affordable Care Act], 2010, sec. 9007). This heightened focus on quality should motivate us to identify areas in public health that lead to improved integration with health care and accelerated movement toward national health goals.

COORDINATED APPROACH TO QUALITY

At the close of the last century, a call to action was posed to the United States to embrace a *coordinated approach to quality* in health care. The President's Advisory Commission on Consumer Protection and Quality in the Health Care Industry urged national leadership to commit to sustaining quality throughout all sectors of the industry (President's Advisory Commission on Consumer Protection and Quality in the Health Care Industry, 1998). Their report, *Quality First: Better Health Care for Americans (1998)* included strategies to foster quality by developing a national consensus, aims, and shared goals. Over the past two years, the U.S. Department of Health and Human Services (HHS), Office of the Assistant Secretary for Health (OASH), acted on those recommendations with guidance from the Public Health Quality Forum (PHQF). Chaired by the Assistant Secretary for Health, the PHQF has members that represent all HHS agencies. In 2008, the PHQF developed a *Consensus Statement on Quality in the Public Health System* (Consensus Statement). Major components in the Consensus Statement to promote uniformity across the system include a definition of public health quality and nine aims representing characteristics of quality in the public health system (Department of Health and Human Services [DHHS], 2008).

- **Definition:**
Quality in public health is the degree to which policies, programs, services and research for the population increase desired health outcomes and conditions in which the population can be healthy
- **Aims (Characteristics) of Public Health Quality:**
Population-Centered, Equitable, Proactive, Health Promoting, Risk-Reducing, Vigilant, Transparent, Effective, Efficient

The next step in defining the field of public health quality is to identify priority areas. This report details recent activities led by the Assistant Secretary for Health to identify priority areas for improvement of quality in the public health system.

Opportunities for Coordination

As described by the World Health Organization (1978), health is not merely the absence of injury or disease, but also must include a barometer of social, mental, and physical well-being. Indeed, public health builds on the premise that the causes of health extend beyond the boundaries of individual biology and behavior (Leischow & Milstein, 2006) to advance and monitor the health of the population in communities throughout the nation. Accordingly, health must be measured, and quality improved, in the context of both individual and population-level interacting elements. This means extending beyond personal medical treatment to include an assessment of an individual's community and personal environments (Bryant, 2006; Cohen, 2006; Weiner et al., 2010). Some even describe assessing individual health without considering elements of one's surrounding environment as advancing contextual errors in patient care (Weiner et al., 2010). In essence, the overall health of the nation is determined by the health of individuals and health conditions in the communities where they live (Koh & Sebelius, 2010). This connection between individual health (health care) and community health (public health) illustrates the importance of having a systems-based coordinated approach to improve the quality of health in America.

When developing initiatives to improve the health for the nation, it is essential to weave in principles and concepts of quality. Transforming the health care and public health systems to improve quality is in fact a primary strategic initiative of the HHS Secretary. New opportunities abound for building quality into both systems in order to aid all Americans in reaching their full health potential. For example, the Affordable Care Act requires development of both a National Strategy for Quality Improvement in Health Care (sec. 399HH) and National Prevention and Health Promotion Strategy (sec. 4001), which in turn

must include a broad population-based and community health focus beyond individual care (Affordable Care Act, 2010). HHS can demonstrate a strong leadership role for coordinating national quality efforts by integrating priorities for public health quality throughout all levels in the system and thereby drive improvements in population health outcomes as well as inform national strategies for improving quality, and prevention. By doing so, systems integration is advanced by synergistically aligning health care and public health.

PRIORITY AREAS

Six priority areas for improvement of quality in public health are unveiled in this report. Three distinct but related selection criteria – impact, improvability, and practice variability – guided the PHQF in the identification of the priority areas.

Based on Institute for Healthcare Improvement concepts (Nolan, 2007), the priorities represent *primary drivers of public health quality and outcomes* (Figure ES-1). The priority areas identified function as system-level interacting drivers that impact across the entire public health system (i.e., diseases, services, organization, performance, financing), including health care. The priority areas also reflect the complex interactive nature of the public health system, since lack of quality in one area can potentially negatively impact quality in another. Secondary drivers, also shown in Figure ES-1, are initiatives that play an essential role for achieving strategic improvements by supporting the primary drivers to ensure quality and achievement of outcomes. In Chapter 2 comprehensive sets of secondary drivers are presented that support strengthening each priority area discussed throughout this report.

Quality First: Better Health Care for Americans (1998) noted the need to make quality a driving force in health care. Specific health care areas recommended for national attention were evidence-based practices, organizations adaptable to change, collaboration between health care workers, and information systems. The public health priorities identified here are consistent with those themes. Identifying the public health priorities which serve as primary drivers of quality and outcomes can improve alignment of efforts with those already occurring in the health care system. This is particularly relevant for tax-exempt hospitals given their mandates, as previously mentioned, for community health needs assessments with input from public health (Affordable Care Act, 2010, sec. 9007).

These priority areas, noted in this report as primary drivers, represent major cross-cutting avenues for advancing outcomes when supported by appropriate secondary drivers. They represent both opportunities and gaps. Chapter 3 of this report offers details for each priority area, including

illustrations of how using this framework of primary and secondary drivers can help systematically address quality in specific areas. These descriptions can also help identify specific elements of the priority areas that require the greatest attention for improving quality and achieving desired results. The list and description of the primary drivers identified as priorities are presented below:

Population Health Metrics and Information Technology —

Improve methods and analytical capacity to collect, evaluate, and disseminate data that can be translated into actionable information and outcomes in population health at the local, state, and national level. Make the improvement of data collection for population subgroups a core value of public health. The informed use of health care quality data can serve as a catalyst to build population-based public health programs as a strategy to improve population health, eliminate health inequities, and bridge gaps between health care and public health.

Evidence-Based Practices, Research, and Evaluation —

Bridge research and practice and institutionalize evidence-based approaches to achieve results-based accountability. Support effective and safe practices that can be used by practitioners.

Systems Thinking —

Advance systems thinking in public health. Foster systems integration strategies by analyzing problems using systems science methodologies (i.e., network analysis) while taking into account the complex adaptive nature of the public health system. Complex adaptive systems are described as those based on relationships of diverse and interconnected agents that have the capacity to learn, change, and evolve (i.e., hospitals, emergency medical services systems, educational systems, emergency preparedness and response systems).

Sustainability and Stewardship—

Strengthen system sustainability and stewardship through valid measures and reporting of performance and quality. Ensure efficient funding methodologies that align resources with goals, demonstrated need, responsibilities, measurable results, and ethical practices.

Policy—

Strengthen policy development and analysis processes and advocacy to ensure that evidence is integrated into policymaking to improve population health.

Workforce and Education—

Develop and sustain a competent workforce by ensuring that educational and skills content are appropriately aligned with core and discipline-specific

competencies. Assure that public health education is accessible at all academic levels, and that life-long learning is encouraged and valued.

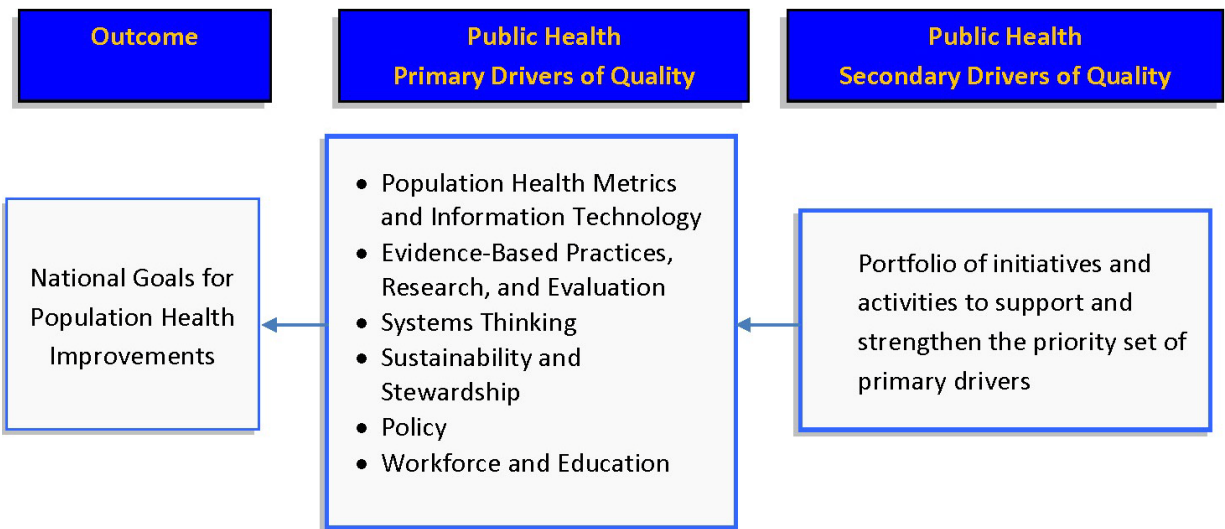


Figure ES-1. Institute for Healthcare Improvement concept of primary and secondary drivers applied to public health

Figure ES-1 displays the Institute of Healthcare Improvement concept of primary and secondary drivers applied to public health using the six priority areas for improvement of quality. In this model for strategic improvement, the likelihood of achieving health outcomes (i.e., national goals) is influenced by primary drivers of quality (i.e., six priority areas for improvement of quality in public health). Secondary drivers provide the necessary support to strengthen the primary drivers. For example:

- Outcome: National Goals for Population Health Improvements
- Public Health Primary Drivers of Quality (i.e., six priority areas):
 - Population Health Metrics and Information Technology
 - Evidence-Based Practices, Research, and Evaluation
 - Systems Thinking
 - Sustainability and Stewardship
 - Policy
 - Workforce and Education
- Public Health Secondary Drivers of Quality: a portfolio of initiatives or projects to support and strengthen the priority set of primary drives.

MOVING FORWARD

We are poised at a transformative time for our country's health. As 2010 concludes, the Department of Health and Human Services will be unveiling its 2020 version of Healthy People, a time-honored national process of setting overarching health goals and objectives for the country (Koh, 2010). The launch of the Affordable Care Act this year also brings many opportunities, including producing a National Strategy for Quality Improvement in Health Care and National Prevention and Health Promotion Strategy. Now, this report contributes to the identification of priority areas that are primary drivers of quality and outcomes and represent avenues for addressing many Healthy People goals. These priority areas represent the best venues to focus valuable human and financial resources to ensure conditions for a healthy population.

In practical terms, the public health primary drivers of quality and outcomes prioritized in this report can now serve as a frame of reference and a starting point. Organizations can use this framework to assess quality, identify weaknesses and redesign them when necessary to achieve greater levels of improvement. Identifying such drivers also allows the launch of continuous improvement processes to overcome barriers toward national goals and move toward better health improvement strategies. A relevant Healthy People 2020 objective is to increase the number of public health agencies that implement agency-wide quality improvement processes (DHHS, 2009).

Recommendations

In the following chapters of this report, we add detail for each of these drivers and also employ diagrams to demonstrate how the priorities facilitate achievement of outcomes. The narrative on each priority area in Chapter 3 and illustrations of secondary drivers in Chapter 2, point to specific system-level elements to review for quality weaknesses. Additionally, within each priority area, we can point to a specific recommendation for improvement. They are:

- *Improve the analysis of population health and move toward achieving health equity*
- *Improve program effectiveness*
- *Improve methods to foster integration among all sectors that impact health (i.e., public health, health care, and others)*
- *Increase transparency and efficiencies to become better stewards of resources*
- *Improve surveillance and other vigilant processes to identify health risks and become proactive in advocacy and advancement of policy agendas that focus on risk reduction*

- *Implement processes to advance professional competence in the public health workforce*

HHS is committed to achieving quality in public health. In particular, OASH continues to build the foundations for quality in public health and advancing Healthy People 2020. We look forward to collaborations with many partners to move toward a vision of true public health quality for the country.

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CHAPTER 1

INTRODUCTION

The U.S. Department of Health and Human Services (HHS) is the lead federal agency for protecting and improving the quality of health for all Americans. The public health system plays a critical role in the quality of health by ensuring conditions for a healthy population. Yet to date, most attention and research on quality has focused on the healthcare setting and not more broadly on population health.

Within the federal government, the Assistant Secretary for Health (ASH) serves as senior advisor to the HHS Secretary and works to promote population health. To advance this mission, the Office of the Assistant Secretary for Health (OASH) led a process to identify dimensions of quality as they apply to broad population health. Now, identifying priority areas for public health quality is the next step necessary for advancing this field. This report provides an overview of that process, introduces the priority areas identified and describes these areas as primary drivers of quality improvement.

PROJECT PURPOSE

The purpose of this project was to continue HHS efforts to build foundations for quality in the public health system and identify specific priority areas. In *Crossing the Quality Chasm: A New Health System for the 21st Century*, the Institute of Medicine (IOM) Committee recommended the identification of priority areas for the improvement of health care quality (Institute of Medicine [IOM], 2001). The Committee proclaimed that doing so would systematically focus attention on achieving substantial progress on a short list of areas needing improvement. Also, the priority areas were viewed as a logical starting point to achieve improvements in the six aims (characteristics of patient care) for the improvement of patient care—safe, timely, effective, efficient, patient-centered, equitable—that were identified by the IOM Committee (IOM, 2001).

HHS acknowledged the relevance of recommendations made by the IOM Committee and the 1998 President’s Advisory Commission on Consumer Protection and Quality and used them as a starting point for recommendations applicable to broader population health. In an earlier project, OASH developed a *Consensus Statement on Quality in the Public Health System* that included both a

definition of public health quality and nine aims (characteristics) of public health quality (Department of Health and Human Services [DHHS], 2008). These aims — population centered, equitable, proactive, health promoting, risk-reducing, vigilant, transparent, effective, and efficient—represent characteristics that should be present in the system when fulfilling a public health mission and are consistent and aligned with the IOM’s six aims for quality in patient care. The Affordable Care Act, which became law in March 2010, provides a platform for building a vision for quality in public health

Vision

Building better systems to give all people what they need to reach their full potential for health.

STUDY PROCESS

The vehicle within HHS for developing foundations for public health quality is the Public Health Quality Forum (PHQF). The PHQF, chaired by the ASH, is represented by each HHS agency and staff and operating division director or their designee. Accomplishments of the PHQF over the past two years include development of the: Consensus Statement on Quality in the Public Health System, definition of public health quality, and nine aims for quality improvement in public health (DHHS, 2008). To promote uniformity across the system, the PHQF defined public health quality as:

Quality in public health is the degree to which policies, programs, services, and research for the population increase desired health outcomes and conditions in which the population can be healthy.

The nine aims that represent characteristics of quality in the system are:

Population-Centered, Equitable, Proactive, Health Promoting, Risk-reducing, Vigilant, Transparent, Effective, and Efficient

Identifying specific priority areas for improvement of quality in public health represented the next project for the PHQF, with key public health stakeholders presenting on issues relevant to their areas of expertise. To this end, in May 2010 the PHQF was reconvened and charged by the ASH with:

Identifying areas of greatest priority where public health should improve quality to facilitate achievement of better population health outcomes.

CRITERIA

The PHQF selected the set of priority areas based on three criteria—impact, improvability, and practice variability:

- **Impact**—the extent of significant improvements in population health, health equity, quality, and safety that could result from changes in this area
- **Improvability**—the potential for changes that could lead to desired health, process, or given changes in system outcomes
- **Practice Variability**—the potential for standardizing areas where wide variability in practices exist and where gaps between current practices and knowledge, evidence, or best practices can be closed without hindering innovation

Each of the criteria is distinct but connected. When examining for *impact*, the extent that changes can result in improvements is documented. The *improvability* criteria document the possibility for changes in a given area. In *practice variability*, gaps and lack of standardization that potentially influence impacts and improvements are examined.

FRAMEWORK

The framework used to guide the identification of the priority areas is shown in Figure 1. The Three Core Functions for Public Health—Assessment, Policy Development, and Assurance—that describe the role of public health, combined with an additional category of System, are the foundation of the framework. This foundation provided the boundaries for identification of the priority areas. Requests to propose areas for consideration that significantly limit the ability to achieve positive health outcomes guided this process.

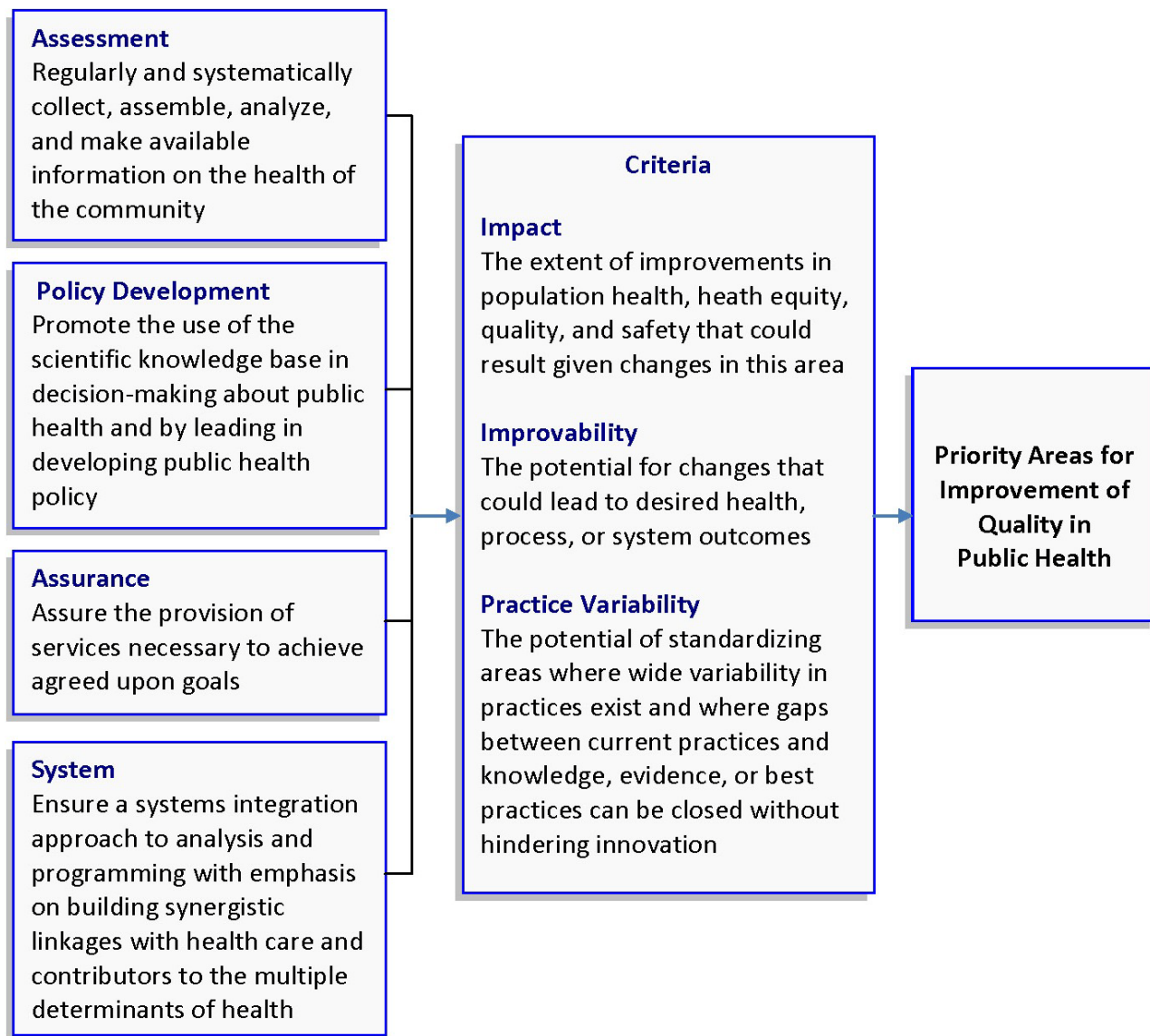


Figure 1. Framework used to identify priority areas

Figure 1 displays the framework used to identify the priority areas. The Three Core Functions for Public Health—Assessment, Policy Development, and Assurance—and an additional category of System are the foundation of the framework. This foundation provided the boundaries for identifying potential areas to examine. Three criteria—impact, improvability, and practice variability—were used to analyze a list of potential areas provided by the PHQF.

- Foundation
 - Assessment: Regularly and systematically collect, assemble, analyze, and make available information on the health of the community.
 - Policy Development: Promote the use of the scientific knowledge base in decision-making about public health and by leading in developing public health policy.
 - Assurance: Assure the provision of services necessary to achieve agreed upon goals.
 - System: Ensure a systems integration approach to analysis and programming with emphasis on building synergistic linkages with health care and contributors to the multiple determinants of health.
- Criteria
 - Impact: The extent of improvements in population health, health equity, quality, and safety that could result given changes in this area.
 - Improvability: The potential for changes that could lead to desired health, process, or system outcomes.
 - Practice Variability: The potential of standardizing areas where wide variability in practices exist and where gaps between current practices and knowledge, evidence, or best practices can be closed without hindering innovation.
- Priority Areas for Improvement of Quality in Public Health
 - The final set of priority areas identified through this process are presented in Chapter 2.

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CHAPTER 2

PRIORITY AREAS FOR IMPROVEMENT OF QUALITY IN PUBLIC HEALTH

The consensus building process of the PHQF led to the identification of the six priority areas listed below. The PHQF intentionally did not rank the priorities and, as such, they are not presented in any prioritized order.

- Population Health Metrics and Information Technology
- Evidence-Based Practices, Research, and Evaluation
- Systems Thinking
- Sustainability and Stewardship
- Policy
- Public Health Workforce and Education

A detailed description and analysis of each area is presented Chapter 3. The narrative in this chapter describes how the priority areas facilitate achievement of outcomes, a key element in the charge to the PHQF.

PRIORITY AREAS AS PRIMARY DRIVERS OF QUALITY

The concept of primary drivers, taken from an Institute of Healthcare Improvement model for Breakthrough Goals and Drivers (Nolan, 2007), is used to demonstrate how improvements in the priority areas can be used to advance quality and achieve outcomes. In this illustration of the model, the priorities represent essential system-level cross-cutting areas, described as **primary drivers** that function as pathways for achieving desired outcomes (Institute for Healthcare Improvement, n.d.). As primary drivers, the priority areas can individually and collectively contribute to fulfilling system-wide outcomes as illustrated in Figure 2. The figure notes primary drivers, as well as sets of *secondary drivers* that flow in a cascading manner to achieve an outcome. The secondary drivers in this illustration represent system-level cross-cutting functions that:

- support critical elements of the primary drivers
- Increase the likelihood of achieving improved outcomes
- strengthen the public health infrastructure

Additionally, the secondary drivers can contribute to strengthening the quality and function of several other primary drivers identified as priorities. For example, as illustrated in Figure 2, **establishing actionable real-time data** capacities is a secondary driver that directly contributes to strengthening the Population Health Metrics and Information Technology primary driver, but also could support identification of evidence-based practices, advancement of systems thinking, and strengthening the analytical capacities of the workforce. The secondary drivers are strengthened when aligned with appropriate aims (characteristics) of public health quality. At a minimum, **actionable real-time data** could promote practice characteristics that are proactive, vigilant, and risk reducing through activities such as early alerts to the population as well as individual patients.

Both primary and secondary drivers are essential for strategic improvements in the system (Nolan, 2007). Secondary drivers presented in Figure 2 also highlight areas in each priority to review for quality weaknesses. The illustrations in Appendix A provide specific examples of secondary drivers unique to outcomes and quality improvements in healthcare-associated infections (HAI), human immunodeficiency virus (HIV), and healthy weight. **Elements and processes within all drivers should be continuously examined and improved for quality to ensure achievement of outcomes.**

Coordination Opportunities

The six priorities represent opportunities to coordinate national efforts for improving public health outcomes, particularly in areas with high potential for improvement and where variability of practices and lack of evidence can be reduced. They also represent interacting system-level areas needing improvement in order to generate the path for achieving desired outcomes.

The relationship between the six priority areas underscores the value for coordinating elements in a complex adaptive system. Complexity in a system is created “when dependency among elements in the system becomes important” (Miller & Page, 2007, p. 9). In fact, research by organizational theorists conceptualizes complex systems as interdependent tasks performed by teams or units within the complex system (March & Simon, 1958). A relationship between the priority areas exists and this connectedness leads to benefits. For example, quality improvements in public health workforce and education impact all other areas. Tasks (processes) within the six priority areas are interdependent as well (March & Simon, 1958; Simon, 1962). An example of interdependency is provided to illustrate this point. Mandates for community health assessments by hospitals in collaboration with public health can be best accomplished with the aid of actionable real-time data coupled with appropriate analytical capacities.

When such metrics to measure population health are present, the process of community health assessment is significantly strengthened. National strategies for health quality can build on this interdependence of public health quality throughout the health care system.

Improvement Opportunities

A list of improvement opportunities is provided in the Executive Summary and as secondary drivers in Figure 2. However, the list is neither comprehensive nor exhaustive. Organizations should design activities to evaluate processes in each of the six cross-cutting areas to determine where to focus quality improvement efforts tailored to their specific needs.

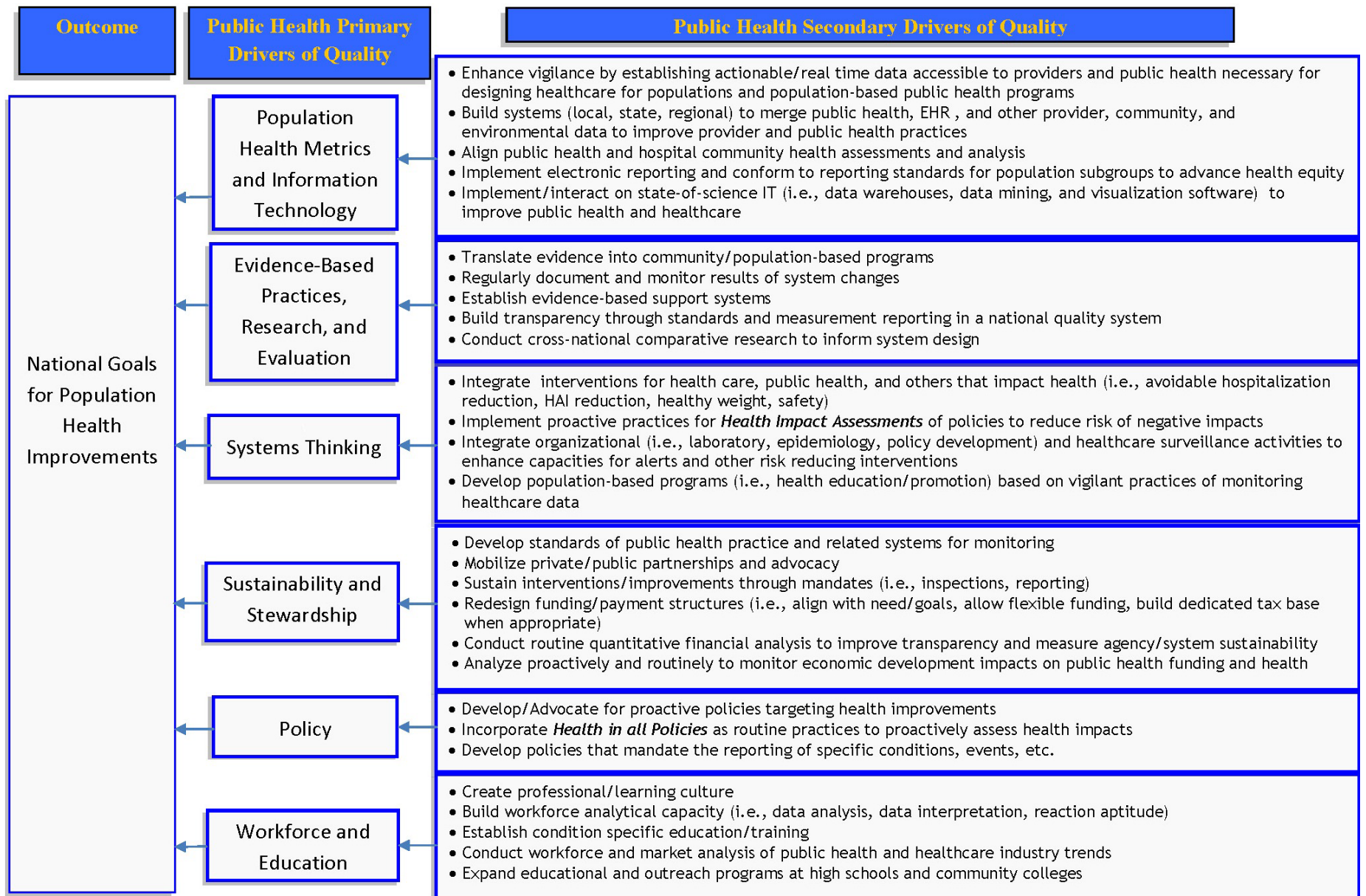


Figure 2. Public health primary and secondary drivers of quality

Figure 2 displays the influence and relationship of the public health primary and secondary drivers of quality to achieve desired outcomes. The secondary drivers support critical elements of the primary drivers and, in this illustration, both drivers represent system-level cross-cutting functions and activities. Strengthening of the primary drivers increases the likelihood of achieving desired health outcomes. The bulleted structure explains how the drivers flow in a cascading manner.

- National Goals for Population Health Improvements (defined as an outcome)
 - Population Health Metrics and Information Technology (primary driver). The secondary drivers are:
 - Enhance vigilance by establishing actionable/real time data accessible to providers and public health necessary for designing healthcare for populations and population-based public health programs
 - Build systems (local, state, regional) to merge public health, EHR , and other provider, community, and environmental data to improve provider and public health practices
 - Align public health and hospital community health assessments and analysis
 - Implement electronic reporting and conform to reporting standards for population subgroups to advance health equity
 - Implement/interact on state-of-science IT (i.e., data warehouses, data mining, visualization software) to improve public health and healthcare
 - Evidence-Based Practices, Research, and Evaluation (primary driver). The secondary drivers are:
 - Translate evidence into community/population-based programs
 - Regularly document and monitor results of system changes
 - Establish evidence-based support systems
 - Build transparency through standards and measurement reporting in a national quality system
 - Conduct cross-national comparative research to inform system design
 - Systems Thinking (primary driver). The secondary drivers are:
 - Integrate interventions for health care, public health, and others that impact health (i.e., avoidable hospitalization reduction, HAI reduction, healthy weight, safety)
 - Implement proactive practices for *Health Impact Assessments* of policies to reduce risk of negative impacts
 - Integrate organizational (i.e., laboratory, epidemiology, policy development) and healthcare surveillance activities to enhance capacities for alerts and other risk reducing interventions
 - Develop population-based programs (i.e., health education/promotion) based on vigilant practices of monitoring healthcare data
 - Sustainability and Stewardship (primary driver). The secondary drivers are:
 - Develop standards of public health practice and related systems for monitoring
 - Mobilize private/public partnerships and advocacy
 - Sustain interventions/improvements through mandates (i.e., inspections, reporting)
 - Redesign funding/payment structures (i.e., align with need/goals, allow flexible funding, build dedicated tax base when appropriate)
 - Conduct routine quantitative financial analysis to improve transparency and measure agency/system sustainability
 - Analyze proactively and routinely to monitor economic development impacts on public health funding and health
 - Policy (primary driver). The secondary drivers are:
 - Develop/advocate for proactive policies targeting health improvements
 - Incorporate *Health in all Policies* as routine practices to proactively assess health impacts
 - Develop policies that mandate the reporting of specific conditions, events, etc.
 - Workforce and Education (primary driver).The secondary drivers are:
 - Create professional/learning culture
 - Build workforce analytical capacity (i.e., data analysis, data interpretation, reaction aptitude)
 - Establish condition specific education/training
 - Conduct workforce and market analysis of public health and healthcare industry trends
 - Expand educational and outreach programs at high schools and community colleges

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CHAPTER 3

DESCRIPTION OF PRIORITY AREAS

The narrative that follows provides a detailed description of the six priority areas for improving quality in public health. Discussion on each of the six areas is framed by the three selection criteria – impact, improvability, and practice variability – used by the PHQF.

Population Health Metrics and Information Technology

Description

Improve methods and analytical capacity to collect, evaluate, and disseminate data that can be translated into actionable information and outcomes in population health at the local, state, and national level. Make the improvement of data collection for population subgroups a core value of public health. The informed use of health care quality data can serve as a catalyst to build population-based public health programs as a strategy to improve population health, eliminate health inequities, and bridge gaps between health care and public health.

Rationale for Selection

Impact

In the 1988 report, *The Future of Public Health*, the Institute of Medicine recommended the regular and systematic collection and analysis of health data by every public health agency. It also recommended that this information be made available to the communities they serve (IOM, 1988). The availability of data by subpopulations such as racial and ethnic groups, persons with disabilities, elderly, gender, geographic region, and socioeconomic status is critical for conducting comprehensive analysis of community health conditions. When data are not available to communities, neither leaders representing public health and their governance structures, local governments, community organizations, health care providers, nor the public have information to guide resource allocations or to set and prioritize goals or outcomes.

Responding to the need for information, HHS is planning the launch of a Health Indicators Warehouse website that will serve as the data hub of the Community Health Data Initiative (CHDI) (DHHS, n.d.). The purpose of CHDI is to enhance understanding of health and health care system performance in communities, and spark and facilitate action to improve performance and value. Additionally, in this era of healthcare reform, access to appropriate data for cross-national comparative research adds to a global dialogue on health

policy and health system performance (Bauer & Ameringer, 2010; Murray & Frenk, 2010; Thorpe, Howard, & Galactionova, 2007).

The capacity to collect and analyze data is critical for implementing public health interventions and designing health care for populations. Health care providers are mandated to report data on certain diseases and conditions and the data are used to populate components of public health information systems. However, complexities caused by some outdated public health reporting requirements often leads to provider frustration, duplication, and potential underreporting of conditions and diseases (Public Health Data Standards Consortium [PHDSC], 2007). Such complexities in data reporting formats and lack of system interoperability can inhibit the ability of public health agencies to provide real-time information back to providers useful for disease prevention and care coordination (PHDSC, 2007).

However, data alone are of limited utility absent the capacity to analyze, interpret, and react. A traditional function of public health is the transformation of data into information to assess, monitor and improve the health of the population. Analyzing data allow measurement of change over time and serve as the foundation for epidemiology, surveillance, planning, and evaluation. Failure to exploit the growing volume of data, to have the right data, and to paint a complete picture of population health can often be attributed directly to the lack of data, trained personnel, and tools to evaluate, analyze, and interpret the data. Setting quality standards to measure fulfillment of the health assessment component of a public health mission absent any process improvements in data and analytical capacity does not serve to improve population health.

Racial and ethnic disparities in health remain prevalent in the United States, with gaps widening in many categories. Health and medical care disparities and inequalities are also found in rural area populations, individuals with disabilities, and certain socioeconomic groups (Agency for Healthcare Research and Quality [AHRQ], 2004; Havercamp, Scandlin, & Roth, 2004; Pappas, Hadden, Kozak, & Fisher, 1997). Eliminating health disparities remains one of the overarching goals of Healthy People 2010 and now Healthy People 2020 (Koh, 2010). Yet, as Berwick, Nolan, and Whittington (2008) state, “the gain in health in one subpopulation ought not to be achieved at the expense of another subpopulation” (p.760). This issue was underscored in the 1985 Report of the Secretary's Task Force on Black and Minority Health, which outlined the magnitude of health disparities between majority and minority populations and proposed that one step toward better addressing these problems would be improving the quality and availability of data to better measure and understand these disparities (DHHS, 1985). Yet data collection methods and reporting at the state and local levels do not always adhere to federal guidelines (Office of Management and Budget) (Bilheimer & Sisk, 2008). As a result, transparency,

one aim for improvement of quality in public health (DHHS, 2008), is absent since data for certain segments of the population are missing. This lack of transparency impacts other aims such as the ability to be proactive, vigilant, or risk reducing. It also inhibits the ability to fully communicate to decision makers, governance structures, or even the community, the information needed to establish goals and outcomes.

The 2006 National Health Disparities Report noted information gaps caused estimation problems related to access and quality measures for select racial and ethnic populations (AHRQ, 2006). In another study examining the capacity of states to track health disparities across population sub groups using the Healthy People 2010 Leading Health Indicators, data were not available across specific age groups (Dodd, Neuman, & Gold, 2007). Moreover, even as data distribution systems have proliferated, analytic methodologies have stagnated. Most population health assessments resemble static report card style lists--county-level, pre-aggregations of a parsimonious set of indicators--ignoring wide variations often hidden within population sub groups.

Local data can serve as a powerful instrument for improving quality and population health in the community. Data can be a driver and foundation for public health policy and health services delivery while providing a baseline for evaluation and quality improvement efforts. In fact, using local information to illustrate community health needs is an effective strategy for building advocacy in the community and advances opportunities to garner political support to fund interventions that address those needs (Dodd et al., 2007; Luck, Chang, Brown, & Lumpkin, 2006). For example, in the 1998 report *Quality First: Better Health Care for All Americans*, the President's Commission on Consumer Protection and Quality in the Health Care Industry recommended the use of health care quality data to build public health programs that address needs identified through analysis of the health care quality measures (President's Advisory Commission on Consumer Protection and Quality in the Health Care Industry, 1988).

Improvability

A history of frameworks, report cards and internet websites has evolved over the past two decades to support the assessment of community health status. While these tools play an important role in providing access to useful information, there is little compelling evidence that these endeavors have resulted in demonstrable improvement (Friedman & Parrish, 2009). Now, the escalating attention on the Patient Protection and Affordable Care Act (Affordable Care Act) to population health, data quality, and information technology provides a favorable climate for improved methods to evaluate

population health across the nation (Patient Protection and Affordable Care Act [Affordable Care Act], 2010).

The ability to improve the health of populations requires a powerful analytical capability and vast amount of data; modern online analytic processing software for modeling; a cadre of specially trained analysts with expertise in the public health measurement sciences and information technology; and a community of users to stimulate development of the system (Studnicki, Fisher, & Eichelberger, 2008). Incentives for strengthening health information exchange and technology through initiatives such as the Beacon Community Program made possible through the American Recovery and Reinvestment Act, illustrate the growing recognition of the value to be gained from such capacities (American Recovery and Reinvestment Act, 2009).

A sophisticated infrastructure composed of state-of-the-science information technology (data warehouses, data mining, and visualization software) also helps to reach the vision of better systems. For example, the hospital/public health collaboration associated with the community health needs assessment requirements of the Affordable Care Act moves us closer to a true systems environment. Inclusion of population health measures (collected and reported by governmental public health agencies) that comply with *meaningful use* requirements for Electronic Health Records (EHR) is another. Section 4302 of the Affordable Care Act that sets forth standards for uniform categories and data collection requirements also offers tremendous opportunities to improve data collection, analysis, and quality especially as it relates to vulnerable populations and identifying and eliminating disparities (Affordable Care Act, 2010). Aligning technology and data standards could add value to the evolving system for public health agency accreditation.

Critical to population health improvements in communities, especially for eliminating disparities and inequities, are systems that unify the structures, processes, and impact of the multiple levels that influence health. Reciprocal interactions needed for achieving improvements are capacity to monitor multiple indicators of health status, flexible analytical capability for problem alerts and priority setting, ability to inform action alternatives, and methods for evaluation of program impacts.

Management of systems knowledge also must include having the appropriate level of internal controls, such as confidentiality practices regarding electronic health information. A survey of state health agencies revealed that over a 2-year period, 25% of all public health agencies had at least one security breach (Myers, Frieden, Bherwani, & Henning, 2008). Principles for public health ethical practices include statements on protecting confidentiality and also for respecting the rights of the community (Cobus, 2008). From a quality

improvement perspective, redesigning processes to ensure confidentiality would be strategically aligned with these ethical guidelines and language in section 3101 of the Affordable Care Act to develop data management security system (Affordable Care Act, 2010).

Practice Variability

Reports document the wide variability in data collection, data reporting, and analytical capacity across states (Gold, Dodd, & Neuman, 2008). At the time of this writing in 2010, three states still did not collect hospital discharge data (D. Love, personal communication, August 19, 2010), and among the remaining 47, there are many differences in data elements and definitions and collection requirements (Love, Rudolph, & Shah, 2008; Schoenman, Sutton, Kintala, Love, & Maw, 2005). Hospital discharge data are essential to analyses related to public safety and injury surveillance, disease registries and surveillance, health planning, measuring hospital quality and performance, conducting research, and informing policy debates.

Data needed to measure population health and especially vulnerable populations, such as the elderly and disabled, are often not available. The lack of an adopted set of standards for public health data and uniform data elements results in a system that lacks interoperability and transparency. This limits the exchange of data between information systems and public health entities and makes it difficult to measure and contrast performance and effectiveness.

The practice of public health is information and data driven yet because information exchange varies greatly throughout the system, there is no assurance that data are collected, shared, or applied to its fullest capability. And, there are currently no consistently agreed upon methods for measuring the health of populations from a quality improvement perspective. Rather, a variety of tools and indicators make up several national models for health status assessment.

Evidence-Based Practices, Research, and Evaluation

Description

Bridge research and practice and institutionalize evidence-based approaches to achieve results-based accountability. Support effective and safe practices that can be used by practitioners.

Rationale for Selection

Impact

Evidence-based public health is defined as “the process of integrating science-based interventions with community preferences to improve the health of populations” (Kohatsu, Robinson, & Torner, 2004). As in industry, doing the “right things right” is critical to assuring quality in public health practice and in programs designed to ensure conditions for a healthy population (Dever, 1997). Building public health interventions based on the best scientific evidence from research and proven best practices, as determined by rigorous program evaluation, maximizes the probability of achieving desired results.

The success of some of the most notable public health interventions—such as childhood vaccinations, fluoridation of water systems, and risk factor control to prevent stroke and heart disease—is attributable to research and evidence-based public health practices translated into community-based programs (Fielding & Briss 2006). One of the best examples of the successful integration of research, policy, and practice is tobacco control. Knowledge from research, in part, drove programs and policies that have significantly reduced population prevalence of smoking. Increasing the excise tax on tobacco, for example, is an evidence-based practice that led to dramatic reductions in smoking rates in California and Massachusetts (Fichtenberg & Glantz, 2000; Koh, Judge, Robbins, Celebuck, Walker, & Connolly, 2005; Pierce et al., 1998). Social marketing, perhaps an underutilized population-based strategy in public health to improve population health, also had an impact on reducing smoking rates (Greenwood, 2009).

Documentation of program results, centrally important to performance measurement and quality management systems, provides the evidence of what works and by how much to continuously improve quality. Furthermore,

evaluation of public health policies and interventions can provide vital information on costs, benefits and utility of specific approaches for decision makers. Such analyses are critical because difficult choices are always made in the context of limited public health resources. For example, physical inactivity, a significant factor in the national epidemic of obesity, is estimated to result in up to \$77 billion a year in excess health care costs (Pratt, Macera, & Wang, 2000). Documenting successful interventions such as school-based physical education programs that show an 8% increase in aerobic fitness when school curricula are modified can assist in deciding where to put limited resources (Task Force on Community Preventive Services, 2005a).

Improvability

Changes in the use of evidence-based practices, research, and evaluation have significant potential to facilitate improved outcomes across the system. Research has been shown to improve quality in at least two areas: 1) the utility and translation of research for practice, and 2) evidence-based support systems to enhance the quality of widespread implementation of evidence-based practices.

However, translation of science into practice remains slow (Kerner, Rimer, & Emmons, 2005). The potential for change in translation practices could be improved by increasing practice-based research as a strategy to improve the relevance and quality of research needed by practitioners and consumers/citizens. Community-based participatory research that involves an academic-community partnership has proven to be a successful research model for improving health outcomes (Viswanathan et al., 2004). For example, Horowitz, Williams, and Bickell (2003) used a community-based approach to identify areas of concern in diabetes care and assess the needs of adults with diabetes residing and obtaining care in East Harlem. A community-based participatory research project, *BRIDGE*, was also used to successfully reduce marijuana and other drug use and HIV/AIDS among African American adolescents in an urban setting (Marcus et al., 2004). As a community-based initiative, *BRIDGE* was sustained as a part of a church ministry that was extended to other churches in a large metropolitan community. Novel approaches such as this that build competencies in community-based organizations are noted as important to advancing innovation in research design and benefits to communities (Koh, Oppenheimer, Massin-Short, Emmons, Geller, & Viswanath, 2010).

Effectiveness is an aim for improvement of quality in public health. Opportunities to improve effectiveness abound since many areas of public health have not fully utilized or disseminated a large amount of scientific

evidence (e.g., obesity prevention, HIV infection prevention, teen pregnancy prevention) (IOM, 2010a; Kelly et al., 2000; Lesesne, Lewis, White, Green, Duffy, & Wandersman, 2008). Also, authority in the Affordable Care Act and the Pandemic and All Hazard Preparedness Act for the advancement of public health systems and services research—a field focused on examining the organization, financing, and delivery of public health services—will add to the base of knowledge on effective strategies regarding prevention, preparedness and response, and other public health interventions (Affordable Care Act, 2010; Pandemic and All-Hazards Preparedness Act, 2006). The definition of public health quality includes research as a component of system elements that contributes to achieving desired health outcomes (DHHS, 2008). Ensuring the quality of public health research is noted as important by the Task Force on Community Preventive Services (2005b) and focusing on evidence that can be used to make improvements and achieve outcomes will create greater probabilities for implementation (Kelly et al., 2000).

To promote widespread use of evidence based programs, accessible syntheses and translations of the literature can guide practitioners, policymakers, and communities through the essential steps needed to plan, implement, evaluate and sustain evidence-based practices, programs, or policies. For example, *Getting to Outcomes* (GTO) is a 10-step, results-based accountability approach that guides practitioners through the key steps of assessment, policy development, assurance, and system collaboration to achieve outcomes (Wandersman, Imm, Chinman, & Kaftarian, 2000). Another example is *Using What Works*. This train-the-trainer course teaches users how to adapt a research-tested intervention program to the local community context (National Cancer Institute, n.d.). Chinman and colleagues (2008) found that use of GTO in community settings increased prevention capacity, program performance, and documented outcomes. Enhancement of *The Guide to Community Preventive Services*, under mandates in the Affordable Care Act, is expected to augment evidence-based practices and knowledge needed for systems such as GTO.

Accelerating the dissemination and implementation of evidence-based practices requires developing the field of evidence-based support systems that include tools, training, and technical assistance (Wandersman, 2009; Wandersman, Chien, & Katz, 2010). An example of evidence-based support is provided by Kelly et al. (2000), who randomized communities into one of three arms of support for evidence-based HIV prevention programming: 1) provision of an intervention manual alone, 2) provision of an intervention manual in tandem with a training workshop, and 3) provision of an intervention manual, training, and proactive TA. Communities within the third arm of support demonstrated the highest level of quality in the delivery of evidence-based HIV prevention.

In a complex adaptive system such as public health, innovation requires variation from standard practice (Plsek & Wilson, 2001) However, it can lead to inconsistent outcomes (Pawson, 2002). Hence, evaluation should include questions of “what works for whom [and] in what circumstances” (Pawson, 2002, p. 213). Encouraging innovation and conforming to the quality aim for equity when designing programs and services requires being cautious about implementing initiatives proven to be effective in one population group but not examined for effectiveness or accepted as culturally appropriate by other groups.

Practice Variability

Significant variability exists in the capacity to integrate science-based interventions and the communities they serve. Further, experts have varying perspectives on why evidence-based public health is not more widespread, and even how much it is already in practice. Some authors attest that evidence-based practices have a long standing tradition in public health (Fielding & Briss, 2006), but others proclaim it to be a relatively new concept in the practice of public health (Anderson et al., 2005). A contributor to practice variability regarding the application of evidence-based practices in public health could be the availability and access to credible information on the scientific basis and best practices for specific programs and interventions. The *Guide to Community Preventive Services* (Community Guide), established in 2001 and produced under the auspices of the Task Force on Community Preventive Services, is a database of recommendations for public health programs based on evidence of practices that have worked to improve health (Briss, Brownson, Fielding, & Zaza, 2004). As highlighted earlier, the Affordable Care Act includes mandates to continue this work, with emphasis on developing new topic areas for review and updating existing topics, integrating recommendations with federal objectives (Affordable Care Act, 2010).

Effective use of evidence based practices varies widely according to level of organizational capacity (e.g., leadership, organizational climate) and innovation capacity (ability to implement an evidence-based practice) at the state, local, organizational, and individual levels (Flaspohler, Duffy, Wandersman, Stillman, & Maras, 2008). Varying levels of capacity across delivery systems can have implications for practice, quality, performance, and outcomes. Establishing a role for an appropriately skilled professional to lead research, translate evidence into practice, and provide coaching (as found to be effective by Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005), could be an effective means for standardizing and institutionalizing the research into agencies with a public health mission.

Gaps between research and practice, but also in sharing successful practices represent major barriers to widespread implementation of evidence based practices. To bridge these gaps, the *Interactive Systems Framework for Dissemination and Implementation*, developed by the Centers for Disease Control and Prevention (CDC) with the collaboration of funders, researchers, and practitioners, integrates research to practice models with community-centered/practice-centered models (Wandersman et al., 2008). The *Framework* indicates that support to practitioners (e.g., training and technical assistance) is essential to utilization of knowledge. A meta analysis by Joyce and Showers (2002) showed theory and discussion plus training was associated with 0% use in the field by practitioners, while direct coaching in the field led to 95% use.

Systems Thinking

Description

Advance systems thinking in public health. Foster systems integration strategies by analyzing problems using systems science methodologies (i.e., network analysis) while taking into account the complex adaptive nature of the public health system. Complex adaptive systems are described as those based on relationships of diverse and interconnected agents that have the capacity to learn, change, and evolve (i.e., hospitals, emergency medical services systems, educational systems, emergency preparedness and response systems).

Rationale for Selection

Impact

The *Three Core Functions of Public Health* and *Ten Essential Public Health Services* describe the scope of responsibilities for the public health system. The public health system in the United States encompasses governmental and non-governmental entities (IOM, 1988). While these documents are useful for articulating the capacities needed for a public health system, no single agent within the system (e.g., public health agencies, federal agencies, mental health institutions, health care organizations, non-profit organizations, and academia) can independently meet these responsibilities for a given population. These functions and services are what the system does *collectively* to ensure conditions for a population to be healthy.

The founding principle of public health is based on the premise that causes of health, disease, and illness extend beyond the boundaries of individual human biology and behavior (Leischow & Milstein, 2006). This principle supports the concept of systems thinking in that gaining knowledge of the interactions and linkages of individual agents in the system is critical to understanding the entire system. Healthy People underscores that the “health of the individual is almost inseparable from the health of the larger community” (Koh, 2010) and recognizes the social determinants of health, i.e., the social, political, and economic forces that impact population health. The connections and associated behavior of the multiple agents in the system produce current levels of population health, with influences from multiple domains outside what we usually consider the health professions (Frieden, 2010). An understanding of

these multiple interconnected societal components (e.g., economic development, education, income, and transportation) can provide important insights into opportunities to improve population health as well as barriers that may negatively impact health. As summarized by the Tobacco Control Research Branch of the National Cancer Institute, “systems thinking in public health cannot be encompassed by a single discipline” (Trochim, Cabera, Milstein, Gallagher, & Leischow, 2006).

A core concept of systems thinking and complex adaptive systems is that relationships between system components impact the system and so finding solutions to public health problems requires a better understanding of such interactions (Leischow et al., 2008). The absence of needed preparations at multiple levels, despite warnings of imminent dangers in advance of Hurricane Katrina, arguably represents a dramatic example of problems emerging from a lack of a systems approach to public health issues. This example also provides insights into the interconnectedness of the public health system to other systems such as social networks and even the military.

A variety of working models support systems thinking philosophies that promote integrating public health with other components in the system. Local efforts to form partnerships between public health and the business community have been successful at improving preparedness (Buehler, Whitney, & Berkelman, 2006). Linkages between public health and health care entities that included efforts such as partnerships, surveillance, outreach and messaging helped to reduce the incidence of health care-associated infections. For example, following implementation of these activities in the first six months of 2009, the incidence of central line-associated bloodstream infections declined 18% nationally compared to the previous three years (Centers for Disease Control and Prevention [CDC], 2010a; DHHS, 2009). A systems approach to build surge capacity was similarly successful when collaboration was fostered for outreach and training, needs assessments, and curriculum development between community health centers, academia, and government agencies (Koh et al., 2006). Most notably, Rust, Satcher, Fryer, Levine, and Blumenthal (2010) concluded that innovations in epidemiology and clinical research combined with public health and medical care practices resulted in a 50% reduction in mortality for seven of the nine leading causes of death categories for the period 1950–2000.

The most obvious system relationships that requires strengthening is between public health and health care organizations. This message resonated prominently both in *The Future of the Public's Health in the 21st Century*, which described the collaboration between governmental public health agencies and the health sector as weak (IOM, 2003b), and also in *Crossing the Quality Chasm: A New Health System for the 21st Century* (IOM, 2001), which recognized the

essential role of the public health system but focused primarily on the health care delivery system.

Improvability

Promoting linkages through systems thinking and considering public health and health care as components of a complex adaptive system can lead to enhanced understanding and integrated knowledge through activities such as health awareness campaigns to benefit the population. As an example, Plsek and Wilson (2001) note how setting a quality standard for the administration of a drug within 30 minutes of arrival at a hospital may not have the full potential for saving lives if the standard should be drug administration within one hour of the onset of patient symptoms. Other activities in the system, such as symptom awareness campaigns by public health agencies and emergency medical service (EMS) response times, could affect a patient's outcome. If a patient waits one hour following symptoms to seek help or if EMS systems are not functioning optimally, the likelihood of negative patient outcomes is increased.

The CDC's newly implemented Program Collaboration and Service Integration Initiative attempts to demonstrate an integrated approach to addressing HIV/AIDS, viral hepatitis, STDs, and TB (CDC, 2009a). Another CDC program based on a systems thinking approach is REACH US. This multilevel program works to eliminate racial and ethnic health disparities through environmental change and policies (CDC, 2010b). Positive outcomes for intervention communities compared to controls include a 5% increase in pap smears, a 12% and 4% increase in cholesterol screenings for Hispanics and for African Americans, respectively, and a 22% decrease in cigarette smoking among Asian American men (CDC, 2010b). The Kellogg Foundation's Food and Community Program to advance a national movement for healthy living is using system-level initiatives to improve healthy eating behavior at home and in schools, and increase access to physical activity environments through linkages between public health agencies, schools and academia, foundations, policymakers, agriculture, and members of the community (W.K. Kellogg Foundation, n.d.). Another example of system linkages is between system agents at the state and local levels. The State Incentive Grants Program funded by the Center for Substance Abuse Prevention (CSAP) of SAMHSA links state and local communities to provide effective substance abuse prevention. CSAP has 37 states with 600 local sub-recipients, with approximately 80% implementing science-based substance abuse prevention programs (Substance Abuse and Mental Health Services Administration, n.d.).

Public health agencies are the only organizations with a legal mandate to deliver population-based health services which can lead to large scale system

improvements (e.g., access to care, data interoperability, and food safety) that can improve population health. There is a growing movement to employ such strategies. Recent examples include strategies for hypertension (IOM, 2010b) and obesity prevention (Kumanyika et al., 2008). The Affordable Care Act also includes opportunities to reinforce systems thinking philosophies. As an example, the National Prevention, Health Promotion, and Public Health Council is composed of members representing diverse interests across government such as agriculture, transportation, labor, and education. Among others, there are opportunities for systems thinking in the areas of community health assessments and electronic health records (Affordable Care Act, 2010).

The concept of Health Impact Assessment (HIA) should be considered as a method for institutionalizing systems thinking in public health. HIA is defined as a process to assess the potential health impact to the population of a program, project or policy (CDC, n.d.). The concept for HIA is similar to Environmental Impact Assessment (EIA) that is mandated through the National Environmental Policy Act (NEPA). The NEPA mandates that federal agencies assess the potential social, economic, cultural and natural resource impacts that may result from a proposed program or policy (National Environment Policy Act, 1970). The law specifically mandates that HHS conduct an assessment of public health impacts that may result from these proposed activities. HIA assessments of programs and policies at the federal, state, and local levels ensures that public health has a voice in proposed activities of disciplines that impact health (e.g., agriculture, transportation, education, economic development) and can proactively reduce any potential risks or advance health promoting benefits. The concept of *Health in All Policies* is similar in concept to HIA and is discussed in the Policy section of this report.

System science methodologies are analytical strategies based on concepts for systems thinking i.e., network analysis, microsimulation, system dynamics modeling. The National Institutes for Health (NIH) are increasingly investing in systems science methodologies to address complex public health problems. For example, in 2007, NIH began to include system science as part of its research portfolio by requiring utilization of these methods as an award requirement (e.g., NIH Program Announcement (PA) Number: PAR-08-224).

Practice Variability

Too many agents in the public health system continue to work as independent entities in disconnected silos, often contributing to variations in public health practice. For example, during the Hurricane Katrina disaster, long-term care providers such as nursing homes were not incorporated into existing emergency response systems, and as a result, many nursing homes did not

evacuate in a timely manner to prevent the deaths of their elderly patients (Hyer, Brown, Berman, & Polivka-West, 2006).

Having a workforce that is knowledgeable about and able to employ systems thinking can help close the gaps in practice variability and improve linkages in the public health system. The Association of Schools of Public Health has identified systems thinking as a core competency for public health education (Association of Schools of Public Health [ASPH], n.d.). This strategy works to close knowledge gaps regarding systems thinking. Also, embedding these competencies in public health education promotes institutionalization of the concept into public health practice.

Sustainability and Stewardship

Description

Strengthen system sustainability and stewardship through valid measures and reporting of performance and quality. Ensure efficient funding methodologies that align resources with goals, demonstrated need, responsibilities, measurable results, and ethical practices.

Rationale for Selection

Impact

Sustainability is defined by Claquin (1989) *as the capacity to maintain service coverage at a level that will provide continuing control of a health problem*. Sustaining a public health system has led to a 25-year increase in life expectancy in the United States over the last century, much of which can be attributed to advances in public health (CDC, 1999). Garrett (2000) also made a compelling case in *Betrayal of Trust: Collapse of Global Public Health* by dramatically drawing attention to increases around the world in premature death, infant mortality, and chronic and infectious diseases when public health systems were no longer sustainable. Another timely example in the United States is the reemergence in the 1980s and 1990s of tuberculosis as a public health threat, which some attribute to funding cutbacks and premature termination of relevant programs (General Accounting Office, 2000; Institute of Medicine, 2000).

Dramatic declines in the sustainability of programs in all sectors of public health highlight a serious risk to the system. Recently, thirty-one states have made cuts to public health (Center for Budget and Policy Priorities, 2010). Responding to distressed economic conditions in 2009, 25% (approximately 700) of local public health departments (LHD) made cuts to programs and services (National Association of County and City Health Officials [NACCHO], 2010). Population-based primary prevention programs targeted most frequently for cuts were those to improve childhood nutrition, increase physical exercise, support tobacco cessation, and reduce chronic disease (NACCHO, 2010). A survey of state health departments (SHD) documented cuts or elimination of

programs for immunizations, emergency medical services, tobacco cessation and prevention of HIV, asthma, and teen pregnancy (Association of State and Territorial Health Officials [ASTHO], 2010). The erosion of LHD revenues resulted in the elimination of 23,000 jobs (15% of the LHD workforce) during the calendar years 2008–2009 (NACCHO, 2010), impacting approximately 73% of the U. S. population residing in those jurisdictions (NACCHO, 2010).

Budget reductions are also impacting the sustainability of services in areas of mental health and disability services. State cuts of \$670 million in mental health services were made in 2009 contributing to, among other areas, some treatments being provided only at the crisis-intervention stage (National Council for Community Behavioral Healthcare, 2009). Also, reductions in program services for low-income elderly and disabled people were made in at least 29 states (Center on Budget and Policy Priorities, 2010). State revenues have fallen sharply during the economic downturn and may not recover until the end of the decade, making continued declines or redesign of services possible (Thomasian, 2010).

Any erosion of tax-exempt hospital revenues also has the potential to negatively impact the public health components of their community-benefit mandates if these activities are cut as costs saving measures. The best developed health goals and population health improvements will never be achieved if programs and agencies that fulfill the public health mission are not sustained.

It is also important to note the negative impact that lack of stewardship has on the system. Public health lags behind other sectors of health with analyzing the financial status and sustainability of agencies and programs. While there are suspicions about the fiscal health of the system, there are no widely applied uniform measures to confirm the magnitude and impact. Professionals, even those in non-financial positions, across all sectors of the systems (i.e., managers, governance boards/structures, national organizations, and federal agencies) must be good stewards of public funding. Yet, many academic programs do not require public health students to take a finance course (Honoré, Gapenski, Morris, Fos, & Leon, 2010).

Valid and value-adding measures and reporting of performance and quality used to inform stakeholders, including the public, must be embedded as standard operating practices of public health. Ensuring responsible stewardship and program integrity through an increased focus on eliminating waste is in fact a component of the HHS Secretary's Strategic Initiatives and Key Agency Collaborations (DHHS, n.d.). Additional funding of \$15 Billion through the Public Health and Prevention Trust Fund should provide a sense of urgency to ensure that effective stewardship and accountability are in place.

Stewardship must be used as a means to ensure sustainability of the system. Program sustainability is important but not all programs should be sustained, especially when a poor performing program negatively impacts the sustainability of the system. The Government Performance and Results Act (GPRA) mandates the establishment of standards by federal agencies to measure performance (Government Performance & Results Act, 1993). Effective stewardship practices such as continuous evaluation, implemented to comply with GPRA, should aid government agencies in identifying those programs, services, and contracts that should be sustained, sustained but improved, or eliminated. Another challenge is related to programs that are implemented in the context of either community-based participatory research, or demonstration programs that are evaluated for their impact on outcomes. When these programs are demonstrated to be effective and important to the community, sustainability becomes an issue, as resources to operate the program must be shifted from other programs, or new resources must be obtained. As with other programs, the continuity of even the most effective programs is often judged in the context of other community needs and priorities and limited resources. Consequently, relying on efficiency and effectiveness as a sustainability strategy may not be sufficient. Seeking partnerships with the private sector, which may share common goals, may be an underutilized strategy in public health especially during periods of economic distress.

Improvability

Building advocacy for public health funding is critical for sustainability. The World Health Organization (WHO) (2009) warns that countries should not allow critical public health systems to become victims of distressed economic conditions. Conversely, when new economic development activities produce substantial revenue increases in state and local jurisdictions, public health should proactively make the case for additional financial resources while also monitoring for any association of increased community revenues on population health (Honoré, Simoes, Moonsinghe, Wang, & Brown, 2007). Advocates can join public health leaders to make the case to sustain critical functions during downturns and for carving out additional funding when new revenue streams emerge.

While advocating for funding that is sustainable, predictable, and flexible, the WHO also underscores the need to be accountable by focusing on funding programs and services that demonstrates effectiveness and results (World Health Organization, 2009). This is consistent with aims for quality in public health for initiatives to be effective and efficient (DHHS, 2008). Also, a consistent theme from participants and reviewers of this process was to advance flexible funding streams.

Responsible stewardship practices by both the funder and recipient organization can advance and uphold accountability. Responsible stewards of public organizations focus on mission, customers and stakeholders, continuous quality improvement, and transparency. Agency and program performance measurement is also central to quality improvement and responsible stewardship. The *Reinventing Government Movement* of the 1990s actually grew out of a sense of urgency during a period when only 10% of Americans felt that government programs were effective (Kehoe, Dodson, Reeve, & Plato, 1995) and reports suggested that \$0.48 of every dollar was wasted (Gore, 1993).

Nonprofit contributors to the public health system also struggle to demonstrate stewardship. In a recent United Way administered survey, respondents indicated that they don't believe that nonprofits adequately achieve their mission of assisting people. Only 11% believe that nonprofits wisely spend money and 71% indicated that trust was compromised due to the lack of transparent practices on how money is spent (United Way, n.d.). The United Way responded by establishing both an *Accountability Statement* and *Standards of Excellence* to increase stewardship through uniform and transparent governance and operational processes throughout the United Way system (United Way, n.d.).

Managing processes to achieve improvement is a fundamental component of quality improvement. The economic cost of poor processes can negatively impact quality and, consequently, program and organizational sustainability (Isaksson, 2006). The integration of accountability, continuous quality improvement, and sustainability creates a synergistic approach to effective stewardship. This linkage also facilitates transparency by connecting actions to results and improves integrity by reinforcing goals with actions that have the highest likelihood of success. Being transparent with performance and quality outcomes through systems comparable to HEDIS is important for improvement advances as well (National Committee for Quality Assurance, n.d.). Similar systems are also important for ensuring valid measures of performance and are consistent with recommendations in *Quality First* (President's Advisory Commission on Consumer Protection and Quality in the Health Care Industry, 1998). Establishing standards of practice combined with appropriate reporting and monitoring systems would serve to advance improvements in this area.

Improving quality alone, however, may not be sufficient to ensure sustainability. Pluye, Potvin, & Denis (2004) suggest that sustainability planning must be woven into the initial stages of planning for a program. A requirement in the Centers for Medicare and Medicaid Services' *Medicaid Infrastructure Grant to States to Support the Competitive Employment of People with Disabilities* mandates that applicants identify how programs will be sustained if funded (Centers for Medicare and Medicaid Services, 2010). The Health Resources and

Services Administration (HRSA) *Healthy Start Program* also includes a requirement for sustainability planning (Health Resources and Services Administration [HRSA], 2006). Pluye et al. (2004) also found that institutionalizing a program through the use of *standardized organizational routines* such as policies or rules (e.g., restaurant inspections, mandatory newborn screenings, disease reporting) were critical to sustainability. Koh et al. (2007) used a systems approach to successfully improve the quality of an organ donation program in Massachusetts. While funding issues and other challenges limited sustainability in the state, the lessons learned served as a forerunner for subsequent national programs led by HRSA.

Practice Variability

Reports document the ongoing decline in public health funding for programs and services and call for accountability in the public health system (Trust for America's Health, 2010). Barriers to accountability in public health include the lack of transparency in financial as well as operational issues. There are mandates for financial data reporting in other sectors of health (e.g., community health centers) but not public health. While such analysis can be accomplished for other sectors (Shi, Collins, Aaron, Watters, & Shah, 2007), it is difficult to comprehensively measure practice variability and agency sustainability across the public health system (Honoré, Clarke, Mead, & Menditto, 2007).

In 2009, a National Association of County and City Health Officials (NACCHO) report showed that only 20% of LHD revenues are from local sources (NACCHO, 2009), highlighting the reliance of sustainability on other sources outside of their immediate control. When compared to other public services, public health's share of dedicated tax revenues is small as well, another signal of reliance on external sources of funding. This reliance makes it difficult for local agencies and communities to direct funding to local prioritized health needs. Conversely, when funding from other sources lack flexibility, resources that could be directed to areas of greatest local need are instead applied to less pressing areas.

Another threat to sustainability in the public health system is the variability and transiency in how governmental public health is funded. A 2009 NACCHO report on all LHDs reveals a median range in per capita expenditures from \$32 to \$42 (NACCHO, 2009). Current efforts to develop and implement a system of accreditation for public health are intended to provide a framework of standards and measures for measuring and reducing practice variability. Incorporating appropriate standards can reduce variability and assure inclusion of measures for stewardship and sustainability. The National Association of

Local Boards of Health and National Association of County and City Health Officials are demonstrating leadership to achieve this outcome by educating its members on practices for measuring agency fiscal sustainability. Quantitative analysis using an agency *Financial Risk Ratio* or a system-wide jurisdiction *Public Health Sustainability Index* (considering indicators such as county tax base, county health status, poverty rates, public health revenue per capita, disability rates, and unemployment) could serve as index components to monitor and proactively mitigate risk to sustainability in the system (Honoré et al., 2010). Using such a systems perspective to measuring sustainability ensures inclusion of linkages to other sectors that directly or indirectly impact health.

Policy

Description

Strengthen policy development and analysis processes and advocacy to ensure that evidence is integrated into policymaking to improve population health.

Rationale for Selection

Impact

Despite the lack of a definitive definition of health policy, one relevant for this discussion is: “a statement of a decision regarding a goal in health care and a plan for achieving that goal” (Mosby’s Medical Dictionary, 2009). Laws are probably the most obvious and frequently used mechanism for implementing policy (Honoré, 2010). Public health law is defined, in part, as “the study of the legal powers and duties of the state to assure the conditions for people to be healthy” (Gostin, Koplan, & Grad, 2003, p. 8).

Policies are also “intended to direct or influence the actions, behaviors, or decisions of others” (Longest, 2010). Policymaking is, in fact, an essential part of implementing meaningful initiatives to improve the health of the population. Policies can be effective when implemented internally as authoritative decisions from administrative and governance structures, or externally as laws, regulations, rules, etc. Funders can also use organizational policies to increase positive health outcomes by mandating the inclusion of specific activities or criteria in the design and implementation of programs (Valdiserri, Aultman, & Curran, 1995).

While U.S. health policy and health spending are dominated by a focus on payment for medical treatment, many of the conditions driving the need for treatment are preventable. Policies designed to promote health and reduce risky behaviors can have a major impact on individual and population health (i.e., reportable health conditions, sanitation, food safety, vaccination, workplace wellness, fluoridation, safety belts). Laws, one of several forms of policies, have played a critical role in public health since the founding of the United States (Gostin et al., 2003). The Public Health Law Association serves a key role by providing a platform to promote “dialogue, partnership, education, and research

in public health law” (Public Health Law Association, n.d.). The link between effective laws and the impact on population health are supported with evidence. The examples below illustrate this point.

- Cigarette smoking constitutes the single greatest preventable source of premature death in developed countries. The development and enforcement of workplace smoking laws and policies improve both the health of smokers (by reducing cigarette consumption and providing a powerful incentive to enroll in cessation programs) and their coworkers (through the reduction of ambient tobacco smoke and passive consumption) (Moskowitz, Lin, & Hudes, 2000). A meta-analysis of 26 studies on the effects of smoke-free workplaces in the United States, Australia, Canada, and Germany found that smoking bans not only reduced the risk of passive smoking, but also reduced the proportion of workers who remained smokers, and lowered the consumption by continuing smokers by 29% (Fichtenberg & Glantz, 2002). Research from nine studies has also shown that significant reductions in hospitalizations for acute myocardial infarction (AMI) were associated with laws making indoor workplaces and public places smoke-free (CDC, 2009b). In one of these studies, AMI hospitalizations decreased 27% in the 18 months post implementation of the policy (CDC, 2009b).
- Methamphetamine is a very addictive synthetic stimulant used by 5.2% of the U.S. population over 12 years of age (Buxton & Dove, 2008), with an estimated economic burden of \$25 billion a year (Nicosia, Pacula, Kilmer, Lundberg, & Chiesa, 2009). The primary circumstances of injury associated with methamphetamine use are motor vehicle crashes and violence (Sheridan, Bennett, Coggan, Wheeler, & McMillan, 2006). With passage of an Oregon state law in 2005 making the main ingredient of methamphetamine, pseudoephedrine, available only by prescription, the number of methamphetamine lab closures by law enforcement in that state dropped from 472 in 2004 to only 10 in 2009, interpreted by enforcement as a decline in methamphetamine production (Oregon’s Methamphetamine Control Strategy, 2010).

These examples show that well-targeted health policies can impact population health through promotion of healthier behaviors and reduced morbidity and mortality. Health policies that successfully promote healthier behaviors will also reduce the toxicity of the environment, thus having a beneficial “multiplier” effect on population health and social well-being.

Improvability

Local, state, and national policy initiatives and initiatives across multiple sectors outside of health collectively play a critical role in improving population health. In policymaking, as well as in public health practice, governance, and advocacy, a key feature to advancing an agenda is garnering political support to enact policy interventions that address pressing health issues. Improving weaknesses at all levels of government in the identification and advancement of policy agendas could play a critical role in improving population health.

A learning culture must emerge within agencies with a public health mission, along with mechanisms for improving the interaction between research and policy (Killoran, Swann, & Kelly, 2006). Educating and informing policymakers, the public, and researchers on the role of public health is also important. Also, as Kohatsu, Robinson, and Torner (2004) noted, having research influence policy requires not simply producing research but making the evidence readily available to policymakers and others who advocate for policies. Greater community engagement in public health decision-making is needed to promote the formation of policy as a “genuinely civic endeavor” (Gostin, 2008, p. 18).

Informing policymakers means being vigilant to produce research and information for them that is clearly articulated, concise, relevant, and provided when it is needed (Greenlick, Goldberg, Lopes, & Tallon, 2005). The pace of the academic research cycle is not consistent with these urgent demands of the policy-practice cycle (Killoran et al., 2005). This creates a “paradox of health services research: If it is not used, why do we produce so much of it?” (Shulock, 1999). Effective health policymaking also includes making evidence available on how policies in non-health areas (e.g., education, agriculture, economic development, etc.) impact health. The theory of *Health in all Policies* (HiAP) recommends the integration of policies in other sectors to improve evidence-based health policymaking (Georgia Health Policy Center, 2008; Ståhl, Wismar, Ollila, Lahtinen, & Leppo, 2006).

The National Prevention and Health Promotion Strategy (sec. 4001), mandated under the Affordable Care Act, represents a timely opportunity to prioritize evidence-based policy and program interventions to address the leading causes of death and disability and the risk factors that underlie these causes, including tobacco use, obesity, poor nutrition, physical inactivity, and excessive alcohol use (Affordable Care Act, 2010). To ensure that relevant research can play a significant part in policymaking in these areas, we should increase the interaction between health researchers and policymakers, and make sure that both of these groups understands the needs of the other (Clancy & Eisenberg, 1998; Kothari, Birch, & Charles, 2005).

The increased implementation of safety belt laws is an example of the potential to improve policy through research. One of the most effective means of reducing motor vehicle crash fatalities and nonfatal injuries is promoting the use of safety belts. New York was the first state to implement a primary safety belt law in 1984 (National Highway Traffic Safety Administration, n.d.). Other states followed but many enacted secondary laws for enforcement of safety belt use—allowing law enforcement to stop and cite a driver only if some other violation is observed. Masten (2007) found that during the period 1994 to 2004, changing from secondary to primary laws was associated with an increase in safety belt use during daytime and nighttime hours. Supporting this is a 2005 study by the Insurance Institute for Highway Safety found that a change from secondary to primary laws reduced motor vehicle death rates by an estimate of 7% (Farmer & Williams, 2005). Following these studies, more jurisdictions have changed from secondary to primary safety belt laws in an attempt to increase the use of safety belts and improve population health.

Practice Variability

The relevance of policymaking to improving population health ranks as one of the three core functions of public health—assessment, assurance, and policy development (IOM, 1988). Yet many policies informed by strong evidence and with demonstrated positive outcomes when implemented are not being adopted. For example, despite six decades of research showing the health benefits of fluoridation (CDC, 1995), only 69.2% of the U.S. population in 2006 was served by a public water supply system with fluoridated water (CDC, n.d.). Also, as noted earlier, primary safety belts laws have proved to save lives. However, only 31 states and the District of Columbia currently have primary safety belt laws (Insurance Institute for Highway Safety, 2010).

There is also wide variability across the United States in the capacity of various public health agencies and other organizations to analyze and influence policy agendas—described by Longest (2010) as *policy competency*. While the IOM recommended that every public health agency create comprehensive public health policies, some states are unable to fully address this responsibility due to the lack of adequate population-based data and the necessary scientific knowledge base for creating effective policy (IOM, 2003b). The variability and absence of specialized units within organizations to fulfill the policy function also impacts the ability to successfully push a policy agenda. This lack of policy competency impacts the capacity for policy analysis to examine issues such as effectiveness, unintended consequences, and potential linkages of public health policy to other interest such as economic prosperity, a determinant of health.

Workforce and Education

Description

Develop and sustain a competent workforce by ensuring that educational and skills content are appropriately aligned with core and discipline-specific competencies. Assure that public health education is accessible at all academic levels, and that life-long learning is encouraged and valued.

Rationale for Selection

Impact

The public health workforce represents the backbone of the public health system (DHHS, 1997). There are approximately 500,000 workers in governmental public health agencies and educational institutions (Moore, Perlow, Judge, & Koh, 2006) representing multiple disciplines such as epidemiology, environmental health, health education, preventive medicine, nursing, information technology, law, and management. Public health professionals also work in other settings such as hospitals, foundations, nonprofit organizations, and insurers.

A public health professional is defined as “a person educated in public health or a related discipline who is employed to improve health through a population focus” (IOM, 2003a). The public health workforce includes many workers who lack training in public health (Koo & Miner, 2010). For example, a survey of all employees (state and local level) in a centralized state health department revealed that more than 60% lacked a college degree (Honoré, Graham, Garcia, & Morris, 2008). Educating this sector of the workforce is a challenge given the limited number of undergraduate public health education programs (Riegelman, 2008) and the unique learning needs of adult students (Koo & Miner, 2010), which may not be considered in many existing public health academic programs. Also, many of these employees may be in jobs where educational requirements and applicable competencies that should be aligned with educational content are not available. Lack of these standards impact the ability of workers to align personal educational goals with job expectations.

There are additional daunting challenges facing the public health workforce that will impact the effectiveness and sustainability of the system. Wages are non-competitive (NACCHO, 2007) and the workforce is small or shrinking relative to needs. For example, in 2009, there were 10% fewer epidemiologists (0.72 epidemiologists per 100,000 population nationally) at state health departments than in 2006 (CDC, 2009c). It is estimated that a 68% increase (1.21 epidemiologists per 100,000 population nationally) is needed to achieve ideal epidemiology and surveillance capacity for infectious diseases, bioterrorism/emergency response, chronic disease, maternal and child health, environmental health, injury, occupational health, oral health, and substance abuse. Twenty-three percent of the public health workforce (110,000 workers) will be eligible to retire by 2012 (ASPH, 2008), and due to the economic downturn, 23,000 workers were lost in local health departments alone between 2008 and 2009 (NACCHO, 2010). An additional 250,000 workers will be needed by 2020 (ASPH, 2008) and a 2007 IOM report noted that the current shortage of public health physicians was 10,000 (IOM, 2007). Also, minority populations are underrepresented in the public health workforce with 68% of local health department jurisdictions being less diverse than the populations that they serve (NACCHO, 2007). The Sullivan Commission on Diversity in the Healthcare Workforce concluded that the health workforce did not resemble the population that they serve and, most importantly, this inequity had the impact of making those populations feel excluded from a seemingly distant and uncaring system (Sullivan Commission on Diversity in the Healthcare Workforce, 2004).

Equally important to ensuring an adequate public health workforce is the competency of the workforce to face existing and emerging challenges. In order to improve population health, the workforce should have a broad view of public health and understand the social factors, such as economic conditions and culture that affect health (Beaglehole, Bonita, Horton, Adams, & McKee, 2004). The public health system is a complex adaptive system. Educating and training the public health workforce must emphasize a systems-thinking approach that looks at the broad range of socioeconomic, political, and other factors that affect health, rather than the traditional approach that is often limited to courses in epidemiology, biostatistics, and environmental health. However, reports suggest that the current public health workforce is not prepared to meet the challenges of the 21st century (DHHS, 1997). This is contrary to a principle for ethical practices in public health that calls on public health institutions to “ensure the professional competence of their employees” (Cobus, 2008). Accordingly, it seems reasonable that training in cultural competencies should be a requirement as well.

Improvability

There is consensus on the need to improve the quality and readiness of the public health workforce as well as for increasing access to and the quality of content in educational offerings (Borders, Blakely, Quiram, & McLeroy, 2006; IOM, 2003a; Olson, Hoepfner, Larson, Ehrenberg, & Leitheiser, 2008). The IOM in 2003 recommended that public health education should be accessible to all undergraduates (IOM, 2003a). Initiatives such as the Consensus Conference on Undergraduate Public Health Education (Riegelman, 2008) have promoted this concept. Improvements can be documented by the increasing number of undergraduate public health programs. The Association of Schools of Public Health (ASPH) is leading an effort in collaboration with the Association of American Colleges and Universities (AAC&U) and the Association for Prevention Teaching and Research (APTR) to develop and disseminate undergraduate public health competencies built upon the AAC&U's Liberal Education and America's Promise (LEAP) essential learning outcomes. The Healthy People Curriculum Task Force, a collaboration of clinical health professional organizations with public health organizations has developed an Education for Health framework designed to serve as an educational underpinning for Healthy People 2020 (Koh, Nowinski, & Piotrowski, in press). Undergraduate public health education serves as the centerpiece of this framework.

The nation's community college system continues to be an underappreciated partner for ameliorating the crisis regarding the public health workforce (Honoré et al., 2008; Riegelman, 2010). Only 1.6% of community colleges offer a public health degree or certificate program (Kirkwood & Riegelman, in press). With more than 1,200 colleges nation-wide, community colleges can serve as one rung on a ladder that connects high school students to four-year and graduate degree public health programs, introduce public health as a career option early in a student's educational experience, facilitate improvements in recruiting minority students to public health careers, foster opportunities for life-long learning through continuing education programs, and provide a convenient venue for existing public health workers to increase their training opportunities and educational attainment levels. As new technologies, knowledge, and crises and threats (e.g., Katrina, 9/11) emerge, venues for continuous education and training are needed (Gebbie & Turnock, 2006). Continuing education programs where participants are trained intensively on new methods, and view the methods as effective, can serve as a model to assist public health programs in adopting new evidence-based prevention methods (Kelly et al., 2000). Also, research on an Environmental Protection Agency small-industry worker certification program found measurable and statistically significant improvements as a result of certification (Enander et al., 2007).

Community colleges share with public health the mission to be intimately linked to their immediate service regions. The North Carolina Community Health Ambassador Program, an initiative of the state health department, illustrates one example of constructive collaboration. The training program, focused on improving diabetes awareness, management, and prevention, uses a systems thinking approach to bring together a diverse range of system stakeholders (i.e., health care, public health, faith-based organizations) for diabetes related training on community-based interventions in the state's community college system (Pullen-Smith, Carter-Edwards, & Leathers, 2008). An objective to increase the number of two-year colleges that offer associate degrees or certificate programs in public health is expected to be included in Healthy People 2020 and potentially can stimulate such collaborations.

Effectiveness, an aim for public health quality, can be improved when workforce competencies are aligned with professional responsibilities. The Council on Linkages between Academia and Public Health Practice (Council on Linkages, 2010) and ASPH (ASPH, 2006) independently developed public health core competencies. There are also improvements in identifying discipline-specific competencies for areas such as finance and business management (Calhoun, Ramiah, Weist, & Shortell, 2008; Honoré & Costich, 2009). Development of discipline specific competencies is supported by previous studies indicating a need in targeted areas (Halverson et al., 1997).

There are serious challenges in preventing current and future shortages in the public health workforce, but there are ongoing efforts to address workforce issues through accreditation criteria, training, and strategic workforce planning. As a criterion for accreditation, the Council on Education for Public Health (CEPH) requires schools of public health to demonstrate that they address the training needs of the workforce that lack any formal training as well as for professionals needing advanced training (Council on Education for Public Health, 2005). The Health Resources and Services Administration (HRSA) currently supports Public Health Training Centers that play a vital role in providing opportunities to expand training opportunities (HRSA, n.d.). Under the Affordable Care Act, an additional \$15.4 million was awarded in September 2010 to the Training Centers to enhance skills development (HRSA, 2010). A site evaluation of a training center found that enhanced job performance was linked to completion of coursework in the program (ASPH, 2004). States are engaging in strategies such as web-based recruiting, job fairs and academic partnerships to market state public health careers to address the shortage (ASTHO, 2008). *Blended Learning*, described as combining face-to-face instruction with technology enhanced teaching methodologies, is also gaining traction in public health (Moore et al., 2006). The TrainingFinder Real-Time Affiliate Integrated Network (TRAIN) is a nationwide learning management system of the Public Health Foundation that connects registered users to public health training

materials from a network of affiliates (Public Health Foundation [PHF], n.d.). Currently there are more than 17,000 courses and 360,000 registered users who have access to TRAIN materials made available by 3,300 providers.

Practice Variability

Wide variability in the size, structure, educational levels, capability, and skills of the workforce argues for standardization of continuing education and skills development. In a survey of TRAIN users (N=11,000), participants reported their highest educational attainment level: 12% had a high school degree, 18.5% an associate's degree, 3.4% a bachelor's degree in public health, 31.7% a bachelor's degree other than in public health, 8.1% held master's in public health, 17.5% a master's other than public health, .6% a doctorate in public health, 2.6% a doctorate other than in public health, and 4.9% held an advanced degree (e.g. medicine, J.D., etc.) (PHF, 2010). A 2009 survey of state health department epidemiologist showed that 57% had a degree in epidemiology, 29% had completed academic coursework or training in epidemiology, and 13% had no formal academic course work of training in epidemiology (CDC, 2009c).

Efforts to close gaps and reduce variability are on the horizon. The release of the ASPH undergraduate public health learning outcomes in the spring of 2011 should offer an opportunity to close gaps and better standardize undergraduate public health in all undergraduate institutions. The linkage of these learning outcomes to the AACU's LEAP initiative should provide an opportunity for national academic discussion and standardization of objectives for undergraduate public health education. The inclusion of objectives for undergraduate public health education in Healthy People 2020 should provide additional opportunities to highlight the needs of the public health workforce and the opportunities for colleges and universities.

As part of the Healthy People 2020 effort, the Office of Disease Prevention and Health Promotion (ODPHP) is supporting the collection and dissemination of resources on undergraduate public health for inclusion in the Healthy People 2020 website. Successful practices by undergraduate institutions will be highlighted. This should assist in disseminating examples of high quality undergraduate public health practices and gaining the attention of undergraduate institutions and faculty.

Gaps and variability also exist in discipline-specific competencies and academic program content. Development of competencies in discipline-specific areas such as business and financial management is supported by research conducted over many years (Halverson et al., 1997; Liange, Renard, Robinson, & Richards, 1993; Sorensen & Bialek, 1993). However, even though public health

competencies are now available for the finance and business management workforce, as well as for public health leaders as noted above, recent research found the absence of appropriate content (e.g., focus on health care rather than public health) in graduate level public health finance coursework (Honoré et al., 2010). There is also increasing emphasis in quality improvement in public health. Yet, it is unclear to what extent public health academic programs include educational content on quality concepts applied to the field of public health.

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Appendix A

Primary and Secondary Drivers of Quality for:

Healthcare-Associated Infections (HAI)

Human Immunodeficiency Virus (HIV)

Healthy Weight

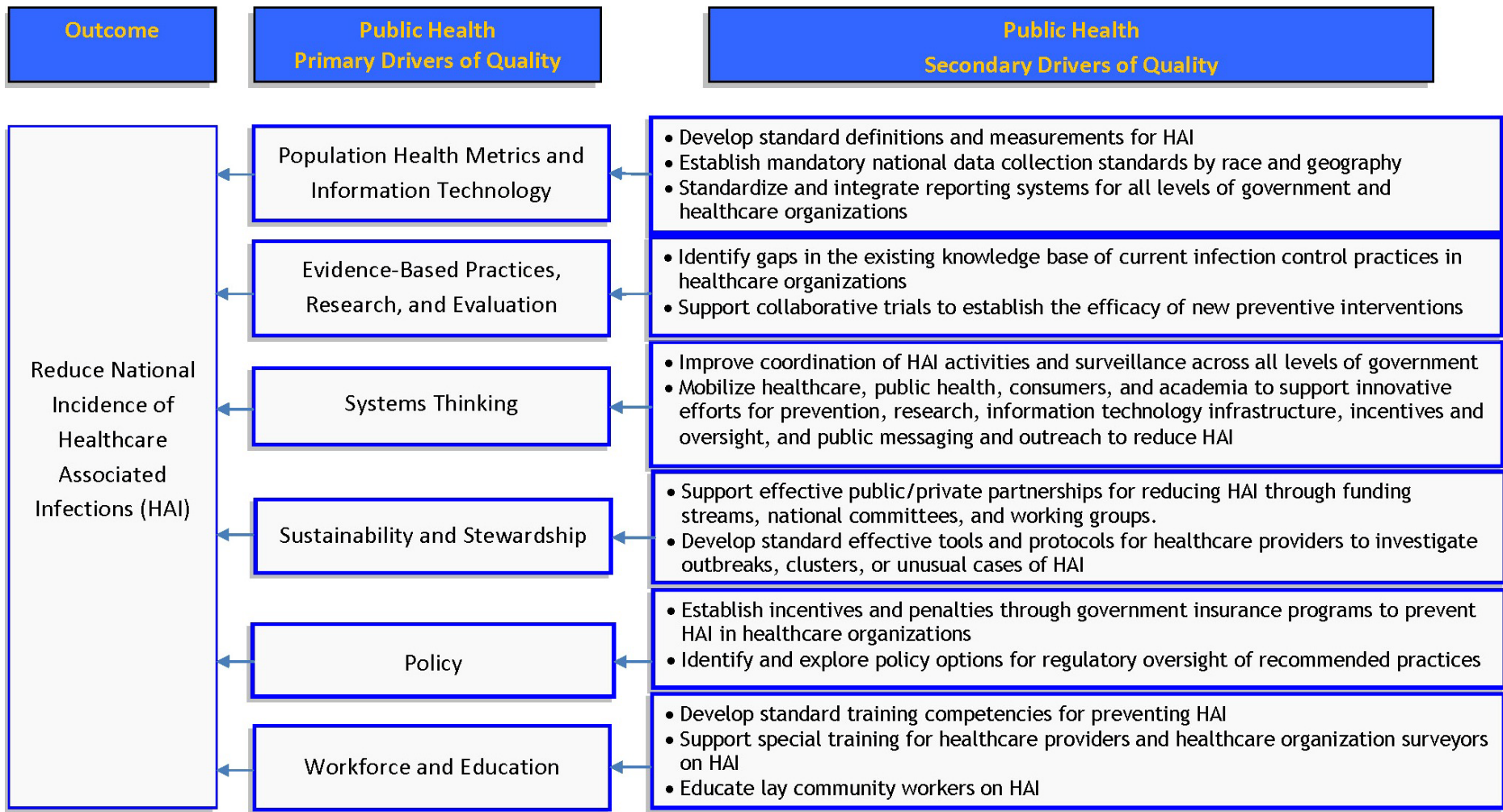


Figure A-1. Public health primary and secondary drivers of quality for HAI

Figure A-1 displays public health primary and secondary drivers of quality for healthcare associated infections (HAI). The bulleted structure explains how the drivers flow in a cascading manner.

- Reduce National Incidence of Healthcare Associated Infections (defined as the outcome)
- Population Health Metrics and Information Technology (primary driver). The secondary drivers are:
 - Develop standard definitions and measurements for HAI
 - Establish mandatory national data collection standards by race and geography
 - Standardize and integrate reporting systems for all levels of government and healthcare organizations
- Evidence-Based Practices, Research, and Evaluation (primary driver). The secondary drivers are:
 - Identify gaps in the existing knowledge base of current infection control practices in healthcare organizations
 - Support collaborative trials to establish the efficacy of new preventive interventions
- Systems Thinking (primary driver). The secondary drivers are:
 - Improve coordination of HAI activities and surveillance across all levels of government
 - Mobilize healthcare, public health, consumers, and academia to support innovative efforts for prevention, research, information technology infrastructure, incentives and oversight, and public messaging and outreach to reduce HAI
- Sustainability and Stewardship (primary driver). The secondary drivers are:
 - Support effective public/private partnerships for reducing HAI through funding streams, national committees, and working groups.
 - Develop standard effective tools and protocols for healthcare providers to investigate outbreaks, clusters, or unusual cases of HAI
- Policy (primary driver). The secondary drivers are:
 - Establish incentives and penalties through government insurance programs to prevent HAI in healthcare organizations
 - Identify and explore policy options for regulatory oversight of recommended practices
- Workforce and Education (primary driver). The secondary drivers are:
 - Develop standard training competencies for preventing HAI
 - Support special training for healthcare providers and healthcare organization surveyors on HAI
 - Educate lay community workers on HAI

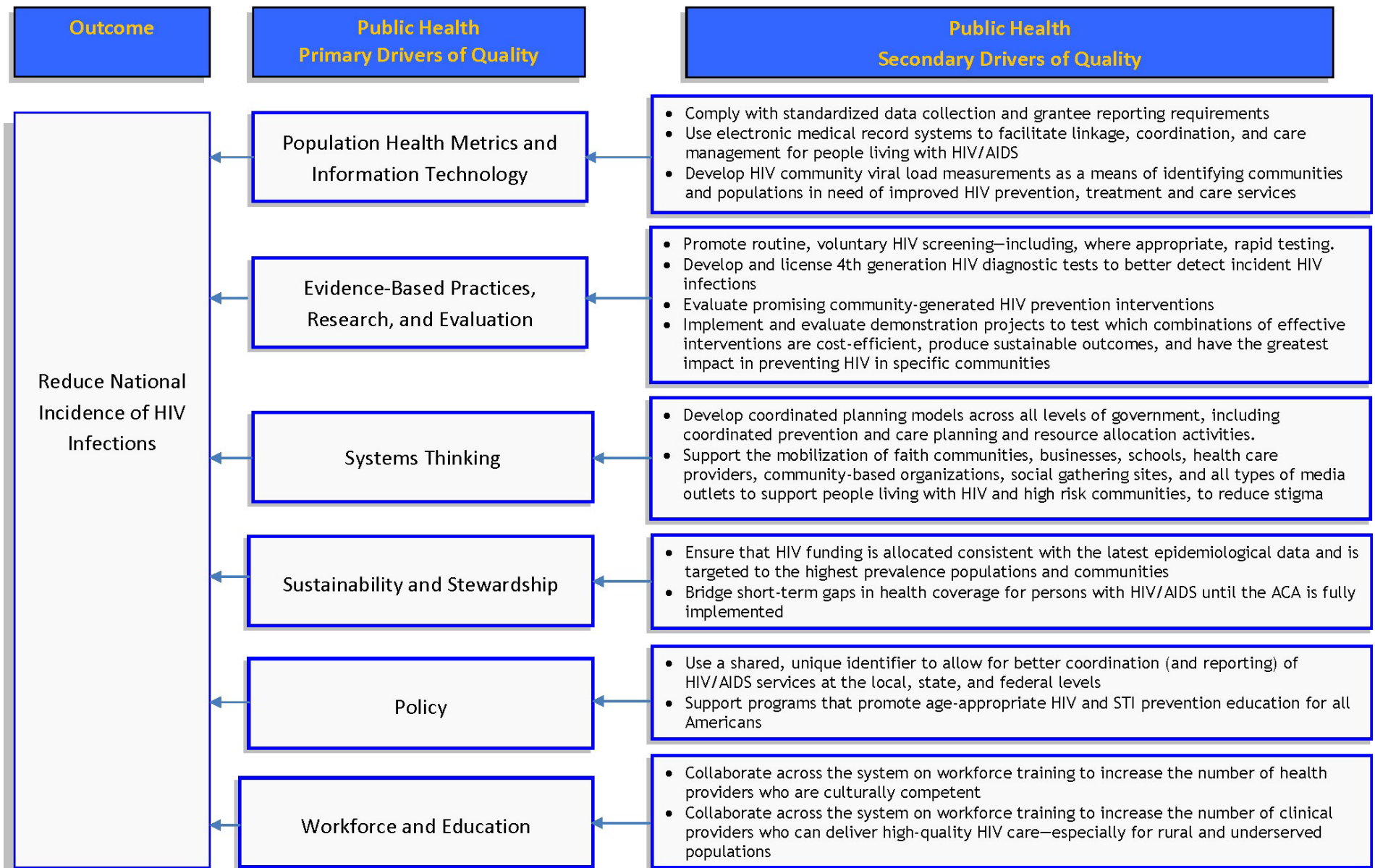


Figure A-2. Public health primary and secondary drivers of quality for HIV

Figure A-2 displays public health primary and secondary drivers of quality for HIV. The bulleted structure explains how the drivers flow in a cascading manner.

- Reduce National Incidence of HIV Infections (defined as the outcome)
- Population Health Metrics and Information Technology (primary driver). The secondary drivers are:
 - Comply with standardized data collection and grantee reporting requirements
 - Use electronic medical record systems to facilitate linkage, coordination, and care management for people living with HIV/AIDS
 - Develop HIV community viral load measurements as a means of identifying communities and populations in need of improved HIV prevention, treatment and care services
- Evidence-Based Practices, Research, and Evaluation (primary driver). The secondary drivers are:
 - Promote routine, voluntary HIV screening—including, where appropriate, rapid testing.
 - Develop and license 4th generation HIV diagnostic tests to better detect incident HIV infections
 - Evaluate promising community-generated HIV prevention interventions
 - Implement and evaluate demonstration projects to test which combinations of effective interventions are cost-efficient, produce sustainable outcomes, and have the greatest impact in preventing HIV in specific communities
- Systems Thinking (primary driver). The secondary drivers are:
 - Develop coordinated planning models across all levels of government, including coordinated prevention and care planning and resource allocation activities.
 - Support the mobilization of faith communities, businesses, schools, health care providers, community-based organizations, social gathering sites, and all types of media outlets to support people living with HIV and high risk communities, to reduce stigma
- Sustainability and Stewardship (primary driver). The secondary drivers are:
 - Ensure that HIV funding is allocated consistent with the latest epidemiological data and is targeted to the highest prevalence populations and communities
 - Bridge short-term gaps in health coverage for persons with HIV/AIDS until the ACA is fully implemented
- Policy (primary driver). The secondary drivers are:
 - Use a shared, unique identifier to allow for better coordination (and reporting) of HIV/AIDS services at the local, state, and federal levels
 - Support programs that promote age-appropriate HIV and STI prevention education for all Americans
- Workforce and Education (primary driver). The secondary drivers are:
 - Collaborate across the system on workforce training to increase the number of health providers who are culturally competent
 - Collaborate across the system on workforce training to increase the number of clinical providers who can deliver high-quality HIV care—especially for rural and underserved populations

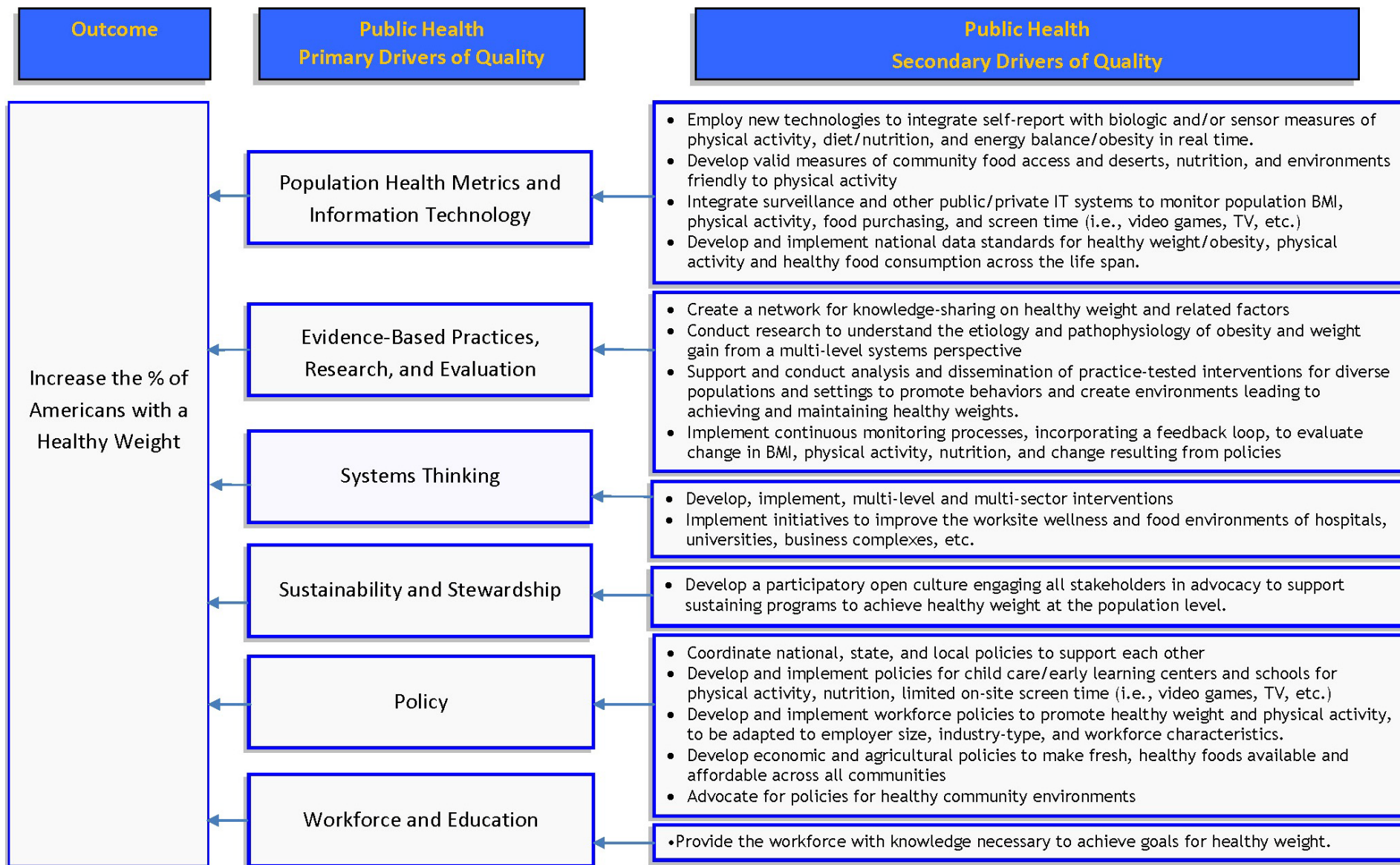


Figure A-3. Public health primary and secondary drivers of quality for Healthy Weight

Figure A-3 displays public health primary and secondary drivers of quality for healthy weight. The bulleted structure explains how the drivers flow in a cascading manner.

- Reduce National Incidence of HIV Infections (defined as the outcome)
- Population Health Metrics and Information Technology (primary driver). The secondary drivers are:
 - Employ new technologies to integrate self-report with biologic and/or sensor measures of physical activity, diet/nutrition, and energy balance/obesity in real time.
 - Develop valid measures of community food access and deserts, nutrition, and environments friendly to physical activity
 - Integrate surveillance and other public/private IT systems to monitor population BMI, physical activity, food purchasing, and screen time (i.e., video games, TV, etc.)
 - Develop and implement national data standards for healthy weight/obesity, physical activity and healthy food consumption across the life span.
- Evidence-Based Practices, Research, and Evaluation (primary driver). The secondary drivers are:
 - Create a network for knowledge-sharing on healthy weight and related factors
 - Conduct research to understand the etiology and pathophysiology of obesity and weight gain from a multi-level systems perspective
 - Support and conduct analysis and dissemination of practice-tested interventions for diverse populations and settings to promote behaviors and create environments leading to achieving and maintaining healthy weights.
 - Implement continuous monitoring processes, incorporating a feedback loop, to evaluate change in BMI, physical activity, nutrition, and change resulting from policies
- Systems Thinking (primary driver). The secondary drivers are:
 - Develop, implement, multi-level and multi-sector interventions
 - Implement initiatives to improve the worksite wellness and food environments of hospitals, universities, business complexes, etc.
- Sustainability and Stewardship (primary driver). A secondary driver is:
 - Develop a participatory open culture engaging all stakeholders in advocacy to support sustaining programs to achieve healthy weight at the population level.
- Policy (primary driver). The secondary drivers are:
 - Coordinate national, state, and local policies to support each other
 - Develop and implement policies for child care/early learning centers and schools for physical activity, nutrition, limited on-site screen time (i.e., video games, TV, etc.)
 - Develop and implement workforce policies to promote healthy weight and physical activity, to be adapted to employer size, industry-type, and workforce characteristics.
 - Develop economic and agricultural policies to make fresh, healthy foods available and affordable across all communities
 - Advocate for policies for healthy community environments
- Workforce and Education (primary driver). A secondary driver is:
 - Provide the workforce with knowledge necessary to achieve goals for healthy weight.

