
An Environmental Scan of Integrated Approaches for Defining and Measuring Total Population Health by the Clinical Care System, the Government Public Health System and Stakeholder Organizations



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Background

The past few decades brought increased momentum towards understanding the inter-related systems that create and sustain the health and well-being of individuals, communities, and populations. Initial data collection and analysis of health indicators using population-based surveys revealed variations in health status and health outcomes of *total populations* at various geographic levels (e.g., countries, states, counties, cities), as well as disparities in health based on race/ethnicity, income-level, education-level, and other demographic subgroups. Research exploring the underlying conditions and factors for these variations confirmed that *multiple determinants* influence the health of individuals over the course of a lifetime. This resulted in a paradigm shift where population-based strategies to address the “upstream” determinants of health are used in parallel with individual prevention-focused behavioral change strategies to improve health. A sense of “shared responsibility” for implementing these strategies through multi-sectoral partnerships and collaborations also emerged and continues to gain momentum.

In the United States, leadership for health improvement involves two, mostly separate, systems—the clinical care system and the government public health system. The clinical care system emphasizes individual health improvement for patients who utilize their provider-based prevention and treatment services. The government public health system focuses its efforts on improving the health of populations across an entire geopolitical jurisdiction using population-based disease prevention and health promotion strategies. Other stakeholder organizations (see description below) may or may not see health improvement as central to their mission, but participate in health coalitions and collaboratives when mutual interests are aligned, funding requires such partnerships, and/or visionary leadership creates a political environment that galvanizes such efforts.

Leadership for assessing *total population health*, identifying community needs (i.e., a formal community needs assessment), and developing population-based multi-sectoral strategies is often a central activity of government public health agencies (Figure 1)¹. For example, the federal U.S. Department of Health and Human Services (HHS) *Healthy People* initiative² and the National Prevention Council’s *National Prevention Strategy*³, provide health promotion and disease prevention frameworks for the nation. These frameworks are based on empirical data from national population-based surveys, evidence-based guidelines, and input from a broad range of stakeholders. Coordination

and implementation of specific health improvement strategies are most commonly led by state and local governmental public health agencies in partnership with numerous community and stakeholder organizations. Alternately, a community organization, advocacy group, clinical care organization, educational institution, or business takes the lead on community health improvement efforts, albeit most commonly for *the populations they directly serve*. For example, a health insurance plan might measure and track improvements in health status for its covered members or “population,” but not the total population of a city, county, or state. Another example is the American Cancer Society, a non-profit organization that works toward improving health through a subset of activities centered on a disease-specific outcome.

Population health improvement infers that there are agreed upon health outcomes, behaviors, and determinants of health that can be measured, tracked, and reviewed to ensure optimal health status for a designated population. Within the government public health system, “population” can mean either the health of the *total population* in a geopolitical area (e.g., leading causes of death, smoking prevalence, tuberculosis rates) or the health of *subpopulations* of at-risk persons to whom health improvement strategies are targeted (e.g., low-income, race/ethnicity, risky behaviors, high burden of disease). Within the clinical care system, “population” is often more narrowly defined as either persons using a clinical care facility within a designated period of time (e.g., emergency room visits, hospitalizations, ambulatory care visits), members of an insurance plan, or individuals receiving care for a specific diagnosis (e.g., diabetes care coordination, children with asthma).

Measuring and tracking total population health and the determinants of health in the U.S. is accomplished through vital statistics reporting and population health surveys that have been in existence for decades. The interest and capabilities to measure the relative and/or cumulative contributions to total population health improvement *within and across stakeholder organizations* is an emerging paradigm. This requires a much more integrated and concerted effort undertaken by numerous partners dedicated to investing resources and adapting health improvement strategies over time. Central to the success of such endeavors is the strong leadership of organizational systems whose core mission is improving health at the individual, community, and/or total population level.

A commitment to total population health improvement also implies that the organizations dedicated to improving health routinely measure, track, and review their own organizational performance to ensure effective, efficient, and equitable services with adequate reach to impact the *populations they directly serve*. In theory, by providing such services, individuals, families, and communities will be more likely to live in healthy environments and be empowered to make the healthiest choices. Improving organizational performance is often part of an organization-wide quality improvement (QI) initiative. Such QI initiatives occur within both the clinical care system (e.g., the Institute for Healthcare Improvement, the Joint Commission, and hospital public reporting websites) and the government public health system (e.g., voluntary accreditation and state and local health department QI learning collaboratives). Additional guidance for QI efforts came from the Institute of Medicine, which proposed

six quality areas for the clinical care system: safety, effectiveness, timeliness, patient-centeredness, equitableness, and efficiency⁴. In 2008, HHS expanded this list to nine quality areas that complement the six clinical quality areas and that can be used by the government public health system and its public and private partners: population-centered, equitable, proactive, health-promoting, risk-reducing, vigilant, transparent, effective, and efficient⁵. Leadership within HHS continues to build momentum for integrated *total population health measurement and quality improvement activities* through its support of a National Quality Strategy⁶.

Focus of Commissioned Paper

This commissioned paper includes an environmental scan of the current efforts to measure and improve the health of total populations and the subpopulations targeted and/or directly served by the clinical care system and the government public health system. For the purpose of this paper, the World Health Organization definition of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” is implicitly being used⁷.

Because the government public health system is increasingly called upon to broaden its mission to encompass strategies that improve the social and physical determinants of health, and because there is strong evidence connecting these upstream determinants to the health status of individuals and populations, these upstream determinants are included, when relevant, in this report.

The primary emphasis on the clinical care system and government public health system in this report should not be interpreted as meaning that other stakeholder organizations that contribute to overall health improvement are being disregarded or are not important. Indeed, many of the health improvement activities led by the government public health system rely on partnerships and collaborations with other government agencies, community-based organizations, academic institutions, and businesses. The authors also acknowledge that a multi-sectoral, “health in all policies” approach is critical to achieving the goals of overall health improvement and reduction in health disparities.

The scan has four aims:

1. to provide an integrated set of definitions for population health, the determinants of health, and health improvement activities
2. to review existing measurement frameworks used by the clinical care and government public health systems to assess and track total population health, the determinants of health, and health improvement activities
3. to propose an *integrated* measurement framework that includes measures of total population health, the determinants of health, and health improvement activities
4. to discuss the challenges and opportunities for aligning health improvement activities and measurement across the clinical care system and the governmental public health system, in partnership with stakeholder organizations

To facilitate and simplify discussion, the following “system” definitions are used throughout the report:

- **The clinical care system:** the full range of hospitals, clinics, emergency departments, laboratories, skilled nursing facilities, and home healthcare services that traditionally have promoted, maintained, and restored health to individual patients through one-on-one interactions with healthcare providers. This also includes private and public insurance plans that help finance the receipt of clinical care services.
- The **government public health system** is a network of administrative or service units of local, state, or the federal government as well as tribes and territories concerned with health and carrying responsibility for the health of a geopolitical jurisdiction. This governmental system is a central player within the public health system, but relies on an array of stakeholders to achieve total population health improvement.
- **Stakeholder organizations** include a wide variety of organizations (e.g., public social service agencies, the school system, worksites, the loosely connected non-profit system, etc.) that may or may not have health improvement as a primary mission. For simplicity of discussion, they are considered in aggregate in this report.

The supportive and synergistic efforts of these organizations are depicted in Figure 1 and described in more detail in the 2011 IOM report, *For the Public's Health: The Role of Measurement in Action and Accountability*¹. Of note, the primary emphasis in this report is on the two systems whose central mission is “health” and that are currently expected to take the lead for coordinating “health improvement” efforts on behalf of society— the clinical care system and the government public health system.

Overview of Report

Section one briefly reviews definitions of population, population health, the determinants of health, and health improvement activities. A list of recommendations for defining key concepts is provided along with a rationale as to why this approach is favored.

Section two presents examples of conceptual frameworks for an *integrated* approach for measuring total population health, the determinants of health, and health improvement activities across the clinical care and government public health system. The selected frameworks are based on an environmental scan of prominent national indicator reports, a representative sample of state-based and local community health improvement plans, and high priority quality improvement activities from within each system.

Section 3 discusses several challenges and opportunities to align health improvement activities and measurement across the clinical care system and the governmental public health system, in partnership with stakeholder organizations. Examples of integrated sets of measures that show the synergistic relationships of individual-level and population-based strategies are provided. Health behaviors and clinical preventive services within the context of the social and physical environments are also provided. Key areas discussed are the difficulties in finding consensus on key definitions, challenges with data collection and data sharing, emerging methods for integrated population health assessment, prioritization models, and the need for integrated quality reporting.

Figure 1. IOM conceptual framework of the “health system” and the key organizations or “subsystems” that are encouraged to work together to improve total population health

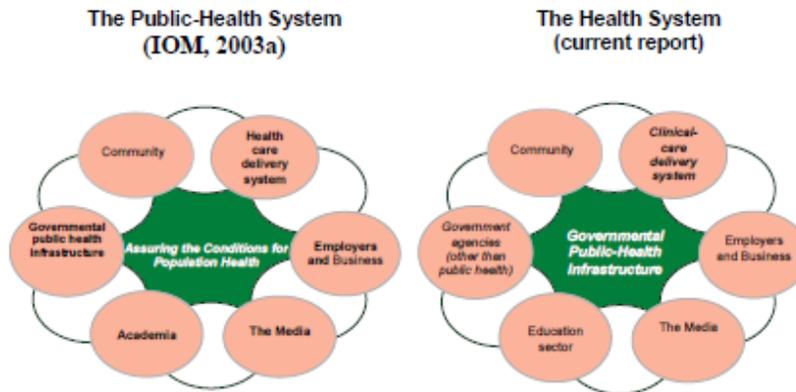


FIGURE 1-1 The health system.

NOTE: The present committee used the 2003 IOM committee’s figure of the circle of system partners and description of the system (IOM, 2003a) but renamed the system and made three revisions in the figure. They include placing the government public-health infrastructure at the center, making it clear that other government agencies (non-public-health agencies, including transportation, education, and others) are also key actors in the circle, and replacing health care with clinical care. The government public-health agencies are in the center not because they are the most important in the population-health system but because they are specifically tasked with ensuring the health of the public through their actions and by working with and through others. An additional change (Academia is now referred to as Education sector) acknowledges the considerable current and potential contributions of schools of all types to health.

The authors acknowledge that many of the opportunities going forward require continued dialogue with thought leaders and innovative decision-makers within the clinical care system, the government public health system, and other stakeholder organizations. This will be critical as the nation, through the opportunities provided in the Affordable Care Act, begins transforming the clinical care system, creating new community-based health promotion and disease prevention efforts, and engaging partners to address the upstream determinants of health. These synergistic efforts will truly empower individuals and families to make healthy choices wherever they live, work, learn, worship, and play.

Section 1. Defining Population Health, the Determinants of Health, and Health Improvement Activities

Academic disciplines and professional practice locations offer different perspectives on the concepts and terms relevant to this paper. The scan includes the perspectives of demography, biostatistics, epidemiology, systems science, health economics, health services research, and public health systems and services research.

Defining Population Health and Determinants of Health

The scan found no central authoritative source for defining population health or the determinants of health. A brief literature review and Google search found relevant dictionaries⁸⁻¹³, scattered professional association and textbook glossaries^{2, 14-17}, and one peer-reviewed article¹⁸ that provide definitions for population health and related terms. Note: a comprehensive review of definitions is not within the scope of this commissioned project. Appendix 1 provides definitions of key terms that the clinical care system and the government public health system need to come to agreement on if an integrated approach to population health measurement is established. This paper uses the World Health Organization definition of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”⁷.

The government public health system is often described as delivering “population-based” services and focusing on improving “population-health.” However, publications provided by the government public health system usually do not provide clear definitions of either term. Academic disciplines most closely connected to public health practice (e.g., epidemiology, demography, biostatistics, community health promotion, public health management) have textbooks with glossaries that contain varying definitions. A review assessing the various definitions of “population health” and “public health” show that there is actually no consensus on an accepted set of definitions within the public health community (report in progress as of February 2012; contact Association of State and Territorial Health Officials for more information).

The clinical care system does not seem to have used the terms “population” or “population health” until recently. The Institute of Healthcare Improvement Triple Aim¹⁹ goals to: 1) improve the health of the population; 2) enhance the patient experience of care; and 3) reduce or at least control per capita cost of care clearly include the terms; however, a clear definition of what is meant by “population” is not provided nor is guidance on a denominator to use when calculating “per capita.” The implication is that this refers to a subpopulation of patients receiving prevention, diagnostic, or treatment services within the clinical care system.

The Triple Aim approach, recently adopted and modified by the Center for Medicaid and Medicare Innovation as its mission²⁰: 1) better clinical care, 2) better health (of entire populations), and 3) reduced costs goes a step further and includes the modifier “entire” populations but provides no clear definition of “entire” or what denominator should be used. The term “population” is also being mentioned more frequently in relation to emerging accountable care organizations that emphasize tracking of diagnoses,

medications, laboratory test results, and preventive screenings of patient populations *within their system*.

Public and private insurance plans, which are encouraged to use the HEDIS quality measures ²¹ to track performance on selected and endorsed health outcomes, define population a third way: as the covered members of their insurance system.

The public health community appears to have applied and continues to use the updated definitions of the determinants of health from national initiatives such as Healthy People. As such, there are four general categories of health determinants that public health practitioners use most frequently: 1) genetics and individual biology; 2) clinical care; 3) behaviors; 4) social environment; and 5) physical environment. The determinants of health are conceptually envisioned at the *total population level* by the government public health system.

It is unknown where and how the clinical care system applies and uses definitions for the determinants of health. It is possible that clinical care providers who seek academic and specialty certification in fields such as preventive medicine or who obtain a master of public health degree may apply and use a set of definitions taught through their respective training programs or in the organizations where they practice. In addition, organizations within the clinical care system whose mission includes community development and/or addressing social inequities leading to poor health outcomes may adopt a set of definitions based on local community preferences.

Defining Health Improvement Activities

Activities within the clinical care system and government public health system are often described across a continuum of prevention, diagnosis, and treatment. For the purpose of the paper, all activities directed to improving health on this continuum will be called “health improvement activities.” Note: a comprehensive review of definitions is not within the scope of this commissioned project.

Appendix 2 provides definitions of key terms where the clinical care system and the government public health system need to agree if an integrated approach to selecting a complementary set of health improvement activities linked to a shared set of total population health indicators is to be successful.

Traditionally, broad categories are used that emphasize disease prevention, health promotion, health protection, and timely treatment free from medical or procedural errors. Specific health improvement activities are largely determined by the varying missions across the prevention, diagnosis, and treatment continuum which are directly influenced by how health improvement activities are funded and organized in our nation.

Government public health priorities and activities

In general, public health activities are broadly defined as the organized activities of society to promote, protect, improve, and when necessary, restore the health of individuals, specified groups, or the total population ¹⁵. Public health activities often

focus on *population-based* disease prevention and health promotion programs and policies that extend beyond medical treatment by targeting underlying risks, such as tobacco, drug, and alcohol use; diet and sedentary lifestyles; and social and environmental factors/determinants. In some areas of the U.S., public health activities include the direct delivery of clinical care services to uninsured and low-income populations, while in other areas they are not included.

Through various public health quality improvement and accreditation initiatives, ten Essential Public Health Services or domains are now recognized nationally (Figure 2). Systematic reviews from the *Community Guide to Preventive Services*²² - interventions that provide or increase the provision of preventive services such as screening, education, counseling, or other programs to groups of people, in community settings or healthcare systems – are readily available online to guide planning efforts and increase impact.

Figure 2. The 10 Essential Public Health Services

1. **Monitor** health status to identify community health problems.
2. **Diagnose and investigate** health problems and health hazards in the community.
3. **Inform, educate, and empower** people about health issues.
4. **Mobilize** community partnerships to identify and solve health problems.
5. **Develop policies and plans** that support individual and community health efforts.
6. **Enforce** laws and regulations that protect health and ensure safety.
7. **Link** people to needed personal health services and assure the provision of health care when otherwise unavailable.
8. **Assure** a competent public health and personal healthcare workforce.
9. **Evaluate** effectiveness, accessibility, and quality of personal and population-based health services.
10. **Research** for new insights and innovative solutions to health problems.

Current government public health activities within these ten domains are vast and vary depending on state and local mandates and regulations. Common areas across jurisdictions include: 1) improving access to care, 2) assuring the delivery of evidence-based clinical preventive services (e.g., cancer, immunizations, obesity prevention); 3) mitigating outbreaks and preventing selected communicable diseases (e.g., tuberculosis, sexually transmitted infections, HIV/AIDs, foodborne illness, organisms with pandemic potential); 4) investigating and mitigating environmental hazards to health (restaurants, homes, air/water quality); 5) engaging the community to address issues related to the social and physical environments; 6) emergency preparedness and response; 7) population health data collection, reporting, and surveillance, and 8) eliminating disparities in health status and health outcomes and increasing health equity.

Clinical care system activities and priorities

In general, clinical care system activities are an organized activity of society to prevent, diagnose, treat, and restore health to individuals seeking care for sickness or injury provided by any qualified professional person in a health-related institution, clinic, or comparable setting¹⁵. However, an increasing array of incentives are requiring the

clinical care system to provide primary preventive care services, improve care coordination and chronic disease management for common chronic diseases (e.g., diabetes, asthma, cardiovascular disease, cancer), and partner with community organizations with the ultimate objectives of decreasing preventable admissions and re-hospitalizations.

Clinical care quality improvement and accreditation initiatives have emphasized medical/surgical complications, adverse events/medical errors, patient safety, evidence-based treatment, timeliness of care for selected life threatening conditions such as heart attacks, heart failure, and pneumonia, and at times delivery of clinical preventive services. Systematic reviews of *Guide to Clinical Preventive Services*²³ – screening tests, immunizations, health education, counseling, or other preventive service delivered to one patient at a time by a healthcare practitioner in an office, clinic, or healthcare system – are readily available online to guide planning efforts and increase impact.

As mentioned above, the current call to action within the clinical care system is the Triple Aim: 1) Better Clinical Care, 2) Better Health, and 3) Decreased Costs. Health improvement activities for the first two items, which are the focus of this paper, vary depending on local and regional market forces and government regulation as well as highly variable investments in information technology that allow for data sharing and the development of patient registries.

General categories of importance include: 1) access to care, 2) patient safety and prevention of adverse/never events and hospital acquired infections, 3) chronic disease management, 4) preventable admissions, 5) health literacy, 6) prevention and early diagnosis through health risk assessments/appraisals and clinical preventive screenings, 7) chemoprevention (e.g., aspirin use), and 7) compliance with prescribed medications.

A final note about the terms in Appendix 2. The clinical care system, through the work of Donabedian, has applied the “structure – process – outcome” (SPO) model to track resources, activities, and patient outcomes²⁴. The government public health system, with its emphasis on improving total population health, can also use the SPO model as long as measures of total population health can be added and accounted for in the model. For example, the modification to “structure – process – outcome – total population outcome” (SPO-TPO) could be used instead. In addition, two categories of total population outcomes – intermediate and final/ultimate – are commonly used by the government public health system.

Recommendations: Defining Population Health, Determinants of Health, and Health Improvement Activities

Through the course of this scan, the following general principles became apparent. Most important, a mix of definitions from the related academic and practice perspectives will likely need to be included as no single discipline currently captures the concepts and terminology required for an integrated approach.

Recommendation 1: The concept and definition of “total population” and “total population health” across a specified geopolitical area should be used when setting goals and objectives for improving overall health status and health outcomes of interest to the clinical care system, the government public health system, and stakeholder organizations. Current use of the abbreviated phrase “population health” should be abandoned and replaced by the phrase “total population health.” This will avoid confusion as the clinical care system moves rather swiftly toward measuring the health of the subpopulations it serves. Geopolitical areas rather than simply geographic areas are recommended when measuring total population health since funding decisions and regulation are inherently political in nature and the majority of publications comparing “total population health” outcomes utilize population-based surveys with a geopolitical sampling frame (see Section 2 for more discussion).

Recommendation 2: The concept and definition of “subpopulations” and “subpopulation health” should be used when setting goals and objectives for targeting health improvement activities whether implemented solely by the clinical care system or the government public health system or through multi-sectoral partnerships and collaborations. This allows a “system within systems” approach where the clinical care system and government public health system can *independently* define its service population (e.g., covered members, hospital referral area, or an at-risk subpopulation) within the context of a *total population* within a larger specified geopolitical area. This approach is recommended due to the separate funding and implementation expectations of the two systems in the U.S. as well as the characteristics of current stand-alone data collection systems.

Recommendation 3: Since the determinants of health are conceptually envisioned at a total population level by the government public health system, it is recommended that an integrated measurement framework define the determinants of health at the total population level as well. The current categorization of the determinants of health: 1) genetics and individual biology; 2) clinical care; 3) behaviors; 4) social environment; and 5) physical environment should be used by all organizations interested in improving total population health.

Recommendation 4: A general term such as “health improvement activities” should be used when describing activities across the prevention-diagnosis-treatment continuum that occurs within the clinical care system and government public health system. This will more easily allow for categorization and linking of complementary activities with total population health outcomes.

Recommendation 5: To encourage acceptance and adoption of a set of shared total population health measures, consistency with the definitions put forth by national planning groups such as *Healthy People 2020*, the National Prevention Council’s *National Prevention Strategy*, the HHS National Strategy for Quality Improvement, and the IRS community benefit requirements for non-profit hospitals (currently under development) is critical.

These relationships can be conceptualized in Figures 3a and 3b. The authors acknowledge that there will undoubtedly be overlap in the subpopulations reached by each system; however, it is impossible at this time to integrate the disparate data and reporting sources across the systems to distinguish where the overlap occurs. Thus, the depiction is currently theoretical in nature and should only be used to guide the selection of an integrated set of measures relevant across the systems. Section 3 provides examples of how to integrate these concepts into a set of integrated measures that can be shared across the systems.

Figures 3a and 3b. Conceptual frameworks for a “system within system” approach to defining total population health, the determinants of health, and the health of subpopulations directly influenced by a subset of complementary health improvement activities

Figure 3a. Conceptual framework showing the relationships of total population and the subpopulations influencing health of the total population

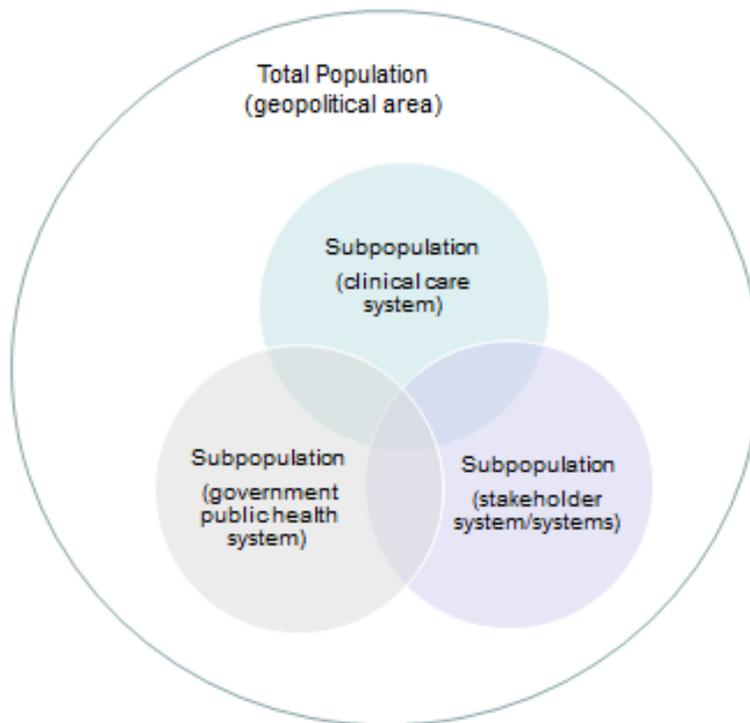
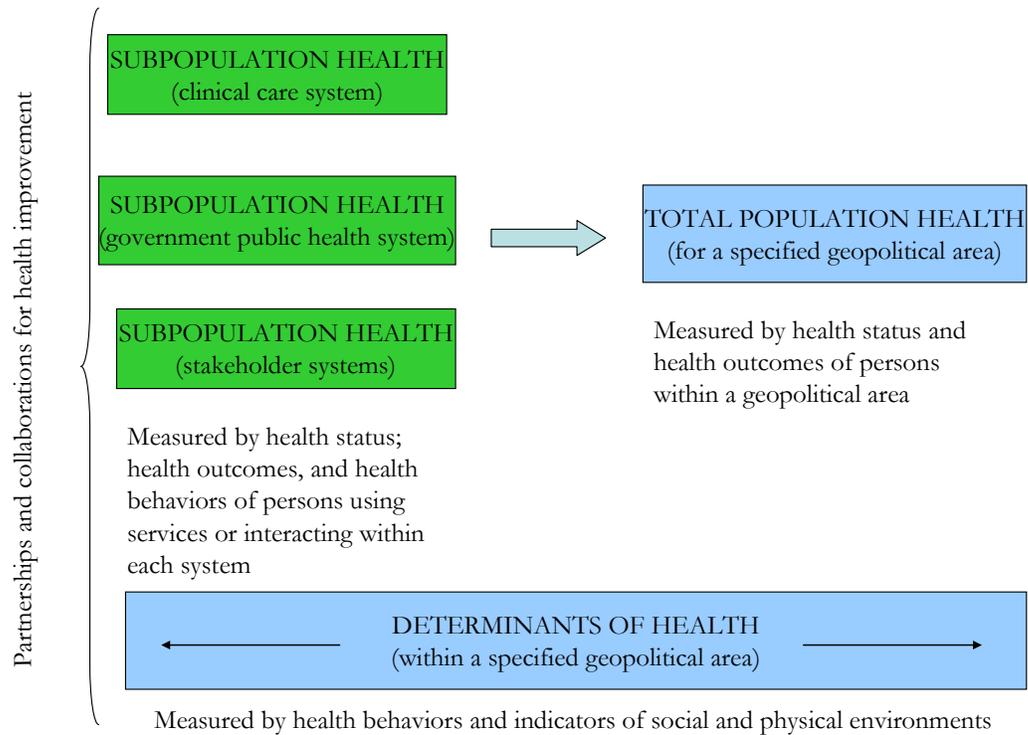


Figure 3b. Conceptual framework depicting the health measurement domains of a “system within system” approach



The leadership role for prioritized health improvement activities linked to the set of shared total population health measures will vary depending on local factors such as availability of financial and human resources, balance of power among systems, existing coalitions and collaborative partnerships, political mandates, and generally accepted social and community expectations. As such, none of the systems are given a greater weight or primary designation as “leader” or “champion” in either Figure 3a or 3b. That being said, the government public health systems at the state and local levels often take the lead role as either the convener or coordinator.

Section 2. Analytic Framework for Assessment and Measurement of Total Population Health, the Determinants of Health, and Health Improvement Activities

The focus of this scan in Section 2 is on existing, published conceptual frameworks where the purpose is to depict domains for assessing and *measuring* total population health, the determinants of health, and health improvement activities. This measurement emphasis was chosen to be sure the relationships between total population health measures and subpopulation outcome measures (i.e., within the clinical care system, the government public health system, and other stakeholder organizations focused on health improvement) are captured and easily incorporated into a logic model for selecting integrated sets of shared and complementary measures.

The universe of additional frameworks is extensive and includes a wide variety of perspectives, including strategic planning and prioritization processes, community health assessments, socio-ecologic models, environmental health cumulative risk assessments, health equity and health disparities models, stand-alone health determinants models, quality improvement, performance measurement (S-P-O) and indicator reporting models, evidence-based or best practices implementation, service delivery models, dynamic systems models, collaborations and partner engagement frameworks, policy development models, and more. This should not be interpreted as meaning these additional frameworks are not important; however, describing all such existing frameworks, and potentially modifying them, is beyond the scope of this paper. Thus, the scan only includes frameworks that depict all three elements – total population health, the determinants of health, and health improvement activities – *within the context of measurement*.

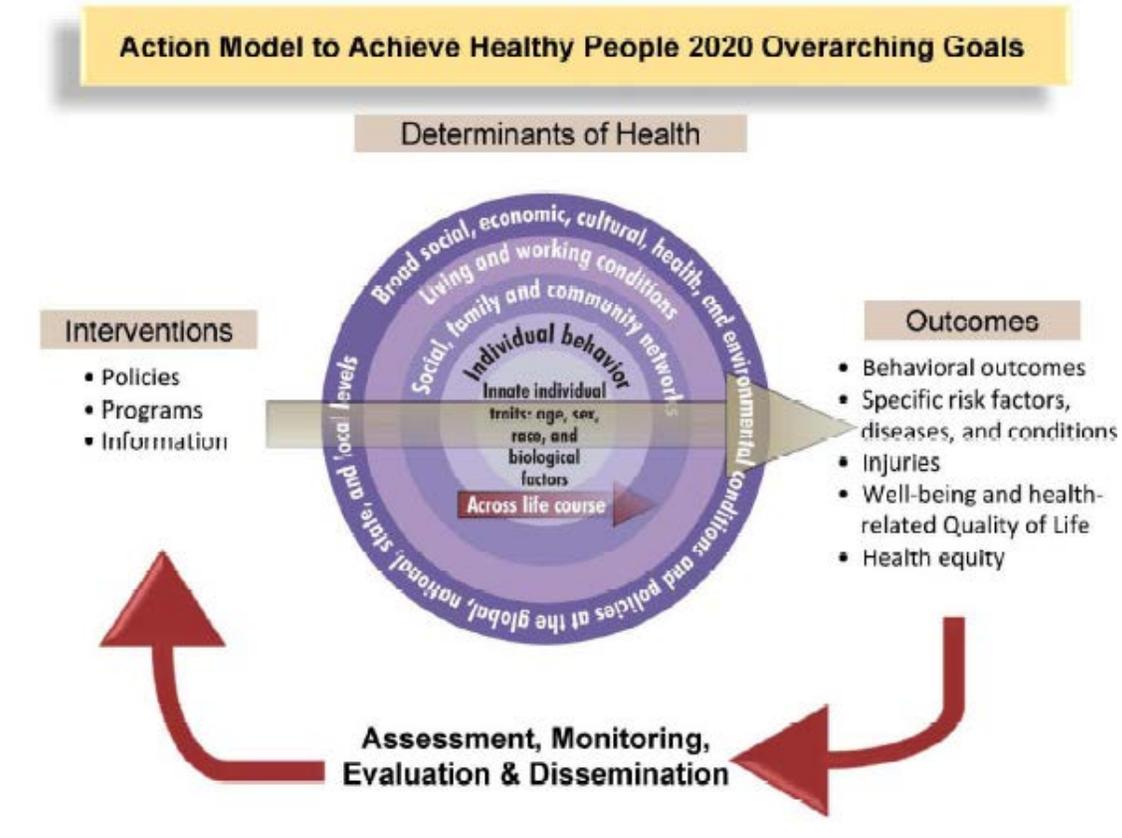
The scan also included a review of prominent national indicator reports as well as a representative subset of state and local government health improvement plans and hospital quality reporting sites. This approach was taken to determine whether a set of common domains for measuring total population health, the determinants of health, and health improvement activities could be created. This can be considered a snapshot of current “prioritized” measurement and health improvement efforts within the U.S.

Environmental scan of measurement frameworks that integrate total population health, determinants of health, and health improvement activities

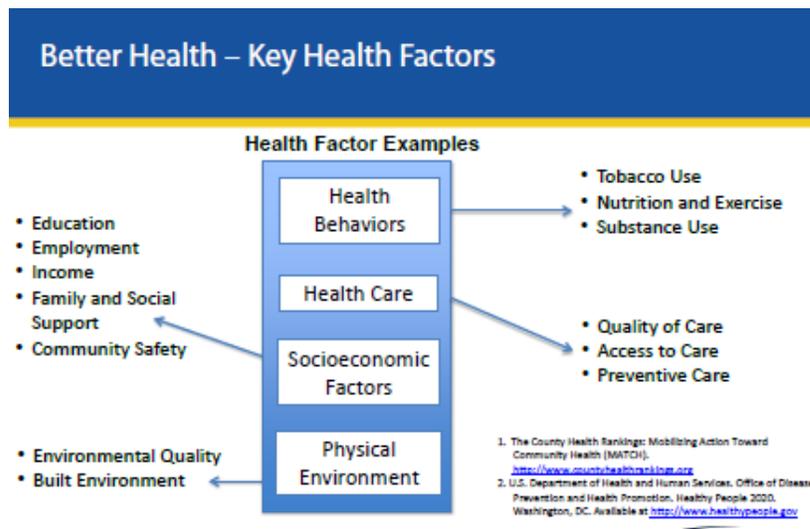
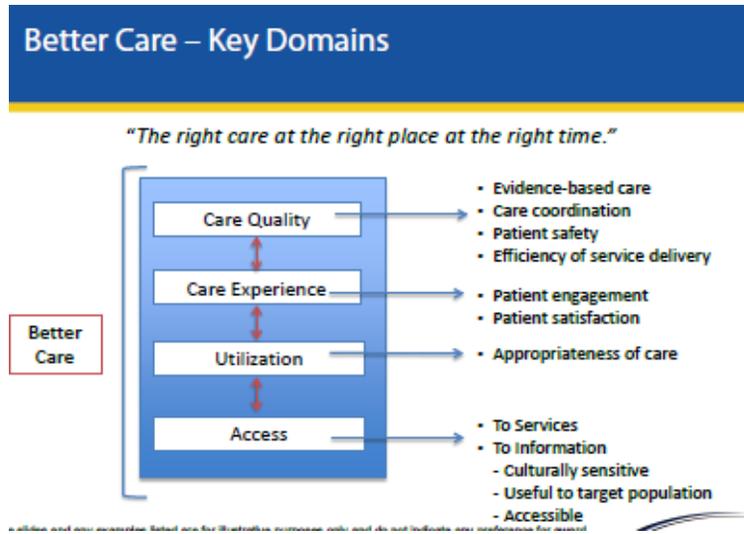
The scan revealed five frameworks that capture the integrated elements that are the focus of this paper. A picture and description of each is provided below. The selected measurement frameworks differ in how they take into account:

- working with relevant stakeholder organizations
- planning with a community focus (e.g., community health assessments)
- implementing evidence-based interventions
- sharing responsibility of high-priority total population health outcomes that are linked to priority health improvement activities that collectively represent the work done within each system.

A. Healthy People 2020 Framework²: organized into clear determinants placed between total population level health status and health outcomes and health improvement activities (policies, programs, and information) underpinned by a continuous quality improvement process. No examples of integrated measures are provided.

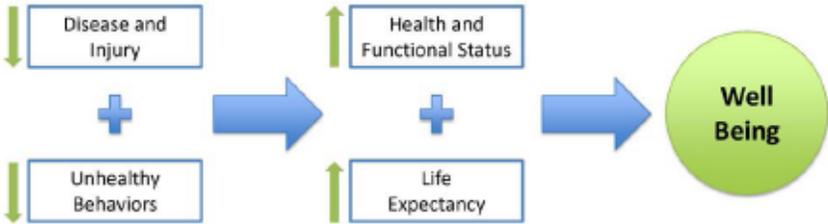


B. CMMI Measurement Framework¹⁹—introduced in late 2011 as part of a cooperative agreement solicitation, this framework places the first two aims of the Triple Aim (Better Care and Better Health) in the context of total population health (community) outcomes. The illustrative example reflects health improvement priorities of the clinical care system.



Better Health - Community Health Outcomes

A Measurably Healthier Population...



1. The County Health Rankings: Mobilizing Action Toward Community Health (MATCH). <http://www.countyhealthrankings.org>
2. U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington, DC. Available at <http://www.healthypeople.gov>

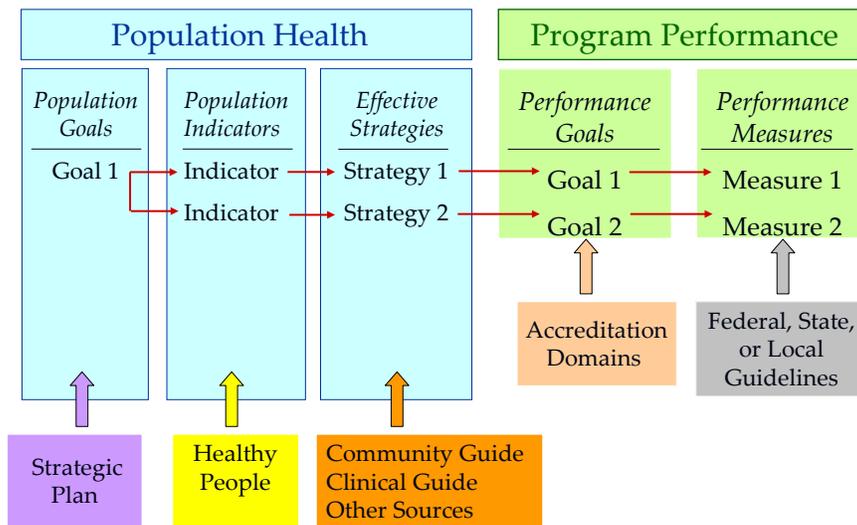


Illustrative Example

Overarching Aim: Improve the care and health of children with asthma in a target population

Better Care	Measures of Success	<p>*Asthma Care Quality Improvement: Resource Guide, Appendix D: Asthma Measures, Available at: http://www.aHRQ.gov/qual/asthmacare/asthmaappd.htm</p>
	<p>Increase % of children with asthma action plan</p> <p>Decrease % of children with mold inside of home (in the past 30 days)</p> <p>Increase % of children receiving flu shots (in the past 12 months)</p> <p>Increase % of all pediatric asthma patients with mild, moderate, or severe persistent asthma who were prescribed preferred long-term control medication or acceptable alternative for long-term control</p>	
Better Health	<p>Decrease the rate of preventable hospitalizations</p> <p>Reduce the rate of school days missed</p> <p>Reduce the rate of days with limited physical activity</p>	

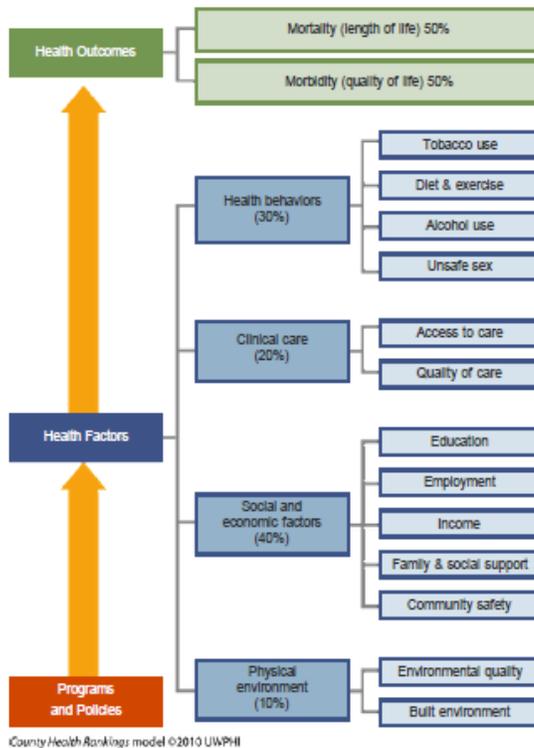
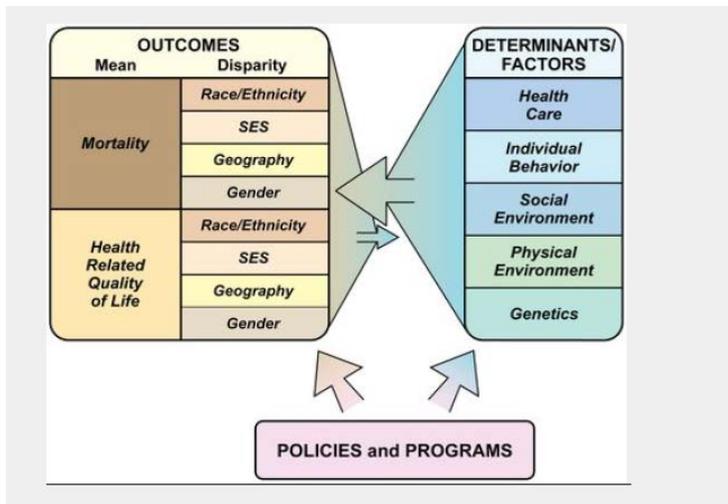
C. Mark Friedman “Results Accountability” Framework (as modified by the Los Angeles County Department of Public Health)²⁵: clearly delineates two different sets of measures, one representing total population outcomes (blue) and another representing health improvement activities (green). In practice, the determinants of health are placed in the population indicator area. The example reflects health improvement priorities of both the government public health system and the clinical care system.



Example: Immunization Program

<p>Population Goal To reduce morbidity and mortality from vaccine-preventable diseases by improving immunization levels</p> <p>Population Indicator Percentage of children, ages 19-35 months, who are fully immunized with one of the series of the Advisory Committee on Immunization Practices (ACIP) recommended vaccines</p> <p>Effective, Evidence-Based Strategies (selected subset)</p> <ol style="list-style-type: none"> 1. Change provider behavior through systems change—Provider recall/reminder systems in clinics 2. Change provider behavior through education—multi-component interventions with education 3. Increase demand and access to immunizations—reduce out-of-pocket costs
<p>Performance Goal (NACCHO Standard 9)</p> <p>Performance Measure Percent of Immunization Program public and nonprofit clinic partners who routinely meet the Standards for Pediatric Immunization Practices for provider and client recall/reminder systems</p>

D. Evans and Stoddart Field Model (as modified by Kindig)²⁶: organized into clear determinants of health linked to total population level health status and health outcomes and underpinned with health improvement activities (policies and programs). The integrated measures were developed for the County Health Rankings initiative and use Behavioral Risk Factor Surveillance System estimates for all counties in the U.S. The example primarily reflects health improvement priorities of the government public health system.



E. IOM Logic Model for Public Health Measurement¹: organized into determinants of health linked to health improvement activities (resources, capacities, processes, interventions, policies) and total population level health outcomes (intermediate and final) which overlay partnerships and variations in health outcomes and geographic level. Community-based planning and priority setting is also indicated in this framework. The example reflects health improvement priorities of the government public health system, the clinical care system, and other stakeholder organizations.

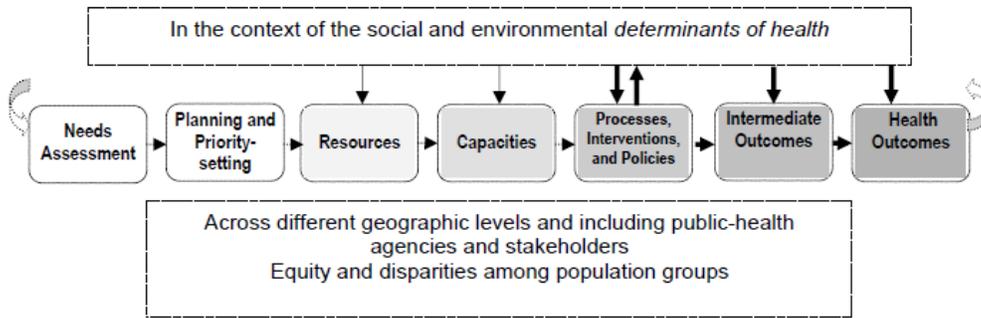


FIGURE 2-2 From inputs to outputs logic model.

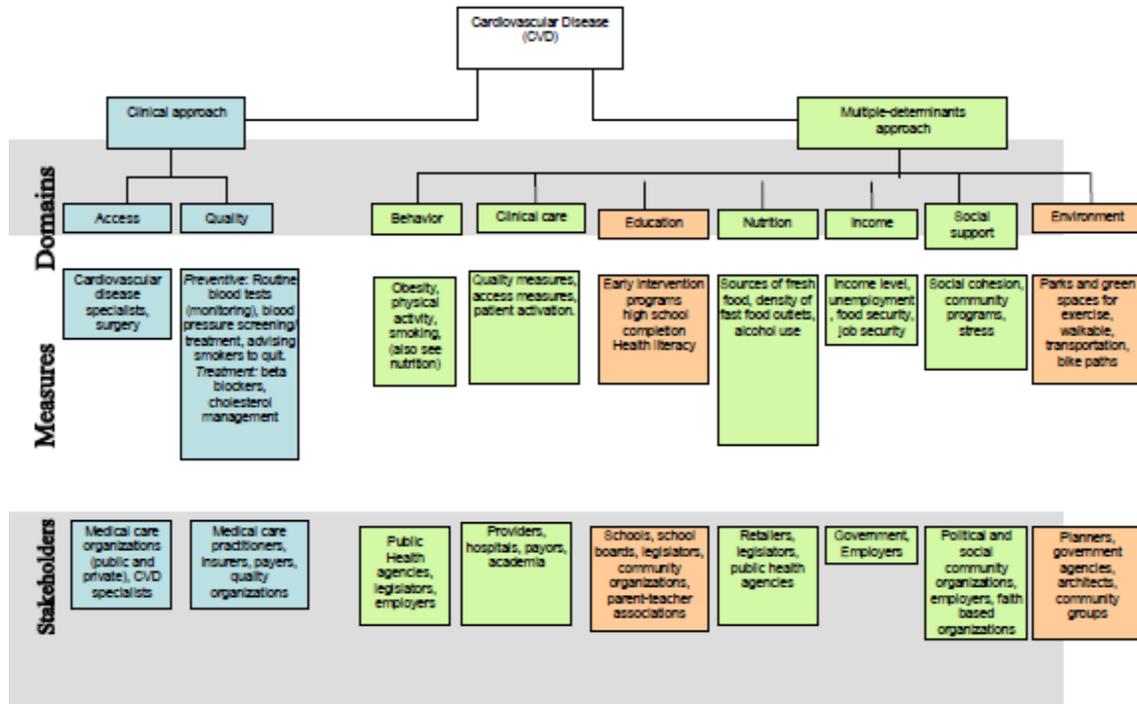


FIGURE 2-1b Contrasting the multiple-determinants and clinical approaches to addressing cardiovascular disease.

Environmental scan of existing prioritized measures of total population health, determinants of health, and health improvement activities

A crosswalk of selected indicators was performed that included a representative sample of total population health indicator reports, community health assessments, and performance reports from various levels of government, nonprofit organizations, and clinical care organizations to see which measures are most commonly used/included and to identify areas of common priorities/shared efforts. Particular attention was paid to health objectives that can be linked to priority interventions and synergistic prevention and health promotion efforts of both the clinical care system and the government public health system.

The following reports were reviewed in this scan: 1) Healthy People 2020 Leading Health Indicators², 2) National Prevention Council – National Prevention Strategy³, 3) Community Health Status Indicators²⁷, 4) State of the USA indicators²⁸, 5) the County Health Rankings²⁶, 6) United Health Foundation – America’s Health Rankings²⁹, 7) AHRQ National Quality Report and Quality Indicators³⁰; 8) HEDIS prevention measures²¹, 9) NQF prevention measures³¹, 10) health improvement plans and hospital quality reporting sites from the states of Iowa, Illinois, California, New York, Washington, and Florida; and 11) health improvement plans and hospital quality reporting sites from the local public health jurisdictions of Chicago, San Diego, New York City, Seattle-King County, and Miami-Dade County.

The scan revealed many lists of measures reflecting hundreds of processes that are not always expressed clearly in the context of improving individual patient outcomes, community outcomes, subpopulation outcomes, or total population health outcomes. There also is little to no synergy for priority setting for what gets measured across the clinical care system, the government public health systems, and stakeholder organizations. It was also unclear how the lists of “prioritized” total population health outcomes were linked to “prioritized” health improvement activities whether solely reflecting the clinical care system, the government public health system, or rarely, across the two systems. Logic models with examples of measures were usually not provided, just lists of domains and ongoing initiatives with tabular and graphic representation of data.

The measures were subsequently categorized in one of the following domains: 1) total population health (health status, health outcomes, and health-related behaviors; 2) determinants of health (social and environmental); and 3) health improvement activities (capacity, process, and outcome) within the clinical care system or government public health system. Table 1 provides a summary of the most common domains and frequency of use in the reviewed report. Table 2 lists the most common indicators/measures included in the reviewed reports.

Table 1: Common domains for measuring total population health, the determinants of health, and health improvement activities in a representative subset of indicator reports (n=26)

Domain	Counts of Indicator Categories
Health status and health-related quality of life	7
Health outcomes	
• Mortality/Natality	22
• Morbidity	16
• Chronic disease/injury	23
• Infectious disease	7
Health-related behaviors	30
Social Environment	16
Physical Environment	13
Health Improvement Activities – Processes and Outcomes	
• Clinical care system	34
• Government public health system	5
Health Improvement Activities –Capacity building	
• Clinical care system	6
• Government public health system	6

Notes:

- a. This paper uses the World Health Organization definition of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”
- b. This paper uses the following categorization of the determinants of health: 1) genetics and individual biology; 2) clinical care; 3) behaviors; 4) social environment; and 5) physical environment. Overlap between these categories is expected (e.g., gene-environment, and clinical care-behaviors).
- c. The determinant “clinical care” in the above table is divided into “processes,” “outcomes,” and “capacity building” to allow for integration with the common performance measurement frameworks (e.g., structure-process-outcome).

Total population health measurement

The government public health system, with its mission to promote and protect the health of the total population, has led the development of national, state, and local population health surveys that measure the health outcomes, determinants of health, and health behaviors of a total population within a designated geographic area. Examples of such surveys include national data systems such as the National Health Interview Survey (NHIS), the National Health and Nutrition Examination Survey (NHANES), and Behavioral Risk Factor Surveillance Survey (BRFSS) as well as state/local sponsored surveys such as the California Health Interview Survey (CHIS), New York City NHANES, and the Los Angeles County Health Survey (LACHS).

These surveys are supported through various funding streams, and the core set of questions are often determined by the priorities of the funding organizations (e.g., advocacy groups, foundations, government grants, etc.) that do not always reflect the most relevant health and social service needs of local communities. The alignment of survey methodologies and the wording of questions are highly dependent on the foresight

and willingness of leaders at all levels of government to do so. In practice, these are inconsistently collected across jurisdictions. The fact that state and local priorities at times differ from national priorities means that surveys developed at different geographic levels may include modules that address broad health goals versus community-specific health needs.

Table 2: Examples of indicators used to assess total population health, the determinants of health, and health improvement activities from a representative subset of indicator reports (n=26)

Concept/Domain	Indicator/Measures
Health status/Health-related quality of life (total population level)	<ul style="list-style-type: none"> • Life expectancy • Healthy life expectancy (HLE) • Years of potential life lost (YPLL) • Healthy days (physically, mentally) • Self-assessed health status • Expected years with activity limitations • Expected years with chronic disease
Health Outcomes <ul style="list-style-type: none"> • Ultimate/Final (total population level) 	<ul style="list-style-type: none"> • Mortality (rates of death) • Morbidity (e.g., disease or injury rates, obesity rates, mental health) • Natality (pregnancy and birth rates) • Health status and health-related quality of life
Health Outcomes <ul style="list-style-type: none"> • Intermediate (total population level) 	<ul style="list-style-type: none"> • levels of risk behaviors (e.g., diet, physical activity, tobacco use, alcohol/drug use) • rates of access to, usage of, and coverage of preventive services (e.g., cancer screening, immunizations, weight loss intervention, smoking cessation) • physiologic measures (e.g., controlled blood pressure or cholesterol levels)
Determinants of health (total population level) <ul style="list-style-type: none"> • Social Environment • Physical Environment 	<ul style="list-style-type: none"> • poverty level • high school graduation rates • exposure to crime and violence, neighborhood safety • affordable and adequate housing • built environment (transportation options, availability of healthful foods, availability of recreational facilities and parks, neighborhood walkability) • exposure to environmental hazards (air, water, food safety) • natural environment (e.g., access to green space, protection from natural disasters)

<ul style="list-style-type: none"> • Clinical Care • Behaviors 	<ul style="list-style-type: none"> • access to health care services and insurance coverage • unmet health needs or delayed care • Rates of tobacco use, alcohol misuse, physical inactivity, and unhealthy diet
<p>Health Improvement Activities—Capacity, Process, and Outcomes (subpopulation level)</p> <ul style="list-style-type: none"> • Capacity • Processes • Outcomes 	<ul style="list-style-type: none"> • electronic health records and integrated surveillance systems • preparedness surge capacity and response time • materials translated, health literacy • quality improvement projects • effective and efficient care coordination and case management • adherence to health promotion or treatment advice • levels of risk behaviors (e.g., diet, physical activity, tobacco use, alcohol/drug use) • rates of access to, usage of, and coverage of preventive services (e.g., cancer screening, immunizations, weight loss intervention, smoking cessation) • physiologic measures (e.g., controlled blood pressure or cholesterol levels) • preventable hospitalizations and readmissions • patient satisfaction • timely and appropriate care received

Notes:

- a. This paper uses the World Health Organization definition of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”
- b. This paper uses the following categorization of the determinants of health: 1) genetics and individual biology; 2) clinical care; 3) behaviors; 4) social environment; and 5) physical environment. Overlap between these categories is expected (e.g., gene-environment, and clinical care-behaviors).
- c. Indicators that fall within the “behaviors” determinant are often reported by the government public health system as intermediate outcomes measured at the total population level. This is usually done in situations where proxy measures for morbidity and mortality are needed and evidence clearly links the preventive behavior to a reduction in morbidity and/or mortality (e.g., immunizations, certain cancer screenings). As such, some overlap in the table above will be noted.
- d. When data collection methodologies and data definitions allow for this, health improvement activities measured at the *subpopulation* level can be aggregated to provide indicators at the *total population* level.

Measures of total population health should be viewed as the health outcomes and behaviors that could be achieved through the shared and collective efforts of an interconnected system of partners whose mission and vision in some capacity is linked to improving health (e.g., the clinical care system, the government public health system, the public health social service system, the school system, the worksite system, the loosely

connected non-profit system, etc.). Each system will have a set of performance measures that is unique to that system alone that reflects its vision and mission.

Clinical care system measurement of health improvement activities

The clinical care system for various reasons has made greater progress in this area. This is most likely due to the urgency of patient safety issues, greater cost and visibility, more research funding, more robust datasets for hospital and ambulatory care services (e.g., National Hospital Discharge Survey, National Ambulatory Medical Care Survey, Medicare Hospital COMPARE data) and has a 20-30 year lead on identifying, standardizing, and collectively measuring process and outcomes across the clinical care system.

As discussed in Section 1, these measures most often assess the performance at the level of a particular clinical care system (e.g., timeliness, appropriateness, and completeness of care for a variety of conditions – diabetes, pneumonia, congestive heart failure, and acute myocardial infarction) and do not include measures of total population health. However, large health plans/systems with highly developed electronic medical record systems and a focus on preventive interventions (e.g., tobacco cessation, obesity prevention, breastfeeding rates, and prenatal care) to some extent assess “total population health” due to their large membership base, which in some areas of the country may actually reflect the demographics of the local county or state populations.

Government public health system measurement of health improvement activities

Metric development within the government public health system has primarily occurred at the total population health level (using the results of national, state, and local sponsored health surveys). These measures reflect total population health for a specified geopolitical area and should **not** be viewed as actually assessing performance at the level of the government public health system.

Measures of government public health performance, however, are emerging and can be organized by the ten Essential Public Health Services (Figure 2) that are now the national public health accreditation domains. Scattered public health systems and services research projects and practice-based research networks are just starting to focus on the topic or performance measurement and quality improvement. Thus, a general sense of topic areas (e.g., obesity prevention, tobacco control, prenatal care case management, immunizations, laboratory testing/reporting, outbreak investigations, and restaurant inspections) and common in-house datasets that are available to measure the performance of such government public health activities in these topic areas is emerging. A few areas for electronic tracking and reporting are relatively more established, such as immunization registries, restaurant inspections, and infectious disease and laboratory reporting. However, capacity for such electronic reporting is highly variable across federal, state, local, tribal, and territorial jurisdictions.

Stakeholder organization measurement of health improvement activities

Metric development within stakeholder systems and organizations has also occurred, especially within the education, transportation, and social service systems. Integration of

the measures most relevant to total population health outcomes and the determinants of health is variable and depends on the presence of inter-sectoral and multi-sectoral partnerships and the depth and breadth of state and local community health improvement planning efforts in different areas of the country.

Recommendations: Framework for Assessing and Measuring Total Population Health, the Determinants of Health, and Health Improvement Activities

The scan shows that there is no agreed upon assessment and measurement framework that is currently used by the clinical care and government public health systems. In fact, the current state of priority setting and tracking of total population health outcomes, determinants of health, and health improvement activities shows largely disconnected processes with wide geographic variation in goals and objectives. This variation is seen within each respective system as well as across systems and is likely due to issues such as data availability, funding streams, community preferences, and political will.

Recommendation 6: The scan reveals the need for a “systems within systems” approach to allow integration of the existing clinical care and government public health perspectives for measuring total population health, the determinants of health, and health improvement activities. Any of the measurement frameworks presented in Section 2 can be adopted and/or modified to allow for successful integration of measurement across systems. Care should be taken to use a framework that is specifically designed to depict three inter-related elements – total population health, the determinants of health, and health improvement activities – within the context of measurement rather than frameworks created for other purposes (e.g., strategic planning, environmental health cumulative risk assessment, stand-alone health determinants, etc.)

Recommendation 7: Regardless of the specific framework selected, organizations within the clinical care system and government public health system within a specified geopolitical area should work together with key partners and stakeholders to:

1. complete an organizational planning and priority-setting process taking into account the needs of the subpopulations they serve within the agreed upon geopolitical area as well as resources available for health improvement activities
2. complete an integrated community health and needs assessment that includes the synergistic needs of all respective organizations
3. agree on a prioritized subset of health improvement activities where the respective organizations will direct resources (possibly jointly) and/or develop capacities to deliver them effectively and equitably
4. take responsibility for leading a particular health improvement activity (process, intervention, or policy activity) within the geopolitical area
5. select an integrated and complementary set of measures and performance targets that reflect improvement in total population health outcomes, the determinants of health, and health improvement activities (processes, intervention, or policy activity)
6. use the same prioritized indicators of intermediate and final health outcomes and determinants of health measured at the total population level. These should clearly

- be linked to the agreed upon subset of prioritized health improvement activities measured at the subpopulation level.
7. provide joint reports on progress toward both subpopulation and total population health outcomes

Recommendations: Selecting Priority Measures of Total Population Health, the Determinants of Health, and Health Improvement Activities

The review of indicator reports demonstrated several common domains and examples of indicators that could be considered as areas of synergy between the clinical care system and government public health system (e.g., chronic disease prevention and management, delivery of clinical preventive services, access to a medical home, and insurance coverage). The review also demonstrated clear areas of isolated priorities between the two systems, namely in the areas of patient safety (primarily the clinical care system) and social and physical determinants of health (primarily the government public health system).

Data availability will also be of primary concern as standardized measures are selected. For example, key clinical care system areas such as BMI assessments are still not readily available within the clinical care system. The demand and interest in developing integrated patient registries using electronic health records is just beginning to gain momentum. Even with the previous investments in population health surveys at various geographic levels, the government public health system continues to lack reliable county and sub-county estimates for total population health measures in many areas of the country. In addition, although there is increasing emphasis by public health leaders to prioritize health improvement activities in the policy development domain, easily accessible, queryable databases for existing and emerging policies are mostly non-existent at any level of government.

Another issue is the capacity to measure health disparities and health equity at both the total population and subpopulation levels. Government public health datasets have variably collected demographic data that allows for comparisons by race/ethnicity, gender, age, disability status, educational attainment, income level, and sexual orientation. Healthy People 2020 has had elimination of disparities as an overarching goal for two decades and recently added attaining health equity as measured by all the determinants of health as a new overarching goal for 2020. The Affordable Care Act includes actions that will enable both clinical care and government public health datasets to more robustly capture disparities data and allow for improved tracking of health equity. To effectively address disparities at the total population level, disparities in access to and delivery of health improvement activities will need to be assessed and measured. Thus, all measures prioritized by the clinical care system and government public health system (structure, process, outcome, and total population outcome) will likely need to include data collection methods that allow for comparison by a set of prioritized demographic variables.

To best address the issues of variable priorities and data availability, the following recommendations are suggested:

Recommendation 8: Use existing national indicator sets when and where possible to select the National Quality Forum total population health measures. Such indicator sets were selected using readily available data and often incorporate multi-stakeholder input to guide selection. Ideally, the selected indicators would provide data at the national, state, and local levels; however, most of the national clinical care and population health surveys are not funded to capture data below the national level. The exceptions are the vital statistics reporting system (mortality and natality), census data (American Community Survey), the BRFSS (total population health outcomes) and Hospital COMPARE (clinical care system – Medicare administrative data only).

Recommendation 9: When and where possible, end users of the National Quality Forum total population health measures should use existing state- and local-sponsored population health surveys, clinical care system administrative data and patient registries, and government public health surveillance and case management registries to supplement the gaps in national data. This will require extra effort to understand and integrate numerous and disparate data sources during the planning and community health assessment processes, most likely at the local and regional levels where the people served by the markets of the clinical care system and the geopolitical boundaries of the government public health system live and receive services.

Recommendation 10: To ensure successful data collection and reporting efforts of total population health, the terminology of the integrated approach needs to reflect the perspective of current data collection systems, including: 1) *total population health surveys* run by the government public health system that allow for data reporting at the state and local levels (e.g., the federal Behavioral Risk Factor Surveillance Survey; state and local population health surveys); 2) *subpopulation data collection systems* unique to a specific organization (e.g., administrative and patient care registry datasets within the clinical care system; case management datasets within government public health agencies); and 3) *total population surveys that capture the social and physical environmental “determinants of health”* (e.g., educational attainment, income/wealth, housing quality, transportation options, access to recreational facilities, access to healthy food choices).

Recommendation 11: To support the attainment of health equity, the selected National Quality Forum total population health measures should ensure, to the extent the related datasets allow, the capacity and capability to measure disparities using distributive metrics. If a measure is selected that does not allow for assessment of disparities, a clear plan for future assessment is recommended.

Note: As mentioned in Section 1, geopolitical boundaries and population health surveys should be used to measure total population health outcomes and determinants of health. The immediate processes and health outcomes of the subpopulations within the respective systems can then be linked to shared total population health outcomes of the

entire geopolitical jurisdiction(s) where the clinical care and government public health service areas coexist. Most importantly, the government public health system should not be seen as having overall responsibility for achieving the total population health outcomes in their jurisdiction – rather the synergistic efforts of the clinical care system, the government public health system, and partner organizations collectively share this responsibility.

Section 3. Opportunities for Alignment of Measurement across the Clinical Care System and Government Public Health System

Integration of the clinical care system and the government public health system is not a new concept³²⁻³⁵. High up-to-date childhood immunization rates, lipid and hypertension control, and declines in cigarette smoking are examples of successful synergistic activities. Nonetheless, systematic priority setting, planning, implementation, and evaluation between these groups are unusual in most communities. In some areas, assessment and measurement goals are well aligned, such as chronic disease management/preventable admissions, delivery of clinical preventive services, health behaviors, access to care, and insurance coverage. On the other hand, some priorities, such as patient safety (clinical care system only) and social and physical determinants of health (public health system only), are salient in only one system.

Numerous opportunities exist to endorse common priorities and common goals. The second iteration of the Healthy People Leading Health Indicators² was launched nationally in November 2011 and plays a central role in shaping priorities for achieving the nation's health goals and objectives over the next decade. In the past, many state and local agencies within the government public health system, as well as some stakeholder organizations, simply adopted the Leading Health Indicators as their list of prioritized *total population* health outcomes for a 10-year period. While the clinical care system historically has not undergone prioritization of indicators at the *total population* level, various prioritization efforts have centered on identifying an agreed upon set of indicators at the clinical care *subpopulation level*. For example, in 2003 the Institute of Medicine released a set of 20 priority areas for improvement in healthcare quality.³⁶ These areas included a mix of structure, process, and outcome measures for the clinical care system to address (e.g., care coordination, preventive screenings, immunizations, treatment of chronic diseases, patient safety). The IOM released a similar call to action for health insurance plans to prioritize a set of standardized performance measures within defined clinical care settings (e.g., ambulatory care, acute care, integrated healthcare systems, and long-term care).³⁷ These also did not include indicators of *total population* health, but rather were expected to lead change within the clinical care sub-system.

As discussed in Section 2 and shown in Tables 2 and 3, these clinical care system priority areas can be integrated with government public health system⁵ and other stakeholder organization priority areas (e.g., policy development, community engagement, and comprehensive education campaigns) to collectively measure and track the synergistic work related to improvement in *total population* health outcomes and determinants of health. Collaborative efforts to do so at the community level could be undertaken with leadership by the government public health system within a specified geopolitical area.

The National Prevention Council's National Prevention Strategy³, a federal inter-sectoral initiative mandated through health reform legislation, offers a comprehensive approach to improving total population health. This strategy complements and supports the Healthy People 2020 goals and objectives. As educational and promotional activities for these initiatives occur, the clinical care system, government public health system, and

stakeholder organizations across the nation could integrate the health improvement activities and measures recommended in these two federal initiatives. This would provide a comprehensive and consistent approach to prevention efforts across the nation and potentially increase overall impact for a set of total population health outcomes.

The Prevention and Public Health Fund created by the Affordable Care Act supports the Community Transformation Grants, the National Public Health Improvement Initiative (NPHII), and other strategic activities to improve core government public health capabilities and address upstream determinants of health. The same set of strategic directions is currently being implemented in selected states, tribes, cities, and counties all over the U.S. If the clinical care system and government public health system could agree to continue funding a core set of prevention, diagnosis, and treatment efforts centered on these strategic directions, the likelihood of achieving overall total population health outcomes (which can take several years to manifest) would markedly increase.

The ACA also provides new Community Health Benefits requirements for non-profit hospitals that mandate a comprehensive community health assessment for their defined “service populations” or “subpopulations.” Although the exact details have yet to be defined by the Department of the Treasury, this requirement provides an excellent opportunity for the clinical care system, the government public health system, and stakeholder organizations to collaborate and share data from multiple sources across systems, select a shared set of total population health outcomes, and strategically plan health improvement activities to achieve over a 1-2 year time period.

Finally, the newly created Center for Medicare and Medicaid Innovation (CMMI)²⁰ is sponsoring demonstration projects and cooperative agreements that aim to improve the health of “populations” through higher quality clinical care services, with an emphasis on encouraging healthy behaviors. New delivery and financing models are being sought that incorporate community characteristics, such as the built and social environments, in addition to clinical care system coordination and management, to more comprehensively influence the capability of individuals to make healthy choices. These incentives from within the clinical care system help bridge government public health and clinical care system interventions.

Frameworks for prioritizing total population health outcomes and related health improvement activities

A number of strategies have been used to prioritize work. Most begin with some framing of the problem based on demographics (e.g., age, race/ethnicity, or other demographic group), disease category, or determinant of health (e.g., behavioral, environmental, or social characteristic). Organization by disease is well understood, but harkens to a biomedical model. Organization by determinants of health may lead to more inter-sectoral and policy-oriented activities as well as the more traditional community and clinical interventions. Regardless, the quantification of the potential impact of the intervention possibilities should provide a first-order approximation of importance.

Preventable burden (burden of the disease or condition times the effectiveness of the intervention) is commonly used for this purpose. For example, the National Commission on Prevention Priorities approach combines burden of disease with quality adjusted life years in its method of ranking the most cost-effective and cost savings clinical preventive services³⁸. Stand-alone calculations of the economic costs of preventing, diagnosing, and treating a particular condition (e.g., cost-benefit analysis) and the cost-effectiveness of a specific intervention or sets of interventions (e.g., incremental cost-effectiveness ratios) are commonly used as well.

There are also qualitative factors that relate to demand for services, such as legislative mandates, affordability, feasibility of implementation, and the values and preferences of providers and community members. Culyer and Lomas³⁹ have categorized the criteria for social decisions, including priority setting, into three categories: 1) scientific information (knowable and context insensitive); 2) social science information (knowable but context sensitive); and 3) colloquial (local, idiosyncratic). These criteria are applicable regardless of the selected prioritization framework.

Simpler approaches can also be considered. One such example is the **3FOUR50** approach created by the Oxford Health Alliance⁴⁰: three behaviors (nutrition, physical activity, and smoking) contribute to four of the leading causes of death (stroke/heart disease, diabetes, cancer, and respiratory disease) that account for 50% of mortality, (i.e., leading causes of death), years of potential life lost, or quality-adjusted life years lost.

Another example is simply using **the leading causes of death**, using state or local data: (national data from the CDC website is listed below)

- Heart disease: 616,067
- Cancer: 562,875
- Stroke (cerebrovascular diseases): 135,952
- Chronic lower respiratory diseases: 127,924
- Accidents (unintentional injuries): 123,706
- Alzheimer's disease: 74,632
- Diabetes: 71,382
- Influenza and Pneumonia: 52,717
- Nephritis, nephrotic syndrome, and nephrosis: 46,448
- Septicemia: 34,828

A community-focused example is to perform **a community needs and health assessment** using whatever data are available and incorporating community preferences and perspectives into the selection of indicators and measures. This is a more time-consuming process, but investment in such a process has been shown to increase stakeholder support for health improvement activities and future sustainability through active coalitions and collaborations. In essence, the snapshot of prioritized indicators from the scan of reports in Section 2 reflects the most common issues that have been prioritized at the national, state, and local levels. Table 3 shows the most common indicators measured within these reports. The tables clearly show room for improvement when measuring the social and physical environments as well as government public

health improvement activities (e.g., policy development and enforcement, community engagement and empowerment, effective use of surveillance systems, efficiency of outbreak investigations).

Table 3: Most common indicators and measures used to assess total population health, the determinants of health, and health improvement activities from a representative subset of indicator reports (n=26 reports)

Percent Ranking	Indicator Topic	Domain
Top 50% - overall	Low birth weight/very low birth weight	Health Outcomes
	Obesity	
	Smoking prevalence	Health-Related Behaviors
	Physical activity	
	Excessive drinking of alcohol	
	Healthy diet/nutrition	
	Cancer screenings – colorectal, cervical, and breast Immunizations – childhood, influenza, and pneumococcal	
None	Social and Physical Environment	
Insurance coverage	Clinical Care	
Unmet clinical care needs		
Prenatal care services received	Health Improvement Activity	
Oral health care services received		
Top 50% - by domain	Infant mortality	Health Outcomes
	Low birth weight/very low birth weight	
	Teen pregnancy rate	
	Mortality and hospitalizations due to injury (aggregate measure)	
	Suicide rate	
	Mortality from motor vehicle accidents	
	Cancer mortality rates	
	Diabetes prevalence rates	
	Cancer incidence rates	
	Obesity	
	Depression	
	Smoking prevalence	Health-Related Behaviors
	Physical activity	
	Excessive drinking	
	Healthy diet/nutrition	
	Breast feeding	
	Cancer screenings – colorectal, cervical, and breast Immunizations – childhood, influenza, and pneumococcal	

	Insurance coverage Unmet clinical care needs Usual primary care provider Air quality index High school graduation rate Poverty level Hospitalizations for preventable admissions (aggregate measure) Prenatal care received Oral health care received Diabetes management received Heart attack care received Depression/mental health care received	Clinical Care Social and Physical Environment Health Improvement Activity (currently not measured at the total population level but they could be if the clinical care system aggregated their data to allow for this within a specified geopolitical area)
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After reviewing areas of commonality and their suitability for measurement, two examples using existing frameworks from Section 2 and health-related behaviors based on the 3FOUR50 approach are provided. Most important, measures of total population health, the determinants of health, and health improvement activities are all included. The authors would also like to emphasize that regardless of the total population health outcomes of interest (e.g., infant mortality, teen pregnancy rates, depression, motor vehicle accidents) the roles of the clinical care system, government public health systems, and stakeholder organizations can be integrated using any of the measurement frameworks in Section 2. When possible, health improvement activities should utilize recommended strategies from both the systematic reviews of the Community Guide to Preventive Services²² and the Guide to Clinical Preventive Services²³.

A primary question remains of how to report and share the results of an integrated set of measures of total population, subpopulation health, determinants of health, and health improvement activities. For example, traditional health indicator reports often report the underlying health and social service needs of the total population but do not include information on how well services are being delivered to ultimately make an impact and improve those indicators. On the other hand, quality and performance reports commonly depict progress toward organizational capacity or processes goals that improve service delivery to a subpopulation, but do not show how they are potentially associated with improvements in subpopulation or total population health outcomes. In addition, internal performance reporting is typically seen as sensitive and proprietary information and is rarely, if ever, provided for external or public review.

The U.S Department of Health and Human Services has outlined nine domains of quality in the HHS Consensus Statement of Quality⁵. These nine categories need to be integrated with the IOM clinical care system quality domains⁴ to establish a new approach to quality and performance reporting. This integrated approach would be most helpful if it reflects

the prioritized health improvement activities, determinants of health, and total population health outcomes at various geopolitical levels.

Illustrative examples of ways to integrate selected measurement frameworks with common indicators of total population health *linked* to related health improvement activities are provided below. The first example designates key stakeholders for the listed health improvement activities. The second example designates proposed subsystem leadership for the listed health improvement activities. The third example designated the HHS Public Health Quality Aim being addressed by the listed health improvement activities.

Illustrative Example 1: Obesity Prevention and Treatment in the context of cardiovascular disease as the total population health outcome of interest with designation of stakeholders (taken from IOM Model for Public Health Measurement framework)¹

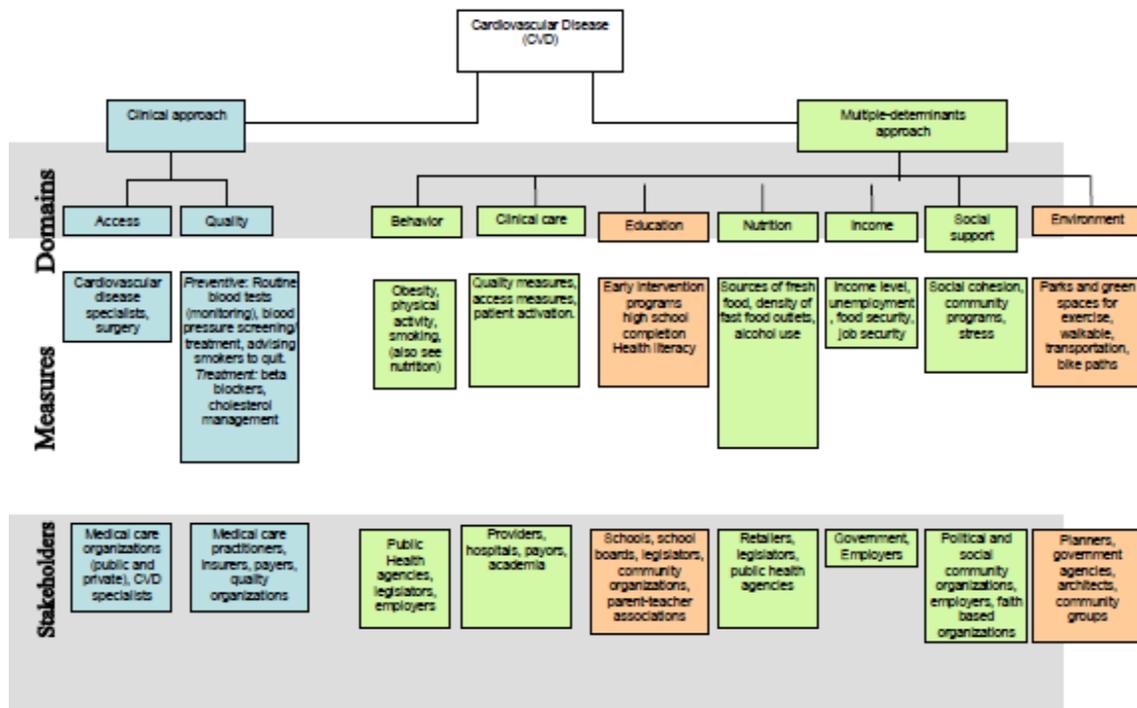
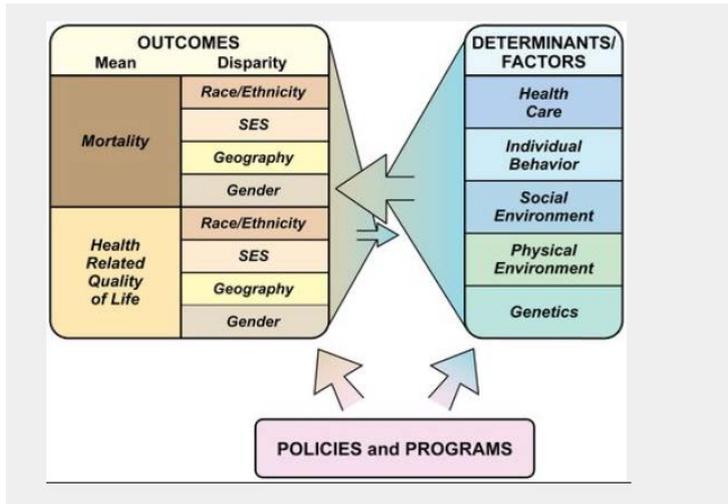


FIGURE 2-1b Contrasting the multiple-determinants and clinical approaches to addressing cardiovascular disease.

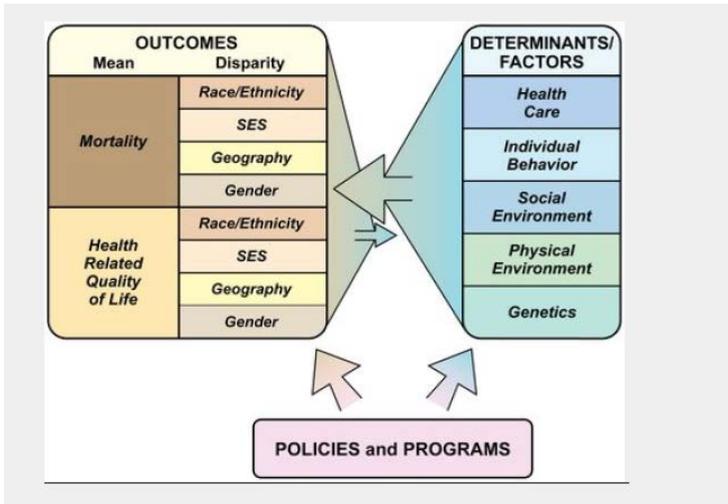
Illustrative Example Two: Tobacco Prevention and Cessation in the context of multiple total population health outcomes of interest with proposed designation of leadership for health improvement activities (using the Kindig/County Health Rankings framework) ²⁶



Health Outcomes	Indicator/Measure	Leadership for Health Improvement Activities
Mortality	Lung Cancer Mortality Cardiovascular Disease Mortality COPD Mortality	Shared
Morbidity	Self-rated health status (among smokers)	Shared
Health Factors		
Health Behaviors	Adolescent and adult Smoking Rates	Shared
Clinical Care	Adolescent and adult Smoking Rates – subpopulation of clinical care system Hospitalizations for cardiovascular disease Timeliness of diagnosis and treatment for lung cancer	Clinical Care System
Social and Economic Factors	Health Literacy – population-based High school graduation rates Access to care and insurance coverage	Government Public Health System
Physical Environment	Exposure to Second-hand Smoke Ambient Air Quality Standards	Government Public Health System
Policies and Programs (health improvement activities)	Counseling to prevent initiation Cessation counseling and treatment Referral to tobacco hotline Health Literacy – one-on-one Clean Air Laws Tobacco Taxes Establish and maintain tobacco hotline	Clinical Care System Government Public Health System

	Ensure provision of tobacco cessation coverage by all health plans	
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Illustrative Example Three: Tobacco Prevention and Cessation in the context of multiple total population health outcomes of interest with proposed designation of HHS Public Health Quality Aims⁵ (using the Kindig/County Health Rankings framework)²⁶



Health Outcomes	Indicator/Measure	Public Health Quality Aim
Mortality	Lung Cancer Mortality Cardiovascular Disease Mortality COPD Mortality	[Total] population centered Equitable
Morbidity	Self-rated health status (among smokers)	[Total] population centered Equitable
Health Factors		
Health Behaviors	Adolescent and adult Smoking Rates	[Total] population centered Equitable
Clinical Care	Adolescent and adult Smoking Rates – subpopulation of clinical care system Hospitalizations for cardiovascular disease Timeliness of diagnosis and treatment for lung cancer	Health promoting Risk reducing Proactive Transparent
Social and Economic Factors	Health Literacy – population-based High school graduation rates Access to care and insurance coverage	Proactive Equitable
Physical Environment	Exposure to Second-hand Smoke Ambient Air Quality Standards	Risk reducing
Policies and Programs (health improvement activities)	Counseling to prevent initiation Cessation counseling and treatment Referral to tobacco hotline Health Literacy – one-on-one Clean Air Laws Tobacco Taxes Establish and maintain tobacco hotline	Effective Health promoting Efficient Proactive Health promoting Equitable

	Ensure provision of tobacco cessation coverage by all health plans	
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Recommendations: Topics for inclusion in a complementary set of shared total population health outcomes, determinants of health, and health improvement activities

The integration of independent and complementary health improvement goals, objectives, outcomes, and activities is a complex and challenging task. It is highly likely that local and regional planners and decision-makers, whether from the clinical care system, the government public health system, or stakeholder organizations, are in the best position to determine the priority health improvement activities and total population health outcomes for the populations they serve. However, data outlining the leading causes of death, both by disease and unhealthy behaviors, is compelling and should lead to coordinated and synergistic health improvement activities that work toward improving them.

Recommendation 12: Select indicators of total population health based on a combination of burden of disease and/or unhealthy risk behaviors, such as the 3FOUR50 approach. When and where possible, use existing indicator sets to help ensure availability of data and inclusion of differing viewpoints for indicator selection.

Recommendation 13: Identify the priority health improvement activities currently receiving the most time, attention, and resources from within the clinical care system and government public health system. These will undoubtedly be different due to the differing missions across the continuum of the determinants of health, prevention, diagnosis, and treatment. Examples of current areas of synergy include: chronic disease management/preventable admissions, delivery of clinical preventive services, access to a medical home and adequate insurance coverage. Ongoing efforts in the areas of primary importance to the clinical care system or the government public health system should be taken into consideration and jointly worked on depending on local and regional priorities. The selected health improvement activities should clearly be linked to the total population health outcomes most likely to be influenced by these investments in specific health improvement activities. When possible, preventable burden and cost-effectiveness should also be a consideration in prioritizing such activities.

Recommendation 14: Start small and identify areas of synergy and overlap where complementary health improvement activities are most likely to already exist and make buy-in and collaboration possible (see Table 3). The financial and accountability demands on both systems make the expectation of major changes in mission that are not aligned with current funding streams and financial incentives unlikely.

Conclusions and Overall Recommendations

This commissioned paper is a first step toward using a “system within system” approach to establish an integrated set of definitions, a measurement framework, and a shared set of indicators that can be used by all organizations whose core mission is improving health at the individual, community, subpopulation, or total population level. The primary emphasis of this paper is on the clinical care system and the government public health system, both of which are clearly expected by society to provide leadership for a subset of health improvement activities across the prevention – diagnosis – treatment continuum. As the U.S. moves toward a “health in all policies” approach, stakeholder organizations should be able to find a home within this approach as well.

Developing shared definitions and conceptual frameworks across systems is always challenging, especially in the U.S. where a variety of organizations create reports reflecting various and differing priorities for measuring health status, health outcomes, health-related behaviors, determinants of health, and health improvement activities. This will undoubtedly be a continuing challenge as the recent health reform legislation provides incentives for systems change and new calls for accountability within both the clinical care and government public health systems.

The key to success is the synchronization of leadership and communication between the clinical care and government public health systems. While geopolitical jurisdictions usually have a government public health agency empowered by the U.S. and state constitutions to provide a subset of health improvement activities within their jurisdictions, the clinical care system remains highly fragmented. Stakeholder organizations also vary widely in scope and content and often lack an overarching coordination system. Clear points of contact within each system as well as clear designations for responsibility and accountability are needed to initiate cross-systems efforts for a subset of health improvement priorities that take into account the perspectives and capabilities of each system. A discussion of future opportunities and remaining challenges to an integrated approach across systems is provided below.

Additional Opportunities for Alignment

- The recent designation of 10 categories of Essential Benefits⁴¹ that all health plans must cover as part of the state-led Health Insurance Exchanges creates another area of potential synergies for selecting total population health outcomes. Each state is given flexibility to select specific items and services that will be covered within each category. These covered services (i.e., clinical care system health improvement activities) will help decrease financial barriers to preventive, diagnostic, and treatment services and should be embraced as part of the solution to improving total population health. As such, these covered services could be included as a central strategy for action by all non-profit hospitals completing a community health benefit assessment within a specified geopolitical area.

- Initiatives led by the Center for Medicare and Medicaid Services such as accountable care organization (ACO) demonstration projects and CMMI-funded projects will likely lead to more standardized measures of quality within and across the clinical care system. Those interested in how these measures can be integrated and /or aligned with measures of total population health should watch these efforts closely.
- The emerging field of public health systems research ⁴², which can be seen as the sibling to health services research, provides new opportunities to study the organization, financing, partnerships, processes, and outputs of the government public health system and stakeholder organizations. Results of these studies can be examined alongside the results of health services research to obtain a more comprehensive understanding of the capacities and processes of local and regional health improvement activities and their association with total population health outcomes.
- Additional reports from the Institute of Medicine that describe and catalyze the integration of primary care and public health ⁴³ may help outline areas of synergy and lead to the selection of a complementary set of health improvement activities that ultimately improve total population health. Collaborative decision making can then be used to designate leadership for specific health improvement activities by either the clinical care system or the government public health system along with key stakeholder organizations.

Remaining Challenges

- Defining populations and communities
With rare exceptions, clinicians and clinical care systems serve populations defined by insurance coverage or by individuals for whom they provide direct services rather than by socio-demographic groups defined by race/ethnicity, gender, income, education, or place of residence. These often differ from the subpopulations served by government public health agencies. Although the mission of government public health agencies is to serve the total population in their jurisdiction, they often do not have the financial and human resources to do so. Rather, they primarily serve the subpopulation of low-income and indigent populations within their jurisdictions.
- Adjusting for case mix in the clinical care and government public health systems
Since the case mix among clinical care practices or care systems varies substantially, simple direct comparisons of indicators among them are likely to be biased. Adjustments for case mix are generally required to enable more suitable comparisons, but a review of methods for doing so is beyond the scope of this review. In addition, methods for determining total population-level case mix and method for risk adjustment based on underlying socio-demographic characteristics need to be developed and put into practice. Caution will need to be

taken to ensure that any incentive initiatives targeted at either level do not reduce revenues for the clinical care organizations that choose to care for higher risk populations.

- **Integrating and harmonizing data collection across the clinical care and government public health system**
Efforts to provide greater integration and sharing of various data sources across the clinical care and government public health systems are under way as observed in initiatives for local and regional health information exchange such as the Beacon Community grants, incentives such as the CMS “meaningful use” criteria, and a new federal data efforts such as the newly launched National Network of State and Local Health Surveys⁴⁴ and the CDC Health Indicators Warehouse⁴⁵. However, funding for the provision of local and state population health survey data collection is patchy and not standardized across geopolitical levels. Similarly, funding for clinical care system outcomes data is also patchy and not routinely shared with the government public health agencies within a shared geopolitical area. As clinical care system datasets become more standardized and potentially pooled across emerging accountable care organizations via health information exchanges, measurement of selected indicators at the total population level might be possible and even preferable to population-based health surveys based on self-report. This future approach is highly dependent on creating collaborations of clinical care organizations that often compete with each other for patients and revenue.
- **Creating standardized criteria for prioritizing and implementing high-value disease prevention and health promotion activities**
Health economists, epidemiologists, and other scientists have proposed various approaches to framing health problems (e.g., disease, risk, or population-based), quantifying health problems (e.g., magnitude of burden, preventability, cost), and applying qualitative and contextual factors for health problems (e.g., values, feasibility, preferences) to determine “high-value” clinical and community-based preventive services. For example, the National Commission on Prevention Priorities approach combines burden of disease with quality adjusted life years in its method of ranking the most cost-effective and cost-savings clinical preventive services³⁸. Policymakers and scientists, however, remain uncertain on the most favored approach. In fact, the Affordable Care Act explicitly prohibits the use of quality-adjusted life years or cost-effectiveness to prioritize and/or determine health plan coverage decisions.
- **Utilizing methodologies that capture the dynamic complexity of concurrent and overlapping health improvement activities**
Newer research methods from the field of systems science allow for the integration of complex and dynamic relationships between individual behaviors, the environment, and policy solutions and provide an assessment of various plausible futures based on changing inputs⁴⁶. These methods are currently quite expensive and time-intensive to create. Support for these newer methods,

however, can allow for better understanding of the relative impacts of health improvement activities across the clinical care system, the government public health system, and stakeholder organizations. This in turn can lead to investments in the most effective interventions over a longer time horizon (e.g., 20-30 years) rather than assuming that short-term solutions are always the most cost-effective.

- Accounting for emerging Internet-based data sources
Social networking and other Internet sites are becoming more common and data are now being mined by both the private and public sector to determine patterns of human behavior. Care should be taken to ensure that researchers and others interested in using this data acknowledge the biases inherent in using convenience samples and take the necessary steps to apply and describe the appropriate weighting methodologies used.

Overall List of Recommendations

Recommendation 1: The concept and definition of “total population” and “total population health” across a specified geopolitical area should be used when setting goals and objectives for improving overall health status and health outcomes of interest to the clinical care system, the government public health system, and stakeholder organizations. Current use of the abbreviated phrase “population health” should be abandoned and replaced by the phrase “total population health.” This will avoid confusion as the clinical care system moves rather swiftly toward measuring the health of the subpopulations they serve. Geopolitical areas rather than simply geographic areas are recommended when measuring total population health since funding decisions and regulation are inherently political in nature and the majority of publications comparing “total population health” outcomes utilize population-based surveys with a geopolitical sampling frame (see Section 2 for more discussion).

Recommendation 2: The concept and definition of “subpopulations” and “subpopulation health” should be used when setting goals and objectives for targeting health improvement activities whether implemented solely by the clinical care system or the government public health system or through multi-sectoral partnerships and collaborations. This allows a “system within systems” approach where the clinical care system and government public health system can *independently* define its service population (e.g., covered members, hospital referral area, or an at-risk subpopulation) within the context of a *total population* within a larger specified geopolitical graphic area. This approach is recommended due to the separate funding and implementation expectations of the two systems in the U.S. as well as the characteristics of current stand-alone data collection systems.

Recommendation 3: Since the determinants of health are conceptually envisioned at a total population level by the government public health system, it is recommended that an integrated measurement framework define the determinants of health at the total population level as well. The current categorization of the determinants of health: 1) genetics and individual biology; 2) clinical care; 3) behaviors; 4) social environment; and 5) physical environment should be used by all organizations interested in improving total population health.

Recommendation 4: A general term such as “health improvement activities” should be used when describing activities across the prevention-diagnosis- treatment continuum that occurs within the clinical care system and government public health system. This will more easily allow for categorization and linking of complementary activities with total population health outcomes.

Recommendation 5: To encourage acceptance and adoption of a set of shared total population health measures, consistency with the definitions put forth by national planning groups such as *Healthy People 2020*, the National Prevention Council’s *National Prevention Strategy*, the HHS National Strategy for Quality Improvement, and

the IRS community benefit requirements for non-profit hospitals (currently under development) is critical.

Recommendation 6: The scan reveals the need for a “systems within systems” approach to allow integration of the existing clinical care and government public health perspectives for measuring total population health, the determinants of health, and health improvement activities. Any of the measurement frameworks presented in Section 2 can be adopted and/or modified to allow for successful integration of measurement across systems. Care should be taken to use a framework that is specifically designed to depict three inter-related elements – total population health, the determinants of health, and health improvement activities – within the context of measurement rather than frameworks created for other purposes (e.g., strategic planning, environmental health cumulative risk assessment, stand-alone health determinants)

Recommendation 7: Regardless of the specific framework selected, organizations within the clinical care system and government public health system within a specified geopolitical area should work together with key partners and stakeholders to:

1. complete an organizational planning and priority-setting process taking into account the needs of the subpopulations they serve within the agreed upon geopolitical area as well as resources available for health improvement activities
2. complete an integrated community health and needs assessment that includes the synergistic needs of all respective organizations
3. agree on a prioritized subset of health improvement activities where the respective organizations will direct resources (possibly jointly) and/or develop capacities to deliver them effectively and equitably
4. take responsibility for leading a particular health improvement activity (process, intervention, or policy activity) within the geopolitical area
5. select an integrated and complementary set of measures and performance targets that reflect improvement in total population health outcomes, the determinants of health, and health improvement activities (processes, intervention, or policy activity)
6. use the same prioritized indicators of intermediate and final health outcomes and determinants of health measured at the total population level. These should clearly be linked to the agreed upon subset of prioritized health improvement activities measured at the subpopulation level.
7. provide joint reports on progress toward both subpopulation and total population health outcomes

Recommendation 8: Use existing national indicator sets when and where possible to select the National Quality Forum total population health measures. Such indicator sets were selected using readily available data and often incorporate multi-stakeholder input to guide selection. Ideally, the selected indicators would provide data at the national, state, and local levels; however, most of the national clinical care and population health surveys are not funded to capture data below the national level. The exceptions are the vital statistics reporting system (mortality and natality), census data (American

Community Survey), the BRFSS (total population health outcomes) and Hospital COMPARE (clinical care system – Medicare administrative data only).

Recommendation 9: When and where possible, end users of the National Quality Forum total population health measures should use existing state- and local-sponsored population health surveys, clinical care system administrative data and patient registries, and government public health surveillance, and case management registries should be used to supplement the gaps in national data. This will require extra effort to understand and integrate numerous and disparate data sources during the planning and community health assessment processes, most likely at the local and regional levels where the people served by the markets of the clinical care system and the geopolitical boundaries of the government public health system live and receive services.

Recommendation 10: To ensure successful data collection and reporting efforts of total population health, the terminology of the integrated approach needs to reflect the perspective of current data collection systems, including: 1) *total population health surveys* run by the government public health system that allow for data reporting at the state and local levels (e.g., the federal Behavioral Risk Factor Surveillance Survey; state and local population health surveys), and 2) *subpopulation data collection systems* unique to a specific organization (e.g., administrative and patient care registry datasets within the clinical care system; case management datasets within government public health agencies), and 3) *total population surveys that capture the social and physical environment “determinants of health”* (e.g., educational attainment, income/wealth, housing quality, transportation options, access to recreational facilities, access to healthy food choices).

Recommendation 11: To support the attainment of health equity, the selected National Quality Forum total population health measures should ensure, to the extent the related datasets allow, the capacity and capability to measure disparities using distributive metrics. If a measure is selected that does not allow for assessment of disparities, a clear plan for future assessment is recommended.

Recommendation 12: Select indicators of total population health based on a combination of burden of disease and/or unhealthy risk behaviors, such as the 3-4-50 approach. When and where possible, use existing indicator sets to help ensure availability of data and inclusion of differing viewpoints for indicator selection.

Recommendation 13: Identify the priority health improvement activities currently receiving the most time, attention, and resources from within the clinical care system and government public health system. These will undoubtedly be different due to the differing missions across the continuum of the determinants of health, prevention, diagnosis and treatment. Examples of current areas of synergy include: chronic disease management/preventable admissions, delivery of clinical preventive services, and access to a medical home and adequate insurance coverage. Ongoing efforts in the areas of primary importance to the clinical care system or the government public health system should be taken into consideration and jointly worked on depending on local and regional

priorities. The selected health improvement activities should clearly be linked to the total population health outcomes most likely to be influenced by these investments in specific health improvement activities. When possible, preventable burden and cost-effectiveness should also be a consideration in prioritizing such activities.

Recommendation 14: Start small and identify areas of synergy and overlap where complementary health improvement activities are most likely to already exist and make buy-in and collaboration possible (see Table 3). The financial and accountability demands on both systems make the expectation of major changes in mission that are not aligned with current funding streams and financial incentives unlikely.

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APPENDIX 1: Key definitions needing clarification for integrated measurement of population health and the determinants of health

Concept/Term	Academia ^{8, 9, 10, 14}	Clinical Care System ^{11, 12}	Government Public Health System ^{2, 13, 15, 16, 17, 18}
Population	<p>Demography: the inhabitants of a given area at a given time; the concept of “area” can be generalized beyond the geographical sense to include members of a formal organization</p> <p>Epidemiology: all the inhabitants of a given country or area considered together; the number of inhabitants in a given country or area</p> <p>Biostatistics/epidemiology: the entire set of persons of interest in a particular study, as compared to a sample, which refers to a subset of the whole</p>	<p>no clear definition found</p> <p>Note: when used in the context of clinical care practice, this implies <i>covered or service population</i>. For example, members of an HMO-covered population or hospital referral regions (HRR) or hospital service areas (HSA)</p>	<p>a group of individuals within a political jurisdiction or contiguous geographic area</p> <p>all the inhabitants of a country or other designated region</p> <p>Note: when used in the context of public health practice, this implies <i>total population</i>. For example, the population of an entire state, region, county, or city.</p>
Total population/ General population	<p>Demography: all people who belong to a given area at a given time by virtue of legal residence or some similar criterion</p> <p>Epidemiology: all members of a human population defined essentially on the basis of geographical location, as in a country, region, city, etc., all inhabitants of some given area</p> <p>Biostatistics/epidemiology: everyone in a population being studied</p>	<p>not in general use</p>	<p>implied, but full term rarely used</p>

<p>Subpopulation/ Target population/ High-risk population/ At-risk population/</p>	<p>Demography: population groups identified separately for purposes of a census or a sample survey because of their distinctive living arrangements or characteristics</p> <p>Demography: the persons to whom an event can potentially occur</p> <p>Epidemiology: the group of persons for whom an intervention is planned</p> <p>Biostatistics/epidemiology: the collection of individuals, items, measurements, etc., about which inferences are desired</p> <p>Biostatistics/epidemiology: the group to which an inference from a study is directed</p>	<p>a specified subset of the population for whom a health-related intervention is specifically intended</p> <p>a defined population subgroup that research has shown to be more likely than others to suffer a condition of interest</p>	<p>a group of individuals within a political jurisdiction or contiguous geographic area that shares related traits and characteristics based on a variety of personal or social attributes, either alone or in combination, such as age, gender, race/ethnicity, income, education, insurance status, disease status, risk behavior patterns, quality of life, healthcare utilization patterns, etc.</p> <p>a specified subset of the population for whom a health-related intervention is specifically intended</p> <p>a defined population subgroup that research has shown to be more likely than others to suffer a condition of interest</p> <p>the population or community to which an intervention is directed ¹⁷</p> <p>Note: subpopulations are often the focus of tailored or targeted community health improvement interventions and programs</p>
<p>Covered population/ Service Population</p>	<p>Epidemiology: a measure of the extent to which services rendered cover the potential need for the services in a community</p>	<p>a group of individuals who receives care at a specified clinical care facility or within an integrated clinical care delivery system at a given time; usually based on overall utilization patterns or use for a</p>	<p>the extent of financial protection afforded by an insurance program</p> <p>the proportion of a population that benefits from a particular healthcare</p>

		<p>specific diagnosis, treatment, procedure, or complication</p> <p>a group of individuals who pay premiums and other costs of care through a specified insurance contract that includes a pre-approved network of facilities and providers</p>	<p>service that is theoretically available to all</p> <p>the extent to which the health services provided for or available to the population of a country or region meet the potential or perceived needs of the people</p>
Population Health	<p>Epidemiology: the health of a population measured by health status indicators; influenced by physical, biological, social, and economic factors in the environment, by personal health behavior, and by access to and effectiveness of healthcare services</p> <p>Epidemiology: the prevailing or aspired level of health of the population of a specified country or region in a defined subset of that population</p>	<p>an emerging term within the clinical care system, most commonly seen in reference to maintaining patient registries based on diagnosis, medications, laboratory results, preventive screenings that can be used to track processes and immediate health outcomes in the <i>subpopulation of patients</i> receiving care from a facility within the clinical care system</p>	<p>the health of a population measured by health status indicators; influenced by physical, biological, behavioral, social, cultural, and economic and other factors</p> <p>the prevailing or aspired level of health of the population, or a specified subset of the population</p> <p>the health outcomes of a group of individuals, including the <i>distribution</i> of such outcomes within the group¹⁸</p> <p>a cohesive, integrated, and comprehensive approach to health considering the distribution of health outcomes in a population, the health determinants that influence the distribution of care, and the policies and interventions that impact and are impacted by the determinants¹⁶</p>

<p>Determinants of Health</p>	<p>Epidemiology: any factor that brings about change in a health condition or makes a difference to a given health outcome</p>	<p>no clear source for how this concept is practically defined within the clinical care system.</p> <p>Note: The clinical care system is likely to use the public health practice definition if and when collaborating with the governmental public health system, community stakeholders, or when improving total population health is a focus of a clinical care organization(s)' mission</p>	<p>a definable entity that causes, is associated with, or induces a health outcome whether a single factor or combination of factors, inherited or acquired including: environmental determinants, biological, behavioral, social, economic, cultural or other factors</p> <p>the range of personal, social, economic, and environmental factors that influence health status and can be categorized as follows: policymaking, social factors, health services, individual behavior, and biology/genetics²</p> <p>causal factor hypothesized to affect health outcomes that can refer to such factors as demographic and population (host) factors; environmental factors, such as disease vectors or transmission agents (e.g., food or water); social, economic, educational, healthcare, cultural, or other systems; and preventive interventions¹⁷</p>
<p>Social/upstream/ distal determinants of health</p>	<p>Epidemiology: a causal factor, such as poverty, that is remote or far apart in position or time to the health outcome of concern</p>	<p>no clear source for how this concept is practically defined within the clinical care system.</p> <p>Note: The clinical care system is likely to use the public health</p>	<p>a determinant of disease that has a indirect but obvious effect on risk factors for disease such as poverty</p> <p>the economic and social conditions under which people are born, live,</p>

		practice definition if and when collaborating with the governmental public health system, community stakeholders, or when improving total population health is a focus of a clinical care organization(s)'mission	learn, work play, and age that impact a wide range of health, functioning, and quality of life outcomes ²
Physical determinants of health/Built environment	<p>the combination of the natural environment and the built environment⁴⁷</p> <p>the built environment is everything humanly made, arranged, or maintained to fulfill human purposes such as needs, wants, and values; to mediate the overall environment with results that affect the environmental context⁴⁸</p>	<p>no clear source for how this concept is practically defined within the clinical care system.</p> <p>Note: The clinical care system is likely to use the public health practice definition if and when collaborating with the governmental public health system, community stakeholders, or when improving total population health is a focus of a clinical care organization(s)'mission</p>	<p>the physical conditions and environment in which people are born, live, learn, work, play, and age that largely determines their health status²</p> <p>the built environment is a general term covering residential, industrial, and public buildings, road and services, such as water supplies, electrical wiring, and sewerage</p>
Behavioral determinants of health	Epidemiology: the combination of knowledge, practices, and attitudes that together contribute to motivate the actions we take regarding health that may promote and preserve good health or if the behavior is harmful, may be a determinant of disease	<p>no clear source for how this concept is practically defined within the clinical care system.</p> <p>Note: The clinical care system is likely to use the public health practice definition if and when collaborating with the governmental public health system, community stakeholders, or when improving total population health is a focus of a clinical care organization(s)'mission</p>	<p>the actions people undertake that influence their health status that may promote, preserve, and protect good health or may lead to injury, death, and chronic disease</p> <p>factors that are believed to be the cause of or to be contributing factors to: accidents, injuries, disease, and death</p>

APPENDIX 2: Definitions needing clarification for integrated measurement of health improvement activities

Concept/Term	Clinical Care System	Government Public Health System
Health improvement activities	<p>care of sickness or injury provided by any qualified professional person in a health-related institution, clinic, or comparable setting</p> <p>any unit of clinical care whether tangible or intangible that include actions by a provider to improve or maintain the patient’s or family’s health and well-being, including preventive, diagnostic, and therapeutic services</p>	<p>10 Essential Services of Public Health – the ten services that describe what public health seeks to accomplish and how it carries out its basic responsibilities (see Figure 2)</p>
Health promotion	<p>1) encouraging consumer behaviors most likely to optimize health potential through health information, preventive programs, access to medical care, health education and other organizational, political, and economic efforts intended to change behavior and environments in ways which will improve or protect health; 2) activities by an individual educator, physician, provider group, or HMO that are directed toward providing the patient or enrolled population with various educational materials, lectures, health risk assessments/appraisals, incentives/disincentives that create awareness of healthy lifestyles including subjects such as smoking, weight control, eating habits, stress, cholesterol and blood pressure.</p>	<p>the process of enabling people to increase control over their health and its determinants, and thereby improve their health; including: no pervasive health problems, unsatisfactory housing, systemic poverty, unemployment, or other social pathology</p>
Disease prevention	<p>an inter-related spectrum of activities that either prevent disease or injury from occurring (primary), be detected early (secondary), and controlled once present (tertiary).</p>	<p>an inter-related spectrum of activities that either prevent disease or injury from occurring (primary), be detected early (secondary), and controlled once present (tertiary).</p>

Disease management	disease management measures – indicators/outcome measures of a health plan’s success in treating the entirety of disease across the continuum of care, including diagnosis, patient satisfaction with care, utilization of preventive services, admission/readmission rates, diagnosis-specific health status	not in general use, although likely to be the same as used by the clinical care system Note: case management is more common in the government public health system
System-based service delivery enhancements	process oriented changes that when implemented consistently and effectively across an organization will improve overall capacity, access, and quality of preventive, diagnostic, and treatment services, including provider/patient reminder systems, decision support tools and software; financial incentives for preventive care and integrated chronic disease management programs, improving hospital discharge communications and transitions between inpatient and outpatient care; and quality improvement strategies	an emerging term, not in general use Note: quality improvement projects addressing the timeliness of outbreak investigations, efficiency of immunization clinics, success of policy development, effectiveness of health education programs, efficiency of contracts and grant processes, timeliness of emergency communications, etc., are increasingly being implemented in government public health agencies across the nation
Output/Outcome measures	the result of a process of prevention, detection, or treatment that is an indicator of the effectiveness of clinical care measures upon patients	the results of implementing an intervention
Health Outcomes <ul style="list-style-type: none"> • Ultimate/Final 	not in general use	the amount and distribution of a disease in a specified population by person, place, and time; may also include measures of health status, life satisfaction, quality of life, and economic impact the change in <i>health</i> that is hypothesized to result from the intervention (e.g., reduced morbidity or mortality or increased physical, mental, or psychological function).

<p>Health Outcomes</p> <ul style="list-style-type: none"> • Intermediate 	<p>not in general use</p>	<p>variable that occurs in the causal pathway between an intervention or determinant and the final health outcome, such as:</p> <ul style="list-style-type: none"> • levels of risk behaviors • rates of access to, usage of, and coverage of preventive services • physiologic measures (e.g., blood pressure or cholesterol levels) • levels of environmental exposure
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