CHAPTER

2

Conceptual Framework of Health Determinants

Conceptual frameworks are maps constructed to define the causal relationship between a problem and the factors contributing to it.[1-4] A key step in the understanding of a problem to be studied is the development of a conceptual framework. Wolfson described the importance of a conceptual framework when he asserted, "Data and facts are not like pebbles on a beach, waiting to be picked up and collected. They can only be perceived and measured through an underlying theoretical and conceptual framework, which defines relevant facts, and distinguishes them from background noise." (p.309)[5] As Wolfson's quote describes, the conceptual framework is a preliminary model of the problem under study, and is reflective of relationships among critical variables of interest. Conceptual frameworks on health have transgressed over time as our understanding and values of health change.[1] Dominant conceptual frameworks on health care systems, specifically those focusing on the United States, encompass a broad range of problems, including the social, environment, and structural factors impacting the quality and quantity of health across populations. Yet, within this diverse problem set lies the commonality of health equity as the proposed solution to addressing our health care system.[1-4]

To begin with, in order to successfully understand conceptual frameworks there must be a clear definition of how the various identified factors contributing to a problem relate to each other.[1] Many prominent conceptual frameworks categorize factors into distinct levels, with the factor at one level leading to the causation of a factor at the next level. For example, in a conceptual framework on the environment's impact on health, it is the absence of reserved open space that leads to the implementation of industrial factories, which in turn lead to the development of poor air quality and adverse health outcomes.[1,3] However, rarely do discrete levels exist in factors contributing to health care problems.[1] Rather, these elements continuously penetrate the health of a population through interconnected pathways, resulting in the fluid decrease or improvement of health over time.[1] So, while the industrial factories lead to poor air quality, they also lead to an increase in jobs and economic wealth for a community, thereby acting as part of an interconnected pathway of both positive and negative health outcomes.[1,3] Nancy Krieger's article **Proximal, Distal and**

the Politics of Causation, proposes that, with a shift of language, conceptual frameworks can more accurately represent this degree relationship.[1] According to Krieger, spatial defining terminology should be replaced with terms like levels and pathways to more accurately represent the relationships of social determinants of health.[1] It is not the distinct presence or absence of an element causing poor health outcomes, but, rather, how the elements interconnect with each other to cause an adverse impact on a population's health.[1]

Globally, the most prominent conceptual frameworks is that proposed by the World Health Organization's (WHO) Commission on Social Determinants of Health.[2] This framework is distinguished due to its ability to identify the structural determinants of health inequities, and the impact of power and government influence on population health. Structural determinants encompass those that stratify individuals into social classes of hierarchical power, including income, education, gender and race.[2] The Commission connects these structural determinants to the resulting inequity in health through intermediary determinants, material circumstances, biological factors, behaviors and psychosocial factors. These intermediary benefits are supported by the social capital and social cohesion of society, including the norms, social trust and networks that facilitate coordination of mutual benefit.[2] The Commission concludes its framework by stressing the integration of structural determinants in policy formulation addressing social determinants to effectively address the inequities of health across populations.[2]

The WHO conceptual framework transcribes to national frameworks on environmental conditions impacting the quality of health across populations. [2,3] One example of a conceptual framework contextualizing the impact of the environment on health is Northridge et al.'s work, as described in **Sorting Out the Connections Between the Built Environment and Health**.[3] A built environment is characterized as the environment built by people for people, the product of urban planning efforts to provide livable settings for populations.[3] This framework contextualizes how modifications made to the natural environment by urban planning translate into built environmental stressors that ultimately influence individual health status.[3] This framework mirrors the outcomes established by the WHO commission, including the impact of power and government intervention on the health outcomes of communities.[2,3] Those most susceptible to poor built environments are those with the least power, alluding to government intervention as the only measure to ensure adequate environmental standards within a given community.[2,3]

Additionally, in order to fully represent dominant frameworks in U.S. health care, a conceptual framework identifying the prominent structural challenges in delivering efficient health care services must be recognized.[4] Bentley et al. defines a framework surrounding waste in the U.S. health care system in the article **Waste in the U.S. Health Care System: A Conceptual Framework**.[4] This framework successfully defines the venues in which health care waste flows, including administrative, operational and clinical waste.[4] Administrative waste is characterized as any spending on administrative activities that exceeds what is necessary to achieve the organization's goals, such as insurance product design and excess claims processing.[4] Operational waste is characterized as any unnecessary use of resources in the production or delivery of health services, including increased patient waiting times and medical errors.[4] Clinical waste can be defined as any spending to produce services that provide little to no marginal health benefit over less costly alternatives, excessive diagnostic testing and lost medical records.[4] Again, as with environmental frameworks, conceptual frameworks on structural problems in U.S. health care mirror the proposed contexts set forth by the WHO commission. [2,3,4] The most vulnerable to being collateral damage to health care waste are those with the least power, suggesting to the need for government action to ensure population health. [2,4]

Conceptual frameworks are only as useful as their ability to induce action into finding solutions for the defined problems.[1-4] These frameworks are best utilized by those possessing the power to induce change in communities and among populations as well as those committed to implementing solutions.[1-4] As referenced by Bentley et al. in discussions of conceptual frameworks on waste in the U.S. health care system, while the problems are easily identified the potential fixes are much more complex.[4]

This chapter includes four readings that illustrate what a conceptual framework is and how conceptual frameworks might be used to understand health and health care problems and identify solutions. In **Proximal, Distal and the Politics of Causation: What's Level Got To Do With It?** Krieger proposes that a relative shift in terminology is needed in order to advance public health science. Historically, public health frameworks on social determinants utilized proximal and distal terminology to define, and categorize, distinctions among social and economic factors in relationship to an individual's health. Proximal and distal terminology has allowed biological and so-

cial sciences to define the spatial location and relative importance of factors describing disease origination. According to Krieger, spatial defining terminology should be replaced with terms like levels and pathways to more accurately represent the relationships of social determinants of health. Unlike proximal and distal events, which occur sequentially through time and space, social determinants are interconnected, existing simultaneously in causal relationships that impact an individual's health. For example, as Krieger examines within her paper, in order to fully analyze the health consequences embodied within tobacco products, one must study both the biological ecology and political economy as they simultaneously relate to each other. A cigarette is simultaneously: (1) a flammable mass of carcinogens providing toxic elements to human lungs upon inhalation; and (2) a product whose high profitability relies on the intentional production and marketing to lower socioeconomic classes. To not recognize the dual biological and social existence of cigarettes would provide an incomplete illustration of the impact of tobacco products on the public's health. Yet, can this simultaneous causal relationship be reflected through frameworks grounded in terms like proximal and distal? According to Krieger, in order to evolve public health knowledge and application, one must abandon the confusion that comes with theories founded on proximal and distal segments and, instead, clearly identify the interweaving pathways and levels of social determinants.

In an excerpt from **America's Health Rankings: A Call to Action for Individuals & Their Communities**, we present the longest running annual assessment of the nation's health on a state-by-state basis. The report uses data from the U.S. Departments of Health and Human Services, Commerce, Education and Labor; U.S. Environmental Protection Agency; the American Medical Association; the Dartmouth Atlas Project; and the Trust for America's Health. The rankings are published jointly by United Health Foundation, the American Public Health Association and Partnership for Prevention. It provides *state-specific rankings* from 1 to 50 across a variety of national health benchmarks such as smoking, obesity, children in poverty, access to care, and incidence of preventable disease. America's Health Rankings are based on the perspective that, in addition to our individual genetic predisposition to disease, health is the result of four essential and controllable components: our behaviors, the environment of the community in which we live and work, the public and health policies and practices made by government and community leaders, and the clinical care we receive. The four components are viewed as the primary health determinants that impact the health outcomes of a state, as well as the nation as a whole. The health determinants interact with each other in a complex web of cause and effect that impact the healthy outcomes we desire. Actions to improve these determinants will eventually improve health outcomes.

In **Sorting Out the Connections Between the Built Environment and Health**, Northridge et al. state a built environment is characterized as the environment built by people for people. More specifically, the built environment is the product of urban planning efforts to adapt natural surroundings into livable settings. The relationship between the built environment and health has been present continuously throughout history, thriving up until the post World War II era. Increased attention on disease manifestation gradually led to the deterioration of this relationship. Northridge et al.'s work analyzes the relative importance, and challenges, of reviving the relationship between urban planning and public health. A joint urban planning and public health conceptual framework is introduced, linking the natural, physical environment to the individual and population health levels. This framework contextualizes how modifications made to the natural environment by urban planning translate into built environmental stressors that ultimately influence individual health status. Northridge et al. use this framework as a foundation to then analyze previous research on the health effects of housing and housing interventions. This analysis acts as an example showing the difficulty in identifying the direct causal relationship between health outcome and the built environment. Physical health problems, including infections and respiratory troubles, have long been associated with residing in slums and ghettos. However, previous studies show that, while relative associations can be made, it is often difficult to isolate the direct impact of housing on physical health. Data from various studies give mixed reviews, with some showing improved physical health upon transitioning to improved housing conditions while others show no change in health outcomes. However, improvements in housing have shown to increase social outcomes, with individuals reporting less fear and isolation upon improvements to their living environment. Thus, when analyzing the relationship between the built environment and health, it is important to define the health outcome targeted by the planning. Northridge et al. conclude the article by recommending that concrete measurements and relevant empirical data be collected in order to fully utilize the

partnership between urban planning and public health.

In 2007, the World Health Organization's Commission on Social Determinants of Health (CSDH) published its latest installment of recommendations to address the growing prominence of health inequities. In **A Conceptual Framework for Action on the Social Determinants of Health**, these recommendations are presented as a framework for action founded on principles of health equity across populations that are preserved by the power of governments. This framework is distinguished from other social determinant frameworks by beginning with the identification of the structural determinants of health inequities. Structural determinants encompass those that stratify individuals into social classes of hierarchical power, including income, education, gender and race. These social markers are borne from the socioeconomic political contexts of society, including the policies, culture, and societal values that determine the amount of social mobility from one classification to the next. CSDH connects these structural determinants to the resulting inequity in health through intermediary determinants, material circumstances, biological factors, behaviors and psychosocial factors. Material circumstances are defined as the determinants linked to the physical environment, including housing, neighborhoods and financial means to buy necessities. Biological factors and behaviors include diet, smoking, alcohol consumption and genetic predisposition to disease. Psychosocial factors are characterized by stress, social support and coping styles utilized when facing life challenges. These intermediary benefits are supported by the social capital and social cohesion of society, including the norms, social trust and networks that facilitate coordination of mutual benefit. Additionally, the health care system acts as a supporting element of the intermediary determinants in which access, or lack thereof, increases the inequity of health. By integrating these factors into the identified social determinants CSDH illustrates the frequently overlooked fact of inequalities within determinants themselves. Inequalities between social determinants are widely known, but amongst a classification of determinants inequities exist due to the varying nature of community culture and values. CSDH concludes its framework by stressing the integration of structural determinants in policy formulation addressing social determinants to effectively address the inequities of health across populations.

References

1. Krieger N. Proximal, Distal and the Politics of Causation: What's Level Got To Do With It? *American Journal of Public Health*. February 2008; 98(2):221-30.
2. WHO Commission on Social Determinants of health. V. CSDH framework for Action. In: *A Conceptual Framework for Action on the Social Determinants of Health*. Geneva, Switzerland: World Health Organization, 2007: 15-49, 71-75. http://www.who.int/social_determinants/resources/csdh_framework_action_05_07.pdf. Accessed November 4, 2009.
3. Northridge, ME, Sclar ED, Biswas P. Sorting Out the Connections between the Built Environment and Health: A Conceptual Framework for Navigating Pathways and Planning Healthy Cities. *Journal of Urban Health*. December 2003;80(4):556-568.
4. Bentley TG, Effros RM, Palar K, Keeler EB. Waste in the U.S. Health Care System: A Conceptual Framework. *The Milbank Quarterly*. 2008; 86(4): 629-659.
5. Wolfson M. Social proprioception: Measurement, data and information from a population health perspective. In RC Evans, ML Barer, and T Marmor (Eds.) *Why Are Some People Healthy and Others Not?* New York: Aldine de Gruyter, 1994.

READING

1

Proximal, Distal, and the Politics of Causation: What's Level Got to Do with It?

Source: Krieger N. Proximal, distal, and the politics of causation: what's level got to do with it? *Am J Public Health* 2008;98:221-30. Reprinted with permission of the American Public Health Association.

Causal thinking in public health, and especially in the growing literature on social determinants of health, routinely employs the terminology of *proximal* (or *downstream*) and *distal* (or *upstream*).

I argue that the use of these terms is problematic and adversely affects public health research, practice, and causal accountability. At issue are distortions created by conflating measures of space, time, level, and causal strength.

To make this case, I draw on an ecosocial perspective to show how public health got caught in the middle of the problematic proximal-distal divide—surprisingly embraced by both biomedical and social determinist frameworks—and propose replacing the terms *proximal* and *distal* with explicit language about levels, pathways, and power. (*Am J Public Health*. 2008;98:221-230. doi: 10.2105/AJPH.2007.111278)

PROXIMAL. DISTAL. UPSTREAM.

Downstream. Risk factor. Determinant. Level. Multilevel. These terms feature prominently in current discussions of causal pathways and public health, especially in work on the social determinants of health. A central focus is on how "upstream" societal influences-typically referred to as *distal*—shape "downstream," or *proximal,* exposures, thereby affecting population health.[1-16]

Exemplifying this line of thought are recent reports issued by the World Health Organization Commission on Social Determinants on Health[2] and the World Health Organization Regional Office for Europe.[3] Common assumptions are that (1) diseases are attributable to many causes, located outside and within the body; (2) the social lies in the realm of the *distal;* (3) the biological belongs to the *proximal;* and (4) the distal and proximal are connected by *levels,* e.g., societal, institutional, household, individual, which can be conceptualized as *near to* or *far from* the causes under consideration. For example, as discussed in both reports, "distal" societal factors drive the risk of smoking; how smoking harms health involves "proximal" biology.[2,3] What could be more obvious?

Yet what seems clear-cut can be deceiving. I argue that although notions of *proximal, distal,* and *level* all matter for elucidating causal pathways, clear thinking—and, hence, public health research, practice, and causal accountability—is distorted by conflating measures of space, time, level, and causal strength. When it comes to causation, it is one thing to think about *near* and *far* in relation to space and time; it is another matter entirely to do so for levels. To make this intellectual argument, I draw on an ecosocial perspective[1,17-21] to show how public health got caught in the middle of the problematic proximal-distal divide- surprisingly embraced by both biomedical and social determinist frameworks—and

propose replacing the terms *proximal* and *distal* with explicit language about levels, pathways, and power.

PROXIMAL AND DISTAL IN PUBLIC HEALTH THOUGHT

The idea that disease etiology and distribution are attributable to causes deemed "far" from and "near" (including within) the body is ancient[22-27]; Hippocratic tradition, in the 5th century BCE, famously invoked both atmosphere and individual constitution as explanations for epidemic disease.[22,25] By contrast, the idea that there is a causal etiological hierarchy, spanning from distal to proximal, is relatively new. It became a core part of the public health canon only in the mid-20th century CE. How this change happened and its public health implications have been little discussed.

Strand 1. 19th Century Emergence of Proximal and Distal as Scientific Terms for Spatiotemporal Scale

Only in the early 19th century CE did the terms *proximal* and *distal* enter the scientific discourse.[28] Invented to describe anatomical location and distance, as measured on a spatial scale, these words were coined by biologists at a time when comparative anatomy occupied a key place in debates over the classification and nature of species.[29,30] *Proximal,* derived from the Latin noun *proximus* ("nearest"), took on the meaning "situated toward the center of the body, or the point of origin or attachment of a limb, bone, or other structure."[28] Its antonym, *distal,* derived from *distant,* was intended to echo two other widely used biological concepts: *ventral* and *dorsal*.[28] Soon other natural sciences adopted the terms, albeit with some critical modifications. In geology, for example, the terms took on a temporal as well as a spatial dimension, reflecting how adjacent geological strata typically are "close" in time as well as in space.[28]

The moment time entered the picture, however, the terms *proximal* and *distal* were primed to develop new meanings. This is because of the ubiquitous metaphorical linkage of time, space, and causal reasoning.[31(pp133-138)] In all known languages, temporal events are described in spatial terms: Time moves through space.[31(p134)] This metaphorical relationship, as argued by the linguist Deutscher, is essential to causal reasoning, because it enables us to "talk freely about one thing coming 'from' another, 'out of' another, or happening 'through' another, to express abstract chains of cause and event."[31(p137)]

New European scientific discoveries of powerful physical laws for gravity, electricity, and magnetism[32-34] further affected scientific thinking about causation. These inverse square laws, expressed as pithy equations, clarified that force depends on distance: The more proximal the mass or the charge of the interacting objects, the greater the force—and the more powerful the effect. It was a short step from here to equate distance with causal strength, in not only the physical but also the life sciences.

Strand 2. From Spatiotemporal Scale to Causal Hierarchies and Levels

Not until the later 19th century, however, did the scientific meanings of *proximal* and *distal* leap from referring only to *spatiotemporal scale* to also describing *levels* and *causal hierarchies*. In their new usage, the "closeness"—or "distance"—of levels defined a new type of proximity, one that could be measured only conceptually, not in meters or minutes.

Initially, this conceptual change occurred within disciplines focused on a different type of body: that of body politic, i.e., the social sciences.[35-42] In books with such titles as *Social Pathology*[41] and *Organism and Society,*[42] influential late-19th century sociologists drew parallels between the biologically nested hierarchies of cell-organism-species and the socially nested hierarchies of individuals-families-societies.[35,36,37(pp4-8),38(pp231-323),40-42] In their view, just as organs, composed of their constituent cells, must collectively work together for an organism to survive, so too do social groups and their constituent individuals have complementary roles they must perform for society to thrive.[35,36,41,42] The intent was counter not only to the ruthless competition of Social Darwinism[30(pp87-90),39,40(pp196-199),42(p10)] but also to the contending Marxist view that class conflict determined societies' structure and development.[35,37(pp4-8),41,42(pp182-186),43,44(pp178-179)]

Borrowing biological terminology, these sociologists newly deployed the terms *proximal* and *distal* to describe societies' structural "levels."[41(xxiii)] Ranging from individual to institutional, these levels and the "distance" between them became defined by their nested relationships: Adjacent levels were "close," and nonadjacent levels were "far."

Meanwhile, biologists likewise expanded the use of the terms *proximal, distal,* and *level,* bringing these terms explicitly into their thinking about causal distance. As part of the early 20th century modern evolutionary synthesis, which integrated Darwinian

evolutionary biology, paleontology, and Mendelian genetics,[29,45,46(pp503-591),47] these biologists newly contrasted what they termed "proximate" (physiological) versus "ultimate" or "distal" (evolutionary) causes.[29(pp313-321),35,46(pp1340-1343),47] This distinction recognized that asking *how* a biological event occurs (e.g., a muscle contraction) is not the same as asking *why* a biological phenomenon exists (e.g., muscles enable locomotion to find food and flee predators). Drawing on holistic thinking,[35,48] they argued that valid explanations could coexist across levels (e.g., species, organism, cell, molecule) and involve the distant past (evolution) *and* the immediate present (current stimulus). In the instant of a muscle contraction, both proximal and distal causes were at play.

The Mid-20th Century Public Health Embrace of Proximal and Distal

By mid-20th century, to be close or far could thus refer to space, to time, to lineage, or to location in hierarchical conceptual levels. The terms *proximal* and *distal* thus became widely encompassing terms to express—and contest—causal conceptions in both the social and the natural sciences. Amid these divergent uses, the terms *proximal* and *distal* finally entered the public health causal lexicon.

Prompting their adoption was growing recognition that the field of public health, still riding the crest of enormous success against infectious diseases in the 19th and 20th centuries CE, had to move beyond a monocausal to a multifactorial account of disease causation, which involved not only the agent but also the host and the environment.[1,17,24,49-51] As exemplified by the findings of the Framingham study of heart disease, rising rates of chronic disease and cardiovascular mortality seemed to be attributable not to any one single exposure but instead to a variety of factors,[51-53] leading the Framingham researchers to coin the term *risk factor* to describe these partial—i.e., not sufficient, not always necessary, but nonetheless contributing—component causes.[53]

It was through the multifactorial perspective that the terms *proximal* and *distal* emerged as terms for the discussion of causality in the public health literature.[17] Unfortunately, however, their new usage drew on shallow understandings of the terms *near* and *far* that impeded rather than deepened multilevel thinking. The essential features of the multifactorial framework remain well-sketched by the still highly influential spiderless[17] "web of causation," first articulated in the 1960s[54] and which, as I have previously argued,[17] (1) leveled all exposures to a single plane; (2) defined "proximal" factors to be those operating directly on or within the body, and relegated all other exposures to the murky realm of "distal"; (3) linked causal potency to distance—i.e., the "closer" the cause, the greater the effect (following the logic of the previously described physical inverse square laws); (4) held that distal causes necessarily exerted their influence through successively more proximal factors; (5) took a studied agnosticism as to what accounted for the array of exposures included in the web and eschewed any discussion of power or injustice; and, hence, (6) adopted a narrow stance of what may best be termed *causal pragmatism*[55,56] that prioritized focusing on what they considered to be "proximal" factors ostensibly amenable to control by either individuals or by public health or medical professionals (including by health education) rather than what they termed the more "distal" determinants requiring societal change.

The use of the terms *proximal* and *distal* persists to this day. It underlies the 21st century successor to the web of causation—that is, the "gene—environment interaction" framework,[57-60] which posits that the occurrence of common and complex diseases reflects the interplay of individual genetic variability with an array of exogenous exposures.[57-60] Work in this area is chiefly engaged[57-60] (albeit with some exceptions[61-65]) in the quest to discover genetic determinants of biological susceptibility and to develop pharmacological interventions that can block deleterious gene expression.

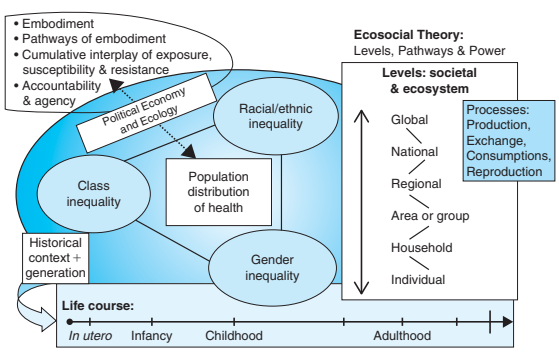
The proximal-distal discourse likewise pervades the social determinants of health perspective,[1-16] which holds that "distal" institutional priorities and practices of government and the private sector shape people's cumulative exposure, across the life course via intermediary pathways, to the proximal physical, behavioral, psychosocial, and biological exposures that trigger pathogenic processes (including gene expression), thereby causing disease. Secondarily, once illness occurs, the social determinants of health framework ask how prognosis is affected by socially produced inequities in access to needed medical care.[1-16]

In both cases, causal distance still matters for causal strength: In the gene-environment interaction model, "proximal" causes remain most potent, whereas for the social determinants of health perspective, "distal" causes are decisive. Despite their fundamentally different approaches, both frameworks cling to the proximal-distal divide. This little remarked convergence hints that some causal logic may be askew.

AN ALTERNATIVE ECOSOCIAL APPROACH TO LEVELS, EMBODIMENT, AND ACCOUNTABILITY

I suggest that one reason the proximal-distal terminology can be so readily used by such totally disparate frameworks is their now deeply entrenched conflation of relationships among space, time, distance, levels, and causal potency. Three examples, based on arguments offered from an ecosocial perspective (Figure 1, Table 1),[1,17-21] illustrate the problems that can arise when logics of scale are confused with analysis of levels and when distance is conflated with power.

The basic point is that societal patterns of disease represent the biological consequences of the ways of living and working differentially afforded to the social groups produced by each society's economy and political priorities.[1,17-21] Class and racial inequality, for example, differentially affect the living standards, working conditions, and environmental exposures of the dominant and subordinated classes and racial/ethnic groups, thereby creating class and racial/ethnic health disparities. Stated more generally, a society's economic, political, and social relationships affect both how people live and their ecologic context, and, in doing so, shape patterns of disease distribution. The understanding of the societal distributions of health thus cannot be divorced from considerations of political economy and political ecology.[1,17-21] Driving health inequities are how power—both *power over* and *power to do*,[66-68] including constraints on and possibilities for exercising each type—structures people's engagement with the world and their exposures to material and psychosocial health hazards. Notably, neither type of power readily maps onto a metric of proximal or distal. Nor do they neatly partition across levels. A critical corollary is that, contrary to the logic of the proximal-distal divide, within the very phenomena of disease occurrence and distribution—just as in a muscle contraction—the distal and the proximal are conjoined.



Note: To explain current and changing population distributions of disease, including health inequities, and who and what is accountable for the societal patterning of health, it is necessary to consider causal pathways operating at multiple levels and spatiotemporal scales, in historical context and as shaped by the societal power relations, material conditons, and social ans biological processes inherent in the political economy and ecology of the populations being analyzed. The embodied consequences of societal and ecologic context are what manifest as population distributions of and inequities in health, disease, and well-being.

Figure 1 A heuristic diagram for guiding ecosocial analyses of disease distribution, population health, and health inequities. See References 1, 17-21.

Example 1. Why Spatiotemporal Scale Is Not the Same as Level

The first example, drawn from ecology, the original multilevel science, clarifies why population sciences cannot afford to confuse metrics of spatiotemporal scale with the phenomena of levels. The example concerns, literally, the forest and the trees. Forests are levels within ecosystems, which involve not only trees but also the other plants and animals that inhabit them.[69-75] Notably, forests can be large or small (a spatial metric), as well as old or young (a temporal metric). Indeed, one key issue in conservation ecology today, spurred by intensified commercially driven logging and deforestation, forest fragmentation, habitat degradation, and spread of zoonoses (e.g., Lyme disease), is just what size, spatially, an expanse of woods needs to be—and how close it needs to be to other such expanses—to function as a particular type of forest.[69-75] Too small, with the ratio of edge-to-interior too high, or too spatially isolated, without connecting corridors, and its species composition will change, often losing diversity, including to the point of outright extinction.[69-75]

The phenomenon of a forest (a level), and interactions among both the entities that constitute it and also between the forest and its environs, is affected by, but not identical to, the forest's size (spatiotemporal scale). Similarly, for measles to become endemic with a community (a level), community size (a scale) must exceed 250,000 people.[76,77] Hence, argument 1: Confuse scale and level—or consider only one, not both—and understanding of population phenomena will be undermined.

Example 2. On Nonlinear Causal Pathways, with Immediate and Long-Term Effects

The second example illustrates that levels need not play by the proximal-distal schema that the path from what is considered "far" to "near" necessarily travels through what is termed "intermediate." This is because events at one level can directly and profoundly affect nonadjacent levels, instantly and persistently, without intermediaries.[29,46-48,66,78,79]

Table 1 **Core Constructs of Ecosocial Theory—an Epidemiological Theory of Disease Distribution—and Some Predictions**

Construct	Elaboration
Embodiment	A concept that refers to how we literally incorporate, biologically, the material and social world in which we live, from in utero to death; a corollary is that no aspect of our biology can be understood absent knowledge of history and individual and societal ways of living. Epidemiologically, "embodiment" is thus best understood: (1) As a construct, process, and reality, contingent upon bodily existence; (2) As a multilevel phenomenon, integrating soma, psyche, and society, within historical and ecological context, and, hence, an antonym to disembodied genes, minds, and behaviors; (3) As a clue to life histories, hidden and revealed; and (4) As a reminder of entangled consequences of diverse forms of social inequality.
Pathways of embodiment	Causal pathways that involve exposure, susceptibility, and resistance (as both social and biological phenomena), structured simultaneously by (1) societal arrangements of power, property, and contingent patterns of production, consumption, and reproduction, and (2) constraints and possibilities of our biology, as shaped by our species' evolutionary history, our ecologic context, and individual histories, that is, trajectories of biological and social development, and that involve gene expression, not just gene frequency.
Cumulative interplay among exposure, susceptibility, and resistance	Expressed in pathways of embodiment, with each factor and its distribution conceptualized at multiple levels (individual, neighborhood, regional or political jurisdiction, national, international, or supranational) and in multiple domains (e.g., home, work, school, other public settings), in relation to relevant ecologic niches, and manifested in processes at multiple scales of time and space.
Accountability and agency	Refers to who and what is responsible for social inequalities in health and for rectifying them, as well as for the overall current and changing contours of population health, as expressed in pathways of and knowledge about embodiment. At issue are the accountability and agency of not only institutions (government, business, and public sector), communities, households, and individuals, but also of epidemiologists and other scientists for theories used and ignored to explain social inequalities in health. A corollary is that, given likely complementary causal explanations at different scales and levels, epidemiological studies should explicitly name and consider the benefits and limitations of their particular scale and level of analysis.
Analytic implications and predictions	Determinants of disease distribution (a population-level phenomenon) presume but are not reducible to mechanisms of disease causation (which occur within individuals' bodies). Key contingent hypotheses are: (1) population patterns of health and disease constitute the embodied biological expression of ways of living and working differentially afforded by each society's political economy and political ecology, and (2) policies and practices that benefit and preserve the economic and social privileges of dominant groups simultaneously structure and constrain the living and working conditions they impose on everyone else, thereby shaping particular pathways of embodiment.

Source: See References 1, 17-21.

Consider, for example, the 1973 U.S. Supreme Court ruling that legalized abortion, on the grounds of individuals' rights to privacy.[80] Here, the levels at issue were defined jurisdictionally, with the federal judicial ruling on individual constitutional rights overturning federal and state laws that interfered with individual privacy by prohibiting abortion. In this case, the so-called distal determinant (1) directly affected individual girls' and women's reproductive rights and (2) reverberated up to other levels, by requiring changes in state laws and by expanding the permitted range of services that could be provided by health professionals and health facilities.

The positive health consequences were both immediate and long-term: U.S. girls and women alike no longer were forced, by law, to face the risk of having an unsafe illegal abortion and they were also less likely to bear unwanted children, thereby reducing risks of adverse maternal and birth outcomes.[81-84] More recent U.S. Supreme Court decisions restricting the right to abortion likewise illustrate this principle of skipping levels, with contrary effects.[85,86]

Analogous examples can readily be drawn from the health and human rights literature, whereby state obligations to respect, protect, and fulfill individuals' human rights affect policies and interventions at multiple levels.[87] The implication, argument 2, is that nonadjacent levels can have direct causal relationships, an insight obscured by the proximal-distal logic.

Example 3. On Levels and the Perils of Commodity Fetishism—the Simultaneity of Material Properties and Social Relations

The third example involves a key problem that permeates the proximal-distal divide: its incompatibility with truly multilevel thinking. This problem can be likened to the old-fashioned error of "commodity fetishism," albeit multiplied. In its original usage, this concept, introduced by Karl Marx (1818-1883), referred to how the value of commodities was mistakenly assumed to be an intrinsic property, rather than a consequence of the complex relationships of ownership,

Table 2 **Proximal and Distal, Spatiotemporal Scale Versus Level—Meanings, Contrasts, and Causal Implications**

Category	Spatiotemporal Scale: Space	Spatiotemporal Scale: Time	Level
Metric of distance	Units of spatial distance, measured in nested increments; examples include: kilometer-meter-millimeter-micron; or mile-foot-inch	Units of temporal distance, measured in nested increments; examples include: millennium-century-year-day-hour-minute-second-millisecond	Adjacency of levels, which can be organized–theoretically, conceptually, or structurally–as nested or nonnested hierarchies; examples include: (1) nested: nation-region-city-neighborhood-household; or ecosystem-species-organism-organ system-organ-cell; (2) nonnested: school | workplace | neighborhood-individual Conceptual or structural nonscalar relationship: adjacent levels Conceptual or structural nonscalar relationship: nonadjacent levels
"Near" "Far" Strength of effect	Proximal, near in space, close Distal, distant in space, far away Usually inverse relationship of spatial distance and force: closer=stronger, hence proximal=powerful; farther=weaker, hence distal=dilute	Proximal, near in time, recent Distal, distant in time, long ago Usually inverse relationship of temporal distance and force: closer=stronger, hence proximal=powerful; farther=weaker, hence distal=dilute	Cannot predict "strength" of "effect" based solely on level: a given phenomenon at any given level potentially can powerfully or weakly affect or be affected by phenomena at the same level, adjacent levels, and nonadjacent levels
Typical causal inference	Proximal=stronger cause Distal=weaker cause	Proximal=stronger cause Distal=weaker cause	Causal inference depends on level of question being asked: There may be different explanations for phenomena at different levels, and explanations for events observed within any given level may involve solely phenomena within that level or also interactions between levels; adjacency of levels may or may not predict causal strength of cause-effect relationship
Relationship to space and time	Physical distance is a spatial dimension distinct from time, but space and time can be related mathematically, e.g., distance=speed×time (and the length of a meter is now defined in relation to time and the speed of light[32[p537]])	Chronological distance is a temporal dimension distinct from space, but time and space can be related mathematically, e.g., time=distance/speed (and initial time units were based on the earth's rotation, involving spatial distance[32[pp3–5]])	Level is not a spatiotemporal phenomenon. It is, instead, a conceptual nonspatiotemporal relational construct that organizes and distinguishes (conceptually or structurally) different orders of hierarchically linked systems and processes (including both nested and nonnested hierarchies). "Distance" for levels does not involve spatiotemporal separation: For any phenomenon at any given point in space and time, all levels co-occur simultaneously, even though some levels may be more causally relevant than others to phenomena occurring at any given level. Space and time nevertheless do matter for levels in the case of nested hierarchies, whereby units within lower-order levels typically are smaller and involve faster processes than units in higher-order levels.

labor, and exchange inherently involved in their production, sale, and consumption.[43(pp35-41,71-83),88] Erring, however, in both directions, whether looking up or down levels, the proximal-distal divide simultaneously does the following:

(1) It promotes analysis of specific exposures and their biological embodiment stripped from the political economy, social relations, actual labor, and engagement with the material world that set the basis for their existence (the error of biomedical individualism and decontextualized "lifestyle" analyses[1-21,89-91]) *and*

(2) It encourages analysis of population health as if all that matters are social hierarchies, and not also the tangible properties of the commodities, i.e., goods and services, at issue (the error of public health nihilism[5,92-94]).

Thus, on the proximal side, official conventional reports[95,96] urge individuals to avoid specific risk factors without mention of the societal changes needed to curtail these factors' production, distribution, and consumption (precisely what the social determinant of health framework appropriately criticizes),[1-21] whereas on the distal side, some contend that public health initiatives that focus on specific risk factors or diseases are futile as long as "distal" or "fundamental" causes are at play.[13,14,97-99]

But insofar as health is concerned, the material substances *and* the social relations inherent in any given product or process *both* matter, precisely because of the physical and social exposures involved. To focus on only one or the other misses the fact we embody both.[1,17-21,94,100-103] To take but one example, consider the political economy and ecology of tobacco products and their embodied health consequences. A cigarette (or Freud's infamous cigar[104]) is *simultaneously:*

(1) A combustible mass of tobacco leaves and additives whose burning smoke transports psychoactive and addictive chemicals (e.g., nicotine) and carcinogens deep down the respiratory tract to the innermost parts of the lung and its alveolar capillaries, thereby increasing risk of cancer, cardiovascular and pulmonary disease, and other smoking-related ailments, *and*

(2) A highly profitable product whose production, distribution, advertisement, and consumption involves relentless corporate marketing (including manipulation of ideologies involving freedom, class, gender, sexuality, and race/ethnicity and targeting of marginalized groups), government regulation and taxation, tobacco farmers and workers, land ownership, trade agreements, and international treaties.[105-109]

Consequently, as recognized by several new sophisticated multilevel initiatives (e.g., Sweden's 2003 new public health policy,[110] the American Legacy Foundation's Truth Campaign,[111] and the Corporations and Health Watch project[112]), effective action to curb tobacco use and social disparities in tobacco-related diseases requires integrated, multifaceted, multilevel campaigns that are relentlessly honest about who gains and who loses from the status quo. The same could be said for any other public health concerns deemed "proximal" or "downstream," whether about environmental and occupational hazards,[6,8,9,113-116] access to safe water,[117,118] access to affordable nutritious food,[119,120] or violence,[121-123]—just as could be said for efforts focused on such ostensibly "distal" or "upstream" social determinants as economic poverty.[124-130]

Hence, argument 3: Unlike distal and proximal events separated by space or time, levels coexist simultaneously, not sequentially, and exert influence accordingly. The proximal-distal divide, however, inherently cleaves levels rather than connects them, thereby obscuring the intermingling of ecosystems, economics, politics, history, and specific exposures and processes at *every* level, macro to micro, from societal to inside the body. As William Blake (1757-1827) famously put it, the challenge instead is "to see a world in a grain of sand"[131]—because it is there.

SCALE, LEVEL, AND THE POLITICS OF CAUSATION

In summary, efforts to advance public health thinking and work about the causes of disease distribution, including health inequities, would do well to abandon the deeply confused language of the terms *proximal* and *distal*. The point is not simply semantic. Clear action requires clear thinking. By deleting the terms *proximal* and *distal* from the public health lexicon, we would have to expose our causal assumptions and also promote greater accountability for the public's health, both within our field and more broadly.

A final example suffices. In recent years, the Bill and Melinda Gates Foundation has become an enormous presence in work on global health,[132-135] funding technically oriented[136] research and medical interventions to address malaria, tuberculosis, HIV/AIDS, and other diseases that disproportionately

burden poorer regions of the world. In January 2007, however, the *Los Angeles Times* published a two-part exposé,[137,138] "showing that the foundation reaps vast financial gains every year from investments that contravene its good works."[139] The foundation's response[140]:

"The stories you told of people who are suffering touched us all. But it is naive to suggest that an individual stockholder can stop that suffering. Changes in our investment practices would have little or no impact on these issues. While shareholder activism has worthwhile goals, we believe a much more *direct* [italics added] way to help people is by making grants and working with other donors to improve health, reduce poverty and strengthen education."[141]

The foundation's view that its real-world health portfolio somehow includes only its explicit biomedical research and health intervention projects and not also the health impacts of its financial investment strategies is the mind-set fostered by the proximal-distal divide. The distance and contradictions created by the proximal-distal discourse—in conceptual understanding and in professional and political accountability—are unacceptable. The extensive reach of this flawed logic is made only the more manifest by its equal use among those who profess a narrow biomedical vantage and those who articulate a more expansive social determinant of health framework. I accordingly propose that we banish the terms *proximal* and *distal* from the public health lexicon and refer instead explicitly to levels, pathways, and power, as one small but needed step toward developing better thinking and strategies for leveling health inequities.

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References

1. Krieger N. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol.* 2001;30:668-677.
2. World Health Organization Commission on Social Determinants of Health. Towards a conceptual framework for analysis and action on the social determinants of health. Discussion paper for the Commission on the Social Determinants of Health [draft]. May 5, 2005. Available at: http://www.who.int/social_determinants/knowledge_networks/en. Accessed March 2, 2006.
3. Whitehead M, Dahlgren G. Leveling up (part 1): a discussion paper on concepts and principles for tackling social inequities in health. Studies on social and economic determinants of population health, No. 2, WHO Europe. Copenhagen, Denmark: World Health Organization Regional Office for Europe; 2006. Available at: http://www.euro.who.int. Accessed November 29, 2006.
4. Black D, Morris JN, Smith C, Townsend P. *The Black Report (Report of the Working Group on Inequalities in Health)*. London, England: Penguin; 1982.
5. Kunitz S. *The Health of Populations: General Theories and Particular Realities*. Oxford, England: Oxford University Press; 2006.
6. Levy BS, Sidel VW, eds. *Social Injustice and Public Health*. New York, NY: Oxford University Press; 2006.
7. Wilkinson R, Marmot M, eds. *Social Determinants of Health: The Solid Facts*. 2nd ed. Oxford, England: Oxford University Press; 2006.
8. Navarro V, Muntaner C, eds. *Political and Economic Determinants of Population Health and Well-Being: Controversies and Developments*. Amityville, NY: Baywood Publishing Co; 2004.
9. Hofrichter R, ed. *Health and Social Justice: Politics, Ideology, and Inequity in the Distribution of Disease*. San Francisco, Calif: Jossey-Bass; 2003.
10. Evans T, Whitehead M, Diderichsen F, Bhuiya A, Wirth M, eds. *Challenging Inequities in Health: From Ethics to Action*. Oxford, England: Oxford University Press; 2001.
11. Berkman L, Kawachi I, eds. *Social Epidemiology*. Oxford, England: Oxford University Press; 2000.
12. Shaw M, Dorling D, Gordon D, Davey Smith G. *The Widening Gap: Health Inequalities and Policies in Britain*. Bristol, England: Policy Press; 1999.
13. McKinlay JB, Marceau LD. To boldly go . . . . *Am J Public Health*. 2000;90:25-33.
14. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav.* 1995; 35(extra issue): 80-94.

15. Glass TA, McAtee MJ. Behavioral science at the crossroads in public health: extending horizons, envisioning the future. *Soc Sci Med*. 2006;62: 1650-1671.
16. Richard L, Potvin L, Kishchuk N, Prlic H, Green LW. Assessment of the integration of the ecological approach in health promotion programs. *Am J Health Promot*. 1996;318-328.
17. Krieger N. Epidemiology and the web of causation: has anyone seen the spider? *Soc Sci Med*. 1994;39: 887-903.
18. Krieger N. Ecosocial theory. In: Anderson N, ed. *Encyclopedia of Health and Behavior*. Thousand Oaks, Calif: Sage; 2004:292-294.
19. Krieger N. Embodiment: a conceptual glossary for epidemiology. *J Epidemiol Community Health*. 2005;59: 350-355.
20. Krieger N, ed. *Embodying Inequality: Epidemiologic Perspectives*. Amityville, NY: Baywood Publishers; 2004.
21. Krieger N. Stormy weather: *race*, gene expression, and the science of health disparities. *Am J Public Health*. 2005;95:2155-2160.
22. Sigerist HE. *History of Medicine. Vol. 1: Primitive and Archaic Medicine; Vol. 2: Early Greek, Hindu, and Persian Medicine*. New York, NY: Oxford University Press; 1955-1961.
23. Rosen G. *A History of Public Health* [1958]. [Introduction by Elizabeth Fee; bibliographical essay and new bibliography by Edward T. Morman.] Expanded ed. Baltimore, Md: Johns Hopkins University Press; 1993.
24. Porter D. *Health, Civilization and the State: A History of Public Health From Ancient to Modern Times*. London, England: Routledge; 1999.
25. Lloyd GER, ed. *Hippocratic Writings*. London, England: Penguin; 1983.
26. Temkin O. *Galenism: Rise and Decline of a Medical Philosophy*. Ithaca, NY: Cornell University Press; 1973.
27. Greenwood M. *Epidemiology: Historical and Experimental*. Baltimore, Md: Johns Hopkins; 1931;1-26.
28. *Oxford English Dictionary*. OED online. Available at: http://dictionary.oed.com.ezp2.harvard.edu (password required). Accessed January 8, 2006.
29. Grene M, Depew D. *The Philosophy of Biology*. Cambridge, England: Cambridge University Press; 2004.
30. Coleman W. *Biology in the Nineteenth Century: Problems of Form, Function, and Transformation*. New York, NY: John Wiley & Sons Inc; 1971.
31. Deutscher G. *The Unfolding of Language*. London, England: William Henemann; 2005.
32. Holton G, Brush SG. *Physics, the Human Adventure: From Copernicus to Einstein and Beyond*. 3rd ed. New Brunswick, NJ: Rutgers University Press; 2001.
33. Gleick J. *Isaac Newton*. New York, NY: Pantheon Books; 2003.
34. Gillmor CT. *Coulomb and the Evolution of Physics and Engineering in Eighteenth-Century France*. Princeton, NJ: Princeton University Press; 1971.
35. Cohen IB. An analysis of interactions between the natural sciences and the social sciences. In: Cohen IB, ed. *The Natural Sciences and the Social Sciences: Some Critical and Historical Perspectives*. Dordrecht, The Netherlands: Kluwer Academic Publishers; 1994:1-100.
36. Maasen S, Mendelsohn E, Weingart P, eds. *Biology as Society, Society as Biology: Metaphors*. Dordrecht, The Netherlands: Kluwer Academic Publishers; 1995.
37. Harris JG. *Foreign Bodies and the Body Politic: Discourses of Social Pathology in Early Modern England*. Cambridge, England: Cambridge University Press; 1998.
38. Maclay GR. *The Social Organism: A Short History of the Idea That a Human Society May Be Regarded as a Gigantic Living Creature*. Croton-on-Hudson, NY: North River Press; 1990.
39. Chase A. *The Legacy of Malthus: The Social Costs of the New Scientific Racism*. New York, NY: Knopf; 1977.
40. Durkheim E. *The Division of Labor in Society* [1893]. Halls WD, trans-ed. [Introduction by Lewis A. Coser.] New York, NY: Free Press; 1984.
41. Lilienfeld P. *La Pathologie Sociale*. [Avec une préface de René Worms.] Paris, France: V. Giard, and EBrière; 1896.
42. Worms R. *Organisme et Société*. Paris, France: V. Giard, and EBrière; 1896.
43. Marx K. *Capital: A Critique of Political Economy. Vol. 1. The Process of Capitalist Production* [1867]. Engels F, ed; Moore S, Aveling E, trans-ed. New York, NY: International Publishers; 1967.
44. Levitas R. *The Inclusive Society?: Social Exclusion and New Labour*. 2nd ed. Basingstoke, England: Macmillan; 2005.
45. Mayr E. Prologue: some thoughts on the history of the evolutionary synthesis. In: Mayr E, Provine WB. *The Evolutionary Synthesis: Perspectives on the Unification of Biology*. Cambridge, Mass: Harvard University Press; 1998: 1-48.
46. Gould SJ. *The Structure of Evolutionary Theory*. Cambridge, Mass: The Belknap Press of Harvard University Press; 2002.
47. Eldredge N. *The Pattern of Evolution*. New York, NY: W.H. Freeman & Co; 1999.

48. Lawrence C, Weisz G, eds. *Greater Than the Parts: Holism in Biomedicine, 1920-1950*. New York, NY: Oxford University Press; 1998.
49. Gordon JE. The world, the flesh and the devil as environment, host, and agent of disease. In: Galdston I, ed. *The Epidemiology of Health*. New York, NY: Health Education Council; 1953: 60-73.
50. Terris M. The epidemiologic tradition. The Wade Hampton Frost Lecture. *Public Health Rep*. 1979; 94:203-209.
51. Susser M. *Causal Thinking in the Health Sciences; Concepts and Strategies of Epidemiology*. New York, NY: Oxford University Press; 1973.
52. Marmot M, Elliott P, eds. *Coronary Heart Disease Epidemiology: From Aetiology to Public Health*. Oxford, England: Oxford University Press; 1992.
53. Rothstein WG. *Public Health and the Risk Factor: A History of an Uneven Medical Revolution*. Rochester, NY: University of Rochester Press; 2003.
54. MacMahon B, Pugh TF, Ipsen J. *Epidemiologic Methods*. Boston, Mass: Little, Brown and Company; 1960.
55. Gannett L. What's in a cause? The pragmatic dimensions of genetic explanations. *Biol Philos*. 1999;14:349-374.
56. Gillies D. An action-related theory of causality. *Br J Philos Sci*. 2005;85: 823-842.
57. National Human Genome Research Institute, National Institutes of Health. The Genes, Environment and Health Initiative (GEI). Available at: http://www.genome.gov/19518663. Accessed January 10, 2007.
58. *Genomics 2006 Program Review Book*. Atlanta, Ga: Centers for Disease Control and Prevention; 2006. Available at: http://www.cdc.gov/genomics/activities/ogdp/2006.htm. Accessed January 20, 2007.
59. Costa LG, Eaton DL, eds. *Gene-Environment Interactions: Fundamentals of Ecogenetics*. Hoboken, NJ: John Wiley & Sons; 2006.
60. Lewontin R. *The Triple Helix: Gene, Organism, and Environment*. Cambridge, Mass: Harvard University Press; 2000.
61. Smith GD, Gwinn M, Ebrahim S, Palmer LJ, Khoury MJ. Make it HuGE: human genome epidemiology reviews, population health, and the IJE. *Int J Epidemiol* 2006;35:507-510.
62. Keavney B, Danesh J, Parish S, et al. Fibrinogen and coronary heart disease: test of causality by "Mendelian randomization." *Int J Epidemiol*. 2006; 35:935-943.
63. Nitsch D, Molokhia M, Smeeth L, DeStavola BL, Whittaker JC, Leon DA. Limits to causal inference based on Mendelian randomization: a comparison with randomized controlled trials. *Am J Epidemiol*. 2006;163:397-403.
64. Davey Smith G, Lawlor DA, Harbord R, et al. Association of C-reactive protein with blood pressure and hypertension: life course confounding and mendelian randomization tests of causality [published correction appears in *Arterioscler Thromb Vasc Biol*. 2005; 25:e129]. *Aterioscler Thromb Vasc Biol*. 2005;25:1051-1056.
65. Davey Smith G, Ebrahim S. "Mendelian randomization": can genetic epidemiology contribute to understanding environmental determinants of disease? *Int J Epidemiol*. 2003;32:1-22.
66. McLennan G. Power. In: Bennett T, Grossberg L, Morris M, eds. *New Keywords: A Revised Vocabulary of Culture and Society*. Malden, Mass: Blackwell Publishing; 2005:274-278.
67. McFarland AS. Power: political. In: *International Encyclopedia of the Social & Behavioral Sciences* [online]. Elsevier; 2004:11936-11939. Available at: http://www.sciencedirect.com.ezp1. harvard.edu/science (password required). Accessed May 30, 2007.
68. Clegg SR. Power in society. In: *International Encyclopedia of the Social & Behavioral Sciences* [online]. Elsevier; 2004:11932-11936. Available at: http://www.sciencedirect.com.ezp1.harvard.edu/science (password required). Accessed May 30, 2007.
69. Peterson DL, Parker VT, eds. *Ecological Scale: Theory and Application*. New York, NY: Columbia University Press; 1998.
70. Patz JA, Daszak P, Tabor GM, et al; Working Group on Land Use Change and Disease Emergence. Unhealthy landscapes: policy recommendations on land use change and infectious disease emergence. *Environ Health Perspect*. 2004;112:1092-1098.
71. Rudel TK. Shrinking tropical forests, human agents of change, and conservation policy. *Conserv Biol*. 2006; 20:1604-1609.
72. Laurance WF, Nascimento HE, Laurance SG, et al. Rain forest fragmentation and the proliferation of successional trees. *Ecology*. 2006;87:469-482.
73. Ferraz G, Russell GJ, Stouffer PC, Bierregaard RO Jr, Pimm SL, Lovejoy TE. Rates of species loss from Amazonian forest fragments. *Proc Natl Acad Sci U S A*. 2003;100:14069-14073.
74. Damschen EI, Haddad NM, Orrock JL, Tewksbury JJ, Levey JJ. Corridors increase plant species richness at large scales. *Science*. 2006;313:1284-1286.
75. Brownstein JS, Skelly DK, Holford TR, Fish D. Forest fragmentation predicts local scale heterogeneity of Lyme disease risk. *Oecologia*. 2005; 146: 469-475.

76. Keeling MJ, Grenfell BT. Disease extinction and community size: modeling the persistence of measles. *Science*. 1997;275:65-67.
77. Bartlett MS. Measles periodicity and community size. *J R Stat Soc [Ser A]*. 1957;120:48-60.
78. Ahl V, Allen TFH. *Hierarchy Theory: A Vision, Vocabulary, and Epistemology*. New York, NY: Columbia University Press; 1996.
79. Gunderson L, Holling CS, eds. *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington, DC: Island Press; 2002.
80. Goldstein LF, ed. *Contemporary Cases in Women's Rights*. Madison, Wis: University of Wisconsin Press; 1994:3-32.
81. Institute of Medicine. *Legalized Abortion and the Public Health: Report of a Study, by a Committee of the Institute of Medicine*. Washington, DC: National Academy of Sciences; 1975.
82. Lee KW, Paneth N, Gartner LM, Pearlman MA, Gruss L. Neonatal mortality: an analysis of the recent improvement in the United States. *Am J Public Health*. 1980;70:15-21.
83. Pakter J, Nelson F. Factors in the unprecedented decline in infant mortality in New York City. *Bull NY Acad Med*. 1974;50:839-868.
84. Lanham JT, Kohl SG, Bedell JH. Changes in pregnancy outcome after liberalization of the New York State abortion law. *Am J Obstet Gynecol*. 1974;118:485-492.
85. Wright AA, Katz IT. Roe versus reality—abortion and women's health. *New Engl J Med*. 2006; 355:1-9.
86. Stout D. Supreme court upholds ban on abortion procedure. *New York Times,* April 18, 2007. Available at: http://www.nytimes.com/2007/04/18/ us/18cnd-scotus.html?ex=1180756800&en=f3466a0d04fb44bb&ei=5070. Accessed May 31, 2007.
87. Gruskin S, Grodin MA, Annas GJ, Marks SP, eds. *Perspectives on Health and Human Rights*. New York, NY: Routledge; 2005.
88. Frow J. Commodity. In: Bennett T, Grossberg L, Morris M, eds. *New Keywords: A Revised Vocabulary of Culture and Society*. Malden, Mass: Blackwell Publishing; 2005:45-47.
89. Tesh S. *Hidden Arguments: Political Ideology and Disease Prevention Policy*. New Brunswick, NJ: Rutgers University Press; 1988.
90. Lock M, Gordon D, eds. *Biomedicine Examined*. Dordrecht, The Netherlands: Kluwer Academic Publishers; 1988.
91. Fee E, Krieger N. Understanding AIDS: historical interpretations and the limits of biomedical individualism. *Am J Public Health*. 1993;83: 1477-1486.
92. Fairchild AL, Oppenheimer GM. Public health nihilism vs pragmatism: history, politics, and the control of tuberculosis. *Am J Public Health*. 1998; 88: 1105-1117.
93. Szreter S. *Health and Wealth: Studies in History and Policy*. Rochester, NY: University of Rochester Press; 2005.
94. Krieger N. Sticky webs, hungry spiders, buzzing flies, and fractal metaphors: on the misleading juxtaposition of "risk factor" vs "social" epidemiology. *J Epidemiol Community Health*. 1999;53:678-680.
95. US Department of Health and Human Services. *A Healthier You*. Washington, DC: US Government Printing Office; 2005.
96. Bush GW. Healthier US: The President's Health and Fitness Initiative. Washington, DC: The White House; 2004. Available at: http://www.whitehouse.gov/infocus/fitness. Accessed January 22, 2007.
97. Wilkinson R. *The Impact of Inequality: How to Make Sick Societies Healthier*. New York, NY: The New Press; 2005.
98. Raphael D. Barriers to addressing the societal determinants of health: public health units and poverty in Ontario, Canada. *Health Promot Int*. 2003;18: 397-405.
99. Phelan JC, Link BG. Controlling disease and creating disparities: a fundamental cause perspective. *J Gerontol B Psychol Sci Soc Sci*. 2005;60(special issue):27-33.
100. Krieger N, Davey Smith G. "Bodies count," and body counts: social epidemiology and embodying inequality. *Epidemiol Review*. 2004;26:92-103.
101. Weiss G, Haber HF, eds. *Perspectives on Embodiment: The Intersections of Nature and Culture*. New York, NY: Routledge; 1999.
102. Scheper-Hughes N, Lock MM. The mindful body: a prolegomenon to future work in medical anthropology. *Med Anthro Q*. 1987;1:6-41.
103. Eldredge N, Grene M. *Interactions: The Biological Context of Social Systems*. New York, NY: Columbia University Press; 1992.
104. The Freud Museum. Frequently asked questions. Available at: http:// www.freud.org.uk/fmfaq.htm. Accessed January 12, 2007.
105. Kluger R. *Ashes to Ashes: America's Hundred-Year Cigarette War, the Public Health, and the Unabashed Triumph of Philip Morris*. New York, NY: Alfred A. Knopf; 1996.
106. Lock S, Reynolds A, Tansey EM, eds. *Ashes to Ashes: The History of Smoking and Health: Symposium and Witness Seminar Organized by the Wellcome Institute for the History of Medicine and the History of the Twentieth Century Medicine Group on 26-27 April 1995*. Amsterdam, The Netherlands: Rodopi; 1998.

107. Brandt AM. *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America*. New York, NY: Basic Books; 2007.
108. Mackay J, Eriksen E, Shafey O. *The Tobacco Atlas*. Atlanta, Ga: American Cancer Society; 2006.
109. Washington HA. Burning love: big tobacco takes aim at LGBT youths. *Am J Public Health*. 2002; 92:1086-1095.
110. Swedish National Institute of Public Health. *Sweden's New Public Health Policy: National Public Health Objectives for Sweden*. Rev ed. 2003. Available at: http://www.fhi.se. Accessed April 13, 2006.
111. American Legacy Foundation. Programs: overview. Available at: http://www.americanlegacy.org/18.htm. Accessed January 21, 2007.
112. Corporations and Health Watch [Web site]. Available at: http://www.corporationsandhealth.org. Accessed January 15, 2007.
113. Markowitz G, Rosner D. *Deceit and Denial: The Deadly Politics of Industrial Pollution*. Berkeley, Calif: University of California Press; 2002.
114. Richardson JW. *The Cost of Being Poor: Poverty, Lead Poisoning, and Policy Implementation*. Westport, Conn: Praeger; 2005.
115. McMichael AJ. *Human Frontiers, Environments, and Disease: Past Patterns, Uncertain Futures*. Cambridge, England: Cambridge University Press; 2001.
116. Mooney C. *The Republican War on Science*. New York, NY: Basic Books; 2005.
117. *Human Development Report 2006: Beyond Scarcity: Power, Poverty, and the Global Water Crisis*. New York, NY: United Nations Development Programme; 2006.
118. Whiteford L, Whiteford S, eds. *Globalization, Water, & Health: Resource Management in Times of Scarcity*. Santa Fe, NM: School of American Research Press; and Oxford, England: James Currey; 2005.
119. Nestle M. *Food Politics: How the Food Industry Influences Nutrition and Health*. Berkeley, Calif: University of California Press; 2002.
120. Schlosser E. *Fast Food Nation: The Dark Side of the All-American Meal*. Boston, Mass: Houghton Mifflin; 2001.
121. Krug EG, Dahlberg LL, Mercy JA, Zwi AB, Lozano R, eds. *World Report on Violence and Health*. Geneva, Switzerland: World Health Organization; 2002.
122. Hemenway D. *Private Guns Public Health*. Ann Arbor, Mich: University of Michigan Press; 2004.
123. Sokoloff NJ, Pratt C, eds. *Domestic Violence at the Margins: Readings on Race, Class, Gender, and Culture*. New Brunswick, NJ: Rutgers University Press; 2005.
124. Blank RM. Selecting among antipoverty policies: can an economist be both critical and caring? *Rev Social Economy*. 2003;61:447-469.
125. Townsend P, Gordon D, eds. *World Poverty: New Policies to Defeat an Old Enemy*. Bristol, England: The Policy Press; 2002.
126. *Human Development Report 2005: International Cooperation at the Crossroads—Aid, Trade and Security in an Unequal World*. New York, NY: United Nations Development Programme; 2005.
127. Katz MB. *In the Shadow of the Poorhouse: A Social History of Welfare in America*. Rev ed. New York, NY: Basic Books; 1996.
128. Sachs J. *The End of Poverty: Economic Possibilities for Our Time*. New York, NY: Penguin Press; 2005.
129. Stiglitz JE. *Making Globalization Work*. New York, NY: WW Norton & Co; 2006.
130. Monbiot G. *Manifesto for a New World Order*. New York, NY: WW Norton; 2004.
131. Blake W. *Auguries of Innocence*. Available at: http://rpo.library.utoronto.ca/poem/161.html. Accessed May 31, 2007.
132. Bill & Melinda Gates Foundation. Global health program. Available at: http://www.gatesfoundation.org/Global-Health. Accessed January 17, 2007.
133. Okie S. Global health—the Gates-Buffett effect. *New Engl J Med*. 2006; 355:1084-1088.
134. Garrett L. The challenge of global health. *Foreign Affairs*. Jan/Feb 2007. Available at: http://www.foreignaffairs.org/20070101faessay86103-p90/laurie-garrett/the-challenge-of-globalhealth.html. Accessed January 22, 2007.
135. [No authors listed.] Governance questions at the Gates Foundation [editorial]. *Lancet*. 2007; 369:163.
136. Birn AE. Gates's grandest challenge: transcending technology as public health ideology. *Lancet*. 2005;366:514-519.
137. Piller C, Sanders E, Dixon R. Dark cloud over good works of Gates Foundation [Part I]. *Los Angeles Times*, January 7, 2007. Available at: http://www.latimes.com/news/nationworld/nation/la-na-gatesx07jan07,0,6827615.story. Accessed January 17, 2007.
138. Piller C. Money clashes with mission: The Gates Foundation invests heavily in sub-prime lenders and other businesses that undercut its good works [Part II]. *Los Angeles Times*, January 8, 2007. Available at: http://www.latimes. com/news/nationworld/nation/la-na-gates8jan08,1,6069951,

full.story?coll=la-headlines-nation. Accessed January 17, 2007.

139. Piller C. Gates Foundation to reassess investments. *Los Angeles Times,* January 11, 2007. Available at: http://www.latimes.com/business/la-fi-gates11jan11,1,7943560.story. Accessed January 17, 2007.
140. Piller C. Gates Foundation to keep its investment approach. *Los Angeles Times,* January 14, 2007. Available at: http://www.latimes.com/business/la-na-gates14jan14,1,1844117.story. Accessed January 17, 2007.
141. Stonesifer P. A foundation states its case [letter]. *Los Angeles Times,* January 14, 2007. Available at: http://www.latimes.com/news/printedition/opinion/la-le-sunday14.3jan14,1,1775487.story. Accessed: January 17, 2007.

READING

2

A Call to Action for Individuals & Their Communities

Source: United Health Foundation. Excerpts from America's Health Rankings: A Call to Action for Individuals & Their Communities. pp.4-37. www.americashealthrankings.org. 2009. Courtesy of America's Health Rankings™ (c)2009 United Health Foundation. All rights reserved.

INTRODUCTION

Health is a result of our behaviors, our individual genetic predisposition to disease, the environment and the community in which we live, the clinical care we receive and the policies and practices of our health care and prevention systems. Each of us, individually, as a community, and as a society, strives to optimize these health determinants, so that all of us can have a long, disease-free and robust life regardless of race, gender or socio-economic status. This report looks at the four groups of health determinants that can be affected:

1. **Behaviors** the everyday activities we do that affect our personal health. It includes habits and practices we develop as individuals and families that have an effect on our personal health and on our utilization of health resources. These behaviors are modifiable with effort by the individual supported by community, policy and clinical interventions.
2. **Community and environment** the reality that the daily conditions in which we live our lives have a great effect on achieving optimal individual health.
3. **Public and health policies** indicative of the availability of resources to encourage and maintain health and the extent that public and health programs reach into the general population.
4. **Clinical care** the quality, appropriateness and cost of the care we receive at doctors' offices, clinics and hospitals.

All health determinants are and must work together to be effective. For example, an initiative that addresses tobacco cessation requires not only efforts on the part of the individual but also support from the community in the form of public and health policies that promote non-smoking and the availability of effective counseling and care at clinics. Similarly, sound prenatal care requires individual effort, access to and availability of prenatal care coupled with high quality of health care services. Obesity, a health epidemic now facing this country, requires coordination among almost all sectors of the economy including food producers, distributors, restaurants, grocery and convenience stores, exercise facilities, parks, urban and transportation design, building design, educational institutions, community organizations, social groups, healthcare delivery and insurance to complement and augment individual actions.

America's Health Rankings™ combines individual measures of each of these determinants with the resultant health outcomes into one comprehensive view of the health of a state. Additionally, it discusses health determinants separately from health outcomes and provides related health, economic and social information to present a comprehensive profile of the overall health of each state.

America's Health Rankings™ employs a unique methodology, developed and periodically reviewed by a panel of leading public health scholars, which balances the contributions of various factors, such as smoking, obesity, binge drinking, high school graduation rates, children in poverty, access to care and incidence of preventable disease, to a state's health. The report is based on data from the U.S. Departments of Health and Human Services, Commerce, Education and Labor; U.S. Environmental Protection Agency; the American Medical Association; the Dartmouth Atlas Project; and the Trust for America's Health.

PURPOSE

The ultimate purpose of *America's Health Rankings*™ is to stimulate action by individuals, elected officials, healthcare professionals, employers, and communities to improve the health of the population of the United States. We do this by promoting public conversation concerning health in our states, as well as providing information to facilitate citizen, community and group participation. We encourage participation in all elements: behaviors, community, environment, clinical care, and public and health policies. Each person individually, and in their capacity as an employee, employer, voter, community volunteer, health official or elected official, can contribute to the advancement of the healthiness of their state. Proven, effective and innovative actions can improve the health of people in every state whether the state is first or 50th.

SCIENTIFIC ADVISORY COMMITTEE

In 2002, United Health Foundation, in concert with the American Public Health Association (APHA) and Partnership for Prevention, commissioned the School of Public Health at the University of North Carolina at Chapel Hill to undertake an ongoing review of *America's Health Rankings*™. The Scientific Advisory Committee, led by Thomas Ricketts, Ph.D., M.P.H., was charged with conducting a thorough review of the current index and recommending improvements that would maintain the value of the comparative, longitudinal information; reflect the evolving role and science of public health; utilize new or improved measures of health as they become available and acceptable; and incorporate new methods as feasible. Minor issues with data are always addressed immediately and incorporated into the contents of the next edition of the report. However, more significant issues, such as new measurements of health conditions, require more indepth study and analysis.

The Scientific Advisory Committee continues its review, and its input is reflected in this Edition. The Committee emphasizes the importance of this tool as a vehicle to promote and improve the general discussion of public health and, also, to encourage balance among public health efforts to benefit the entire community.

This Edition includes several suggestions discussed by the committee including:

- Changing the method of scoring metrics from a change relative to the national mean to a change measured in units of standard deviation

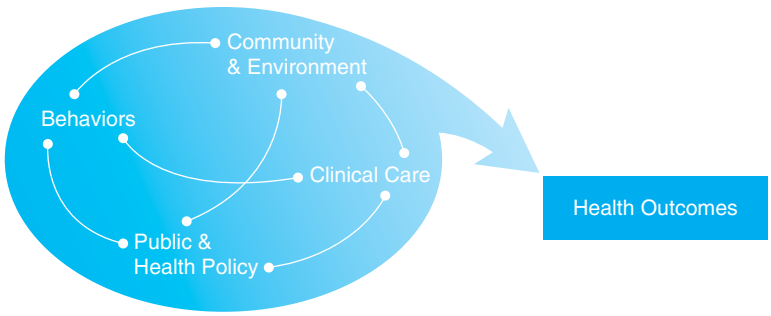

Figure 2-2 Components of Health

of the measure (Z-score). This method represents a major change to *America's Health Rankings*™ and required a recalculation of all prior years of rankings.

- Revising the Air Pollution measure to better accommodate nonreporting areas of states. Nonreporting counties were assigned a baseline value of exposure to fine particulate matter equal to the average of the lowest annual readings for fine particulate matter for the last three years in their Air Quality Control Region or, if not available, in their state.
- Geographic Disparity was reviewed and suggested that counties with a low number of deaths and deemed unreliable should be handled separately. The current calculation assigns the state's average total mortality rate to those counties that are unreliable.

In addition, the committee continues to work on issues concerning improved environmental health indicators, methods of expressing variability within the rankings, oral health indicators, mental health indicators, improved health disparities, improved cost measures, quality of care measures and international benchmarking. (Some of these measures are included in the expanded detail of each state's health profile at www.americashealth rankings.com/StateRank/details.aspx.) The committee also stresses the importance of focusing on health determinants as improving these measures can improve the healthiness of the states and the nation. This year, the overall ranks for combined determinants, as well as outcomes are presented in each state snapshot.

The methodology review group represents a variety of stakeholders, including representatives from state health departments and the Centers for Disease Control and Prevention, members of APHA, as well as experts from many academic disciplines.

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FINDINGS

The 2009 Edition of *America's Health Rankings*™ is considered a benchmark of the relative health of states due to its longevity and its sound model. Numerous states incorporate this report into their annual review of programs, and several organizations use this study as a reference point when assigning goals for health improvement programs.

One of the major goals of this report is to continuously improve. Along this line, the underlying methodology used to calculate the final score and rank of each state has been substantially changed this year. Prior editions calculated the final score using a weighted average of the percent each state varied from the nation. This edition calculated the final score using a weighted average of number of standard deviations that a state is different than the nation.

The effect of this change is that the final score is much more representative of the real variation of the state from the nation. It reduces the effect of measures that are widely scattered among states and highlights where the state statistically differs from the nation as a whole. See the Methodology section for additional information.

The 2009 Edition of *America's Health Rankings*™ uses this improved methodology to calculate state ranks. Rankings presented in this edition are not comparable to rankings published in prior editions. However, all prior rankings have been recalculated using the improved method. The recalculated rankings are available at www.americashealthrankings.org, and can be compared to the rankings in this edition. All historical comparisons discussed in this report are to rankings calculated using the improved method.

2009 Results

America's Health Rankings™—2009 Edition shows Vermont at the top of the list of healthiest states. The state has had a steady climb in the rankings for the last twelve years from a ranking of 17th in 1997 and 1998. Utah is ranked second this year, an improvement from ranking around 5th for the prior five years. Massachusetts is number three, followed by Hawaii and New Hampshire. Mississippi is 50th and the least healthy state, while Oklahoma is 49th. Alabama, Louisiana and South Carolina complete the bottom five states.

Vermont moved from 20th in 1990 and 1991 to the top position with sustained improvement in the last twelve years. Vermont's strengths include its number one position for all health determinants combined which includes ranking in the top ten states for a high rate of high school graduation, a low violent crime rate, a low percentage of children in poverty, high per capita public health funding, a low rate of uninsured population and ready availability of primary care physicians. Vermont's two challenges are low immunization coverage with 74.4 percent of children ages 19 to 35 months receiving complete immunizations and a high prevalence of binge drinking at 17.6 percent of the population. For further details, see Vermont's state snapshot at www.americashealth rankings.org/2009/vt.aspx.

Mississippi is 50th this year, the same as the last eight years. It has been in the bottom three states since the 1990 Edition. The state ranks well for a low prevalence of binge drinking and a low violent crime rate. It ranks in the bottom five states on 11 of the 22 measures including a high prevalence of obesity, a low high school graduation rate, a high percentage of children in poverty, limited availability of primary care physicians, and many preventable hospitalizations. It ranks 50th for all health determinants combined, so its overall ranking is unlikely to change significantly in the near future. For further details, see Mississippi's state snapshot at www.americashealthrankings.org/2009/ms.aspx.

Table 1 lists the score and ranking for each of the 50 states.

Scores presented in the tables indicate the weighted number of standard deviation units a state is above or below the national norm. For example, Vermont with a score of 1.064 is slightly more than one standard deviation unit above the national norm.

Table 1 2009 Overall Rankings

ALPHABETICAL BY STATE			RANK ORDER		
RANK	STATE	SCORE*	RANK	STATE	SCORE*
48	Alabama	−0.546	1	Vermont	1.064
34	Alaska	−0.091	2	Utah	1.006
27	Arizona	0.082	3	Massachusetts	0.905
40	Arkansas	−0.416	4	Hawaii	0.892
23	California	0.278	5	New Hampshire	0.886
8	Colorado	0.606	6	Minnesota	0.828
7	Connecticut	0.779	7	Connecticut	0.779
32	Delaware	−0.082	8	Colorado	0.606
36	Florida	−0.200	9	Maine	0.569
43	Georgia	−0.469	10	Rhode Island	0.557
4	Hawaii	0.892	11	Washington	0.538
14	Idaho	0.524	12	Wisconsin	0.534
29	Illinois	−0.056	13	Oregon	0.530
35	Indiana	−0.188	14	Idaho	0.524
15	Iowa	0.503	15	Iowa	0.503
24	Kansas	0.245	16	Nebraska	0.475
41	Kentucky	−0.434	17	North Dakota	0.421
47	Louisiana	−0.530	18	New Jersey	0.414
9	Maine	0.569	19	Wyoming	0.343
21	Maryland	0.281	20	South Dakota	0.286
3	Massachusetts	0.905	21	Maryland	0.281
30	Michigan	−0.063	22	Virginia	0.281
6	Minnesota	0.828	23	California	0.278
50	Mississippi	−0.789	24	Kansas	0.245
38	Missouri	−0.238	25	New York	0.203
26	Montana	0.192	26	Montana	0.192
16	Nebraska	0.475	27	Arizona	0.082
45	Nevada	−0.482	28	Pennsylvania	−0.031
5	New Hampshire	0.886	29	Illinois	−0.056
18	New Jersey	0.414	30	Michigan	−0.063
31	New Mexico	−0.067	31	New Mexico	−0.067
25	New York	0.203	32	Delaware	−0.082
37	North Carolina	−0.206	33	Ohio	−0.084
17	North Dakota	0.421	34	Alaska	−0.091
33	Ohio	−0.084	35	Indiana	−0.188
49	Oklahoma	−0.566	36	Florida	−0.200
13	Oregon	0.530	37	North Carolina	−0.206
28	Pennsylvania	−0.031	38	Missouri	−0.238
10	Rhode Island	0.557	39	Texas	−0.320
46	South Carolina	−0.492	40	Arkansas	−0.416
20	South Dakota	0.286	41	Kentucky	−0.434
44	Tennessee	−0.480	42	West Virginia	−0.446
39	Texas	−0.320	43	Georgia	−0.469
2	Utah	1.006	44	Tennessee	−0.480
1	Vermont	1.064	45	Nevada	−0.482
21	Virginia	0.281	46	South Carolina	−0.492
11	Washington	0.538	47	Louisiana	−0.530
42	West Virginia	−0.446	48	Alabama	−0.546
12	Wisconsin	0.534	49	Oklahoma	−0.566
19	Wyoming	0.343	50	Mississippi	−0.789

*Scores presented in this table indicate the weighted number of standard deviations a state is above or below the national norm.

When comparing states from year to year, differences in score are more important than changes in ranking.

Determinants and Outcomes

The 22 measures that comprise *America's Health Rankings*™ are of two types—health determinants and health outcomes. Health determinants represent those actions that can affect the future health of the population, whereas health outcomes represent the result of what has already occurred, either through death or missed days due to illness.

For a state to improve the health of its population, efforts must focus on changing the determinants of health. If a state is significantly better in its ranking for health determinants than its ranking for health outcomes, it will be more likely to improve its overall health ranking in the future. Conversely, if a state is worse in its ranking for health determinants than its ranking for health outcomes, its overall health ranking will be more likely to decline over time.

Table 2 presents the overall rankings for the health determinants, health outcomes and implications for the future. If the current trend is positive, the future overall ranking is more likely to increase; if it is neutral, the future overall ranking will probably stay the same; or if it is negative, the future overall ranking is more likely to decline.

The top ten states for strong determinants are, in order from the top ranked state: Vermont, Utah, Massachusetts, New Hampshire, Hawaii, Connecticut, Minnesota, Maine, Colorado and Rhode Island.

The states with the weakest determinants, beginning with the lowest listed first, are: Mississippi, Nevada, Oklahoma, Georgia, Texas, South Carolina, Louisiana, Alabama, Tennessee and Arkansas.

The top ten states for strong health outcomes are, in order from the top ranked state: Minnesota, Hawaii, Nebraska, Massachusetts, Iowa, Utah, Connecticut, New Hampshire, Vermont and Washington. The states with the weakest determinants, beginning with the lowest listed first, are: Mississippi, Alabama, West Virginia, Kentucky, Louisiana, Tennessee, Oklahoma, Arkansas, South Carolina and Georgia.

When compared to other states, South Dakota, Maryland and Maine have a much higher ranking for health determinants than for health outcomes, showing a stronger indication they will improve over time. Texas, Nebraska and New York show a stronger indication that they will decline over time compared to other states.

There are many other measures that states can use to compare themselves, especially as action plans are created and implemented. The measures are posted on the Web site. These supplemental measures can be accessed by viewing the state's snapshot at http://www.americashealthrankings.org/StateRank/details.aspx.

Health Diparities within States

One of the primary goals of *Healthy People 2010* to eliminate health disparities among segments of the population, including differences that occur by gender, race or ethnicity, education or income, disability, geographic location, or sexual orientation.[1]

The statewide measures used in *America's Health Rankings*™ reflect the condition of the "average" resident. However, when those measures are examined more closely, startling differences can exist within a state when race, gender, geographic location and/or economic status are considered.

The National Healthcare Disparities Report (http://www.ahrq.gov/qual/nhdr08/nhdr08.pdf), released each year by the Agency for Healthcare Research and Quality, highlights disparities at a national level. The report analyzes numerous measures and indicates that disparities exist for many groups, including women, children, the elderly, rural residents, and among racial and socioeconomic groups. The report also indicates that such disparities affect all aspects of health and health care delivery, including preventive care, acute care and chronic disease management, and affect many delivery locations including primary care, home health care, hospice, emergency care, hospitals and nursing homes.

The report highlights three themes:

- Disparities persist in health care quality and access.
- The magnitude and pattern of disparities are different within subpopulations.
- Some disparities exist across multiple priority populations.

While each state has unique issues that contribute to disparities, states that have been successful in reducing disparities in health indicators while retaining high overall health can serve as models for other states.

The 2009 Edition of *America's Health Rankings*™ contains an explicit metric for disparities—Geographic

[1] Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services, Rockville, Md., http://www.healthypeople.gov/About/goals.htm.

Table 2 Health Determinants and Health Outcomes, 2009

STATE	RANK FOR ALL DETERMINANTS	RANK FOR ALL OUTCOMES	INFLUENCE ON FUTURE OVERALL RANK
Alabama	43	49	Positive
Alaska	34	28	Negative
Arizona	27	23	Neutral
Arkansas	41	43	Neutral
California	24	19	Negative
Colorado	9	13	Neutral
Connecticut	6	7	Neutral
Delaware	32	32	Neutral
Florida	34	40	Positive
Georgia	47	41	Negative
Hawaii	5	2	Neutral
Idaho	12	15	Neutral
Illinois	33	24	Negative
Indiana	38	33	Negative
Iowa	18	5	Negative
Kansas	25	22	Neutral
Kentucky	40	47	Positive
Louisiana	44	46	Neutral
Maine	8	21	Positive
Maryland	16	34	Positive
Massachusetts	3	4	Neutral
Michigan	30	31	Neutral
Minnesota	7	1	Negative
Mississippi	50	50	Neutral
Missouri	37	39	Neutral
Montana	23	27	Neutral
Nebraska	21	3	Negative
Nevada	49	37	Negative
NewHampshire	4	8	Neutral
NewJersey	17	16	Neutral
NewMexico	31	29	Neutral
NewYork	26	12	Negative
North Carolina	36	38	Neutral
NorthDakota	19	14	Negative
Ohio	28	36	Positive
Oklahoma	48	44	Neutral
Oregon	14	11	Neutral
Pennsylvania	29	29	Neutral
RhodeIsland	10	18	Positive
South Carolina	45	42	Neutral
SouthDakota	15	35	Positive
Tennessee	42	45	Neutral
Texas	46	26	Negative
Utah	2	5	Neutral
Vermont	1	9	Positive
Virginia	20	25	Positive
Washington	13	10	Neutral
WestVirginia	39	48	Positive
Wisconsin	11	16	Positive
Wyoming	22	20	Neutral

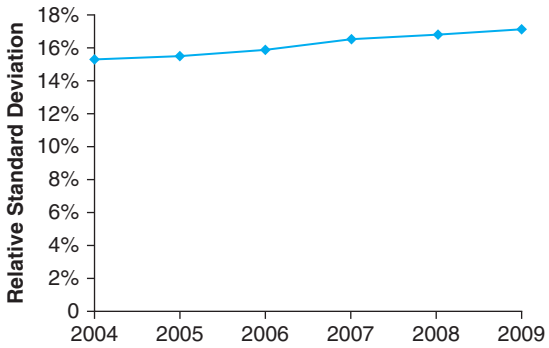
Disparity. This indicator reflects the range of age adjusted mortality rates that exist within a state at the county level. Graph 1 shows geographic disparity increasing in the United States over the last five years. Disparity in mortality rates occur for many reasons, including differences in behaviors, genetics, community and environmental situations, health care policies and clinical interventions. State data is at www.americashealthrankings.org/2009/disparity.aspx.

While this overall disparity metric provides a broad view of the challenges facing a state, specific measures shed more light on the sources of the disparity and how disparity exists in behaviors, disease and mortality for subgroups in the United States.

While it is helpful to understand disparity across all factors, data for disparity differences by race/ethnicity is the most readily available in the United States. Tables 3 and 4 show how the prevalence of smoking and the prevalence of obesity vary by race/ethnicity within the states. These tables show how disparities are a local issue; in some states, there is a wide difference among race/ethnicity groups whereas in other groups, the difference is much less pronounced. This type of analysis, especially when expanded to encompass a broad range of social, economic and health indicators, allows communities, their organizations and public health officials to target programs to address the biggest areas of concern.

Disparities also exist in the prevalence of diseases, especially chronic disease. Table 5 shows how diabetes affects the various race/ethnic groups in each state. It is notable that diabetes among non-Hispanic blacks is consistently higher than diabetes among either non-Hispanic whites or Hispanics.

The effect of disparities continues throughout life, resulting in higher mortality rates among certain race/ethnic groups, as shown in Table 6.



Graph 1 Geographic Disparity for United States Since 2004

Comparison to Other Nations

When health in the United States is compared to health in other countries, the picture is disappointing. The World Health Organization, in its annual World Health Statistics 2009, compares the United States to the nations of the world on a large variety of measures. While the U.S. does exceed many countries, it is far from the best in many of the common measures used to gauge our healthiness and lags behind its peers in other developed countries.

Healthy life expectancy (HALE) is a measure that indicates the number of years that a newborn can expect to live a healthy and productive life. Japan is the perennial leader in this measure with a HALE of 76 years on average for both genders. At 70 years, the United States has the same HALE as Czech Republic and Chile. There are 30 other countries that exceed the United States in healthy life expectancy, including Australia, Italy, Spain, France, Germany, Greece and United Kingdom. The difference between Japan and the United States for females is 7 years; the difference for males is 5 years (Table 7).

One of the underlying causes for these differences is the gap in infant mortality rates between the United States and many other countries (Table 7). The infant mortality rate for the U.S. in 2007 was six deaths per 1,000 live births; the infant mortality rates for Sweden, Japan, France, Norway, Portugal and the Czech Republic were three deaths or fewer per 1,000 live births—one-half of the rate in the United States. Of the 193 countries rated, 36 countries had lower infant mortality rates than the United States.

Differences in healthy life expectancy are also affected by the effectiveness of treating diseases, especially those that are amenable to care, including bacterial infections, treatable cancers, diabetes, cardiovascular and cerebrovascular disease, some ischemic heart disease and complications from common surgical procedures. The age-adjusted amenable mortality rate before age 75 for the United States was 109.7 deaths per 100,000 population in 2002, which meant it ranked last among the 19 countries of the Organization for Economic Cooperation and Development (OECD) nations studied. The rate in the U.S. is 50 percent higher than the rate in France, Japan, Spain, Italy, Canada and Australia.

Additionally, the study indicated that despite spending more than any other country on health care, the United States continues to slip further behind other countries. In 1997, the U.S. ranked 15th in this mortality rate. Since then, Finland, Portugal, United Kingdom and Ireland have reduced their

Table 3 Prevalence of Smoking by Race/Ethnicity and State (percent of adult population)

STATE	NON-HISPANIC WHITE	NON-HISPANIC BLACK	HISPANIC	NON-HISPANIC ASIAN	NON-HISPANIC HAWAIIAN/ PACIFIC ISLANDER	NON-HISPANIC AMERICAN INDIAN OR ALASKAN NATIVE	NON-HISPANIC MULTIRACIAL
Alabama	23.6%	20.0%	23.1%	—	—	28.5%	24.6%
Alaska	19.0%	—	21.9%	9.3%	—	39.9%	40.2%
Arizona	18.0%	23.0%	16.2%	20.5%	—	19.1%	20.2%
Arkansas	22.3%	24.0%	21.5%	—	—	31.2%	35.9%
California	14.7%	21.0%	13.5%	8.2%	22.2%	29.3%	23.9%
Colorado	16.5%	25.2%	21.5%	13.0%	—	38.3%	31.7%
Connecticut	15.5%	19.4%	21.2%	9.0%	—	—	38.8%
Delaware	19.8%	17.0%	22.4%	4.2%	—	—	26.0%
Florida	21.2%	15.5%	15.5%	8.4%	—	32.0%	27.2%
Georgia	20.1%	17.5%	17.3%	16.2%	—	31.1%	32.4%
Hawaii	13.9%	11.0%	24.1%	12.7%	21.9%	—	22.2%
Idaho	17.4%	—	18.8%	—	—	33.9%	23.7%
Illinois	20.2%	24.1%	20.6%	10.9%	—	—	21.1%
Indiana	24.1%	27.8%	28.6%	—	—	—	32.4%
Iowa	19.5%	34.8%	21.9%	—	—	—	—
Kansas	18.1%	22.9%	19.4%	6.7%	—	31.7%	32.4%
Kentucky	27.1%	27.5%	25.7%	—	—	49.5%	41.2%
Louisiana	22.1%	21.8%	25.9%	18.4%	—	33.7%	26.6%
Maine	19.4%	—	24.4%	—	—	41.6%	28.1%
Maryland	17.0%	18.3%	11.1%	6.8%	—	29.6%	17.1%
Massachusetts	16.8%	17.6%	17.7%	6.6%	—	28.2%	28.4%
Michigan	20.4%	24.9%	25.6%	7.9%	—	35.9%	29.2%
Minnesota	16.9%	21.8%	25.2%	14.8%	—	—	—
Mississippi	24.2%	22.6%	24.7%	—	—	—	37.4%
Missouri	23.6%	26.6%	27.8%	—	—	37.2%	37.8%
Montana	17.3%	—	26.4%	—	—	43.5%	31.8%
Nebraska	18.5%	24.8%	17.4%	10.5%	—	47.2%	39.4%
Nevada	21.4%	24.3%	20.0%	13.2%	—	29.0%	34.9%
New Hampshire	18.3%	—	22.7%	3.8%	—	35.9%	38.2%
New Jersey	17.2%	19.6%	15.6%	7.2%	—	23.0%	22.7%
New Mexico	19.2%	26.4%	21.1%	20.2%	—	17.3%	34.4%
New York	18.8%	17.6%	17.4%	8.4%	—	29.7%	22.0%
North Carolina	22.2%	22.4%	16.3%	10.4%	—	36.4%	36.0%
North Dakota	18.1%	—	17.0%	—	—	47.7%	—
Ohio	20.8%	26.5%	32.2%	6.3%	—	59.4%	39.4%
Oklahoma	24.1%	29.1%	20.6%	12.8%	—	33.6%	31.4%
Oregon	16.9%	—	13.3%	6.0%	—	33.1%	32.1%
Pennsylvania	20.4%	26.7%	23.4%	15.1%	—	47.1%	32.8%
Rhode Island	18.1%	17.7%	14.8%	13.5%	—	—	—
South Carolina	22.2%	18.7%	19.6%	12.5%	—	44.0%	31.4%
South Dakota	17.0%	—	23.2%	—	—	48.8%	45.7%
Tennessee	23.9%	21.5%	19.1%	—	—	—	22.7%
Texas	18.9%	22.6%	16.9%	7.3%	—	37.1%	28.0%
Utah	9.4%	—	15.2%	7.0%	—	19.0%	15.8%
Vermont	17.0%	—	25.4%	—	—	40.8%	29.6%
Virginia	17.8%	20.7%	14.4%	7.6%	—	31.0%	31.1%
Washington	16.3%	21.8%	13.4%	7.8%	16.3%	35.0%	26.8%
West Virginia	26.4%	28.3%	21.3%	—	—	—	32.9%
Wisconsin	19.3%	30.5%	21.2%	—	—	46.9%	36.3%
Wyoming	19.8%	—	28.0%	—	—	47.8%	28.8%
United States	19.5%	21.1%	16.1%	9.2%	23.3%	34.4%	28.2%
District of Columbia	9.9%	23.0%	13.4%	9.7%	—	—	25.0%

Source: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2006-2008.

Table 4 Prevalence of Obesity by Race/Ethinicity and State (percent of adult population)

STATE	NON-HISPANIC WHITE	NON-HISPANIC BLACK	HISPANIC	NON-HISPANIC ASIAN	NON-HISPANIC HAWAIIAN/ PACIFIC ISLANDER	NON-HISPANIC AMERICAN INDIAN OR ALASKAN NATIVE	NON-HISPANIC MULTIRACIAL
Alabama	28.2%	41.1%	32.5%	—	—	28.8%	24.9%
Alaska	26.2%	—	25.6%	14.0%	—	35.0%	26.6%
Arizona	22.4%	32.9%	32.0%	11.0%	—	34.8%	31.3%
Arkansas	27.7%	38.2%	25.8%	—	—	28.0%	37.5%
California	21.1%	36.7%	29.3%	6.6%	13.4%	28.6%	26.2%
Colorado	17.1%	26.7%	26.0%	7.5%	—	28.8%	23.9%
Connecticut	20.7%	31.7%	24.1%	7.3%	—	—	40.9%
Delaware	25.5%	40.2%	28.2%	9.5%	—	—	28.4%
Florida	21.8%	35.9%	26.9%	9.7%	—	29.7%	30.0%
Georgia	24.7%	37.4%	24.6%	8.1%	—	25.6%	34.1%
Hawaii	18.3%	24.0%	28.3%	12.6%	56.1%	—	32.7%
Idaho	24.6%	—	25.8%	—	—	38.1%	34.4%
Illinois	24.5%	34.0%	30.1%	7.2%	—	—	19.8%
Indiana	27.2%	36.7%	22.7%	—	—	—	30.8%
Iowa	26.6%	36.1%	26.6%	—	—	—	—
Kansas	26.6%	42.6%	31.2%	6.9%	—	36.7%	30.7%
Kentucky	28.4%	40.5%	25.4%	—	—	22.3%	35.4%
Louisiana	26.1%	36.8%	25.1%	—	—	31.3%	30.9%
Maine	24.6%	—	24.8%	—	—	33.6%	30.9%
Maryland	23.8%	35.2%	20.0%	11.3%	—	29.6%	27.6%
Massachusetts	20.8%	30.1%	26.4%	4.0%	—	32.3%	23.9%
Michigan	27.4%	38.0%	29.4%	9.0%	—	44.3%	35.7%
Minnesota	25.4%	28.4%	28.0%	11.5%	—	—	—
Mississippi	28.2%	41.0%	26.3%	—	—	—	46.5%
Missouri	27.3%	37.2%	29.2%	—	—	39.8%	32.3%
Montana	21.9%	—	21.4%	—	—	37.4%	29.4%
Nebraska	26.6%	37.0%	25.5%	7.9%	—	35.8%	35.7%
Nevada	24.2%	27.4%	28.3%	9.0%	—	37.1%	27.9%
New Hampshire	24.1%	—	32.2%	5.9%	—	33.6%	32.5%
New Jersey	23.0%	34.1%	24.3%	8.3%	—	20.5%	21.9%
New Mexico	20.2%	39.2%	28.8%	7.9%	—	34.7%	25.9%
New York	24.0%	31.4%	27.0%	5.3%	—	24.6%	25.3%
North Carolina	25.9%	40.0%	25.3%	4.3%	—	36.0%	35.5%
North Dakota	25.8%	—	35.5%	—	—	45.4%	—
Ohio	27.7%	43.1%	24.4%	5.4%	—	34.3%	24.8%
Oklahoma	28.2%	33.4%	31.8%	9.6%	—	36.6%	33.6%
Oregon	25.5%	—	23.2%	10.8%	—	29.4%	29.5%
Pennsylvania	25.9%	37.0%	31.0%	6.4%	—	31.1%	31.7%
Rhode Island	21.1%	27.7%	25.6%	12.2%	—	—	—
South Carolina	26.1%	40.1%	28.4%	6.5%	—	43.4%	27.5%
South Dakota	26.2%	—	27.7%	—	—	39.8%	26.2%
Tennessee	28.2%	40.3%	40.9%	—	—	—	31.4%
Texas	24.7%	39.2%	31.8%	8.7%	—	31.6%	30.9%
Utah	22.5%	—	20.5%	8.2%	—	27.2%	32.9%
Vermont	22.1%	—	22.6%	—	—	24.6%	29.1%
Virginia	24.8%	35.9%	24.2%	5.8%	—	30.6%	28.7%
Washington	25.2%	29.1%	29.5%	7.8%	30.4%	39.3%	30.2%
West Virginia	31.1%	35.9%	28.7%	—	—	—	35.4%
Wisconsin	25.4%	37.9%	26.4%	—	—	36.7%	32.0%
Wyoming	23.6%	—	28.9%	—	—	37.4 %	32.8%
United States	24.7%	36.8%	28.4%	7.6%	19.5%	32.8%	29.3%
District of Columbia	9.4%	34.0%	19.7%	5.6%	—	—	20.7%

Source: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2006-2008. Note: Differences between groups may be more or less than shown because of variations in the correctioness of self-report data varies by ethinic and racial groups[2].

[2] S.Yun et. al, A comparison of national estimates of obestiy prevalence from the behavioral risk factor surveillance systems and the national health and nutrition examination survey. *International Journal of Obestity*, 2006, pg 164-170.

Table 5 Prevalence of Diabetes by Race/Ethnicity and State (percent of adult population)

STATE	NON-HISPANIC WHITE	NON-HISPANIC BLACK	HISPANIC	NON-HISPANIC ASIAN	NON-HISPANIC HAWAIIAN/ PACIFIC ISLANDER	NON-HISPANIC AMERICAN INDIAN OR ALASKAN NATIVE	NON-HISPANIC MULTIRACIAL
Alabama	9.6%	12.9%	12.0%	—	—	—	12.2%
Alaska	5.9%	—	8.6%	5.8%	—	7.2%	3.5%
Arizona	7.6%	13.1%	9.7%	2.8%	—	15.0%	—
Arkansas	8.8%	10.9%	5.5%	—	—	12.6%	12.5%
California	6.9%	14.2%	8.8%	7.4%	—	15.6%	8.1%
Colorado	4.8%	11.1%	7.4%	—	—	9.9%	6.3%
Connecticut	6.4%	13.9%	7.1%	5.2%	—	—	9.6%
Delaware	8.2%	10.7%	4.6%	6.0%	—	—	—
Florida	8.6%	12.5%	7.9%	6.7%	—	15.8%	13.8%
Georgia	8.5%	12.4%	10.1%	8.9%	—	10.2%	9.0%
Hawaii	4.6%	—	8.0%	9.5%	11.1%	—	8.8%
Idaho	7.2%	—	5.8%	—	—	—	16.9%
Illinois	7.3%	14.6%	7.8%	7.1%	—	—	9.2%
Indiana	8.4%	12.9%	7.7%	—	—	—	11.9%
Iowa	7.1%	9.5%	4.6%	—	—	—	—
Kansas	7.4%	10.9%	7.2%	5.8%	—	16.7%	6.7%
Kentucky	9.6%	13.1%	—	—	—	14.1%	14.2%
Louisiana	8.9%	12.9%	8.0%	—	—	—	11.3%
Maine	7.7%	—	6.1%	—	—	10.8%	9.9%
Maryland	7.5%	11.4%	5.3%	7.1%	—	6.6%	6.2%
Massachusetts	6.5%	10.9%	9.1%	5.3%	—	14.5%	6.5%
Michigan	8.1%	13.4%	8.8%	—	—	—	12.1%
Minnesota	5.8%	5.0%	5.6%	—	—	—	—
Mississippi	10.0%	13.5%	5.8%	—	—	—	8.0%
Missouri	7.9%	9.3%	—	—	—	12.3%	13.3%
Montana	6.1%	—	6.8%	—	—	12.2%	10.2%
Nebraska	7.4%	10.4%	6.9%	4.1%	—	8.1%	8.1%
Nevada	8.6%	11.5%	5.1%	8.6%	—	—	10.3%
New Hampshire	7.2%	—	11.5%	5.8%	—	9.5%	10.3%
New Jersey	7.4%	13.6%	8.9%	6.0%	—	15.7%	—
New Mexico	6.1%	—	9.2%	8.2%	—	11.3%	8.3%
New York	7.6%	11.5%	7.0%	5.7%	—	12.5%	—
North Carolina	8.5%	14.3%	4.5%	4.4%	—	12.2%	10.5%
North Dakota	6.5%	—	8.9%	—	—	12.8%	—
Ohio	8.1%	14.4%	8.8%	—	—	12.6%	11.2%
Oklahoma	9.0%	13.5%	8.0%	—	—	17.1%	13.3%
Oregon	6.8%	14.6%	4.4%	5.1%	—	—	9.3%
Pennsylvania	8.0%	14.4%	8.0%	2.4%	—	—	13.1%
Rhode Island	7.0%	13.2%	9.0%	—	—	—	—
South Carolina	8.4%	13.1%	7.8%	4.7%	—	13.3%	11.0%
South Dakota	6.3%	—	3.7%	—	—	12.6%	4.9%
Tennessee	11.0%	12.7%	2.6%	—	—	—	—
Texas	8.1%	12.2%	10.6%	5.7%	—	—	13.2%
Utah	5.8%	—	5.6%	2.8%	—	13.0%	10.4%
Vermont	6.2%	—	13.8%	—	—	11.8%	8.4%
Virginia	7.0%	14.9%	4.7%	5.3%	—	10.3%	—
Washington	7.0%	8.0%	6.0%	5.8%	6.2%	10.8%	8.5%
West Virginia	11.6%	11.1%	10.0%	—	—	—	16.5%
Wisconsin	6.2%	12.6%	5.4%	—	—	11.7%	6.5%
Wyoming	6.6%	—	9.2%	—	—	—	12.1%
United States	7.7%	12.8%	8.8%	6.6%	7.2%	13.1%	10.1%
District of Columbia	2.4%	13.3%	4.8%	3.1%	—	—	—

Source: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2006-2008.

Table 6 Mortality by Race/Ethnicity and State (deaths per 100,000 population, age adjusted)

STATE	WHITE*	BLACK*	ASIAN*	AMERICAN INDIAN OR ALASKAN NATIVE*	HISPANIC**
Alabama	950.9	1147.2	349.5	323.2	313.7
Alaska	735.2	710.2	458.6	1054.4	468.5
Arizona	750.1	861.9	373.8	844.9	690.1
Arkansas	897.4	1141.9	394.7	349.7	326.9
California	753.1	1014.9	466.7	421.3	588.0
Colorado	748.5	835.3	431.8	497.1	715.4
Connecticut	739.8	835.9	337.7	413.7	563.3
Delaware	811.0	995.1	313.9	617.6	582.1
Florida	728.9	945.4	325.4	303.8	586.1
Georgia	863.7	1028.2	380.2	681.9	308.2
Hawaii	692.3	431.2	639.3	362.4	1104.8
Idaho	776.0	493.3	419.3	819.3	581.5
Illinois	788.7	1083.1	379.3	247.0	467.2
Indiana	862.0	1069.4	341.5	190.5	455.9
Iowa	755.0	1000.9	370.3	615.9	404.5
Kansas	803.9	1125.9	379.9	1125.7	542.0
Kentucky	941.6	1075.2	388.0	197.8	570.0
Louisiana	931.1	1199.6	456.8	332.3	378.5
Maine	822.1	554.0	376.9	1218.4	306.5
Maryland	786.7	994.0	391.5	409.5	345.1
Massachusetts	760.2	818.4	369.3	362.0	484.3
Michigan	810.7	1084.2	383.8	977.5	714.6
Minnesota	697.3	864.7	522.3	1045.4	405.5
Mississippi	937.8	1145.4	489.4	749.5	253.3
Missouri	855.3	1116.9	423.8	435.3	556.6
Montana	784.3	605.6	405.9	1196.9	574.1
Nebraska	752.1	1016.2	431.5	1173.9	508.5
Nevada	905.4	946.7	481.7	674.5	474.7
New Hampshire	769.1	520.5	304.4	—	328.1
New Jersey	765.5	979.2	357.6	403.9	480.9
New Mexico	795.4	741.5	322.3	802.6	769.2
New York	744.0	802.0	386.1	263.8	576.3
North Carolina	839.7	1056.9	369.8	880.3	266.3
North Dakota	711.3	603.1	—	1343.8	216.7
Ohio	856.7	1093.4	320.1	202.3	469.7
Oklahoma	943.9	1135.1	447.9	929.2	516.8
Oregon	804.7	880.2	464.8	797.0	436.7
Pennsylvania	823.8	1083.9	358.8	279.0	526.9
Rhode Island	786.3	875.0	421.7	647.1	416.7
South Carolina	848.4	1071.2	403.0	443.0	413.6
South Dakota	719.0	832.6	487.2	1417.4	413.4
Tennessee	918.9	1139.6	409.3	302.0	294.2
Texas	807.0	1053.0	402.0	188.5	674.7
Utah	742.5	778.8	528.3	705.4	552.1
Vermont	757.6	587.0	—	—	191.6
Virginia	791.6	1012.4	421.6	292.6	387.2
Washington	764.2	882.9	480.0	902.6	473.3
West Virginia	976.9	1057.4	149.2	—	218.2
Wisconsin	759.3	1075.9	476.3	1085.9	384.8
Wyoming	816.3	830.6	350.9	982.4	711.0
United States	797.0	1022.2	446.9	656.0	590.2
District of Columbia	592.4	1162.7	439.9	315.7	248.7

* Includes both Hispanic and non-Hispanic ethnicities
** Includes all races

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File, CDC WONDER, 2004-2006

Table 7 International Comparisons

LOCATION	HEALTHY LIFE EXPECTANCY* (HALE) AT BIRTH (YEARS)	INFANT MORTALITY RATE* (DEATHS BETWEEN BIRTH AND AGE 1 PER 1,000 LIVE BIRTHS)
Japan	76	3
San Marino	75	2
Switzerland	75	4
Iceland	74	2
Sweden	74	2
Andorra	74	3
Italy	74	3
Spain	74	4
Australia	74	5
Singapore	73	2
France	73	3
Luxembourg	73	3
Ireland	73	3
Norway	73	3
Monaco	73	4
Germany	73	4
Israel	73	4
Netherlands	73	4
Canada	73	5
New Zealand	73	5
Finland	72	3
Austria	72	4
Belgium	72	4
Greece	72	4
Denmark	72	4
Malta	72	5
United Kingdom	72	5
Slovenia	71	3
Portugal	71	3
Republic of Korea	71	4
Czech Republic	70	3
Cyprus	70	3
United States of America	70	6
Chile	70	8
Cuba	69	5
Kuwait	69	9
Costa Rica	69	10

Source: World Health Statistics, 2009, World Health Organization, Geneva, Switzerland

mortality rate from disease amenable to care more rapidly than the United States. All now have better rates than the U.S.[3]

Equally discouraging are results from a UNICEF study of child well-being, in which the U.S. ranked second to last when compared to 21 comparably "rich" countries based on 40 different measures. When UNICEF looked specifically at child health aspects of well-being, the United States fared very poorly due to a high infant mortality rate, a high percentage of low birth weight infants and only an average rate of immunization coverage.[4]

The Commonwealth Fund rates the U.S. last in health care system performance when compared to a group of six countries that include Australia, Canada, Germany, New Zealand and the United Kingdom. The U.S. spends twice as much as these six countries on a per-capita basis, yet it is last on dimensions of access, patient safety, efficiency and equity[5], while the U.S. is spending more on total health care when compared to other countries, the country is getting less access, patient safety, efficiency and equity.

The results of these studies should be a wake-up call to everyone in the United States to strive to improve all aspects of our health system however possible, including education, prevention and clinical care. Other countries have improved their overall health by improving their health care system, indicating that we too can do the same.

CHANGES FROM 1990

National

The 20-year perspective provided by this report allows us to view health over time. During the past 20 years, this report has tracked our nation's 20.1 percent improvement in overall health (Graph 2). This national success stems from improvements in the reduction of infant mortality, infectious disease, prevalence of smoking, cardiovascular deaths, violent crime and children in poverty, and an increase in immunization coverage (Table 8). However, success has eluded us in two very significant measures—the rapid increases in both the prevalence of obesity and the rate of uninsured population. In addition, the high school graduation rate remains relatively stagnant with fewer than three of four incoming freshmen graduating within four years.

Graph 2 shows that the rate of improvement experienced in the health of the United States' population occurred in two phases. During the 1990s, annual improvement in health was 1.5 percent per year on average. During this decade, the annual improvement in health has been 0.4 percent per year. Special concern surrounds the decline in health determinants, as those measures point to the future health of the population.

The United States has the potential to return to the rates of improvement typical in the 1990s. However, to do so, it must address the drivers of declining health more directly while focusing on reducing important risk factors. For example, the prevalence of smoking has been stagnant for many years and only just recently started to show improvement, declining from 19.8 percent in 2008 to 18.3 percent in 2009, the lowest level in 20 years.

Unprecedented and unchecked growth in the prevalence of obesity has also dramatically affected the overall health of the United States. The prevalence of obesity has increased 129 percent from 11.6 percent of the in 1990 to 26.6 percent of the population in 2009. Now, more than one in four people in the U.S. is considered obese—a category that the Centers for Disease Control and Prevention reserves for those who are significantly over the suggested body weight given their height. This alarming rate of increase shows little evidence of slowing or abating (Graph 4). These very high obesity rates are gathered from the Behavioral Risk Factor Surveillance System, the nation's largest phone survey about health, and rely on selfreported height and weight. Actual obesity rates, as measured by health professionals, may be almost 10 percent higher, meaning that over one-third of the population is now obese.[6]

Lack of health insurance coverage increased from 13.9 percent in 2001 to 15.3 percent of the population in 2009 (Graph 5). Lack of health insurance not only inhibits people from getting the proper care when needed but also reduces access to necessary preventive care to curtail or minimize future illnesses.

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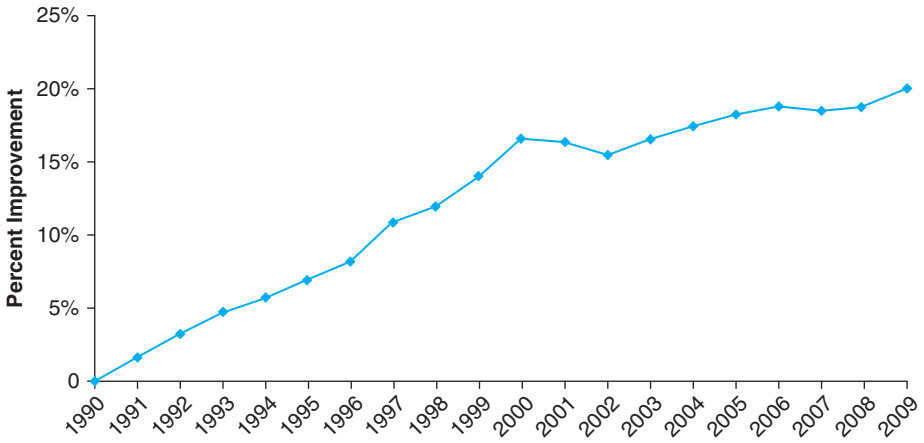
3. Nolte, Ellen and McKee, C. Martin, Measuring the Health of Nations: Updating an Earlier Analysis, Health Affairs, 27, No 1 (2006): 58-71 http://content.healthaffairs.org/cgi/content/abstract/27/1/58.

4. "UNICEF, Child poverty in perspective: An overview of child well-being in rich countries, Innocents Report Card 7" 2007, UNICEF Innocenti Research Centre, Florence, http://www.unicef-irc.org.

5. Davis, K. et. al. Mirror, Mirror on the Wall: An International Update on the Comparative Performance of American Health Care, The Commonwealth Fund, May 2007. www.commonwealthfund.org http://content.healthaffairs.org/cgi/content/abstract/hlthaff.25.w457.

6. Yun, S. et. al. A comparison of national estimates of obesity prevalence from the behavioral risk factor surveillance system and the national health and nutrition examination survey, *International Journal of Obesity* (2006) 30, 164–170.

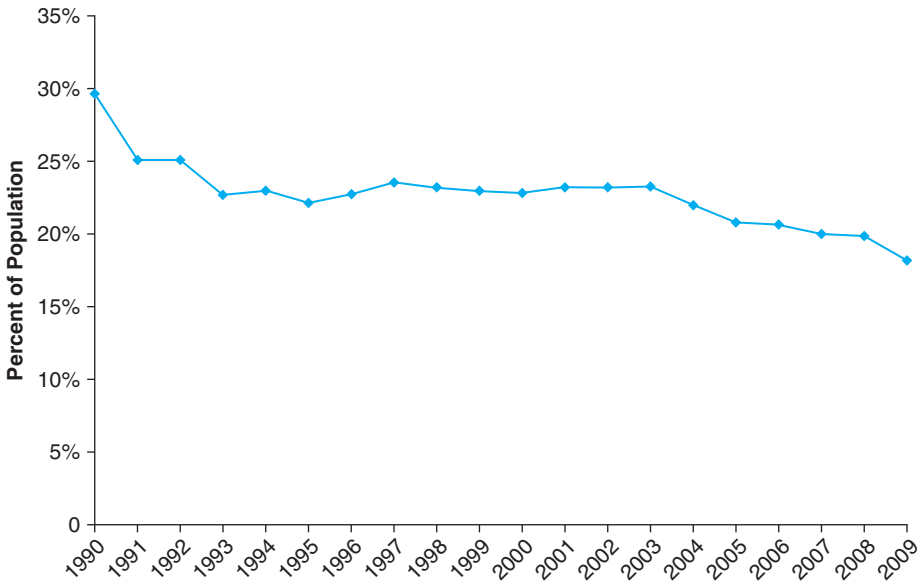


Graph 2 Improvements since 1990

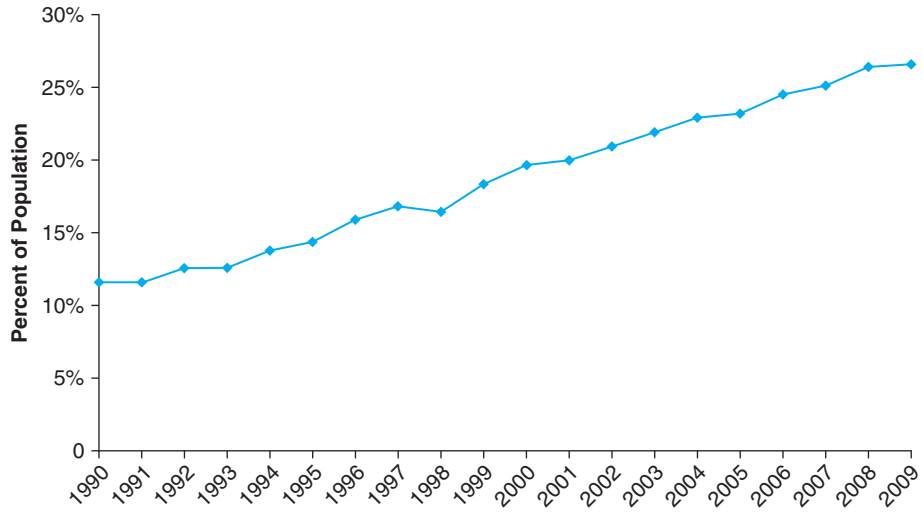
Table 8 **National Measures of Successes and Challenges: Long Term**

MEASURE	EDITION TO EDITION CHANGES
Successes	
Infectious Disease	53 percent decrease in the incidence of infectious disease from 40.7 cases in 1990 to 19.1 cases per 100,000 population in 2009.
Infant Mortality	33 percent decrease in the infant mortality rate from 10.2 deaths in 1990 to 6.8 deaths per 1,000 live births in 2009.
Prevalence of Smoking	38 percent decline in the prevalence of smoking from 29.5 percent in 1990 to 18.3 percent of the population in 2009.
Violent Crime	25 percent decline in the violent crime rate from 609 offenses in1990 to 455 offenses per 100,000 population in 2009.
Cardiovascular Deaths	29 percent decline in the rate of deaths from cardiovascular disease from 405.1 deaths in 1990 to 287.9 deaths per 100,000 population in 2009.
Children in Poverty	8 percent decline in the percentage of children in poverty from 20.6 percent in 1990 to 19.0 percent of persons under age 18 in 2009.
Immunization Coverage	42 percent increase in immunization coverage from 55.1 percent in 1999 to 78.2 percent of children ages 19 to 35 months receiving complete immunizations in 2009.
Premature Death	14 percent decline from 8,716 years of potential life lost before age 75 per 100,000 population in 1990 to 7,511 years of potential life lost before age 75 per 100,000 population in 2009.
Air Pollution	The average amount of fine particulate in the air continues to decline from 13.2 micrograms in 2003 to 11.7 micrograms per cubic meter in 2009.
Challenges	
Prevalence of Obesity	129 percent increase in the prevalence of obesity from 11.6 percent in 1990 to 26.6 percent of the population in 2009.
Lack of Health Insurance	14 percent increase in the rate of uninsured population from 13.4 percent in 1990 to15.3 percent in 2009.
High School Graduation Rate	The high school graduation rate continues to remain around 73 percent of incoming freshman that graduate within four years.
Poor Mental Health Days	In the last eight years, the number of poor mental health days per month has stagnated at 3.4 days in the previous 30 days.
Poor Physical Health Days	In the last six years, the number of poor physical health days per month has stagnated at 3.6 days in the previous 30 days.
Prenatal Care	Adequate prenatal care is available to only about 70 percent of pregnant women.

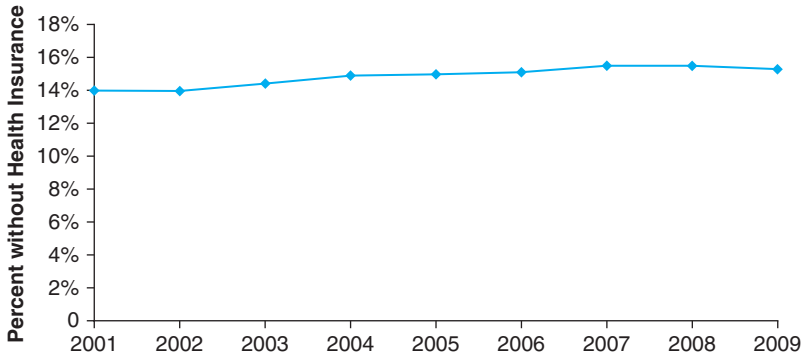
Source: World Health Statistics, 2009, World Health Organization, Geneva, Switzerland.



Graph 3 Prevalence of Smoking since 1990



Graph 4 Prevalence of Obesity since 1990



Graph 5 Lack of Health Insurance since 2001

High school graduation, poor mental health days and poor physical health days have had minimal improvement in the last decade and restrict more significant improvements in health.

While there have been improvements since 1990, these worsening influences have caused and will continue to cause slower rates of improvement than experienced in the 1990s.

States

All states except Oklahoma show a positive change in overall score between 1990 and 2009. New York, Vermont, Hawaii, New Hampshire, New Jersey and Minnesota have improved 32.5 percent or more overall since the 1990 Edition, or 12 percent more than the national average change in score of 20.1 percent (Table 9). Twenty-three states in total have exceeded the national rate of improvement.

The principal reasons for the changes in these states from 1990 to 2009 are:

New York: The violent crime rate dropped by 60 percent from 1,007 to 398 offenses per 100,000 population, the infant mortality rate declined from 10.7 to 5.7 deaths per 1,000 live births and the prevalence of smoking declined from 28.7 percent to 16.7 percent of the population. In the last ten years, immunization coverage increased from 62.6 percent to 76.2 percent of children ages 19 to 35 months receiving complete immunizations.

Vermont: The prevalence of smoking decreased by 46 percent from 30.7 percent to 16.7 percent of the population and the percentage of children in poverty declined by 39 percent from 15.9 percent to 9.8 percent of persons under age 18. In the last ten years, immunization coverage increased from 55.8 percent to 74.4 percent of children ages 19 to 35 months receiving complete immunizations.

Hawaii: The prevalence of smoking decreased by 44 percent from 27.6 percent to 15.4 percent of the population and the infant mortality rate declined from 9.1 to 6.0 deaths per 1,000 live births. In the last ten years, the incidence of infectious disease declined from 47.5 to 17.6 cases per 100,000 population.

New Hampshire: The prevalence of smoking decreased by 45 percent from 30.7 percent to 17.0 percent of the population, the infant mortality rate from 8.4 to 5.7 deaths per 1,000 live births and the rate of deaths from cardiovascular disease decreased from 392.3 to 255.4 deaths per 100,000 population.

New Jersey: The violent crime rate declined by 40 percent from 541 to 327 offenses per 100,000 population, the prevalence of smoking decreased by 47 percent from 27.9 percent to 14.7 percent of the population and the infant mortality rate declined by 44 percent from 9.6 to 5.4 deaths per 1,000 live births.

Minnesota: The prevalence of smoking decreased by 39 percent from 28.7 percent to 17.5 percent of the population, the infant mortality rate declined from 8.9 to 5.1 deaths per 1,000 live births and the percentage of children in poverty decreased from 21.2 percent to 15.6 percent of persons under age 18. In the last ten years, immunization coverage increased from 41.2 percent to 77.4 percent of children ages 19 to 35 months receiving complete immunizations.

Twenty-seven states are below the national rate of improvement and are slipping further behind in healthiness when compared to the nation as a whole. Oklahoma has declined 2.7 percent since 1990 while West Virginia, Mississippi and Kentucky have improved by less than 7 percent compared to the 20.1 percent improvement in the U.S. on average (Table 10).

The principal reasons for changes in these states from 1990 to 2009 are:

Oklahoma: The prevalence of obesity surged from 11.6 percent in 1990 to 30.9 percent of the pop-

Table 9 States with the Greatest Overall Health Score Improvement 1990 to 2009

STATE	CHANGE IN SCORE
New York	+37.5
Vermont	+36.5
Hawaii	+35.0
New Hampshire	+34.8
New Jersey	+32.5
Minnesota	+32.5

Table 10 States with the Least Overall Health Score Improvement 1990 to 2009

STATE	CHANGE IN SCORE
Oklahoma	−2.7
West Virginia	+3.9
Mississippi	+6.2
Kentucky	+6.7

ulation in 2009. The percentage of children in poverty increased from 17.7 percent to 21.8 percent of persons under age 18 and the violent crime rate increased from 419 to 527 offenses per 100,000 population.

West Virginia: The prevalence of smoking declined less rapidly in West Virginia than other states, declining from 34.0 percent to 26.5 percent of the population, and is now ranked 50th in the country. The violent crime rate increased by 98 percent from 138 to 274 offenses per 100,000 population.

Mississippi: Infant mortality rates continue to stay high in Mississippi at 11.0 deaths per 1,000 live births, the highest in the nation. Improvements in the prevalence of smoking are slower than in other states and the prevalence of obesity continues to rise rapidly with one-third of the population now considered obese.

Kentucky: The percentage of children in poverty increased slightly from 23.7 percent in 1990 to 24.4 percent of persons under age 18 in 2009. The prevalence of smoking and the violent crime rate both improved since 1990, but at a much slower rate than in other states.

The changes in scores and rankings for all 50 states since the 1990 Edition of *America's Health Rankings*™ are at www.americashealthrankings.org/2009/1990state.aspx. States that have changed less than 20.1 percent are not improving as quickly as the nation as a whole.

CHANGES FROM 2008

National

Since the 2008 Edition, overall health in the United States has increased slightly from 18.9 percent to 20.1 percent above the 1990 baseline. This increase is primarily due to a decline in the prevalence of smoking, a significant decline from 19.8 percent to 18.3 percent of the population.

Table 11 shows the national changes in the last year. In addition to a decrease in the prevalence of smoking, other improvements included decreases in the occupational fatalities rate, the rate of deaths from cardiovascular disease and the incidence of infectious disease, and an increase in per capita public health funding. These improvements were offset by a deterioration in several measures, including an increase in the prevalence of obesity from 26.3 percent to 26.6 percent of the population, an increase in the percentage of children in poverty from 18.0 percent to 19.0 percent of persons under age 18 and a decrease in the high school graduation rate from 74.7 percent to 73.4 percent of incoming ninth graders who graduate within four years.

States

Comparisons of state scores for these two years indicate that 34 states had positive changes in their overall scores on health, 14 states experienced declines and two did not change. The largest positive increases were in Mississippi, Louisiana, Utah and Oregon, all of which increased by 3.0 points or more (Table 12).

The principal reasons for the changes in these states are:

Mississippi: The percentage of children in poverty declined from 32.8 percent to 23.5 percent of persons under age 18 and the rate of preventable hospitalizations also declined from 109.8 to 101.3 discharges per 1,000 Medicare enrollees.

Louisiana: The violent crime rate decreased by 10 percent from 730 to 656 offenses per 100,000

Table 11 National Measures of Successes and Challenges: 2008 to 2009

MEASURE	EDITION TO EDITION CHANGES
Successes	
Prevalence of Smoking	Decreased from 19.8 percent to 18.3 percent of the population.
Occupational Fatalities	Decreased from 5.2 to 4.8 deaths per 100,000 workers.
Infectious Disease	Decreased from 20.1 to 19.1 cases per 100,000 population.
Cardiovascular Deaths	Decreased from 298.2 to 287.9 deaths per 100,000 population.
Public Health Funding	Increased from $88 to $94 per person.
Challenges	
Prevalence of Obesity	Increased from 26.3 percent to 26.6 percent of the population who are obese.
Children in Poverty	Increased from 18.0 percent to 19.0 percent of persons under age 18.
High School Graduation	Decreased from 74.7 percent to 73.4 percent of incoming ninth graders who graduate within four years.

Table 12 States with the Greatest Overall Health Score Improvement: 2008 to 2009

STATE	CHANGE IN SCORE
Mississippi	+4.7
Louisiana	+4.0
Utah	+3.6
Oregon	+3.0

population and the levels of air pollution declined by 8 percent from 12.3 to 11.3 micrograms of fine particulate per cubic meter of air. Immunization coverage increased by 7 percent from 77.7 percent to 83.0 percent of children ages 19 to 35 months receiving complete immunizations.

Utah: The percentage of children in poverty declined from 12.6 percent to 8.8 percent of persons under age 18, the rate of preventable hospitalizations also declined from 46.8 to 43.5 discharges per 1,000 Medicare enrollees, and the rate of deaths from cardiovascular disease decreased from 243.2 to 230.8 deaths per 100,000 population.

Oregon: Air pollution declined by 5 percent from 8.5 to 8.1 micrograms of fine particulate per cubic meter of air, the rate of preventable hospitalizations also declined from 51.2 to 46.6 discharges per 1,000 Medicare enrollees, and the rate of deaths from cardiovascular disease decreased from 265.1 to 254.6 deaths per 100,000 population.

No state declined by 3 points or more in the last year.

The comparisons of scores and rankings between 2008 and 2009 are shown at www.americashealthrankings.org/2009/2008state.aspx.

METHODOLOGY

The methodology underlying *America's Health Rankings*™ reflects the evolving expectations and role of health in our society and our ability to measure various aspects of health. This year, the methodology was revised to better capture and reflect the variation in health metrics among the states. All prior editions have been recalculated to reflect the new methodology such that the 20-year history can be maintained to provide a resource for tracking and evaluating progress. All years of data are available at www.americashealthrankings.org.

For each measure, the raw data as obtained from the stated sources and adjusted for age as appropriate is presented and referred to as "value." All age-adjusted data utilizes the population profile for the middle year of data. For example, if the data is from 2006 to 2008, the standard population is set at 2007.

The score for each state is based on the following formula. The score is stated as a decimal.

$$\text{SCORE} = \frac{\text{STATE VALUE} - \text{NATIONAL MEAN}}{\text{(STANDARD DEVIATION OF ALL STATE VALUES)}}$$

Often referred to as a "Z-score," this score indicates the number of standard deviations a state is above or below the national mean. This results in a score of 0.00 for a state with the same value as the national mean. States that have a higher value than the national average will have a positive score while those with lower values will have a negative score. Scores are calculated to three decimal places and, to prevent an extreme value from excessively influencing a final score, the maximum score any state could receive for a measure is plus or minus 2.

Confidence intervals, where available, are presented in the online version of the tables and calculated according to the description for each metric. Confidence intervals are presented at a 95 percent confidence level unless indicated otherwise.

For several measures, such as Infant Mortality and Infectious Disease, the data from multiple years are combined to provide sufficient sample size to be meaningful.

Where a value for the United States overall is not available, the national average is set at the average value of the states and the District of Columbia.

The overall score was calculated by adding the scores of each measure multiplied by its weight or the percent of total overall ranking. (Note: Scores reported for individual measures may not add up to the overall scores due to the rounding of numbers.)

The ranking is the ordering of each state according to value. Ties in scores are assigned equal rankings.

Overall comparisons to prior years, such as Changes from 1990, are based upon the relative change in the values of a measure compared to the national average for each measure. The overall result is the weighted sum of these variations. The change between years is the summation of all changes between those years for the components included in the models used for the years of interest.

All earlier results have been revised to correct any errors discovered since the release of prior edi-

tions. Because of the new methodology, scores in this edition are not comparable to scores presented in prior editions and overall ranks presented in this edition are not comparable to overall ranks in prior printed editions. However, all prior editions have been recalculated and are presented online at www.americashealthrankings.org.

MEASURES

Selection of Measures

Four primary considerations drove the design of *America's Health Rankings*™ and the selection of the individual measures:

1. The overall rankings had to represent a broad range of issues that affect a population's health,
2. Individual measures needed to use common health measurement criteria,
3. Data had to be available at a state level, and
4. Data had to be current and updated periodically.

While not perfect, the measures selected are believed to be the best available indicators of the various aspects of healthiness at this time and are consistent with past reports.

The Scientific Advisory Committee suggested that the measures be divided into two categories—Determinants and Outcomes. For further clarity, determinants are divided into four groups: Behaviors, Community and Environment, Public and Health Policies, and Clinical Care. These four groups of measures influence the health outcomes of the population in a state, and improving these inputs will improve outcomes over time. Most measures are actually a combination of activities in all four groups. For example, the prevalence of smoking is a behavior that is strongly influenced by the community and environment in which we live, by public policy, including taxation and restrictions on smoking in public places and by the care received to treat the chemical and behavioral addictions associated with tobacco. However, for simplicity, we placed each measure in a single category.

For *America's Health Rankings*™ to continue to meet its objectives, it must evolve and incorporate new information as it becomes available. The Scientific Advisory Committee provides guidance for the evolution of the rankings, balancing the need to change with the desire for longitudinal comparability. Over the last few years, change is being driven by: (1) the acknowledgment that health is more than years lived but also includes the quality of those years; (2) data about the quality and cost of health care delivery are becoming available on a comparative basis; and (3) measurement of the additional determinants of health are being initiated and/or improved. The committee also emphasizes that the real impact on health will be made by addressing the health determinants, and making improvements on these items will affect the long-term health of the population. The determinants are the predictors of our future health.

Health outcomes are traditionally measured using mortality measures including premature death, infant mortality, cancer and cardiovascular mortality. While these measures overlap significantly, they do present different views of mortality outcomes of the population. Two measures of the quality of life—poor mental health days and poor physical health days—are also included and defined as the number of days in the previous 30 days when a person indicates their activities are limited due to mental or physical health difficulties. Disparity in health outcomes is now explicitly captured in the Geographic Disparity measure.

As with all indices, the positive and negative aspects of each measure must be weighed when choosing and developing them. These aspects for consideration include: (1) the interdependence of the different measures; (2) the possibility of the overall ranking disguising the effects of individual measures; (3) an inability to adjust all data by age and race; (4) an overreliance on mortality data; and (5) the use of indirect measures to estimate some effects on health. These concerns cannot be addressed directly by adjusting the methodology; however, assigning weights to the individual measures can mitigate their impact (Table 17).

Each measure is assigned a weight that determines its percentage of the overall score. Determinants account for 75 percent of the overall ranking and outcomes account for 25 percent, a shift from the 50/50 balance in the original 1990 index. This reflects the importance and growing availability of determinant measures.

Description of Measures

Table 13 is a summary of each of the measures in *America's Health Rankings*™. The table includes the core measures included in the current model, plus supplemental measures that can be used to further understand the situation. The supplemental measures are more fully described at www.americashealthrankings.org/measure.aspx.

Table 13 Summary Description of Measures CORE MEASURES

Core Measures

DETERMINANTS	DESCRIPTION
Behaviors	
Prevalence of Smoking	Percentage of population over age 18 that smokes on a regular basis. This is an indication of known, addictive, health-adverse behaviors within the population. (www.americashealthrankings.org/measure/2009/smoking.aspx)
Prevalence of Binge Drinking	Percentage of population over age 18 that has drunk excessively in the last 30 days. Binge drinking is defined as 5 drinks for a male and 4 for a female in one setting. It is a proxy indicator for excessive drug and alcohol use within a population. (www.americashealthrankings.org/measure/2009/binge.aspx)
Prevalence of Obesity	Percentage of the population estimated to be obese, with a body mass index (BMI) of 30.0 or higher. Obesity is known to contribute to a variety of diseases, including heart disease, diabetes and general poor health. (www.americashealthrankings.org/measure/2009/obesity.aspx)
High School Graduation	Percentage of incoming ninth graders who graduate in four years from a high school with a regular degree, as reported by NCES in compliance with the No Child Left Behind initiative. It is an indication of the individual's ability to learn about, create and maintain a healthy lifestyle and to understand and access health care when required. (www.americashealthrankings.org/measure/2009/graduation.aspx)
Community & Environment	
Violent Crime	The number of murders, rapes, robberies and aggravated assaults per 100,000 population. It reflects an aspect of overall lifestyle within a state and its associated health risks. (www.americashealthrankings.org/measure/2009/crime.aspx)
Occupational Fatalities	Number of fatalities from occupational injuries per 100,000 workers. This measure reflects job safety as a part of public health. (www.americashealthrankings.org/measure/2009/WorkFatalities.aspx)
Infectious Disease	Number of AIDS, tuberculosis and hepatitis (A and B) cases reported to the Centers for Disease Control and Prevention per 100,000 population. This is an indication of the toll that infectious disease is placing on the population. (www.americashealthrankings.org/measure/2009/disease.aspx)
Children in Poverty	The percentage of persons under age 18 who live in households at or below the poverty threshold. Poverty is an indication of the lack of access to health care by this vulnerable population. (www.americashealthrankings.org/measure/2009/ChildPoverty.aspx)
Air Pollution	The average exposure of the general public to particulate matter of 2.5 microns or less in size (PM2.5). Health studies have shown a significant association between exposure to fine particles and premature death from heart or lung disease. Fine particles can aggravate heart and lung diseases and have been linked to effects such as: cardiovascular symptoms; cardiac arrhythmias; heart attacks; respiratory symptoms; asthma attacks; and bronchitis. (www.americashealthrankings.org/measure/2009/air.aspx)

(continues)

Table 13 Summary Description of Measures CORE MEASURES (continued)

Core Measures

DETERMINANTS	DESCRIPTION
Public & Health Policies	
Lack of Health Insurance	Percentage of the population that does not have health insurance privately, through their employer or the government. This is an indicator of the ability to access care as needed, especially preventive care. (www.americashealthrankings.org/measure/2009/insurance.aspx)
Public Health Funding	State funding dedicated to public health as well as federal funding directed to states by the Centers for Disease Control and Prevention and the Health Resources and Services Administration, expressed on a per capita basis. This represents the annual investment being made in public health programs to monitor and improve population health. (www.americashealthrankings.org/measure/2009/PH_Spending.aspx)
Immunization Coverage	Percentage of children ages 19 to 35 months who have received four or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of any measles-containing vaccine, three or more doses of HiB, and three or more doses of HepB vaccine. (www.americashealthrankings.org/measure/2009/immunize.aspx)
Clinical Care	
Prenatal Care	Percentage of pregnant women receiving adequate prenatal care, as defined by Kotelchuck's Adequacy of Prenatal Care Utilization (APNCU) Index. This measures how well women are receiving the care they require for a healthy pregnancy and development of the fetus. (www.americashealthrankings.org/measure/2009/prenatal.aspx)
Primary Care Physicians	Number of primary care physicians (including general practice, family practice, OB-GYN, pediatrics and internal medicine) per 100,000 population. This measure reflects the availability of physicians to assist the population with preventive and regular care. (www.americashealthrankings.org/measure/2009/PCP.aspx)
Preventable Hospitalizations	Discharge rate among the Medicare population for diagnoses that are amenable to non-hospital based care. This reflects how well a population uses the various delivery sites for necessary care. (www.americashealthrankings.org/measure/2009/preventable.aspx)

(continues)

Table 13 Summary Description of Measures CORE MEASURES (continued)

Core Measures

OUTCOMES	DESCRIPTION
Poor Mental Health Days	Number of days in the previous 30 days when a person indicates their activities are limited due to mental health difficulties. This is a general indication of the population's ability to function on a day-to-day basis. (www.americashealthrankings.org/measure/2009/MentalDays.aspx)
Poor Physical Health Days	Number of days in the previous 30 days when a person indicates their activities are limited due to physical health difficulties. This is a general indication of the population's ability to function on a day-to-day basis. (www.americashealthrankings.org/measure/2009/PhysicalDays.aspx)
Geographic Disparity	The variation among the overall mortality rates among the counties within a state. Equality among counties would be expressed by low variation. This measure indicates how equal the outcomes are across a state. (www.americashealthrankings.org/measure/2009/disparity.aspx)
Infant Mortality	Number of infant deaths (before age 1) per 1,000 live births. This is an indication of the prenatal care, access and birth process for both child and mother. (www.americashealthrankings.org/measure/2009/IMR.aspx)
Cardiovascular Deaths	Number of deaths due to all cardiovascular diseases, including heart disease and strokes, per 100,000 population. This is an indication of the toll that these types of diseases place on the population. (www.americashealthrankings.org/measure/2009/CVD.aspx)
Cancer Deaths	Number of deaths due to all causes of cancer per 100,000 population. This is an indication of the toll cancer places on the population. (www.americashealthrankings.org/measure/2009/cancer.aspx)
Premature Death	Number of years of potential life lost prior to age 75 per 100,000 population. This is an indication of the number of useful years of life that are not available to a population due to early death. (www.americashealthrankings.org/measure/2009/PrematureDeath.aspx)

(continues)

Table 13 Summary Description of Measures CORE MEASURES (continued)

Supplemental Measures

DETERMINANTS	DESCRIPTION
Behaviors	
Cholesterol Check	Percentage of adults who have had their blood cholesterol checked within the last five years. (www.americashealthrankings.org/measure/2009/CholesterolTest.aspx)
Dental Visit	Percentage of adults who have visited the dentist or dental clinic within the past year for any reason. (www.americashealthrankings.org/measure/2009/dental.aspx)
Physical Activity	Percentage of adults who, during the past month, participated in any physical activities. (www.americashealthrankings.org/measure/2009/activity.aspx)
Teen Birth Rate	The number of births per 1,000 mothers age 15 to 19. (www.americashealthrankings.org/measure/2009/teenbirth.aspx)
Chronic Disease	
Cardiac Heart Disease	Percentage of adults who have been told by a health professional that they had angina or coronary heart disease. (www.americashealthrankings.org/measure/2009/Cardiac.aspx)
Diabetes	Percentage of adults who have been told by a health professional that they had diabetes(does not include pre-diabetes or diabetes during pregnancy). (www.americashealthrankings.org/measure/2009/diabetes.aspx)
High Cholesterol	Percentage of adults who have had their cholesterol checked and been told that it was high. (www.americashealthrankings.org/measure/2009/HighCholesterol.aspx)
Heart Attack	Percentage of adults who have been told by a health professional that they had a heart attack(myocardial infarction). (www.americashealthrankings.org/measure/2009/HeartAttack.aspx)
Stroke	Percentage of adults who have been told by a health professional that they had a stroke. (www.americashealthrankings.org/measure/2009/stroke.aspx)
Hypertension	Percentage of adults who have been told by a health professional that they had high blood pressure. (www.americashealthrankings.org/measure/2009/hypertension.aspx)
Economic	
Personal Income	Per capita personal income in current dollars.(www.americashealthrankings.org/measure/2009/income.aspx)
Unemployment Rate	Total unemployed as a percent of the civilian labor force (U-3 definition). This is the usual number cited by officials and in the media. The annual unemployment rate is at www.americashealthrankings.org/measure/2009/annual unemployment.aspx; the August 2009 unemployment rate, seasonally adjusted,is at www.americashealthrankings.org/measure/2009/augustunemployment.aspx.
Underemployment Rate	Total unemployed, plus all marginally attached workers, plus total employed part time for economic reasons, as a percent of the civilian labor force plus all marginally attached workers (U-6 Definition).This more comprehensive definition accounts for individuals that are not fully employed, are involuntarily working part time or have stopped looking for employment. (www.americashealthrankings.org/measure/2009/underemployment.aspx)
IncomeDisparity (Ginicoefficient)	A common measure of income in equality that varies between 0, which reflects complete equality of income and 1, which indicates complete inequality (one person has all the income or consumption, all others have none). (www.americashealthrankings.org/measure/2009/gini.aspx)

A short discussion of each measure immediately follows. The data for each year is the most current data available at the time the report was compiled.

The data tables are available at www.americashealthrankings.org/measure.aspx.

Determinants

Behaviors

Four measures reflect behaviors that are potentially modifiable through a combination of personal, community and clinical interventions: the prevalence of smoking, the prevalence of obesity, the percentage of the population that binge drinks and high school graduation. These items are determinants that measure behaviors and activities having an immediate or delayed effect on health and are prominently included in these rankings. However, the selection of these four does not imply that they are the only underlying behaviors that need to be addressed in a comprehensive public health effort. For example, the American Academy of Family Physicians suggests that to improve health, individuals should:

- Avoid any form of tobacco,
- Eat a healthy diet,
- Exercise regularly,
- Drink alcohol in moderation, if at all,
- Avoid use of illegal drugs,
- Practice safe sex,
- Use seat belts (and car seats for children) when riding in a car or truck,
- Avoid sunbathing and tanning booths,
- Keep immunizations up-to-date, and
- See a doctor regularly for preventive care.

Additional suggestions for individual initiatives are in *Healthy People in Healthy Communities, A Community Planning Guide Using Healthy People 2010*, published by the U.S. Department of Health and Human Services, Washington, D.C., available at http://www.healthypeople.gov/Publications/HealthyCommunities2001/ default.htm.

The impact of changing behaviors is huge. CDC estimates that if tobacco use, poor diet and physical inactivity were eliminated, 80 percent of heart disease and stroke, 80 percent of Type 2 diabetes and 40 percent of cancer would be prevented.[7]

Prevalence of Smoking measures the percent of the population over age 18 that smokes tobacco products regularly. The information is obtained from the Behavioral Risk Factor Surveillance System (BRFSS) and measures the percentage of the population that has smoked at least 100 cigarettes and currently smokes regularly.

The prevalence of smoking in the population has an adverse impact on overall health by causing increased cases of respiratory diseases, heart disease, stroke, cancer and other illnesses (http://www.cdc.gov/tobacco/). It is a lifestyle behavior that an individual can directly influence with support from the community and, as required, clinical intervention.

The 2009 ranks, based on 2008 data (Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention), can be found at www.americashealthrankings.org/measure/2009/smoking.aspx. The national average is 18.3 percent of the population, a significant decrease of 1.5 percent from the rate last year. This means that over 40 million American adults smoke on a regular basis. Cigarette smoking is estimated to be responsible for about one in five deaths annually, or about 443,000 deaths per year.[8] The proportion of the population that smokes varies from a low of 9.3 percent in Utah to more than 25 percent in Kentucky, Indiana and West Virginia. The prevalence of smoking decreased significantly in Wyoming, from 22.1 percent to 19.3 percent of the population, and in Ohio, from 23.1 percent to 20.1 percent of the population. If all states were to accomplish a smoking rate equal to the best state (Utah), the number of smokers in the United States would be halved.

Since the 1990 Edition, the prevalence of smoking decreased in the United States by 11.2 percent. Rhode Island, Virginia, Maryland, Florida, Delaware and Vermont each lowered the prevalence of smoking since 1990 by 14 percent or more. Every state experienced a decrease since the 1990 Edition. Missouri had the smallest decrease in percentage of the population and continues to hover around one-quarter of the population smoking on a regular basis. Due to the limits of the BRFSS, caution must be used in comparing changes in prevalence of smoking in states with small populations.

Prevalence of Binge Drinking measures the percentage of the population who binge drink. Binge

[7] Mensah, George A., Associate Director for Medical Affairs, CDC "Global and Domestic Health Priorities: Spotlight on Chronic Disease," National Business Group on Health Webinar, May 23, 2006.

[8] Centers for Disease Control and Prevention. Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses-United States, 2000-2004. *Morbidity and Mortality Weekly Report* [serial online]. 2008;57(45):1226-1228.

drinking is defined as males having five or more drinks and females having four or more drinks on one occasion. Binge drinking has an adverse effect on health due to increased injuries and deaths, increased aggression, damage to the fetus and liver diseases along with other health concerns (http://www.cdc.gov/alcohol/).

Prevalence of Binge Drinking is measured over a two-year span to increase the reliability of the estimates and to allow better state-to-state comparisons. The measure reflects the impact of excessive alcohol on increased motor vehicle deaths, liver damage and unintentional injuries.

The 2009 ranks, based on 2007 and 2008 data (Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention) are at www.americashealthrankings.org/mea sure/2009/binge.aspx. The prevalence of binge drinking varies from less than 10 percent in Tennessee, West Virginia and Utah to more than 20 percent in Iowa, North Dakota and Wisconsin. The national average is 15.7 percent of the adult population who binge drinks and has varied from 14.3 percent to 16.8 percent of the population over the last seven years. The largest decrease in the last year was in West Virginia where the prevalence of binge drinking decreased from 10.5 percent to 9.3 percent of the population, however this decline may not be statistically significant. New Mexico also declined in overall ranking in the last year, but its notable gain is the decline in binge drinking from 15.4 percent in 2002 to 11.9 percent of the population in 2009. Even though the definition of binge drinking has changed during this time span, the state has shown consistent declines in the last seven years. The largest increase in the last year was in Kentucky, but it also may not be statistically significant in that it increased from 8.4 percent to 10.1 percent of the population and just returned to historical levels.

Prevalence of Obesity is the percentage of the population estimated to be obese, defined as having a body mass index (BMI) of 30.0 or higher. BMI is equal to your weight in pounds divided by your height in inches squared and then multiplied by 703. CDC has a calculator for BMI at http://www.cdc.gov/nccdphp/dnpa/bmi/ calc-bmi.htm. Weight status is determined per Table 14. Obesity is known to contribute to a variety of diseases, including heart disease, diabetes and general poor health (http://www.cdc.gov/nccdphp/dnpa/ obesity/). The data are collected by each state as part of the Behavioral Risk Factor Surveillance System of the Centers for Disease Control and Prevention.

The 2009 ranks, based on 2008 data (Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention), are at www.americashealthrankings.org/measure/2009/obesity.aspx. The average for the United States is 26.6 percent of the adult population, up from 26.3 percent of the population in 2008 and substantially more than double the rate of 11.6 percent of the population in 1990. In the United States, this means that more than one-in-four are obese—that is 56 million adults with a body mass index of 30.0 or higher. If the population of the United States could return to the weight status of 1990, there would be 25 million fewer obese individuals—more than the entire population of the second most populous U.S. state, Texas.

The prevalence of obesity ranges from 19.1 percent of the population in Colorado to over 30 percent of the population in Kentucky, South Carolina, Oklahoma, Tennessee, West Virginia, Alabama and Mississippi. In the last year, no state experienced a significant change in obesity, however over the last five years, obesity has significantly increased in 80 percent of all states. There has been no significant decline in obesity in the last five years. Since 1990, the prevalence of obesity increased in all states. The largest increases have been in Alabama, Tennessee and Oklahoma.

High School Graduation estimates the percentage of incoming ninth graders who graduate within four years and are considered regular graduates. The National Center for Education Statistics collects the enrollment and completion data and, now, as part

Table 14 **Body Mass Index (BMI)**

BMI	WEIGHT STATUS	EXAMPLES (ADULTS) 5'6"	5'10"	6'2"
Below 18.5	Underweight	Under 115 lbs	Under 129 lbs	Under 144 lbs
18.5 to 24.9	Normal	115 to 154 lbs	129 to 174 lbs	144 to 194 lbs
25.0 to 29.9	Overweight	155 to 185 lbs	175 to 208 lbs	195 to 233 bls
30.0 and above	Obese	Over 186 lbs	Over 208 lbs	Over 233 lbs

of the No Child Left Behind initiative, estimates the graduation rate for each state. The rate is the number of graduates divided by the estimated count of freshmen four years earlier. This average freshman enrollment count is the sum of the number of 8th graders five years earlier, the number of 9th graders four years earlier (because this is when current year seniors were freshmen) and the number of 10th graders three years earlier divided by three. Enrollment counts include a proportional distribution of students not enrolled in a specific grade.

Data are not adjusted for the presence or quality of basic health and consumer health education in the curriculum, for continuing education programs nor for other non-traditional learning programs. Also, individual states are increasingly altering graduation requirements, which may affect their reported number of regular graduates, their graduation rate and the comparability of these rates across time.

Education is a vital contributor to health as consumers must be able to learn about, create and maintain a healthy lifestyle and understand and participate in their options for care.

The 2009 ranks, based on 2005 to 2006 data (National Center for Education Statistics, Washington, D.C., U.S. Department of Education), are at www.americashealthrankings.org/measure/2009/graduation.aspx. The rate varies from 87.5 percent of incoming ninth graders who graduate within four years in Wisconsin to 55.8 percent in Nevada. The national average is 73.4 percent, down 1.3 percent from 74.7 percent in the 2008 Edition. Graduation rates have stagnated in the last five years with around 73 percent of incoming ninth graders graduating within four years. Arizona's rate returned back to more historical levels dropping from 84.7 percent to 70.5 percent of incoming ninth graders who graduate within four years. Utah, California and Virginia indicated a drop of 5 percent or more in the last year.

Community & Environment

Five measures are used to represent the community and the environment: the violent crime rate, the occupational fatalities rate, the percentage of children in poverty, the incidence of air pollution. Measures of community and environment reflect the reality that the daily conditions in which we live our lives have a great effect on achieving optimal individual health. The presence of pollution, violence, illegal drugs, infectious disease and unsafe workplaces are detrimental. In addition, studies indicate that the general socio-economic conditions and the level of education have a significant relationship to the healthiness of a community's residents.

These determinants measure both positive and negative aspects of the community and environment of each state and their effects on the population's health. Again, there are many additional efforts of communities that improve the overall health of a population but are not directly reflected in these five measures. Each community has its strengths, challenges and resources and should undertake a careful planning process to determine what action plans are best for them.

Violent Crime measures the effect of criminal behavior on a population's health. It represents factors such as illegal drug use and various social ills. Violent crime measures the annual number of murders, rapes, robberies and aggravated assaults per 100,000 population. Violent crime reflects an aspect of current U.S. lifestyle and is an indicator of health risk and death.

The 2009 ranks, based on 2008 data (Crime in the United States: 2008. Washington, D.C., Federal Bureau of Investigation), are at www.americashealthrankings.org/measure/2009/crime.aspx. The violent crime rate is dependent upon many factors, not just population; thus when taking action to combat crime, each state must consider its specific circumstances.

The violent crime rate varies from less than 175 offenses per 100,000 population in Maine, Vermont, New Hampshire and North Dakota to more than 700 offenses per 100,000 population in South Carolina, Nevada, Tennessee and Delaware. The national average is 455 offenses per 100,000 population, down 12 offenses per 100,000 population from the prior year and down 154 offenses per 100,000 population from the 1990 Edition. Crime peaked in 1993 and 1994 at 758 offenses per 100,000 population and has since dropped by 40 percent.

The largest reported decreases in violent crime from the 2008 Edition occurred in Louisiana where reported offenses decreased by 74 offenses per 100,000 population and in South Carolina where reported offenses decreased by 58 offenses per 100,000 population. The largest reported increases occurred in Connecticut, from 256 to 298 offenses per 100,000 population, and in South Dakota, from 169 to 201 offenses per 100,000 population.

This is the tenth year that the national violent crime rate is lower than the 1990 Edition. However, several states experienced significant increases since 1990, led by Delaware, Alaska and Tennessee with increases of 271 offenses, 197 offenses and 188 offenses per 100,000 population, respectively. New York, California and Florida reduced violent crime the most since the 1990 Edition, decreasing from

1,007 to 398 offenses per 100,000 population, from 918 to 504 offenses per 100,000 population, and from 1,024 to 689 offenses per 100,000 population, respectively.

Occupational Fatalities represents the impact of hazardous jobs on the population. Occupational injuries would be a preferred measure; however, there is not a uniform reporting system used by all 50 states. Due to the different industry mixes in each state, occupational fatalities are adjusted to more accurately reflect the actual safety differences between the states.

Occupational fatalities are measured over a three-year span because of their low incidence rate. The industry adjustment is based on the ratio of workers in the following industries: construction, manufacturing, trade, transportation, utilities, professional and business services as defined by the North American Industry Classification System (NAICS).

The 2009 ranks, based on 2006 to preliminary 2008 data (Census of Fatal Occupational Injuries, Bureau of Labor Statistics, U.S. Department of Labor, Washington, D.C.), are at www.americashealthrankings.org/measure/2009/WorkFatalities.aspx. Scores vary from 3.1 deaths per 100,000 workers in Massachusetts and Minnesota to over 10 deaths per 100,000 workers in Wyoming and Alaska. The national norm is 4.8 deaths per 100,000 workers, down from 5.2 deaths per 100,000 workers in the 2008 Edition. The occupational fatalities rate decreased the most in the last year in Florida, by 1.3 deaths per 100,000 workers. The rate did not significantly increase in any state.

Children in Poverty measures the percentage of related persons under age 18 living in a household that is below the poverty threshold. The poverty threshold established by the U.S. Census Bureau for a household of four people which includes two children living in the lower 48 states is approximately $22,050 in household income.

The 2009 ranks, based on 2008 data (March 2009 Current Population Survey, Washington, D.C., U.S. Census Bureau), are at www.americashealthrankings.org/measure/2009/Child Poverty.aspx. The percentage of children in poverty ranged from less than 10 percent of persons under age 18 in New Hampshire, Utah, Alaska and Vermont to a high of more than 25 percent in New Mexico and Arizona. The national average is 19.0 percent, up 1.0 percent from the 2008 Edition and up 3.2 percent from the low of 15.8 percent of persons under age 18 reported in the 2002 Edition. It is only 1.6 percent below the 1990 Edition. In the past year, the percentage of children in poverty increased in 35 of 50 states, though no individual changes are statistically significant. Since 1990, the percentage of children in poverty has increased in 17 of 50 states. Children in poverty increased by 5 percent or more in Rhode Island, Arizona and Delaware, while during the same time period, it decreased by 10 percent or more in Louisiana and Mississippi.

Infectious Disease includes the occurrence of Acquired Immune Deficiency Syndrome (AIDS), tuberculosis and hepatitis (A and B) as representative of all major infectious diseases in a state. It is a running three-year average.

It should be noted that this measure is neither age nor race adjusted, and, as reporting comes from each individual state health department, the level of accuracy may differ from state to state. Despite these drawbacks, the data remains the best available.

The 2009 ranks, based on 2006 to 2008 data (*Mortality and Morbidity Weekly Reports*, Centers for Disease Control and Prevention), are at www.americashealthrankings.org/2008/disease.aspx. AIDS cases in 2008 were not available as the data collection system for this measure is being revised. The incidence of infectious disease per 100,000 population varies from a reported low of less than five cases in North Dakota, Wyoming, Montana, Idaho and Vermont to a reported high of more than 30 cases in New York, Maryland and Florida. The national average is 19.1 cases per 100,000 population, down from 20.1 cases per 100,000 population in the 2008 Edition and down considerably from 40.7 cases per 100,000 population in the 1990 Edition.

In Georgia, reported infectious disease decreased by 4.8 cases per 100,000 population and continues a five-year decline in the state. No state had a considerable increase. Since the 1990 Edition, Oregon, Alaska, Arizona and Washington have seen the greatest decreases in reported cases with more than 70 fewer cases per 100,000 population and all show a gradual, continued decline in infectious disease rates. None of the states have experienced increases in the incidence of infectious disease since the 1990 Edition.

Air Pollution measures the fine particulates in the air we breathe. The fine particulates, too small to see individually but appearing as haze in the air, can enter the deepest portions of the lungs. Air pollution has been shown to have an adverse effect on health, including decreased lung function, aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease. See www.epa.gov/air/particlepollution/health.html for more information.

Air Pollution was a new measure in the 2008 Edition. It is the population weighted average exposure to particulates 2.5 micron and smaller for each county reporting within a state. Air pollution is monitored in many counties where population density is significant and/or where there have been pollution concerns in prior years. Population weighting of the county data adjusts the information to reflect the actual number of people potentially exposed to the particulate. In counties where pollution data is not available, the population was assumed to be exposed to the background level of particulate in the air quality control region and/or state. Background levels are estimated to be the average of the lowest measures in each region or state for each of the last three years. The data is collected by the EPA and available at http://www.epa.gov/air/data/. (Due to modification in the method used to estimate particulate exposure in background areas, the data for the 2008 Edition is restated in this report.)

The 2009 ranks, based on 2006 to 2008 data (U.S. Environmental Protection Agency, Washington, D.C. and the U.S. Census Bureau, Washington, D.C.), are at www.americashealthrankings.org/measure/2009/air.aspx. Air pollution varies from a low of 4.8 micrograms of fine particulate per cubic meter in Hawaii to 13.9 micrograms of fine particulate per cubic meter in California, Delaware, Georgia and Pennsylvania. The average for reporting counties in the United States is 11.7 micrograms of fine particulate per cubic meter, down slightly from 12.2 micrograms in 2008 and 12.8 micrograms five years ago in the 2004 Edition.

Public & Health Policies

Three measures are used to represent public and health policies and programs: public health funding, immunization coverage and lack of health insurance. These measures are indicative of the availability of resources and the extent of the program's reach to the public.

Every state has many excellent and effective public health programs, too numerous and individualized to list, that contribute to the overall health of the population but are not explicitly included in these rankings. Contact your state public health officials to obtain additional information about programs in your state that are enacted to optimize individual and community health. Each state summary lists the Web site for that state's health department. Individuals can also see the spectrum of options available to states and communities by visiting www.thecommunityguide.org, a Web site that provides a systemic review of programs and evidence-based recommendations for health and community officials.

Lack of Health Insurance measures the percentage of the population not covered by private or public health insurance. Individuals without health insurance have greater difficulty accessing the health care system, frequently are not able to participate in preventive care programs and can add substantially to the cost of health care due to delayed care and emergency department treatment.

The 2009 ranks, based on 2008 data (March 2009 Current Population Survey, Washington, D.C., U.S. Census Bureau), are at www.americashealthrankings.org/measure/2009/insurance.aspx.

The rate of uninsured population ranged from 5.4 percent in Massachusetts to over 20 percent in Texas, New Mexico and Florida. The national average is 15.3 percent (46.3 million people) uninsured.[9] If the United States as a whole could emulate the best state, the number of uninsured would decrease by over 25 million people or more than the population of Texas, the second most populous state in the United States.

In the last year, the two-year average rate of uninsured population decreased in 16 states, led by Massachusetts with a significant decline of 2.5 percent. The rate of uninsured population increased in 32 states, including an increase of 1.0 percent or more in Rhode Island and Alaska. Over a five-year period, Washington and Massachusetts have experienced a significant decrease in the uninsured rate and Tennessee and South Carolina (as well as the United States as a whole) have experienced a significant increase.

Public Health Funding measures the dollars per person that are spent on public or population health through funding from Centers for Disease Control and Prevention, Health Resources Services Administration and the state. This does not include spending from other sources such as county or city governments. High spending on these health programs are indicative of states that are proactively implementing preventive and education programs targeted at improving the health of at-risk populations within a state. Recent research has shown that an investment of $10 per person per year in proven community-based programs to increase physical activity, improve nutrition, and prevent smoking and other tobacco use could save the country more than $16 billion annually within five years. This is a return of $5.60 for every $1 invested (http://healthyamericans.org/reports/prevention08/Prevention08.pdf).

The 2009 ranks, based on 2006 and 2007 data (Trust for America's Health, Washington, D.C.) are at www.americashealthrankings.org/measure/2009/PH_Spending.aspx. It ranges from more than $150 per person in Vermont, Alaska and Hawaii to less than $40 per person in Wisconsin, Indiana, Nevada and Ohio. The average funding in the United States is $94 per person, up from $88 per person last year and $76 per person two years ago.[9]

Immunization Coverage is the percentage of children ages 19 to 35 months who have received the suggested early childhood immunizations listed in Table 15. Early childhood immunization has been shown to be a safe and cost-effective manner of controlling diseases within the population.

The 2009 ranks, based on 2008 data (National Immunization Program, Centers for Disease Control and Prevention), are at www.americas healthrankings.org/measure/2009/immunize.aspx. It ranges from immunization coverage of 85.0 percent in New Hampshire to less than 70 percent in Montana, Idaho and Wyoming. Compared to coverage in the prior year, coverage for the complete series of immunizations in the United States decreased from 80.1 percent to 78.2 percent of children ages 19 to 35 months. In the last year, immunization coverage dropped significantly in Connecticut from 89.3 percent to 72.5 percent of children ages 19 to 35 months and in Maryland from 92.4 percent to 82.6 percent of children ages 19 to 35 months. (The latter is less troubling since 2008 data was reported to be unusually high compared to prior years.) In the last 14 years, coverage in the United States increased from 55.1 percent to 78.2 percent of children ages 19 to 35 months who received the complete set of immunizations. The rate peaked in 2005 and 2006 at almost 81 percent of children receiving a full set of immunizations. The recent decline is not significant at the 95 percent confidence level, yet is still troubling in its direction.

The Guide to Community Preventive Services has numerous proven methods to increase the rate of vaccinations in a community that include ways to increase the demand in the community, improving access and system-based or provider-based innovations. See their suggestions at http://www.thecommunityguide.org/vaccine/default.htm.

[9] U.S. Bureau of the Census; Income, Poverty and Health Insurance Coverage in the United States: 2008, September 2009.

Table 15 Immunization Coverage

IMMUNIZATION	DOSES
DTP	4 or more
Poliovirus	3 or more
MCV	1 or more
HiB	3 or more
HepB	3 or more

Clinical Care

Preventive and curative care must be delivered in an effective, appropriate and timely manner. In the 2009 Edition, three measures are included in this section: Prenatal Care, Primary Care Physicians and Preventable Hospitalizations. Prenatal Care has been included since the 1990 Edition and Primary Care Physicians and Preventable Hospitalizations were added in the 2007 Edition.

Prenatal Care is a measure of both access to and frequency of prenatal care based on the Adequacy of Prenatal Care Utilization (APNCU) Index developed by Kotelchuck. This index considers two aspects of prenatal care: the month it was initiated and the number of visits occurring after initiation. The 1990 through 2004 Editions of the report defined Prenatal Care using the Kessner Index, a measure highly correlated to Kotelchuck; however, it does not consider both initiation and frequency of visits. The introduction of a new birth certificate, the information of record from which the APNCU is derived, is an additional complication to the data. The adoption of the new birth certificate is gradual across the system and directly comparing the APNCU from the different certificates is not valid. Therefore, starting with this Edition, the APNCU index only compares a state to another state using the same birth certificate. While this does allow a score to be calculated among peer states, it doesn't allow for ranking the states for this measure.

Prenatal care is not adjusted for age or race.

The 2009 Edition is based on 2006 data (National Center for Health Statistics. Adequacy of Care by State, United States, Hyattsville, Md.) and can be found at www.americashealthrankings.org/measure/2009/prenatal.aspx.

Primary Care Physicians is a measure of access to primary care for the general population as measured by number of primary care physicians per 100,000 population. Primary care physicians provide a combination of direct care to the patient and, as necessary, counsel the patient in the appropriate use of specialists and advance treatment locations.

The 2009 ranks, based on 2007 data (American Medical Association, Physician Characteristics and Distribution in the United States, 2009 Edition, Chicago, Ill. Data used with permission), are at www.americashealthrankings.org/measure/2009/PCP.aspx. Primary care physicians include all those who identify themselves as Family Practice physicians, General Practitioners, Internists, Pediatricians, Obstetricians or Gynecologists.

The number of Primary Care Physicians per 100,000 population will change because of changing state population, physician retirements, new physicians, and physicians moving between states and specialties. Primary Care Physicians range from 190.0 physicians per 100,000 population in Massachusetts to 78.1 physicians in Idaho. The national average is 120.6 physicians per 100,000 population, essentially unchanged in the last few years.

Preventable Hospitalizations is a measure of the discharge rate from hospitals for ambulatory care-sensitive conditions. Ambulatory care-sensitive conditions are those "for which good outpatient care can potentially prevent the need for hospitalization, or for which early intervention can prevent complications or more severe disease."[10] These hospitalizations can often be reduced by strong outpatient care systems and include conditions such as adult asthma, bacterial pneumonia, congestive heart failure, chronic obstructive pulmonary disease, diabetes, low birth weight, urinary tract infection and other conditions. It is not adjusted by characteristics of the population served, such as age or health status.

These discharges are also highly correlated with general admissions and reflect the tendency for a population to overuse the hospital setting as a site for care.

The 2009 ranks, based on 2006 data (The Dartmouth Atlas of Health Care, The Dartmouth Institute for Health Policy and Clinic Practice, Lebanon, N.H.), are at www.americashealthrankings.org/measure/2009/preventable.aspx. The rate of preventable hospitalizations ranges from a low of under 50 discharges per 1,000 Medicare enrollees in Washington, Oregon, Hawaii and Utah to over 100 discharges per 1,000 Medicare enrollees in West Virginia, Kentucky and Mississippi. The national average is 74.2 discharges per 1,000 Medicare enrollees, down from 78.4 discharges last year. Four of five states had a significant improvement in this measure in the last year. In the last eight years, the national discharge rate declined from 82.5 to 74.2 discharges per 1,000 Medicare enrollees, a notable improvement in this metric that reflects improving clinical care and follow-up for preventable hospitalizations.

[10] http://www.qualityindicators.ahrq.gov/.

Health Outcomes

Health outcomes include the length of life, the disparity among outcomes in a state and the quality of life. These seven measures represent the burden placed on the overall health of a population by death, disparity and depressed quality of life. Measures range from counting days in which people feel their normal activities are limited due to poor health to disease-specific mortality and years of potential life lost.

Poor Mental Health Days is the average number of days in the previous 30 days that a person could not perform work or household tasks due to mental illness. The data is collected by the Behavioral Risk Factor Surveillance System of the Centers for Disease Control and Prevention and rely on the accuracy of each respondent's estimate of the number of limited activity days lost in the previous 30 days.

Poor mental health days highlight the fact that good health outcomes preclude days in which mental health prohibits an individual from accomplishing everyday activities.

The 2009 ranks, based on 2008 data (Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention), are at www.americashealthrankings.org/measure/2009/MentalDays.aspx. The number of poor mental health days in the previous 30 days ranges from an average of 2.2 days in North Dakota to 4.0 or more days in Oklahoma, Alabama, Mississippi, West Virginia and Kentucky. The average number of poor mental health days in the previous 30 days for the United States is 3.4 days, essentially unchanged from the prior eight editions. Kentucky had a significant increase of 0.9 days in the previous 30 days, returning it to more historical values. Florida had a significant increase of 0.5 days, rising to 3.7 days in the previous 30 days, and continues to trend upward over the last ten years.

Poor Physical Health Days is the average number of days in the 30 days that a person could not perform work or household tasks due to physical illness. The data are collected by the Behavioral Risk Factor Surveillance System of the Centers for Disease Control and Prevention and rely on the accuracy of each respondent's estimate of the number of limited activity days lost in the previous 30 days.

Poor physical health days highlight that good health outcomes preclude days in which physical

health prohibits an individual from accomplishing everyday activities.

The 2009 ranks, based on 2008 data (Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention), are at www.americashealthrankings.org/measure/2009/PhysicalDays.aspx. The number of poor physical health days in the previous 30 days ranges from an average of 2.7 days in Nebraska, 2.8 days in North Dakota, 2.9 days in Connecticut and Minnesota and 5.5 days in West Virginia. The average number of poor physical health days in the previous 30 days for the United States is 3.6 days, and it has remained the same for the last six years.

Geographic Disparity measures the variation in the age-adjusted mortality rate among counties within a state. Ideally, health and mortality should be equal among the populations of every county within a state and not vary based upon the physical location where a person lives. Many things may differ among counties, including natural features such as altitude, latitude, moisture and temperature and man-made features such as land use, population density, roads and communications. But even with all these variations, health should still be equal.

Geographic Disparity was a new measure in the 2008 Edition. It indicates the amount of variation among the counties of a state. It is the standard deviation of the three-year average, age-adjusted all-cause mortality rate for all counties within a state divided by the three-year age-adjusted all-cause mortality rate for the state. The lower the percent, the closer each county is to the state average and the more uniform the mortality rate is across the state. For counties with fewer than 20 deaths in the three year period (about 20 to 30 counties in the United States each year), the county was assumed to have an age-adjusted death rate equal to the state's age-adjusted death rate and thus has no effect on the geographic disparity of the state.

The 2009 ranks, based on 2004 to 2006 data (Centers for Disease Control and Prevention), are at www.americashealthrankings.org/measure/2009/disparity.aspx. It varies from a low geographic disparity of less than 6 percent in Connecticut, New Hampshire and Delaware to a high geographic disparity of more than 20 percent in Florida and South Dakota. For the United States as a whole, the geographic disparity among all counties is 17.1 percent, up slightly from 16.8 percent in the 2008 Edition and on a consistently upward trend since the 2004 Edition, the first year it was calculated.

Infant Mortality represents many factors surrounding birth, including but not limited to: the health of the mother, prenatal care, quality of the health services delivered to the mother and child and infant care. In addition, high infant mortality rates are often considered preventable and, thus, can be influenced by various educational and care programs.

The 2009 ranks, based on a two-year average using 2005 and 2006 data (National Center for Health Statistics, Washington, D.C. Some data is provisional), are at www.americashealthrankings.org/measure/2009/IMR.aspx. Infant mortality varies greatly among states, from less than 5.0 deaths per 1,000 live births in Washington and Utah to more than 10.0 deaths per 1,000 live births in Mississippi. The national average is 6.8 deaths per 1,000 live births. The data has not been updated since the 2008 Edition.

States with a low number of births will experience more fluctuations in the two-year average infant mortality rate than states with a higher number of births.

Cardiovascular Deaths is measured using a three-year average, age-adjusted death rate due to heart disease, strokes and other cardiovascular disease. The effect of cardiovascular disease on health was measured using mortality data due to the improved accuracy of the data and the ability to adjust for age and race.

The use of mortality data does not reflect the full impact of cardiovascular disease as data indicates that even though mortality rates are declining, more individuals are living with cardiac disease as new procedures prolong the lives of these individuals.

The 2009 ranks, based on 2004 to 2006 data (Centers for Disease Control and Prevention), are at www.americashealthrankings.org/measure/2009/CVD.aspx. This measure varies from a low of 212.6 deaths from cardiovascular disease per 100,000 population in Minnesota to over 350 deaths per 100,000 population in Alabama, Oklahoma and Mississippi. The national average is 287.9 deaths per 100,000 population, down from 298.2 deaths per 100,000 population last year and 405.1 deaths per 100,000 population in 1990.

In the last year, 38 of 50 states had a significant decline in cardiovascular deaths led by declines in Oklahoma from 371.0 deaths to 354.4 deaths per 100,000 population and in Tennessee from 353.8 deaths to 338.1 deaths per 100,000 population. No state experienced an increase. All states have had a significant decline in cardiovascular deaths since the 2007 Edition and the nation overall has experienced a steady decline since the 1990 Edition.

Cancer Deaths is measured using a three-year average, age-adjusted death rate due to cancer. The effect of cancer on health was measured using mortality data due to the improved accuracy of the data and the ability to adjust for age.

The 2009 ranks, based on 2004 to 2006 data (Centers for Disease Control and Prevention), are at www.americashealthrankings.org/measure/2009/cancer.aspx. The rate varies from less than 150 cancer deaths per 100,000 population in Utah to over 220 deaths per 100,000 population in West Virginia, Louisiana and Kentucky. The national average is 192.6 deaths per 100,000 population, a decrease of 0.8 deaths per 100,000 population from the 2008 Edition and a decrease of only 4.9 deaths per 100,000 population from the 1990 Edition. Cancer deaths peaked in 1996 when the national rate was 205.5 deaths per 100,000 population, but unlike cardiovascular deaths, there has not been a significant decline in cancer deaths over the last 20 years.

In the last five years, cancer deaths have declined significantly in about half of the states led by declines in Virginia, Alaska, New Jersey, Nevada and New York.

Premature Death measures the loss of years of productive life due to death before age 75 as defined by Centers for Disease Control and Prevention's Years of Potential Life Lost (YPLL-75). Thus, the death of a 25-year-old would account for 50 years of lost life, while the death of a 60-year-old would account for 15 years.

The 2009 ranks, based on 2006 data (Centers for Disease Control and Prevention), are at www.americashealthrankings.org/measure/2009/prematureDeath.aspx. The age-adjusted data vary from less than 6,000 years lost per 100,000 population in Minnesota, New Hampshire and Vermont to more than 10,000 years lost per 100,000 population in Mississippi, Louisiana and Alabama. The national average is 7,511 years lost before age 75 per 100,000 population, which is 21 years more than the 2008 Edition. Premature death has essentially plateaued in the last decade and hovers around 7,500 years lost before age 75 per 100,000 population.

Supplemental Measures

The core measures used in the Rankings are a small fraction of those measures available to the public and public health officials. *The America's Health Rankings*™ Web site contains additional measures that are useful in understanding the health of your state and provide information for more in-depth analysis.

Table 13 contains a brief definition of the supplemental measures and a link to the data.

Cholesterol Check: The National Cholesterol Education Program (NCEP) recommends that adults aged 20 years or older have their cholesterol checked every 5 years. A simple blood test can measure total cholesterol levels, including LDL (low-density lipoprotein, or "bad" cholesterol), HDL (high-density lipoprotein, or "good" cholesterol), and triglycerides. More than 107 million people are considered to have high cholesterol, of which 38 million are over 240 mg/dL, a level which puts them are a higher risk for heart disease.[11]

[11] Division of Heart Disease and Stroke Prevention, Centers for Disease Control and Prevention, http://www.cdc.gov/dhdsp/library/fs_cholesterol.htm, accessed Sept 3, 2009.

Table 16 Supplemental Chronic Disease Measures

MEASURE	QUESTION	TABLE
Cardiac Heart Disease	Has a doctor, nurse, or other health professional EVER told you that you had any of the following? (Ever told) you had angina or coronary heart disease?	www.americashealthrankings.org/measure/2009/cardiac.aspx
Diabetes	Have you EVER been told by a doctor that you have diabetes?	www.americashealthrankings.org/measure/2009/diabetes.aspx
High Cholesterol	Have you EVER been told by a doctor, nurse or other health professional that your blood cholesterol is high?	www.americashealthrankings.org/measure/2009/HighCholesterol.aspx
Heart Attack	Has a doctor, nurse, or other health professional EVER told you that you had any of the following? (Ever told) you had a heart attack, also called a myocardial infarction?	www.americashealthrankings.org/measure/2009/HeartAttack.aspx
Stroke	Has a doctor, nurse, or other health professional EVER told you that you had any of the following? (Ever told) you had a stroke?	www.americashealthrankings.org/measure/2009/stroke.aspx
Hypertension	Have you EVER been told by a doctor, nurse, or other health professional that you have high blood pressure?	www.americashealthrankings.org/measure/2009/hypertension.aspx

These data are collected through the Behavioral Risk Factor Surveillance System by Centers for Disease Control and Prevention. A table of the percentage of adults receiving a blood cholesterol check within the last five years is at www.americashealthrankings.org/measure/2009/CholesterolTest.aspx. Factors that influence individuals receiving a blood cholesterol check include access, cost, education and motivation.

The National Heart, Lung and Blood Institute at the National Institute of Health provides additional background information on cholesterol and actions you can take to manage high cholesterol at http://www.nhlbi.nih.gov/health/public/heart/index.htm#chol.

Dental Visit: Oral health is a vital part of a comprehensive preventive health program. The Division of Oral Health at the CDC notes, "There are threats to oral health across the lifespan. Nearly one-third of all adults in the United States have untreated tooth decay. One in seven adults aged 35 to 44 years has gum disease; this increases to one in every four adults aged 65 years and older. In addition, nearly a quarter of all adults have experienced some facial pain in the past six months. Oral cancers are most common in older adults, particularly those over 55 years who smoke and are heavy drinkers."[12]

These data are collected through the Behavioral Risk Factor Surveillance System by Centers for Disease Control and Prevention. A table of the percentage of adults visiting a dental office within the last year is at www.americashealthrankings.org/measure/2009/dental.aspx. Factors that influence individuals receiving dental include access, cost, education and motivation.

Additional information on oral health can be obtained from the Division of Oral Health, Centers for Disease Control and Prevention (http://www.cdc.gov/OralHealth) and from the American Dental Association (http://www.ada.org/public/index.asp). Both Websites address questions about personal oral health and community programs to improve overall oral health, such as water fluoridation.

Physical Activity: Regular physical activity is one of the most important things you can do for your health. It can help:[13]

- Control your weight
- Reduce your risk of cardiovascular disease
- Reduce your risk for type 2 diabetes and metabolic syndrome
- Reduce your risk of some cancers
- Strengthen your bones and muscles
- Improve your mental health and mood
- Improve your ability to do daily activities and prevent falls, if you're an older adult
- Increase your chances of living longer

These data are collected through the Behavioral Risk Factor Surveillance System by Centers for Disease Control and Prevention. A table of the percentage of adults who have participated in any physical activities in the last 30 days is at www.americashealthrankings.org/measure/2009/activity.aspx. These physical activities range from walking through exercise programs, so the range includes activities that are available to almost every individual.

Centers for Disease Control and Prevention presents guidelines for physical activities for adults, children and older adults at http://www.cdc.gov/physicalactivity/everyone/guidelines/index.html.

Diet: According to the Dietary Guidelines for Americans published by the CDC, a healthy eating plan:[14]

- Emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products
- Includes lean meats, poultry, fish, beans, eggs, and nuts
- Is low in saturated fats, trans fats, cholesterol, salt (sodium), and added sugars
- Stays within your daily calorie needs

Data collected for this measure focus on the consumption of vegetables and fruits at the recommended five portions per day. These data are collected through the Behavioral Risk Factor Surveillance System by Centers for Disease Control and Prevention. A table of the percentage of adults who consume five or more servings of vegetables and fruit a day is at www.americashealthrankings.org/measure/2009/diet.aspx.

Nutritional information is abundant and overwhelming, but two sound starting points for information are the Centers for Disease Control and

[12] Division of Oral Health, Centers for Disease Control and Prevention, http://www.cdc.gov/OralHealth/topics/adult.htm, accessed Sept 3, 2009.

[13] Centers for Disease Control and Prevention, http://www.cdc.gov/physicalactivity/everyone/health/index.html accessed Sept 3, 2009.

[14] Centers for Disease Control and Prevention, http://www.cdc.gov/healthyweight/healthy_eating/index.html, accessed Sept 3, 2009.

Prevention (http://www.cdc.gov/healthyweight/index.html) resources about healthy weight and the National Heart, Lung and Blood Institute DASH nutrition plan (http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/introduction.html). The DASH eating plan was originally developed as an eating plan to reduce high blood pressure, i.e., hypertension. (DASH stands for Dietary Approaches to Stop Hypertension.) However, the plan also represents a healthy approach to eating for those who do not have a problem with hypertension.

Teen Birth Rate: Prevention of teen and unplanned pregnancy is an important part of a healthy community. The CDC notes, "In 2006, there were 435,436 births to mothers aged 15-19 years in the United States, a birth rate of 41.9 per 1,000 women in this age group. The majority, nearly two thirds among mothers under age 18 and more than half among mothers aged 18-19 years, of teen births are unintended—they occurred sooner than desired or were not wanted at any time. U.S. teen pregnancy, birth, and abortion rates are considerably higher than most other developed countries."[15]

Data collected for this measure focus on the rate of birth to mothers age 15 through 19. These data are collected by the Centers for Disease Control and Prevention. The birth rate for teens is at www.americashealthrankings.org/measure/2009/teenbirth.aspx.

A valuable resource for further information about teen and unplanned pregnancy is available from The National Campaign to Prevent Teen and Unplanned Pregnancy (http://www.thenationalcampaign.org/default.aspx).

Chronic Disease: Six diseases are included in this category: cardiac heart disease, diabetes, high cholesterol, heart attack, stroke and hypertension (high blood pressure). These diseases are long term illnesses that many individuals can manage through lifestyle changes and healthcare interventions. However, they do place a burden on many of the affected individuals by constraining options and activities available to them and can mean expensive and on-going expenditures for health care.

All measures are self-reported by respondents to the Behavioral Risk Factor Surveillance System to the following questions.

Resources for heart and vascular diseases are at National Heart, Lung and Blood Institute (http://www.nhlbi.nih.gov/health/public/heart/index.htm) as well as at the Division for Heart Disease and Stroke Prevention, Centers for Disease Control and Prevention (http://www.cdc.gov/DHDSP/index.htm).

Diabetes information is available at National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention (http://www.cdc.gov/diabetes/ and http://www.cdc.gov/nccdphp/publications/aag/ddt.htm) and the American Diabetes Association (http://www.diabetes.org/).

Median Household Income: Median household income is the amount that divides the income distribution into two equal groups, half with income above that amount, and half with income below that amount. The household's income reflects the ability for that household to afford aspects of a healthy lifestyle, preventive medicine and curative care not provided to the individual through government, business, trade groups or other sources.

Data for household income is from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplements and presented at www.americashealthrankings.org/measure/2009/MedianIncome.aspx.

Personal Income: An individual's income reflects the ability for that individual to afford aspects of a healthy lifestyle, preventive medicine and curative care not provided to the individual through government, business, trade groups or other sources. Personal income has also been shown to be negatively correlated to morbidity and mortality, that is higher income relates to lower illness and death.[16]

Data for personal income is from the Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce and presented at www.americashealthrankings.org/measure/2009/income.aspx. Per capita personal income is total personal income divided by total midyear population.

Unemployment Rate: For many individuals, their employer is the source for their healthcare insurance. For most, employment is the source of income for sustaining a healthy life and for accessing healthcare.

The Bureau of Labor Statistics, U.S. Department of Labor releases unemployment figures monthly and annually. The official definition of the unemployment rate is "total unemployed, as a percent of the

[15] Centers for Disease Control and Prevention, http://www.cdc.gov/reproductivehealth/AdolescentReproHealth/AboutTP.htm, accessed Sept 3, 2009.

[16] "Poverty or income inequality as predictor of mortality: longitudinal cohort study" by Fiscella, Frank and Franks, Peter; *BMJ*1997;314:1724 (14 June), http://www.bmj.com/cgi/content/ full/314/7096/1724.

civilian labor force" and is the figure most widely published by the media.

Data for the most recent annual unemployment rate is at www.americashealthrankings.org/measure/2009/annualunemployment.aspx.

Data for the August 2009 unemployment rate is at www.americashealthrankings.org/measure/2009/augustunemployment.aspx.

Underemployment Rate: Many suggest that the official unemployment rate does not reflect the full impact of employment on the market. The Bureau of Labor Statistics uses an expanded definition to allow for individuals that are no longer seeking employment, those employed only part time when they desire full time work and workers that are only marginally attached, that is persons who currently are "neither working nor looking for work but indicate that they want and are available for a job and have looked for work sometime in the recent past."

Data for the most recent annual underemployment rate is at www.americashealthrankings.org/measure/2009/underemployment.aspx.

Income Disparity (Gini): The Gini coefficient is a common measure of income inequality. It varies between 0, which reflects complete equality of income and 1, which indicates complete inequality (one person has all the income or consumption, all others have none). Historically, the U.S. index has varied from .386 in 1968 to .470 in 2006.

There is debate among the public health and economic communities as to the effect of income disparity on health of a population. However, that need not be resolved to acknowledge that income disparity does play a factor in how a community will develop plans and take actions to change health. As such, income disparity provides a valuable description of the environment in which health improvement programs must be implemented.

The source for the data is U.S. Census Bureau, Current Population Survey, 1978 to 2008 Annual Social and Economic Supplements and it is presented at www.americashealthrankings.org/measure/2009/gini.aspx.

Historically, the U.S. index has varied from .386 in 1968 to .470 in 2006 (http://www.census.gov/hhes/www/income/histinc/h04.html). Most developed European nations and Canada have Gini indices between .24 and .36. (The Gini Index, which is the Gini coefficient times 100, is reported for other countries by the Central Intelligence Agency at https://www.cia.gov/library/publications/the worldfactbook/fields/2172.html and in Human Development Reports, United Nations Development Program at http://hdrstats.undp.org/en/indicators/147.html.)

Weighting of Measures

Three criteria were considered when assigning weights to measures.

1. What effect does a measure have on overall health?
2. Is the effect measured solely by this measure or is it included in other measures?
3. How reliable is the data supporting a measure?

The final weights, presented in Table 17, are based on input from the experts in 1990 and 1991 and from input from the Scientific Advisory Committee and its continuing methodological review. The weights of the measures total 100 percent. The column labeled "% of Total" indicates the weight of each measure in determining the overall ranking. For example, prevalence of smoking is 7.5 percent of the *America's Health Rankings*™. The column labeled "Effect on Score" presents how each measure positively or negatively relates to the overall ranking. For example, a high prevalence of smoking has a negative effect on score and will lower the ranking of a state. An increase in the percent of high school graduates has a positive effect on score and will increase the overall ranking of a state.

Table 17 Weight of Individual Measures

NAME OF MEASURE	% OF TOTAL	EFFECT ON SCORE
Determinants		
Behaviors		
Prevalence of Smoking	7.5	Negative
Prevalence of Binge Drinking	5.0	Negative
Prevalence of Obesity	7.5	Negative
Community & Environment		
High School Graduation	5.0	Positive
Violent Crime	5.0	Negative
Occupational Fatalities	2.5	Negative
Infectious Disease	5.0	Negative
Children in Poverty	5.0	Negative
Air Pollution	5.0	Negative
Public & Health Policies		
Lack of Health Insurance	5.0	Negative
Public Health Funding	2.5	Positive
Immunization Coverage	5.0	Positive
Clinical Care		
Prenatal Care	5.0	Positive
Primary Care Physicians	5.0	Positive
Preventable Hospitalizations	5.0	Negative
Health Outcomes		
Poor Mental Health Days	2.5	Negative
Poor Physical Health Days	2.5	Negative
Geographic Disparity	5.0	Negative
Infant Mortality	5.0	Negative
Cardiovascular Deaths	2.5	Negative
Cancer Deaths	2.5	Negative
Premature Death	5.0	Negative
Overall Health Ranking	100.0	—

READING

3

Sorting Out the Connections between the Built Environment and Health: A Conceptual Framework for Navigating Pathways and Planning Healthy Cities

Source: With kind permission from Spring Science + Business Media: Northridge ME, Sclar ED, Biswas P. Sorting out the connections between the built environment and health: a conceptual framework for navigating pathways and planning healthy cities. *J Urban Health* 2003;80:556-68.

ABSTRACT

The overarching goal of this article is to make explicit the multiple pathways through which the built environment may potentially affect health and well-being. The loss of close collaboration between urban planning and public health professionals that characterized the post–World War II era has limited the design and implementation of effective interventions and policies that might translate into improved health for urban populations. First, we present a conceptual model that developed out of previous research called Social Determinants of Health and Environmental Health Promotion. Second, we review empirical research from both the urban planning and public health literature regarding the health effects of housing and housing interventions. And third, we wrestle with key challenges in conducting sound scientific research on connections between the built environment and health, namely: (1) the necessity of dealing with the possible health consequences of myriad public and private sector activities; (2) the lack of valid and reliable indicators of the built environment to monitor the health effects of urban planning and policy decisions, especially with regard to land use mix; and (3) the growth of the "megalopolis" or "super urban region" that requires analysis of health effects across state lines and in circumscribed areas within multiple states. We contend that to plan for healthy cities, we need to reinvigorate the historic link between urban planning and public health, and thereby conduct informed science to better guide effective public policy.

While it has been stated before, it nonetheless bears repeating that the connections between urban planning and public health are not new.[1] What has changed is the magnitude of the population health crisis that we presently face in both the developed

and less developed areas of the world. The United Nations Human Settlements Programme (UN-HABITAT) estimates that approximately 1 billion people out of a global population of close to 6 billion people are presently living in slumlike conditions.[2] By 2030, the global population is expected to increase by about 2 billion people; the slum-dwelling population is expected to account for half of this increase.[2] The squalid living conditions of industrialized cities in the middle of the 19th century that gave rise to both the urban planning and public health professions are again fully manifest at the beginning of the 21st century,[3] as large segments of the world's population lack basic shelter and sanitation, especially in developing countries.[2]

Unfortunately, the loss of close collaboration between urban planning and public health professionals that characterized the post–World War II era has limited the design and implementation of effective interventions and policies that might translate into improved health for urban populations. While the theory that connects the built environment to health and well-being is intuitively plausible, we still have a long way to go in collecting sufficient empirical data to make convincing appeals for planning and policy changes by the weight of the evidence.

In the interest of reviving strategic collaborations between urban planning and public health professionals, next we outline three major aims for this article. First, we present a conceptual model that developed out of previous research conducted separately by colleagues at the University of Michigan[4] and our group at Columbia University,[3] which we then connected and built upon to construct a framework for "Social Determinants of Health and Environmental Health Promotion."[5] Unlike other approaches in which the built environment is considered as background or context, our conceptual model specifically focuses on urban morphology and responds to Hebbert's conjectures about where the streets and buildings belong in the "new public health."[6(p446)]

Second, we review empirical research from both the urban planning and public health literature regarding the health effects of housing and housing interventions, both to illustrate how connections between the built environment and health and well-being have been investigated to date, and to recommend strategies that may be useful in future scientific inquiry. An earlier article by Greenberg et al. found only minor overlap in a review of all articles and book reviews published between 1978 and 1990 in the *Journal of the American Planning Association* and the *American Journal of Public Health*.[7] Since that time, the "new urbanism" has devoted rather more attention to the new public health than vice versa,[6] but recent campaigns spearheaded by the National Center for Environmental Health of the Centers for Disease Control and Prevention[8] and the National Institute of Environmental Health Sciences of the National Institutes of Health[9] are helping to redirect the attention of public health researchers toward investigating the health outcomes of urban design choices and community revitalization projects. In September 2003, the *American Journal of Public Health*[10] and the *American Journal of Health Promotion*[11] both published theme issues devoted to the built environment and health. The current issue of the *Journal of Urban Health* provides additional scientific and policy focus on these connections, with particular emphasis on the urban context.

Finally, we wrestle with key challenges in conducting sound scientific research on connections between the built environment and health, namely: (1) the necessity of dealing with the possible health consequences of myriad public and private sector activities, including those primarily concerned with commerce, housing, transportation, labor, energy, and education;[12] (2) the lack of valid and reliable indicators of the built environment to monitor the health effects of urban planning and policy decisions, especially with regard to land use mix;[13] and (3) the growth of the "megalopolis" or "super urban region" that requires analysis of health effects across state lines and in circumscribed areas within multiple states.[14] While they are by no means panaceas, we suggest strategies for addressing each of these challenges, in order to advance the science of connections between the built environment and health, and better plan for healthy cities.

FOCUS ON URBAN ENVIRONMENTS AND POPULATIONS

More of us are urban dwellers than ever before. According to the 2000 census, nearly 80% of the approximately 280 million people counted in the United States live in metropolitan areas or, more correctly, *metropolitan statistical areas,* defined as urban agglomerations of 50,000 people or more.[15] The largest of these is the New York consolidated metropolitan statistical area, which spreads out over four states (New York, New Jersey, Connecticut, and Pennsylvania) and contains over 21 million people. The U.S. Bureau of the Census defines a *consolidated metropolitan statistical area* as an agglomeration of over 1 million people living in adjacent primary met-

ropolitan statistical areas or metropolitan statistical areas that by local common agreement are effectively aggregated into one region.[15]

The importance of this observation rests upon its implications for the relevant spatial unit for analyzing data, as well as the "level" for intervention to improve population health. For instance, most of the environmental interventions conducted to date, such as ameliorating lead paint, have occurred at the neighborhood, site, and building levels. Increasingly, however, the most important environmental and population health interventions, such as decreasing emissions of greenhouse gases, will require collaboration at the national, regional, and even global levels.

A CONCEPTUAL FRAMEWORK FOR UNDERSTANDING THE CONNECTIONS BETWEEN THE BUILT ENVIRONMENT AND HEALTH

Our joint urban planning and public health framework is centrally concerned with the social, political, economic, and historical processes that generate the urban built environment.[3] By the built environment, we mean that part of the physical environment made by people for people, including buildings, transportation systems, and open spaces. The remainder of the physical environment is the natural environment. None of the natural environment per se remains in cities, since even the parks and waterways have been created—or at least significantly modified—by people, and are therefore part of the built environment.[16] Nonetheless, the natural environment is essential to all life, including urban dwellers. Thus, while we consider the natural environment to be a fundamental determinant of health and well-being, in the context of our joint urban planning and public health framework it is background, while the built environment is foreground.

Mary Northridge recently collaborated with Amy Schulz, a University of Michigan sociologist, to delineate the various mechanisms and pathways through which social, political, and economic processes interface with the physical configurations of cities to affect the health and well-being of urban populations.[5] The conceptual model we jointly devised is presented in Figure 1 (not included).

Figure 1 (not included) was adapted from a conceptual model for understanding racial disparities in health that was developed by Dr. Schulz and her colleagues at the University of Michigan,[4] and draws upon a joint urban planning and public health framework for use in health impact assessment that our group at Columbia University previously introduced.[3] The model posits that three domains—the natural environment (including topography, climate, and water supply), macrosocial factors (including historical conditions, political and economic orders, and human rights doctrines), and inequalities (including those related to the distribution of wealth, employment and educational opportunities, and political influence)—contain the fundamental factors that underlie and influence health and well-being via multiple pathways through differential access to power, information, and resources.[17]

Fundamental factors, in turn, influence two domains of intermediate factors: the built environment (including land use, transportation systems, and buildings) and the social context (including community investment, public and fiscal policies, and civic participation). Structurally, our model posits a set of simultaneous and dynamic relationships among four of the five domains that comprise the first two levels of our model. For analytic purposes, the natural environment is treated as an exogenous domain. It is important to note, however, that this last assumption does not hold over extended time frames. In the longer term, anthropomorphic choices about transportation systems and energy sources do, in fact, change the natural environment. Nonetheless, for our purposes, holding the natural environment relatively constant does little damage to more sophisticated models in which it, too, becomes an endogenous domain.

In terms of the synthesis we seek between the urban built environment and population health and well-being, it is the intermediate factors that we choose to emphasize, in particular. Whether purposefully or inadvertently, it is here that the impact of the built environment is especially subject to policy manipulation. A corollary is that these types of interventions may have the greatest potential benefit for improved population health and well-being. Intermediate factor interventions include the development of land use strategies based upon densification, land use mixing, and microscale design considerations. Because urban planners work at the interface between the built environment and social context applying the knowledge of social science and urban design to generate the physical configurations of cities, we believe that stronger collaborations between urban planners and public health practitioners may prove effective in designing and planning for healthy cities.

Moving from the intermediate factors to the proximate factors in Figure 1 (not included), we shift

from the familiar territory of the urban planner to the familiar territory of the public health practitioner. The proximate factors influencing health and well-being are dominated by two domains: stressors (including violent crime, financial insecurity, and environmental toxins) and social integration and social support (including the shape of social networks and the resources available within networks). A somewhat transitional domain is depicted for health behaviors, as they are conceptually separate and distinct from the other two proximate domains, and yet are impossible to practically disentangle from them. Interactive and dynamic relationships among the various domains, between the fundamental and intermediate factors as well as between the intermediate and proximate factors, are depicted by the arrows in Figure 1.

In the past several decades, public health research and practice has focused on understanding and influencing health behaviors, such as smoking cessation, mammography screening, and consumption of more fruits and vegetables. As early as the 1970s and 1980s, however, economic insecurity—unemployment in particular—was implicated in the creation of both physical and mental illness.[18,19] More recently, a broader set of proximate factors, including the effects of racism on health[20] and social support on longevity,[21] have been given greater scientific attention.

Finally, the last column in Figure 1, Health and Well-Being, contains two domains: health outcomes include obesity, injury and violence, respiratory health, and others; well-being effects include hope/despair, life satisfaction, and happiness, to name but a few. As these in turn clearly influence civic life, Figure 1 illustrates the interactive and dynamic nature of the proximate factors and health and well-being domains through the use of arrows between these levels.

Increased interest in the life course approach to chronic disease epidemiology has helped inform population health theory and practice over the past several years, even as this approach is not new to public health or unique to epidemiology.[22] As defined by Ben-Shlomo and Kuh, the life course approach to chronic disease epidemiology is "the study of long-term effects on chronic disease risk of physical and social exposures during gestation, childhood, adolescence, young adulthood, and later adult life."[22(p285)] This perspective includes studies of the biological, behavioral, and psychosocial pathways that operate across an individual's life course as well as across generations to influence the development of chronic diseases and is clearly consonant with the conceptual model presented in Figure 1.

EVIDENCE BASE FOR CONNECTIONS BETWEEN HOUSING AND HOUSING INTERVENTIONS AND HEALTH AND WELL-BEING

On October 25, 1967, at the engineering and sanitation section program at the 95th annual meeting of the American Public Health Association in Miami Beach, Florida, M. Allen Pond, Assistant Surgeon General for Special Projects of the Public Health Service, presented a paper on the role of the public health service in housing and urban life:

> Health problems associated with housing—and the neighborhood that the housing services—are too important to be dealt with on a strictly categorical basis. The problems of the slums and the ghettos in America demand the broadest possible attention, and health officials at all levels must give the highest priority to their solution. The job to be done is simply too big to be handled in a unified, sharply delineated way. Indeed, much of what the Public Health Service does in support of research and development, preparation of standards, training of manpower, provision of technical assistance, and sharing in the costs of program development and operation bears significantly on our national efforts to improve the quality of housing and urban living.[23(p101)]

Our interest in housing interventions is both long-standing[24] and contemporary,[25] renewed in part from ongoing efforts to address the childhood asthma epidemic in Harlem, New York City.[26] Presently, the shortage of affordable housing is so severe in New York City that the homeless population is larger than it has ever been at 38,200 people, including 17,000 children. Fully 85% of the homeless population in New York City is composed of families; 40% of these homeless children have asthma, and lack a regular physician or health care worker to oversee their medical care.[27]

In searching the public health literature for research linking housing and health, we came across a comprehensive review of evidence related to the health and social effects of housing improvements.[28] Upon turning to the urban planning literature, we found an equally thoughtful review on both links between housing and health, and the effects of urban regeneration on health.[29] The following discussion draws heavily on these two current reviews.

Thomson et al. reviewed studies from the observational public health literature on hazards in domestic buildings and identified hygrothermal

conditions, radon, falls, house dust mites, environmental tobacco smoke, and fires as the major health risks.[28] Meanwhile, Curtis et al. reviewed studies from the urban planning literature and concluded that poor housing may affect physical health through greater risks of injury and violence, increased levels of respiratory disease and gastrointestinal problems associated with cold, damp conditions and mold growth, and increased rates of infection because of crowded living conditions, especially in temporary accommodations.[29]

Nonetheless, Thomson et al.'s comprehensive review of the health effects of housing improvements concluded that there was insufficient evidence to support improved housing as a means to improved health.[28] In terms of general physical health and illness episodes, 10 of the studies reviewed found some health improvements, 5 studies found no differences on certain measures, and some studies found mixed effects. A more consistent pattern was found for mental health, suggesting that improved housing generates mental health gains. The findings on respiratory health were more equivocal, although one study found children's respiratory symptoms improved and fewer days were missed from school due to asthma 3 months after installation of central heating.[30]

In terms of well-being, the intervention results were more positive. On the basis of four studies that assessed social outcomes, the overall findings were that, after relocation, residents reported a reduced sense of isolation, a reduced fear of crime, an increased sense of belonging and feelings of safety, increased involvement in community affairs, greater recognition of neighbors, and improved outlook on the area as a good place to live.[28] Conversely, two of the reviewed studies on rehousing and area regeneration highlighted the potential for unintended adverse effects because of increased rents. One older study reported increases in standardized mortality rates in the rehoused residents, which was attributed to a doubling in rents, and the household members' consequent inability to afford adequate food.[31]

Curtis et al.[29] concluded that it is difficult to disentangle the health effects of housing renewal from other factors. Housing improvements to windows and bathrooms, fencing of semiprivate spaces, closing alleyways, calming traffic, and improving children's play spaces in an English town estate resulted in reduced anxiety and depression, improved self-esteem, reduced fear of crime, and greater perceived "friendliness" of the area.[32] In an area of Sweden that had undergone improvements to local services and facilities, the population showed reduced levels of mental illness and increased levels of social support.[33] Finally, Collard recorded the experiences of Bangladeshi families in temporary accommodations, who reported that financial assistance in moving, and redecorating and furnishing the home would have been helpful.[34] Not surprisingly, high levels of mobility had detrimental effects on the families' access to primary health care and education.

Saegert et al.[35] have reviewed and evaluated the key characteristics, methods, and results of housing interventions designed to improve health. Of the 64 interventions reviewed from 12 electronic databases, 90% addressed a single condition (most often lead, injury, or asthma), 59% were targeted to children, and 13% were designed for older adults. The message is that current interventions linking housing and health are woefully limited in both scope and scale. The lack of an evidence base relating improved housing to improved health may be due in part to the failure of public health researchers and practitioners to engage in meaningful housing development projects from the initial planning stages and to evaluate them longitudinally and across the life course using valid and reliable measures of health and well-being.

Calls for broad-based studies of the health impacts of the built environment and needed planning and policy interventions at the intermediate level in our conceptual model have historic precedent. On November 16, 1967, Richard A. Prindle, Assistant Surgeon General and director of the Bureau of Disease Prevention and Environmental Control, Public Health Service, gave a speech titled, "The City as Environment: Biological and Social Implications," at a centennial symposium at Wayne State University in Detroit, Michigan. He concluded:

> We public health workers must begin to concern ourselves with land use policy in the broadest sense. We must develop criteria of effective use of resources, and in order to develop these criteria we must relate them to standards concerning the health and well-being of people.
>
> We in the health professions also have a specific job of collecting the kind of information on which public planning and policy can be based and of translating these data for the decision makers—which ultimately is the general public. Finally, we in public health, in concert with others, must move from the ivory tower into the community to observe and work with situations as they exist. Epidemiology may not be the full answer, but it certainly is the beginning. We need measurements and plans based on those measurements. We need actions to correct the problems as those affected see them

if our solutions are to be accepted, put in practice, and have lasting benefits.[36]

This is not to say it will be easy. We turn our attention next to two key hurdles we have identified in conducting sound scientific research on connections between the built environment and health, and our proposed strategies for surmounting them.

CHALLENGES IN CONDUCTING SOUND SCIENTIFIC RESEARCH ON THE BUILT ENVIRONMENT AND HEALTH

Rather than compiling an exhaustive list of the challenges likely to be encountered in conducting research on connections between the built environment and health, we have elected instead to discuss two key areas and how we have sought to address each of the difficulties we faced. The first is the lack of valid and reliable indicators of the built environment to monitor effects of urban planning and policy decisions, especially with regard to land use mix. For instance, current land use policies not only facilitate automobile use and dependence but also actually hinder the ability to safely access even nearby urban destinations on foot or bike, or by mass transit. Prior to the establishment of a precedent for exclusionary zoning in 1926 (*Euclid, Ohio v Ambler Realty),* land uses were most often intermixed. Afterward, *euclidean* emerged as a euphemism to convey homogeneous zoning, which predominates in the United States today.[13]

Mixed use or heterogeneous zoning allows compatible but different land uses to locate in close proximity to one another and thereby decreases the travel distances between activities.[37] The effects of land use mix on travel choices vary as distances between complementary land uses increase. Thus, one strategy for mitigating air quality and traffic problems and encouraging walking, biking, and transit is to improve accessibility to work sites, services, and transit stations within existing urban settings.[38]

Empirical research regarding the relationship between land use mix and travel behavior has been limited by the relative complexity of measurement, thereby hampering investigations of proposed theoretical ideas involving population health effects.[13] For instance, if a zone is more than half a mile across, then the benefit of mixing uses at a scale in which residents may choose to walk for shopping or a meal may not be captured. For this reason, measuring land use mix at the census block group level rather than at the census tract level may be more meaningful. In addition, when measured at a zonal level, land use mix also needs to take into account the effects of complementary land uses located in adjacent zones, since people do not recognize census borders when selecting destinations. If services are located within a convenient and pleasurable walk, that is, a safe and comfortable one, more people will access these services on foot rather than in automobiles.

Other methodological complications arise in examining the effects of land use mix on transportation modes. For instance, to reduce automobile use, there needs to be pedestrian connectivity between nearby, complementary land uses. Handy notes that access is a function of both travel times and the number and quality of nearby destinations, which need to be accounted for in empirical investigations.[39]

As important as land use mix is to urban planning, there is a dearth of empirical evidence in the public health literature regarding the effects of zoning and land use policies that may potentially affect population health and well-being. An exception is Maantay's longitudinal case study of New York City over the period 1961 to 1998, in which she found that noxious industrial uses are increasingly concentrated within poor communities of color.[40] Employing geographical information systems along with block-by-block canvassing for walkability and verification of service locations, it may be possible to generate improved measures of land use mix across a range of urban and suburban communities that may be usefully employed in future investigations of connections between land use mix and population health.

A second major challenge in conducting sound research on the built environment and health relates to the growth of the megalopolis or super urban region, which requires the analysis of health effects across state lines and in circumscribed areas within multiple states.[14] Not only is the United States a metropolitan nation, it is highly skewed in its distribution of residents. The 10 largest consolidated metropolitan statistical areas account for one third of the entire population. Hence, to effectively plan for urban design and health services, regional analyses are required.

The methodologies for conducting the necessary empirical investigations far surpass the cooperative arrangements that would be needed to implement meaningful policy interventions such as interstate compacts in state and local taxing and land use policy. For example, Rodwin and Gusmano, as part of their World Cities Project, first defined an urban core

for New York City, London, Paris, and Tokyo, and then examined the similarities and differences among them.[41] Their current studies illuminate inequalities in health care use and health status, the importance of neighborhoods in protecting population health, and the quality of life in diverse urban communities. Nelson et al., using data from the Behavioral Risk Factor Surveillance System, found significant intrastate differences for binge drinking among metropolitan areas in New York, Tennessee, and Utah.[42] They concluded that metropolitan area estimates might be useful in guiding local efforts to reduce binge drinking. Such methods could be extended to investigate, for example, injury, diabetes, and obesity estimates by metropolitan area, and might then be related to transportation systems, land use policies, and other features of the built environment that have been calculated for these metropolitan statistical areas.[14]

Given sufficient resources, it may even be possible to conduct public health surveillance by city and "megacity," in addition to the current monitoring conducted by states. Certainly the methodological capabilities exist, including using census blocks, census block groups, and census tracts, to construct meaningful agglomerations of the areas of interest.[43]

EFFECTING MEANINGFUL CHANGE

When asked if he ever gets discouraged in his efforts to address urban poverty, Robert M. Coard, the president of Action for Boston Community Development, replied: "[Y]ou know that there's a need. But the need changes. And the face of poverty changes. And what we do changes."[44(p4)]

The needs of the world's poor are profound. The 21st century began with almost 2 billion people living in urbanized regions of the developing world, three quarters of whom live in wretched poverty. Over the next 30 years, the number of city dwellers will double to 4 billion, in a global population that by then will total 8 billion.[3]

According to de la Barra, "Cities are the physical expression of the societies that build them, and the political, social, and economic interactions of their inhabitants.[45(p7)] If we are to collectively revive a passion for "urbanism as a way of life"[46] in the 21st century, it is essential to pay careful attention to the physical definitions of streets and buildings, and ensure that public spaces are places of shared use.

One method of translating research into action on the built environment and health may be through some form of health impact assessment, which is expressly designed to deal with the population health effects of myriad public and private activities, including those primarily concerned with commerce, housing, transportation, labor, energy, and education.[12] In August 2002, Mary Northridge and Elliott Sclar attended a small working meeting of 25 scholars and practitioners from over eight disciplines and 10 countries at the Harvard School of Public Health in Boston, Massachusetts. The aim was to foster a critical exchange about the promises, process, and pitfalls of health impact assessment. In recognition of the fact that public health is strongly influenced by nonmedical health determinants, recent government policies in the United Kingdom and Canada, especially, have provided the impetus for conducting health impact assessments on policies that have not been traditionally viewed as the responsibility of the health sector.[47]

While considerable caution was voiced at the meeting about institutionalizing health impact assessment in the United States, much was learned from the informed and engaged dialogue and debate. A greater appreciation on the part of urban planners and public health professionals of the political processes (from local to federal) that ultimately determine what policies are enacted and what projects are constructed is a first step toward ensuring that research on the built environment and health is more usefully directed toward planning for healthy cities. Yet scientific and professional input is not sufficient to promote healthy living conditions at increasingly high levels of density—the essence of urban life.[3] Only by including the views of the people who bear the brunt of enacted policies and programs will any devised strategies prove acceptable and thus capable of improving population health and well-being. Methodologically, health impact assessment has the potential to improve diverse approaches to developing, testing, validating, implementing, and disseminating research on policies that affect population health, including but not limited to community-based participatory action research.[12,48]

Ultimately, rather than institutionalize health impact assessment in the United States, it may eventually be possible to revamp the environmental impact statement process,[49] which has not been amended in 30 years. Concerns on the part of both environmentalists and developers regarding either erosions of current requirements or further impediments to building projects have hampered efforts to restore it as a meaningful tool of land use decision making.[1] Such improvements might include stronger consideration of environmental health impacts on human

populations, consequential public input from the start rather than only at the end of the process via litigation, and follow-up assessments of the predictions of environmental impact statements which rarely, if ever, are conducted.[12]

CONCLUSION

The conceptual model presented here, Social Determinants of Health and Environmental Health Promotion, includes both the built environment and the social context as intermediate determinants of health and well-being. We seek to integrate this model with other multilevel frameworks, notably the ecosocial perspective,[50] in addition to various complementary and reinforcing frameworks, including the life course approach,[22] health and human rights,[51] the precautionary principle,[52] and sustainable production.[53] In order to meaningfully sort out the connections between the built environment and health, however, we need to do more than be explicit about the hypothesized pathways. We also need to test our theories empirically and use these data to refine our models.

The current public health literature lacks concrete measures of the physical dimensions of the neighborhoods and communities it purports to study. The current urban planning literature fails to take into account the distribution of health determinants within and across social groups defined by age, gender, race/ethnicity, class, and sexuality. We contend that in order to plan effectively for healthy cities, we need to reinvigorate the historic collaborative link between urban planning and public health professionals, and together conduct informed science. Perhaps then we can amass sufficient empirical data to make convincing "weight of the evidence" appeals for essential planning and policy changes to improve the health and lives of urban populations.

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REFERENCES

1. Sclar E, Northridge ME. Property, politics, and public health. *Am J Public Health*. 2001; 91:1013-1015.
2. United Nations Human Settlements Programme (UN-HABITAT). Available at: http:// www.unhabitat.org/about/challenge.asp. Accessed June 1, 2003.
3. Northridge ME, Sclar E. A joint urban planning and public health framework: contributions to health impact assessment. *Am J Public Health*. 2003;93: 118-121.
4. Schulz AJ, Williams DR, Israel BA, Lembert LB. Racial and spatial relations as fundamental determinants of health in Detroit. *Milbank Q*. 2002;20(4): 677-707.
5. Schulz A, Northridge ME. Social determinants of health and environmental health promotion. *Health Educ Behav*. In press.
6. Hebbert M. A city in good shape: town planning and public health. *Town Planning Rev*. 1999:70; 433-453.
7. Greenberg M, Popper F, West B, Krueckeberg D. Linking city planning and public health in the United States. *J Plann Lit*. 1994;8:235-239.
8. Dannenberg AL, Jackson RJ, Frumkin H, et al. The impact of community design on public health: a scientific research agenda. *Am J Public Health*. 2003; 93:1500-1508.
9. Srinivasan S, O'Fallon LR, Dearry A. Creating healthy communities, healthy homes, healthy people: initiating a research agenda on the built environment and public health. *Am J Public Health*. 2003;93:1446-1450.
10. Jackson RJ. The impact of the built environment on health: An emerging field. *Am J Public Health*. 2003;93:1382-1384.
11. Killingsworth R, Earp J, Moore R. Supporting health through design: Challenges and opportunities. *Am J Health Promotion*. 2003;18:1-2.
12. Krieger N, Northridge ME, Gruskin S, et al. Assessing health impact assessment: multidisciplinary and international perspectives. *J Epidemiol Community Health*. 2003;57:659-662.
13. Frank LD. Land use and transportation interaction: implications on public health and quality of life. *J Plann Educ Res*. 2000;20:6-22.
14. Sclar E. A metropolitan nation. *Am J Public Health*. In press.
15. US Bureau of the Census. Available at: http://factfinder.census.gov/servlet/GCT Table?ds_name=DEC_2000_SF1_U&geo_id=01000US&_box_head_nbr=GCT-PH1- R&format=US-10S. Accessed December 21, 2002.
16. Health and Environment: Partners for Life. Ottawa, Ontario: Health Canada; 1997. Report available at http://www.atl.ec.gc/community/resources.html.

17. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav.* 1995;spec no:80-94.
18. Brenner MH. Fetal, infant, and maternal mortality during periods of economic instability. *Int J Health Serv.* 1973;3:145-159.
19. Sclar ED. Community economic structure and individual well-being: a look behind the statistics. *Int J Health Serv.* 1980;10:563-579.
20. Krieger N. Does racism harm health? Did child abuse exist before 1962? On explicit questions, critical science, and current controversies: an ecosocial perspective. *Am J Public Health*. 2003; 93:194-199.
21. Glass TA, Dym B, Greenberg S, Rintell D, Roesch C, Berkman LK. Psychosocial intervention in stroke: Families in Recovery from Stroke Trial (FIRST). *Am J Orthopsychiatry.* 2000;70:169-181.
22. Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: conceptual models, empirical challenges, and interdisciplinary perspectives. *Int J Epidemiol.* 2002;31:285-293.
23. Pond MA. Role of the public health service in housing and urban life. *Public Health Reports*. 1968;83:101-107.
24. Sclar ED. Homelessness and housing policy: a game of musical chairs. *Am J Public Health*. 1990;80:1039-1040.
25. Northridge ME, Sclar ED. Housing and health. *Am J Public Health*. 2002;92:701.
26. Northridge ME, Jean-Louis B, Shoemaker K, Nicholas S. Advancing population health in the Harlem Children Zone Project. *Soz Praventiv Med.* 2002;47:201-204.
27. Newfield J. How the other half still lives: in the shadow of wealth, New York's poor increase. *The Nation.* March 17, 2003:11-17.
28. Thomson H, Pettricrew M, Douglas M. Health impact assessment of housing improvements: incorporating research evidence. *J Epidemiol Community Health*. 2003;57:11-16.
29. Curtis C, Cave B, Coutts A. Is urban regeneration good for health? Perceptions and theories of the health impacts of urban change. *Environ Plann C: Gov Policy.* 2002;20:517-534.
30. Somerville M, Mackenzie I, Owen P, et al. Housing and health: does installing heating in the home improve the health of children with asthma? *Public Health*. 2000;114: 434-440.
31. McGonigle G, Kirby J. *Poverty and Public Health*. London, England: Gillencz, 1936.
32. Halpern D. *Mental Health and the Built Environment: More Than Bricks and Mortar.* London, England: Taylor and Francis, 1995.
33. Dalgard O, Tambs K. Urban environment and mental health: a longitudinal study. *J Psychiatry.* 1997;171:530-536.
34. Collard A. *Settling Up: Towards a Strategy for Resettling Homeless Families*. London, England: Homeless Forum, 1997.
35. Saegert SC, Klitzman S, Freudenberg N, Cooperman J, Nassar S. Healthy housing: a structured review of published evaluations of U.S. interventions to improve health by modifying housing in the United States, 1990-2001. *Am J Public Health*. 2003;93: 1471-1477.
36. Prindle RA. Health aspects of the urban environment. *Public Health Rep*. 1968;83: 617-621.
37. Parker T. *The Land Use Air Quality Linkage: How Land Use and Transportation Affect Air Quality.* Sacramento: California Air Resources Board, 1994.
38. Handy S. Understanding the link between urban form and network travel behavior. *J Plann Educ Res*. 1996;15:183-198.
39. Handy S. Regional versus local accessibility: neotraditional development and its implications for non-work travel. *Built Environ.* 1992;18:253-267.
40. Maantay, J. Zoning, equity and public health. *Am J Public Health*. 2001; 91:1033-1041.
41. Rodwin VG, Gusmano MK. The World Cities Project: rationale, organization, and design for comparison of megacity health systems. *J Urban Health*. 2002;79:445-463.
42. Nelson DE, Naimi TS, Brewer RD, Bolen J, Wells HE. Metropolitan area estimates of binge drinking in the United States. *Am J Public Health*. In press.
43. Krieger N, Chen JT, Waterman PD, Soobader MJ, Subramanian SV, Carson R. Geocoding and monitoring of US socioeconomic inequalities in mortality and cancer incidence: does the choice of area-based measure and geographic level matter? The Public Health Disparities Geocoding Project. *Am J Epidemiol.* 2002;156:471-482.
44. Weiss J. *Boston Globe Magazine*. October 27, 2002:4.
45. de la Barra X. Fear of epidemics: the engine of urban planning. *Plann Pract Res*. 2000; 15:7-16.
46. Wirth L. Urbanism as a way of life. In: LeGates RT, Stout F, eds. *The City Reader.* 2nd ed. London, England: Routledge; 2000:97-105.
47. Department of Health. *Independent Inquiry Into Inequalities in Health: Report*. Chairman Sir Richard Acheson. London, England: Stationery Office; 1998.
48. Israel BA, Schulz AJ, Parker A, Becker AB. Review of community-based research: assessing partnership approaches to improve public health. *Annu Rev Public Health*. 1998; 19:173-202.

49. Gilpin A. *Environmental Impact Assessment (EIA): Cutting Edge for the Twenty-First Century.* Cambridge, England: Cambridge University Press; 1995.

50. Krieger N. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol.* 2001;30:668-677.

51. Gruskin S, Tarantola D. Health and human rights. In: Detels R, McEwen J, Beaglehole R, Tanaka K, eds. *The Oxford Textbook of Public Health*. 4th ed. New Yok, NY: Oxford University Press; 2001:311-335.

52. Kriebel D, Tickner J, Epstein P, et al. The precautionary principle in environmental health. *Environ Health Perspect*. 2001;109:871-876.

53. Quinn MM, Kriebel D, Geiser K, Moure-Eraso R. Sustainable production: a proposed strategy for the work environment. *Am J Ind Med.* 1998;34:297-304.

READING

4

A Conceptual Framework for Action on the Social Determinants of Health

Source: WHO Commission on Social Determinants of Health. V. CSDH framework for action. In: *A Conceptual Framework for Action on the Social Determinants of Health* (http://www.who.int/social_determinants/resources/csdh_framework_action_05_07.pdf, accessed November 4, 2009). Geneva, Switzerland: World Health Organization, 2007: 15-49, 71-75.

Key messages from this section:

- In contemporary social epidemiology, the three main theoretical frameworks for explaining disease distribution are: (1) psychosocial approaches; (2) social production of disease/political economy of health; and (3) ecosocial and other emerging multi-level frameworks. All represent theories of disease distribution, which presume but cannot be reduced to mechanism-oriented theories of disease causation.
- The main social pathways and mechanisms through which social determinants affect people's health can usefully be seen through three perspectives: (1) 'social selection', or social mobility; (2) 'social causation'; and (3) lifecourse perspectives.
- These frameworks/directions and models are not mutually exclusive. On the contrary, they are complementary, and all contribute elements to the CSDH framework.
- Some previous frameworks for understanding SDH and disease distribution have paid insufficient attention to political variables. The CSDH framework will systematically incorporate these factors.

V. CSDH FRAMEWORK FOR ACTION

V.1.—Purpose of constructing a model for the CSDH

We now proceed to present in detail the specific conceptual framework developed for the CSDH. This is an action-oriented framework, whose primary purpose is to support the CSDH in identifying the level(s) at which it will seek to promote change in tackling SDH through policy. The framework helps to situate these levels of intervention, clarify their relationships and suggest the scope and limits of policy action in each area. A comprehensive SDH model should achieve the following:

(a) Identify the social determinants of health and the social determinants of inequities in health;
(b) Show how major determinants relate to each other;
(c) Clarify the mechanisms by which social determinants generate health inequities;
(d) Provide a framework for evaluating which SDH are the most important to address; and
(e) Map specific levels of intervention and policy entry points for action on SDH.

To include all these aspects in one model is difficult and may complicate understanding. In an earlier version of the CSDH conceptual framework, drafted in 2005, we attempted to include all of these elements in a single synthetic diagram. However, this approach was not necessarily the most helpful. In

the current presentation, we separate out the various major components of the framework, and we present and discuss each element separately, in detail.

We begin the presentation by sketching some additional important background elements: first, insights from the theorization of social power, which can help to clarify the dynamics of social stratification; second, an existing model of the social production of disease developed by Diderichsen and colleagues, from which the CSDH framework draws significantly. With these background elements in place, we proceed to examine the key components of the CSDH framework in turn, including: (1) the socio-political context; (2) structural determinants and socioeconomic position; (3) intermediary determinants. We conclude the presentation with a synthetic review of the framework as a whole. The issue of entry points for policy action will be taken up explicitly in the next chapter.

V.2.—Theories of power to guide action on social determinants

Health inequities flow from patterns of social stratification—that is, from the systematically unequal distribution of power, prestige and resources among groups in society. As a critical factor shaping social hierarchies and thus conditioning health differences among groups, 'power' demands careful analysis from researchers concerned with health equity and SDH. Understanding the causal processes that underlie health inequities, and assessing realistically what may be done to alter them, requires understanding how power operates in multiple dimensions of economic, social and political relationships.

The theory of power is an active domain of inquiry in philosophy and the social sciences, and developing a full-fledged theory of power lies beyond the mandate of the CSDH. What the Commission can do is draw elements from philosophical and political analyses of power to guide its framing of the relationships among health determinants and its recommendations for interventions to alter the social distribution of health and sickness.

Power is 'arguably the single most important organizing concept in social and political theory',[67] yet this central concept remains contested and subject to diverse and often contradictory interpretations. Classic treatments of the concept of power have emphasized two fundamental aspects: (1) 'power to', i.e., what Giddens has termed 'the transformative capacity of human agency', in the broadest sense 'the capability of the actor to intervene in a series of events so as to alter their course";[68] and (2) 'power over', which characterizes a relationship in which an actor or group achieves its strategic ends by determining the behavior of another actor or group. Power in this second, more limited but politically crucial sense may be understood as 'the capability to secure outcomes where the realization of these outcomes depends upon the agency of others'.[69] 'Power over' is closely linked to notions of coercion, domination and oppression; it is this aspect of power which has been at the heart of most influential modern theories of power.[70] It is important to observe, meanwhile, that 'domination' and 'oppression' in the relevant senses need not involve the exercise of brute physical violence, nor even its overt threat. In a classic study, Steven Lukes showed that coercive power can take covert forms. For example, power expresses itself in the ability of advantaged groups to shape the agenda of public debate and decision making in such a way that disadvantaged constituencies are denied a voice. At a still deeper level, dominant groups can mold people's perceptions and preferences, for example through control of the mass media, in such a way that the oppressed are convinced they do not have any serious grievances. 'The power to shape people's thoughts and desires is the most effective kind of power, since it pre-empts conflict and even pre-empts an awareness of possible conflicts'.[71] Iris Marion Young develops related insights on the presence of coercive power even where overt force is absent. She notes that 'oppression' can designate, not only 'brutal tyranny over a whole people by a few rulers', but also 'the disadvantage and injustice some people suffer . . . because of the everyday practices of a well-intentioned liberal society'. Young terms this 'structural oppression', whose forms are 'systematically reproduced in major economic, political and cultural institutions'.[72]

For all their explanatory value, power theories which tend to equate power with domination leave key dimensions of power insufficiently clarified. As Angus Stewart argues, such theories must be complemented by alternative readings that emphasize more positive, creative aspects of power. A crucial source for such alternative models is the work of philosopher Hannah Arendt. Arendt challenged fundamental aspects of conventional western political theory by stressing the inter-subjective character of power in collective action. In Arendt's philosophy, 'power is conceptually and *above all politically* distinguished, not by its implication in agency, but above all by its character as *collective action*'[73]. For Arendt, 'Power corresponds to the human ability not just to act, but to act in concert. Power is never the property of an individual; it belongs to a group and

remains in existence only so long as the group keeps together'[74]. From this vantage point, power can be understood as 'a relation in which people are not dominated but empowered' through critical reflection leading to shared action[75].

Recent feminist theory has further enriched these perspectives. Luttrell, Quiroz and Scrutton (2007) follow Rowland (1997) in distinguishing four fundamental types of power:

- Power over (ability to influence or coerce)
- Power to (organize and change existing hierarchies)
- Power with (power from collective action)
- Power within (power from individual consciousness)

They note that these different interpretations of power have important operational consequences for development actors' efforts to facilitate the empowerment of women and other traditionally dominated groups. An approach based on 'power over' emphasizes greater participation of previously excluded groups within existing economic and political structures. In contrast, models based on 'power to' and 'power with', emphasizing new forms of collective action, push towards a transformation of existing structures and the creation of alternative modes of power-sharing: 'not a bigger piece of the cake, but a different cake'.[76]

This emphasis on power as collective action connects suggestively with a model of social ethics based on human rights. As one analyst has argued: 'Throughout its history, the struggle for human rights has a constant: in very different forms and with very different contents, this struggle has consisted of one basic reality: a demand by oppressed and marginalized social groups and classes *for the exercise of their social power*'.[77] Understood in this way, a human rights agenda means supporting the collective action of historically dominated communities to analyze, resist and overcome oppression, asserting their shared power and altering social hierarchies in the direction of greater equity.

The theories of power we have reviewed are relevant to analysis and action on the social determinants of health in a number of ways. First and most fundamentally, they remind us that any serious effort to reduce health inequities will involve changing the distribution of power within society to the benefit of disadvantaged groups. Changes in power relationships can take place at various levels, from the 'micro' level of individual households or workplaces to the 'macro' sphere of structural relations among social constituencies, mediated through economic, social and political institutions. Power analysis makes clear, however, that micro-level modifications will be insufficient to reduce health inequities unless micro-level action is supported and reinforced through structural changes.

By definition, then, action on the social determinants of health inequities is a political process that engages both the agency of disadvantaged communities and the responsibility of the state. This political process is likely to be contentious in most contexts, since it will be seen as pitting the interests of social groups against each other in a struggle for power and control of resources. Theories of power rooted in collective action, such as Arendt's, open the perspective of a less agonistic model of equity-focused politics, emphasizing the creative self-empowerment of previously oppressed groups. 'Here the paradigm case is not one of command, but one of enablement in which a disorganized and unfocused group acquires an identity and a resolve to act'.[78] However, there can be little doubt that the political expression of vulnerable groups' 'enablement' will generate tensions among those constituencies that perceive their interests as threatened. On the other hand, theories that highlight both the overt and covert forms through which coercive power operates provide a sobering reminder of the obstacles confronting collective action among oppressed groups.

Theorizing the impact of social power on health suggests that the empowerment of vulnerable and disadvantaged social groups will be vital to reducing health inequities. However, the theories reviewed here also encourage us to problematize the concept of 'empowerment' itself. They point to the different (in some cases incompatible) meanings this term can carry. What different groups mean by empowerment depends on their underlying views about power. The theories we have discussed acknowledge different forms of power and thus, potentially, different kinds and levels of empowerment. However, these theories urge skepticism towards depoliticized models of empowerment and approaches that claim to empower disadvantaged individuals and groups while leaving the distribution of key social and material goods largely unchanged. Those concerned to reduce health inequities cannot accept a model of empowerment that stresses process and psychological aspects at the expense of political outcomes and downplays verifiable change in disadvantaged groups' ability to exercise control over processes that affect their well-being. This again raises the issue of state responsibility in creating spaces and conditions under which the empowerment of disadvantaged communities

can become a reality. A model of community or civil society empowerment appropriate for action on health inequities cannot be separated from the responsibility of the state to guarantee a comprehensive set of rights and ensure the fair distribution of essential material and social goods among population groups. This theme is explored more fully in section VI.4.3, below.

Key messages from this section:

- An explicit theorization of power is useful for guiding action to tackle health inequities.
- Classic conceptualizations of power have emphasized two basic aspects: (1) 'power to', i.e., the ability to bring about change through willed action; and (2) 'power over', the ability to determine other people's behavior, associated with domination and coercion.
- Theories that equate power with domination can be complemented by alternative readings that emphasize more positive, creative aspects of power, based on collective action. In this perspective, human rights can be understood as embodying a demand on the part of oppressed and marginalized communities for the expression of their collective social power.
- Any serious effort to reduce health inequities will involve changing the distribution of power within society to the benefit of disadvantaged groups.
- Changes in power relationships can range from the 'micro' level of individual households or workplaces to the 'macro' sphere of structural relations among social constituencies, mediated through economic, social and political institutions. Micro level modifications will be insufficient to reduce health inequities unless supported by structural changes.
- This means that action on the social determinants of health inequities is a political process that engages both the agency of disadvantaged communities and the responsibility of the state.

V.3.—Relevance of the Diderichsen model for the CSDH framework

The CSDH framework for action draws substantially on the contributions of many previous researchers, prominently including Finn Diderichsen. Diderichsen's and Hallqvist's 1998 model of the social production of disease was subsequently adapted by Diderichsen, Evans and Whitehead (2001)[79]. The concept of social position is at the center of Diderichsen's interpretation of "the mechanisms of health inequality"[80]. In its initial formulation, the model emphasized the pathway from society through social position and specific exposures to health. The framework was subsequently elaborated to give greater emphasis to "mechanisms that play a role in stratifying health outcomes,"[81] including "those central engines of society that generate and distribute power, wealth and risks" and thereby determine the pattern of social stratification. The model emphasizes how social contexts create social stratification and assign individuals to different social positions. Social stratification in turn engenders differential exposure to health damaging conditions and differential vulnerability, in terms of health conditions and material resource availability. Social stratification likewise determines differential consequences of ill health for more and less advantaged groups (including economic and social consequences, as well as differential health outcomes per se).

At the individual level, the figure depicts the pathway from social position, through exposure to specific contributing causal factors, and on to health outcomes. As many different interacting causes in the same pathway might be related to social position, the effect of a single cause might differ across social positions as it interacts with some other cause related to social position[82]. Diderichsen's most recent version of the model provides some additional insights.[83] Both *differential exposure* (Roman numeral 'I' in the diagram below[not included]) and *differential vulnerability* (II) may contribute to the relation between social position and health outcomes, as can be tested empirically[84]. Ill health has serious social and economic consequences due to inability to work and the cost of health care. These consequences depend not only on the extent of disability but also on the individual's social position (III—*differential consequences)* and on the society's environment and social policies. The social and economical consequences of illness may feed back into the etiological pathways and contribute to the further development of disease in the individual (IV). This effect might even, on an aggregate level, feed into the context of society, as well, and influence aggregate social and economic development[85].

Many of the insights from Diderichsen's model will be taken up into the CSDH framework, which we will now begin to explain, presenting its key components one by one.

Key messages from this section:

- Social position is at the center of Diderichsen's model of 'the mechanisms of health inequality'.

- The mechanisms that play a role in stratifying health outcomes operate in the following manner:
  - **Social contexts** create social stratification and assign individuals to different social positions.
  - **Social stratification** in turn engenders **differential exposure** to health-damaging conditions and **differential vulnerability,** in terms of health conditions and material resource availability.
  - Social stratification likewise determines **differential consequences** of ill health for more and less advantaged groups (including economic and social consequences, as well differential health outcomes per se).

V.4 .—First element of the CSDH framework: socio-economic and political context

The social determinants framework developed by the CSDH differs from some others in the importance attributed to the *socioeconomic-political context*. This is a deliberately broad term that refers to the spectrum of factors in society that cannot be directly measured at the individual level. 'Context' therefore encompasses a broad set of structural, cultural and functional aspects of a social system whose impact on individuals tends to elude quantification but which exert a powerful formative influence on patterns of social stratification and thus on people's health opportunities. Within the context in this sense will be found those social and political mechanisms that generate, configure and maintain social hierarchies, such as for example the labor market, the educational system, and political institutions including the welfare state.

One point noted by some analysts, and which we also wish to emphasize, is the relative inattention to issues of political context in a substantial portion of the literature on health determinants. It has become commonplace among population health researchers to acknowledge that the health of individuals and populations is strongly influenced by SDH. It is much less common to aver that the quality of SDH is in turn shaped by the policies that guide how societies (re)distribute material resources among their members[86]. In the growing area of SDH research, a subject rarely studied is the impact on social inequalities and health of political movements and parties and the policies they adopt when in government[87].

Meanwhile, Navarro and other researchers have compiled over the years an increasingly solid body of evidence that the quality of many social determinants of health is conditioned by approaches to public policy. To name just one example, the state of Kerala in India has been widely studied, showing the relationship between its impressive reduction of inequalities in the last 40 years and improvements in the health status of its population. With very few exceptions, however, these reductions in social inequalities and improvements in health have rarely been traced to the public policies carried out by the state's governing communist party, which has governed in Kerala for the longest period during those 40 years[88]. Hung and Muntaner find similarly that few studies have explored the relationship between political variables and population health at the national level, and none has included a comprehensive number of political variables to understand their effect on population health, while simultaneously adjusting for economic determinants.[89] As an illustration of the powerful impact of political variables on health outcomes, these researchers concluded in a recent study of 18 wealthy countries in Europe, North America and the Asia-Pacific region that 20% of the differences in infant mortality rate among countries could be explained by the type of welfare state. Similarly, different welfare state models among the countries accounted for about 10% of differences in the rate of low birth weight babies.[90]

Raphael similarly emphasizes how policy decisions impact a broad range of factors that influence the distribution and effects of SDH across population groups. Policy choices are reflected for example in: family-friendly labor policies; active employment policies involving training and support; the provision of social safety nets; and the degree to which health and social services and other resources are available to citizens[91]. The organization of health care is also a direct result of policy decisions made by governments. Public policy decisions made by governments are of course themselves driven by a variety of political, economic, and social forces, constituting a complex space in which the relationship between politics, policy and health works itself out.

It is safe to say that these specifically political aspects of context are important for the social distribution of health and sickness in virtually all settings, and have been seriously understudied. On the other hand, it is also the case that the most relevant contextual factors, i.e., those that play the greatest role in generating social inequalities, may differ considerably from one country to another.[92] For example, in some countries religion will be a decisive factor, in others less so. In general, the construction/mapping of context should include at least six points: (1) **governance** in the broadest sense and its processes, including definition of needs, patterns of

discrimination, civil society participation, and accountability/transparence in public administration; (2) **macroeconomic policy,** including fiscal, monetary, balance of payments and trade policies, and underlying labour market structures; (3) **social policies** affecting factors such as labor, social welfare, land and housing distribution; (4) **public policy** in other relevant areas such as education, medical care, water and sanitation;[93] (5) **culture and societal values;** (6) **epidemiological conditions,** particularly in the case of major epidemics such as HIV/AIDS, which exert a powerful influence on social structures and must be factored into global and national policy-setting. In what follows, we highlight some of these contextual elements, focusing particularly on those with major importance for health equity.

We have adopted the UNDP definition of governance, which is as follows: "[the] system of values, policies and institutions by which society manages economic, political and social affairs through interactions within and among the state, civil society and private sector. It is the way a society organizes itself to make and implement decisions. It comprises the mechanisms and processes for citizens and groups to articulate their interests, mediate their differences and exercise their legal rights and obligations. It is the rules, institutions and practices that set limits and provide incentives for individuals, organizations and firms. Governance, including its social, political and economic dimensions, operates at every level of human enterprise, be it the household, village, municipality, nation, region or globe".[94] It is important to acknowledge, meanwhile, that there is no general agreement on the definition of governance, or of good governance. Development agencies, international organizations and academic institutions define governance in different ways, this being generally related to the nature of their interests and mandates.[95]

Regarding labour market policies, we adopt aspects included in the glossary elaborated for the CSDH's Employment Conditions Knowledge Network[96]: "Labour market policies mediate between supply (jobseekers) and demand (jobs offered) in the labour market and their intervention can take several forms. There are policies that contribute directly to matching workers to jobs and jobs to workers or enhancing workers' skills and capacities, reducing labour supply, creating jobs or changing the structure of employment in favour of disadvantaged groups (e.g. employment subsidies for target groups). Typical passive programmes are unemployment insurance and assistance and early retirement; typical active measures are labour market training, job creation in form of public and community work programmes, programmes to promote enterprise creation and hiring subsidies. Active policies are usually targeted at specific groups facing particular labour market integration difficulties: younger and older people, women and those particularly hard to place such as the disabled".

The concept of the 'welfare state' is one in which the state plays a key role in the protection and promotion of the economic and social well-being of its citizens. It is based on the principles of equality of opportunity, equitable distribution of wealth, and public responsibility for those unable to avail themselves of the minimal provisions for a good life. The general term may cover a variety of forms of economic and social organization. A fundamental feature of the welfare state is social insurance. The welfare state also usually includes public provision of basic education, health services, and housing (in some cases at low cost or without charge). Anti-poverty programs and the system of personal taxation may also be regarded as aspects of the welfare state. Personal taxation falls into this category insofar as it is progressively used to achieve greater justice in income distribution (rather than merely to raise revenue) and also insofar as it used to finance social insurance payments and other benefits not completely financed by compulsory contributions. In socialist countries the welfare state also covers employment and administration of consumer prices.[97]

One of the main functions of the welfare state is 'income redistribution'; therefore, the welfare state framework has been applied to the fields of social epidemiology and health policy as an amendment to the 'relative income hypothesis'. Welfare state variables have been added to measures of income inequality to determine the structural mechanism through which economic inequality affects population health status.[98]

Chung and Muntaner provide a classification of welfare state types and explore the health effects of their respective policy approaches. Their study concludes that countries exhibit distinctive levels of population health by welfare regime types, even when adjusted by the level of economic development (GDP per capita) and intra-country correlations. They find, specifically, that Social Democratic countries exhibit significantly better population health status, i.e., lower infant mortality rate and low birth weight rate, compared to other countries.[99]

Institutions and processes connected with globalization constitute an important dimension of context as we understand it. 'Globalization' is defined by the CSDH Globalization Knowledge Network, fol-

lowing Jenkins, as: '"a process of greater integration within the world economy through movements of goods and services, capital, technology and (to a lesser extent) labour, which lead increasingly to economic decisions being influenced by global conditions"—in other words, to the emergence of a global marketplace'[100]. Non-economic aspects of globalization, including social and cultural aspects, are acknowledged and relevant. However, economic globalization is understood as the force that has driven other aspects of globalization over recent decades. The importance of globalization signifies that contextual analysis on health inequities will often need to examine the strategies pursued by actors such as transnational corporations and supranational political institutions, including the World Bank and International Monetary Fund.

'Context' also includes social and cultural values. The value placed on health and the degree to which health is seen as a collective social concern differs greatly across regional and national contexts. We have argued elsewhere, following Roemer and Kleczkowski, that the social value attributed to health in a country constitutes an important and often neglected aspect of the context in which health policies must be designed and implemented.[101] In constructing a typology of health systems, Roemer and Kleczkowski have proposed three domains of analysis to indicate how health is valued in a given society:

- The extent to which health is a priority in the governmental/societal agenda, as reflected in the level of national resources allocated to health.
- The extent to which the society assumes collective responsibility for financing and organizing the provision of health services. In maximum collectivism (also referred to as a state-based model), the system is almost entirely concerned with providing collective benefits, leaving little or no choice to the individual. In maximum individualism, ill health and its care are viewed as private concerns.
- The extent of societal distributional responsibility. This is a measure of the degree to which society assumes responsibility for the distribution of its health resources. Distributional responsibility is at its maximum when the society guarantees equal access to services for all.[102]

These criteria are important for health systems policy and evaluating systems performance. They are also relevant to assessing opportunities for action on SDH.

To fully characterize all major components of the socioeconomic and political context is beyond the scope of the present paper. Here, we have considered only a small number of those components likely to have particular importance for health equity in many settings.

V.5.—Second element of the framework: structural determinants and socioeconomic position

Graham observes that the concept of 'social determinants of health' has acquired a dual meaning, referring both to the social factors promoting and undermining the health of individuals and populations and to the social processes underlying the unequal distribution of these factors between groups occupying unequal positions in society. The central concept of 'social determinants' thus remains ambiguous, referring simultaneously to the determinants of health and to the determinants of inequalities in health. Graham notes that: "using a single term to refer to both the social factors influencing health and the social processes shaping their social distribution would not be problematic if the main determinants of health—like living standards, environmental influences, and health behaviors—were equally distributed between socioeconomic groups". But the evidence points to marked socioeconomic differences in access to material resources, health-promoting resources, and in exposure to risk factors. Furthermore, policies associated with positive trends in health determinants (e.g., a rise in living standards and a decline in smoking) have also been associated with persistent socioeconomic disparities in the distribution of these determinants (marked socioeconomic differences in living standards and smoking rates).[103] We have attempted to resolve this linguistic ambiguity by introducing additional differentiations within the field of concepts conventionally included under the heading 'social determinants'. We adopt the term '***structural determinants***' to refer specifically to the components of people's socioeconomic position. Structural determinants, combined with the main features of the socioeconomic and political context described above, together constitute what we call the ***social determinants of health inequities***. This concept corresponds to Graham's notion of the 'social processes shaping the distribution' of downstream social determinants. When referring to the more downstream factors, we will use the term '***intermediary determinants of health***'. We attach to this term specific nuances that will be spelt out in a later section (see section V.6.,).

Within each society, material and other resources are unequally distributed. This inequality can be portrayed as a system of social stratification or social hierarchy[104]. People attain different positions in the social hierarchy according mainly to their social class, occupational status, educational achievement and income level. Their position in the social stratification system can be summarized as their socioeconomic position. (A variety of other terms, such as social class, social stratum, and social or socioeconomic status, are often used more or less interchangeably in the literature, despite their different theoretical bases.)

The two major variables used to operationalize socioeconomic position in studies of social inequities in health are *social stratification* and *social class*. The term stratification is used in sociology to refer to social hierarchies in which individuals or groups can be arranged along a ranked order of some attribute. Income or years of education provide familiar examples.

Measures of social stratification are important predictors of patterns of mortality and morbidity. However, despite their usefulness in predicting health outcomes, these measures do not reveal the social mechanisms that explain how individuals arrive at different levels of economic, political and cultural resources. 'Social class', meanwhile, is defined by relations of ownership or control over productive resources (i.e. physical, financial, organizational)[105]. This concept adds significant value, in our view, and for that reason we have chosen to include it as an additional, distinct component in our discussion of socioeconomic position. The particularities of the concept of social class will be described in greater detail when we analyze this concept under point V.5.4.

Two central figures in the study of socioeconomic position were Karl Marx and Max Weber. For Marx, socioeconomic position was entirely determined by "social class", whereby an individual is defined by their relation to the "means of production" (for example, factories, land). Social class, and class relations, is characterized by the inherent conflict between exploited workers and the exploiting capitalists or those who control the means of production. Class, as such, is not an a priori property of individual human beings, but is a social relationship created by societies. One explicit adaptation of Marx's theory of social class that takes into account contemporary employment and social circumstances is Wright's social class classification. In this scheme, people are classified according to the interplay of three forms of exploitation: (a) ownership of capital assets, (b) control of organizational assets, and (c) possession of skills or credential assets[106].

Weber developed a different view of social class. According to Weber, differential societal position is based on three dimensions: class, status and party (or power). Class is assumed to have an economic base. It implies ownership and control of resources and is indicated by measures of income. Status is considered to be prestige or honor in the community. Weber considers status to imply "access to life chances" based on social and cultural factors such as family background, lifestyle and social networks. Finally, power is related to a political context.[107] In this paper, we use the term "socioeconomic position", acknowledging the three separate but linked dimensions of social class reflected in the Weberian conceptualization.

Krieger, Williams and Moss refer to *socioeconomic position* as an aggregate concept that includes both resource-based and prestige-based measures, as linked to both childhood and adult social class position. Resource-based measures refer to material and social resources and assets, including income, wealth, and educational credentials; terms used to describe inadequate resources include "poverty" and "deprivation". Prestige-based measures refer to individuals' rank or status in a social hierarchy, typically evaluated with reference to people's access to and consumption of goods, services, and knowledge, as linked to their occupational prestige, income, and educational level. Given distinctions between resource-based and prestige-based aspects of socioeconomic position and the diverse pathways by which they affect health, epidemiological studies should state clearly how measures of socioeconomic position are conceptualized.[108] Educational level creates differences between people in terms of access to information and the level of proficiency in benefiting from new knowledge, whereas income creates differences in access to scarce material goods. Occupational status includes both these aspects and adds to them benefits accruing from the exercise of specific jobs, such as prestige, privileges, power and social and technical skills.

Kunst and Mackenbach have argued that there are several indicators for socioeconomic position, and that the most important are occupational status, level of education and income level. Each indicator covers a different aspect of social stratification, and it is therefore preferable to use all three instead of only one. They add that the measurement of these three indicators is far from straightforward, and due attention should be paid to the application of appropriate classifications, for example, children,

women and economically inactive people, for whom one or more of these indicators may not be directly available. Information on education, occupation and income may be unavailable, and it may then necessary to use proxy measures of socioeconomic status such as indicators of living standards (for example, car ownership or housing tenure).

Singh-Manoux and colleagues have argued that the social gradient is sensitive to the proximal/distal nature of the indicator of socioeconomic position employed. The idea is that there is valid basis for causal and temporal ordering in the various measures of socioeconomic position. An analysis of the socioeconomic status of individuals at several stages of their lives showed that socioeconomic origins have enduring effects on adult mortality through their effect on later socioeconomic circumstances such as education, occupation and financial resources. This approach is derived from the life course perspective, where education is seen to structure occupation and income. In this model, education influences health outcomes both directly and indirectly through its effect on occupation and income.[109] The disadvantage with education is that it does not capture changes in adult socioeconomic circumstances or accumulated socioeconomic position.

Reporting that educational attainment, occupational category, social class, and income are probably the most often used indicators of current socioeconomic status in studies on health inequalities, Lahelman and colleagues find that each indicator is likely to reflect both common impacts of a general hierarchical ranking in society, and particular impacts specific to the indicator. (1) Educational attainment is usually acquired by early adulthood. The specific nature of education is knowledge and other non-material resources that are likely to promote healthy lifestyles. Additionally, education provides formal qualifications that contribute to the socioeconomic status of destination through occupation and income. (2) Occupation-based social class relates people to social structure. Occupational social class positions indicate status and power, and reflect material conditions related to paid work. (3) Individual and household income derive primarily from paid employment. Income provides individuals and families necessary material resources and determines their purchasing power. Thus income contributes to resources needed in maintaining good health. Following these considerations, education is typically acquired first over the life course. Education contributes to occupational class position and through this to income. The effect of education on income is assumed to be mediated mainly through occupation[110].

Socioeconomic position can be measured meaningfully at three complementary levels: individual, household, and neighborhood. Each level may independently contribute to distributions of exposure and outcomes. Also, socioeconomic position can be measured meaningfully at different points of the lifespan: e.g., infancy, childhood, adolescent, adult (current, past 5 years, etc.). Relevant time periods depend on presumed exposures, causal pathways, and associated etiologic periods. Today it is also vital to recognize gender, ethnicity and sexuality as social stratifiers linked to systematic forms of discrimination.[111]

The CSDH framework posits that *structural determinants* are those that generate or reinforce social stratification in the society and that define individual socioeconomic position. These mechanisms configure the health opportunities of social groups based on their placement within hierarchies of **power, prestige** and **access to resources** (economic status). We prefer to speak of *structural determinants,* rather than 'distal' factors, in order to capture and underscore the causal hierarchy of social determinants involved in producing health inequities. Structural social stratification mechanisms, joined to and influenced by institutions and processes embedded in the socioeconomic and political context (e.g., redistributive welfare state policies), can together be conceptualized as ***the social determinants of health inequities.***

We now examine briefly each of the major variables used to operationalize socioeconomic position. First we analyse the proxies use to measure social stratification, including income, education and occupation. Income and education can be understood as social outcomes of stratification processes, while occupation serves as a proxy for social stratification. Having reviewed the use of these variables, we then turn to analyse social class, gender and ethnicity, which operate as important structural determinants.

V.5.1.—Income

Income is the indicator of socioeconomic position that most directly measures the material resources component. As with other indicators such as education, income has a "dose-response" association with health, and can influence a wide range of material circumstances with direct implications for health[112,113]. Income also has a cumulative effect over the life course and is the socioeconomic position indicator that can change most on a short term basis. It is implausible that money in itself directly affects health, thus it is the conversion of money and assets into

health-enhancing commodities and services via expenditure that may be the more relevant concept for interpreting how income affects health. Consumption measures are, however, rarely used in epidemiological studies,[114] and are in fact seriously flawed when used in health equity research because high medical costs (an element of consumption) may make a household appear non-poor[115].

Income is not a simple variable. Components include wage earning, dividends, interest, child support, alimony, transfer payments and pensions. Kunst and Mackenbach argued that this is more proximate indicator of access to scarce material resources or of standard of living. It can be expressed most adequately when the income level is measured by: adding all income components (this yield total gross income); subtracting deductions of tax and social contribution (net income); adding the net income of all household members (household income); or adjusting for the size of the household (household equivalent income)[116] .

While individual income will capture individual material characteristics, household income may be a useful indicator, since the benefits of many elements of consumption and asset accumulation are shared among household members. This cannot be presumed, especially in the context of gender divisions of labour and power within the household, in particular for women, who may not be the main earners in the household. Using household income information to apply to all the people in the household assumes an even distribution of income according to needs within the household, which may or may not be true. However income is nevertheless the best single indicator of material living standards. Ideally, data are collected on disposable income (what individuals/households can actually spend), but often data are collected instead on gross incomes, or incomes that do not take account in-kind transfers that function as hypothecated income. The meaning of current income for different age groups may vary and be most sensitive during the prime earning years. Income for young and older adults may be a less reliable indicator of their true socioeconomic position because income typically follows a curvilinear trajectory with age. Measures at one point in time may thus fail to capture important information about income fluctuations.[117,118] Macinko, Shi, Starfield and Wulu propose the following summary table of explanations for the relationship between income inequality and health[119]. Galobardes, Shaw, Lawler, Lynch and Davey Smith, conversely, have argued that income primarily influences health through a direct effect on material resources that are in turn mediated by more proximal factors in the causal chain,

Explanation	***Synopsis of the Argument***
Psychosocial (micro): Social status	Income inequality results in "invidious processes of social comparison" that enforce social hierarchies causing chronic stress leading to poorer health outcomes for those at the bottom.
Psychosocial (macro): Social cohesion	Income inequality erodes social bonds that allow people to work together, decreases social resources, and results in less trust and civic participation, greater crime, and other unhealthy conditions.
Neo-material (micro): Individual income	Income inequality means fewer economic resources among the poorest, resulting in lessened ability to avoid risks, cure injury or disease, and/or prevent illness.
Neo-material (macro): Social disinvestment	Income inequality results in less investment in social and environmental conditions (safe housing, good schools, etc.) necessary for promoting health among the poorest.
Statistical artifact	The poorest in any society are usually the sickest. A society with high levels of income inequality has high numbers of poor and consequently will have more people who are sick.
Health selection	People are not sick because they are poor. Rather, poor health lowers one's income and limits one's earning potential.

such as behaviors. The mechanisms through which income could affect health are:

- Buying access to better quality material resources such as food and shelter.
- Allowing access to services, which may improve health directly (such as health services, leisure activities) or indirectly (such as education).
- Fostering self esteem and social standing by providing the outward material characteristics relevant to participation in society.
- Health selection (also referred to as 'reverse causality') may also be considered as income level can be affected by health status.

V.5.2.—Education

Education is a frequently used indicator in epidemiology. As formal education is frequently completed in young adulthood and is strongly determined by parental characteristics[120,121], it can be conceptualized within a life course framework as an indicator that in part measures early life socioeconomic position. Education can be measured as a continuous variable (years of completed education), or as a categorical variable by assessing educational milestones such as completion of primary or high school, higher education diplomas, or degrees. Although education is often used as a generic measure of socioeconomic position, specific interpretations explain its association with health outcomes:

- Education captures the transition from parents' (received) socioeconomic position to adulthood (own) socioeconomic position and it is also a strong determinant of future employment and income. It reflects material, intellectual, and other resources of the family of origin, begins at early ages, is influenced by access to and performance in primary and secondary school and reaches final attainment in young adulthood for most people. Therefore it captures the long term influences of both early life circumstances on adult health, as well as the influence of adult resources (for example, through employment status) on health.
- The knowledge and skills attained through education may affect a person's cognitive functioning, make them more receptive to health education messages, or more able to communicate with and access appropriate health services.
- Ill health in childhood could limit educational attendance and/or attainment and predispose to adult disease, generating a health selection influence on health inequalities.

Finally, measuring the number of years of education or levels of attainment may contain no information about the quality of the educational experience, which is likely to be important if conceptualizing the role of education in health outcomes specifically related to knowledge, cognitive skills, and analytical abilities but may be less important if education is simply used as a broad indicator of socioeconomic position.

V.5.3.—Occupation

Occupation-based indicators of socioeconomic position are widely used. Kunst and Mackenbach emphasize that this measure is relevant because it determines people's place in the societal hierarchy and not just because it indicates exposure to specific occupational risk, such as toxic compounds. Galobardes, Shaw, Lawler, Lynch & Davey Smith suggest that occupation can be seen as a proxy for represent Weber's notion of socioeconomic position, as a reflection of a person's place in society related to their social standing, income and intellect. Occupation can also identify working relations of domination and subordination between employers and employees or, less frequently, characterize people as exploiters or exploited in class relations.

The main issue, then, is how to classify people with a specific job according to their place in the social hierarchy. The most usual approach consists of classifying people based on their position in the labour market into a number of discrete groups or social classes. People can be assigned to social classes by means of a set of detail rules that use information on such items as occupational title, skills required, income pay-off and leadership functions. For example Wright's typology distinguishes among four basic class categories: wage laborers, petty bourgeois (self-employed with no more than one employee; small employers (2-9 employees) and capitalist (10 or more employees). Also other classifications-called "social class" but more accurately termed "occupational class"—have been used in European public health surveillance and research. Among the best known and longest lived of these occupational class measures is the British Registrar General's social class schema, developed in 1913. This schema has proven to be powerfully predictive of inequalities in morbidity or mortality, especially among employed men[122,123]. The model has five categories based on a graded hierarchy of occupations ranked according to skill. Importantly,

these occupational categories are not necessarily reflective of class relations.

Most studies use the current or longest held occupation of a person to characterize their adult socioeconomic position. However, with increasing interest in the role of socioeconomic position across the life course, some studies include parental occupation as an indicator of childhood socioeconomic position in conjunction with individuals' occupations at different stages in adult life. Some of the more general mechanisms that may explain the association between occupation and health related outcomes are presented by:

- Occupation (parental or own adult) is strongly related to income and therefore the association with health may be one of a direct relation between material resources—the monetary and other tangible rewards for work that determines material living standards—and health.
- Occupations reflect social standing and may be related to health outcomes because of certain privileges—such as easier access to better health care, access to education, and more salubrious residential facilities—that are afforded to those of higher standing.
- Occupation may reflect social networks, work based stress, control, and autonomy and thereby affect health outcomes through psychosocial processes.
- Occupation may also reflect specific toxic environmental or work task exposures such as physical demands (for example, transport driver, labourer).

One of the most important limitations of occupational indicators is that they cannot be readily assigned to people who are not currently employed. As a result, if used as the only source of information on socioeconomic position, socioeconomic differentials may be underestimated through the exclusion of retired people, people whose work is inside the home (mainly affecting women), disabled people (including those disabled by work-related illness and injury), the unemployed, students, and people working in unpaid, informal, or illegal jobs.[124] Given the growing prevalence of insecure and precarious employment, knowing a person's occupation is of limited value without further information about the individual's employment history and the nature of the current employment relationship. Further, socioeconomic indicators based on occupational classification may not adequately capture disparities in working and living conditions across divisions of race/ethnicity and gender.[125]

V.5.4.—Social Class

Social class is defined by relations of ownership or control over productive resources (i.e. physical, financial, and organizational). Social class provides an explicit relational mechanism (property, management) that explains how economic inequalities are generated and how they may affect health. Social class has important consequences for the lives of individuals. The extent of an individual's legal right and power to control productive assets determines an individual's strategies and practices devoted to acquire income and, as a result, determines the individual's standard of living. Thus the class position of 'business owner' compels its members to hire 'workers' and extract labour from them, while the 'worker' class position compels its members to find employment and perform labour. Most importantly, class is an inherently relational concept. It is not defined according to an order or hierarchy, but according to relations of power and control. Although there have been few empirical studies of social class and health, the need to study social class has been noted by social epidemiologists.[126]

Class, in contrast to stratification, indicates the employment relations and conditions of each occupation. The criteria used to allocate occupations into classes vary somewhat between the two major systems presently in widespread use: the Goldthorpe schema and the Wright schema. According to Wright, power and authority are 'organisational assets' that allow some workers to benefit from the abilities and energies of other workers. The hypothetical pathway linking class (as opposed to prestige) to health is that some members of a work organization are expending less energy and effort and getting more (pay, promotions, job security, etc.) in return, while others are getting less for more effort. So the less powerful are at greater risk of running down their stocks of energy and ending up in some kind of physical or psychological 'health deficit'. French industrial sociologists called this 'l'usure de travail'—the usury of work. At the most obvious level, the manager sits in an office while the routine workers are exposed to all the dangers of heavy loads, dusts, chemical hazards and the like[127].

The task of class analysis is precisely to understand not only how macro structures (e.g., class relations at the national level) constrain micro processes (e.g., interpersonal behavior) but also how micro processes (e.g., interpersonal behavior) can affect macro structures (e.g. via collective action)[128].

Social class is among the strongest known predictors of illness and health and yet is, paradoxically, a variable about which very little research has been conducted.[129] Muntaner and colleagues have observed that, while there is substantial scholarship on the psychology of racism and gender, little research has been done on the effects of class ideology (i.e., classism). This asymmetry could reflect that in most wealthy democratic capitalist countries, income inequalities are perceived as legitimate while gender and race inequalities are not[130].

V.5.5.—Gender

'Gender' refers to those characteristics of women and men which are socially constructed, whereas 'sex' designates those characteristics that are biologically determined[131]. Gender involves 'culture-bound conventions, roles, and behaviours' that shape relations between and among women and men and boys and girls[132]. In many societies, gender constitutes a fundamental basis for discrimination, which can be defined as the process by which 'members of a socially defined group . . . are treated differently (especially unfairly)' because of their inclusion in that group[133]. Socially constructed models of masculinity can have deleterious health consequences for men and boys (e.g., when these models encourage violence or alcohol abuse). However, women and girls bear the major burden of negative health effects from gender-based social hierarchies.

In many societies, girls and women suffer systematic discrimination in access to power, prestige and resources. Health effects of discrimination can be immediate and brutal: e.g., in cases of female infanticide, or when women suffer genital mutilation, rape or gender-based domestic violence. Gender divisions within society also affect health through less visible biosocial processes, whereby girls' and women's lower social status and lack of control over resources exposes them to health risks. Disproportionately high levels of HIV infection among young women in some sub-Saharan African countries are fueled by patterns of sexual coercion, forced early marriage, and economic dependency among women and girls[134]. Widespread patterns of underfeeding girl children, relative to their male siblings, provide another example of how gender-based discrimination undermines health. As Doyal argues, 'A large part of the burden of preventable morbidity and mortality experienced by women is related directly or indirectly to the patterning of gender divisions. If this harm is to be avoided, there will need to be significant changes in related aspects of social and economic organization. In particular, strategies will be required to deal with the damage done to women's health by men, masculinities and male institutions'[135].

Gender-based discrimination often includes limitations on girls' and women's ability to obtain education and to gain access to respected and well remunerated forms of employment. These patterns reinforce women's social disadvantage and, in consequence, their health risks. Gender norms and assumptions define differential employment conditions for women and men and fuel differential exposures and health risks linked to work. Women generally work in different sectors than men and occupy lower professional ranks. 'Women are more likely to work in the informal sector, for example in domestic work and street vending'[136]. Broadly, gender disadvantage is manifested in women's often fragmented and economically uncertain work trajectories: domestic responsibilities disrupt career paths, reducing lifetime earning capacity and increasing the risks of poverty in adulthood and old age[137]. For these reasons, Doyal argues that 'the removal of gender inequalities in access to resources' would be one of the most important policy steps towards gender equity in health. 'Since it is now accepted that gender identities are essentially negotiated, policies are needed which will enable people to shape their own identities and actions in healthier ways. These could include a range of educational strategies, as well as . . . employment policies and changes in the structure of state benefits'[138].

V.5.6.—Race/ethnicity

Constructions of racial or ethnic differences are the basis of social divisions and discriminatory practices in many contexts. As Krieger observes, it is important to be clear that 'race/ethnicity is a social, not biological, category'. The term refers to social groups, often sharing cultural heritage and ancestry, whose contours are forged by systems in which 'one group benefits from dominating other groups, and defines itself and others through this domination and the possession of selective and arbitrary physical characteristics (for example, skin colour)'[139].

In societies marked by racial discrimination and exclusion, people's belonging to a marginalized racial/ethnic group affects every aspect of their status, opportunities and trajectory throughout the life-course. Health status and outcomes among oppressed racial/ethnic groups are often significantly worse than those registered in more privileged groups or than population averages. Thus, in the United States, life expectancy for African-Americans is significantly lower than for whites, while an

African-American woman is twice as likely as a white woman to give birth to an underweight baby[140]. Indigenous groups endure racial discrimination in many countries and often have health indicators inferior to those of non-indigenous populations. In Australia, the average life expectancy of Aboriginal and Torres Strait Islanders lags 20 years behind that of non-Aboriginal Australians. Perhaps as a result of the compounded forms of discrimination suffered by members of minority and oppressed races/ethnicities, the 'biological expressions of racism' are closely intertwined with the impact of other determinants associated with disadvantaged social positions (low income, poor education, poor housing, etc.).

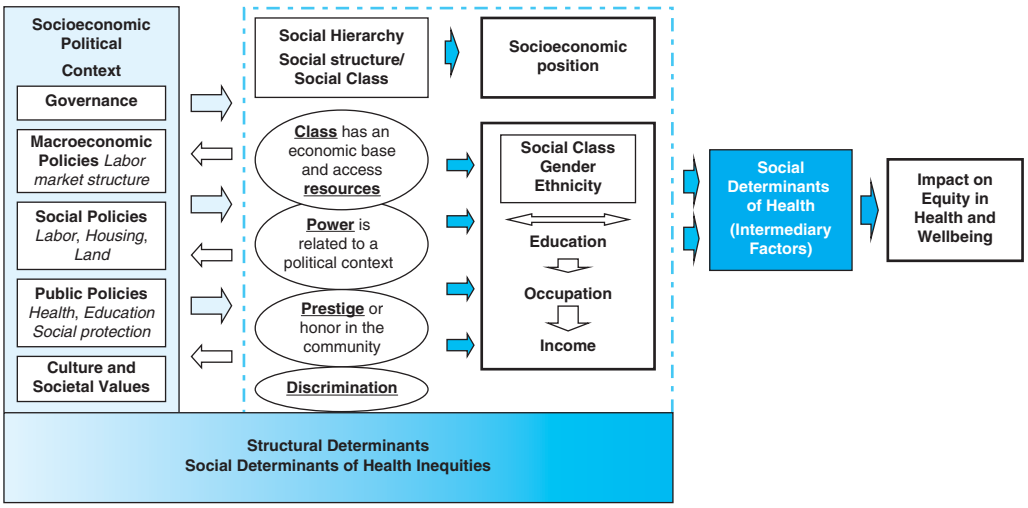
V.5.7.—Links and mutual influence between social-political context and structural determinants

A close relationship exists between the social-political context and what we term the structural determinants of health inequities. The CSDH framework posits that *structural determinants* are those that generate or reinforce stratification in the society and that define individual socioeconomic position. In all cases, structural determinants present themselves in a specific political and historical context. It is not possible to analyze the impact of structural determinants on health inequities, nor to assess policy and intervention options, if contextual aspects are not included. As we have noted, key elements of the context include: governance patterns; macroeconomic policies; social policies; and public policies in other relevant sectors, among other factors. Contextual aspects, including education, employment and social protection policies, act as modifiers or buffers influencing the effects of socioeconomic position on health outcomes and well-being among social groups. At the same time, the context forms part of the 'origin' and sustenance of a given distribution of power, prestige and access to material resources in a society and thus, in the end, of the pattern of social stratification and social class relations existing in that society. The positive significance of this linkage is that it is possible to address the effects of the structural determinants of health inequities through purposive action on contextual features, particularly the policy dimension.

V.5.8.—Diagram synthesizing the major aspects of the framework presented thus far

In this diagram we have summarized the main elements of the social and political context that model and directly influence the pattern of social stratification and social class existing in a country. We have included in the diagram, in the far left column, the main contextual aspects that affect inequities in health, e.g., governance, macroeconomic policies, social policies, public policies in other relevant areas, culture and societal values, and epidemiological conditions. The context exerts an influence on health through socioeconomic position.

Moving to the right, in the next column of the diagram, we have situated the main aspects of social hierarchy, which define social structure and social class relationships within the society. These features are given according to the distribution of power, prestige and resources. The principal domain is social class/position within the social structure, which is connected with the economic base and access to resources. This factor is also linked with people's degree of power, which is in turn again influenced by



the political context (functioning democratic institutions or their absence, corruption, etc.). The other key domain in this area encompasses systems of prestige and discrimination that exist in the society.

Again moving to the right, in the next column, we have described the main aspects of socioeconomic position. Studies and evaluations of equity frequently use income, education and occupation as proxies for these domains (power, prestige and economic status). When we refer to the domains of prestige and discrimination, we find them strongly related to gender, ethnicity and education. Social class also has a close connection to these different domains, as previously indicated. As an inherently relational variable, class is able to provide greater understanding of the mechanisms associated with the social production of health inequities.

Meanwhile, the patterns according to which people are assigned to socioeconomic positions can turn back to influence the broader context, for example by generating momentum for or against particular social welfare policies, or affecting the level of participation in trade unions.

Proceeding again to the next column to the right (blue rectangle), we see that it is socioeconomic position as assigned within the existing social hierarchy which determines differences in exposure and vulnerability to intermediary health-affecting factors, (what we call the 'social determinants of health' in the limited and specific sense), depending on people's positions in the hierarchy.

Together, context and socioeconomic position constitute the social determinants of health inequities, whose effect is to give rise to an inequitable distribution of health, wellbeing and disease across social groups.

Key messages from this section:

- The CSDH framework is distinguished from some others by its emphasis on the socio-economic and political context and the structural determinants of health inequity
- 'Context' is broadly defined to include all social and political mechanisms that generate, configure and maintain social hierarchies, including: the labor market; the educational system political institutions and other cultural and societal values.
- Among the contextual factors that most powerfully affect health are the welfare state and its redistributive policies (or the absence of such policies)
- In the CSDH framework, *structural determinants* are those that generate stratification and social class divisions in the society and that define individual socioeconomic position within hierarchies of power, prestige and access to resources. Structural determinants are rooted in the key institutions and mechanisms of the socioeconomic and political context. The most important structural stratifiers and their proxy makers include:
  - Income
  - Education
  - Occupation
  - Social Class
  - Gender
  - Race/ethnicity
- Together, context and structural determinants constitute the *social determinants of health inequities*. We began this study by asking the question of where health inequities come from. The answer to that question lies here. The structural mechanisms that shape social hierarchies according to these key stratifiers are the root cause of inequities in health.

V.6.—Third element of the framework: intermediary determinants

The structural determinants operate through a series of what we will term ***intermediary social factors or social determinants of health***. The social determinants of health inequities are causally antecedent to these intermediary determinants, which are linked, on the other side, to a set of individual-level influences, including health-related behaviors and physiological factors. The intermediary factors flow from the configuration of underlying social stratification and, in turn, determine differences in exposure and vulnerability to health-compromising conditions. At the most proximal point in the models, genetic and biological processes are emphasized, mediating the health effects of social determinants.[141] The main categories of intermediary determinants of health are: material circumstances; psychosocial circumstances; behavioral and/or biological factors; and the health system itself as a social determinant. We once again review these elements in turn.

V.6.1.—Material circumstances include determinants linked to the physical environment, such as housing (relating to both the dwelling itself and its location), consumption potential, i.e., the financial means to buy healthy food, warm clothing, etc., and the physical working and neighbourhood environments. Depending on their quality, these circumstances both provide resources for health and contain health risks.

Differences in material living standards are probably the most important intermediary factor. The material standards of living are probably directly significant for the health status of marginalized groups, and also for the lower socioeconomic position, especially if we include environmental factors. Housing characteristics measure material aspects of socioeconomic circumstances[142]. A number of aspects of housing have direct impact on health: the structure of dwellings; internal conditions such as damp, cold and indoor contamination. Indirect housing effects related to housing tenure, including wealth impacts, and neighborhood effects are seen as increasingly important. Housing as a neglected site for public health action, include indoor and outdoor housing condition, as well as, material and social aspect of housing, and local neighborhood have an impact on health of occupants. Galobardes, Shaw, Lawler, Lynch and Davey Smith propose a number of household amenities include access to hot and cold water in the house, having central heating and carpets, sole use of bathrooms and toilets, whether the toilet is inside or outside the home, having a refrigerator, washing machine, or telephone. These household amenities are markers of material circumstances and may also be associated with specific mechanisms of disease. For example, lack of running water and a household toilet may be associated with increased risk of infection[143]. In addition to household amenities, household conditions such as the presence of damp and condensation, building materials, rooms in the dwelling, and overcrowding are housing-related indicators of material resources. These are used in both industrialized and non-industrialized countries.[144] Crowding is calculated as the number of persons living in the household per number of rooms available in the house. Overcrowding can plausibly affect health outcomes through a number of different mechanisms: overcrowded households are often households with few economic resources and there may also be a direct effect on health through facilitation of the spread of infectious diseases. Galobardes et al. add that recent efforts to better understand the mechanisms underlying socioeconomic inequalities in health have lead to the development of some innovative area level indicators that use aspects of housing. For example, a ''broken windows" index measured housing quality, abandoned cars, graffiti, trash, and public school deterioration at the census block level in the USA[145].

An explicit definition incorporating the causal relationship between work and health is given by the Spanish National Institute of Work, Health and Safety: "The variables that define the making of any given task as well as the environment in which it is carried out, determining the health of the workers in threefold sense: physical, psychological and social".[146] There are clear social differences in physical, mental, chemical and ergonomic strains in the workplace. The accumulation of negative environmental factors throughout working life probably has a significant effect on variations in the general health of the population, especially when people are exposed to such factors over a long period of time. Main types of hazards at the workplace include physical, chemical, ergonomic, biological, and psychosocial risk factors. General conditions of work define, in many ways, peoples' experience of work. Minimum standards for working conditions are defined in each country but the large majority of workers, including many of those whose conditions are most in need of improvement, are excluded from the scope of existing labour protection measures. In many countries, workers in cottage industries, the urban informal economy, agricultural workers (except for plantations), small shops and local vendors, domestic workers and home workers are outside the scope of protective legislation. Other workers are deprived of effective protection because of weaknesses in labour law enforcement. This is particularly true for workers in small enterprises, which account for over 90% of enterprises in many countries, with a high proportion of women workers.

V.6.2.—Social-environmental or psychosocial circumstances include psychosocial stressors (for example, negative life events, job strain), stressful living circumstances (e.g., high debt) and (lack of) social support, coping styles, etc. Different social groups are exposed to different degrees to experiences and life situations that are perceived as threatening, frightening and difficult to deal with. This partly explains the long-term pattern of social inequalities in health.

Stress may be a causal factor and trigger direct many forms of illness, and detrimental, long-term stress may also be part of the causal complex behind many somatic illnesses. A person's socioeconomic position may itself be a source of long-term stress, and will also affect the opportunities to deal with stressful and difficult situations. However, there are also other, more indirect explanations of the pathway from stress to social inequalities in health. Firstly, there is an on-going international debate on what is often called Wilkinson's "income inequality and social cohesion" model. The model states that, in rich societies, the size of differences in income is more important from a health point of view than the

size of the average income. Wilkinson's hypothesis is that the greater the income disparities are in a society, the greater becomes the distance between the social strata. Social interaction is thus characterized by less solidarity and community spirit.[147] The people who lose most are those at the bottom of the income hierarchy, who are particularly affected by psychosocial stress linked to social exclusion, lack of self-respect and more or less concealed contempt from the people around them. Secondly, there are significant social differences in the prevalence of episodes of stress occurrence of short-term and long-term episodes of mental stress, linked to uncertainty about the financial situation, the labor market and social relations. The same applies to the probability of experiencing violence or threats of violence. Disadvantaged people have experienced far more insecurity, uncertainty and stressful events in their life course, and this affects social inequalities in health. This is illustrated in the following table published in the Norwegian Action Plan to Reduce Social Inequalities in Health 2005-06.[148]

Some studies refer to the association between socio-economical status and health locus control. This concept refers to the way people perceive the events related to their healthy: as controllable (internal control), or as controlled by others (external control). People with education below university level more frequently identified an external locus of control.[149] Other important challenges arise from increased incidence and prevalence of precarious and informal employments consequent on changes in the labor market raise many issues and challenges for health care providers, organizational psychologists, personnel and senior managers, employers and trade union representatives, and workers and their families. Job insecurity and non-employment are also matters of concern to the wider community.[150]

V.6.3.—Behavioural and biological factors include smoking, diet, alcohol consumption, and lack of physical exercise, which again can be either health protecting and enhancing (like exercise) or health damaging (cigarette smoking and obesity), between biological factor we are including genetics factor and from perspective of social determinants of health age and sex distribution could be including.

Social inequalities in health have also been associated with social differences in lifestyle or behaviors. Such differences are found in nutrition, physical activity, tobacco and alcohol consumption. This indicates that differences in lifestyle could partially explain social inequalities in health, but researchers do not agree on their importance: some regard differences in lifestyle as a sufficient explanation without further elaboration; others regard them as contributory factors that in turn result from more fundamental causes. For example, Margolis et al. found that the prevalence of both acute and persistent respiratory symptoms in infants showed dose response relationships with SEP. When risk factors such as crowding and exposure to smoking in the household were adjusted for, relative risk associated with SEP was reduced but still remained significant. The data further suggest that risk factors operated differently for different SEP levels; being in day care was associated with somewhat reduced incidence in lower SEP families but with increased incidence among infants from high SEP families.[151] Health risk behaviors such as cigarette smoking, physical inactivity, poor diet, and substance abuse are closely tied to

	Social status:[1]	
PERCENTAGES WHO HAVE EXPERIENCED IN THEIR ADULT LIFE:	LOW:	HIGH:
– several episodes of 3+ months of unemployment	11%	1%
– lost their job serveral times (involuntarily)	7%	2%
– received social security benefits	11%	2%
– had a serious accident	21%	6%
– been unemployed at the age of 55	29%	7%
– been unmarried/had no cohabitant at the age of 55	26%	14%
– had a low income at the age of 53	20%	2%

[1]Low status = the third with the lowest occupational prestige, high status = the third with the highest occupational prestige

both SEP and health outcomes. Despite the close ties, the association of SEP and health is reduced but not eliminated when these behaviors are statistically controlled.[152]

Cigarette smoking is strongly linked to SEP, including education, income, and employment status, and it is significantly associated with morbidity and mortality, particularly from cardiovascular disease and cancer[153]. A linear gradient between education and smoking prevalence was also shown in a community sample of middle-aged women: Additionally, among current smokers the number of cigarettes smoked was related to SEP.[154] Significant employment grade differences in smoking were found in the Whitehall II study, which examined a new cohort of 10,314 subjects from the British Civil Service beginning in 1985.[155] Moving from the lowest to the highest employment grades, the prevalence of current smoking among men was 33.6%, 21.9%, 18.4%, 13.0%, 10.2%, and 8.3%, respectively. For women, the comparable figures were 27.5%, 22.7%, 20.3%, 15.2%, 11.6%, and 18.3%, respectively. Social class differences in smoking are likely to continue because rates of smoking initiation are inversely related to SEP and because rates of cessation are positively related to SEP[156].

Lifestyle factors are relatively accessible for research, so this is one of the causal areas we know a good deal about. Although descriptions of the correlation of lifestyle factors with social status are relatively detailed and well-founded, this should not be taken to indicate that these factors are the most important causes of social inequalities in health. Other, more fundamental factors may cause variations in both lifestyle and health. Some surveys indicate that differences in lifestyle can only explain a small proportion of social inequalities in health.[157] For instance, material factors may act as a source of psychosocial stress, and psychosocial stress may influence health related behaviors. Each of them can influence health through specific biological factors. For example a diet rich in saturated fat will lead to atherosclerosis, which will increase the risk of a myocardial infarction. Stress will activate hormonal systems that may increase blood pressure and reduce the immune response. Adoption of health-threatening behaviors is a response to material deprivation and stress. Environments determine whether individuals take up tobacco, use alcohol, have poor diets, and engage in physical activity. Tobacco and excessive alcohol use, and carbohydrate-dense diets, are means of coping with difficult circumstances.[158]

V.6.4.—The health system as a social determinant of health.

As previously discussed, various models that have tried to explain the functioning and impact of SDH have not made sufficiently explicit the role of the health system as a social determinant. The role of the health system becomes particularly relevant through the issue of access, which incorporates differences in exposure and vulnerability. On the other hand, differences in access to health care certainly do not fully account for the social patterning of health outcomes. Adler, Boyce, Chesney, Folkman and Syme, for instance, have considered the role of access to care in explaining the SEP-health gradient and concluded that access alone could not explain the gradient[159].

In a comprehensive model, the health system itself should be viewed as an intermediary determinant. This is closely related to models for the organization of personal and non-personal health service delivery. The health system can directly address differences in exposure and vulnerability not only by improving equitable access to care, but also in the promotion of intersectoral action to improve health status. Examples would include food supplementation through the health system and transport policies and intervention for tackling geographic barrier to access health care. A further aspect of great importance is the role the health system plays in mediating the differential consequences of illness in people's lives. The health system is capable of ensuring that health problems do not lead to a further deterioration of people's social status and of facilitating sick people's social reintegration. Examples include programmes for the chronically ill to support their reinsertion in the workforce, as well as appropriate models of health financing that can prevent people from being forced into (deeper) poverty by the costs of medical care. Another important component to analyze relates to the way in which the health system contributes to social participation and the empowerment of the people, if in fact this is defined as one of the main axes for the development of pro-equity health policy. In this context, we can reflect on the hierarchical and authoritarian structure that predominates in the organization of most health systems. Within health systems, people enjoy little participatory space through which to take part in monitoring, evaluation and decision-making about system priorities and the investment of resources.

Diderichsen suggests that services through which the health sector deals with inequalities in health can be of five different types: (1) reducing the inequality

level among the poor with respect to the causal factors that mediate the effects of poverty on health in such areas as nutrition, sanitation, housing, and working conditions; (2) reinforcing factors that might reduce susceptibility to health effects from inequitable exposures, using various means including vaccination, empowerment, and social support; (3) treating and rehabilitating the health problems that constitute the socioeconomic gap of burden of disease (the rehabilitation of disabilities, in particular, is often overlooked as a potential contributor to the reduction of health inequalities); (4) strengthening policies that reproduce contextual factors such as social capital that might modify the health effects of poverty; (5) protecting against social and economic consequences of ill health though health insurance sickness benefits and labor market policies.[160] Even if there were some dispute as to whether the health system can itself be considered an indirect determinant of health inequities, it is clear that the system influences how people move among the social strata. Benzeval, Judge and Whitehead argue that the health system has three obligations in confronting inequity: (1) to ensure that resources are distributed between areas in proportion to their relative needs; (2) to respond appropriately to the health care needs of different social groups; and (3) to take the lead in encouraging a wider and more strategic approach to developing healthy public policies at both the national and local level, to promote equity in health and social justice.[161] On this point the UK Department of Health has argued that the health system should play a more active role in reducing health inequalities, not only by providing equitable access to health care services but also by putting in place public health programmes and by involving other policy bodies to improve the health of disadvantaged communities[162].

V.6.5.—Diagram summarizing the content of the preceding section on intermediary determinants

Socioeconomic context directly affects intermediary factors, e.g. through kind, magnitude and availability (large yellow arrow). But for the population, the more important path of influence is through socioeconomic position. Socioeconomic position influences health through more specific, intermediary determinants. Those intermediary factors include: material circumstances, such as neighborhood, working and housing conditions; psychosocial circumstances, and also behavioral and biological factors. The model assumes that members of lower socioeconomic groups live in less favorable material circumstances than higher socioeconomic groups, and that people closer to the bottom of the social scale more frequently engage in health-damaging behaviors and less frequently in heath-promoting behaviors than do the more privileged. The unequal distribution of these intermediary factors (associated with differences in exposure and vulnerability to health-compromising conditions, as well as with differential consequences of ill-health) constitutes the primary mechanism

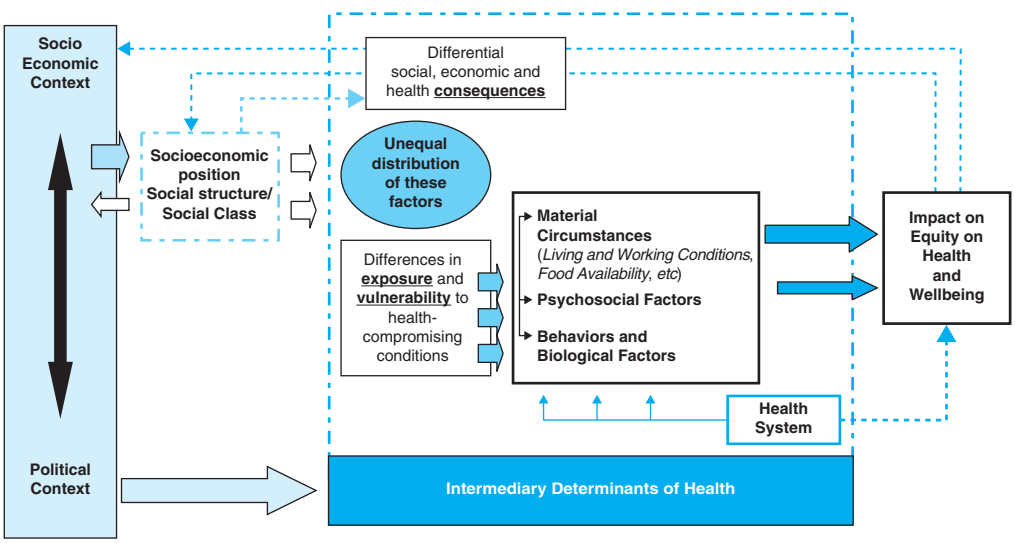


Figure Mechanisms and intermediary factors of social determinants of health elaborated for EQH/EIP (OPSH) 2006

through which socioeconomic position generates health inequities. The model includes the health system as a social determinant of health and illustrates the capacity of the heath sector to influence the process in three ways, by acting upon: differences in exposures, differences in vulnerability and differences in the consequences of illness for people's health and their social and economic circumstances.

V.6.6.—A crosscutting determinant: social cohesion/ social capital[163].

The concepts of social cohesion and 'social capital' occupy an unusual (and contested) place in understandings of SDH. Over the past decade, these concepts have been among the most widely discussed in the social sciences and social epidemiology. Influential researchers have proclaimed social capital a key factor in shaping population health.[164,165,166,167] However, controversies surround the definition and importance of social capital.

In the most influential recent discussions, three broad approaches to the characterization and analysis of social capital can be distinguished: communitarian approaches, network approaches and resource distribution approaches. The *communitarian approach* defines social capital as a psychosocial mechanism, corresponding to a neo-Durkheimian perspective on the relation between individual health and society[168]. This school includes influential authors such as Robert Putnam and Richard Wilkinson. Putnam defines social capital as "features of social organization, such as networks, norms, and social trust, that facilitate coordination and cooperation for mutual benefit"[169]. Social capital is looked upon as an extension of social relationships and the norms of reciprocity[170], influencing health by way of the social support mechanisms that these relationships provide to those who participate on them. The *network approach* considers social capital in terms of resources that flow and emerge through social networks. It begins with a systemic relational perspective; in other words, an ecological vision is taken that sees beyond individual resources and additive characteristics. This involves an analysis of the influence of social structure, power hierarchies and access to resources on population health[171]. This approach implies that decisions that groups or individuals make, in relation to their lifestyle and behavioural habits, cannot be considered outside the social context where such choices take place. Two of the most outstanding conceptualisations in this regard have been elaborated by James Coleman and Pierre Bourdieu, whose work has focused primarily on notions of social cohesion. Finally, the *resource distribution approach,* adopting a materialistic perspective, suggests that there is a danger in promoting social capital as a substitute for structural change when facing health inequity. Some representatives of this group openly criticize psychosocial approaches that have suggested social capital and cohesion as the most important mediators of the association between income and health inequality[172]. The resource distribution approach insists that psychosocial aspects affecting population health are a consequence of material life conditions[173].

Recent work by Szreter and Woolcock (2004)[174] has enriched the debates around social capital and its health impacts. These authors distinguish between bonding, bridging and linking social capital. *Bonding social* capital refers to the trust and cooperative relationships between members of a network that are similar in terms of their social identity. *Bridging social capital,* on the other hand, refers to respectful relationships and mutuality between individuals and groups that are aware that they do not possess the same characteristics in socio-demographic terms. Finally, *linking social capital* corresponds with the norms of respect and trust relationships between individuals, groups, networks and institutions that interact from different positions along explicit gradients of institutionalised power[175].

Some scholars have critiqued what they see as the faddish, ideologically driven adoption of the term 'social capital'. Muntaner, for example, has suggested that the term serves primarily as a 'comforting metaphor' for those in public health who wish to maintain that 'capitalism . . . and social cohesion/ social integration are compatible'. Beyond such ideological reassurance, Muntaner argues, the vocabulary of social capital provides few if any fresh insights, and may in fact provoke confusion. Those innovations that have been achieved by researchers investigating social capital could just as well 'have been carried out under the label of "social integration" or "social cohesion"'. Indeed, 'it would be more adequate to use terms such as "cohesion" and "integration" to avoid the confusion and implicit endorsement of [a specific] economic system that the term [social capital] conveys'[176].

We share with Muntaner the concern that the current interest in 'social capital' may further encourage depoliticized approaches to population health and SDH. Indeed, it is clear that the concept of social capital has not infrequently been deployed as part of a broader discourse promoting reduced state responsibility for health, linked to an emphasis on individual and community characteristics, values and lifestyles as primary shapers of health outcomes.

Logically, if communities can take care of their own health problems by generating 'social capital', then government can be increasingly discharged of responsibility for addressing health and health care issues, much less taking steps to tackle underlying social inequities. Navarro suggests that foundational work on social capital, including Putnam's, 'reproduced the classical . . . dichotomy between civil and political society, in which the growth of one (civil society) requires the contraction of the other (political society—the state)'. From this perspective, the adoption of social capital as a key for understanding and promoting population health is part of a broader, radically depoliticizing trend.[177]

On the other hand, however, it can be argued that the recognition of linking social capital through Szreter's and Woolcock's work has contributed to a higher consideration of the dimension of power and of structural aspects in tackling social capital as a social determinant of health. This may help move discussions of social capital resolutely beyond the level of informal relationships and social support. The idea of linking social capital has also been fundamental as a new element when discussing the role that the state occupies or should occupy in the development of strategies that favour equity. Linking social capital offers the opportunity to analyse how relationships that are established with institutions in general, and with the state in particular, affect people's quality of life. Such discussions highlight the role of political institutions and public policy in shaping opportunities for civic involvement and democratic behaviour[178,179]. The CSDH adopts the position that the state possesses a fundamental role in social protection, ensuring that public services are provided with equity and effectiveness. The welfare state is characterized as systematic defense against social insecurity, this being understood as individuals', groups' or communities' vulnerability to diverse environmental threats[180]. In this context, while remaining alert to ways in which notions of 'social capital' or community may be deployed to excuse the state from responsibility for the well-being of the population[181,182,183], we can also look for aspects of these concepts that shed fresh light on key state functions.

The notion of linking social capital speaks to the idea that one of the central points of health politics should be the configuration of cooperative relationships between citizens and institutions. In this sense, the state should assume the responsibility of developing more flexible systems that facilitate access and develop real participation by citizens. Here, a fundamental aspect is the strengthening of local or regional governments so that they can constitute concrete spaces of participation[184,185]. The development of social capital, understood in these terms, is based on citizen participation. True participation implies a (re)distribution of empowerment, that is to say, a redistribution of the power that allows the community to possess a high level of influence in decision-making and the development of policies affecting its well being and quality of life.

The competing definitions and approaches suggest that 'social capital' cannot be regarded as a uniform concept. Debate surrounds whether it should be as seen a property of individuals, groups, networks, or communities, and thus where it should be located with respect to other features of the social order. It is unquestionably difficult to situate social capital definitively as either a structural or an intermediary determinant of health, under the categories we have developed here. It may be most appropriate to think of this component as 'cross-cutting' the structural and intermediary dimensions, with features that link it to both.

V.7.—Impact on equity in health and well-being

This section summarizes some of the outcomes that emerge at the end of the social 'production chain' of health inequities depicted in the framework. At this stage (far right side of the framework diagrams), we find the measurable impacts of social factors upon comparative health status and outcomes among different population groups, i.e., health equity. According to the analysis we have developed, the structural factors associated with the key components of socioeconomic position (SEP) are at the root of health inequities measured at the population level. This relationship is confirmed by a substantial body of evidence.

Socioeconomic health differences are captured in general measures of health, like life expectancy, all-cause mortality and self-rated health.[186] Differences correlated with people's socioeconomic position are found for rates of mortality and morbidity from almost every disease and condition[187]. SEP is also linked to prevalence and course of disease and self-rated health[188]. Socioeconomic health inequalities are evident in specific causes of disease, disability and premature death, including lung cancer, coronary heart disease, accidents and suicide. Low birth weight provides an additional important example. This is a sensitive measure of child health and a major risk factor for impaired development through childhood, including intellectual development[189]. There are marked differences in national rates of low birth

weight, with higher rates in the U.S. and UK and lower rates in Nordic countries like Sweden, Norway and the Netherlands. These rates vary in line with the proportion of the child population living in poverty (in households with incomes below 50% of average income): at their lowest in lowpoverty countries like Sweden and Norway, and at their highest in high-poverty countries like the UK and U.S.[190].

a) ***Impact along the gradient:*** There is evidence that the association of SEP and health occurs at every level of the social hierarchy, not simply below the threshold of poverty. Not only do those in poverty have poorer health than those in more favored circumstances, but those at the highest level enjoy better health than do those just below[191]. The effects of severe poverty on health may seem obvious through the impact of poor nutrition, crowded and unsanitary living conditions, and inadequate medical care. Identifying factors that can account for the link to health all across the SEP hierarchy may shed light on new mechanisms that have heretofore been ignored because of a focus on the more readily apparent correlates of poverty. The most notable of the studies demonstrating the SEP-health gradient is the Whitehall study of mortality (Marmot et al., 1984), which covered British civil servants over a period of 10 years. Similar findings emerge from census data in the United Kingdom (Susser, Watson and Hopper 1985)[192]. Surprisingly, we know rather little about how SEP operates to influence biological functions that determine health status. Part of the problem may be the way in which SEP is conceptualized and analyzed. SEP has been almost universally relegated to the status of a control variable and has not been systematically studied as an important etiologic factor in its own right. It is usually treated as a main effect, operating independently of other variables to predict health.

b) ***Life course perspective on the impact:*** Children born into poorer circumstances are at greater risk of the forms of developmental delay associated with intellectual disability, including speech impairments, cognitive difficulties and behavioral problems[193,194]. Some other conditions, like stroke and stomach cancer, appear to depend considerably on childhood circumstances, while for others, including deaths from lung cancer and accidents/violence, adult circumstances play the more important role. In another group are health outcomes where it is cumulative exposure that appears to be important. A number of studies suggest that this is the case for coronary heart disease and respiratory disease, for example[195].

c) ***Selection processes and health-related mobility:*** As discussed above, people with weaker health resources, allegedly, have a tendency to end up or remain low on the ladder of socioeconomic position. According to some analysts, the status of research on selection processes and health-related mobility within the socioeconomic structure can be summarized in three points: (1) Variations in health in youth have some significance for educational paths and for the kind of job a person has at the beginning of his or her working career; (2) For those who are already established in working life, variations in health have little significance for the overall progress of a person's career; (3) People who develop serious health problems in adult life are often excluded from working life, and often long before the ordinary retirement age[196].

Graham argues that people with intellectual disabilities are more exposed to the social conditions associated with poor health and have poorer health than the wider population[197]. She adds that, for example, those with mild disabilities are more likely than non-disabled people to have employment histories punctured by repeated periods of unemployment. Women with mild intellectual disabilities are further disadvantaged by high rates of teenage motherhood[198]. In both childhood and adulthood, co-morbidity—the experience of multiple illnesses and functional limitations—disproportionately affects people with intellectual disabilities[199]. For example, in the British 1958 birth cohort study, children with mild mental retardation were at higher risk of sensory impairments and emotional difficulties; they were also more likely to be in contact with psychiatric services. In adulthood, mild mental retardation was associated with limiting long-term illness and disability, and, particularly for women, with depressed mood.

One might assume such effects to be inevitable. But they are in part due to dis-

criminatory practices, in part also to failures to adapt educational institutions and working life to special needs. To the extent that this is the case, social selection is neither necessary, nor inevitable, nor fair. This phenomenon particularly affects persons with disabilities, persons from immigrant backgrounds and, to a certain extent, women[200].

d) ***Impact on the socioeconomic and political context:*** From a population standpoint, we observe that the magnitude of certain diseases can translate into direct effects on features of the socioeconomic and political context, through high prevalence rates and levels of mortality and morbidity. The HIV/AIDS pandemic in sub-Saharan Africa can be seen in this light, with its associated plunge in life expectancy and stresses on agricultural productivity, economic growth, and sectoral capacities in areas such as health and education. The magnitude of the impact of epidemics and emergencies will depend on the historical, political and social contexts in which they occur, as well as on the demographic composition of the societies affected. These are aspects that must be considered when analyzing welfare state structures, in particular models of health system organization that may be considered to respond to such challenges[201].

Key messages from this section:

- The underlying social determinants of health inequities operate through a set of intermediary determinants of health to shape health outcomes. The vocabulary of 'structural determinants' and 'intermediary determinants' underscores the causal priority of the structural factors.
- The main categories of intermediary determinants of health are: material circumstances; psychosocial circumstances; behavioral and/or biological factors; and the health system itself as a social determinant
- Material circumstances include factors such as housing and neighborhood quality; consumption potential (i.e., the financial means to buy healthy food, warm clothing, etc.), and the physical work environment.
- Psychosocial circumstances include psychosocial stressors, stressful living circumstances and relationships, and social support and coping styles (or the lack thereof).
- Behavioral and biological factors include nutrition, physical activity, tobacco consumption and alcohol consumption, which are distributed differently among different social groups. Biological factors also include genetic factors.
- The CSDH framework departs from many previous models by conceptualizing the health system itself as a social determinant of health. The role of the health system becomes particularly relevant through the issue of access, which incorporates differences in exposure and vulnerability, and through intersectoral action led from within the health sector. The health system plays an important role in mediating the differential consequences of illness in people's lives.
- The concepts of social cohesion and social capital occupy a conspicuous (and contested) place in discussions of SDH. Social capital cuts across the structural and intermediary dimensions, with features that link it to both.
- Focus on social capital risks reinforcing depoliticized approaches to public health and SDH; however, certain interpretations, including Szreter's and Woolcock's notion of 'linking social capital', have spurred new thinking on the role of the state in promoting equity.
- A key task for health politics is nurturing cooperative relationships between citizens and institutions. The state should take responsibility for developing flexible systems that facilitate access and participation on the part of the citizens.
- The social, economic and other consequences of specific forms of illness and injury vary significantly, depending on the social position of the person who falls sick.
- Illness and injury have an indirect impact in the socioeconomic position of individuals. From the population perspective, the magnitude of certain illnesses can directly impact key contextual factors (e.g., the performance of institutions).
- Looking at the ultimate impact of social processes on health equity, we find that the structural factors associated with the key components of socioeconomic position (SEP) are at the root of health inequities at the population level. This relationship is confirmed by a substantial body of evidence.
- Differences correlated with people's socioeconomic position are found for rates of mortality and morbidity from almost every disease and condition. SEP is also linked to prevalence and course of disease and self-rated health.
- The magnitude of certain diseases can directly affect features of the socioeconomic and political context, through high prevalence rates and levels of mortality and morbidity. The HIV/AIDS pandemic in sub-Saharan Africa provides one example, with its impact on agriculture, economic growth and sectoral capacities in areas such as health and education.

V.8.—Summary of the mechanisms and pathways represented in the framework

In this section, we summarize key features of the CSDH model and begin to sketch some of the considerations for policymaking to which the model gives rise. The next chapter will explore policy implications and entry points in greater depth.

The figure below illustrates the main processes captured in the CSDH framework, as we have explored them, step by step, in the present chapter. The diagram also highlights the reverse or feedback effects through which illness may affect individual social position, and widely prevalent diseases may affect key social, economic and political institutions. Reading the diagram from left to right, we see the social and political context (in yellow), which gives rise to a set of unequal socioeconomic positions or social classes (red column). (Phenomena related to socioeconomic position can also influence aspects of the context, as suggested by the pale red arrows pointing back to the left.) Groups are stratified according to the economic status, power and prestige they enjoy, for which we use income levels, education, occupation status, gender, race/ethnicity and other factors as proxy indicators. This column of the diagram ("socioeconomic position") locates the underlying mechanisms of social stratification and the creation of social inequities.

Moving to the right, we observe how these socioeconomic positions then translate into specific determinants of individual health status reflecting the individual's social location within the stratified system. The model shows that a person's socioeconomic position affects his/her health, but that this effect is not direct. Socioeconomic position influences health through more specific, intermediary determinants.

Based on their respective social status, individuals experience differences in exposure and vulnerability to health-compromising conditions. Socioeconomic position directly affects the level or frequencies of exposure and the level of vulnerability, in connection with intermediary factors. Also, differences in exposure can generate more or less vulnerability in the population after exposure.

Once again, a distinctive element of this model is its explicit incorporation of the health system. Socioeconomic inequalities in health can in fact be partly explained by the "feedback" effect of health on socioeconomic position, e.g., when someone experiences a drop in income because of a work-induced disability or the medical costs associated with major illness. Persons who are in poor health less frequently move up and more frequently move down the social ladder than healthy persons. This implies that the health system itself can be viewed as a social determinant of health. This is in addition to the health sector's key role in promoting and coordinating SDH policy, as regards interventions to alter differential exposures and differential vulnerability through action on intermediary factors (material circumstances, psychosocial factors and behavioral/biological factors). It may be noted, in addition, that

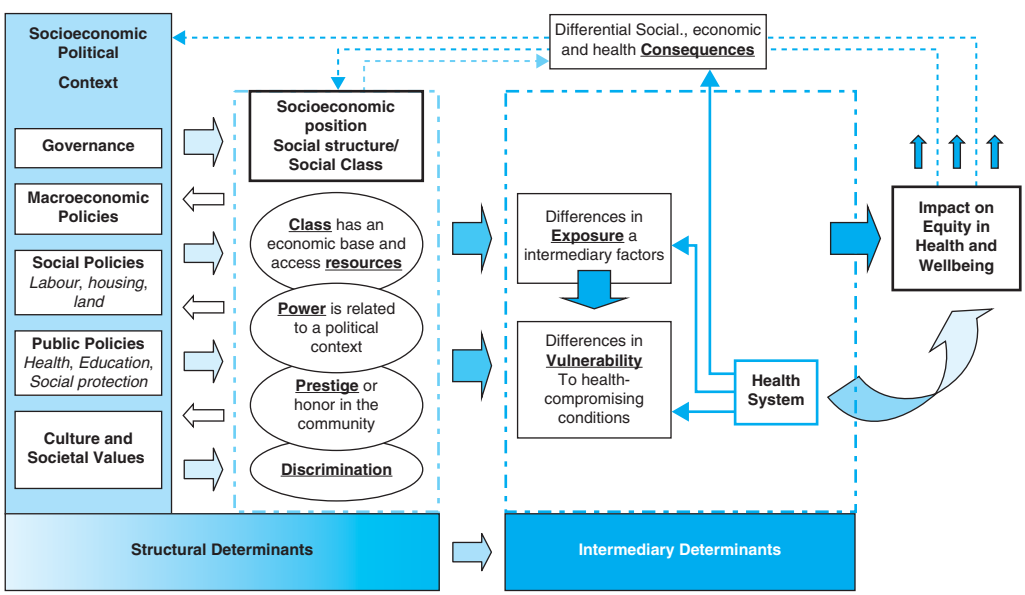


Figure summary pathway and mechanism of social determinants of health inequities elaborated EQH/EI

some specific diseases can impact people's socioeconomic position not only by undermining their physical capacities, but also through associated stigma and discrimination, e.g., in the case of HIV/AIDS. Because of their magnitude, certain diseases, such as HIV/AIDS and malaria, can also impact key contextual components directly, e.g., the labour market and governance institutions. This effect is illustrated by the blue arrow in the diagram. The whole set of 'feedback' mechanisms just described is brought together under the heading of 'differential social, economic and health consequences'. We have included the impact of social position on these mechanisms, indicating that path with a red arrow.

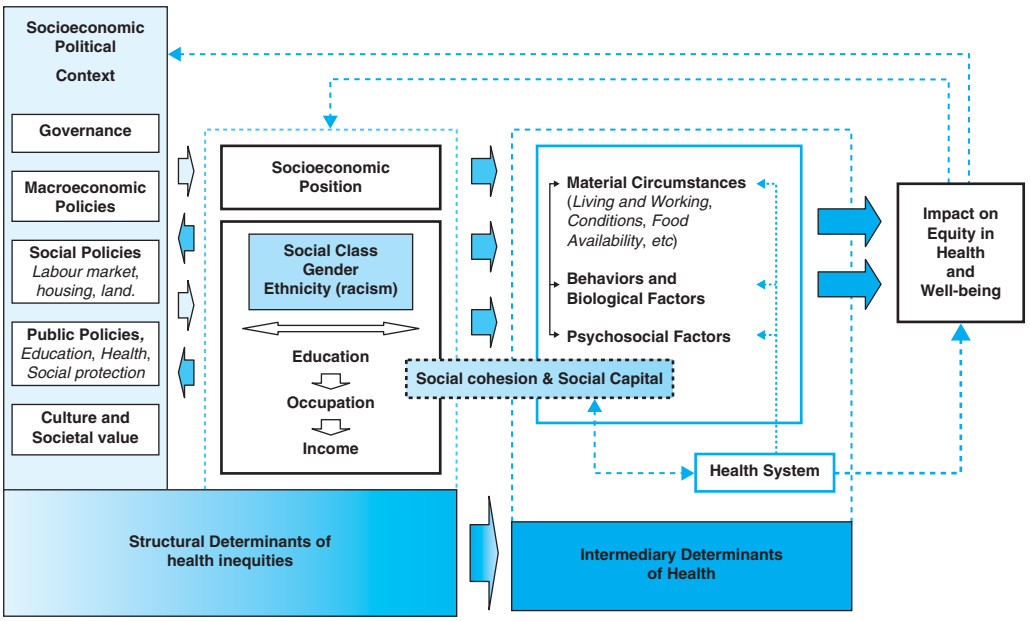
We have repeatedly referred to Hilary Graham's warning about the tendency to conflate the social determinants of health and the social processes that shape these determinants' unequal distribution, by lumping the two phenomena together under a single label. Maintaining the distinction is more than a matter of precision in language. As Graham argues, blurring these concepts may lead to seriously misguided policy choices. "There are drawbacks to applying health-determinant models to health inequalities." To do so may "blur the distinction between the social factors that influence health and the social processes that determine their unequal distribution. The blurring of this distinction can feed the policy assumption that health inequalities can be diminished by policies that focus only on the social determinants of health. Trends in older industrial societies over the last 30 years caution against assuming that tackling "the layers of influence" on individual and population health will reduce health inequalities. This period has seen significant improvements in health determinants (e.g., rising living standards and declining smoking rates) and parallel improvements in people's health (e.g., higher life expectancy). But these improvements have broken neither the link between social disadvantage and premature death nor the wider link between socioeconomic position and health. As this suggests, those social and economic policies that have been associated with positive trends in health-determining social factors have also been associated with persistent inequalities in the distribution of these social influences.'[202]

Many existing models of the social determinants of health may need to be modified in order to help the policy community understand the social causes of health inequalities. Because inequalities in determinants are not factored into the models, their central role in driving inequalities in health may not be recognized. They are designed to capture schematically the distinction between health determinants and health inequality determinants, which can be obscured in the translation of research into policy. Evidence points to the importance of representing the concept of social determinants to policymakers in ways that clarify the distinction between the social causes of health and the factors determining their distribution between more and less advantaged groups. Our CSDH framework attempts to fulfill this objective. Indeed, this is one of its most important intended functions.

Graham argues that what is obscured in many previous treatments of these topics '*is that tackling the determinants of health inequalities is about tackling the* ***unequal distribution of health determinants'***. Focusing on the unequal distribution of determinants is important for thinking about policy. This is because policies that have achieved overall improvements in key determinants such as living standards and smoking have not reduced inequalities in these major influences on health. When health equity is the goal, the priority of a determinants-oriented strategy is to reduce inequalities in the major influences on people's health. Tackling inequalities in social position is likely to be at the heart of such a strategy. For, according to Graham, social position is the pivotal point in the causal chain linking broad ('wider') determinants to the risk factors that directly damage people's health.

Graham emphasizes that policy objectives will be defined quite differently, depending on whether our aim is to address determinants of health or determinants of health inequities:

- ***Objectives for health determinants*** are likely to focus on reducing overall exposure to health-damaging factors along the causal pathway. These objectives are being taken forward by a range of current national and local targets: for example, to raise educational standards and living standards (important constituents of socioeconomic position) and to reduce rates of smoking (a major intermediary risk factor).
- ***Objectives for health inequity determinants*** are likely to focus on leveling up the distribution of major health determinants. How these objectives are framed will depend on the health inequities goals that are being pursued. For example, if the goal is to narrow the health gap, the key policies will be those which bring standards of living and diet, housing and local services in the poorest groups closer to those enjoyed by the majority of the population. If the health inequities



goal is to reduce the wider socioeconomic gradient in health, then the policy objective will be to lift the level of health determinants across society towards the levels in the highest socioeconomic group.[203]

V.9.—Final form of the CSDH framework

The diagram above brings together the key elements of the account developed in successive stages throughout this chapter. This image seeks to summarize visually the main lessons of the preceding analysis and to organize in a single comprehensive framework the major categories of determinants and the processes and pathways that generate health inequities.

The framework makes visible the concepts and categories discussed in this paper. It can also serve to situate the specific social determinants on which the Commission has chosen to focus its efforts, and can provide a basis for understanding how these choices were made (balance of structural and intermediary determinants, etc.).

• • • REFERENCES

67. Ball T, New faces of power. In Wartenberg T (ed). 1992. *Rethinking power*. Albany: SUNY Press: 14.
68. Cited in Stewart A 2001. *Theories of power and domination: the politics of empowerment in late modernity*. London /Thousand Oaks, Calif.: SAGE: 15.
69. Giddens 1976 cited in Stewart 2001: 14.
70. Stewart A 2001. *Theories of power and domination: the politics of empowerment in late modernity*. London/Thousand Oaks, Calif.: SAGE.
71. Quiroz S (2006). *Empowerment: a selected annotated bibliography*, p 6-7.
72. Young IM. Five Faces of Oppression. In Wartenberg T (ed). 1992. *Rethinking power*. Albany: SUNY Press: 175-76.
73. Stewart A 2001. *Theories of power and domination: the politics of empowerment in late modernity*. London/Thousand Oaks, Calif.: SAGE: p 36, emphasis in original.
74. Arendt, cited in Wartenberg 22.
75. Fay B, cited in Ball T, New faces of power. In Wartenberg, 23.
76. In Luttrell C, with Quiroz S and Scrutton C (2007). *Empowerment: an overview* (poverty-wellbeing.net).
77. Instituto de Estudios Politicos para America Latina y Africa. http://www.iepala.es/curso_ddhh/ddhh27.htm. Emphasis ours.
78. Fay, cited in Ball, in Wartenberg 23.
79. In Evans T, Whitehead M, Diderichsen F, Bhuiya A, Wirth M (eds). 2001. *Challenging inequities in health*. New York: Oxford UP.
80. (Diderichsen 1998, 102).
81. (Diderichsen, Evans, and Whitehead 2001, 15).
82. (Hallqvist, et al. 1998).
83. Resource allocation for *Health Equity : Issues and Methods*. Finn Diderichsen, September 2004.

Health, Nutrition and Population (HNP) The World Bank.

84. (Whitehead, Diderichsen, and Burström 2000).
85. (Sen 1999).
86. Esping-Andersen G. *Why we need a new Welfare State*. Oxford University 2002.
87. Navarro V. Shi L. The Political context of Social Inequalities and Health. *Health International Journal of Services*, Vol 31 , Pages 1-21, 2001
88. Navarro V. and Shi L. The Political context of Social Inequalities and Health. *International Journal of Healthy Services*, Vol 31, Pages 1-21, 2001.
89. Chung H, Muntaner C. 2006. Political and welfare state determinants of infant and child health indicators: an analysis of wealthy countries. *Soc Sci Med*. 2006 Aug;63(3):829-42.
90. Chung H, Muntaner C. 2006. Political and welfare state determinants of infant and child health indicators: an analysis of wealthy countries. *Soc Sci Med*. 2006 Aug;63(3):829-42.
91. Raphael D. 2006. Social determinants of health: present status, unanswered questions, and future directions. *Int J Health Serv*. 2006;36(4):651-77. Raphael D, Bryant T. 2006. Maintaining population health in a period of welfare state decline: political economy as the missing dimension in health promotion theory and practice. *Promot Educ*. 2006;13(4):236-42.
92. Socieconomic inequalities in health, Part 1, Mackenbach , Bakker, Kunst and Diderichsen. reducing Inequalities in health: *European Perspective*. 2002.
93. Rockefeller Health Equity programme, from Concept and trends in research on Social determinants of Health in Latin America and the Caribbean J.A. Casas WHO.
94. As cited in Gender-sensitive and Pro-poor Indicators of Good Governance.
95. A first approach to Labour Market, Governance and Educational Indicators, Update 7th December 2006, Antía Castedo García.
96. CSDH Employment Conditions Knowledge Network (EMCONET). A Glossary of key concepts 2006.
97. 'Welfare state'. Encyclopædia Britannica. 2006. Encyclopædia Britannica Online. 14 Dec. 2006 <http://www.search.eb.com/eb/article-9076482>.
98. Coburn D. Income inequality, social cohesion and the health status of populations: the role of neoliberalism. *Social Science & Medicine* 2000; 51(1):135-46.
99. Chung H, Muntaner C. 2007. Welfare state matters: a typological multilevel analysis of wealthy countries. *Health Policy*. 2007 Feb;80(2):328-39.
100. Labonte R, Schrecker T. 2005. Globalization and social determinants of health: strategic and analytic review paper. http://www.who.int/social_determinants/resources/globalization.pdf.
101. Orielle HSR and repro health paper.
102. Solar O, Irwin A, Vega J. 2004. Equity in Health Sector Reform and Reproductive Health: Measurement Issues and the Health Systems Context. WHO Health Equity Team working paper. [i] Kleczkowki BM, Roemer M, Van Der Werff A. 1984. *National health systems and their reorientation toward health for all: guidance for policymaking*. Geneva: WHO.
103 (Hills 1998; Howden-Chapman and Tobias 2000; Kubzansky et al. 2001; Perrson et al. 2001).
104. Giddens E. 1993 cited in A. Kunst and Johan P Mackenbach. Measuring socioeconomic inequalities in Health WHO Regional Office Europe 2000.
105. Muntaner C, Borell C, Benach J Pasarin MI Fernadez E. The associations of social class and social stratification with patterns of general and mental health in a Spanish population. *International journal of epidemiology* 2003;32:950-958.
106. Wright EO The class analysis of poverty *Int J Health Serv* 1995.25:85-100.
107. Liberatos P Link BG Kelsey JL. The measurement of social class in epidemiology. *Epidemiology Review* 1988;10:87-121.
108. Krieger, Willimas and Moss. Measuring Social Class. *Annu. Review Public Health* 1997,18:341-378.
109. Singh-Manoux, Clarke P, Marmot M Multiple measure of socioeconomic position and psychosocial health: proximal and distal measures. *International Journal of Epidemiology* 2002; 31:1192 -1199.
110. Pathways between socioeconomic determinants of health. E Lahelma, P Martikainen, M Laaksonen and A Aittomäki. *Journal Epidemiol. Community Health* 2004;58;327-332.
111. Krieger N, Rowley DL, Herman AA, Avery B, Phillips MT.1993. Racism, sexism and social class, implications for studies of health, diseases and well being *Ann J Prev. Med* 9:82-122.
112. Ecob R. Davey Smith G. Income and health: what is the nature of the relationship? *Soc Sci Med 1999*, 48 693-705.
113. Liberatos P Link BG Kelsey JL. The measurement of social class in epidemiology. *Epidemiology Review* 1988;10:87-121.
114. Galobardes B. Shaw M Lawler D Lynch J Davey Smith G. *J. Epidemiol Community Health* 2006; 60:7-12.
115. See E. van Doorslaer et al. (2006), Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data, *Lancet* 368:1357-1364.

116. Kunst and Johan P Mackenbach. Measuring socioeconomic inequalities in Health WHO Regional Office Europe 2000.
117. Galobardes B. Shaw M Lawler D Lynch J Davey Smith G. *J. Epidemiol Community Health* 2006; 60:7-12.
118. Krieger, Williams and Moss. Measuring Social Class. *Annu. Review Public Health* 1997,18: 341-378.
119. Macinko J., Shi L. Starfield B. AND Wulu J. Income Inequality and Health: A critical Review of the Literature. *Medical Care Research and review*, Vol 60 n 4 (December 2003) 407-452.
120. Matthijs Kalmijn Mother's Occupational Status and Children's Schooling *American Sociological Review*, Vol. 59, No. 2. (Apr., 1994), pp. 257-275.
121. Duane F. Alwin Family of Origin and Cohort Differences in Verbal Ability. *American Sociological Review*, Vol. 56, No. 5. (Oct., 1991), pp. 625-638.
122. Marmot M Bobak M Smith DG 1995 Explanations for social inequalities on Health, In Society and Health. Oxford Univ. Express.
123. Towsend P, Davinson N Whitehead M 1990, *Inequalities in Health: The Black Report and the Health Divide*. London: Peguin Books.
124. Galobardes B. Shaw M Lawler D Lynch J Davey Smith G. *J. Epidemiol Community Health* 2006; 60:7-12.
125. Krieger, Williams and Moss. Measuring Social Class. Annu. *Review Public Health* 1997,18: 341-378
126. Oakes JM, Rossi PH. The measurement of SES in health research: current practice and steps toward a new approach. *Soc Sci Med* 2003;56:769-84.
127. M Bartley Commentary: Relating social structure and health *International Journal of Epidemiology* 2003;32:958-960.
128. Muntaner, Lynch and Oates The Social class determinants of income inequality and social cohesion International *Journal of Health service* 1999, Vol 20, Number 4 : 699-732.
129. Socioeconomic Status and Health The challenge of the gradient Adler N, Boyce T, and colleagues *American Psychologist* January 1994: 15-24
130. Muntaner, Lynch and Oates The Social class determinants of income inequality and social cohesion *International Journal of Health service* 1999, Vol 20, Number 4 : 699-732.
131. WHO (2002). Gender glossary. Appendix to Integrating gender perspectives in the work of WHO: WHO gender policy. Geneva: WHO, 2002.
132. Krieger N. 2001. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol.* 2001 Aug;30(4):668-77.
133. Krieger N. 2001. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol.* 2001 Aug;30(4):668-77.
134. Centre for AIDS Development, Research and Evaluation. 2003. Gender-based violence and HIV/AIDS in South Africa : organisational responses / developed by Centre for AIDS Development, Research and Evaluation (CADRE), for the Department of Health, South Africa. Braamfontein: Centre for AIDS Development, Research and Evaluation.
135. Doyal 2000.
136. WHO, http://www.who.int/gender/other_health/Gender,HealthandWorklast.pdf.
137. (Walby 1999).
138. Doyal 2000.
139. Krieger N. 2001. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol.* 2001 Aug;30(4):668-77.
140. UNDP. Human Development Report 2005. New York: UNDP.
141. Hilary Graham Social Determinants and their unequal distribution: clarifying policy understandings. *The Milkbank* Vol 82, n 1, 2004. pp 101-124.
142. P Howden-Chapman Housing Standards: a glossary of housing and Health *J Epidemiol Community Helath* 2004;58:162-168.
143. Dedman DJ, Gunnell D, Davey Smith G, et al. Childhood housing conditions and later mortality in the Boyd Orr cohort. *J Epidemiol Community Health* 2001;55:10-15.
144. Lenz R. Jakarta kampung morbidity variations: some policy implications. *Soc Sci Med* 1988;26: 641-9.
145. Cohen D, Spear S, Scribner R, et al. ''Broken windows" and the risk of gonorrhea. *Am J Public Health* 2000;90:230-6.
146. Employment Conditions Knowledge Network (EMCONET) A Glossary of key concepts for EMCONET 2006.
147. R. G. Wilkinson: Unhealthy societies. The Affliction of inequality. London: Routlegde, 1996.
148. Reference Published : Jon Ivar Elstad/Statistisk sentralbyrå: Livsløpsundersøkelse blant 55-årige menn i 2001 (previously unpublished).
149. Willems Sara.*The socioeconomic gradient in health: a never-ending history? A descriptive and explorative study in Belgium*. October 2005 Department of General Practice and Primary Health Care.
150. Labour market changes and job insecurity: a challenge for social welfare and health promotion *Edited by* Jane E. Ferrie, Michael G. Marmot, John Griffiths *and* Erio Ziglio WHO 1999

151. Margolis, P. A., Greenberg, R. A., Keyes, L. L., Lavange, L. M., Chapman, R. S., Denny, F. W, Bauman, K. E., & Boat, B. W. (1992). Lower respiratory illness in infants and low socioeconomic status. *American Journal of Public Health, 82,* 1119-1126.
152. (Marmot et al., 1984).
153. Adelstein, 1980; Centers for Disease Control, 1987; Devesa & Diamond, 1983; Escobedo, Anda, Smith, Remington, & Mast, 1990; Kraus et al., 1980; Marmot et al., 1991; Pugh, Power, Goldblatt, & Arber, 1991; Remington et al., 1985; Seccareccia, Menotti,& Prati, 1991; U.S. Department of Health, Education, and Welfare [DHEW], 1979; Winkleby, Fortmann,& Barrett, 1990.
154. (Matthews, Kelsey, Meilahn, Kuller, & Wing, 1989).
155. (Marmot et al., 1991).
156. (Escobedo et al., 1990; Kaprio & Koskenvuo, 1988; Pugh etal., 1991).
157. M. G. Marmot, G. Rose, M. Shipley and P. J. S. Hamilton: "Employment grade and coronary heart disease in British civil servants". *Journal of Epidemiology and Community Health* 32 (1978), pp. 244-249.
158. ref Mackenbach book.
159. (Adler, Boyce, Chesney, Folkman, & Syme, 1993).
160. Diderichsen.
161. Benzeval, Judge and Whitehead.
162. J, Mackenbach, L.J. Gunning-Schepers How should interventions to reduce inequalities in helath be evaluated? *Journal of Epidemiology and Communities Health* 1997;51:359-364.
163. This part of the paper was taken of the background paper elaborated for Pamela Bernales May 2006 Internship of the Department Equity, Poverty and Social Determinants, EIP,WHO.
164. Ferguson, K. (2006). Social capital and children's wellbeing: a critical synthesis of the international social capital literature. *International Journal of Social Welfare,* 15: 2-18.
165. Kawachi, I., Kennedy, B. P., Lochner, K. and Prothrow-Stith, D. (1997). Social capital, income inequality, and mortality. *American Journal of Public Health,* 87: 1491-1498.
166. Putnam, R. (2000). *Bowling alone: The collapse and revival of American community.* New York: Simon & Schuster.
167. Putnam, R. (2001). Foreword. In S. Saegert, J. P. Thompson and M. R. Warren (Eds.), *Social capital and poor communities* (pp. xv-xvi). New York: Russell Sage Foundation.
168. Popay, J. (2000). Social capital: the role of narrative and historical research. *Epidemiology and Community Health,* 54: 401.
169. Putnam, R. (1995). Bowling alone: America's declining social capital. *Journal of Democracy,* 6: 65-78. (p. 67).
170. Szreter, S. and Woolcock, M. (2004). Health by association?. Social capital, social theory, and the political economy of public health. *International Journal of Epidemilogy,* 33: 650-667.
171. Moore, S., Haines, V., Hawe, P. and Shiell, A. (2006). Lost in translation: a genealogy of the "social capital" concept in public health. *Journal of Epidemiology and Community Health,* 60: 729-734.
172. Lynch, J., Due, P., Muntaner, C. and Davey Smith, G. (2000). Social capital—Is it a good investment strategy for public health?. *Journal of Epidemiology and Community Health,* 54: 404-408.
173. Lynch, J. (2000). Income inequality and health: expanding the debate. *Social Science and Medicine,* 51: 1001-1005.
174. Szreter, S. and Woolcock, M. (2004). Health by association?. Social capital, social theory, and the political economy of public health. *International Journal of Epidemilogy,* 33: 650-667.
175. Szreter, S. and Woolcock, M. (2004). Health by association?. Social capital, social theory, and the political economy of public health. *International Journal of Epidemilogy,* 33: 650-667.
176. Muntaner C 2004 Social capital, social class and the slow progress of psychosocial epidemiology. *Int J Epidemiol* 2004;33: 1-7.
177. Navarro V (2004). Is capital the solution or the problem? *Int J of Epidemiology* 2004;33: 672-74.
178. Cropper, S. (2002). What contributions might ideas of social capital make to policy implementation for reducing health inequalities?. *Paper to HAD Seminar Series 'Tackling Health Inequalities: turning policy into practice'. Seminar 3: Organisational Change and Systems Management.* 17th September 2002, Royal Aeronautical Society, London.
179. Lowndes, V. and Wilson, D. (2001). Social capital and local governance: exploring the institutional design variable. *Political Studies,* 49: 629-647.
180. Castel, R. (2005). Estado e inseguridad social. Conferencia Subsecretaría de la Gestión Pública, República de Argentina, 03 Agosto de 2005.
181. Crawshaw, P., Bunton, R. and Gillen, K. (2002). Health action zones and the problem of community. *Health and Social Care in the Community,* 11 (1): 36-44.
182. Labra, M. (2002). Capital social y consejos en salud en Brasil. ¿Un círculoo virtuoso?. *Cuadernos de Saúde Pública vol. 18 suppl. Río de Janeiro.* Download 13-07-2006 de http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2002000700006&.

183. Rose, N. (1999). Inventiveness in politics. *Economy and Society,* 28 (3): 467-493.

184. Castel, R. (2005). Estado e inseguridad social. Conferencia Subsecretaría de la Gestión Pública, República de Argentina, 03 Agosto de 2005.

185. Szreter, S. and Woolcock, M. (2004). Health by association?. Social capital, social theory, and the political economy of public health. *International Journal of Epidemilogy,* 33: 650-667.

186. (Drever & Whitehead 1997; Kubzansky et al. 2001; Mackenbach et al. 2002; Singh & Yu 1996).

187. (Antonovsky, 1967; Ulsley& Baker, 1991).

188. Quality of life fundation.

189. Graham H. 2005. Intellectual disabilities and Socieconomic inequalities in Health : An overview of research Journal of Applied Research in Intellectualities 2005,18,101-111.

190. (Emerson 2004) .

191. Adelstein, 1980; Kraus, Borhani, & Franti, 1980; Marmot et al., 1991; Marmot, Shipley, & Rose, 1984).

192. Marmot, Kogevinas, and Elston (1987).

193. (Power & Hertzman 2004).

194. (Maughan et al. 1999).

195. Davey Smith at al 2001.

196. Ref

197. (Cf. Leonard & Wen 2002; US Department of Health and Human Services (USDHSS) 2002; Elliott et al. 2003). Graham 2004.

198. (Maughan et al. 1999).

199. (Elliott et al. 2003).

200. Graham H. Social Determinants and their unequal distribution: clarifying policy understandings. *The Milbank Quarterly* Vol 82, n 1, 2004.

201. Buscar referencia.

202. Graham H. 2004. Social Determinants and their unequal distribution: clarifying policy understandings. *The Milbank Quarterly* Vol 82, n 1, 2004 pp. 101-124.

203. Graham H. 2004. Social Determinants and their unequal distribution: clarifying policy understandings. *The Milbank Quarterly* Vol 82, n 1, 2004 pp. 101-124.