What Is Population Health?

Population health is a relatively new term that has not yet been precisely defined. Is it a concept of health or a field of study of health determinants?

We propose that the definition be "the health outcomes of a group of individuals, including the distribution of such outcomes within the group," and we argue that the field of population health includes health outcomes, patterns of health determinants, and policies and interventions that link these two.

We present a rationale for this definition and note its differentiation from public health, health promotion, and social epidemiology. We invite critiques and discussion that may lead to some consensus on this emerging concept. (*Am J Public Health.* 2003;93:380–383)

David Kindig, MD, PhD, and Greg Stoddart, PhD

ALTHOUGH THE TERM "population health" has been much more commonly used in Canada than in the United States, a precise definition has not been agreed upon even in Canada, where the concept it denotes has gained some prominence. Probably the most influential contribution to the development of the population health approach is Evans, Barer, and Marmor's *Why Are Some People Healthy and Others Not? The Determinants of Health of Populations*,[1] which grew out of the work of the Population Health Program of the Canadian Institute for Advanced Research. No concise definition of the term appears in this volume, although its authors state the concept's "linking thread [to be] the common focus on trying to understand the determinants of health of populations."[1(p29)]

The idea that population health is a field of study or a research approach focused on determinants seems to have evolved from this work. Early discussions at the Canadian Institute for Advanced Research also considered the definition and measurement of health and the processes of health policymaking, but the dominant emphasis evolved to the determinants themselves, particularly the nonmedical determinants. John Frank, the scientific director of the recently created Canadian Institute of Population and Public Health, has similarly called population health "a newer research strategy for understanding the health of populations."[2] T.K. Young's recent book *Population Health* also tends in this direction; he states that in Canada and the United Kingdom in the 1990s, the term has taken on the connotation of a "conceptual framework for thinking about why some populations are healthier than others as well as the policy development, research agenda, and resource allocation that flow from this framework."[3(p4)]

However, Young also indicates that in the past, the term has been used as a "less cumbersome substitute for the health of populations," which is of course its literal meaning. Evans and Stoddart, while supporting an emphasis on "understanding of the determinants of population health," have also stated, however, that "different concepts [of health] are neither right or wrong, they simply have different purposes and applications. . . . [W]hatever the level of definition of health being employed, however, it is important to distinguish this from the question of the determinants of that definition of health."[1(p28)] The Health Promotion and Programs Branch of Health Canada has recently stated that "the overall goal of a population health approach is to maintain and improve the health of the entire population and to reduce inequalities in health between population groups."[4(p1)] They indicate that one guiding principle of a population health approach is "an increased focus on health outcomes (as opposed to inputs, processes, and products) and on determining the degree of change that can actually be attributed to our work."[(p11)]

Dunn and Hayes, quoting the definition of the Canadian Federal/Provincial/Territorial Advisory Committee on Population Health, write that "population health refers to the health of a population as measured by health status indicators and as influenced by social, economic, and physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development, and health services. As an approach, population health focuses on interrelated conditions and factors that influence the health of populations over the life course, identifies systematic variations in their patterns of occurrence, and applies the resulting knowledge to develop and implement policies and actions to improve the health and well being of those populations."[5(p57)] Kindig has suggested a similarly broad definition: population health is "the aggregate health outcome of health adjusted life expectancy (quantity and quality) of a group of individuals, in an economic framework that balances the relative marginal returns from the multiple determinants of health."[6(p47)] This definition proposes a specific unit of measure of population health and also includes consideration of the relative cost-effectiveness of resource allocation to multiple determinants.

Recently, even in the United States, the term is being more widely used, but often without clarification of its meaning and definition. While this development might be seen as a useful movement in a new and positive direction, increased use without precision of meaning could threaten to render the term more confusing than helpful, as may already be the case with "community health" or "quality of medical care." For this reason, we propose a definition that may have a more precise meaning for policymakers and academics alike; our purpose is to stimulate active critiques and debate that may lead to further clarification and uniformity of use.

DEFINITION AND CONCEPT

As indicated above, the primary tension or confusion at present seems to be between defining population health as a field of study of health determinants or as a concept of health. The Group Health Community Foundation has recently stated that "some observers see population health as a new term that highlights the influential role of social and economic forces in combination with biological and environmental factors, that shape the health of entire populations . . . others interpret population health primarily as a goal—a goal of achieving measurable improvements in the health of a defined population."[7(p7)]

We think that there are 3 general possibilities: population health (a) is only concerned with the independent variables (the multiple determinants), (b) is only concerned with the dependent variables (health outcomes), or (c) is concerned with both the definition and measurement of health outcomes and the roles of determinants. While none of the three is normatively correct or incorrect, we believe that the latter is more appropriate, primarily because the concept and measurement of health and health outcomes focuses attention and research effort on the impact of each determinant and their interactions on some appropriate outcome. It also allows one to consider health inequality and inequity and the distribution of health across subpopulations, as well as the ethical and value considerations underpinning these issues.[8]

While the original Evans and Stoddart "field model" did not discuss a population health concept in these terms, the idea is implicit in the evolution of the dependent variable from "health care" to "health and function" to "well being."[1(pp33–53)] The Institute of Medicine has given serious attention to measuring population health, thereby encouraging some kind of summary measure that includes mortality and health-related quality of life.[9]

Given these considerations, we propose that *population health as a concept of health* be defined as "the health outcomes of a group of individuals, including the distribution of such outcomes within the group." These populations are often geographic regions, such as nations or communities, but they can also be other groups, such as employees, ethnic groups, disabled persons, or prisoners. Such populations are of relevance to policymakers. In addition, many determinants of health, such as medical care systems, the social environment, and the physical environment, have their biological impact on individuals in part at a population level.

Defining population health this way requires some measure(s) of health outcomes of populations, including their distribution throughout the population. We chose the broader term "health outcomes" rather than the more narrow term "health status"; we believe the latter refers to health at a point in time rather than over a period of years. We do not believe that there is any one definitive measure, but we argue that the development and validation of such measures for different purposes is a critical task for the field of population health research.

Our definition does imply the necessity of one or more broad summary measures capable of being a dependent variable for the spectrum of all determinants (generally including length of life and health-related quality and function of those life years), along with a family of other submeasures for different policy and research purposes. For example, the Health Utilities Index is being used in the Canadian National Population Health Survey,[10] Years of Healthy Life have been used in Healthy People 2000,[11] and the EuroQuol has been recently added to the Medical Expenditure Panel Survey.[12]

We support the idea that a hallmark of *the field of population health* is significant attention to the multiple determinants of such health outcomes, however measured. These determinants include medical care, public health interventions, aspects of the social environment (income, education, employment, social support, culture) and of the physical environment (urban design, clean air and water), genetics, and individual behavior. We note with caution that such a list of categories can lead to a view that they operate independently; population health research is fundamentally concerned about the interactions between them, and we prefer to refer to "patterns" of determinants.

Population health researchers tend to use a set of methods and approaches that have the following important characteristics: examination of systematic differences in outcomes across populations, complexity of interactions among determinants, biological pathways linking determinants to population health outcomes, and the influence of different determinants over time and throughout the life cycle.[13–15]

In our view, a population health perspective also requires attention to the resource allocation issues involved in linking determinants to outcomes. Part of the study of population health involves the estimation of the cross-sectoral cost-effectiveness of different types and combinations of investments for producing health.[16] Because improvement in population health requires the attention and actions of multiple actors (legislators, managers, providers, and individuals), the field of population health needs to pay careful attention to the knowledge transfer and academic-practice partnerships that are required for positive change to occur.[17,18] Figure 1 shows how we view the field of population health. The field investigates each of the components shown in the figure, but particularly their interactions.

CRITIQUES

We expect and welcome critiques of the definition presented here. As noted above, one critique will be that the tasks of defining and measuring concepts of health are large enough to constitute a subject of their own, rather than being combined with the study of determinants of health. We have already given our rationale for including them

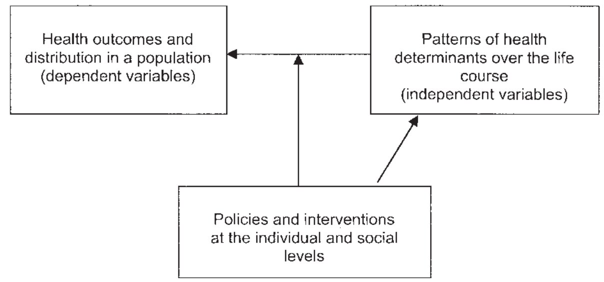

FIGURE 1—A schematic definition of the field of population health.

in population health as a field of study, but we would add that the need for accountability argues strongly for the inclusion of outcome and distributional considerations if a population health approach is to be useful in guiding policymaking regarding resource allocation across determinants and sectors. Without such a framework, advocacy and financial incentives for individual determinants can proceed independently of their impact, as some would argue is now the case for some medical care expenditures in the United States.

A second critique is that such a definition and concept is so broad that it includes everything and is therefore not useful to guide either research or policy. We understand this concern but do not agree with it. We believe that a guiding synthesis is essential for considering both the relative impacts of the pattern of determinants and their interactions. Integration of knowledge about health and its multiple determinants seldom occurs. Policy managers typically have responsibility for a single sector; advocacy groups typically have an interest in only one disease or determinant. No one in the public or private sectors currently has responsibility for overall health improvement. We suggest that the importance of a population health perspective is that it forces review of health outcomes in a population *across* determinants. For population health research, specific investigations into a single determinant, outcome measure, or policy intervention are relevant, and may even be critical in some cases, but they must be recognized as only a part and not the whole.

Those in public health or health promotion may legitimately feel that population health is simply a renaming of what has been their work or legacy. Hamilton and Bhatti have attempted to show the complementarity and overlap between population health and health promotion,[19] building on the Canadian Achieving Health for All Framework for Health Promotion[20] and the World Health Organization Ottawa Charter on Health Promotion.[21] Frank has indicated that historic concepts of public health were similarly broad, until the biomedical paradigm became dominant. Those who define public health as the "health of the public" would not disagree with the definition of population health proposed here; in the words of Frank, the "shift in thinking entailed in population health should be a small one for public health workers . . . in fact it is not so much a shift as a return to our historical roots encompassing all the primary determinants of health in human populations."[22(p163)]

However, much of public health activity, in the United States at least, does not have such a broad mandate even in the "assurance" functions, since major determinants such as medical care, education, and income remain outside of public health authority and responsibility, and current resources do not even allow adequate attention to traditional and emerging public health functions. Similarly, we believe that the emerging prominence of social epidemiology is a very important development for population health but does not have the breadth, or imply all of the multiple interactions and pathways, of the definition proposed here for population health.

CONCLUSION

We believe that the time has come for a clarification of the meaning and scope of the term "population health." We have offered a clarification of the term that combines the definition and measurement of health outcomes and their distribution, the patterns of determinants that influence such outcomes, and the policies that influence the optimal balance of determinants. We welcome discussion and debate regarding these suggestions as a way of moving toward some consensus on this important and emergent concept. ■

About the Authors

David Kindig is with the Department of Population Health Sciences, University of Wisconsin–Madison School of Medicine, Madison. Greg Stoddart is with the Department of Clinical Epidemiology and Biostatistics, McMaster University Health Science Centre, Hamilton, Ontario.

Requests for reprints should be sent to David A. Kindig, MD, PhD, Suite 760, 610 Walnut St, Madison, WI 53726-2397 (e-mail: dakindig@facstaff.wisc.edu).

This article was accepted November 15, 2002.

Contributors

Both authors contributed equally to the planning and writing of this article.

Acknowledgments

D. Kindig was funded in part by the Robert Wood Johnson Health and Society Scholars Planning Grant to the Department of Population Health Sciences at the University of Wisconsin Madison School of Medicine.

We acknowledge the helpful comments of John Mullahy, Stephanie Robert, Donn D'Alessio, John Lavis, and many members of the Robert Wood Johnson Foundation Health and Society Scholars Planning Group.

References

1. Evans R, Barer M, Marmor T. *Why Are Some People Healthy and Others Not? The Determinants of Health of Populations.* New York, NY: Aldine de Gruyter; 1994.

2. Frank J. Canada Institute of Population and Public Health. Message from: Dr John Frank, scientific director, Institute of Population and Public Health. Available at: http://www.cihr-irsc.gc.ca/institutes/ipph/about_ipph/ipph_message_director_e.shtml. Accessed December 23, 2002.

3. Young TK. *Population Health: Concepts and Methods.* New York, NY: Oxford University Press; 1998.

4. Health Canada. *Taking Action on Population Health.* Ottawa, Ontario: Health Canada; 1998.

5. Dunn JR, Hayes MV. Toward a lexicon of population health. *Can J Public Health.* 1999;90(suppl 1):S7–S10.

6. Kindig DA. *Purchasing Population Health: Paying for Results.* Ann Arbor: University of Michigan Press; 1997.

7. Kreuter M, Lezin N. *Improving Everyone's Quality of Life: A Primer on Population Health.* Atlanta, Ga: Group Health Community Foundation; 2001.

8. Williams A. Conceptual and empirical issues in the efficiency-equity trade-off in the provision of health care or, if we are going to get a fair innings, someone will need to keep the score! In:

Maynard AJ, ed. *Being Reasonable About the Economics of Health.* Cheltenham, England: Edward Elgar; 1997:322–349.

9. *Summarizing Population Health Directions for the Development and Application of Population Metrics.* Washington, DC: Institute of Medicine, Division of Health Care Services; 1998.

10. Wall R, Foster R. Beyond life expectancy. *Health Policy Res Bull.* 2002; 1:32–33.

11. Erickson P, Wilson R, Shannon I. *Years of Healthy Life.* Bethesda, Md: National Center for Health Statistics; 1995. Statistics note no. 7.

12. Gold MR, Muenning P. Measure-dependent variation in burden of disease estimates. *Med Care.* 2002;40: 260–266.

13. Berkman L, Kawachi I. *Social Epidemiology.* New York, NY: Oxford University Press; 2000.

14. Keating DP, Hertzman C. *Developmental Health and the Wealth of Nations: Social, Biological, and Educational Dynamics.* New York, NY: Guilford Press; 1999.

15. Adler N, Marmot M, McEwen B, Stewart J. Socioeconomic status and health in industrial nations: social, psychological, and biological pathways. *Ann N Y Acad Sci.* 1999;896.

16. Drummond M, Stoddart G. Assessment of health producing measures across different sectors. *Health Policy.* 1995;33:219–231.

17. Lavis JN, Ross SE, Hurley JE, et al. Examining the role of health services research in public policy making. *Milbank Q.* 2002;80:125–154.

18. Lomas J. Using “linkage and exchange” to move research into policy at a Canadian foundation. *Health Aff.* 2000;19(3):236–240.

19. Hamilton N, Bhatti T. *Population Health Promotion: An Integrated Model of Population Health and Health Promotion.* Ottawa, Ontario: Health Promotion Development Division; February 1996.

20. Epp J. *Achieving Health for All: A Framework for Health Promotion.* Ottawa, Ontario: Health and Welfare Canada; 1986.

21. World Health Organization (WHO). *Ottawa Charter on Health Promotion.* Copenhagen, Denmark: WHO Regional Office for Europe; 1986.

22. Frank JW. Why “population health”? *Can J Public Health.* 1995;86: 162–164.

HSR Health Services Research

© Health Research and Educational Trust
DOI: 10.1111/1475-6773.12393
RESEARCH ARTICLE

The Effects of Job Insecurity on Health Care Utilization: Findings from a Panel of U.S. Workers

Rita Hamad, Sepideh Modrek, and Mark R. Cullen

Objective. To examine the impacts of job insecurity during the recession of 2007–2009 on health care utilization among a panel of U.S. employees.

Data Sources/Study Setting. Linked administrative and claims datasets on a panel of continuously employed, continuously insured individuals at a large multisite manufacturing firm that experienced widespread layoffs ($N = 9{,}486$).

Study Design. We employed segmented regressions to examine temporal discontinuities in utilization during 2006–2012. To assess the effects of job insecurity, we compared individuals at high- and low-layoff plants. Because the dataset includes multiple observations for each individual, we included individual-level fixed effects.

Principal Findings. We found discontinuous increases in outpatient (3.5 visits/month/10,000 individuals, $p = .002$) and emergency (0.4 visits/month/10,000 individuals, $p = .05$) utilization in the panel of all employees. Compared with individuals at low-layoff plants, individuals at high-layoff plants decreased outpatient utilization (−4.0 visits/month/10,000 individuals, $p = .008$), suggesting foregone preventive care, with a marginally significant increase in emergency utilization (0.4 visits/month/10,000 individuals, $p = .08$).

Conclusions. These results suggest changes in health care utilization and potentially adverse impacts on employee health in response to job insecurity during the latest recession. This study contributes to our understanding of the impacts of economic crises on the health of the U.S. working population.

Key Words. Health care utilization, job insecurity, mass layoffs, panel study, workplace

---

Job insecurity refers to an individual's perception of a threat to his or her employment and the anticipation of job loss (Sverke and Hellgren 2002). Prior research has demonstrated that *subjective* job insecurity brings about worsened physical and mental health among affected individuals (Ferrie et al. 2002; Sverke, Hellgren, and Naswall 2002). *Objective* measures of job insecurity, such as the occurrence of downsizing or local mass layoffs, have also been associated with higher work-related stress (Dragano, Verde, and Siegrist 2005), decreased job satisfaction (Heaney, Israel, and House 1994), and worsened health among surviving employees (Kivimäki et al. 2003; Vahtera et al. 2004; Martikainen, Maki, and Jantti 2008; Modrek and Cullen 2013b).

A related literature addresses the health effects of recessions and economic downturns. Several comprehensive reviews of this literature exist (Catalano et al. 2011; Modrek et al. 2013). Studies on the effects of recessions often focus on the effects among unemployed individuals or at the population level, with fewer studies examining outcomes specifically among employed individuals; job insecurity may be more pronounced among surviving employees if the economy is in recession, as labor markets are weaker and other employment opportunities may be limited (Modrek et al. 2013). A study by the American Life Panel Survey during 2008–2010 found that employees consistently overestimated their likelihood of unemployment (Hurd and Rohwedder 2010). Therefore, it is important to specifically examine the health impacts of job insecurity during economic downturns. For example, during the “Great Recession” of 2007–2009, studies have shown increased incidence of hypertension and diabetes among surviving employees at high-layoff firms (Modrek and Cullen 2013a), as well as increased use of mental health treatments (Modrek, Hamad, and Cullen 2015).

Notably absent from this literature is an examination of the impacts of mass layoffs and job insecurity on health care utilization, although prior work has examined utilization during recessions more generally. For the purposes of this literature review, we include studies that employ both objective and subjective measures of job insecurity. Studies of health care utilization provide insight into health-seeking behavior in response to financial and psychological threats (actual or anticipated). For example, Roehrig et al. (2012) identified a decrease in the U.S. national expenditure on health during the Great Recession. This may suggest a possible decline in the need for services, as some studies have reported improved health during recessions (Miller et al. 2009). Supporting this hypothesis, studies found decreased health care utilization during the Great Recession based on reports from insurers and health care

---

Address correspondence to Dr. Rita Hamad, M.D., M.P.H., M.S., Division of General Medical Disciplines, Department of Medicine, Stanford University, 1070 Arastradero Road, Palo Alto, CA 94304; e-mail: rhamad@stanford.edu. Sepideh Modrek, Ph.D., is with the Division of General Medical Disciplines, Department of Medicine, Stanford University, Palo Alto, CA. Mark R. Cullen, M.D., is with the Division of General Medical Disciplines, Department of Medicine, Stanford University, Stanford, CA.

providers (American Academy of Family Physicians 2009; American Hospital Association 2009; Johnson, Rockoff, and Mathews 2010). Yet it is possible that lower expenditures are due to patients foregoing care, as prior work has found decreased cancer screening during economic downturns (Catalano, Satariano, and Ciemins 2003; Dorn et al. 2012). Other studies have documented greater utilization of outpatient and emergency room (ER) visits among those whose homes were recently foreclosed upon and increased hospitalizations among the elderly during the Great Recession, as well as increased outpatient utilization more generally, suggesting that utilization changes may reflect worsening health in response to economic downturns (Pollack et al. 2011; McInerney and Mellor 2012; Du and Yagihashi 2015). These conflicting findings may be due to limitations in methodologies; for example, surveys of insurers likely suffer from survivorship bias as laid-off workers lose their private insurance. Alternatively, it may be that population-level studies mask the presence of heterogeneous effects on different subgroups due to differences in the degree of job insecurity. Almost without exception, these studies have examined the effects on utilization of macroeconomic changes, rather than the impacts of an individual's more immediate environment.

In this study, we examined health care utilization trends among a panel of continuously employed, continuously insured workers at a large U.S. manufacturing firm in the hopes of clarifying the impacts of job insecurity on health and health-seeking behavior during recessions. We used mass layoffs at an individual's place of work as an objective measure of his or her job insecurity, as mass layoffs have been associated in prior work with increased subjective job insecurity among surviving employees (Kivimäki et al. 2000). We hypothesized that job insecurity at the firm brought about changes in health care utilization among employees, especially those with heightened job insecurity (i.e., those working in plants with relatively more layoffs). The direction of this change was *a priori* unclear: economic forces such as reduced household income or fear or unemployment may lead to decreased utilization in the context of avoidance of absenteeism; meanwhile, worsening health due to increased job demands or physiological stress might lead to increased utilization (Catalano 2009). To test this hypothesis, we explored patterns in outpatient, ER, and inpatient utilization. Furthermore, we investigated pathways through which health may be impacted. That is, we examined the impacts of job insecurity on medication adherence and foregone preventive care, to test the hypothesis that economic hardship led to an inappropriate decrease in utilization. We also examined whether there were changes in utilization specifically among those with preexisting poor health, to evaluate whether the trends we observed were driven by this high-risk subgroup.

METHODS

Dataset

Our sample was constructed using administrative and claims datasets from a multisite U.S. manufacturing firm that experienced widespread layoffs during the Great Recession. These data are available to researchers through an ongoing collaboration between the investigators and the firm under study, and they have been described in detail in previous publications (Cullen et al. 2006). Our panel included 9,486 employees who were continuously employed from January 2006 to December 2012 at the 26 largest plants in 15 states nationwide (Table 1). These plants were those for which reliable administrative data were available during the study period. In this sample, all were continuously covered by similar insurance plans with comprehensive health care benefits. Insurance plans underwent only minor design changes during the study period. Approximately 97 percent of employees at this firm selected this insurance coverage, with the remaining 3 percent electing coverage from a separate health maintenance organization (HMO) plan; the latter data were not avail-

Table 1: Panel Characteristics* (2006–2012)

	Employees (N = 9,486)
Female (%)	18.9
Age in 2006, mean (SD)	45.3 (8.0)
Race (%)	
White	82.5
Black	8.6
Hispanic	6.0
Other	2.9
Employed at high-layoff plant† (%)	55.6
Risk score‡ (%)	
0–1	67.6
1–2	24.5
2–4	7.9

*Inclusion criteria: continuous employment and continuous insurance coverage during study period.
†High-layoff plants are those in which at least 40 individuals were terminated in a single day.
‡A score of 1 indicates that the individual's health expenditures are likely to fall at the mean in the following year, with each unit increase predicting a one-fold increase in expenditures above the mean.

able to us. All variables were derived from these linked datasets, and there were no missing data.

Measures

Utilization data included detailed information from each medical encounter and prescription drug claims. The latter included prescriptions that were filled by the individual, but not those that were prescribed and never filled. Using current procedural terminology (CPT) codes, we enumerated how many encounters an individual had in each month in three domains: outpatient physician clinic visits, ER visits, and inpatient hospitalizations. Thus, our primary outcome variables measured the number of visits per person per month in a given domain. Outcomes were reported per 10,000 individuals to facilitate interpretation of the magnitude of the observed relationships.

To examine the effects of job insecurity more locally, we used the personnel dataset to determine the presence of mass layoffs at each site, defined as 40 or more individuals terminated on a given day. This represented a natural break in the data and is similar to definitions used in prior studies and by the Bureau of Labor Statistics (Bureau of Labor Statistics 2013b; Modrek and Cullen 2013a). Eight of the 26 plants experienced mass layoffs, with the first in January 2009 and the last in March 2010. Surviving employees at these plants were assumed to experience greater job insecurity compared to those at other plants. While this approach does not capture employees' perceived or subjective job insecurity, it has been used in prior studies as an objective measure (Vahtera et al. 2004; Martikainen, Maki, and Jantti 2008). As it captures changes in the employee's immediate environment, it may more accurately represent perceived job insecurity, as compared to state-level unemployment rates used in other studies.

Using prescription claims data, we calculated medication adherence for each individual. We considered four categories of medications: (1) beta-blockers and (2) angiotensin-converting enzyme (ACE) inhibitors and angiotensin-receptor blockers (ARBs) for hypertension, (3) statins for high cholesterol, and (4) controller medications for asthma and chronic obstructive pulmonary disease (COPD). We chose these medications because the drugs in these categories are seldom used to treat other conditions, and because adherence is important in the treatment of chronic disease. For each category, we calculated the medication possession ratio (MPR), dividing the number of days' supply of the medication the individual filled in that year by 360. This measure denotes the percentage of the medication that an individual filled in a given year, a method employed to measure adherence in prior studies (Hill et al. 2013).

We also examined whether changes in utilization were more pronounced among those who were more ill at baseline. To classify individuals by health status, we used a third-party algorithm (DxCG Software; Verisk Health Inc, Jersey City, New Jersey, USA) to compute a health risk stratification score for each individual at baseline in 2006. This score was computed using an individual's historical CPT and International Classification of Diseases codes and use of health care services. A score of 1 indicates that the individual's health expenditures are likely to fall at the mean in the following year. Each unit increase predicts a one-fold increase in expenditures above the mean. This score predicts a variety of health outcomes (Handel 2011; Modrek and Cullen 2012, 2013a; Kubo et al. 2013), including mortality in higher quintiles (Hamad et al. 2015). We created a categorical variable to classify individuals' underlying health into three groups: 0–1 (reference group), 1–2 (slightly above the mean), and 2–4 (more than double the mean) (Table 1). We excluded individuals with scores greater than 4 (1.4 percent of the sample) as they likely have severe preexisting conditions.

Data Analysis

The primary outcome variables included the number of monthly outpatient, ER, and inpatient visits. To examine changes in these outcomes over time, we employed segmented (piecewise) linear regression, a method used to compare trends in an outcome variable before and after a defined discontinuity or "knot." This method has been used previously to examine health care utilization during the Great Recession (Dorn et al. 2012; Modrek, Hamad, and Cullen 2015). We modeled the knot in January 2009, the month in which major layoffs began at the firm, with a press release in January 2009 announcing plans for a workforce reduction of 13 percent, citing "extraordinary times requiring extraordinary actions" (Alcoa 2009). The press release did not specify which plants would be affected, so we assumed that individuals at all plants experienced some degree of job insecurity after the announcement in anticipation of the layoffs. Later announcements also indicated that multiple rounds of layoffs would occur, contributing to a sense of chronic job insecurity, particularly at high-layoff plants (DeWitt 2009).

After conducting a graphical analysis of the data using kernel-weighted local polynomial regressions, we found that this knot corresponded to a natural break in the data. The piecewise model allowed for differences in slope and intercept in two linear segments. Identifying a change in the intercept would reflect a difference in the baseline level of utilization in this population, which might occur abruptly as a result of a major shock such as the firm's announcements of mass layoffs. Meanwhile, a shift in slope would capture any sustained variation in the rate of change of utilization that might result from chronic job insecurity. We allowed the post-2009 segment to extend until 2012, as prior studies have demonstrated that the effects of job insecurity on health status can linger for several years, even after job security is restored (Ferrie et al. 2002). Others have shown that the effects of chronic job insecurity are more persistent (Heaney, Israel, and House 1994), which was probable at this firm given that layoffs continued into 2010. More specifically, studies at this firm have found that increased work stress and use of mental health treatments persisted until 2012 (Modrek and Cullen 2013b; Modrek, Hamad, and Cullen 2015).

To examine the effects of job insecurity even more locally, we conducted two additional analyses. In the first, we included an interaction term between time and an indicator variable for whether an individual's plant experienced a mass termination event in the models described above, thereby comparing utilization trends among employees at high- and low-layoff plants. In the second, we narrowed our sample to examine utilization trends at only high-layoff plants. In this second set of models, we again conducted segmented regressions, but in this case we measured time relative to the occurrence of the first mass termination event at a given plant. Plants without mass termination events were not included in this second set of models. In these analyses, we assumed that the occurrence of mass layoffs at an individual's own plant was likely to make the threat of job loss more salient and led to a heightened sense of subjective job insecurity compared to employees at plants without mass layoffs. This has been empirically shown in the prior studies of layoffs and job insecurity, and conceptually it is likely related to both an increased likelihood of job loss as well as fear of job loss (Kivimäki et al. 2000; Sverke and Hellgren 2002).

We also assessed heterogeneity in employees' responses to the recession by including an interaction term between time and a categorical variable for risk score.

In all models, we accounted for the possibility that changes in utilization may be due to aging of the sample by including a third-degree polynomial for age. We also included year to account for secular trends. In analyses of trends in medication adherence, which is an annual rather than a monthly measure, we did not control for year or age due to the small number of time periods and subsequent collinearity, although we did include age-squared and age-cubed. As the dataset includes multiple observations for each individual, we included individual-level fixed effects and robust standard errors clustered at the individual level in all models.

To evaluate the robustness of our findings, we conducted sensitivity analyses. To determine whether the placement of our knot at January 2009 is an appropriate model of the discontinuity in utilization trends, we tested alternative specifications. We examined models in which the knot is placed instead in January 2007, 2008, 2010, and 2011. If discontinuities in utilization trends are present at other knots, it may complicate the interpretation of our findings. Then, to isolate the effects of local job insecurity from possible effects of the recession more generally, we included a time-varying variable representing monthly state-level unemployment rates in the model of the overall employee sample.

RESULTS

Utilization Trends

Segmented regressions in the overall sample (Figure 1, Table S1) revealed increased outpatient utilization among all employees after January 2009. Increases in the intercept (99.8 visits/10,000 individuals, $p = .002$) and slope (3.5 visits/month/10,000 individuals, $p = .02$) were apparent. ER visits also rose, with a marginally significant increase in the intercept of 10.0 visits/10,000 individuals ($p = .06$), and an increase in the slope of 0.4 visits/month/10,000 individuals ($p = .05$). There was no change for inpatient hospitalizations.

Utilization by Degree of Job Insecurity

To examine the effects of job insecurity more locally, we first included an interaction term between time and an indicator variable for whether an employee worked at a high-layoff plant (Table 2). Employees at high-layoff plants experienced decreased outpatient utilization relative to employees at other plants (−4.0 visits/month/10,000 individuals, $p = .008$), although the overall trend was still positive, and marginally significantly increased ER utilization (0.4 visits/month/10,000 individuals, $p = .08$).

We then examined changes in utilization relative to the timing of the first mass termination event at high-layoff plants to evaluate the effects of local job insecurity, rather than modeling the discontinuity at January 2009 (Figure 2). There was an increase in the intercept for outpatient visits of 182 visits/10,000 individuals ($p < .001$), although there was no increase in slope as we found in the overall employee panel. There was also an increase in the slope for ER visits of 0.9 visits/month/10,000 individuals ($p = .004$). There was no change for inpatient hospitalizations.

Medication Adherence

We found an increase in the annual percentage filled of beta-blockers, ACE inhibitors/ARBs, and statins after 2009, and decreased use of asthma/COPD controllers (Table 3A). Individuals at high-layoff plants exhibited similar behavior, although the decrease in asthma/COPD controllers was no longer statistically significant (Table 3B).

Utilization by Health Risk Score

Prior to the onset of the recession, employees with initially high-risk scores demonstrated relative declines in utilization in all domains, likely indicative of mean reversion, as would be expected among high-risk individuals who have experienced an earlier health crisis (e.g., a myocardial infarction or motor vehicle accident) (Table 2). After January 2009, however, individuals with the highest baseline risk scores experienced significant increases in ER utilization (1.7 visits/month/10,000 individuals, $p = .009$) and marginally significant increases in outpatient (6.3 visits/month/10,000 individuals, $p = .09$) and inpatient (0.6 hospitalizations/month/10,000 individuals, $p = .06$) utilization relative to employees with lower risk scores.

Sensitivity Analyses

When testing alternative placements of the knot, in 2008 we noted an increased slope and intercept for outpatient visits, and an increased slope for

Figure 1: Health Care Utilization among All Employees before and after January 2009, by Type of Visit. (Analyses were conducted using segmented regressions with fixed effects at the individual level. Standard errors clustered at individual level. Covariates include year, age-squared, and age-cubed. NS = not significant)

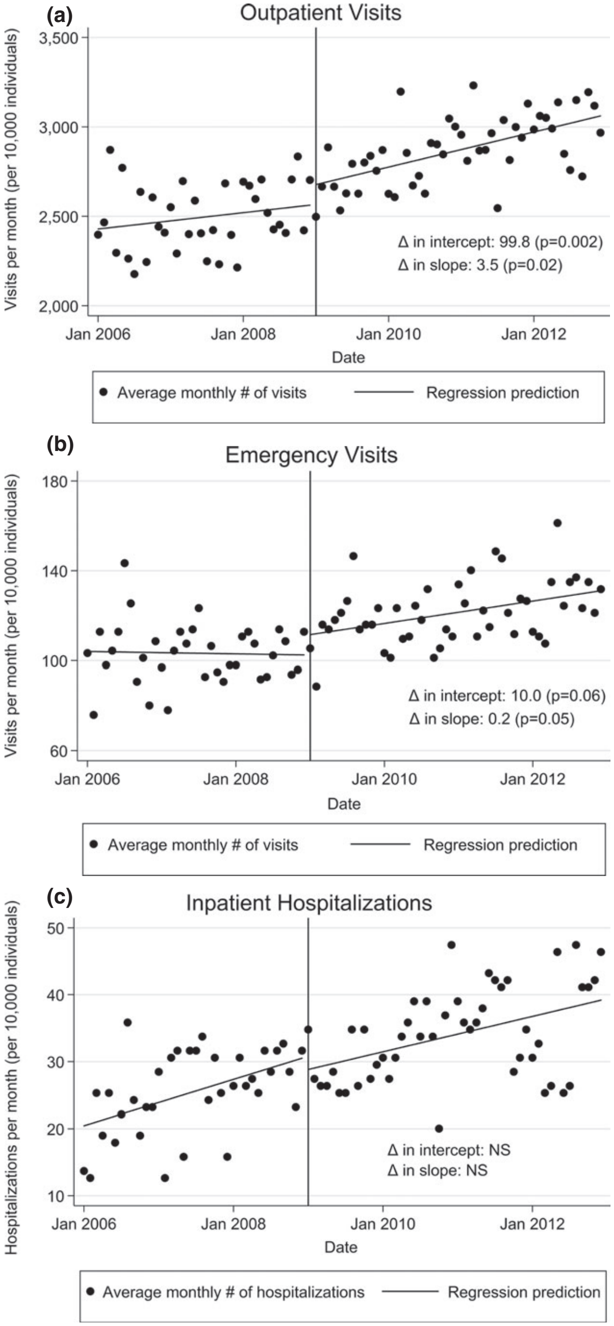
(a)
Outpatient Visits
Visits per month (per 10,000 individuals)
3,500
3,000
2,500
2,000
Jan 2006
Jan 2008
Jan 2010
Jan 2012
Date
Δ in intercept: 99.8 (p=0.002)
Δ in slope: 3.5 (p=0.02)
● Average monthly # of visits
Regression prediction
(b)
Emergency Visits
Visits per month (per 10,000 individuals)
180
140
100
60
Jan 2006
Jan 2008
Jan 2010
Jan 2012
Date
Δ in intercept: 10.0 (p=0.06)
Δ in slope: 0.2 (p=0.05)
● Average monthly # of visits
Regression prediction
(c)
Inpatient Hospitalizations
Hospitalizations per month (per 10,000 individuals)
50
40
30
20
10
Jan 2006
Jan 2008
Jan 2010
Jan 2012
Date
Δ in intercept: NS
Δ in slope: NS
● Average monthly # of hospitalizations
Regression prediction

Table 2: Moderating Factors of Monthly Health Care Utilization (per 10,000 Individuals) among All Employees (2006–2012)

	By Job Security			*By Risk Score*		
	Visits per 10,000 Individuals per Month [95% CI]			*Visits per 10,000 Individuals per Month [95% CI]*		
	Outpatient	*Emergency*	*Inpatient*	*Outpatient*	*Emergency*	*Inpatient*
Time pre-Jan 2009	−0.15 [−5.05, 4.76]	0.39 [−0.41, 1.19]	0.43* [0.033, 0.83]	11.5** [7.01, 15.9]	0.97* [0.22, 1.73]	0.76** [0.38, 1.13]
Time post-Jan 2009	6.45** [1.85, 11.0]	0.43 [−0.36, 1.22]	0.42 [−0.0064, 0.85]	3.28 [−1.02, 7.59]	0.52 [−0.23, 1.27]	0.31 [−0.089, 0.71]
Interaction terms:						
Job security†						
Pre-2009 × High-layoff	1.67 [−2.05, 5.39]	−0.33 [−0.89, 0.23]	0.045 [−0.23, 0.32]			
Post-2009 × High-layoff	−3.98** [−6.94, −1.02]	0.40 [−0.053, 0.85]	−0.074 [−0.33, 0.18]			
Interaction terms:						
Risk score‡						
Pre-2009 × Risk score 1–2				−25.9** [−30.9, −21.0]	−1.65** [−2.35. −0.96]	−0.33 [−0.67, 0.0071]
Pre-2009 × Risk score 2–4				−49.5** [−59.2, −39.9]	−4.18** [−5.70, −2.66]	−2.62** [−3.54, −1.71]
Post-2009 × Risk score 1–2				0.61 [−3.32, 4.53]	−0.058 [−0.61, 0.49]	0.063 [−0.27, 0.40]
Post-2009 × Risk score 2–4				6.30 [−1.17, 13.8]	1.69** [0.42, 2.96]	0.62 [−0.028, 1.26]
Year	78.4 [−162, 318]	−29.8 [−62.3, 2.82]	−7.57 [−24.4, 9.26]	53.3 [−187, 294]	−33.9* [−66.5, −1.29]	−7.68 [−24.5, 9.11]

Continued

Table 2. *Continued*

	By Job Security			*By Risk Score*		
	Visits per 10,000 Individuals per Month [95% CI]			*Visits per 10,000 Individuals per Month [95% CI]*		
	Outpatient	*Emergency*	*Inpatient*	*Outpatient*	*Emergency*	*Inpatient*
Age-squared	−2.16	0.52	0.077	−3.07	0.52	0.046
	[−7.47, 3.15]	[−0.19, 1.22]	[−0.31, 0.46]	[−8.41, 2.27]	[−0.19, 1.23]	[−0.34, 0.43]
Age-cubed	0.025	−0.0033	−0.00027	0.041*	−0.0027	0.00016
	[−0.015, 0.064]	[−0.0084, 0.0019]	[−0.0032, 0.0026]	[0.00095, 0.080]	[−0.0080, 0.0025]	[−0.002, 0.0031]
Number of observations	796,824	796,824	796,824	796,824	796,824	796,824
Number of individuals	9,486	9,486	9,486	9,486	9,486	9,486

Notes. Analyses involved segmented regression with a discontinuity in January 2009, with fixed effects at the individual level. Time-invariant characteristics, such as an individual's gender, risk score, or degree of job insecurity, were therefore not included in the model. Standard errors clustered at the individual level. Age was not included in these models as it is perfectly collinear with year.

[†] A high-layoff plant was one in which 40 or more employees were laid off in a single day. Reference group = low-layoff plants.

[‡] Higher risk scores indicate higher predicted health expenditures in the following year. Reference group = risk score 0–1.

$^{*}p < .05$, $^{**}p < .01$.

ER visits (Table S2). In 2007, the increase in the slope for outpatient utilization was significant; and in 2010, the increase in intercept was significant. To summarize, the discontinuous changes that we find in January 2009 are similar in January 2008, before the occurrence of mass layoffs at the firm, but squarely within the time period of the recession.

Including a time-varying variable representing monthly unemployment rates resulted in similar coefficients and significance levels as in the primary models, although the increase in intercepts for outpatient and emergency utilization was no longer significant (Table S1).

DISCUSSION

Our study examined the impacts on health care utilization of job insecurity in a continuously employed, continuously insured panel of U.S. workers in response to local mass layoffs during the Great Recession. It adds to the existing literature on the effects of job insecurity on health by demonstrating heterogeneous effects on health care utilization. We found a discontinuous increase in outpatient and ER visits in the overall sample after January 2009, when layoffs began at the firm. This included changes in the baseline level of utilization (intercept) and the rate of growth (slope), consistent with findings from previous studies in which job insecurity leads to both immediate and persistent effects on health status (Heaney, Israel, and House 1994; Ferrie et al. 2002; Modrek and Cullen 2013b; Modrek, Hamad, and Cullen 2015). We noted a greater relative increase in outpatient, ER, and inpatient utilization among individuals with higher baseline health risk scores, suggesting greater vulnerability in those with poor baseline health. We included controls for age and year, suggesting that our findings are not due to aging or secular trends.

We explored the moderating effects of job insecurity, which has been associated with increased chronic disease, worsened mental health, and decreased outpatient utilization (Sverke, Hellgren, and Naswall 2002; Modrek and Cullen 2013a; Reichert, Augurzky, and Tauchmann 2015). The increased

---

Figure 2: Health Care Utilization among Employees at High-Layoff Plants Relative to Mass Layoff Event, by Type of Visit. (Analyses were conducted using segmented regressions with fixed effects at the individual level. Standard errors clustered at individual level. Covariates include year, age-squared, and age-cubed. NS = not significant)

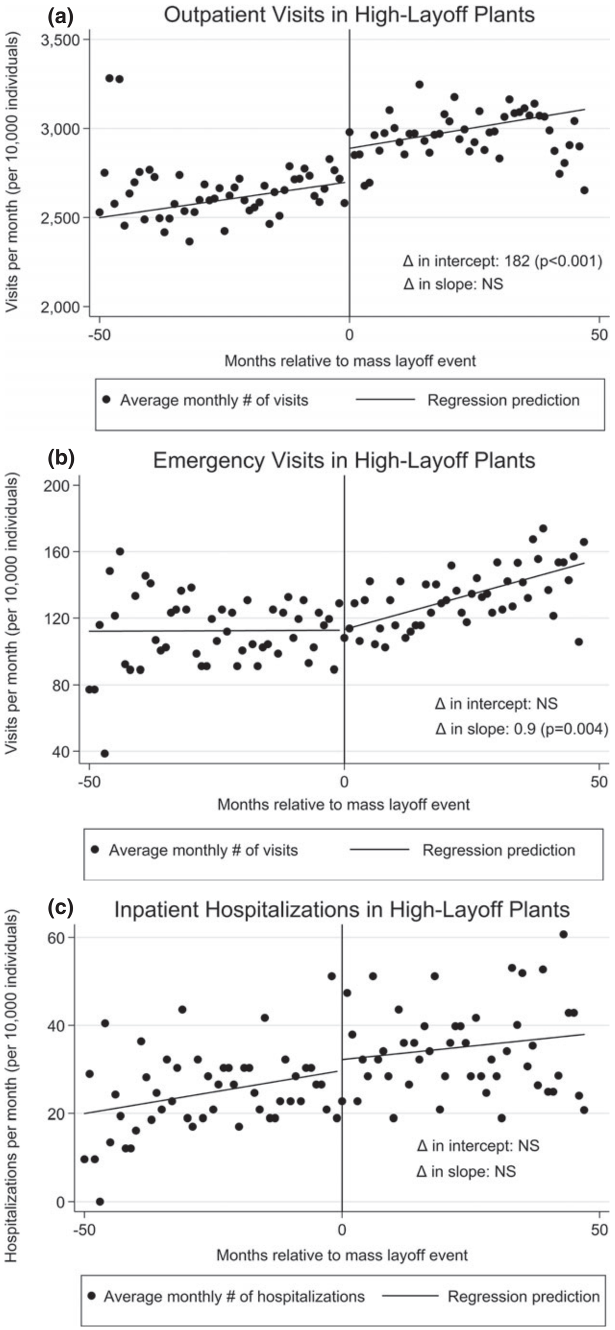
(a)
Outpatient Visits in High-Layoff Plants
Visits per month (per 10,000 individuals)
3,500
3,000
2,500
2,000
-50
0
50
Months relative to mass layoff event
Δ in intercept: 182 (p<0.001)
Δ in slope: NS
● Average monthly # of visits
Regression prediction
(b)
Emergency Visits in High-Layoff Plants
Visits per month (per 10,000 individuals)
200
160
120
80
40
-50
0
50
Months relative to mass layoff event
Δ in intercept: NS
Δ in slope: 0.9 (p=0.004)
● Average monthly # of visits
Regression prediction
(c)
Inpatient Hospitalizations in High-Layoff Plants
Hospitalizations per month (per 10,000 individuals)
60
40
20
0
-50
0
50
Months relative to mass layoff event
Δ in intercept: NS
Δ in slope: NS
● Average monthly # of hospitalizations
Regression prediction

Table 3: Changes in Annual Adherence to Medications (2006–2012)

	Pre-2009 % Δ in MPR[†]/year [95% CI]	*Post-2009 % Δ in MPR/year [95% CI]*	*p-Value for Pre–Post Δ in Trend*
Panel A: Overall employee sample[†]			
Beta-blockers	0.20* [0.014, 0.39]	0.22* [0.030, 0.41]	.08
ACEIs/ARBs	0.12* [0.0071, 0.23]	0.15** [0.037, 0.26]	<.001
Statins	0.070 [−0.053, 0.19]	0.095 [−0.028, 0.22]	<.001
Asthma/COPD controllers	0.14 [−0.12, 0.40]	0.10 [−0.15, 0.36]	.03
Panel B: Employees at high-layoff plants[‡]			
Beta-blockers	0.31* [0.029, 0.59]	0.34* [0.055, 0.62]	.02
ACEIs/ARBs	0.11 [−0.034, 0.26]	0.15* [0.0079, 0.30]	<.001
Statins	0.10 [−0.064, 0.27]	0.14 [−0.029, 0.30]	<.001
Asthma/COPD controllers	0.16 [−0.19, 0.51]	0.13 [−0.22, 0.47]	.13

[†] Analyses were conducted using segmented regression with a discontinuity in 2009, with fixed effects at the individual level. Control variables included age-squared and age-cubed. Standard errors clustered at the individual level.

[‡] Analyses were conducted using segmented regression with a discontinuity in the year of each plant's first mass layoff event, with fixed effects at the individual level. Control variables included age-squared and age-cubed. Standard errors clustered at the individual level.

$*p < .05$, $**p < .01$.

ACEI, angiotensin-converting enzyme inhibitors; ARB,angiotensin-receptor blockers; COPD, chronic obstructive pulmonary disease; MPR, medication possession ratio.

intercept for outpatient visits among employees may represent an abrupt increase in utilization—or "hoarding"—due to fears of loss of insurance, while the subsequent decreased slope among employees at high-layoff plants relative to those at low-layoff plants may represent foregone care due to fears of reprisal for absenteeism or economic hardship (International Foundation of Employee Benefit Plans 2009). This is supported by previous studies, which found decreased cancer screening during economic downturns (Catalano, Satariano, and Ciemins 2003; Dorn et al. 2012), although these studies did not utilize a panel population and therefore may suffer from selection bias. Another study found that high community-level unemployment was associated with a decrease in preventive dental visits among an insured population, also suggesting foregone preventive care (Quinn, Catalano, and Felber 2009). While the decreased outpatient visits in this subsample may be because less healthy individuals were laid off and not included in our panel, as shown in prior work on this population during the recession (Modrek and Cullen 2013a; Modrek, Hamad, and Cullen 2015), this is less likely to be the explanation given the increased ER use. The growth in ER utilization may represent exacerbation of chronic disease or increased workloads among survivors leading to deteriorating health, or substitution of ER visits for outpatient visits to avoid absenteeism (Davidson 1978). This finding is consistent with other studies finding increased ER use during the Great Recession (Chen et al. 2014).

Supplemental analyses to explore the pathways through which these changes may have occurred demonstrate no consistent drop in medication usage during the study period. This may be due to the robustness of the insurance coverage enjoyed by this workforce and the low costs of medications under this plan. The only drugs that demonstrate a decreased MPR are asthma/COPD controllers, whose out-of-pocket costs are at least double those of the other medications (i.e., roughly $25 per month compared to $5–12 per month). This may also be due to employees "stocking up" on medications due to fear of job and insurance loss (International Foundation of Employee Benefit Plans 2009).

Another potential pathway involves the impacts of financial stressors on stress physiology (Cohen, Janicki-Deverts, and Miller 2007). A separate study of this population showed increased utilization of mental health treatments in response to the recession (Modrek, Hamad, and Cullen 2015). Future studies could consider measurements of allostatic load and biomarkers of chronic stress to explore this hypothesis.

Sensitivity analyses demonstrate that the discontinuous changes that we find in January 2009 are also present in January 2008, before the occurrence of mass layoffs at the firm, but squarely within the time period of the recession. We do not observe similar discontinuous changes at other time points. While this suggests that our findings may be driven by macroeconomic conditions more generally, including a time-varying state-level unemployment variable left our results unchanged with the exception of a loss of significance for the intercepts for outpatient and emergency utilization.

Implications for Policies and Interventions

The magnitude of these changes makes our findings relevant to health care spending. While the increase in outpatient and ER expenditures among employees was a few cents per member per month (data not shown), this represents an increase of over 60 percent. Compared to diabetes care management programs, in which a decrease in expenditure of 1–2 percent is considered noteworthy (Milliman Inc. 2012), this represents significant growth in health care spending. If these findings are replicated in other studies, they suggest that employers, insurers, and providers should be attentive to shifts in health care utilization in response to job insecurity, and intervene to either accommodate these shifts or work to counter them.

The results are also suggestive of the toll that job insecurity takes on employee physical and mental health. It has been shown that addressing employee perceptions around fairness and control can mitigate the negative effects of job insecurity (Sverke and Hellgren 2002). These perceptions could be addressed through workplace wellness or employee assistance programs. One study that also found decreased primary care use and increased ER use among the uninsured segment of the U.S. population suggested that this might be remedied by expansions in Medicaid coverage (Chen et al. 2014); our study, however, suggests that insurance coverage in and of itself may not be a sufficient factor in assisting individuals to seek preventive services. Others have suggested actively encouraging surviving employees to continue to use preventive services (Quinn, Catalano, and Felber 2009). Overall, however, there is little research on specific remedies of job insecurity, and future research could address this gap in knowledge.

Strengths and Limitations

Our study contributes new knowledge to our understanding of the impacts of job insecurity on health care utilization. While this sample is not representative of the U.S. population in terms of demographics, it is among the first to observe a large stable panel of individuals using objective measures (i.e., claims data) for a period of several years. With the exception of Medicare data, which include only older individuals, U.S. datasets provide few opportunities to examine populations in such detail, which is an advantage of this study sample. While some studies have relied on subjective reports by health providers, our study uses a robust dataset of claims and personnel data. Unlike studies of macroeconomic effects, it enables the study of more local effects of job insecurity by using linked administrative datasets. Population-level data from insurers or providers may suffer from survivorship bias, leading to a perception of decreased utilization (American Academy of Family Physicians 2009; American Hospital Association 2009; Johnson, Rockoff, and Mathews 2010), while our sample consists of a panel of employees. Research conducted in high-income countries with universal health insurance echoes our findings of increased outpatient utilization (Carr-Hill, Rice, and Roland 1996; Kraut et al. 2000).

This study has several limitations. First, we are unable to make definitive causal conclusions based on the types of models employed in this study. Also, while our population provides evidence of the effects of job insecurity on health care utilization among a geographically and demographically diverse segment of the U.S. workforce, it is nevertheless not generalizable to the entire U.S. population: roughly 60 percent of the U.S. population was employed at any given point during the Great Recession (Bureau of Labor Statistics 2013a), and about 55 percent were covered by employer-based insurance plans that were likely not as robust as those enjoyed by this sample (DeNavas-Walt, Proctor, and Smith 2010). Moreover, the manufacturing industry experienced greater declines in employment than other industries during the Great Recession (Bureau of Labor Statistics 2012). Future research could examine workers in other sectors. This study also does not reflect utilization trends among those not in the workforce, such as the elderly. Our study may be limited in its use of mass layoffs as an objective proxy for job insecurity, which may contribute to measurement error. A subjective individual-level measure of job insecurity might enhance the ability to detect more subtle associations between job insecurity and health care utilization. Future research should consider inclusion of alternative measures of job insecurity. Similarly, our measure of drug adherence is based on prescriptions filled, and it does not capture actual consumption of medications that were prescribed. Given the specific characteristics of health care access and insurance coverage in the United States, this study has limited generalizability to international settings. Finally, this study examines the effects of job insecurity during a recession, which may differ from job insecurity due to other factors, such as industrial restructuring or technological change.

CONCLUSION

Our study demonstrates discontinuous changes in health care utilization among a panel of continuously employed, continuously insured U.S. workers in response to heightened job insecurity. The results add to the literature on the impacts of job insecurity on health care utilization, suggesting differential effects among subgroups based on the degree of job insecurity. In particular, it suggests an increase in overall utilization concerning for "hoarding" of health care or worsening health, but a relative decrease in outpatient care and increase in emergency care among those at high-layoff plants. The latter results confirm findings from the previous literature that suggest foregone preventive care among employed individuals during economic downturns with potentially negative long-term health consequences. This study suggests that the health and social impacts of increased job insecurity experienced by workers during the recent recession may still emerge even as the economy improves.

DATA SHARING

As an alternative to providing a deidentified dataset to the public domain, we allow access for reanalyses or appropriate follow-on analyses by any qualified investigator willing to sign a contractual covenant with the host institution limiting the use of data to a specific agreed-upon purpose and observing the same restrictions as are limited in our contract with the firm, such as 60-day manuscript review for compliance purposes.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: This work was supported by the National Institute on Aging (1R01AG026291) and by a grant from Alcoa. Dr. Hamad is supported by a KL2 Mentored Career Development Award of the Stanford Clinical and Translational Science Award to Spectrum (NIH KL2 TR 001083). Dr. Cullen serves as a senior medical advisor to Alcoa, under the terms of a research contract between Stanford University and Alcoa. All other authors receive some percentage of their salary support from a grant from Alcoa. The funders had no role in study design or conduct; the collection, management, analysis, or interpretation of the data; preparation or approval of the manuscript; or the decision to submit the paper for publication.

Disclosures: None.

Disclaimers: None.

REFERENCES

Alcoa. 2009. *Alcoa Taking Decisive Action to Address Economic Downturn.* Pittsburgh, PA: Alcoa.

American Academy of Family Physicians. 2009. *Patient Care during the 2008–2009 Recession.* Leawood, KS: American Academy of Family Physicians.

American Hospital Association. 2009. *The Economic Crisis: The Toll on the Patients and Communities Hospitals Serve.* Washington, D.C.: American Hospital Association.

Bureau of Labor Statistics. 2012. *Spotlight on Statistics: The Recession of 2007–2009.* Washington, DC: Bureau of Labor Statistics.

Bureau of Labor Statistics. 2013a. *News Release: Mass Layoffs—May 2013.* Washington, DC: U.S. Department of Labor.

Bureau of Labor Statistics. 2013b. “Labor Force Statistics from the Current Population Survey” [accessed on December 16, 2013]. Available at http://data.bls.gov/timeseries/LNS12300000

Carr-Hill, R. A., N. Rice, and M. Roland. 1996. "Socioeconomic Determinants of Rates of Consultation in General Practice Based on Fourth National Morbidity Survey of General Practices." *British Medical Journal* 312: 1008–13.

Catalano, R. A. 2009. "Health, Medical Care, and Economic Crisis." *New England Journal of Medicine* 360 (8): 749–51.

Catalano, R. A., W. A. Satariano, and E. L. Ciemins. 2003. "Unemployment and the Detection of Early Stage Breast Tumors among African Americans and Non-Hispanic Whites." *Annals of Epidemiology* 13: 8–15.

Catalano, R., S. Goldman-Mellor, K. Saxton, C. Margerison-Zilko, M. Subbaraman, K. LeWinn, and E. Anderson. 2011. "The Health Effects of Economic Decline." *Annual Review of Public Health* 32: 431–50.

Chen, J., A. Vargas-Bustamante, K. Mortensen, and S. B. Thomas. 2014. "Using Quantile Regression to Examine Health Care Expenditures during the Great Recession." *Health Services Research* 49 (2): 705–30.

Cohen, S., D. Janicki-Deverts, and G. E. Miller. 2007. "Psychological Stress and Disease." *Journal of the American Medical Association* 298 (14): 1685–7.

Cullen, M. R., S. Vegso, L. Cantley, D. Galusha, P. Rabinowitz, O. Taiwo, M. Fiellin, D. Wennberg, J. Iennaco, M. D. Slade, and K. Sircar. 2006. "Use of Medical Insurance Claims Data for Occupational Health Research." *Journal of Occupational and Environmental Medicine* 48 (10): 1054–61.

Davidson, S. M. 1978. "Understanding the Growth of Emergency Department Utilization." *Medical Care* 16 (2): 122–32.

DeNavas-Walt, C., B. D. Proctor, and J. C. Smith. 2010. *Income, Poverty, and Health Insurance Coverage in the United States: 2009.* Washington, DC: U.S. Census Bureau.

DeWitt, J. 2009. *Alcoa to Expand Layoffs at Davenport Works.* Davenport, IA: Quad-City Times.

Dorn, S. D., D. Wei, J. F. Farley, N. D. Shah, N. J. Shaheen, R. S. Sandler, and M. D. Kappelman. 2012. "Impact of the 2008–2009 Economic Recession on Screening Colonoscopy Utilization among the Insured." *Clinical Gastroenterology and Hepatology* 10: 278–84.

Dragano, N., P. E. Verde, and J. Siegrist. 2005. "Organisational Downsizing and Work Stress: Testing Synergistic Health Effects in Employed Men and Women." *Journal of Epidemiology and Community Health* 59: 694–9.

Du, J., and T. Yagihashi. 2015. "Health Care Use, Out-of-Pocket Expenditure, and Macroeconomic Conditions during the Great Recession." *The BE Journal of Economic Analysis & Policy* 15 (1): 119–56.

Ferrie, J. E., M. J. Shipley, S. A. Stansfeld, and M. G. Marmot. 2002. "Effects of Chronic Job Insecurity and Change in Job Security on Self Reported Health, Minor Psychiatric Morbidity, Physiological Measures, and Health Related Behaviours in British Civil Servants: The Whitehall II Study." *Journal of Epidemiology and Community Health* 56: 450–4.

Hamad, R., S. Modrek, J. Kubo, B. A. Goldstein, and M. R. Cullen. 2015. "Using "Big Data" to Capture Overall Health Status: Properties and Predictive Value of a Claims-Based Health Risk Score." *PLoS ONE* 10 (5): e0126054.

Handel, B. R. 2011. *Adverse Selection and Switching Costs in Health Insurance Markets: When Nudging Hurts.* Working Paper 17459. Cambridge, MA: National Bureau of Economic Research.

Heaney, C. A., B. A. Israel, and J. S. House. 1994. "Chronic Job Insecurity among Automobile Workers: Effects on Job Satisfaction and Health." *Social Science and Medicine* 38 (10): 1431–7.

Hill, J. J., D. Galusha, M. D. Slade, and M. R. Cullen. 2013. "Drug Adherence after Price Changes in a Previously Compliant Population." *American Journal of Managed Care* 19 (3): 236–7.

Hurd, M. D., and S. Rohwedder. 2010. *Effects of the Financial Crisis and Great Recession on American Households.* Working Paper 16407. Cambridge, MA: National Bureau of Economic Research.

International Foundation of Employee Benefit Plans. 2009. *Health Care Plans: Impact of the Financial Crisis.* Brookfield, WI: International Foundation of Employee Benefit Plans.

Johnson, A., J. D. Rockoff, and A. W. Mathews. 2010. "Americans Cut Back on Visits to Doctor." *Wall Street Journal* July 29, 2010: A1.

Kivimäki, M., J. Vahtera, J. Pentti, and J. E. Ferrie. 2000. "Factors Underlying the Effect of Organisational Downsizing on Health of Employees: Longitudinal Cohort Study." *British Medical Journal* 320 (7240): 971–5.

Kivimäki, M., J. Vahtera, M. Elovainio, J. Pentti, and M. Virtanen. 2003. "Human Costs of Organizational Downsizing: Comparing Health Trends between Leavers and Stayers." *American Journal of Community Psychology* 32 (1/2): 57–67.

Kraut, A., C. Mustard, R. Walld, and R. Tate. 2000. "Unemployment and Health Care Utilization." *Scandinavian Journal of Work, Environment and Health* 26 (2): 169–77.

Kubo, J., B. A. Goldstein, L. F. Cantley, B. Tessier-Sherman, D. Galusha, M. D. Slade, I. M. Chu, and M. R. Cullen. 2013. "Contribution of Health Status and Prevalent Chronic Disease to Individual Risk for Workplace Injury in the Manufacturing Environment." *Occupational and Environmental Medicine* 71 (3): 159–66.

Martikainen, P., N. Maki, and M. Jantti. 2008. "The Effects of Workplace Downsizing on Cause Specific Mortality: A Register-Based Follow-Up Study of Finnish Men and Women Remaining in Employment." *Journal of Epidemiology and Community Health* 62: 1008–13.

McInerney, M., and J. M. Mellor. 2012. "Recessions and Seniors' Health, Health Behaviors, and Healthcare Use: Analysis of the Medicare Current Beneficiary Survey." *Journal of Health Economics* 31: 744–51.

Miller, D. L., M. E. Page, A. H. Stevens, and M. Filipski. 2009. "Why Are Recessions Good for Your Health?" *The American Economic Review* 99 (2): 122–7.

Milliman Inc. 2012. *The Cost and Quality Gap in Diabetes Care: An Actuarial Analysis.* New York: Milliman Inc.

Modrek, S., and M. R. Cullen. 2012. *Job Demand and Early Retirement.* Chestnut Hill, MA: Center for Retirement Research at Boston College.

———. 2013a. "Health Consequences of the 'Great Recession' on the Employed: Evidence from an Industrial Cohort in Aluminum Manufacturing." *Social Science and Medicine* 92: 105–13.

———. 2013b. "Job Insecurity during Recessions: Effects on Survivors' Work Stress." *BMC Public Health* 13: 929.

Modrek, S., R. Hamad, and M. R. Cullen. 2015. "Psychological Well-Being during the Great Recession: Changes in Mental Health Care Utilization in an Occupational Cohort." *American Journal of Public Health* 105 (2): 304–10.

Modrek, S., D. Stuckler, M. McKee, M. R. Cullen, and S. Basu. 2013. "A Review of Health Consequences of Recessions Internationally and a Synthesis of the US Response during the Great Recession." *Public Health Reviews* 35 (1): 1–33.

Pollack, C. E., S. K. Kurd, A. Livshits, M. Weiner, and J. Lynch. 2011. "A Case-Control Study of Home Foreclosure, Health Conditions, and Health Care Utilization." *Journal of Urban Health* 88 (3): 469–78.

Quinn, B. C., R. A. Catalano, and E. Felber. 2009. "The Effect of Community-Level Unemployment on Preventive Oral Health Care Utilization." *Health Services Research* 44 (1): 162–81.

Reichert, A. R., B. Augurzky, and H. Tauchmann. 2015. "Self-Perceived Job Insecurity and the Demand for Medical Rehabilitation: Does Fear of Unemployment Reduce Health Care Utilization?" *Health Economics* 24 (1): 8–25.

Roehrig, C., A. Turner, P. Hughes-Cromwick, and G. Miller. 2012. "When the Cost Curve Bent—Pre-Recession Moderation in Health Care Spending." *New England Journal of Medicine* 367 (7): 590–3.

Sverke, M., and J. Hellgren. 2002. "The Nature of Job Insecurity: Understanding Employment Uncertainty on the Brink of a New Millennium." *Applied Psychology* 51 (1): 23–42.

Sverke, M., J. Hellgren, and K. Naswall. 2002. "No Security: A Meta-Analysis and Review of Job Insecurity and Its Consequences." *Journal of Occupational Health Psychology* 7 (3): 242–64.

Vahtera, J., M. Kivimäki, J. Pentti, A. Linna, M. Virtanen, P. Virtanen, and J. E. Ferrie. 2004. "Organisational Downsizing, Sickness Absence, and Mortality: 10-Town Prospective Cohort Study." *British Medical Journal* 328 (7439): 555.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Table S1. Health Care Utilization among Employees before and after January 2009, by Type of Visit.

Table S2. Changes in Knot Placement for Overall Employee Health Care Utilization, 2006–2012.

Published in final edited form as:
J Health Commun. 2016 ; 21(Suppl): 43–50. doi:10.1080/10810730.2015.1131776.

Health Literacy and Access to Care

Helen Levy, PhD and
Research Associate Professor, Institute for Social Research, University of Michigan, Ann Arbor, MI 48104, (734) 936 – 4506

Alex Janke, BS
Wayne State University

Helen Levy: hlevy@mich.edu; Alex Janke: ajanke@med.wayne.edu

Abstract

Despite well-documented links between low health literacy, low rates of health insurance coverage, and poor health outcomes, there has been almost no research on the relationship between low health literacy and self-reported access to care. This study analyzed a large, nationally representative sample of community-dwelling adults ages 50 and older to estimate the relationship between low health literacy and self-reported difficulty obtaining care. We found that individuals with low health literacy were significantly more likely than individuals with adequate health literacy to delay or forego needed care or to report difficulty finding a provider, even after controlling for other factors including health insurance coverage, employment, race/ethnicity, poverty, and general cognitive function. They were also more likely to lack a usual source of care, although this result was only marginally significant after controlling for other factors. The results show that in addition to any obstacles that low health literacy creates within the context of the clinical encounter, low health literacy also reduces the probability that people get in the door of the health care system in a timely way.

Introduction

The importance of health literacy for a wide range of health-related outcomes – including the use of preventive medical services, control of chronic conditions, and, ultimately, mortality – is well established (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; Paasche-Orlow & Wolf, 2007; White, Chen, & Atchison, 2008). However, the mechanisms through which health literacy may affect health outcomes are not well understood (Paasche-Orlow & Wolf, 2007), and there is surprisingly little empirical evidence on how health literacy affects access to care, despite substantial theoretical attention to this question (Sørensen et al., 2012; Squiers, Peinado, Berkman, Boudewyns, & McCormack, 2012). A recent study establishes that low health literacy is a significant risk factor for lacking health insurance (Sentell, 2012), but almost no research has analyzed whether health literacy is related to self-reported indicators of poor access, including difficulty finding providers, delays in accessing care, or having a usual source of care.

Correspondence to: Helen Levy, `hlevy@mich.edu`.

One reason for this omission may be that, with few exceptions, empirical research on health literacy has relied on samples of individuals who already have an established connection to the health care system. For example, studies have used samples of patients presenting for care at a given clinic (D. W. Baker et al., 2007; Miller, Lee, DeWalt, & Vann, 2010); patients with a particular condition (Bennett et al., 1998; Grubbs, Gregorich, Perez-Stable, & Hsu, 2009; Lindau, Basu, & Leitsch, 2006; Mancuso & Rincon, 2006); or enrollees in Medicare managed care plans (David W Baker et al., 2004; Cho, Lee, Arozullah, & Crittenden, 2008; Howard, Gazmararian, & Parker, 2005; Scott, Gazmararian, Williams, & Baker, 2002). The use of such samples may understate the negative association between low health literacy and access to care because they do not consider, by design, obstacles that that precede an individual's arrival at a healthcare setting. In a nutshell: if low health literacy keeps individuals from reaching the door of the clinic, then focusing on patients who are already in the door misses a piece of the problem.

The goal of the current study was to explore the relationship between low health literacy and access barriers that arise before individuals get to the clinic door. We used data from a nationally-representative sample of older Americans to estimate the relationship between self-assessed health literacy and four self-reported measures of access to care: (1) delaying care because of cost; (2) delaying care for other reasons; (3) difficulty finding a provider; (4) not having a usual source of care. We also analyzed differences in reported reasons for delaying care and in the nature of difficulty finding a provider.

Study Data and Methods

Data

Data for the study come from the Health and Retirement Study (HRS), an ongoing, longitudinal, biennial study of 22,000 individuals ages 51 and older that was begun in 1992, with new sample cohorts enrolled every 6 years. The basic design of the study has been described elsewhere (Juster & Suzman, 1995; Sonnega et al., 2014a). In addition to the core surveys that are conducted every two years either in person or by telephone to collect information on health, cognition, employment, and economic status, supplemental surveys are administered via US mail or Internet during the off years. We designed such a supplemental survey, with questions on health literacy and access to care, that was administered by mail in fall 2011 to a random subsample of approximately half of the 22,032 individuals who completed the 2010 core survey. We refer to this supplemental survey as the health care mail survey. Most of our key dependent and independent variables came from the health care mail survey, with some covariates drawn from the 2010 core survey.

Sample

The 2010 HRS sample represents the US population born in 1959 and earlier. Blacks and Hispanics are oversampled by design; the use of analysis weights that address unequal sampling probabilities as well as response rates that vary by racial and geographic subgroups yields nationally representative estimates (Heeringa & Connor, 1995; Ofstedal, Weir, Chen, & Wagner, 2011). Response rates to recent waves of the core survey have been above 88%

(Sonnega et al., 2014b). Interviews were conducted in English (94% of the core 2010 sample) and Spanish (6%). Although the possibility of nonrandom attrition from the sample is a concern for any longitudinal study, several careful studies have documented that attrition bias in the HRS is not significant (Cheshire, Ofstedal, Scholes, & Schröder, 2011; Weir, Faul, & Langa, 2011).

The 2011 health care mail survey was sent to a subsample of 10,230 respondents randomly drawn from the 22,032 respondents who completed the 2010 HRS core interview. Seventy-five percent (n = 7,648) returned a completed mail survey; of these, we kept the 7,258 who were born before 1960 and therefore age-eligible for the study. We further excluded 23 individuals residing in nursing homes and 93 who did not complete key health literacy and/or access items for a final analysis sample of 7,142 community-dwelling individuals ages and older.

Variables

Access/utilization—

We used four measures of self-reported access to care from the health care mail survey. Respondents were asked whether there was any time in the last twelve months when they needed medical care but did not get it because they couldn't afford it; they were then asked about whether care was ever delayed in the past 12 months for any other reason, with a list of possible reasons where respondents were asked to mark all that apply. We used these responses to construct two measures of delayed care: first, a variable equal to one if the respondent delayed care because of cost, and second, a variable equal to one if the respondent delayed care for some other reason. The third measure was difficulty finding a provider; respondents were asked whether they had any difficulty in the past 12 months finding a general doctor, specialist, or other provider (dentist, physical therapist, occupational therapist, home care provider, pharmacist, other) who would see them, with a list of possible reasons for the difficulty where respondents were asked to mark all that apply. Fourth, respondents were asked whether there is a place they usually go when they are sick or need advice about health; respondents who said "yes" were asked about what kind of place it is. Respondents who reported that there is not a place they usually go, or who report that the place they usually go is a hospital emergency room, were considered to lack a usual source of care.

Health literacy—

We measured health literacy using responses to a question included in the health care mail survey: "How confident are you filling out medical forms by yourself?" Possible responses were: extremely confident; quite confident; somewhat confident; a little confident; not at all confident. Studies validating this measure against well-established measures of health literacy such as the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA) suggest defining low health literacy as a response of "somewhat confident" or less (L. D. Chew, Bradley, & Boyko, 2004; Lisa D. Chew et al., 2008; Powers, Trinh, & Bosworth, 2010; Wallace, Rogers, Roskos, Holiday, & Weiss, 2006) and we followed this convention. This measure has also been validated in Spanish (Sarkar, Schillinger, López, & Sudore, 2011).

Health insurance—The health care mail survey asked respondents to report all sources of health insurance – Medicare, Medicaid, employer-sponsored coverage, individually purchased private coverage, TRICARE/CHAMPUS/CHAMPVA, other public coverage, care through the VA – and we created a binary indicator for those with no coverage. Given the documented relationship between health insurance and problems with access to care (Baicker et al., 2013; D. Card, C. Dobkin, & N. Maestas, 2008; Sommers, Baicker, & Epstein, 2012) and between low health literacy and health insurance (Sentell, 2012), we considered health insurance status to be a very important control variable for multivariate models.

Health status and chronic conditions—In the mailer survey, respondents reported their health status as excellent, very good, good, fair, or poor; we constructed a binary indicator for fair or poor health. We also used self-reports from the 2010 core HRS to create indicators for respondents who have ever been diagnosed with any of the following chronic conditions: hypertension, diabetes, cancer, lung disease, heart disease, stroke, or psychiatric problems.

Cognition—The core HRS routinely includes a battery of cognition measures, including subtraction (7 from 100 successively; 1 from 20 or 1 from 86, successively), and memory (immediate and delayed recall of a list of common words). These variables provide an observed, rather than self-reported, measure of cognitive ability that has been validated (Langa, Kabeto, & Weir, 2010). Following a previous study, we defined cognitive impairment as a score of 7 or lower on a 27-point cognition scale constructed using these measures from the core 2010 data (Crimmins, Kim, Langa, & Weir, 2011). General cognition is highly correlated with health literacy and, if omitted from multivariate analyses, may yield misleadingly large coefficients on health literacy (David W Baker, Wolf, Feinglass, & Thompson, 2008; Mõttus et al., 2014; Serper et al., 2014).

Demographic and socioeconomic characteristics—The core HRS routinely collects information from all core respondents on age, gender, marital status, race, Hispanic ethnicity, educational attainment, and employment status (full-time work; part-time work; unemployed; retired; neither working nor looking for work). We characterized race and ethnicity using four mutually exclusive categories: white non-Hispanic, black non-Hispanic, other non-Hispanic, and Hispanic (any race). We coded educational attainment categorically: less than high school, high school graduate, some college, and education greater than or equal to a four-year college degree. We include these characteristics in our multivariate models because existing research shows that low health literacy is correlated with age, race, and education (Kutner, Greenberg, Jin, Paulsen & White 2006).

Statistical methods and analytic approach: All statistical analyses were performed using Stata version 14 (Stata Corporation, College Station, TX) and are weighted to be nationally representative of community-dwelling Americans aged 50 and older. Our statistical analysis began with calculating the average characteristics of participants in our sample and testing for differences in these characteristics across groups defined by low and adequate health literacy, using adjusted Wald tests that take into account the complex sampling design of the Health and Retirement Study; we report the p-values associated with these tests. Next, we performed similar tests for differences in the outcomes of interest (access problems; all measured as binary variables) across the two groups, as well as differences in the fraction of participants who reported specific reasons for encountering particular access problems. Our next step was to estimate a multivariate logistic regression for each of the outcomes of interest, modeling these outcomes as function of the covariates described above. The results of the regressions are reported as odds ratios, with associated 95% confidence intervals that take into account the complex survey design. Finally, in order to provide a meaningful interpretation of the odds ratios from the multivariate models, we calculated the average marginal effect of low health literacy on each outcome by subtracting the average predicted value from the model with “low health literacy” set to equal one from the average predicted value with “low health literacy” set equal to zero. For each outcome, we added this marginal effect to the simple mean value of the outcome for individuals with adequate health literacy to obtain a “covariate-adjusted” estimate of the mean value of each outcome for those with low health literacy. These covariate-adjusted estimates are presented graphically in a figure with the unadjusted mean outcomes for both groups, in order to provide a visual summary of the main results of the analysis.

Study Results

Table 1 reports average characteristics for participants in our sample with low versus adequate health literacy. Approximately one-quarter of our sample had low health literacy; exact proportions were 24.20% (weighted) and 26.90% (unweighted). Consistent with previous research (Sentell, 2012), those with low health literacy were more likely to be uninsured, with 10.49% uninsured among those with low health literacy compared with only 7.48% for those with adequate health literacy, a difference that is marginally statistically significant with p = 0.079. Individuals with low health literacy were, on average, less educated, more likely to be racial or ethnic minorities, less healthy, older, and more likely to exhibit cognitive impairment than were those with adequate health literacy; these results, too, are also consistent with earlier research (Baker, Gazmararian, Sudan & Patterson 2000; Baker, Wolf, Feinglass & Thompson 2008; Kutner, Greenberg, Jin, Paulsen & White 2006).

Table 2 presents the fraction of individuals who reported having delayed care. About one-third (31.86%) of those with low health literacy reported that they delayed care in the last 12 months, either because of cost (12.77%) or for another reason (26.19%). (Note that these two fractions sum to more than 31.86% because some people report both cost-related and non-cost-related delays.) In contrast, less than one-quarter (22.98%) of those with adequate health literacy reported that they delayed or did not obtain care, a significantly lower fraction than among those with low health literacy. Those with adequate health literacy were significantly less likely than those with low health literacy to report either cost-related or non-cost-related problems.

When we looked at the detailed reasons participants offered for delaying care, we found that these reasons differed for participants with low versus adequate health literacy (bottom panel of Table 2). The commonest reason reported for delay by either group was “I could not afford it,” reported by 40.09% those with low health literacy and 34.75% of those with adequate health literacy. The second most common reason overall, “I am too busy to go to the doctor,” was reported more than twice as often among respondents with adequate health literacy compared with those who had low health literacy (24.34% versus 10.61%), which likely reflects in part the fact that individuals with low health literacy in our sample were less likely to work than those with adequate health literacy. Three other reasons stand out because they were significantly more likely to be chosen by respondents with low health literacy: not having transportation, having to wait too long at the doctor’s office, and being afraid of what they might find out. Almost three times as many respondents with low health literacy reported having delayed care because they did not have transportation (16.88% versus 6.21%). Respondents with low health literacy were significantly more likely to say they had to wait too long once they got to the doctor’s office (17.63% of respondents with low health literacy compared with 10.99% of those with adequate health literacy). This may have been because they frequented different providers who did, in fact, have longer waiting times or it may have been that individuals with low health literacy had less patience for waiting to see providers, but we could not test those theories using these data. Respondents with low health literacy were also more likely to report that they were afraid of what they might find out. Other reasons for delaying or foregoing care – including not being able to get an appointment soon enough and not being able to get through on the phone – were equally common for respondents with low versus adequate health literacy.

Table 3 presents the fraction of participants who report each of the other access problems we analyze: difficulty finding a provider, not having a usual source of care, and not having had a doctor’s visit in the past year. Individuals with low health literacy were also significantly more likely to report difficulty finding a provider (17.09% for those with low health literacy versus 7.99% for those with adequate health literacy) or to lack a usual source of care (26.93% versus 18.47%). They were also more likely to report not having seen a doctor in the past year, although this difference is not statistically significant at conventional levels ($p = 0.190$). The bottom panel of Table 3 shows reported reasons for difficulty finding a provider, which for the most part were similar for low and adequate health literacy although the prevalence of insurance-related problems – high for both groups – is somewhat higher for individuals with low health literacy (52.77% versus 45.96%; $p = 0.071$). “No appointments available” was the second most common reason for delay, reported by just over 40 percent of those with difficulty regardless of health literacy, and about 20 percent of each group reported not having doctors near where they lived.

For the four access problems that were significantly more likely, in our univariate analyses, to be reported by individuals with low health literacy compared to those with adequate health literacy, we estimated multivariate models to determine whether these differences in reported access could be explained by the differences in other characteristics documented in Table 1. Table 4 presents the results of these multivariate models, which control for insurance status, demographics, socio-economic status, cognitive ability, and health status. Three of the four outcomes – both cost-related and other delays in obtaining care, and difficulty finding a provider – remain significantly more likely among participants with low health literacy compared with participants who have adequate health literacy, after controlling for other characteristics, as indicated in Table 4 by odds ratios and associated 95% confidence intervals on “low health literacy” that are greater than one. The p-values associated with the coefficient on low health literacy in these three models are 0.024, less than 0.001, and 0.054, respectively. For the fourth outcome, no usual source of care, the effect of health literacy is marginally significant (p = 0.080) after controlling for other characteristics. These results confirm the significance of low health literacy as a predictor of access problems, even after multiple other factors correlated with low health literacy have been taken into account, including health insurance.

Figure 1 summarizes graphically the main results from our analysis. The blue bars and the red bars represent the rates at which four access problems are reported by participants with adequate health literacy and low health literacy, respectively; these results were also reported in Table 1. The green bars reflect the covariate-adjusted rates of these problems for participants with low health literacy, calculated as described above using the average marginal effect of health literacy on each outcome from the multivariate models. This figure shows the bottom line: access problems – delaying care, difficulty finding a provider, and not having a usual source of care – were more prevalent among individuals with low health literacy, and these disparities persisted even after controlling for other factors.

Study Limitations

Our study had both strengths and weaknesses. Strengths included the focus on a topic that has received surprisingly little attention from researchers, the use of a nationally representative sample (in contrast to most studies of health literacy), the use of a validated and widely used measure of self-assessed health literacy, and the availability of a rich set of covariates, including general cognitive ability.

A significant limitation of our study was its cross-sectional, observational nature. Although our multivariate analyses include a wide range of relevant covariates, it is possible that an omitted variable correlated with both health literacy and our measures of access to care was driving the apparent correlation between the two. Patient activation, for example, is not measured in our sample, and has been shown to be correlated with both health literacy and health-related outcomes, prompting a debate about the distinctions between these two constructs and their relative importance (Hibberd, Stockard, Mahoney, & Tusler, 2004; Smith, Curtis, Wardle, von Wagner, & Wolf, 2013). The possibility of an important omitted variable suggests that our results should not be viewed as the final word on the topic of health literacy and access to care (a position we are inclined to agree with under any circumstances), but rather as highlighting an area where further investigation is needed

Another limitation was the fact that the sample was restricted to individuals aged 50 and older; this study therefore does not speak to the relationship between low health literacy and access to care at earlier stages in the life course. Finally, a limitation related to the use of self-reported measures of access was that we could say relatively little about whether the differences in access that we observed for individuals with low versus adequate health literacy were driven by underlying differences in the actual availability of care or by a similar level of availability that individuals with low health literacy perceived or navigated differently.

Discussion

Health literacy matters for access to care. Individuals with low health literacy are more likely to delay getting care and have more difficulty finding providers than their counterparts with adequate health literacy, even after controlling for insurance status and other characteristics. These barriers compound any subsequent difficulties that patients with low health literacy may face in terms of understanding and acting on information from clinical encounters.

Understanding exactly *why* health literacy matters for access, and how this information should inform interventions to improve outcomes for individuals with low health literacy, is the challenge that remains. One promising avenue may focus on how low health literacy affects individuals' ability to choose or navigate insurance plans. We found that even after controlling for insurance status, individuals with low health literacy report more difficulty finding providers who will see them. This may be because they have insurance coverage that is systematically less generous than do individuals with higher health literacy (for example, narrower provider networks); or it may be that, even with identical insurance coverage, those with low health literacy have more difficulty figuring out which type of provider they need to see, which ones are actually taking new patients, etc. – in short, the hassles that anyone who uses the U.S. health care system is familiar with, but that may loom larger for individuals with low health literacy. The relatively new concept of "health insurance literacy" (Kim, Braun, & Williams, 2013; McCormack, Bann, Uhrig, Berkman, & Rudd, 2009; Paez, Mallery, Noel, Pugliese, McSorley, Lucado, & Ganachari, 2014) encompasses both of these mechanisms. Our results suggest that lower rates of health insurance coverage are not the *only* reason individuals with low health literacy experience worse access, but this does not mean that health insurance is irrelevant. The interaction between low health literacy and health insurance offers a promising avenue for understanding why individuals with low health literacy are more likely to experience access problems.

Second, our results suggest that interventions to improve outcomes for health literacy should look beyond the clinical encounter to reach individuals for whom low health literacy represents a fundamental obstacle to accessing the health care system. A recent review of interventions for individuals with low health literacy concluded that there has been progress in the range of endpoints targeted by these interventions, with an increasing number moving beyond comprehension of health information as the outcome of interest and looking instead at more distal outcomes such as health (Sheridan, Halpern, Viera, Berkman, Donahue, & Crotty, 2011). Our results suggest focusing on the middle range as well; can we develop interventions that effectively connect individuals with low health literacy with available providers, and would this then reduce their delays in obtaining care?

Finally, understanding the full implications of low health literacy for access to care will also require a shift in how researchers think about data for studying health literacy. Many studies of health literacy have relied on clinic or disease-based samples, and this approach has yielded important insights into how health literacy affects patient-provider communication in the context of the clinical encounter (Aboumatar, Carson, Beach, Roter, & Cooper, 2013; Barragan et al., 2005; Katz, Jacobson, Veledar, & Kripalani, 2007; Mancuso & Rincon, 2006; Rodríguez et al., 2013). But a full understanding of the impact of health literacy requires a broader view: one that takes into account the importance of health literacy outside the clinical encounter. Theoretical frameworks for understanding the interaction between health literacy, health care access, and health outcomes encompass multiple factors such as culture, social support, and community health care resources (Squiers et al., 2012). Addressing unanswered questions about access baiers that arise even before patients reach the clinic will require integrating measures of health literacy into population-based data collection.

Acknowledgments

Levy acknowledges financial support from the National Institute on Aging (grant number NIA K01AG034232). The data used in this study are from the Health and Retirement Study (HRS), which is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and conducted by the University of Michigan. Preliminary results from this analysis were presented at the 5th Health Literacy Annual Research Conference (HARC V), October 28–29, 2013 in Washington, DC.

References

Aboumatar HJ, Carson KA, Beach MC, Roter DL, Cooper LA. The Impact of Health Literacy on Desire for Participation in Healthcare, Medical Visit Communication, and Patient Reported Outcomes among Patients with Hypertension. Journal of General Internal Medicine. 2013; 28(11): 1469–1476. [PubMed: 23690237]

Baicker K, Taubman SL, Allen HL, Bernstein M, Gruber JH, Newhouse JP, … Finkelstein AN. The Oregon experiment—effects of Medicaid on clinical outcomes. New England Journal of Medicine. 2013; 368(18):1713–1722. [PubMed: 23635051]

Baker DW, Gazmararian JA, Sudano J, Patterson M. The association between age and health literacy among elderly persons. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences. 2000; 55(6):S368–S374.

Baker DW, Gazmararian JA, Williams MV, Scott T, Parker RM, Green D, … Peel J. Health literacy and use of outpatient physician services by Medicare managed care enrollees. Journal of General Internal Medicine. 2004; 19(3):215–220. [PubMed: 15009775]

Baker DW, Wolf MS, Feinglass J, Thompson JA. Health literacy, cognitive abilities, and mortality among elderly persons. J Gen Intern Med. 2008; 23(6):723–726. [PubMed: 18330654]

Baker DW, Wolf MS, Feinglass J, Thompson JA, Gazmararian JA, Huang J. Health literacy and mortality among elderly persons. Archives of Internal Medicine. 2007; 167(14):1503–1509. DOI: 10.1001/archinte.167.14.1503 [PubMed: 17646604]

Barragan M, Hicks G, Williams MV, Franco-Paredes C, Duffus W, Del Rio C. Low health literacy is associated with HIV test acceptance. Journal of General Internal Medicine. 2005; 20(5):422–425. [PubMed: 15963165]

Bennett CL, Ferreira MR, Davis TC, Kaplan J, Weinberger M, Kuzel T, … Sartor O. Relation between literacy, race, and stage of presentation among low-income patients with prostate cancer. Journal of Clinical Oncology. 1998; 16(9):3101–3104. [PubMed: 9738581]

Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low Health Literacy and Health Outcomes: An Updated Systematic Review. Annals of Internal Medicine. 2011; 155(2):97–107. DOI: 10.7326/0003-4819-155-2-201107190-00005 [PubMed: 21768583]

Card D, Dobkin C, Maestas N. The Impact of Nearly Universal Insurance Coverage on Health Care Utilization: Evidence from Medicare. Am Econ Rev. 2008; 98(5):2242–2258. [PubMed: 19079738]

Card D, Dobkin C, Maestas N. The Impact of Nearly Universal Insurance Coverage on Health Care Utilization: Evidence from Medicare. American Economic Review. 2008; 98(5):2242–2258. [PubMed: 19079738]

Cheshire H, Ofstedal MB, Scholes S, Schröder M. A comparison of response rates in the English Longitudinal Study of Ageing and the Health and Retirement Study. Longitudinal and Life Course Studies. 2011; 2(2):127. [PubMed: 24432049]

Chew LD, Bradley KA, Boyko EJ. Brief questions to identify patients with inadequate health literacy. Fam Med. 2004; 36(8):588–594. [PubMed: 15343421]

Chew LD, Griffin JM, Partin M, Noorbaloochi S, Grill JP, Snyder A, … VanRyn M. Validation of Screening Questions for Limited Health Literacy in a Large VA Outpatient Population. Journal of General Internal Medicine. 2008; 23(5):561–566. DOI: 10.1007/s11606-008-0520-5 [PubMed: 18335281]

Cho YI, Lee SYD, Arozullah AM, Crittenden KS. Effects of health literacy on health status and health service utilization amongst the elderly. Social science & medicine. 2008; 66(8):1809–1816. [PubMed: 18295949]

Crimmins EM, Kim JK, Langa KM, Weir DR. Assessment of cognition using surveys and neuropsychological assessment: the health and retirement study and the aging, demographics, and memory study. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences. 2011; 66(suppl 1):i162–i171.

Grubbs V, Gregorich SE, Perez-Stable EJ, Hsu C-y. Health literacy and access to kidney transplantation. Clinical Journal of the American Society of Nephrology. 2009; 4(1):195–200. [PubMed: 19056617]

Heeringa, SG.; Connor, JH. Technical description of the Health and Retirement Survey sample design. Ann Arbor: University of Michigan; 1995.

Hibbard JH, Stockard J, Mahoney ER, Tusler M. Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. Health services research. 2004; 39(4p1):1005–1026. [PubMed: 15230939]

Howard DH, Gazmararian J, Parker RM. The impact of low health literacy on the medical costs of Medicare managed care enrollees. The American journal of medicine. 2005; 118(4):371–377. [PubMed: 15808134]

Juster FT, Suzman R. An Overview of the Health and Retirement Study. The Journal of Human Resources. 1995; 30:S7–S56. (ArticleType: research-article / Issue Title: Special Issue on the Health and Retirement Study: Data Quality and Early Results / Full publication date: 1995 / Copyright © 1995 The Board of Regents of the University of Wisconsin System). DOI: 10.2307/146277

Katz MG, Jacobson TA, Veledar E, Kripalani S. Patient literacy and question-asking behavior during the medical encounter: a mixed-methods analysis. J Gen Intern Med. 2007; 22(6):782–786. [PubMed: 17431697]

Kim J, Braun B, Williams AD. Understanding health insurance literacy: A literature review. Family and Consumer Sciences Research Journal. 2013; 42(1):3–13.

Kutner, M.; Greenburg, E.; Jin, Y.; Paulsen, C. The Health Literacy of America’s Adults: Results from the 2003 National Assessment of Adult Literacy. National Center for Education Statistics; 2006. NCES 2006-483

Langa K, Kabeto M, Weir D. Report on race and cognitive impairment using HRS in, 2010 Alzheimer’s disease facts and figures. 2010 Retrieved July 12, 2010.

Lindau ST, Basu A, Leitsch SA. Health Literacy as a Predictor of Follow-Up After an Abnormal Pap Smear: A Prospective Study. Journal of General Internal Medicine. 2006; 21(8):829–834. [PubMed: 16881942]

Mancuso CA, Rincon M. Impact of health literacy on longitudinal asthma outcomes. Journal of General Internal Medicine. 2006; 21(8):813–817. [PubMed: 16881939]

McCormack L, Bann C, Uhrig J, Berkman N, Rudd R. Health insurance literacy of older adults. Journal of Consumer Affairs. 2009; 43(2):223–248.

Miller E, Lee JY, DeWalt DA, Vann WF. Impact of caregiver literacy on children’s oral health outcomes. Pediatrics. 2010; 126(1):107–114. [PubMed: 20547644]

Mõttus R, Johnson W, Murray C, Wolf MS, Starr JM, Deary IJ. Towards understanding the links between health literacy and physical health. Health Psychology. 2014; 33(2):164. [PubMed: 23437854]

Ofstedal, M.; Weir, D.; Chen, K.; Wagner, J. Updates to HRS Sample Weights. Ann Arbor: University of Michigan; 2011.

Paasche-Orlow MK, Wolf MS. The causal pathways linking health literacy to health outcomes. American Journal of Health Behavior. 2007; 31(Supplement 1):S19–S26. [PubMed: 17931132]

Paez KA, Mallery CJ, Noel H, Pugliese C, McSorley VE, Lucado JL, Ganachari D. Development of the Health Insurance Literacy Measure (HILM): Conceptualizing and measuring consumer ability to choose and use private health insurance. Journal of health communication. 2014; 19(sup2):225–239. [PubMed: 25315595]

Powers BJ, Trinh JV, Bosworth HB. Can this patient read and understand written health information? JAMA. 2010; 304(1):76–84. DOI: 10.1001/jama.2010.896 [PubMed: 20606152]

Rodríguez V, Andrade AD, García-Retamero R, Anam R, Rodríguez R, Lisigurski M, … Ruiz JG. Health Literacy, Numeracy, and Graphical Literacy Among Veterans in Primary Care and Their Effect on Shared Decision Making and Trust in Physicians. J Health Commun. 2013; 18(sup1):273–289. [PubMed: 24093361]

Sarkar U, Schillinger D, López A, Sudore R. Validation of Self-Reported Health Literacy Questions Among Diverse English and Spanish-Speaking Populations. Journal of General Internal Medicine. 2011; 26(3):265–271. DOI: 10.1007/s11606-010-1552-1 [PubMed: 21057882]

Scott TL, Gazmararian JA, Williams MV, Baker DW. Health literacy and preventive health care use among Medicare enrollees in a managed care organization. Medical care. 2002; 40(5):395–404. [PubMed: 11961474]

Sentell T. Implications for reform: Survey of California adults suggests low health literacy predicts likelihood of being uninsured. Health Affairs. 2012; 31(5):1039–1048. [PubMed: 22566444]

Serper M, Patzer RE, Curtis LM, Smith SG, O'Conor R, Baker DW, Wolf MS. Health Literacy, Cognitive Ability, and Functional Health Status among Older Adults. Health Services Research. 2014

Sheridan SL, Halpern DJ, Viera AJ, Berkman ND, Donahue KE, Crotty K. Interventions for individuals with low health literacy: a systematic review. Journal of health communication. 2011; 16(sup3):30–54. [PubMed: 21951242]

Smith SG, Curtis LM, Wardle J, von Wagner C, Wolf MS. Skill set or mind set? Associations between health literacy, patient activation and health. PLoS One. 2013; 8(9):e74373. [PubMed: 24023942]

Sommers BD, Baicker K, Epstein AM. Mortality and Access to Care among Adults after State Medicaid Expansions. New England Journal of Medicine. 2012; 367(11):1025–1034. DOI: 10.1056/NEJMsa1202099 [PubMed: 22830435]

Sonnega A, Faul JD, Ofstedal MB, Langa KM, Phillips JW, Weir DR. Cohort Profile: the Health and Retirement Study (HRS). International journal of epidemiology. 2014a; 43(2):576–585. [PubMed: 24671021]

Sonnega A, Faul JD, Ofstedal MB, Langa KM, Phillips JWR, Weir DR. Cohort Profile: the Health and Retirement Study (HRS). International Journal of Epidemiology. 2014b; doi: 10.1093/ije/dyu067

Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, Brand H. Health literacy and public health: a systematic review and integration of definitions and models. BMC Public Health. 2012; 12(1):80. [PubMed: 22276600]

Squiers L, Peinado S, Berkman N, Boudewyns V, McCormack L. The health literacy skills framework. J Health Commun. 2012; 17(sup3):30–54. [PubMed: 23030560]

Wallace LS, Rogers ES, Roskos SE, Holiday DB, Weiss BD. BRIEF REPORT: Screening Items to Identify Patients with Limited Health Literacy Skills. Journal of General Internal Medicine. 2006; 21(8):874–877. DOI: 10.1111/j.1525-1497.2006.00532.x [PubMed: 16881950]

Weir DR, Faul JD, Langa KM. Proxy interviews and bias in cognition measures due to non-response in longitudinal studies: a comparison of HRS and ELSA. Longitudinal and Life Course Studies. 2011; 2(2):170–184. [PubMed: 25360159]

White S, Chen J, Atchison R. Relationship of preventive health practices and health literacy: a national study. American Journal of Health Behavior. 2008; 32(3):227–242. [PubMed: 18067463]

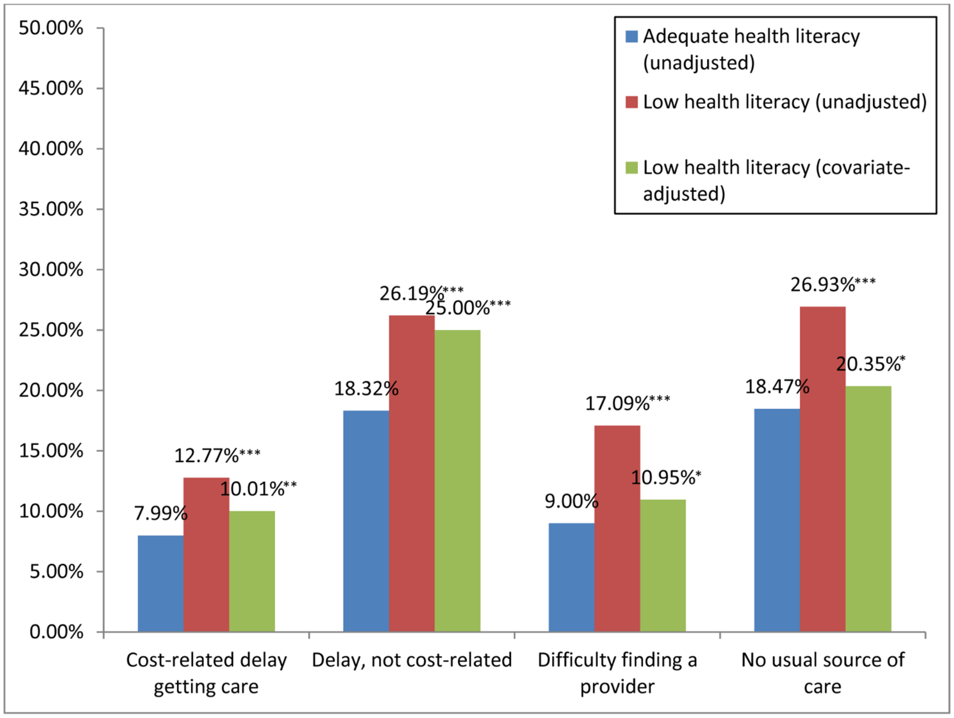

Figure 1.

Rates of self-reported access problems among individuals with low versus adequate health literacy, unadjusted and adjusted for covariates

Notes. Asterisks indicate a rate that is significantly different from the rate for individuals with adequate health literacy, with p<0.01 (***), p<0.05 (**), or p<0.10 (*). Please see the text for a description of how covariate-adjusted rates are calculated.

Table 1

Participant characteristics, by health literacy status

	Health literacy		
	Low	**Adequate**	***p* value**
Characteristic			
No health insurance	10.49%	7.48%	0.079
Years of education	11.3	13.8	<0.001
White non-Hispanic	71.03%	84.85%	<0.001
African-American non-Hispanic	10.72%	6.70%	<0.001
Other non-Hispanic	3.48%	3.36%	0.888
Hispanic (any race)	14.77%	5.09%	<0.001
Age (years)	66.7	63.8	<0.001
Female	48.92%	56.37%	<0.001
Married	61.36%	69.56%	<0.001
Working	28.37%	45.77%	<0.001
Income less than poverty	16.60%	5.44%	<0.001
Congitive impairment	7.70%	1.56%	<0.001
Health is fair or poor	48.14%	15.07%	<0.001
Has chronic health condition	81.93%	70.88%	<0.001
Unweighted *n*	1,921	5,221	7,142

Note. The p value reported in the final column is associated with a test of the null hypothesis that the outcome reported in that row is the same for individuals with low versus adequate health literacy.

Table 2

Delayed/foregone care, by low vs. adequate health literacy status

	Health literacy		
	Low	**Adequate**	***p* value**
Fraction of participants who reported delaying or not obtaining care…			
…for any reason	31.86%	22.98%	<0.001
…because of cost	12.77%	7.99%	<0.001
…for a reason other than cost	26.19%	18.32%	<0.001
Among those who delayed or did not obtain care, the fraction who reported each of the following reasons:			
Could not afford it	40.09%	34.75%	0.091
I am too busy to go to the doctor	10.61%	24.34%	<0.001
I don’t like going to the doctor	27.84%	22.82%	0.153
I couldn’t get an appointment soon enough	18.62%	19.38%	0.790
I am afraid of what I might find out	14.37%	9.41%	0.040
Once I get there, I have to wait too long	17.63%	10.99%	0.005
I didn’t have transportation	16.88%	6.21%	<0.001
The clinic wasn’t open when I could get there	5.84%	6.42%	0.690
I couldn’t get through on the telephone	8.77%	7.22%	0.413
I don’t believe in going to doctors	2.98%	2.97%	0.988
Unweighted n: all participants	1,921	5,221	
Unweighted n: participants reporting delayed/foregone care	590	1,146	

Notes. Percentages are weighted. The p value reported in the final column is associated with a test of the null hypothesis that the outcome reported in that row is the same for individuals with low versus adequate health literacy.

Table 3

Difficulty finding provider, no usual source of care, and no doctor visit in past year, by low vs. adequate health literacy status

	Health literacy		
	Low	**Adequate**	***p* value**
Fraction of participants who reported…			
…difficulty finding a provider	17.09%	9.00%	<0.001
…no usual source of care	26.93%	18.47%	<0.001
…no doctor visit in past year	10.93%	9.35%	0.190
Among those who reported difficulty finding a provider, the fraction who reported each of the following reasons:			
Insurance-related problem	52.77%	45.96%	0.071
No appointments available	42.66%	40.59%	0.613
No doctors near where I live	23.18%	19.09%	0.256
Other	5.99%	5.51%	0.817
Unweighted n, all participants	1,921	5,221	
Unweighted n, participants with difficulty finding a provider	361	536	

Notes. Percentages are weighted. The p value reported in the final column is associated with a test of the null hypothesis that the outcome reported in that row is the same for individuals with low versus adequate health literacy.

Table 4

Weighted multivariate logistic regression predicting a "yes" response to problems accessing health care

	Delay because of cost		Delay for a reason other than cost		Difficulty finding a provider		No usual source of care	
Characteristic	**OR**	**[95% CI]**	**OR**	**[95% CI]**	**OR**	**[95% CI]**	**OR**	**[95% CI]**
Low health literacy	1.32	[1.04, 1.67]	1.52	[1.23, 1.88]	1.24	[1.00, 1.54]	1.13	[0.98, 1.30]
No health insurance	5.53	[4.01, 7.63]	0.99	[0.74, 1.32]	1.84	[1.31 2.60]	3.81	[2.89, 5.03]
Education								
< High school degree	1.15	[0.72, 1.83]	0.85	[0.62, 1.16]	1.29	[0.82 2.02]	1.49	[1.13, 1.96]
High school degree	1.29	[0.95, 1.75]	0.72	[0.58, 0.91]	0.98	[0.66 1.44]	1.37	[1.09, 1.72]
Some college	1.15	[0.85, 1.55]	0.91	[0.74, 1.12]	1.20	[0.85 1.70]	1.20	[0.97, 1.49]
Coll. degree or more		Ref		Ref		Ref		Ref
Race/ethnicity								
White non-Hispanic		Ref		Ref		Ref		Ref
Black non-Hispanic	1.44	[1.12, 1.85]	0.95	[0.77, 1.18]	1.98	[1.53, 2.57]	1.84	[1.50, 2.26]
Other non-Hispanic	1.54	[1.03, 2.30]	0.86	[0.57, 1.29]	2.59	[1.77, 3.79]	1.84	[1.34, 2.52]
Hispanic	0.70	[0.50, 1.00]	1.17	[0.91, 1.52]	1.49	[1.03, 2.16]	1.46	[1.12, 1.89]
Other characteristics								
Age	0.92	[0.91, 0.94]	0.96	[0.95, 0.97]	0.97	[0.96, 0.99]	1.02	[1.01, 1.03]
Female	1.05	[0.81, 1.38]	1.09	[0.93, 1.28]	0.94	[0.77, 1.15]	0.92	[0.78, 1.09]
Married	0.71	[0.56, 0.89]	0.85	[0.71, 1.01]	0.65	[0.52, 0.80]	0.72	[0.62, 0.83]
Working	0.99	[0.73, 1.34]	1.45	[1.25, 1.69]	0.64	[0.48, 0.85]	0.84	[0.69, 1.01]
Income ≤ 100% of FPL	1.22	[0.73, 2.02]	1.29	[1.01, 1.65]	1.75	[1.26, 2.43]	1.31	[0.95, 1.80]
Cognitive impairment	0.86	[0.43, 1.70]	1.52	[1.03, 2.26]	2.28	[1.50, 3.47]	1.64	[1.08, 2.48]
Health is fair or poor	1.83	[1.36, 2.48]	1.93	[1.52, 2.46]	1.57	[1.22, 2.03]	1.19	[0.96, 1.49]
Chronic conditions								
Hypertension	1.14	[0.91, 1.42]	0.90	[0.74, 1.09]	0.95	[0.76, 1.19]	0.75	[0.63, 0.89]
Diabetes	1.03	[0.75, 1.42]	1.00	[0.82, 1.22]	0.94	[0.75, 1.19]	0.91	[0.75, 1.11]
Cancer	0.89	[0.61, 1.29]	0.90	[0.72, 1.13]	1.17	[0.87, 1.57]	0.73	[0.59, 0.89]
Lung disease	1.42	[0.95, 2.12]	1.06	[0.82, 1.37]	1.13	[0.87, 1.46]	0.98	[0.76, 1.26]

	Delay because of cost		Delay for a reason other than cost		Difficulty finding a provider		No usual source of care	
Characteristic	**OR**	**[95% CI]**	**OR**	**[95% CI]**	**OR**	**[95% CI]**	**OR**	**[95% CI]**
Heart disease	0.97	[0.71, 1.32]	1.00	[0.79, 1.26]	1.04	[0.76, 1.42]	1.16	[0.95, 1.43]
Stroke	1.30	[0.73, 2.31]	0.81	[0.52, 1.24]	1.27	[0.84, 1.92]	0.87	[0.64, 1.19]
Psychiatric problems	2.12	[1.52, 2.94]	1.37	[1.12, 1.67]	1.61	[1.26, 2.04]	0.72	[0.58, 0.89]

Note. OR=odds ratio; CI=confidence interval; FPL=federal poverty level.

The Case For More Active Policy Attention To Health Promotion

To succeed, we need leadership that informs and motivates, economic incentives that encourage change, and science that moves the frontiers.

by J. Michael McGinnis, Pamela Williams-Russo, and James R. Knickman

ABSTRACT: Until recently, when anthrax triggered a concern about preparedness in the public health infrastructure, U.S. health policy and health spending had been dominated by a focus on payment for medical treatment. The fact that many of the conditions driving the need for treatment are preventable ought to draw attention to policy opportunities for promoting health. Following a brief review of the determinants of population health—genetic predispositions, social circumstances, environmental conditions, behavioral patterns, and medical care—this paper explores some of the factors inhibiting policy attention and resource commitment to the nonmedical determinants of population health and suggests approaches for sharpening the public policy focus to encourage disease prevention and health promotion.

ONE OF THE MOST-CITED STATISTICS in public health is the imbalance of social investments in medical care compared with prevention activities. Approximately 95 percent of the trillion dollars we spend as a nation on health goes to direct medical care services, while just 5 percent is allocated to populationwide approaches to health improvement.[1] However, some 40 percent of deaths are caused by behavior patterns that could be modified by preventive interventions.[2] (Social circumstances and environmental exposure also contribute substantially to preventable illness.) It appears, in fact, that a much smaller proportion of preventable mortality in the United States, perhaps 10–15 percent, could be avoided by better availability or quality of medical care. Thus, one could question a funding scheme that places so much

The authors are all with the Robert Wood Johnson Foundation (RWJF) in Princeton, New Jersey. Michael McGinnis is senior vice-president and director of the RWJF Health Group. Pamela Williams-Russo is a senior program officer. James Knickman is vice-president for research and evaluation.

emphasis on medical care and not on prevention.

The fact that medical care historically has had limited impact on the health of populations has been known for many years. In 1974 Marc Lalonde, then the Canadian minister of health and welfare, issued a seventy-six-page governmental working document that advanced the idea that government priority is drawn primarily to the financing and delivery of medical care, with scant attention to many other influences on health.[3]

This observation and recent initiatives are grounded in science derived from many sources, ranging from research sponsored by the U.S. National Institutes of Health (NIH) on the etiologies of disease to observations in the late 1960s and early 1970s like those of England's Thomas McKeown, who noted that the major contributions to improved health in England over the previous 200 years came more from changes in food supplies, sanitary conditions, and family size than from medical interventions.[4] John Bunker, in the United States, estimated that since 1950 medicine has accounted for about three of the total of seven years by which life expectancy has increased.[5] The balance seems to be due to prevention, broadly defined.

Why have we as a nation allocated so few health dollars to prevention? If we wanted to expand our investments in promoting population health, perhaps reducing the demand for spending to restore health, what types of public policy interventions might work? These are the questions addressed in this paper. In addition, the paper provides an overview of what social and behavioral researchers have learned about the nonmedical determinants of health: What domains influence health prospects? What interventions within each domain might improve health? How do different types of causal factors interact and intersect?

The Leading Determinants Of Health

Our understanding of the factors that shape the health of populations has come from structured efforts to gather evidence linking where and how we live to our health futures. In the United States, lessons from William Kannel and colleagues in the Framingham Heart Study and from Lester Breslow and colleagues in the Alameda County study gave us early insights on the impact of behavioral choices on health outcomes.[6] Similarly, important insights about the influence of social circumstances on health prospects have come from McKeown and, more recently, Britain's Michael Marmot.[7]

Drawing on the power of the extensive studies of the past generation, we can now speak about our health prospects as being shaped by our experiences in five domains: genetic and gestational endowments, social circumstances, environmental conditions, behavioral choices, and medical care.[8] The health of populations is the product of the intersecting influences from these different domains, influences that are dynamic and that vary in their impact depending upon when in the life course they occur and upon the effects of preceding and subsequent factors.[9]

■ **Genetics.** Our predispositions to health or disease begin to take form at the moment of conception, embedded in our genetic blueprint for construction of the proteins that give form to our sizes, shapes, and personalities and even to the biologic limit of our life expectancies. Under certain circumstances, inborn variants of the code occasionally occur that confer disadvantage. Changes also can occur in the codes of certain cells as a result of exposures during the life cycle. For some cancers or neural tube defects, for example, environmental triggers can alter the genetic coding signals, resulting in abnormally regulated cell growth.

Although only about 2 percent of deaths in the United States may be attributed to purely genetic diseases, perhaps 60 percent of late-onset disorders—such as diabetes, cardiovascular disease, and cancer—have some genetic component.[10] The apportioning of that component is still uncertain. The BRCA1 gene accounts for only about 5–10 percent of breast cancers in the United States, only 10 percent of colon cancers may be explained by genes, and only about one case in twenty of elevated serum cholesterol levels may be explained by familial hyperlipidemia.[11] Studies of monozygotic (identical) twins focusing on the occurrence of schizophrenia and other similar twin studies looking at mental alertness in older people have found that about half of each might be explained by genetic factors.[12] About two-thirds of the risk of obesity may be genetic, but, as with most other predispositions, that risk is expressed only with exposure to lifestyle factors that are controllable.[13]

The estimated 30,000–60,000 genes of the human genome have been sequenced, and our rapidly expanding knowledge in this area will lead to possibilities for new interventions with greater specificity about individual vulnerabilities to environmental and behavioral factors and later to alteration of genetic determinants of disease and disability. Similarly, we will gain new insights into the impact of exposures during gestation, and the results from long-term observational studies now getting under way will help us to assess the consequences of maternal, social, environmental, behavioral, and medical care factors on the health of offspring.

■ **Social circumstances.** Our first encounter at birth is with the domain of social circumstances, about which a great deal has been learned in recent years. Health is powerfully influenced by education, employment, income disparities, poverty, housing, crime, and social cohesion. From cradle to grave, interpersonal linkages matter. Studies consistently have shown that infant nurturing enhances socialization and survival. Recent research reported by David Olds, for example, demonstrates that nurses' prenatal home visits to at-risk mothers can reduce the likelihood of both risky health behavior and criminal activity some fifteen years hence.[14] Socially isolated persons have a death rate two to five times higher than that of those who maintain close ties to friends, family, and community.[15]

For the population as a whole, the most consistent predictor of the likelihood of death in any given year is level of education; persons ages 45–64 in the highest levels of education have death rates 2.5 times lower than those of persons in the lowest level.[16] Poverty, another strong influence, has been estimated to account for 6 percent of U.S. mortality.[17] The observation also has been made that each 1 percent rise in income inequality (the income differential between rich and poor) is associated with something on the order of a 4 percent increase in deaths among persons on the low end, which prods us to sort out the pecuniary elements of deprivation from the biological, behavioral, and psychological consequences of place.[18]

■ **Environmental conditions.** Health status also is affected by physical environments. The places where we live and work can present hazards in the form of toxic agents, microbial agents, and structural hazards. Toxic agents from occupational products, environmental pollutants, chemical contaminants of food and water supplies, and components of commercial products have been associated in particular with skin diseases, cancers, allergies, and other diseases of various organ systems. Radon occurs as a natural background gas in certain places and increases the risk for cancer. Elevations of airborne pollutants such as particulates, sulfur dioxide, and carbon monoxide have been associated with transient increases in mortality and morbidity rates, in particular from pulmonary and cardiovascular conditions. The sum of the lower boundaries of various estimates of the mortality burden of toxic-agent exposures places their contribution in the range of 60,000 deaths per year.[19]

Infectious disease threats also can be related to environmental conditions. Apart from behavior-associated diseases such as HIV and hepatitis B, many infectious diseases, sheltered and cultured by environmental conditions, are major contributors to death in the United States. This is more common than might be inferred from the news reports of Hantavirus, legionellosis, *E. coli*, and Cryptosporidium and persists despite the fact that immunizations and infection control measures may already prevent as many as 135 million infections and more than 60,000 deaths annually in the United States.[20] In all, an estimated 90,000 infectious disease deaths occur each year, beyond those infections attributable to sexual behavior or use of tobacco, alcohol, or illicit drugs.[21]

Structural hazards in the environment, ranging from roadway design and lighting to worksite conditions and home hazards, also contribute greatly to the burden of preventable injury morbidity and mortality. Approximately 7,000 deaths occur annually from motor vehicle crashes, falls, fires, and work-related injuries derivative of structural design and safety shortfalls.[22]

■ **Behavioral choices.** Behavior patterns represent the single most prominent domain of influence over health prospects in the United States. The daily choices we make with respect to diet, physical activity, and sex; the substance abuse and addictions to which we fall prey; our approach to safety; and our coping strategies in confronting stress are all important determinants of health.

What we choose to eat and how we design activity into (or out of) our lives have a great bearing on our health prospects. Dietary factors have been associated with coronary heart disease; stroke; cancers of the colon, breast, and prostate; and diabetes.[23] Physical inactivity has been associated with increased risk for heart disease, colon cancer, diabetes, dementia, and osteoporosis.[24] In the face of imprecise data on individual dietary habits and physical activity patterns, and the fact that given the basic laws of thermodynamics, obesity is a common intermediary for a fair amount of the burden of each, it is difficult if not impossible to parcel out the share specific to diet or to physical activity. But combined, the range of the estimates for their contributions spans from 300,000 to more than 500,000 deaths annually in the United States.[25]

Unprotected sexual intercourse is accountable each year not only for 1.5 million unintended pregnancies and twelve million new cases of sexually transmitted diseases, but also for deaths from HIV, hepatitis B, and cervical cancer and excess infant mortality.[26] Together, about 30,000 deaths in 1999 were related to sexual behavior.[27]

Substance abuse and addiction inflict a tremendous toll on the health of Americans. Tobacco, at more than 400,000 deaths, is the leading single contributor to mortality, and substance abuse as a whole represents the most prominent contributor to the constellation of preventable illness, health costs, and related social problems facing U.S. families and communities today.[28] In 1995 substance abuse accounted for some forty-three million illnesses or injuries and more than half a million deaths.[29]

In all, behavioral choices account for at least 900,000 deaths annually, of which more than 40 percent (and all of them, by definition) are early deaths, and the burden of associated illness is compelling. Thus, taken together, behavioral issues represent the greatest single domain of influence on the health of the U.S. population.

■ **Medical care.** Improvements in the quality or use of medical care have a relatively limited ability to reduce deaths among Americans. This is not too surprising, given the fact that we spend 15 percent of our gross domestic product (GDP) to treat people.[30] Over the course of the twentieth century, about five of the thirty years of increased life expectancy could be attributable to better medical care.[31] As noted previously, the relative contribution of medical care to life expectancy rose during the latter part of the century and will likely continue to grow as technology is better able to address the health care needs of our aging population. But in terms of the practical possibilities of the moment, the potential of medical care is revealed by where it misses the mark: where problems of access or poor quality of care have done harm. The Institute of Medicine (IOM), for example, suggests that medical errors alone may account for 44,000–98,000 deaths annually, or about 2–4 percent of all deaths.[32] A long-standing estimate by the Centers for Disease Control and Prevention (CDC) places the contribution of health care system deficiencies to total mortality at about 10 percent.[33] Thus, even if the entire population had timely, error-free treatment, the number of early deaths would not be much reduced.

■ **Contributions of various domains.** On a population basis, using the best available estimates, the impacts of various domains on early deaths in the United States distribute roughly as follows: genetic predispositions, about 30 percent; social circumstances, 15 percent; environmental exposures, 5 percent; behavioral patterns, 40 percent; and shortfalls in medical care, 10 percent. But more important than these proportions is the nature of the influences in play where the domains intersect. Ultimately, the health fate of each of us is determined by factors acting not mostly in isolation but by our experience where domains interconnect. Whether a gene is expressed can be determined by environmental exposures or behavioral patterns. The nature and consequences of behavioral choices are affected by our social circumstances. Our genetic predispositions affect the health care we need, and our social circumstances affect the health care we receive.

The growing knowledge and evidence base in these areas provides important opportunities for targeted action and analysis that will develop tools to prompt and facilitate change, build the capacities of networks and organizations best positioned to use those tools, and strengthen the levers of policy that directly affect the dynamics that shape these influences.

Why Are So Few Dollars Devoted To Promoting Health?

In the past a dominant factor slowing investments that address the nonmedical determinants of health was lack of consensus on what could be done to change factors such as behavioral choices, social conditions, and the physical environment. However, clear evidence is emerging about health-promoting interventions that do work. The recent IOM report, *Promoting Health*, documents social, behavioral, and clinical interventions for which there is solid empirical evidence about effectiveness in promoting and maintaining health.[34]

For example, childhood vaccines are clearly effective at preventing a range of childhood diseases, and organizational interventions such as computerized registries have been shown to greatly improve the use of vaccines for children.[35] Methods to reduce youth initiation to tobacco use are clear: Raising the tax on cigarettes to increase prices greatly reduces initiation, as does enforcing regulations to restrict youth access.[36] Behavioral interventions by health care providers have been documented to improve the ability of addicted tobacco users to stop smoking. An understanding that many users will have a chronic problem remaining tobacco-free has guided the development of effective long-term cessation treatments.[37] Moderate amounts of physical activity have been shown to greatly reduce the risk of heart attacks, strokes, and diabetes. Also, evidence is emerging about effective strategies that communities can use to encourage physical activity and about behavioral interventions that providers can use to help people maintain exercise regimens.[38]

■ **Cost-effectiveness.** The cost-effectiveness of various interventions to improve population health is less clear. In a vexing example of double standards, public investments in health promotion seem to require evidence that future savings in health and other social costs will offset the investments in prevention. Medical treatments do not need to measure up to this standard; all that is required here is evidence of safety and effectiveness. The cost-effectiveness challenge often is made tougher by a sense that the benefits need to accrue directly and in the short term to the payer making the investments. Neither of these two conditions applies in many interventions for health promotion.

■ **Complexity of interventions.** Prevention also requires the targeting of multiple, and often upstream, causes of disease, while medical care often focuses only on a single symptom or manifestation. The treatment of colorectal cancer, for example, is based on clear protocols tailored to family history and the stage of the disease. Prevention of this disease, on the other hand, needs to address issues such as genetic predisposition, dietary and physical activity patterns, access to screening services, and social conditions that affect risk. When multiple factors need to be addressed to assure prevention, multiple funding streams need to be coordinated, and incentives for numerous actors need to be addressed through a broad health strategy. Support for strategies with a single decision node—such as passage by Congress of Medicare coverage of end-stage renal disease treatment—is both easier to achieve and longer lasting than is support for time-limited authorization of a community-based program to reduce the prevalence of high blood pressure through dietary change, physical activity, and tobacco cessation.

■ **Interest-group dynamics.** Quite distinct from the issues of evidence and complexity is old-fashioned interest-group dynamics. The interest groups that make health their highest priority and thus lobby hard for resources are those focused on research and treatment related to specific chronic diseases. In contrast, the millions of people who benefit from health promotion interventions each receive seemingly small benefits—usually sometime in the distant future.

The result is a vacuum of political accountability for maintaining population health—in effect, a diffusion of responsibility for health.[39] Again, in contrast, a well-defined set of actors—physicians and other health care providers—has responsibility for medical care. These groups have a strong professional ethic to provide as much medical care as needed. Also, providers have strong financial incentives to provide medical care as well as interest-group incentives to lobby for increasingly more medical care resources.

Interest-group dynamics, of course, play large roles in considerations of ways to change social conditions and the physical environment. Changing social inequalities and even investing tax dollars in social and community programs always represent zero-sum activities where those with more resources need to share with those with few resources. It takes more than just evidence that social change would improve health to convince the general public that such redistributive investments should be undertaken. These choices are very much about ideology and social values.

Investments in improving the environment often concentrate costs for these efforts on a small number of businesses that have great incentives to argue against such investments. Also, the behavioral issues that together account for so many deaths—tobacco, alcohol, dietary excess, and sedentary lifestyles—are all products in part of strong commercial forces. Tobacco and alcohol represent U.S. industries with annual sales of well over $100 billion.[40] The food industry spends billions just on advertising and promotion.

"Many prevention initiatives depend upon policy changes that are outside the traditional health policy world."

■ **Broad policy arena.** Many prevention initiatives depend upon policy changes that are outside the traditional health policy world. Excise taxes on tobacco and alcohol products, passage and enforcement of nonsmoking laws, development and implementation of safety standards for workers and products, zoning approaches to enhance recreational opportunities or reduce the density of bars and liquor stores, establishment and monitoring of environmental standards for potential hazards, adoption of community water supply fluoridation, and assurance of truth and reliability in the marketing of health-related products are all examples of important prevention efforts that not only touch on but are often entirely dependent upon action across a broad spectrum of the political and policy political arena.

■ **Social preferences.** In comparing investments in behavioral change to investments in medical care, the added issue of lifestyle and habits comes into play. The public clearly wants medical care when illness occurs; this is a well-articulated social preference. However, many people do not want to change their health-threatening behavior even when they are quite aware of the risks they are taking. In these cases, arguments to invest in public programs to encourage behavioral change need to consider what social factors predispose people to choose health-threatening behavior.

Often, careful consideration indicates that people are induced to adopt unhealthy behavior in subtle and not so subtle ways. Simple examples include eating unhealthy foods because of the absence of supermarkets in low-income neighborhoods, adopting sedentary lifestyles because of unsafe neighborhoods or environments that make walking dangerous or unappealing, and smoking cigarettes or overusing alcohol because of the influence of advertisements.

Successful Health Promotion Investments

■ **In the states.** While this discussion focuses on barriers impeding investment in health promotion, there are important exceptions to the investment shortfall rule that offer support for the case that increased investments could be effective at improving population health. Some states (such as California, Florida, Arizona, and Massachusetts) have developed policy interventions to discourage tobacco use among minors, with striking success. Investments in auto safety have paid off in the form of reduced fatalities. Public policy and civic initiatives to reduce drunk driving have proved successful, and some ambitious interventions to increase screening for diseases such as breast cancer, monitoring and paying attention to cholesterol, and helping patients to better manage asthma have had positive health promotion outcomes.[41]

■ **Healthy People initiative.** Evidence of improvements in population health also emerges from the Healthy People national initiative. Two decades ago, as the U.S. Public Health Service began looking to the end of the twentieth century, it established measurable targets for health improvement: for 1990, reduce infant mortality by 35 percent, death rates among children by 20 percent, death rates for adolescents and young adults by 20 percent, adult death rates by 25 percent, and, for older adults, sick days by about 20 percent.[42] These were targets based on the evidence at hand about the controllability of disease and injury at various stages of life and, although ambitious, were expected to be accomplished in a decade's time. Despite the size of the gains anticipated, the goals were largely reached: Infant mortality declined by just under 35 percent by decade's end, childhood death rates greatly exceeded the target with a decline of about 29 percent, adolescent and young adult deaths fell short of the mark with a 9 percent decline, adult death rates declined by 25 percent, and age-adjusted sick days for older adults declined by about 14 percent.[43] Many of these achievements can be traced to behavioral and social interventions.

Among the various component targets established, the most glaring shortfalls are related to the access and health status gaps that still exist among population subgroups. As a result, when the decision was made to extend the initiative to 2010, the Healthy People goals were broadened to issues of functional status and quality of life and placed particular emphasis on reducing disparities among groups.[44] In the current Healthy People 2010 initiative, quantified targets have been established for twenty-six priority areas designed to promote healthy behavior, promote healthy and safe communities, improve systems for personal and public health initiatives, and prevent and reduce diseases and disorders. The inventory of areas sweeps broad and deep, ranging from physical activity and fitness to food and consumer product safety, family planning, chronic disease management, and public health infrastructure.

Public Policy Approaches For Change

Key elements of public policy for change include leadership that informs and motivates, economic incentives that encourage and facilitate change, and science that moves the frontiers. The strongest allies for prevention need to be the people who benefit from prevention activities. Thus, leadership that encourages health promotion needs to first raise awareness among the public about the power of prevention and health promotion to increase longevity and improve the quality of life. A focused, engaged public needs to understand the payoffs to healthier lifestyles and improved social conditions that reduce stress and improve well-being. Also, people need to be convinced that interventions to change lifestyles and social conditions are available and not too burdensome.

■ **Role of leadership to inform and motivate.** Better public communication efforts and adequate funding for such efforts are essential. Such communications initiatives are now under way to influence youths not to use illegal drugs. This is a worthwhile first step, and evaluative research needs to assess the effectiveness of the advertisement-oriented communications campaigns. However, given the epidemiology of disease, there are many added behavioral targets on which to focus communication efforts.

Perhaps most importantly, our leaders for health-promoting public policies must be comfortable working in complex environments, at those intersections of the domains of influence in which our lives play out. When behavioral patterns are affected by social triggers, environmental surroundings, and even genetic predispositions, shaping a focused vector for change is challenging. Leading change requires facility in brokering partnerships and blending science and community action. These are the skills that must be honed for the promotion of population health and that must be cultivated in our new generation of leaders.

■ **Incentives to facilitate change.** A second prerequisite for change is found in the incentives we build into policy initiatives for healthier lifestyles, environments, and social conditions. An array of legal and public policy interventions is available to improve population health: economic incentives and disincentives, information interventions, direct regulation, indirect regulation through the tort system, and deregulation.[45] Of this list, the potential of economic incentives and disincentives offers the largest opportunities to make a difference. These can take many forms, ranging from taxes to increase the price of tobacco, to advertising the identity of restaurants in violation of food-safety protocols, to grants-in-aid to encourage communities to develop bike paths. Over the long run, for example, the initiative of the Surface Transportation Policy Project to set aside Highway Trust Fund resources for community initiatives for sidewalks, walking trails, and bike paths could be one of our most important steps to better health.

Clearly, the use of incentives has fostered the strong progress made in the United States against tobacco. Sustained increases in

"Policymakers need to begin thinking in terms of a health agenda rather than a health care agenda."

excise taxes, constraining advertising and marketing, constricting use in public places, and penalizing the sale and distribution to minors have all worked to help drive down the use of tobacco. The sensitivity of teen tobacco use to these measures has yielded aggressive and successful campaigns in several states.

Economic incentives also can be used to encourage health care providers to take a broader perspective when considering how to keep people healthy. Reimbursement rates for brief interventions to assist smokers to quit or to encourage exercise routines would motivate providers to undertake these behavioral interventions. Similarly, incentives for health care purchasers and payers can be structured to provide stronger emphasis on the principles of "purchasing population health" or "paying for outcomes."[46] Purchasers contracting with provider groups can build in incentives oriented around their successes in the design and delivery of proven health promotion interventions to the populations most at risk. On a larger scale, policies could be envisioned that set aside small portions of medical care premiums or payments for redeployment for communitywide initiatives, with incentives for measures such as those related to air quality, design for walking and biking, or zoning to reduce the concentration of alcohol establishments in vulnerable areas.

For these measures to work, public policymakers need to begin thinking in terms of a health agenda rather than a health care agenda or—even more narrowly—a health care financing agenda. In prioritizing policy initiatives, health care cost savings should not be the only way to rank the importance of interventions. Sometimes prevention will save money, and sometimes it will not. Instead, quality of life and health status of populations need to be what drives priorities in health policy. It is important that when funding is taken into consideration on matters of health and health care, relative returns of investing in health promotion and health care interventions should play out in concert. For rational public policy, and for good health, our social investment decisions that affect health should be made with a common calculus and with quality of life foremost in the value equation.

■ **Improve the science base.** Vital for informed and sustained progress is our commitment to an improved science base that will yield new insights, both on the determinants of health and disease and on the relative effectiveness of alternative approaches to improving population health. This expanded agenda should include more attention to understanding how social factors and social environments affect health and well-being. A research agenda should focus on the relationships between social factors associated with poor health outcomes and the mechanisms that lead to poor health. In behavior, the highest research priority may be to better understand how social marketing and behavior-change interventions can be designed and implemented to work at the population level. Also, a carefully designed cost-effectiveness research agenda can help to focus specific interventions and develop believable economic guidance for decisionmakers. A key research need, as previously noted, is better understanding of the factors at play within each of the domains determining health and of the dynamics at their intersections. Ultimately, success at engaging health promotion opportunities in our communities will depend on the reliability of insights into the ways these complex interactions shape our lives.

Opportunities For Progress

Formidable as some of these challenges may be, a number of opportunities exist for progress related to the various nonmedical influences on health status. More innovative science, better targeting of social efforts to improve health, new models for policy implementation, and stronger leadership all can assist such efforts. From more innovative science, we may be better able to understand the nature of those domain intersections and better build the case for the power and course of effective interventions that are not only clinical but also personal, environmental, and cultural.

■ **Targeting the vulnerable.** Some of these scientific advances may help to improve our targeting of vulnerable groups. With a better understanding of what constitutes vulnerability, we may begin to strip away the anonymity of some of these problems. With better coordination of information from clinical, social, and legal sources, we may intervene earlier in the course of children who live in families under the pall of abuse, violence, or dysfunction; teens who are estranged, truant, and in trouble with the law; and older persons who are cut off from supportive relationships. We also may be able to improve the way persons who, although not so anonymous or invisible to society's line of sight, have issues that are invisible to the normal course of clinical care: sedentary lifestyles, weight problems, addiction, or depression.

■ **New policy models.** Ingenuity in fashioning new models for policy development and implementation will also help. Medical care payment policy can be better structured to induce the provision of behavior-change interventions, by fostering linkages with supportive community-based resources and rewarding broad efforts to improve the population health and quality of life. Other financial incentives can be imaginatively plied to nurture health-promoting behavior and community initiatives on active lifestyles.

■ **New linkages across sectors.** New linkages can be forged between elements of the social services system, which work in different and often uncoordinated ways to provide strategic support to vulnerable children, families, teens, and older people. Also, innovative models for community planning and design might be fashioned in the interest of environmental approaches to enhancing the health and safety of communities, ranging from zoning to reduce the concentration of liquor establishments in poor areas to improving streets and parks to encourage physical activity.

As UNDERSTANDING AND AWARENESS INCREASE about what is possible, broader leadership is necessary to muster the will. It is therefore important not only that we use established means of reaching the health policy community, but also that thought leaders from disciplines far beyond the health sector become engaged in the discussion, debate, and leadership.

The authors acknowledge the invaluable assistance of Jessica Siehl in the preparation of this manuscript.

NOTES

1. Centers for Medicare and Medicaid Services, Office of the Actuary, "National Health Expenditures, by Source of Funds and Type of Expenditure: Calendar Years 1994–1998," <www.hcfa.gov/stats/nhe-oact/tables/t3.htm> (5 December 2000); and R. Brown et al., "Effectiveness in Disease and Injury Prevention: Estimated National Spending on Prevention—United States, 1988," *Morbidity and Mortality Weekly Report* (24 July 1992): 529–531.
2. J.M. McGinnis and W.H. Foege, "Actual Causes of Death in the United States," *Journal of the American Medical Association* 270, no. 18 (1993): 2207–2212.
3. M. Lalonde, *A New Perspective on the Health of Canadians* (Ottawa: Minister of Supply and Services Canada, 1974).
4. T. McKeown, *The Role of Medicine: Dream, Mirage, or Nemesis?* (London: Nuffield Provincial Hospitals Trust, 1976).
5. J.P. Bunker, H.S. Frazier, and F. Mosteller, "The Role of Medical Care in Determining Health: Creating an Inventory of Benefits," in *Society and Health*, ed. B.C. Amick III et al. (New York: Oxford University Press, 1995), 305–341.
6. W.B. Kannel et al., "Regional Obesity and Risk of Cardiovascular Disease: The Framingham Study," *Journal of Clinical Epidemiology* 44, no. 2 (1991): 183–190; and L.F. Berkman and L. Breslow, *Health and Ways of Living: The Alameda County Study* (New York: Oxford University Press, 1983).
7. N.B. Belloc and L. Breslow, "Relationship of Physical Health Status and Health Problems," *Preventive Medicine* 1, no. 1 (1972): 409–421; McKeown, *The Role of Medicine;* and M.G. Marmot et al., "Health Inequalities among British Civil Servants: The Whitehall II Study," *Lancet* (8 June 1991): 1387–1393.
8. J.M. McGinnis, "United States," in *Critical Issues in Global Health*, ed. C.E. Koop

(San Francisco: Jossey-Bass, 2001), 80–90.

9. Institute of Medicine, *Health and Behavior: The Interplay of Biological, Behavioral, and Societal Influences* (Washington: National Academy Press, 2001).
10. R.C. Strohman, "Ancient Genomes, Wise Bodies, Unhealthy People: Limits of a Genetic Paradigm in Biology and Medicine," in *Wellness: Lecture Series* (Berkeley: University of California, Berkeley, 1992); and P.A. Baird, "The Role of Genetics in Population Health," in *Why Are Some People Healthy and Others Not?* ed. R.G. Evans, M.L. Barer, and T.R. Marmor (New York: Aldine de Gruyter, 1994), 133–159.
11. H. Muller, "Hereditary Colorectal Cancer: From Bedside to Bench and Back," *Annals of Oncology* 11, no. 4 Suppl. (October 2000): 7; and P. Pajukanta et al., "Linkage of Familial Combined Hyperlipidaemia to Chromosome 1q21-q23," *Nature Genetics* (April 1998): 369–373.
12. K.S. Kendler, "Overview: A Current Perspective on Twin Studies of Schizophrenia," *American Journal of Psychiatry* (November 1983): 1413–1425; and J.W. Rowe and R.L. Kahn, *Successful Aging*, 1st ed. (New York: Pantheon Books, 1998).
13. Rowe and Kahn, *Successful Aging*.
14. D. Olds et al., "Long Term Effects of Nurse Home Visitation on Children's Criminal and Antisocial Behavior: Fifteen-Year Follow-up of a Randomized Controlled Trial," *Journal of the American Medical Association* (14 October 1998): 1238–1244.
15. L.F. Berkman and T. Glass, "Social Integration, Social Networks, Social Support, and Health," in *Social Epidemiology*, ed. L.F. Berkman and I. Kawachi (New York: Oxford University Press, 2000), 137–173.
16. National Center for Health Statistics, *Health, United States, 1998, with Socioeconomic Status and Health Chartbook*, Pub. no. (PHS)98-1232 (Hyattsville, Md.: NCHS, 1998).
17. G. Pappas et al., "The Increasing Disparity between Socioeconomic Groups in the United States, 1990 and 1996," *New England Journal of Medicine* (8 July 1993): 103–109.
18. M. Wolfson et al., "Relation between Income Inequality and Mortality: Empirical Demonstration," *British Medical Journal* (9 October 1999): 953–957.
19. McGinnis and Foege, "Actual Causes of Death in the United States."
20. J.V. Bennet et al., "Infectious and Parasitic Diseases," *American Journal of Preventive Medicine* 55, no. 3 Suppl. (1987): 102–114.
21. McGinnis and Foege, "Actual Causes of Death in the United States."
22. D.L. Hoyert et al., "Deaths: Final Data for 1999," *National Vital Statistics Reports* 49, no. 8 (Hyattsville, Md.: National Center for Health Statistics, 2001).
23. U.S. Department of Health and Human Services, *The Surgeon General's Report on Nutrition and Health*, Pub. no. (PHS)88-50210 (Washington: DHHS, 1988).
24. DHHS, *Physical Activity and Health: A Report of the Surgeon General*, Pub. no. S/N 017-023-00196-5 (Atlanta: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996).
25. McGinnis and Foege, "Actual Causes of Death in the United States."
26. NCHS, National Survey of Family Growth, 21 December 2001, <www.cdc.gov/nchs/nsfg.htm> (7 January 2002); S.K. Henshaw, "Unintended Pregnancy in the United States," *Family Planning Perspectives* 30, no. 1 (1998): 24–29, 46; and CDC, Division of STD/HIV Prevention, *Annual Report, 1992* (Atlanta: CDC, 1993).
27. CDC, National Vital Statistics System, Mortality Tables, 1999, <www.cdc.gov/nchs/data/vs00199wktbli.pdf> (18 December 2001); and McGinnis and Foege, "Actual Causes of Death in the United States."
28. CDC, "Cigarette Smoking among Adults—United States, 1995," *Morbidity and*

Mortality Weekly Report (26 December 1997): 1217–1220.

29. J.M. McGinnis and W.H. Foege, “Mortality and Morbidity Attributable to Use of Addictive Substances in the United States, Health and Economic Burdens,” *Proceedings of the Association of American Physicians* 3, no. 2 (1999): 109–118.
30. K.R. Levit et al., “National Health Expenditures, 1996,” *Health Care Financing Review* (Fall 1997): 161–200.
31. DHHS, Public Health Service, *For a Healthy Nation: Returns on Investments in Public Health,* Pub. no. 0-16-045143-4 (Washington: U.S. Government Printing Office, 1994).
32. B.D. Smedley and S.L. Syme, eds., *Promoting Health: Intervention Strategies from Social and Behavioral Research* (Washington: National Academy Press, 2000).
33. DHHS, Public Health Service, “Ten Leading Causes of Death in the United States” (Atlanta: Bureau of State Services, July 1980).
34. Smedley and Syme, eds., *Promoting Health.*
35. J.F. Cordero et al., “Developing Immunization Registries: Experiences from the All Kids Count Program,” *American Journal of Preventive Medicine,* suppl. to vol. 13, no. 2 (March/April 1997).
36. F.J. Chaloupka and M. Grossman, “Price, Tobacco Control Policies, and Youth Smoking,” NBER Working Paper no. 5740 (Cambridge, Mass.: National Bureau of Economic Research, 1996).
37. C.T. Orleans et al., “Helping Pregnant Smokers Quit: Meeting the Challenge in the Next Decade,” *Tobacco Control* 9, no. 3 Suppl. (2000): iii6–iii11.
38. DHHS, *Physical Activity and Health..*
39. J.N. Lavis, “Ideas at the Margin or Marginalized Ideas? Nonmedical Determinants of Health in Canada,” *Health Affairs* (Mar/Apr 2002): 107–112.
40. Schneider Institute for Health Policy and Robert Wood Johnson Foundation, *Substance Abuse: The Nation’s Number One Health Problem,* Pub. no. 0-942054-13-X (Princeton, N.J.: RWJF, February 2001).
41. S.L. Isaacs and S.A. Schroeder, “Where the Public Good Prevailed,” *American Prospect* (4 June 2001): 26–30.
42. DHHS, *Healthy People: The Surgeon General’s Report on Health Promotion and Disease Prevention,* Pub. no. (PHS)70-55071 (Washington: DHHS, 1979).
43. J.M. McGinnis et al., “Healthy Progress in the United States—Results of the 1990 Objectives for the Nation,” *Journal of the American Medical Association* (11 November 1992): 2545–2552.
44. DHHS, *Healthy People 2010 (Conference Edition, in Two Volumes),* Pub. no. 20402-9382 (Washington: U.S. GPO, November 2000).
45. J.D. Gostin, “Legal and Public Policy Interventions to Advance the Population’s Health,” in *Promoting Health,* ed. Smedley and Syme, 390–416.
46. D.A. Kindig, *Purchasing Population Health: Paying for Results* (Ann Arbor, Mich.: University of Michigan Press, 1997).

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

SHATTUCK LECTURE

We Can Do Better — Improving the Health of the American People

Steven A. Schroeder, M.D.

THE UNITED STATES SPENDS MORE ON HEALTH CARE THAN ANY OTHER nation in the world, yet it ranks poorly on nearly every measure of health status. How can this be? What explains this apparent paradox?

The two-part answer is deceptively simple — first, the pathways to better health do not generally depend on better health care, and second, even in those instances in which health care is important, too many Americans do not receive it, receive it too late, or receive poor-quality care. In this lecture, I first summarize where the United States stands in international rankings of health status. Next, using the concept of determinants of premature death as a key measure of health status, I discuss pathways to improvement, emphasizing lessons learned from tobacco control and acknowledging the reality that better health (lower mortality and a higher level of functioning) cannot be achieved without paying greater attention to poor Americans. I conclude with speculations on why we have not focused on improving health in the United States and what it would take to make that happen.

From the Department of Medicine, University of California at San Francisco, San Francisco. Address reprint requests to Dr. Schroeder at the Department of Medicine, University of California at San Francisco, 3333 California St., Suite 430, San Francisco, CA 94143, or at schroeder@medicine.ucsf.edu.

N Engl J Med 2007;357:1221-8.

HEALTH STATUS OF THE AMERICAN PUBLIC

Among the 30 developed nations that make up the Organization for Economic Cooperation and Development (OECD), the United States ranks near the bottom on most standard measures of health status (Table 1).[1-4] (One measure on which the United States does better is life expectancy from the age of 65 years, possibly reflecting the comprehensive health insurance provided for this segment of the population.) Among the 192 nations for which 2004 data are available, the United States ranks 46th in average life expectancy from birth and 42nd in infant mortality.[5,6] It is remarkable how complacent the public and the medical profession are in their acceptance of these unfavorable comparisons, especially in light of how carefully we track health-systems measures, such as the size of the budget for the National Institutes of Health, trends in national spending on health, and the number of Americans who lack health insurance. One reason for the complacency may be the rationalization that the United States is more ethnically heterogeneous than the nations at the top of the rankings, such as Japan, Switzerland, and Iceland. It is true that within the United States there are large disparities in health status — by geographic area, race and ethnic group, and class.[7-9] But even when comparisons are limited to white Americans, our performance is dismal (Table 1). And even if the health status of white Americans matched that in the leading nations, it would still be incumbent on us to improve the health of the entire nation.

PATHWAYS TO IMPROVING POPULATION HEALTH

Health is influenced by factors in five domains — genetics, social circumstances, environmental exposures, behavioral patterns, and health care (Fig. 1).[10,11] When it

Table 1. Health Status of the United States and Rank among the 29 Other OECD Member Countries.

Health-Status Measure	United States	U.S. Rank in OECD	Top-Ranked Country in OECD*
Infant mortality (first year of life), 2001			
All races	6.8 deaths/ 1000 live births	25	Iceland (2.7 deaths/ 1000 live births)
Whites only	5.7 deaths/ 1000 live births	22	
Maternal mortality, 2001†			
All races	9.9 deaths/ 100,000 births	22	Switzerland (1.4 deaths/ 100,000 births)
Whites only	7.2 deaths/ 100,000 births	19	
Life expectancy from birth, 2003			
All women	80.1 yr	23	Japan (85.3 yr)
White women	80.5 yr	22	
All men	74.8 yr	22	Iceland (79.7 yr)
White men	75.3 yr	19	
Life expectancy from age 65, 2003‡			
All women	19.8 yr	10	Japan (23.0 yr)
White women	19.8 yr	10	
All men	16.8 yr	9	Iceland (18.1 yr)
White men	16.9 yr	9	

* The number in parentheses is the value for the indicated health-status measure.
† OECD data for five countries are missing.
‡ OECD data for six countries are missing.

Proportional Contribution to Premature Death

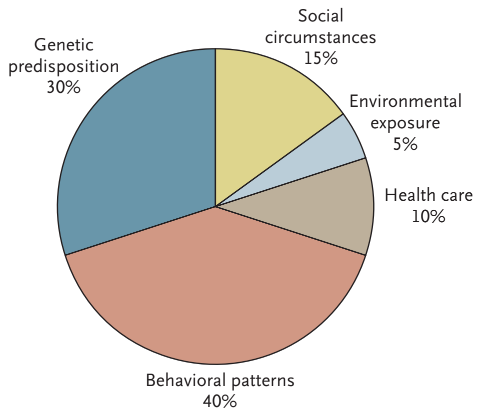

Figure 1. **Determinants of Health and Their Contribution to Premature Death.**

Adapted from McGinnis et al.[10]

comes to reducing early deaths, medical care has a relatively minor role. Even if the entire U.S. population had access to excellent medical care — which it does not — only a small fraction of these deaths could be prevented. The single greatest opportunity to improve health and reduce premature deaths lies in personal behavior. In fact, behavioral causes account for nearly 40% of all deaths in the United States.[12] Although there has been disagreement over the actual number of deaths that can be attributed to obesity and physical inactivity combined, it is clear that this pair of factors and smoking are the top two behavioral causes of premature death (Fig. 2).[12]

ADDRESSING UNHEALTHY BEHAVIOR

Clinicians and policymakers may question whether behavior is susceptible to change or whether attempts to change behavior lie outside the province of traditional medical care.[13] They may expect future successes to follow the pattern whereby immunization and antibiotics improved health in the 20th century. If the public's health is to improve, however, that improvement is more likely to come from behavioral change than from technological innovation. Experience demonstrates that it is in fact possible to change behavior, as illustrated by increased seat-belt use and decreased consumption of products high in saturated fat. The case of tobacco best demonstrates how rapidly positive behavioral change can occur.

The Case of Tobacco

The prevalence of smoking in the United States declined among men from 57% in 1955 to 23% in 2005 and among women from 34% in 1965 to 18% in 2005.[14,15] Why did tobacco use fall so rapidly? The 1964 report of the surgeon general, which linked smoking and lung cancer, was followed by multiple reports connecting active and passive smoking to myriad other diseases. Early antismoking advocates, initially isolated, became emboldened by the cascade of scientific evidence, especially with respect to the risk of exposure to secondhand smoke. Counter-marketing — first in the 1960s and more recently by several states and the American Legacy Foundation's "truth®" campaign — linked the creativity of Madison Avenue with messages about the duplicity of the tobacco industry to produce compelling antismoking messages[16] (an antismoking advertisement is available with the full text of this article at www.nejm.org). Laws, regulations, and litigation, particularly at the state and community levels, led to smoke-free public places and increases in the tax on cigarettes — two of the strongest evidence-based tobacco-control measures.[14,17,18] In this regard, local governments have been far ahead of the federal government, and they have inspired European countries such as Ireland and the United Kingdom to make public places smoke-free.[14,19] In addition, new medications have augmented face-to-face and telephone counseling techniques to increase the odds that clinicians can help smokers quit.[15,20,21]

It is tempting to be lulled by this progress and shift attention to other problems, such as the obesity epidemic. But there are still 44.5 million smokers in the United States, and each year tobacco use kills 435,000 Americans, who die up to 15 years earlier than nonsmokers and who often spend their final years ravaged by dyspnea and pain.[14,20] In addition, smoking among pregnant women is a major contributor to premature births and infant mortality.[20] Smoking is increasingly concentrated in the lower socioeconomic classes and among those with mental illness or problems with substance abuse.[15,22,23] People with chronic mental illness die an average of 25 years earlier than others, and a large percentage of those years are lost because of smoking.[24] Estimates from the Smoking Cessation Leadership Center at the University of California at San Francisco, which are based on the high rates and intensity (number of cigarettes per day plus the degree to which each is finished) of tobacco use in these populations, indicate that as many as 200,000 of the 435,000 Americans who die prematurely each year from tobacco-related deaths are people with chronic mental illness, substance-abuse problems, or both.[22,25] Understanding why they smoke and how to help them quit should be a key national research priority. Given the effects of smoking on health, the relative inattention to tobacco by those federal and state agencies charged with protecting the public health is baffling and disappointing.

The United States is approaching a "tobacco tipping point" — a state of greatly reduced smoking prevalence. There are already low rates of smoking in some segments of the population, including physicians (about 2%), people with a postgraduate education (8%), and residents of the states of Utah (11%) and California (14%).[25] When Kaiser Permanente of northern California implemented a multisystem approach to help smokers quit, the smoking rate dropped from 12.2% to 9.2% in just 3 years.[25] Two basic strategies would enable the United States to meet its Healthy People 2010 tobacco-use objective of 12% population prevalence: keep young people from starting to smoke and help smokers quit. Of the two strategies, smoking cessation has by far the larger short-term impact. Of the current 44.5 million smokers, 70% claim they would like to quit.[20] Assuming that one half of those 31 million potential nonsmokers will die because of smoking, that translates into 15.5 million potentially preventable premature deaths.[20,26] Merely increasing the baseline quit rate from the current 2.5% of smokers to 10% — a rate seen in placebo groups in most published trials of the new cessation drugs — would prevent 1,170,000 premature deaths. No other medical or public health intervention approaches this degree of impact. And we already have the tools to accomplish it.[14,27]

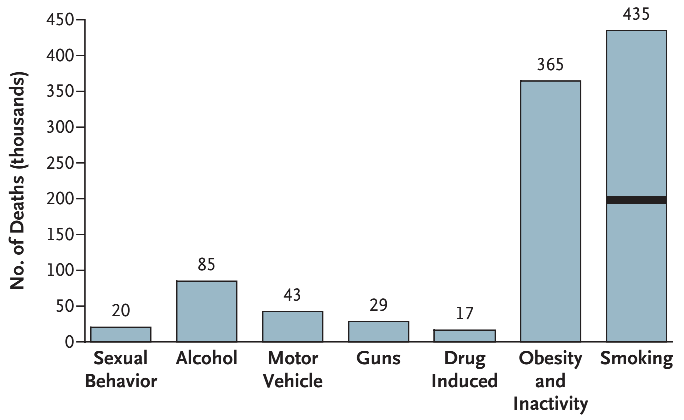

Figure 2. Numbers of U.S. Deaths from Behavioral Causes, 2000.
Among the deaths from smoking, the horizontal bar indicates the approximately 200,000 people who had mental illness or a problem with substance abuse. Adapted from Mokdad et al.[12]

Is Obesity the Next Tobacco?

Although there is still much to do in tobacco control, it is nevertheless touted as a model for combating obesity, the other major, potentially preventable cause of death and disability in the United States. Smoking and obesity share many charac-

Table 2. Similarities and Differences between Tobacco Use and Obesity.

Characteristic	Tobacco	Obesity
High prevalence	Yes	Yes
Begins in youth	Yes	Yes
20th-century phenomenon	Yes	Yes
Major health implications	Yes	Yes
Heavy and influential industry promotion	Yes	Yes
Inverse relationship to socioeconomic class	Yes	Yes
Major regional variations	Yes	Yes
Stigma	Yes	Yes
Difficult to treat	Yes	Yes
Clinician antipathy	Yes	Yes
Relative and debatable definition	No	Yes
Cessation not an option	No	Yes
Chemical addictive component	Yes	No
Harmful at low doses	Yes	No
Harmful to others	Yes	No
Extensively documented industry duplicity	Yes	No
History of successful litigation	Yes	No
Large cash settlements by industry	Yes	No
Strong evidence base for treatment	Yes	No
Economic incentives available	Yes	Yes
Economic incentives in place	Yes	No
Successful counter-marketing campaigns	Yes	No

teristics (Table 2). Both are highly prevalent, start in childhood or adolescence, were relatively uncommon until the first (smoking) or second (obesity) half of the 20th century, are major risk factors for chronic disease, involve intensively marketed products, are more common in low socioeconomic classes, exhibit major regional variations (with higher rates in southern and poorer states), carry a stigma, are difficult to treat, and are less enthusiastically embraced by clinicians than other risk factors for medical conditions.

Nonetheless, obesity differs from smoking in many ways (Table 2). The binary definition of smoking status (smoker or nonsmoker) does not apply to obesity. Body-mass index, the most widely used measure of obesity, misclassifies as overweight people who have large muscle mass, such as California governor Arnold Schwarzenegger. It is not biologically possible to stop eating, and unlike moderate smoking, eating a moderate amount of food is not hazardous. There is no addictive analogue to nicotine in food. Nonsmokers mobilize against tobacco because they fear injury from secondhand exposure, which is not a peril that attends obesity. The food industry is less concentrated than the tobacco industry, and although its advertising for children has been criticized as predatory and its ingredient-labeling practices as deceptive, it has yet to fall into the ill repute of the tobacco industry. For these reasons, litigation is a more problematic strategy, and industry payouts — such as the Master Settlement Agreement between the tobacco industry and 46 state attorneys general to recapture the Medicaid costs of treating tobacco-related diseases — are less likely.[14] Finally, except for the invasive option of bariatric surgery, there are even fewer clinical tools available for treating obesity than there are for treating addiction to smoking.

Several changes in policy have been proposed to help combat obesity.[28-30] Selective taxes and subsidies could be used as incentives to change the foods that are grown, brought to market, and consumed, though the politics involved in designating favored and penalized foods would be fierce.[31] Restrictions could also apply to the use of food stamps. Given recent data indicating that children see from 27 to 48 food advertisements for each 1 promoting fitness or nutrition, regulations could be put in place to shift that balance or to mandate support for sustained social-marketing efforts such as the "truth®" campaign against smoking.[16,32] Requiring more accurate labeling of caloric content and ingredients, especially in fast-food outlets, could make customers more aware of what they are eating and induce manufacturers to alter food composition. Better pharmaceutical products and counseling programs could motivate clinicians to view obesity treatment more enthusiastically. In contrast to these changes in policy, which will require national legislation, regulation, or research investment, change is already under way at the local level. Some schools have banned the sale of soft drinks and now offer more nutritionally balanced lunches. Opportunities for physical activity at work, in school, and in the community have been expanded in a small but growing number of locations.

NONBEHAVIORAL CAUSES OF PREMATURE DEATH

Improving population health will also require addressing the nonbehavioral determinants of health that we can influence: social, health care, and environmental factors. (To date, we lack tools to change our genes, although behavioral and environmental factors can modify the expression of genetic risks such as obesity.) With respect to social factors, people with lower socioeconomic status die earlier and have more disability than those with higher socioeconomic status, and this pattern holds true in a stepwise fashion from the lowest to the highest classes.[33-38] In this context, class is a composite construct of income, total wealth, education, employment, and residential neighborhood. One reason for the class gradient in health is that people in lower classes are more likely to have unhealthy behaviors, in part because of inadequate local food choices and recreational opportunities. Yet even when behavior is held constant, people in lower classes are less healthy and die earlier than others.[33-38] It is likely that the deleterious influence of class on health reflects both absolute and relative material deprivation at the lower end of the spectrum and psychosocial stress along the entire continuum. Unlike the factors of health care and behavior, class has been an "ignored determinant of the nation's health."[33] Disparities in health care are of concern to some policymakers and researchers, but because the United States uses race and ethnic group rather than class as the filter through which social differences are analyzed, studies often highlight disparities in the receipt of health care that are based on race and ethnic group rather than on class.

But aren't class gradients a fixture of all societies? And if so, can they ever be diminished? The fact is that nations differ greatly in their degree of social inequality and that — even in the United States — earning potential and tax policies have fluctuated over time, resulting in a narrowing or widening of class differences. There are ways to address the effects of class on health.[33] More investment could be made in research efforts designed to improve our understanding of the connection between class and health. More fundamental, however, is the recognition that social policies involving basic aspects of life and well-being (e.g., education, taxation, transportation, and housing) have important health consequences. Just as the construction of new buildings now requires environmental-impact analyses, taxation policies could be subjected to health-impact analyses. When public policies widen the gap between rich and poor, they may also have a negative effect on population health. One reason the United States does poorly in international health comparisons may be that we value entrepreneurialism over egalitarianism. Our willingness to tolerate large gaps in income, total wealth, educational quality, and housing has unintended health consequences. Until we are willing to confront this reality, our performance on measures of health will suffer.

One nation attempting to address the effects of class on health is the United Kingdom. Its 1998 Acheson Commission, which was charged with reducing health disparities, produced 39 policy recommendations spanning areas such as poverty, income, taxes and benefits, education, employment, housing, environment, transportation, and nutrition. Only 3 of these 39 recommendations pertained directly to health care: all policies that influence health should be evaluated for their effect on the disparities in health resulting from differences in socioeconomic status; a high priority should be given to the health of families with children; and income inequalities should be reduced and living standards among the poor improved.[39] Although implementation of these recommendations has been incomplete, the mere fact of their existence means more attention is paid to the effects of social policies on health. This element is missing in U.S. policy discussions — as is evident from recent deliberations on income-tax policy.

Although inadequate health care accounts for only 10% of premature deaths, among the five determinants of health (Fig. 1), health care receives by far the greatest share of resources and attention. In the case of heart disease, it is estimated that health care has accounted for half of the 40% decline in mortality over the past two decades.[40] (It may be that exclusive reliance on international mortality comparisons shortchanges the results of America's health care system. Perhaps the high U.S. rates of medical-technology use translate into comparatively better function. To date, there are no good international comparisons of functional status to test that theory, but if it could be substantiated, there would be an even more compelling claim for expanded health insurance coverage.) U.S. expenditures on health care in 2006 were an estimated $2.1 trillion, accounting for 16% of our gross domestic product.[41] Few other countries even reach double digits in health care spending.

There are two basic ways in which health care can affect health status: quality and access. Although qualitative deficiencies in U.S. health care have been widely documented,[42] there is no evidence that its performance in this dimension is worse than that of other OECD nations. In the area of access, however, we trail nearly all the countries: 45 million U.S. citizens (plus millions of immigrants) lack health insurance, and millions more are seriously underinsured. Lack of health insurance leads to poor health.[43] Not surprisingly, the uninsured are disproportionately represented among the lower socioeconomic classes.

Environmental factors, such as lead paint, polluted air and water, dangerous neighborhoods, and the lack of outlets for physical activity, also contribute to premature death. People with lower socioeconomic status have greater exposure to these health-compromising conditions. As with social determinants of health and health insurance coverage, remedies for environmental risk factors lie predominantly in the political arena.[44]

THE CASE FOR CONCENTRATING ON THE LESS FORTUNATE

Since all the actionable determinants of health — personal behavior, social factors, health care, and the environment — disproportionately affect the poor, strategies to improve national health rankings must focus on this population. To the extent that the United States has a health strategy, its focus is on the development of new medical technologies and support for basic biomedical research. We already lead the world in the per capita use of most diagnostic and therapeutic medical technologies, and we have recently doubled the budget for the National Institutes of Health. But these popular achievements are unlikely to improve our relative performance on health. It is arguable that the status quo is an accurate expression of the national political will — a relentless search for better health among the middle and upper classes. This pursuit is also evident in how we consistently outspend all other countries in the use of alternative medicines and cosmetic surgeries and in how frequently health "cures" and "scares" are featured in the popular media.[45] The result is that only when the middle class feels threatened by external menaces (e.g., secondhand tobacco smoke, bioterrorism, and airplane exposure to multidrug-resistant tuberculosis) will it embrace public health measures. In contrast, our investment in improving population health — whether judged on the basis of support for research, insurance coverage, or government-sponsored public health activities — is anemic.[46-48] Although the Department of Health and Human Services periodically produces admirable population health goals — most recently, the Healthy People 2010 objectives[49] — no government department or agency has the responsibility and authority to meet these goals, and the importance of achieving them has yet to penetrate the political process.

WHY DON'T AMERICANS FOCUS ON FACTORS THAT CAN IMPROVE HEALTH?

The comparatively weak health status of the United States stems from two fundamental aspects of its political economy. The first is that the disadvantaged are less well represented in the political sphere here than in most other developed countries, which often have an active labor movement and robust labor parties. Without a strong voice from Americans of low socioeconomic status, citizen health advocacy in the United States coalesces around particular illnesses, such as breast cancer, human immunodeficiency virus infection and the acquired immunodeficiency syndrome (HIV–AIDS), and autism. These efforts are led by middle-class advocates whose lives have been touched by the disease. There have been a few successful public advocacy campaigns on issues of population health — efforts to ban exposure to secondhand smoke or to curtail drunk driving — but such efforts are relatively uncommon.[44] Because the biggest gains in population health will come from attention to the less well off, little is likely to change unless they have a political voice and use it to argue for more resources to improve health-related behaviors, reduce social disparities, increase access to health care, and reduce environmental threats. Social advocacy in the United States is also fragmented by our notions of race and class.[33] To the extent that poverty is viewed as an issue of racial injustice, it ignores the many whites who are poor, thereby reducing the ranks of potential advocates.

The relatively limited role of government in the U.S. health care system is the second explanation. Many are familiar with our outlier status as the only developed nation without universal health care coverage.[50] Less obvious is the dispersed and relatively weak status of the various agencies responsible for population health and the fact that they are so disconnected from the delivery of health services. In addition, the American emphasis on the value of individual responsibility creates a reluctance to intervene in what are seen as personal behavioral choices.

HOW CAN THE NATION'S HEALTH IMPROVE?

Given that the political dynamics of the United States are unlikely to change soon and that the less fortunate will continue to have weak representation, are we consigned to a low-tier status when it comes to population health? In my view, there is room for cautious optimism. One reason is that despite the epidemics of HIV–AIDS and obesity, our population has never been healthier, even though it lags behind so many other countries. The gain has come from improvements in personal behavior (e.g., tobacco control), social and environmental factors (e.g., reduced rates of homicide and motor-vehicle accidents and the introduction of fluoridated water), and medical care (e.g., vaccines and cardiovascular drugs). The largest potential for further improvement in population health lies in behavioral risk factors, especially smoking and obesity. We already have tools at hand to make progress in tobacco control, and some of these tools are applicable to obesity. Improvement in most of the other factors requires political action, starting with relentless measurement of and focus on actual health status and the actions that could improve it. Inaction means acceptance of America's poor health status.

Improving population health would be more than a statistical accomplishment. It could enhance the productivity of the workforce and boost the national economy, reduce health care expenditures, and most important, improve people's lives. But in the absence of a strong political voice from the less fortunate themselves, it is incumbent on health care professionals, especially physicians, to become champions for population health. This sense of purpose resonates with our deepest professional values and is the reason why many chose medicine as a profession. It is also one of the most productive expressions of patriotism. Americans take great pride in asserting that we are number one in terms of wealth, number of Nobel Prizes, and military strength. Why don't we try to become number one in health?

Supported in part by grants from the Robert Wood Johnson and American Legacy Foundations. The sponsors had no role in the preparation of the Shattuck Lecture.

No potential conflict of interest relevant to this article was reported.

I thank Stephen Isaacs for editorial assistance; Michael McGinnis, Harold Sox, Stephen Shortell, and Nancy Adler for comments on an earlier draft; and Kristen Kekich and Katherine Kostrzewa for technical support.

REFERENCES

1. OECD health data 2006 (2001 figures). Paris: Organisation for Economic Co-operation and Development, October 2006.

2. Infant, neonatal, and postneonatal deaths, percent of total deaths, and mortality rates for the 15 leading causes of infant death by race and sex: United States, 2001. Hyattsville, MD: National Center for Health Statistics. (Accessed August 24, 2007, at http://www.cdc.gov/search.do?action=search&queryText=infant+mortality+rate+2001&x= 18&y=15.)

3. Hoyert DL. Maternal mortality and related concepts. Vital Health Stat 3 2007;33:4.

4. Chartbook on trends in the health of Americans. Table 27: life expectancy at birth, at age 65 years of age, and at age 75 years of age, by race and sex: United States, selected years 1900-2004:193. Hyattsville, MD: National Center for Health Statistics. (Accessed August 24, 2007, at http://www.cdc.gov/nchs/fastats/lifexpec.htm.)

5. WHO core health indicators. Geneva: World Health Organization. (Accessed August 24, 2007, at http://www3.who.int/whosis/core/core_select_process.cfm.)

6. Minino AM, Heron M, Smith BL. Deaths: preliminary data for 2004. Health E-Stats. Released April 19, 2006. (Accessed August 24, 2007, at http://www.cdc.gov/nchs/products/pubs/pubd/hestats/prelimdeaths04/preliminarydeaths04.htm.)

7. Harper S, Lynch J, Burris S, Davey Smith G. Trends in the black-white life expectancy gap in the United States, 1983-2003. JAMA 2007;297:1224-32.

8. Murray JL, Kulkarni SC, Michaud C, et al. Eight Americas: investigating mortality disparities across races, counties, and race-counties in the United States. PLoS Med 2006;3(9):e260.

9. Woolf SH, Johnson RE, Phillips RL, Philipsen M. Giving everyone the health of the educated: an examination of whether social change would save more lives than medical advances. Am J Public Health 2007;97:679-83.

10. McGinnis JM, Williams-Russo P, Knickman JR. The case for more active policy attention to health promotion. Health Aff (Millwood) 2002;21(2):78-93.

11. McGinnis JM, Foege WH. Actual causes of death in the United States. JAMA 1993;270:2207-12.

12. Mokdad AH, Marks JS, Stroup JS, Gerberding JL. Actual causes of death in the United States, 2000. JAMA 2004;291:1238-45. [Errata, JAMA 2005;293:293-4, 298.]

13. Seldin DW. The boundaries of medicine. Trans Assoc Am Phys 1981;38:lxxv-lxxxvi.

14. Schroeder SA. Tobacco control in the wake of the 1998 Master Settlement Agreement. N Engl J Med 2004;350:293-301.

15. *Idem.* What to do with the patient who smokes? JAMA 2005;294:482-7.

16. Farrelly MC, Healton CH, Davis KC, et al. Getting to the truth: evaluating national tobacco countermarketing campaigns. Am J Public Health 2002;92:901-7. [Erratum, Am J Public Health 2003;93:703.]

17. Warner KE. Tobacco policy research: insights and contributions to public health

policy. In: Warner KE, ed. Tobacco control policy. San Francisco: Jossey-Bass, 2006:3-86.
18. Schroeder SA. An agenda to combat substance abuse. Health Aff (Millwood) 2005;24:1005-13.
19. Koh HK, Joossens LX, Connolly GN. Making smoking history worldwide. N Engl J Med 2007;356:1496-8.
20. Fiore MC, Bailey WC, Cohen SJ, et al. Treating tobacco use and dependence: clinical practice guideline. Rockville, MD: Public Health Service, 2000.
21. Schroeder SA, Sox HC. Trials that matter: varenicline — a new designer drug to help smokers quit. Ann Intern Med 2006;145:784-5.
22. Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. Smoking and mental illness: a population-based prevalence study. JAMA 2000;284:2606-10.
23. Zeidonis DM, Williams JM, Steinberg ML, et al. Addressing tobacco dependence among veterans with a psychiatric disorder: a neglected epidemic of major clinical and public health concern. In: Isaacs SL, Schroeder SA, Simon JA, eds. VA in the vanguard: building on success in smoking cessation. Washington, DC: Department of Veterans Affairs, 2005:141-70. (Accessed, August 24, 2007, at http://smokingcessationleadership.ucsf.edu/AboutSCLC_vanguard.html.)
24. Colton CW, Manderscheid RW. Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. Prev Chronic Dis 2006;3:April (online only). (Accessed August 24, 2007, at http://www.cdc.gov/pcd/issues/2006/apr/05_0180.htm.)
25. Smoking Cessation Leadership Center. Partner highlights. (Accessed August 24, 2007, at http://smokingcessationleadership.ucsf.edu/PartnerFeatured.html.)
26. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. BMJ 2004;328:1519-27.
27. Fiore MC, Croyle RT, Curry SJ, et al. Preventing 3 million premature deaths and helping 5 million smokers quit: a national action plan for tobacco cessation. Am J Public Health 2004;94:205-10.
28. Nestle M. Food marketing and childhood obesity — a matter of policy. N Engl J Med 2006;354:2527-9.
29. Mello MM, Studdert DM, Brennan TA. Obesity — the new frontier of public health law. N Engl J Med 2006;354:2601-10.
30. Gostin LO. Law as a tool to facilitate healthier lifestyles and prevent obesity. JAMA 2007;297:87-90.
31. Pollan M. You are what you grow. New York Times Sunday Magazine. April 22, 2007:15-8.
32. Food for thought: television food advertising to children in the United States. Menlo Park, CA: Kaiser Family Foundation, March 2007:3.
33. Isaacs SL, Schroeder SA. Class — the ignored determinant of the nation's health. N Engl J Med 2004;351:1137-42.
34. Adler NE, Boyce WT, Chesney MA, Folkman S, Syme SL. Socioeconomic inequalities in health: no easy solution. JAMA 1993;269:3140-5.
35. McDonough P, Duncan GJ, Williams DR, House J. Income dynamics and adult mortality in the United States, 1972 through 1989. Am J Public Health 1997;87:1476-83.
36. Marmot M. Inequalities in health. N Engl J Med 2001;345:134-6.
37. Williams DR, Collins C. US socioeconomic and racial differences in health: patterns and explanations. Annu Rev Sociol 1995;21:349-86.
38. Minkler M, Fuller-Thomson E, Guralnik JM. Gradient of disability across the socioeconomic spectrum in the United States. N Engl J Med 2006;355:695-703.
39. Independent inquiry into inequalities in health report. London: Stationery Office, 1998 (Accessed August 24, 2007, at http://www.archive.official-documents.co.uk/document/doh/ih/contents.htm.)
40. Ford ES, Ajani UA, Croft JB, et al. Explaining the decrease in U.S. deaths from coronary disease, 1980–2000. N Engl J Med 2007;356:2388-98.
41. Poisal JA, Truffer C, Smith S, et al. Health spending projections through 2016: modest changes obscure Part D's impact. Health Aff (Millwood) 2007;26:w242-w253 (Web only). (Accessed August 24, 2007, at http://content.healthaffairs.org/cgi/content/full/26/2/w242.)
42. Institute of Medicine. To err is human: building a safer health system. Washington, DC: National Academy Press, 2000.
43. *Idem.* Hidden costs, value lost: uninsurance in America. Washington, DC: National Academy of Sciences, 2003.
44. Isaacs SL, Schroeder SA. Where the public good prevailed: lessons from success stories in health. The American Prospect. June 4, 2001:26-30.
45. Gawande A. Annals of medicine: the way we age now. The New Yorker. April 30, 2007:50-9.
46. McGinnis JM. Does proof matter? Why strong evidence sometimes yields weak action. Am J Health Promot 2001;15:391-6.
47. Kindig DA. A pay-for-population health performance system. JAMA 2006;296:2611-3.
48. Woolf SH. Potential health and economic consequences of misplaced priorities. JAMA 2007;297:523-6.
49. Healthy People 2010: understanding and improving health. Washington, DC: Department of Health and Human Services, 2001.
50. Schroeder SA. The medically uninsured — will they always be with us? N Engl J Med 1996;334:1130-3.

Supplementary Appendix

This appendix has been provided by the author to give readers additional information about his work.

Supplement to: Schroeder SA. Shattuck Lecture: we can do better — improving the health of the American people. N Engl J Med 2007;357:1221-8.

WANTED

PHILIP MORRIS

AKA

"THE MARLBORO MAN"

IS WANTED FOR THE DEATHS OF MILLIONS.

SUBJECT IS CONSIDERED EXTREMELY DANGEROUS!

MAY BE DISGUISED AS ALTRIA

www.PhilipMorrisCantHide.org

Public Policy Frameworks for Improving Population Health

ALVIN R. TARLOV[a,b]

The Health Institute, New England Medical Center, Harvard School of Public Health, Tufts University School of Medicine, USA

ABSTRACT: **Four conceptual frameworks provide bases for constructing comprehensive public policy strategies for improving population health within wealthy (OECD) nations. (1) *Determinants* of population health. There are five broad categories: genes and biology, medical care, health behaviors, the ecology of all living things, and social/societal characteristics. (2) *Complex systems*: Linear effects models and multiple independent effects models fail to yield results that explain satisfactorily the dynamics of population health production. A different method (complex systems modeling) is needed to select the most effective interventions to improve population health. (3) *An intervention framework* for population health improvement. A two-by-five grid seems useful. Most intervention strategies are either ameliorative or fundamentally corrective. The other dimension of the grid captures five general categories of interventions: child development, community development, adult self-actualization, socioeconomic well-being, and modulated hierarchical structuring. (4) *Public policy development process*: the process has two phases. The initial phase, in which public consensus builds and an authorizing environment evolves, progresses from values and culture to identification of the problem, knowledge development from research and experience, the unfolding of public awareness, and the setting of a national agenda. The later phase, taking policy action, begins with political engagement and progresses to interest group activation, public policy deliberation and adoption, and ultimately regulation and revision. These frameworks will be applied to help understand the 39 recommendations of the *Independent Inquiry into Inequalities in Health,* the Sir Donald Acheson Report from the United Kingdom, which is the most ambitious attempt to date to develop a comprehensive plan to improve population health.**

INTRODUCTION

Copious data, confirmed in practically every study and society examined, has identified with sufficient confidence many of the key social and societal factors that if improved would elevate population health. Further research undoubtedly will broaden, add important insights, and refine the texture of our understanding. Nonetheless, the knowledge base that exists in 1999 is sufficiently comprehensive and

---

[a] Current address for correspondence: Alvin R. Tarlov, M.D., James A. Baker III Institute for Public Policy, Rice University, 6100 Main St., Houston, TX 77005-1892. 713-527-4063 (voice).

[b] This manuscript is a slightly modified version of Chapter 17 by Tarlov and St. Peter in *Society and Population Health; A Reader. Volume II: A State Perspective.* Alvin R. Tarlov & Robert F. St. Peter, Eds. 1999. The New Press, New York.

robust to support the beginning of selected aspects of a population health improvement program.

The improvement of certain societal features would at a minimum improve the general quality of living overall, but would likely improve population health as well. These features include improved opportunities for the following: successful child development, strengthened community cohesion, enhanced self-fulfillment, increased socioeconomic well-being, and modulated hierarchical structuring.

Multipronged actions initiated by multiple sectors are likely to be most effective. The sectors include nonprofit community and national organizations; faith organizations; philanthropies; schools; the recreational, entertainment, and media groups; business; political parties; public policy interests; and local, regional, and national governments. This paper is limited to public policies to improve population health, but the public policies are unlikely to be effective, or even adopted, unless there is in parallel an activation of multiple sectors and synergism is achieved. Social currents, directions, and norms become embedded in expectations, behaviors, and operations. Accepted paradigms ultimately become encoded in laws and regulations. Even relatively modest shifts in social norms, say five degrees out of a whole circumference, will be difficult to achieve. Movement toward more healthful societal circumstances will require multiple approaches and the mobilization of understanding, concern, and commitment of multiple sectors. Public policy development usually does not lead, but rather follows broad public concern.

Four conceptual frameworks, when integrated, can provide guidance for constructing public policy ideas and developing strategies for improving population health within developed nations: (1) determinants of population health, (2) complex system modeling, (3) intervention framework, and (4) public policy development process. The four conceptual frameworks will be described, and then applied to an assessment of the 39 recommendations made in *Independent Inquiry into Inequalities in Health*,[1] the 1998 Sir Donald Acheson report from the United Kingdom, the most ambitious research-based attempt to date to formulate a comprehensive plan to improve population health. Although many chapters in this book advance policy recommendations, the comprehensiveness and coherency of the *Independent Inquiry* provide an opportunity to illustrate the conceptual frameworks for policy developed for this chapter.

DETERMINANTS OF POPULATION HEALTH

There are five major categories of influence on health: genes and associated biology; health behaviors such as dietary habits, tobacco, alcohol and drug use, and physical fitness; medical care and public health services; the ecology of all living things; and social and societal characteristics (FIG. 1). To summarize, the relative proportional influence of each of the five categories is unknown in precise quantitative terms. FIGURE 1 should be interpreted as a crude approximation at this stage of the science. The dashed radii are intended to convey rough estimates, as well as the interdependence/interactivity of the various influences. The absence of a radial line separating total ecology from social/societal characteristics reflects the lack of quantitative knowledge on these two categories of determinants at this time. Genes,

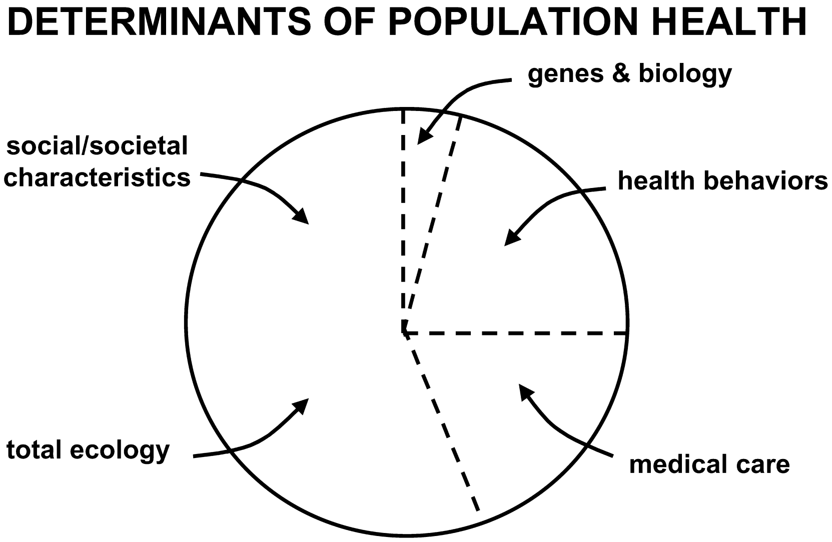

FIGURE 1. Relative influence of the five major determinant categories of population health: rough approximations.

health behaviors, medical care, total ecology, and social/societal characteristics comprise a big, complex, and dynamic network of interactive variables that is understood in a general sense but not understood in a precise, quantitative way. A large body of evidence indicates that social/societal factors exert a major influence on population health. Efforts to improve population health through policies to modify the other four categories of influence while leaving social/societal characteristics unchanged are unlikely to be successful.

COMPLEX SYSTEM MODELING

Mention is made above of the interactivity of most of the factors that influence population health. Changes in one induce responses in the others. Positive and negative feedbacks and cancellation and synergistic effects are predominant features of hugely complex systems exemplified by the influence of surrounding factors on population health. When added to the surrounding factors the physiological systems within the human being that mediate the social effects with uncountable numbers and kinds of adaptations and adjustments, the health production system reveals itself as almost incomprehensibly complex. Linear effects models, multiple independent effects models, and multivariate analytic methods that have driven the social determinants of health field up to this time fail to yield results that satisfactorily explain the dynamics of population health production. Population health production is unlikely to be understood from analyses of individual components. Sociobiologic system complexity cannot be explained mechanistically or predictably as can the internal combustion engine or chemical equations. The social determinants of health field, and most particularly the ability to predict with greater certainty the multitudinous consequences of interventions, require that the concepts and measures of complex systems be applied. It is noteworthy that 30 pages of a recent issue of *Science*[2] have been devoted to exploring complex systems related not only to chemistry and the nervous system but also to social systems such as the grouping behavior of animals and the economy.

Yet, despite quantitative shortcomings in our ability to assign precise numerical causal roles to each class of population health determinant and our inability to isolate with precision the impact on population health of each variable in the complex social-health system, there are several broad categories of interventions that could beneficially be applied now. Improvements in child development, community cohesion, self-fulfillment, total ecology, and socioeconomic mobility would result generally in improved quality of life, and at the same time these improvements would likely be salutary to population health. Reasonable evidence, not certainty of knowledge, permitted tobacco control to move forward 40 years ago. Existing data is adequate for formulating policies and other actions that could affect population health importantly. Awaiting new analytic methods and quantitatively more precise information will delay by decades or longer attempts to improve population health.

AN INTERVENTION FRAMEWORK FOR POPULATION HEALTH IMPROVEMENT

The intervention framework (TABLE 1) identifies five broad intervention objectives that are likely to be salutary for population health. The five are improved child development, strengthened community cohesion, enhanced self-fulfillment, increased socioeconomic well-being, and modulated hierarchical structuring; that is, interventions aimed at children, the community, adults, the economy, and arrangements for social positioning. Each intervention can be classified as either ameliorative or fundamentally corrective. For example, ameliorative interventions to improve child development might include approval of a city ordinance that allows surplus space in public school buildings to be used for day care while parents are working, or to reinvigorate the YMCAs and the YWCAs so that supervised after-school recreational activities for children and youths become generally available. Fundamentally

TABLE 1. Intervention framework to improve population health

INTERVENTION OBJECTIVES	AMELIORATIVE	FUNDAMENTALLY CORRECTIVE
Improve *child* development		
Strengthen *community cohesion*		
Enhance opportunities for *self-fulfillment*		
Increase *socioeconomic* well-being		
Modulate *hierarchical* structuring		

corrective programs to improve child development might include programs to train fathers and mothers in parenting skills and in establishing home environments conducive to positive cognitive, emotional, and behavioral development, and developing day care programs having high standards, well-trained and culturally diverse professionals who earn professional wages, transportation that makes the program within practical reach of families, and financial foundations to make the programs affordable to all. The intervention framework could help a community or organization develop short- and long-range planning and identify a combination of ameliorative and fundamentally corrective strategies to provide some near-term accomplishments as well as long-term restructuring that addresses the population health program at its roots.

Other examples can be chosen for strengthening community cohesion, enhancing opportunities for self-fulfillment, increasing socioeconomic mobility, or for modulating the effects of hierarchical structuring. The examples are likely to include combinations of public policies, private sector actions, and community programs, and the active involvement of multiple sectors as presented earlier in this chapter. We will return to this intervention framework in reference to the *Independent Inquiry into Inequalities in Health.*

PUBLIC POLICY DEVELOPMENT PROCESS

This framework separates policy development into two phases (FIGURE 2), an initial phase leading to the development of a public consensus and a later political phase when specific policy actions are taken. Before political action, a broad public understanding needs to be acquired that population health problems have origins in real issues that can be addressed remedially to everyone's advantage. Once that understanding has been assimilated, an evident desire must develop at a high enough priority among a sufficient proportion of the population to create a national agenda, or an authorizing environment and momentum for action. When sufficient momentum has developed, the political process will be authorized to pursue policies to address the problem. This framework helps decide where to apply energy in implementing strategies for population health improvement.

In the example of improved child development used above, all aspects of the initial phase have already been accomplished. That is, a public consensus has formed, a national agenda has been developed, and an authorizing environment has developed that will make it natural and acceptable to engage the political process in thinking through alternative proposals to improve opportunities for successful child development. However, although early childhood experiences are commonly known to be related to cognitive, emotional, and behavioral development, it is not well known that the quality of early childhood development is closely tied to adult health. Americans also place a high value on adult health. Therefore, while the issue of child development is ready for political engagement, the policy action phase might be advanced with greater force if the adult health issue is joined.

On the other hand, a plan to elevate socioeconomic well-being that includes a component of income redistribution should acknowledge that the startling rise in income inequality in the United States has been well documented in books and reports

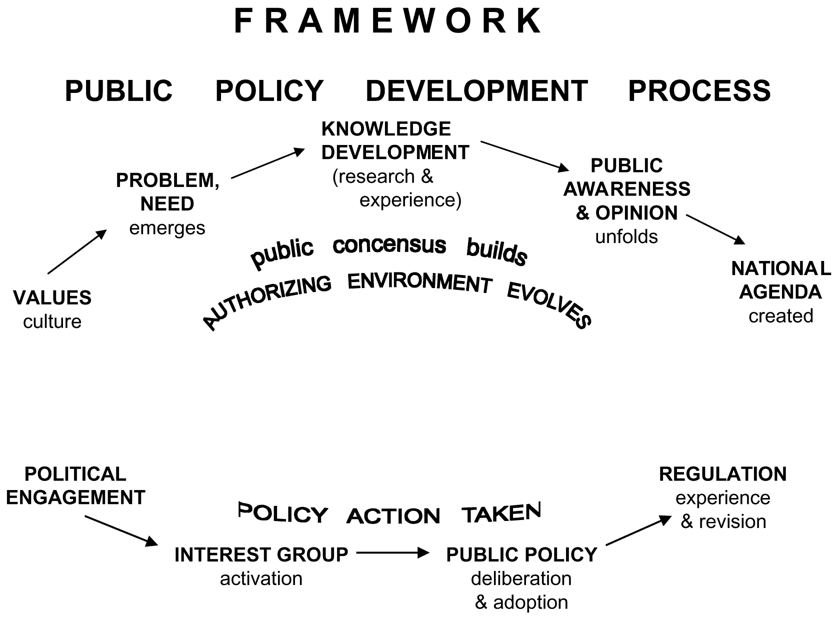

FIGURE 2. Conceptual framework for the two phases of the public policy development process: public consensus/national agenda building, and political/public policy actions taken.

from universities, research organizations, some nonprofit organizations, and journalists. Yet, the relationship of income inequality to gross inequalities in health has not yet stimulated a broad and sustained dialogue in the U.S. media and on the political campaign trails. Nor has the problem risen to occupy a position on the national agenda as has been achieved for issues in education, social security, Medicare, patient bill of health care rights, and international finance and trade. In contrast to the child development issue that is ripe for political action, the income distribution issue should start in the public awareness and public consensus arena. Political productivity is the end game of social transformation.

All four conceptual frameworks should be integrated into a coherent strategy for improving population health. Although the emphasis in this chapter is on public policies, surely corporate policies, community programs, medical care, and health behaviors have important roles to play in child development and adult health. We would lose important potential allies if we ignored the corporate, community, health care, and behavior change public health sectors. Likewise, an understanding of complex systems, even at a low level of sophistication, will be important in anticipating the likelihood of multiple effects of interventions and in maintaining an early alertness and watchful eye for unintended and undesired consequences of interventions. Further, desired outcomes in complex systems can be accomplished through several routes, allowing the selection of an alternate public policy initiative that has a greater public and political chance of being adopted and sustained. The intervention framework provides the key choices in relatively neutral terms for specific objective setting and intervention concentration, while the public policy development framework can help design the strategy and select the venue in which to initiate the strategy.

INDEPENDENT INQUIRY INTO INEQUALITIES IN HEALTH

The New Labor Party government of Prime Minister Tony Blair, United Kingdom, in July, 1997, requested Sir Donald Acheson, former Chief Medical Officer of the National Health Service, to review and summarize inequalities in health in England, and to identify priority areas for future policy development likely to offer opportunities for government to develop beneficial cost-effective and affordable interventions to reduce health inequalities.

The charge of the inquiry instructed that the policy proposals were to be based on "scientific and expert evidence" and "within the broad framework of Government's financial strategy"(Ref. 1, pp.155–157). The report was to be completed in about a year, and indeed was submitted to the government in September, 1998.

Several limitations were imposed at the outset. The report was to be focused on government opportunities, as opposed to private sector initiatives. The recommendations were to be framed in the context of the new governments' financial plans for the country. Only one year was allowed for a project that many of us would have regarded as a three or more year undertaking.

A salient feature of the inquiry is its consistent insistence that the summarization of knowledge be based on science and that the recommendations be supportable by the scientific evidence and by peer review by scientists expert in this field. The process and the report were overseen by a five-member Scientific Advisory Group.

The inquiry was guided by a socioeconomic model of health initially proposed by Dahlgren and Whitehead in 1991 (Ref. 1, pp.5–6). The model emphasizes the context in which we live and by which health or disease is generated. The context is depicted by concentric rings with people at its center enveloped successively by the influences of lifestyle, social and community characteristics, and finally an array of macro-socioeconomic, cultural, and environmental conditions. The influence of this contextual conceptualization, sometimes referred to as socioecologic, is evident in the report.

The report is in two parts. Part 1 contains a summary of research data on inequalities in health. Part 2 consists of reviews of the evidence, amplified from the data cited in Part 1, upon which the policy formulations are discussed. A list of 39 policy recommendations is given at the end of Part 2.

Readers might tend to turn directly to the list of recommendations, but it is a mistake if one's analysis of the report ends there. Out of context, the recommendations can be interpreted as a war on poverty or as a welfare program for disadvantaged mothers and children. A reading of the entire Part 2, however, adds background, content, depth, and texture to the recommendations. They become a comprehensive, integrated, and plausible set of recommendations for government policies designed to reduce inequalities in population health. The recommendations address population health inequalities induced by health behaviors, by deficiencies in medical care planning and delivery, or by the pervasive influence of social and societal characteristics. Although the principal emphasis is on social and societal factors, the argument is well made that inequalities in medical services often sustain or amplify inequalities in health.

The Recommendations

Most of the 39 recommendations have multiple sub-recommendations, and many recommendations are cross-listed under several of the 13 recommendation categories devised for the report (TABLE 2). For simplicity in this chapter, the recommendation categories can usefully be collected into four "groupings" (TABLE 3). The groupings will only be scanned briefly here.

Group A, Scope and Emphasis

Recommendations 1 and 2 set a comprehensive tone by indicating that all government policies should be examined for their possible impact on health inequalities, and indicates that the report gives special emphasis to the less well-off with highest (but not exclusive) priority to women of child-bearing age, expectant mothers, and children.

Group B, Sociostructural Improvements

Recommendations 3 through 20 will perhaps be of greatest interest to this book's readers; they are summarized in TABLE 4. Assessment of *all* public policies for their

TABLE 2. Thirteen categories used for the 39 recommendations in the *Independent Inquiry into Inequalities in Health,* United Kingdom, 1998

1. General
2. Poverty, income, benefits
3. Education
4. Employment
5. Housing
6. Mobility, transport, pollution
7. Nutrition and agriculture policy
8. Mothers, children, families
9. Young people and workers
10. Older people
11. Ethnic minorities
12. Gender
13. National health services

TABLE 3. Four groupings (by the author of this chapter) for the 39 recommendations in the *Independent Inquiry into Inequalities in Health,* United Kingdom, 1998

Group	Number of Recommendations
A. Scope and emphasis	(2)
B. Sociostructural improvements	(18)
C. Disadvantaged emphasis	(16)
D. Health services	(3)

impact on health inequalities appears in TABLE 4 with specific attention to employment and nutrition (agricultural) policies. Income transfers are invoked to lift the bottom out of poverty, to ameliorate the effects of unemployment, and to assure the affordability of wholesome foods for all. Benefits strategies are advanced by the report with respect to expanding preschool opportunities, improving job training, increasing the availability and quality of public housing, and increasing public transport. Again, a full understanding of the sweep of the report should be achieved by reading the texts of both Parts 1 and 2.

Group C, Disadvantaged Emphasis

Recommendations 21 through 36, specify the report's emphasis on mothers, children, and families; young people and workers; older people; ethnic minorities; and young men and young women separately. To cite just a few examples, for families the report recommends elimination of poverty by income transfers, the elimination of food poverty through distribution of surpluses and assuring affordability, greater opportunities for day care and preschool education, and social and emotional support services for parents through increasing the role of "health visitors." The issue of material inequality is addressed for older people through income transfers and benefits, and for ethnic minorities the report recommends that socioeconomic inequalities be reduced. The span of the recommendations for the disadvantaged can be appreciated by reading the full report. A large fraction of the specific recommendations under Groups A, B, and D would also be beneficial to the disadvantaged.

TABLE 4. Recommendations for sociostructural improvements, Group B, 18 recommendations, in the *Independent Inquiry into Inequalities in Health,* United Kingdom, 1998

Needing Improvement	Recommendations
Poverty and income inequality	Income transfers Benefits
Education	Increase funds for preschools and less well-off schools, and expand health promotive schools
Employment	Improve training and job quality Study impact of all employment policies Ameliorate affects unemployment
Housing	Increase availability and quality of public housing
Mobility, transportation, pollution	Increase public transportion Decrease motor vehicle use Lower speed limits Increase cycling and walking
Nutrition	Study impact of agricultural policies Improve distribution surplus Wholesome foods in grocery stores Ensure affordability of foods

Group D, Health Services

Recommendations 37 through 39 seek to promote equity of access and quality of services. The report recommends that resource allocation for health services be differentially determined by needs weighting for each specific population. Monitoring of improved equity should be facilitated by adequate data systems and triennial audits.

A brief summary of the report does not do justice to its expanse. Its objective is to reduce inequalities in health through a reassessment of all government policies that might have a direct or indirect effect on health inequality. It uses all avenues including medical care, preventative public health measures, encouragement of more salutary health behaviors, and a large measure of sociostructural remodeling. The latter includes direct actions for diminishing income inequality (income transfers) and recommends a wide range of expanded benefits intended to reduce inequalities in health. The comprehensiveness of the report's attention to a wide panoply of structurally embedded societal features commands attention by everyone concerned about the recalcitrant problem of health inequalities within societies.

A U.S. PERSPECTIVE (INTERVENTION FRAMEWORK) APPLIED TO THE INDEPENDENT INQUIRY'S RECOMMENDATIONS

The cultural, social, and political contexts of the United Kingdom and the United States are sufficiently dissimilar to justify skepticism that conceptual frameworks for action are cross-applicable. Nonetheless, as scientists and others working in the field of society and population health turn attention to the practical work of fostering development of actual programs and social policies to improve population health, concepts and theories will be needed to guide the formulations and to ground imaginations in reality. Two conceptual frameworks (interventions, public policy development) offered in this chapter are works in progress. There is no empiric evidence of their validity or their practical usefulness. These works in progress might be sharpened and made more useful by applying them to the independent inquiry's recommendations in a test more or less of the validity of the concepts within the frameworks. TABLE 5 is an attempt to do that.

In this depiction we have placed each of the report's recommendations on sociostructural remodeling into the grid of intervention objectives and assigned them as most likely to be in the ameliorative or fundamentally corrective category. Using child development as an example, expanding preschool opportunities for children aged 0–5 and using financial support allocation formulas that are weighted according to the needs of the particular students of each school are both fundamentally corrective. For increasing socioeconomic well-being, income transfers and benefits programs are fundamentally corrective. For enhancing opportunities for self-fulfillment using employment policies, assessing and responding supportively to the effects of unemployment can be ameliorative of a problem that already is in existence, whereas elevating skill levels of workers by institutionalizing training and undertaking a comprehensive assessment of all employment policies regarding their direct and indirect effects on health inequalities could be fundamentally corrective actions.

TABLE 5. Recommendations for sociostructural improvements made by the *Independent Inquiry into Inequalities in Health* (U.K.) placed into the conceptual framework for interventions advanced in this paper (U.S.)

Intervention	Ameliorative	Fundamentally Corrective
Improve *child* development		EDU: preschools weighted funding
Strengthen *community cohesion*		MOB: ↑ public transport ↓ motor vehicles ↑ cycling, walking
Enhance opportunities for *self-fulfillment*	EMP: unemployment effects HOU: public housing NUT: distribute surplus grocery stores	EMP: training/skills policies review
Increase *socioeconomic* well-being		PII: income transfers benefits
Modulate *hierarchical* structuring		

ABBREVIATIONS: EDU, education; EMP, employment; HOU, housing; MOB, mobility; NUT, nutrition, PII, poverty, income inequality.

What does the intervention framework reveal about the recommendations of the report? Our interpretations should be regarded as tentative, and perhaps even foolhardy, because of our ignorance of the British value structure, politics, present and long-range currents in social transformation, and the present state of laws and regulations. With reservations, and in the spirit of a desire to understand whether the framework has any utility, two interpretations are offered. First, the report advances relatively few recommendations that are ameliorative, at least with respect to sociostructural modifications. Ameliorative actions respond to the present population's needs and sufferings and in many ways are reflections of a society's empathy and humanitarianism toward its fellow citizens. The empty spaces in the ameliorative column can possibly be explained by the fact that the charge to the inquiry specifically circumscribed the attention to "…government…interventions to reduce health inequalities." Private sector organizations and communities are more likely to take ameliorative actions. Perhaps the report's relatively greater emphasis on fundamentally corrective policies should be lauded, especially in light of the report's recommendation No. 1 that *all* policies be reviewed for their possible impact on health inequalities.

Second, the report offers no recommendations to modulate hierarchical structuring. This might be the most difficult target area to restructure. Most of the research and published attention on social inequality has concentrated on the most easily measured social variable, that is, per capita or household income. But other elements of hierarchical social structures might be fundamentally and more profoundly causative of health inequalities. Some of these include hierarchically graded distributions within a social structure of status, opportunity, privilege, power, and authority. These variables have not been addressed in the research and have been absent from the public discourse, little as it has been, on social characteristics and population health inequalities.

How do the independent inquiry's recommendations on sociostructural improvements fit into the framework for the public policy development process (FIG. 3)? To reiterate, the conceptualization of the process for the United States is not likely to be transferable to the United Kingdom. However, perhaps something can be learned from doing so.

To begin, all of the recommendations of the report are framed as recommendations for government action because the inquiry was conceived of and framed by the government elected to office at that time. As a result all recommendations enter the process at a late phase of the public policy development process—at the public policy deliberation stage.

I would think that, in the hypothetical exercise of applying the inquiry's report to America, a preferred strategy would be to enter the process at an earlier phase, as

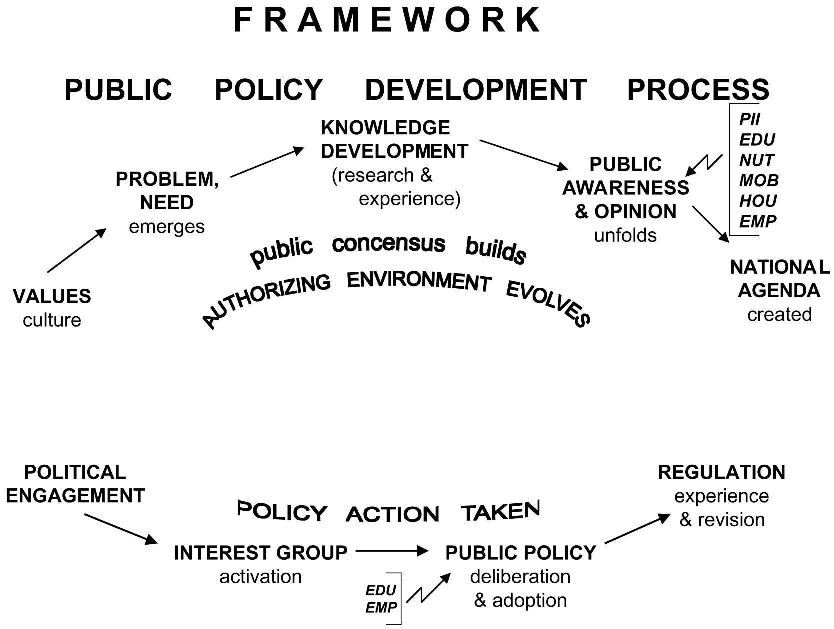

FIGURE 3. Recommendations for sociostructural improvements made by the *Independent Inquiry into Inequalities in Health* (UK) inserted into in the public policy development process in places (*italics*) that the author of this chapter believes would be appropriate for the circumstances of the United States.

depicted in FIGURE 3. Political, media, and public awareness of the causative connection of social position to inequalities in health does not exist in the U.S. The national popular agenda does not include health related to hierarchical structuring except as an issue of poverty. A public consensus on this subject does not exist. An authorizing environment has not been created. Social–health inequalities cannot be engaged as a political issue.

In the United States, political engagement has begun for small parts of the inquiry's recommendations. For example, expanding preschool availability receives consistent attention in policy discussions related both to working mothers and to children being raised in poverty. Several large and influential nonprofit advocacy organizations promote and sustain these issues. Consistent media attention is directed. The environment has evolved, a national agenda has developed, political engagement and interest groups have been activated, and public policy deliberations are taking place.

But the larger agenda, acquisition by the U.S. society of an understanding of the dynamics of health production through sociostructural influences, has not even begun. Therefore, a strategy more likely to succeed in the United States according to this framework and depicted in FIGURE 3 would start with continued research connected to a national program of elevating public awareness to the level of concern that lifts the issue to the national agenda. The strategy for the United States would begin with research to understand just what the American public, by subpopulations, already knows about the relationship of social features to population health. It is probably very little, except as related to poverty. Knowledge would also have to be gained about specific values and beliefs already held by the public that might be sparked into reverberation with the social-health gradient subject. This would provide a focus for a national public information program using multiple channels of communication and education.

The British report, *Independent Inquiry into Inequalities in Health,* given its purpose, is a highly valuable and progressive source of information and recommendations. It sets out a comprehensive policy agenda to improve population health, at least for developed nations. With individual nations building their own conceptual frameworks to select social restructuring targets for intervention, and with knowledge of the public attitude development process in their country and with approaches that activate the public sector, the private sector, and community action, the independent inquiry provides a treasure of summarized knowledge and comprehensive approaches that other nations will find valuable.

The conceptual frameworks developed in this chapter with some modifications might be salient for health improvement planning at the national, state, or smaller geopolitical unit level. The independent inquiry from the United Kingdom sets a useful example by its comprehensiveness and its attention to the need for sociostructural revision if meaningful population health improvement is to be attained.

REFERENCES

1. INDEPENDENT INQUIRY. 1998. Inequalities in Health: Report. Her Majesty's Stationery Office, London. With the permission of the Department of Health.
2. 1994. Complex systems. Science **284**(5411): 79–109.