
Public Health Literacy in America

An Ethical Imperative

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Abstract One of public health professionals' major challenges is to provide the public with messages that are understandable and based on science. Traditionally, public health communication efforts have focused on the science behind the message rather than on how the information should be communicated and whether the message is understood. With more than one third of the U.S. population struggling with low health literacy, ensuring that individuals understand critical health messages is an ethical imperative for public health agencies, organizations, and professionals. This paper explores the ethical implications of public health literacy and the steps the public health community needs to take to promote a society that is public health literate.

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Introduction

The mandate to assure and protect the health of the public is an inherently moral one. It carries with it an obligation to care for the well being of others, and it implies the possession of an element of power in order to carry out the mandate. The need to exercise power to ensure health and at the same time to avoid the potential abuses of power are at the crux of public health ethics.¹

Since 9/11 and subsequent fears of anthrax and other bioterrorist attacks, the public health community has fallen under increased scrutiny about how critical health information reaches the public. As scientific advances and communication channels proliferate, the public demands accurate, up-to-date health information. Even the most critical, time-sensitive health information is meaningless, however, unless its intended audience can access and understand it.² Because health messages can be confusing and contradictory, we need to ask ourselves as public health professionals whether we accept the ethical responsibility to communicate important health issues clearly to the entire public.

Public health professionals inform, educate, and empower people about health issues.³ Collectively, we assure conditions that promote health.⁴ Public health literacy is an essential element for individual and community health and wellness. This paper describes

the role of health literacy for individuals, explores the ethical imperatives of public health literacy, and outlines the steps we need to take to become a more public health-literate society.

The Role of Health Literacy for Individuals

Inadequate literacy—an individual's ability to read, write, and speak in English and compute and solve problems at proficiency levels sufficient to function on the job and in society⁵—is a recognized crisis in America. In 1993, the National Adult Literacy Survey (NALS) found that 40 million adult Americans scored at level one, the lowest of five levels, and another 50 million scored at level two. Almost half of the U.S. adult population, therefore, has deficiencies in reading or computational skills.^{6,7} NALS also documented that minority populations and older adults, who share the greatest burden of health disparities, have the lowest literacy skills.⁶

Results from NALS raised concerns about the ability of many Americans to function in the healthcare setting.⁷ Health literacy is generally defined as the degree to which individuals can obtain, process, and understand basic health information and services needed to make appropriate health decisions.⁷⁻⁹ At its core, functional health literacy requires the skills and abilities traditionally known simply as literacy. However, functional health literacy encompasses more than a single skill or ability. To function in the complex and multi-dimensional healthcare environment, one must possess a combination of individual-level attributes, including abilities in prose, document, and quantitative literacy; ability to engage in two-way communication; skills in media literacy and computer literacy; motivation to

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receive health information; freedom from impairments, and/or access to communicative assistance from others (e.g., a surrogate reader).¹⁰

Research on health literacy has been gaining momentum over the last 10 years, exemplified by a growing number of articles published on this topic.^{7,8,11,12} Furthermore, health literacy has been added as one of the nation's *Healthy People 2010*⁹ objectives, and is listed together with self-management as one of 20 priority areas in which quality improvement could transform health care in America.¹³ Recently, the Institute of Medicine (IOM)¹⁴ and Agency for Healthcare Research and Quality¹⁵ published separate reports on health literacy. Moreover, health and scientific literacy has been identified as perhaps the leading priority of two national scientific leaders, U.S. Surgeon General Richard M. Carmona¹⁶ and National Academy of Science President Bruce Alberts.¹⁷ For example, Surgeon General Carmona repeatedly states that "our nation's low health literacy is a threat to the health and well being of Americans and to the health and well being of the American healthcare system."¹⁶

Low health literacy affects individuals of every age, race/ethnicity, and education and income level. Although national figures on the problem have yet to be compiled, we can conservatively estimate that approximately one of every three American adults needs help with health literacy.¹⁸ Health literacy research has consistently demonstrated far-reaching consequences for individuals with low health literacy skills. For example, people with low health literacy make more medication errors¹⁹; are less likely to understand insurance coverage rules²⁰; and fail to comply with treatments,¹⁹ obtain preventive services,²¹ or manage their own care effectively.²²⁻²⁴ These people are also more likely to be re-hospitalized.^{19,25}

This gap between the requisite skills and actual skills of many Americans to process and understand healthcare and health messages is growing. Many factors influence this gap, including educational materials written at an advanced reading level and the growing role of technology in health communications. The reading level of written health materials is usually well above that of many adults.^{9,26} While the average American has an 8th-grade reading level, the average medical/health information is written at a 12th-grade level.²⁷ In fact, no matter how well people read, most need help understanding healthcare information.^{28,29} Although communication technology provides alternatives to written materials, the technology is often complex, increasing concerns that populations with limited access to information technology will not be reached.¹⁰ As health professionals, is it ethical to provide information to patients that is either too difficult to understand or access?

Moreover, the expectation that individuals should assume responsibility for their own care in a complex healthcare system creates challenges in understanding health information. People with the greatest healthcare needs often cannot comprehend the information required to successfully navigate and function in the U.S. healthcare system.¹⁸ Health literacy is the currency that an individual needs to access, understand, and act on health information. It allows the individual to navigate the complex healthcare system and realize the full benefits of the delivery system.⁸ Although there are many factors that influence an individual's care, as health professionals, we need to ensure that we are clearly communicating health information to the public—whether it is about self-care management or filling out insurance forms.

Ethical Imperatives of Public Health Literacy

To date, the focus on health literacy has been largely restricted to the healthcare system and specifically to communication between healthcare providers and patients. The health literacy framework in the IOM report¹⁴ describes literacy, which gives individuals the skills to understand and communicate, as the foundation of health literacy. Health literacy is the interaction between individuals' literacy abilities and health contexts. Increasingly, public health professionals are calling for a broader definition of health literacy, one that moves beyond comprehension of the written word and patients' interaction with the healthcare system.³⁰⁻³² Public health literacy can be viewed as an additional level of the IOM framework, where individuals understand not only how health information affects them, but also the community and society at large.³² Public health literacy skills are essential if one is to understand a health risk, vote on an environmental issue, recognize biases in health information reported by the media, or appreciate clean water and air.³⁰

Despite many scientific advances that enable people to live longer and healthier lives,³³ the public health community has not reached its potential to effectively communicate information to the public.³⁴ Often, public health disseminates its messages as grounded in the theories and principles of health education (e.g., what the message says) or health communication (e.g., how the message is delivered), rather than considering the health literacy of the intended audience (e.g., whether the message is accessed and understood). Although some public health scientists prefer to "let science speak for itself," today's health information can be so complex that few non-experts will understand the science without translation. America's growing diversity complicates clear communication, with issues of culture and language becoming critical for intended au-

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diences to understand the messages. We believe that public health professionals should consider the ethics of providing health information to the public without concern for the audience's ability to access and understand it.³⁵

U.S. Surgeon General Carmona hypothesizes that low health literacy among the public may be the root cause for why public health falters repeatedly in its communications efforts.¹⁶ He observes, for example, that the National Institutes of Health have spent 25 years encouraging Americans to know their blood pressure level and seek appropriate treatment, yet many Americans with hypertension still do not seek treatment. He points out that 4000 American children will try smoking for the first time each day, despite extensive evidence that smoking has many risks. He observes that many Americans avoid appropriate check-ups for breast, colorectal, and cervical cancer, even when these preventive screenings could prolong their lives. Carmona suggests that people perhaps do not know the health risks, do not want to know, or just do not care. On the other hand, perhaps they just do not understand the health information that is provided to them.^{8,16}

Ordinary Americans should be able to understand the health messages delivered by their government without having to study the text closely or consult an expert, as is often the case. Again, it is our ethical responsibility to clearly communicate information that affects the public. For example, a survey by the Kaiser Family Foundation in February 2004 showed that seniors are confused about the outcome of the Medicare prescription drug debate and the prescription drug law.³⁶ While two thirds of seniors report following the debate closely, just 15% say that they understand the new prescription drug law very well, and almost seven in ten do not know that it passed and became law.

The Vision: A Public Health–Literate America

The quality of health information that Americans receive and their ability to understand and use that information is the key to building a healthier America.³⁶

Closing the gap in health literacy, an issue of ethics and equity, is essential to reducing health disparities.¹² The challenge is to shape public health communication that is effective, culturally and linguistically appropriate, and in plain language.^{27,37} Effective tools that make health information accessible and understandable will benefit not only those at higher risk for low health literacy—the poor, older adults, recent immigrants, and ethnic minorities—but also will benefit everyone.^{28,29} The ability to access, understand, and use health-related information and services is critical to future public health successes in improving emergency

preparedness, eliminating health disparities, preventing disease, and promoting good health.³⁸

The practice of shaping public health messages to make them more accessible to those with low health literacy, while essential, may ultimately address only the “side effects” of low health literacy without addressing the underlying problem. The IOM report on health literacy outlines the research and best practice findings in education, health services, and sociocultural factors, all of which influence health literacy.¹⁴ An ethical approach to remediating low health literacy would be to train, educate, and empower people, giving them the skills and abilities they need for functional health literacy.

Steps for achieving a more public health–literate society are multifaceted and involve at least six components. First, we need to define what it means to be public health literate. The IOM report¹⁴ outlines several characteristics of a health-literate America (Table 1), and the specific skills needed to achieve it (Table 2). While these outlines are a start, it must be noted that both the public's health information knowledge and skills, and the communication skills and health information resources of health professionals and health-care organizations need improvement. For example, can most individuals search for online health informa-

Table 1. Characteristics of a health-literate America¹⁴

Everyone has the opportunity to improve her/his health literacy.
Everyone has the opportunity to use reliable, understandable information that could make a difference in her/his overall well-being, including everyday behaviors such as how she/he eats, whether she/he exercises, and whether she/he gets checkups.
Health and science content would be basic parts of K-12 curricula.
People are able to accurately assess the credibility of health information presented by health advocate, commercial, and new media sources.
Health-literacy policies and practices include monitoring and accountability.
Public health alerts, vital to the health of the nation, are presented in everyday terms to enable people to take needed action.
The cultural contexts of diverse peoples, including those from various cultural groups and non-English speaking peoples, are integrated in all health information.
Health practitioners communicate clearly during all interactions with their patients, using everyday vocabulary.
Ample time is available for discussions between patients and healthcare providers.
Patients feel free and comfortable to ask questions as part of the healing relationship.
Rights and responsibilities in relation to health and health care are presented or written in clear, everyday terms so that people can take needed action.
Informed consent documents used in health care are written in a way that allow people to give or withhold consent based on information they need and understand.

Table 2. Examples of skills needed for health¹³

Health-related goal	Skills needed
Promote and protect health and prevent disease	<p>Read and follow guidelines for physical activity</p> <p>Read, comprehend, and make decisions based on food and product labels</p> <p>Make sense of air-quality reports and modify behavior as needed</p> <p>Find health information on the Internet or in periodicals and books</p>
Understand, interpret, and analyze health information	<p>Analyze risk factors in advertisements for prescription medicines</p> <p>Determine health implications of a newspaper article on air quality</p> <p>Determine which health websites contain accurate information and which do not</p> <p>Understand the implications of health-related initiatives in order to vote</p>
Apply health information over a variety of life events and situations	<p>Read and apply health information regarding child care or elder care</p> <p>Read and interpret safety precautions at work; choose a healthcare plan</p>
Navigate the healthcare system	<p>Fill out health insurance enrollment or reimbursement forms</p> <p>Understand printed patient rights and responsibilities</p> <p>Find one's way in a complicated environment such as a busy hospital or clinical center</p>
Actively participate in encounters with healthcare professionals and workers	<p>Ask for clarification</p> <p>Ask questions</p> <p>Make appropriate decisions based on information received</p> <p>Work as a partner with care providers to discuss and develop an appropriate regimen to manage a chronic disease</p>
Understand and give consent	<p>Comprehend required informed consent documents before procedures or for involvement in research studies</p>
Understand and advocate for rights	<p>Advocate for safety equipment based on worker right-to-know information</p> <p>Request access to information based on patient rights documents</p> <p>Determine use of medical records based on the privacy act</p>

tion and assess its accuracy and credibility, or use problem-solving skills to compare the nutrition information of foods in the grocery store?¹⁰ Similarly, do most health professionals and organizations provide information on the Internet that is user-friendly and accurate, or is nutrition information presented clearly? Moreover, making the public health literate includes an understanding of the social, environmental, and policy factors that influence health.^{39,40} People who are

public health literate ultimately understand that health issues affect themselves, their community, and society at large.⁴⁰

Second, we need to develop measures of public health literacy. Once we obtain baseline data on the magnitude of the problem, we will need to determine the impact of our efforts to improve public health literacy. *Healthy People 2010* objectives⁹ are a start, but we need to set clear, measurable indicators for public health literacy, realizing that health literacy underlies all of the objectives.⁴¹ We also need a strategy to obtain these measures through representative national and targeted surveys. Since part of the problem of health literacy stems from our education system, the measures of public health literacy should also be tied to education standards.

Third, we need to critically evaluate our communication efforts. This will involve determining whether the intended audience can access and understand the health messages. Does the public understand, and if not, why? A desired outcome of our health education efforts^{42,43} would be to make people understand the overall problems of health, and the value of good health and what it means to them and their families. People claim ownership only when they feel that something affects them.³⁴

Fourth, we need to build on health literacy efforts focused on the healthcare system by emphasizing the verbal communication and listening skills of health professionals. Currently, these skills and strategies are not addressed thoroughly in medical and public health schools. We also need to critically evaluate our current healthcare system, finding ways to simplify the system and make it user-friendly to meet the needs of all Americans.

Fifth, we need to recognize that while health literacy is essential for ensuring that people can access and understand health messages, possessing health-related knowledge is necessary but not sufficient for engaging in healthy behaviors. Health behaviors are affected by multiple levels of influence ranging from the intrapersonal to the ecologic.⁴⁴ Even within the intrapersonal level, many factors beyond knowledge affect behaviors, including stage of change,⁴⁵ attitudes,⁴⁶ and motivation.⁴⁷ Many definitions of health literacy include these higher-level factors by also including people's ability to apply health information as a requisite component of health literacy. Recent work by Hibbard et al.⁴⁸ in developing the Patient Activation Measure (PAM) holds promise for tailoring interventions and assessing changes.

Finally, achieving a public health-literate America will require extensive collaboration. We need to determine the appropriate roles public health and other professionals can play in this effort. Public health professionals should unite behind the goal of creating a society in which people have the skills they need to

obtain, interpret, and use health information effectively. The IOM report on educating public health professionals for the 21st century noted that communication, cultural competency, and ethics are crucial content areas for public health education.⁴⁹

Partnerships, both traditional and new, must marshal necessary resources if public health literacy is to progress. For example, both education and marketing professions are critical to achieve a more public health-literate society. Education is clearly essential to improve the overall literacy levels of individuals, as well as to provide health information in early childhood education programs. Since many of the health problems facing our nation today arise during childhood and adolescence,⁵⁰ some school-based interventions to teach children healthy habits (e.g., physical activity, nutrition), as well as basic skills to interpret and use health information, could help reduce problems for future generations. We also need to partner with adult education programs. These include literacy programs in the workplace, correctional facilities, and at job-training sites, family literacy and English-as-a-second-language courses, and distance learning programs.⁵¹ Finally, public health can gain from studying marketing principles. If we are to make a difference, we need to market public health like McDonald's markets hamburgers,³⁴ that is, in a way that attempts to reach everyone.

Although there is no quick "fix" for the health literacy problem, active collaboration among consumers, government, healthcare professionals, patient advocacy groups, healthcare organizations, media, industry, policymakers, and community-based organizations will help raise awareness of the problem and develop interventions to address it. This collaboration would take responsibility for providing clear health information and navigational tools.¹⁴

Progress in public health literacy will yield an informed, motivated public with the skills and resources to make positive choices that enhance individual and community health. A skilled professional workforce in health care and public health will communicate with the public in ways that they understand. In the current public health environment, as a matter of ethics, we cannot ignore Americans who do not manage their health nor improve their quality of life because they do not understand how to do so.¹² We must build a society where people can understand and act on health information. A public health-literate society will be a prized addition to the long list of public health's greatest achievements.

References

1. Public Health Leadership Society. Principles of the ethical practice of public health, version 2.2. New Orleans LA: Public Health Leadership Society, 2002.

2. Centers for Disease Control and Prevention. About CDC. CDC provides credible information to enhance health decisions. Available at: www.cdc.gov/aboutcdc.htm#provide. Accessed July 15, 2004.
3. Harrell JA, Baker EL, Essential Services Work Group. The Essential Services of Public Health. American Public Health Association, 1994. Available at: <http://www.apha.org/ppp/science/10ES.htm>. Accessed January 12, 2005.
4. Institute of Medicine. The future of the public's health in the 21st century. Washington DC: National Academy Press, 2002.
5. Public Law 102-73 National Literacy Act of 1991. Available at: <http://www.nifl.gov/public-law.html>. Accessed January 12, 2005.
6. Kirsch I, Jungeblut A, Jenkins L, Kolstad A. Adult literacy in America: a first look at the findings of the National Adult Literacy Survey. Washington DC: National Center for Education Statistics, U.S. Department of Education, 1993.
7. Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, American Medical Association. Health literacy: report of the Council on Scientific Affairs. JAMA 1999;281:552-7.
8. Ratzan S, Parker R. Introduction. Current bibliographies in Medicine 2000-1: health literacy January 1990 through October 1999. Bethesda MD: National Library of Medicine, February 2000. Available at: www.nlm.nih.gov/pubs/cbm/hliteracy.html. Accessed July 15, 2004.
9. U.S. Department of Health and Human Services. Healthy people 2010. With understanding and improving health and objectives for improving health. 2nd ed. 2 vols. Washington DC: U.S. Government Printing Office, November 2000.
10. Bernhardt JM, Brownfield ED, Parker RM. Understanding health literacy. In: Schwartzberg JG, Van Geest JB, Wang CC, eds. Understanding health literacy: implications for medicine and public health. Chicago: American Medical Association Press, 2004:3-16.
11. Zorn M, Allen MP, Horowitz AM. Current bibliographies in medicine 2004-1: understanding health literacy and its barriers. Bethesda MD: National Library of Medicine, May 2004. Available at: www.nlm.nih.gov/pubs/cbm/healthliteracybarriers.html. Accessed July 15, 2004.
12. Partnership for Clear Health Communication Steering Committee. Eradicating low health literacy: the first public health movement of the 21st century overview. New York NY: Pfizer Inc., March 2003. Available at: <http://clearhealthcommunication.com/contact.html>. Accessed July 15, 2004.
13. Institute of Medicine. Priority areas for national action: transforming healthcare quality. Washington DC: National Academy Press, 2003.
14. Institute of Medicine. Health literacy: a prescription to end confusion. Washington DC: National Academy Press, 2004.
15. Berkman N, DeWalt D, Pignone MP, et al. Literacy and health outcomes: summary report. Rockville MD: Agency for Healthcare Research and Quality, January 2004 (AHRQ publication 04-E007-440-1).
16. Carmona RH. Prepared remarks given at American Medical Association House of Delegates meeting, Chicago, June 14, 2003. Available at: www.surgeongeneral.gov/news/speeches/ama061403.htm. Accessed July 15, 2004.
17. Pace Marshall S, Scheppler JA, Palmisano MJ, eds. Science literacy for the twenty-first century. Amherst NY: Prometheus Books, 2003.
18. Parker RM, Ratzan SC, Lurie N. Health literacy: a policy challenge for advancing high-quality health care. Health Aff 2003;22:147-53.
19. Baker DW, Parker RM, Williams MV, Clark WS. Health literacy and the risk of hospital admission. J Gen Intern Med 1998;13:791-8.
20. Matthews TL, Sewell JC. State official's guide to health literacy. Lexington KY: Council of State Governments, 2002.
21. Scott TL, Gazmararian JA, Williams MV, Baker DW. The relationship between health literacy and preventive health care use among medicare enrollees in a managed care organization. Med Care 2002;40:395-404.
22. Williams MV, Baker DW, Honig EG, et al. Inadequate literacy is a barrier to asthma knowledge and self-care. Chest 1998;114:1008-15.
23. Williams MV, Baker DW, Parker RM, Nurs J. Relationship of functional health literacy to patient's knowledge of their chronic disease. Arch Intern Med 1998;158:166-72.
24. Gazmararian JA, Williams MW, Baker DW, Peel J. Health literacy and patient knowledge of chronic disease. Patient Educ Counseling 2003;51:267-75.
25. Baker DW, Gazmararian JA, Williams MV, et al. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. Am J Public Health 2002;92:1278-83.
26. Rudd RE, Moeykens BA, Colton TC. Health and literacy: a review of medical and public health literature. In: Comings JP, Garner B, Smith C, eds. The annual review of adult learning and literacy. San Francisco: Jossey-Bass Publishers, 2000:158-99.

27. National Cancer Institute. Clear and simple: developing effective print materials for low-literate readers. Washington DC: U.S. Department of Health and Human Services, 1995 (publication NIH 95-3594).
28. Kerka S. Health and literacy. Washington DC: Educational Resources Information Center, 2002 (Practice application brief 7, ERIC ED438450).
29. Davis TC, Bocchini JA, Fredrickson D, et al. Parent comprehension in polio vaccine information pamphlets. *Pediatrics* 1996;97:804-10.
30. Kickbusch I. Health promoting environments—the next steps. *Aust N Z J Public Health* 1997;21:431-4.
31. Nutbeam D. Theory in a nutshell: a guide to health promotion theory. New York: McGraw-Hill, 1999.
32. Rudd R. Health and literacy in the new millennium. Remarks presented at Canadian Public Health Conference, "Health and Literacy in the New Millennium." Ottawa, Canada, May 2000.
33. Centers for Disease Control and Prevention. Ten great public health achievements: United States, 1900-1999. Available at: www.cdc.gov/epo/mmwr/preview/mmwrhtml/00056796.htm. Accessed July 15, 2004.
34. Elders MJ. The role of public health in improving the health of America. Keynote address, American Public Health Association, Washington, DC, October 13, 1994. *J Public Health Policy* 1995;16:133-40.
35. Cole P. The moral bases for public health interventions. *Epidemiology* 1995;6:78-83.
36. Kaiser Family Foundation. Selected findings on knowledge and understanding of the new Medicare Rx drug program—January/February 2004 Kaiser health poll report survey. Menlo Park CA: Kaiser Family Foundation, 2004. Available at: www.kff.org/kaiserpolls/pomr022604pkg.cfm. Accessed July 15, 2004.
37. Doak CC, Doak LG, Root JH. Teaching patients with low literacy skills. 2nd ed. Philadelphia: JB Lippincott Company, 1996.
38. U.S. Department of Health and Human Services. U.S. Surgeon General promotes health literacy. HHS Weekly Report, June 16-22, 2003. Available at: www.hhs.gov/news/newsletter/weekly/archive/16jun03.htm#3. Accessed July 15, 2004.
39. California Department of Education. Health framework for California public schools. Sacramento: California Department of Education, 2003. Available at: www.cde.ca.gov/re/pn/fd/health-frame-pdf.asp. Accessed July 15, 2004.
40. Curran J. Public health implications of health literacy. Remarks presented at Pfizer Health Literacy Meeting, Washington DC, September 2002.
41. U.S. Department of Health and Human Services. Communicating health: priorities and strategies for progress. Washington DC: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, July 2003.
42. Joint Committee on National Health Education Standards. National health education standards: achieving health literacy. Atlanta GA: American Cancer Society, 1995.
43. The health education profession in the 21st century: setting the stage. National Commission for Health Education Credentialing, Inc., Coalition of National Health Education Organizations, USA. *J Sch Health* 1996;66:291-8.
44. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q* 1988;15:351-77.
45. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consulting Clin Psychol* 1983;51:390-5.
46. Fishbein M, Ajzen I. Beliefs, attitudes, and behavior: an introduction to theory and research. Reading MA: Addison-Wesley, 1975.
47. Miller WR, Rollnick S. Motivational interviewing: preparing people for change. 2nd ed. New York: Guilford Press, 2002.
48. 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 Res* 2004;39:1005-26.
49. Institute of Medicine. Who will keep the public healthy? Educating public health professionals for the 21st century. Washington DC: Board on Health Promotion and Disease Prevention, Institute of Medicine, 2003. Available at: www.nap.edu/openbook/030908542X/html/4.html. Accessed July 15, 2004.
50. McGinnis JM, Foegle WH. Actual causes of death in the United States. *JAMA* 1993;270:2207-12.
51. Birch DA. Helping prospective school health educators develop political advocacy skills. *J Sch Health* 1991;61:176-7.