Public Policy Approaches to the Prevention of Heart Disease and Stroke

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Those studying the causes of human disease have long recognized the important roles of social, economic, and environmental factors. Engel's[1] biopsychosocial model emphasizes the importance of a hierarchy of systems from molecules to cells, to individuals and families, to societies, and to cultures in the causation of disease and its sequelae. Although specific diseases may vary in the contributions from each system, it is very clear that social and environmental factors contribute strongly to the risk of heart disease and stroke. Blackburn[2] provides an extensive compendium of evidence for a significant sociocultural contribution to the cause of the major cardiovascular diseases and the need for intervention at community and societal levels. Such evidence led Rose et al[3] to "seek a general change in behavioral norms and in the circumstances which facilitate their adoption."

Many of the interventions in clinical medicine constitute the "high-risk approach," namely the clinical identification of individuals in that portion of the population at highest risk and their intensive treatment through behavioral or pharmacological means. For example, the detection and treatment of high blood cholesterol according to the Adult Treatment Panel guidelines seek to intensely treat the upper tail of the population distribution to move those high-risk individuals to more moderate levels of risk (Figure 1A).[4] American Heart Association guidelines for the primary and secondary prevention of heart disease and stroke largely use the high-risk approach.[5,6] In contrast, the population approach to cholesterol reduction seeks to shift the entire curve to a lower risk level through population-wide changes in diet, exercise, and weight management (Figure 1B).[4] Both approaches are necessary, although analyses of the 20th century decline in coronary disease mortality suggest that the majority of the decline could be attributable to lifestyle changes in the American diet and the use of tobacco.[7,8] For these reasons, the 2003 AHA guidelines for preventing heart disease and stroke at the community level[9] have been added to complement clinical guidelines for the treatment of individuals. The *Public Health Action Plan to Prevent Heart Disease and Stroke* (2003) includes policy and environmental changes affecting the entire US population as a means to change adverse behavioral patterns as the first goal of a comprehensive public health strategy to prevent heart disease and stroke.[10] Indeed, recent considerations of the 2010 Affordable Care Act (US Healthcare Reform Legislation) emphasize the need for population-wide change outside the healthcare system,[11] citing estimates that only 10% to 15% of preventable deaths in the United States are affected by medical care.[12]

This contribution to the Recent Advances in Preventive Cardiology and Lifestyle Medicine series focuses on interventions that facilitate population-wide cardiovascular health through public policy, environmental change, and legislation. Although policy and legislation may have impacts on other important public health activities such as surveillance, public health education, and individual preventive health services, this review is limited to policy interventions that result in changes in the physical, economic, and social contexts that affect population-wide risk for heart disease and stroke.

The Theoretical Basis for Public Policy Approaches

A rich theoretical foundation underpins the population approach to heart disease and stroke prevention. The social ecological theory serves to integrate theories on individual behavior change with the understanding of the role for environmental enhancement and restructuring[13] to better understand the interaction between an individual and his or her social and physical environments as a potentially strong influence on health and its determinants. An obvious implication of this interaction is that the enhancement and restructuring of an environment could then beneficially affect large numbers of individuals in an at-risk population. Frieden[14] builds on this model with a Health Impact Pyramid in which interventions are made to "change the context to make individuals' default decisions healthy" (Figure 2). In this pyramid, most or all individuals would be affected by a healthier environment in which the individual would have to actively avoid the benefits of the healthier environment.

Such individual-environment interactions need to occur in communities targeted for cardiovascular risk–reducing interventions.[15,16] The concept of "diffusion of innovation," de-

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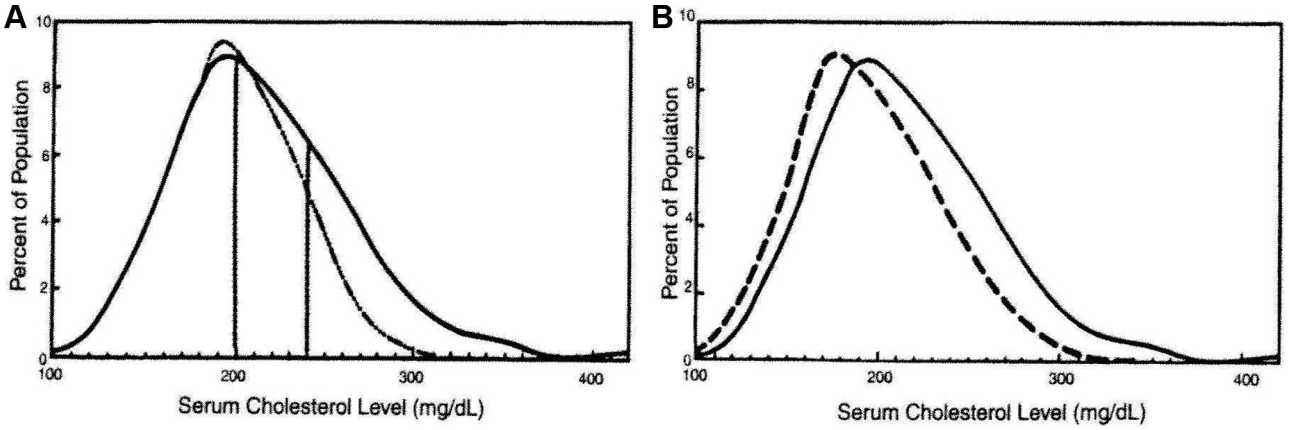

Figure 1. High-risk vs the population approach to cardiovascular risk reduction illustrated for serum cholesterol. **A**, The high-risk approach seeks to identify persons with serum cholesterol levels >240 mg/dL (solid line) and treat them intensively to reduce the number of high-risk individuals (dashed line). **B**, The population approach seeks to reduce all people's risk by reducing the entire population's high levels of serum cholesterol (solid line) to lower levels of serum cholesterol (dashed line).[4]

veloped by Rogers and Shoemaker,[17] may help to explain the wide variation in risk behaviors across communities and populations. The diffusion of innovation concept posits that the social, economic, and educational environment allows some communities or subpopulations within communities to readily adopt recommendations related to cardiovascular health. Such communities will effectively use information about the risk they face and actively engage in behavior change in response to health education campaigns that alter their knowledge and attitudes. These approaches alone have been effective in some communities.[18] It is also apparent that other communities with different social, economic, and educational characteristics are resistant to these same interventions, resulting in widening disparities in disease burdens.[19,20] For example, after the Surgeon General's reports on the risks of tobacco smoking were released in the 1960s, changes in smoking cessation rates were not evenly distributed across US society, with low-income and low-education strata, as well as residents of the tobacco-producing regions, lagging in their rates of decline in tobacco use.[20]

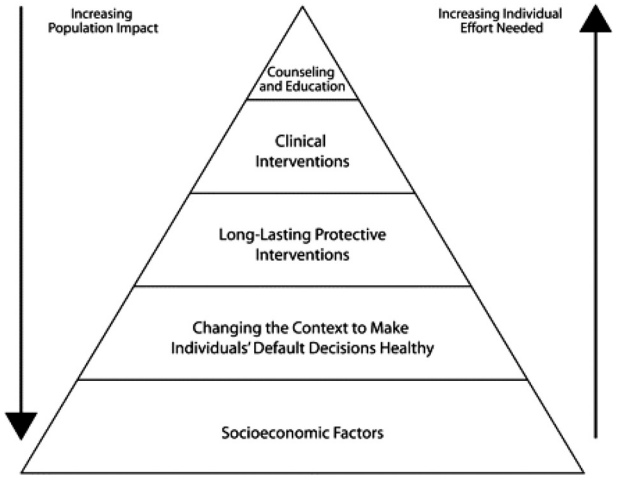

Figure 2. The Health Impact Pyramid identifies a level of intervention in which a large portion of the population benefits but with less individual effort needed, namely that of changes in the environmental context in which healthy options are the default choice.[14]

The combination of the social ecological model and the diffusion of innovation concept suggests that the approaches to early- versus late-adopter populations might need to be very different (Figure 3).[15] Early-adopter communities may require only recognition of the health burden of heart disease and stroke, with minimal health education via mass or social media to alter their social norms to lead to change in the risk behavior. On the other hand, for a late-adopter community, additional efforts may be needed to support changes in knowledge and attitudes by additional community-wide ef-

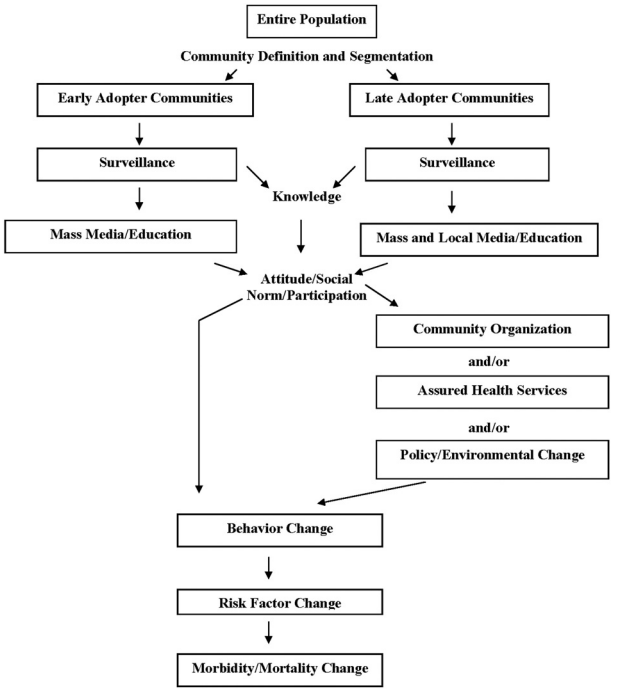

Figure 3. Illustration of the need for additional policy and environmental change in late-adopter segments of the population to avoid increasing the disparity in health risk. Early-adopter populations may change their social norms and health behaviors in response to information on health risks. For late-adopter populations, such interventions may not be sufficient, requiring additional organizational and policy interventions to affect behavior change.[15]

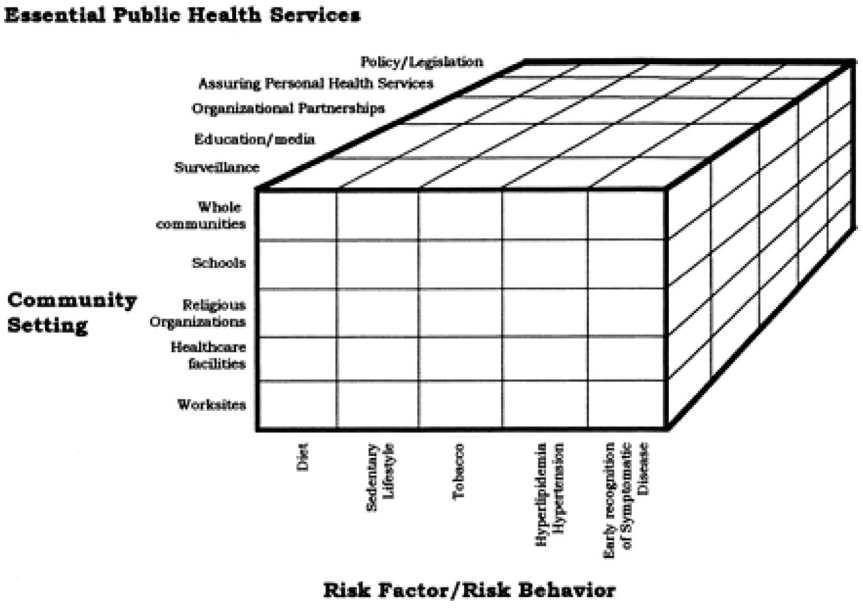

Figure 4. Conceptual framework for population-wide cardiovascular risk behavior change, showing 3 dimensions for consideration: the risk factor or risk behavior targeted for change, the community setting in which the intervention would be implemented, and the type of public health intervention or service used, including policy legislative strategies.[9]

forts or provision of health services. Policy and environmental change in which healthy behaviors would be the default option or other policy-based incentives may be necessary for population-wide behavior change in these late-adopter communities. The social ecological theory emphasizes that such interactions between social and cultural characteristics and environmental modifications may be an effective strategy to alter risk on a population-wide basis rather than only in the privileged strata of society. Elimination of disparities in cardiovascular risk is a primary objective of the *Public Health Action Plan to Prevent Heart Disease and Stroke*.[10]

The Policy Framework for Population-Wide Heart Disease and Stroke Prevention

The global epidemiology of heart disease and stroke in the latter half of the 20th century identified striking variations in cause-specific mortality rates between developed and developing countries, between developed countries, and even within developed countries.[21] The interpretation of these trends emphasized the social and political origins of cardiovascular risk. In response, the International Heart Health Network convened a series of International Heart Health Conferences, which provided a series of declarations related to population-wide heart health policies. The Victoria Declaration in 1992 called on governments and the private sector to educate and coordinate public efforts to slow the growing global epidemic of heart disease and stroke.[22] The Catalonia Declaration in 1996 discussed the resources and assets needed as an investment in heart health programs[23] and identified 141 examples of successful, sustainable programs and 81 case studies of heart health programs.[24] The Singapore Declaration in 1998 especially described the need for the political will to create a policy infrastructure as a prerequisite to national programs to control cardiovascular disease.[25] The Osaka Declaration in 2001 emphasized factors originating outside the health sector that serve as impediments to heart health.[26] The Milan Declaration further described technological approaches to improvement in cardiovascular risk.[27] These documents have been pulled together in the Policy Framework for Heart Health,[28] which integrates more than a decade of discussion about policy approaches to heart disease. One striking conclusion of these documents is the need to involve a much broader partnership beyond the health and life science sectors, including governmental and private sector agencies dealing with education, trade and commerce, culture, recreation, and agriculture. For a policy infrastructure supportive of population risk reduction, all these sectors must be engaged.

Conceptual Approach to Population-Wide Heart Disease and Stroke Prevention

In the AHA guidelines for preventing heart disease and stroke at the community level,[9] a 3-dimensional model was proposed as a simplified approach to the complex task of population-wide intervention to reduce heart disease and stroke risks (Figure 4). The 3 dimensions include the risk behaviors targeted for modification, the community setting in which the intervention would take place, and the essential public health services that constitute the interventions in the community.

The risk behaviors targeted for intervention are simplified for the framework but can be expanded with more specific details (Table 1). In general, the lifestyle habits of a calorie-balanced diet low in saturated and *trans* fats and sodium, regular exercise, and avoidance of tobacco have long been identified as predictors of low levels of risk factors and subsequent heart disease and stroke.[29,30] The risk behaviors related to hyperlipidemia and hypertension deal with the population levels of compliance with evidence-based recommendations for screening and diagnosis and the adherence to lifestyle and drug interventions[31,32] rather than adherence of healthcare providers or health systems to those clinical guidelines for high blood pressure and high blood cholesterol. The population-wide behaviors targeted for early recognition for symptoms of heart disease and stroke entail individuals' knowledge of the signs of heart attack and stroke and their

Table 1. Risk Behaviors Targeted for Policy Interventions to Reduce the Risk of Heart Disease and Stroke at the Community Level

Diet
High saturated fat, *trans* fat, and cholesterol
High sodium
Excessive calories
Heavy alcohol consumption
Sedentary lifestyle
Work related, including transportation to/from work
Local use of transportation
Leisure related
Tobacco
Smoking
Environmental tobacco smoke
Hyperlipidemia and hypertension
Compliance with screening and diagnosis
Adherence with treatment recommendations
Delayed recognition and treatment of symptomatic disease
Presentation for diagnosis and treatment
Emergency out-of-hospital care by first responders

presentation to healthcare providers immediately after the acute onset of symptoms so as to maximally benefit from evidence-based interventions for acute coronary syndromes and ischemic stroke. Population-wide education in resuscitation methods, including the use of community-based external defibrillator technologies, may also be a focus of policies to ensure access to trained personnel and resuscitation technology.

The 5 community settings for policy intervention deal with the places where people live, work, and play, namely whole communities, schools and children's services, religious organizations, healthcare facilities, and worksites. The 5 settings represent the social units where most community trials have been conducted as feasible units in which to modify cardiovascular risk in large numbers of persons.[33]

The essential public health services use those functions used by public health agencies to modify population-wide risk behaviors.[34] The important roles of surveillance, education and media, organizational partnerships, and assurance of personal health services in changing population-wide behavior are beyond the scope of this review, although the interactions of these functions with policy and legislation are discussed briefly.

A further delineation of policy and legislative approaches has been provided by a Committee on Preventing the Global Epidemic of Cardiovascular Disease of the Institute of Medicine.[35] Its conceptual model includes more detail on the determinants of cardiovascular health and emphasizes the roles of health education/communication and healthcare delivery (Figure 5). The model also identifies financial, legal, regulatory, and trade policies as 4 specific policy approaches that enable individuals and communities to make and maintain healthful choices. Most of these policy approaches deal with reducing access to or promoting the use of healthy alternatives to the deleterious health behaviors listed in Table 1. Likewise, many of the policy approaches can be carried out in whole geopolitical units but also may focus on more targeted community settings such as schools or children/youth organizations, worksites, religious organizations, or healthcare settings.

The combination of Figures 4 and 5 then allows the development of a conceptual framework for consideration of policy approaches to heart disease and stroke prevention (Figure 6). The risk behaviors targeted for change remain those with the epidemiological evidence identifying them as determinants of heart disease and stroke, although the Institute of Medicine model appropriately describes a more

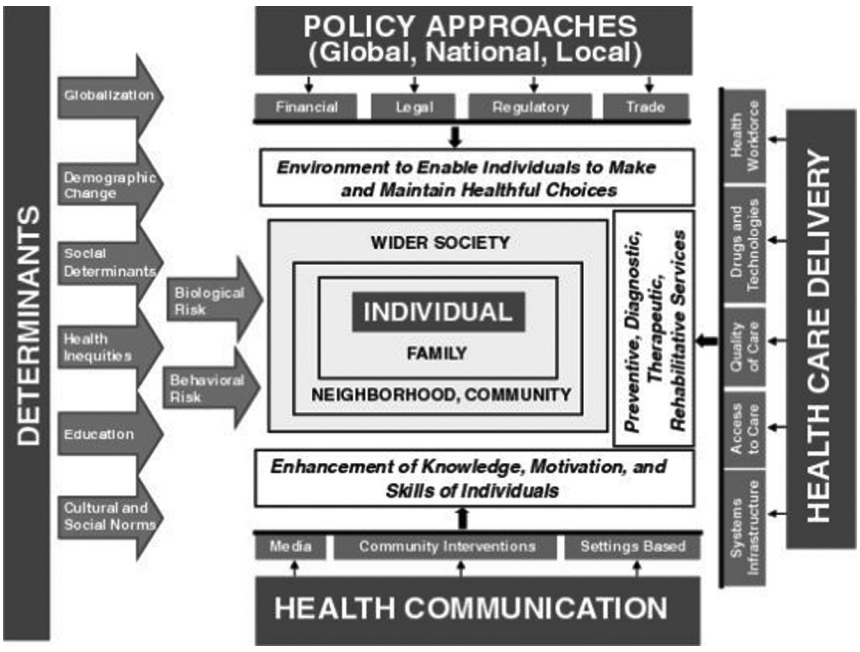

Figure 5. A comprehensive strategy to address cardiovascular disease from the Institute of Medicine.[35] The important role of policy is identified and subdivided into 4 approaches.

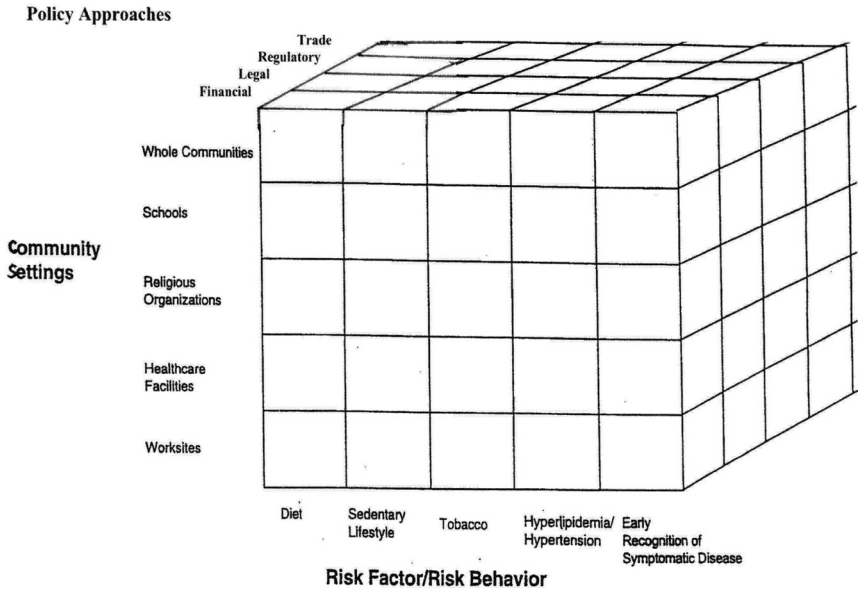

Figure 6. A conceptual framework for policy approaches to facilitate population-wide cardiovascular risk behavior change, emphasizing consideration of the 4 policy approaches[35] for 5 risk behavior clusters across 5 community settings.[9]

complex set of determinants of these behavioral risks.[35] The inclusion of the 5 community settings emphasizes that not all policies originate in governmental agencies. Employers, healthcare providers, religious organizations, and educational institutions can institute their own policies affecting their members, either in response to a government policy or on their own volition. An employer's commitment to providing a low-saturated/*trans*-fat and low-sodium food service, incentives for physical activity during the workday, strict clean air regulations, access to screening programs for hypertension and hyperlipidemia, and instruction on cardiopulmonary resuscitation and use of external defibrillators that are accessible at the worksite would be an example of private sector investment to heart-healthy behavior change similar to those encompassing whole communities enacted by local governments.

The 4 policy approaches—financial, legal, regulatory, and trade policies—also provide insight into more specific strategies to reduce risk behaviors in each of the community settings. All 100 cells (5 settings×5 behaviors×4 policy approaches) may not have current applications but provide a framework to consider new ones. Financial policies would be those that increase the monetary costs of deleterious behaviors (eg, taxation of tobacco) or reduce the monetary cost of healthy alternatives (eg, price supports for fruits and vegetables). Legal policies would be those that inhibit under the force of law the exposure of the population to risks, with penalties (fines, incarceration) incurred on being accused and found guilty of violating a law (eg, smoking in a tobacco-restricted area). Within the tort system, organizations exposing persons to risk can also risk civil lawsuits and financial settlements (eg, tobacco smoke exposure to airline flight crews). Regulatory policies would be those that set standards for various determinants of risk (air quality, *trans* fat content of food) and the requirements for accurate communication of risks such as food labeling for sodium, saturated fat, and *trans* fat content of foods. Organizations not meeting standards could face fines or discontinuation of sales unless they meet the standards. Therefore, legal and regulatory policies overlap. Trade and marketing policies would be those laws affecting the production, importation/exportation, buying, and selling of products that affect the risk behaviors (eg, agricultural policies to encourage fruit, vegetable, and fish production; marketing of food, drink, and tobacco).

Factors Initiating and Influencing Policy Change

Although surveillance, educational media, organizational partnerships, and assurances of personal health services are not the focus of this discussion of policy approaches, their important interactions with policy formulation and implementation should not be overlooked. Surveillance of the population burdens of heart disease and stroke borne by communities and nations is an obvious driver of policy, especially those data that document inequities in disease incidence and mortalities across demographic and geographic groups, as well as secular trends showing increasing disease prevalence, disability, and cost. Moreover, the effective use of media and other health education modalities is an important means to grow grassroots support for environmental change through legislative action by policy makers. Organizational partnerships are frequently conduits for advocacy for policy change, especially on behalf of governmental organizations constrained from lobbying policy makers directly. Finally, healthcare facilities have access to cardiovascular disease policies in the form of evidence-based clinical guidelines. Clinicians often can be effective advocates and credible content experts in support of policy change.

The effectiveness of behavior change and therapeutic interventions in individuals supports the evidence base for population-wide strategies that accomplish similar changes in cardiovascular risk. Conversely, a strong policy infrastructure should also benefit other individual and public health functions, especially personal health services. There continues to be a dearth of research describing the interactions between public health policies and individual healthcare policies to

Table 2. Comparison of Individual and Community Approaches for Cardiovascular Disease Prevention*

Individual: Clinical Practice	Community: Population Approaches and Health Promotion
The standards are randomized, controlled trials	Standards are outcome and process evaluation, using quantitative and qualitative methods
Patients are individuals	The client is the community
Less than therapeutic dose is unacceptable	Preventive dose is rarely applied
Easier to treat an individual	Difficult to scale up health promotion programs that reach the whole population
Outcomes of interventions are individual change	Outcomes are to change the social norms, environments, and behavior of entire populations
Interventions can focus on most factors relevant to the outcome	Interventions rarely take on social determinants external to the community

*The Osaka Declaration.[25]

promote heart disease and stroke prevention. Although the coexistence of policies ensuring a heart-healthy and stroke-free environment should logically facilitate healthcare providers' efforts to provide individuals with preventive services, few well-designed studies have been able to examine this potentially rich interaction between the high-risk and population approaches.

Evidence of Policy Effectiveness

Evidence from well-designed, observational, and randomized studies has become established as a strict prerequisite for clinical guidelines since the 1990s, and similar demands for a scientific basis for making public health decisions have followed.[36,37] Yet, it has been realized that, although clinical medicine depends overwhelmingly on the results of randomized clinical trials, the nature of public health evidence may need to be broader, not only because of logistical and statistical issues related to population-wide intervention studies but also so that additional observational and qualitative studies that add valuable experience to the evidence base are not overlooked.[38] The Osaka Declaration identified a number of fundamental differences between the evidence bases supporting individual (clinical) versus community approaches to the prevention of heart disease and stroke (Table 2).[26] The Community Preventive Services Task Force has incorporated this broader and sometimes judgmental perspective into its recommendations,[39] including economic evaluations.[40] It may be safe to conclude that policy makers continue to face gaps in the evidence base for population-wide interventions to meet their needs, in part owing to the infrequency of formal evaluations of implemented policies and the relative rarity of publication in venues other than official governmental documents. Nonetheless, the availability of evidence for effectiveness should certainly weigh heavily in favoring an evidence-based policy over others without such evidence.

Another consideration regarding the effectiveness of an evidence-based policy is the method of implementation and the context in which it is implemented rather that the policy itself. As with clinical guidelines based on randomized efficacy studies performed in ideal settings, the implementation of a public policy may have very different outcomes across local, state, national, and international venues and contexts. The assessment of the degree to which a policy might be applicable is built into the research, effectiveness, adoption, implementation, and maintenance program evaluation scheme of Green and Glasgow.[41] In the case of an ineffective policy, these 5 steps are a useful framework for policy reevaluation. The complexity of the contextual setting in which policies are implemented and evaluated is illustrated by Kumanyika et al[42] in the description of the policy frameworks for the control of the obesity epidemic (Figure 7). This important disease not only relates to 2 risk behaviors (excessive caloric intake and sedentary lifestyle) but also is

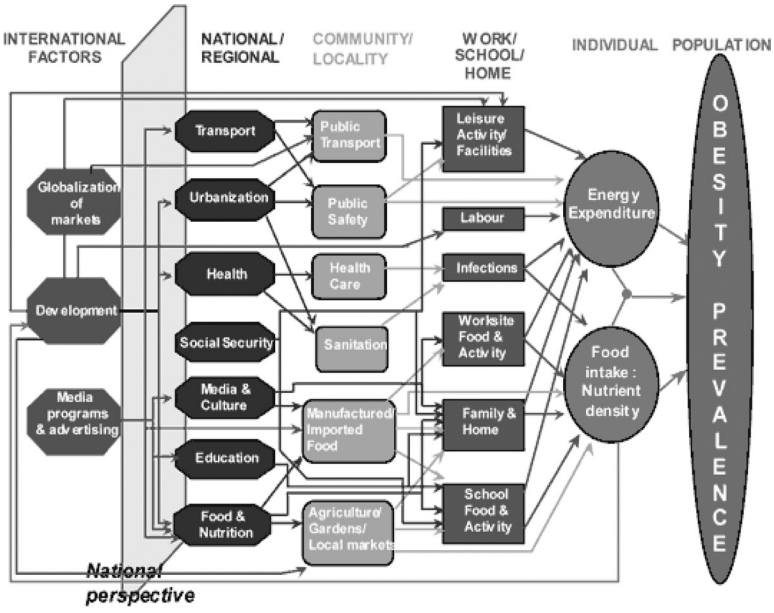

Figure 7. Illustration of the complexity of the context in which policy-driven behavior change may take place, including the determinants of obesity, the levels of society involved, and their multiple interactions (from Reference 42 as cited in Reference 43).

affected by many environmental and behavioral factors that in turn might be addressed by policies at the local, regional, national, and international levels. The interactions between a public health policy; other policies involving the built environment, transportation, and agriculture; and other environmental factors may explain the success or failure of the same policy implemented in different locales.[40]

Policy Approaches to Support Population-Wide Change in Specific Risk Behaviors

In general, policy approaches to reduce heart disease and stroke risk at the population level involve the restriction of access to the deleterious health behaviors listed on Table 1 and/or the promotion of access to alternative healthy behaviors. In this section, the policy approaches to altering the risk behaviors are discussed from the perspective of type of public policy approach used, namely financial, legal, regulatory, or trade policies. Examples of these policies are drawn from the *Public Health Action Plan to Prevent Heart Disease and Stroke*,[10] Guide to Community Preventive Services[44] from the United States, the National Institute for Health and Clinical Excellence 2010 Public Health Guidance for the United Kingdom,[45] and individual policy studies.

Diet

A strong evidence base exists for specific dietary policies relevant to cardiovascular health. From this evidence, the 2010 US Dietary Guidelines Advisory Committee[46] recommends (1) the reduction of saturated fat to <7% of calories with replacement of saturated fat calories with monounsaturated or polyunsaturated fats; (2) elimination of industrial *trans* fatty acids; (3) reduction of dietary sodium to 1500 m/d; (4) balance of calorie intake with expenditure; (5) limitation of alcohol to 2 drinks per day for men and 1 drink per day for women and no more than 4 drinks in a single day for men or 3 drinks in a single day for women; and (6) consumption of 2 servings of seafood per week providing 250 mg/d of N-3 fatty acids. As described in this report,[46] wide gaps remain between those recommended and those assessed by recurrent nutritional surveys over the past 20 years. The estimated benefits to health indicators and related medical care costs is potentially enormous.[47]

Many policy approaches exist for population-wide dietary change (Table 3). Price supports for foods low in sodium, saturated fat, or *trans* fat and the removal of price supports for foods high in sodium, saturated fat, or *trans* fat have been proposed by National Institute for Health and Clinical Excellence (NICE) in the United Kingdom[45] on the basis of a number of countries enacting legislation of this nature and then experiencing impressive reductions in heart disease and stroke. Poland ended price supports for butter and high-fat meats and allowed importation of fruits, vegetables, and low-saturated-fat margarines after the fall of the Iron Curtain in the early 1990s. This was followed by a rapid 26% decrease in coronary disease mortality in that country.[48] Mauritius introduced legislation to make mandatory the substitution of polyunsaturated oils for cooking in place of those high in saturated fats, with a rapid fall in cardiovascular disease deaths.[49] Taxation of high-fat foods in the United States has been proposed but is highly controversial. Nonetheless, alteration of costs of foods, either healthy or unhealthy, appears to affect purchase and consumption.

Legal policies have included the ban on industrial *trans* fats from human consumption in New York City and other locales (Table 3). The result has been a strong initiative by food manufacturers to reduce *trans* fats in their products; analysis of *trans* fats in 2006 to 2007 from the Food Labels and Package Surveys compared with the 2004 analysis of food products shows remarkable declines in *trans* fats, with virtual removal of *trans* fats from potato chips, tortilla chips, and cereals/granola in 2007.[50] Other policies limit access to unhealthy foods by restricting points of sale and age of purchaser. Local and state laws limiting the number of establishments selling alcohol-containing beverages, their hours, and the age at which alcoholic beverages can be purchased are examples.

Regulatory approaches especially deal with rules about the content of sodium, *trans* fats, and saturated fats in prepared foods, as well as labeling to convey this information accurately to consumers. In contrast to the rather technical labels in the United States, the UK NICE supports the use of the traffic light system (red, avoid; yellow, cautious; green, consume) for labeling of foods.[51] Regulations and principles for food and beverage marketing to children have been established by governments and food manufacturers. The restriction on unhealthy food choices in vending machines used by children is also proposed by NICE.[45]

Trade policies especially affect the agricultural sector, ie, to create markets that encourage the food industry and agriculture to produce and sell products low in sodium, saturated fat, and *trans* fats. NICE, for example, seeks to assure companies providing such foods that they will not put themselves at economic risk. Another example would be the limitation of federal or state procurement of foods to favor healthful foods in the sizeable proportion of meals directly or indirectly purchased by state and federal governments on a daily basis in the United States. Other policies include the marketing of low-fat milk, fruits and vegetables, fish, and lean meats[46] or, conversely, restricting the marketing of unhealthy alternatives in mass media and nonbroadcast media, especially restricting advertisement of these foods to children.

Sedentary Lifestyle

The 2008 *Physical Activity Guidelines for Americans* reviewed the extensive evidence for the health benefits of regular physical activity.[52] The guidelines establish the baseline level of physical activity per week as 150 minutes of moderate intensity, 75 minutes of vigorous intensity, or an equivalent combination of moderate and vigorous intensity exercise. If a person is not at a healthy weight, an increase in physical exercise or decrease in caloric intake is needed. The role of the built environment in creating an environment in which physical activity is the default option is increasingly understood, especially in the origins of obesity.[42,43,53–55]

The effective policy interventions to reduce sedentary lifestyle can therefore be related to physical activity at work,

Table 3. Policy Approaches to Improve Population-Wide Dietary Behaviors

Policy Approaches	Whole Communities	Schools/ Children	Religious Organizations	Healthcare Facilities	Worksites
Financial policies					
Provide price supports for low-sodium, low–*trans* fat, low–saturated fat foods	X	X		X	X
Tax high-sodium, high–*trans* fat, high–saturated fat foods	X				
Tax alcoholic beverages	X				
Provide grants and loans for healthy food retailers in food deserts	X	X	X		
Legal policies					
Ban industrial *trans* fat from human consumption	X				
Limit hours and density of alcohol retailers	X	X			
Limit legal age of alcohol purchase and consumption	X				
Regulatory approaches					
Create regulations to limit the number and hours of fast-food outlets near schools	X	X			
Develop limits for sodium and saturated fat for preserved foods	X				
Develop labeling for shelves or packaging of fresh foods	X				
Label food to identify those high in sodium, saturated fat, and *trans* fat	X	X			X
Limit percent of *trans* fats in fats and oils used in food preparation	X	X			X
Require offerings of healthy foods and beverages in vending machines	X	X			X
Require healthy food choices in school meals	X	X			
Trade and marketing					
Restrict nonbroadcast advertising and promotion of foods high in sodium, fat, sugar, and alcohol	X	X			X
Establish principles/regulations for food and beverage marketing to children	X	X			
Encourage public companies frequented by children to resist sponsorship by makers of high-fat, high–*trans* fat, high-sodium food	X	X			
Require procurement contracts to serve healthy food and drink	X	X		X	X
Restrict television advertising for food and drink high in fat, *trans* fat, salt, and sugar	X				
Support favorable conditions for food industry and agriculture to provide products low in sodium, saturated fat, and *trans* fat	X				
Promote low-fat milk, fruits and vegetables, fish, lean meats	X	X	X	X	X
Encourage food producers and retailers to reduce sodium, *trans* fat, and saturated fat in commonly consumed foods	X				
Create community vegetable gardens	X	X	X		

local transportation, and leisure-time physical activity (Table 4).[56] Financial policies can encourage people to use physically active means to travel to/from work by providing walking and bicycle paths, safe bicycle storage areas, and bicycle racks on mass transit vehicles or by increasing the cost of sedentary alternatives (eg, price of gasoline, automobile parking charges). Discounts for fitness centers can also be offered by employers, health insurers, healthcare providers, or church members. Worksite wellness programs in general should include environmental inducements to increase physical activity during work and break periods.[57] Healthcare-based interventions can also be useful to encourage physical activity.[58] Reimbursement for cardiac rehabilitation services has recently been partially restored; the full cost of these services should be covered. Legal policies should also remove prohibitions on the use of public facilities for physical activity such as the closure of school facilities because of liability risk.[45] Other legal and regulatory approaches deal with the built environment, including transportation plans, construction of parks, green spaces, walking paths, and community gardens. Bike and pedestrian trails can be cost-effective strategies to encourage physical activity.[59] Standards and requirements for daily physical activity have been absent from many schools and need to be established.

Tobacco Use

The cardiovascular disease burden attributable to tobacco smoking has long been established, with more recent definition of the role of second-hand smoke.[60] The reduction in smoking has focused on financial policies to increase the cost of smoking through excise taxes, which have been especially effective in youths and persons with limited financial resources (Table 5).[61–63] Other financial policies involve increased health, life, and fire insurance premiums and other incentives.[64,65] Payment for smoking cessation programs also appears to be cost-effective for Medicaid recipients[66] and should include quitlines and other population-based interventions.[65] Legal approaches have been especially effective in

Table 4. Policy Approaches to Alter Population-Wide Sedentary Lifestyles

Policy Approaches	Whole Communities	Schools/ Children	Religious Organizations	Healthcare Facilities	Worksites
Financial policies					
Provide incentives to use physically active transportation	X	X	X		X
Reduce disincentives for physical activity (eg, subsidized parking)	X	X		X	X
Reduce costs for exercise facilities or reduce health insurance costs if exercise facilities are used	X		X	X	X
Reimburse fully for cardiac rehabilitation				X	
Legal policies					
Repeal laws that prohibit physical activity in public places	X	X	X	X	
Require local transportation plans to promote physical activity	X				X
Regulatory approaches					
Require local built environment plans to promote walking and cycling	X	X	X		X
Establish requirements for daily physical activity in schools		X			
Trade and marketing					
Improve built environment and parks to encourage local physical activity	X	X		X	
Provide adequate space for formal and informal physical activity	X	X	X	X	X
Establish community gardens and purchase locally grown food	X	X	X	X	X

reducing environmental tobacco smoke, including monetary settlements in favor of workers so exposed who develop smoking-related diseases. These restrictions on environmental tobacco smoke exposure are associated with sizable and rapid population-wide reductions in acute coronary disease.[67,68] Other legal approaches have been the prohibition of sales of cigarettes to minors and, related to that, the limitations of vending machine sales of cigarettes or the sale of cigarettes by mail. Regulatory policies have long included warning labels on cigarettes with mixed results, although more graphic messages are currently being used. Marketing of tobacco products has been eliminated from broadcast media but needs to be further curtailed in nonbroadcast media and event sponsorship. US trade policies with regard to

Table 5. Policy Approaches to Alter Population Tobacco Use

Policy Approaches	Whole Communities	Schools/ Children	Religious Organizations	Healthcare Facilities	Worksites
Financial policies					
Tax tobacco sales to all citizens	X				
Increase healthcare premiums for smokers	X			X	X
Increase life, property/fire insurance for smokers	X				
Pay for tobacco cessation programs, including "quitlines"	X			X	X
Use tobacco settlement funds for tobacco prevention and cessation programs	X				
Legal policies					
Enact strict clean air laws; restrict smoking to designated areas	X	X	X	X	X
File personal injury lawsuits on smoking harm	X			X	
Restrict sales to minors	X	X			
Restrict vending machine sales	X	X			X
Restrict sales by mail	X	X			
Regulatory approaches					
Require no-smoking policies in public housing	X				
Place warning labels on tobacco products	X				
Trade and marketing					
Reduce export and marketing of US tobacco products abroad	X				
Subsidize farmers to replace tobacco with healthy crops	X				
Restrict television and radio advertising of all tobacco products	X				
Restrict nonbroadcast advertising and promotion of tobacco products	X	X	X	X	X
Encourage organizations to resist sponsorship by tobacco companies		X	X	X	X
Ratify and endorse the World Health Organization Framework Convention on Tobacco Control	X				

exportation and marketing of tobacco products abroad have been a target for criticism and international policy activity,[69] including pressure on the United States to sign the World Health Organization Framework Convention on Tobacco Control, which promotes many national and international policies to reduce tobacco trade and marketing.[70]

Detection and Treatment of Hypertension and Hyperlipidemia

The evidence base for the detection and treatment of hypertension and hyperlipidemia is the same as that for clinical guidelines that include recommendations for individuals to access screening and diagnostic services, to receive appropriate healthcare, and then to adhere to the prescribed treatment regimens.[31,32] Screening for hypertension and hyperlipidemia are among the more cost-effective preventive interventions in the US Preventive Services Task Force A and B graded services[71] and certainly should be included in the annual health assessment and prevention plan proposed by the Affordable Care Act.[72] Whole communities, schools, religious organizations, healthcare facilities, and worksites should recognize this, ensure their members access to screening programs, and support adherence to lifestyle and drug regimens that their members are prescribed.

Delay in Recognition and Treatment of Symptomatic Heart Disease and Stroke

With regard to public policies to improve detection and care for acute cases of heart disease and stroke, policy interventions to improve individuals' recognition of symptoms of heart disease and stroke and the seeking of emergency care include public education and media campaigns to ensure public knowledge. A second group of policies might ensure availability and accessibility of personnel and technologies to provide acute resuscitative care. Recent studies suggest that the incidence of initial ventricular fibrillation or pulseless ventricular tachycardia is higher in public settings than at home and more amenable to defibrillation and other resuscitation efforts.[73] Regulatory policies would then prioritize the training of laypersons who work in high-risk areas in cardiopulmonary resuscitation and the proper use of defibrillators, as well as the financial policies for the purchase and maintenance of automatic external defibrillators in locations with a high density of people involved in high-risk activities such as airports and urban centers.[73–76] These prioritized sites might include worksites, healthcare facilities, and religious organizations.

Looking Ahead

Challenges

In the setting of increasingly limited resources to spend on health, the investment in population-wide policy strategies often competes with short-term spending for acute care services for heart disease and stroke. The need to attend to acutely ill individuals with acute coronary and cerebrovascular syndromes is a compelling one that should not compete with the provision of preventive services and environmental improvements that have reduced but not eliminated the steady stream of these cases of preventable diseases.[77] This "tyranny of the urgent" provides a tough dilemma for the policy maker. As recommended by the National Action Plan for the Prevention of Heart Disease and Stroke,[10] a balanced approach across the disease spectrum from primordial prevention to palliative care is required.

More well-designed studies are needed to bolster the evidence base for population-based prevention, including the translation of epidemiological and clinical studies to health policies, rigorous evaluations of impact of specific policies, and implementation studies of how the policy should be rolled out to be most effective. The issues of cost-effectiveness and generalizability of results underscore the need for similar interventions tested for effectiveness in different settings. The complexity of socioeconomic factors, other policies, and other contextual factors needs to be understood to increase confidence that public policies will be effective and efficient.

Opportunities

The National Forum for Heart Disease and Stroke Prevention (United States),[78] in partnership with the Collaborative Integrated Non-Communicable Diseases Intervention Program (Europe and Canada),[79] is launching a program to identify best policies for population-based prevention of heart disease and stroke. This policy toolkit should provide a starting point for the selection and implementation of best policies and practices at US and international sites to create and bolster the policy infrastructure to support population-based cardiovascular disease prevention. The social, economic, and cultural contexts must be taken into account for the policies to be established as effective. Likewise, the local, state, regional, or global levels of intervention need to be considered,[43] as well as the evidence available to endorse their implementation. The potential for significant and relatively near-term reductions in the burdens from heart disease and stroke should provide the impetus to establish and strengthen that policy infrastructure required to reduce the global risk of heart disease and stroke on its own but also to support other types of preventive interventions aimed at controlling this global epidemic.

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None.

References

1. Engel GL. The need for a new medical model. *Science*. 1977;196:129–136.
2. Blackburn H. Epidemiological basis of a community strategy for the prevention of cardiopulmonary disease. *Ann Epidemiol*. 1997;S7:S8–S13.
3. Rose G, Khan K-T, Marmot M. *Rose's Strategy of Preventive Medicine*. New York, NY: Oxford University Press. 2008:135.
4. Carleton RA, Dwyer J, Finberg L, Flora J, Goodman DS, Grundy SM, Havas S, Hunter GT, Kritchevsky D, Lauer RM. Report of the Expert Panel on Population Strategies for Blood Cholesterol Reduction. *Circulation*. 1991;83:2154–2232.
5. Smith SC, Allen AJ, Blair SN, Bonow RO, Brass LM, Fonarow GC, Grundy SM, Hiratzka L, Jones D, Krumholz HM, Mosca L, Pasternak RC, Pearson TA, Pfeffer MA, Taubert KA. AHA/ACC guidelines for secondary prevention for patients with coronary and other atherosclerotic vascular disease: 2006 update. *Circulation*. 2006;113:2363–2372.
6. Pearson TA, Blair SN, Daniels SR, Eckel RH, Fair JM, Fortmann SP, Franklin BA, Goldstein LB, Greenland P, Grundy SM, Hong Y, Miller NH, Lauer RM, Ockene IS, Sacco RL, Sallis JF Jr, Smith SC Jr, Stone NJ, Taubert KA; American Heart Association Science Advisory and Coordinating Committee. AHA guidelines for primary prevention of cardiovascular disease and stroke: 2002 update. *Circulation*. 2002;106:388–391.
7. Levy RL. The decline in cardiovascular disease mortality. *Ann Rev Public Health*. 1981;2:49–70.
8. Goldman L. The decline in ischemic heart disease mortality rates. *Ann Intern Med*. 1984;101:825–836.
9. Pearson TA, Bazzarre TL, Daniels SR, Fair JM, Fortmann SP, Franklin BA, Goldstein LB, Hong Y, Mensah GA, Sallis JF Jr, Smith S Jr, Stone NJ, Taubert KA, American Heart Association guide for improving cardiovascular health at the community level. *Circulation*. 2003;107:645–651.
10. US Department of Health and Human Services. *A Public Health Action Plan to Prevent Heart Disease and Stroke*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2003.
11. Williams DR, McClellan MB, Rivlin AM. Beyond the Affordable Care Act: achieving real improvements in Americans' health. *Health Aff (Millwood)*. 2010;29:1481–1488.
12. McGinnis JM, Williams-Russo P, Knickman JR. The case for more active policy attention to health promotion. *Health Aff (Millwood)*. 2002;21:78–93.
13. Stokols D. Translating social ecological theory into guidelines for community health promotion. *Am J Health Promot*. 1996;10:282–298.
14. Frieden TR. A framework for public health action: the Health Impact Pyramid. *Am J Public Health*. 2010;100:590–595.
15. Pearson TA, Lewis C, Wall S, Jenkins PL, Weinehall L, Nafziger AN, Erb TA. Dissecting "the black box" of community intervention: background and rationale. *Scand J Public Health*. 2001;29(suppl 56):5–12.
16. Kaplan G, Keil J. Socioeconomic factors and cardiovascular disease: a review of the literature. *Circulation*. 1993;88:1973–1998.
17. Rogers EM, Shoemaker EF. *Communication of Innovation*. New York, NY: Free Press; 1971;99–134, 175–196.
18. Maccoby N, Farquhar JW, Wood PD, Alexander J. Reducing the risk of cardiovascular disease: effects of a community-based campaign on knowledge and behavior. *J Community Health*. 1977;3:100–114.
19. Marmot MG, McDowall ME. Mortality decline and widening social inequalities. *Lancet*. 1986;2:274–276.
20. Pappas G, Queen S, Hadden W, Fisher G. The increasing disparity in mortality between socioeconomic groups in the United States, 1960 and 1986. *N Engl J Med*. 1993;329:103–109.
21. Achutti A, Balaguer-Vintro I, deLuna AB, Chalmers J, Chockalingam A, Farinaro E, Lauzon R, Martin I, Papp JG, Postiglione A, Reddy KS. *The World Heart Federation White Book: Impeding Global Pandemic of Cardiovascular Diseases: Challenges and Opportunities for the Prevention and Control of Cardiovascular Diseases in Developing Countries and Countries in Transition*. Chockalingam A, Balaguer-Vintro I, eds. Barcelona, Spain: Prous Science.
22. *Victoria Declaration on Heart Health*. Victoria, Canada: Health and Welfare Canada; 1992.
23. *Catalonia Declaration: Investing in Heart Health*. Catalonia, Spain: Autonomous Government of Catalonia, Barcelona, Spain; 1996.
24. *Worldwide Efforts to Improve Heart Health*. Catalonia, Spain: Autonomous Government of Catalonia, Barcelona, Spain; 1997.
25. Pearson TA, Bales VS, Blair L, Emmanuel SC, Farquhar JW, Low LP, MacGregor LJ, MacLean DR, O'Connor B, Pardell H, Petrasovits A. The Singapore Declaration: forging the will for heart health in the next millennium. *CVD Prev*. 1998;1:182–199.
26. Advisory Board of the Fourth International Heart Health Conference. The Osaka Declaration: health, economics, and political action: stemming the global tide of cardiovascular disease. 2001. Osaka Prefectural, Japan. http://www.med.mun.ca/chhdbc/pdf/Eng%20Osaka%20Declaration.pdf. Accessed October 31, 2011.
27. Advisory Board of the Fifth International Heart Health Conference. The Milan Declaration: positioning technology to serve global heart health. 2004. http://www.phac-aspc.gc.ca/ccdpc-cpcmc/cindi/pdf/milan_dec_en.pdf. Accessed October 31, 2011.
28. International Heart Health Society. *International Action on Cardiovascular Disease: A Platform for Success*. Vancouver, BD, Canada: International Heart Health Study; 2005.
29. Stamler J, Stamler R, Neaton JD, Wentworth D, Daviglus ML, Garside D, Dyer AR, Liu K, Greenland P. Low risk-factor profile and long-term cardiovascular and non-cardiovascular mortality and life expectancy: findings for 5 large cohorts of young adult and middle-aged men and women. *JAMA*. 1999;282:2012–2018.
30. Stamler MJ, Hu FB, Manson JE, Rimm EB, Willett WC. Primary prevention of coronary heart disease in women through diet and lifestyle. *N Engl J Med*. 2000;343:16–22.
31. Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure*. Bethesda, MD: National Heart, Lung, and Blood Institute, National Institutes of Health, Department of Health and Human Services; 2003.
32. US Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). http://www.nhlbi.nih.gov/guidelines/cholesterol. Accessed October 31, 2011.
33. Stone EJ, Pearson TA, eds. Community trials for cardiopulmonary health: directions for public health practice, policy, and research. *Ann Epidemiol*. 1997;S7:S1–S124.
34. Institute of Medicine. *The Future of Public Health*. Washington, DC: National Academy Press; 1988.
35. Institute of Medicine. *Promoting Cardiovascular Health in the Developing World: A Critical Challenge to Achieve Global Health*. Washington, DC: National Academies Press; 2010.
36. Brownson RC, Baker EH, Leet TL, Gillespie KN. *Evidence-Based Public Health*. Oxford, UK: Oxford University Press. 2003.
37. Anderson LM, Brownson RC, Fullilove MT, Anderson LM, Brownson RC, Fullilove MT, Teutsch SM, Novick LF, Fielding J, Land GH. Evidence-based public health policy and practice: promises and limits. *Am J Prev Med*. 2005;28:226–230.
38. Victoria CG, Habicht JP, Bryce J. Evidence-based public health: moving beyond randomized trials. *Am J Public Health*. 2004;94:400–405.
39. Briss PA, Zaza S. Pappaioanou M, Fielding J, Wright-De Aguero L, Truman BI, Hopkins DP, Mullen PD, Thompson RS, Woolf SH, Carande-Kulis VG, Anderson L, Hinman AR, McQueen DV, Teutsch SM, Harris JR. Developing an evidence-based guide to Community Preventive Services: methods. *Am J Prev Med*. 2000;18:35–43.
40. Carade-Kulis VG, Maciosek MV, Briss PA, Teutsch SM, Zaza S, Truman BI, Messonnier ML, Pappaloanou M, Harris JR, Fielding J. Methods for systematic review of economic evaluations for the Guide to Community Preventive Services. *Am J Prev Med*. 2000;18:75–91.
41. Green LW, Glasgow RE. Reevaluating the relevance, generalizability and applicability of research. *Eval Health Prof*. 2006;29:126–153.
42. Kumanyika S, Jeffery RW, Morabia A, Ritenbaugh C, Antipatis VJ. Public Health Approaches to the Prevention of Obesity (PHAPO) Working Group of the International Obesity Task Force (IOTF). Obesity prevention: the case for action. *Int J Obes Relat Metab Disord*. 2002;26:425–436.
43. Huang TT, Drewnowski A, Kumanyika SK, Glass TA. A systems-oriented multilevel framework for addressing obesity in the 21st century. *Prev Chronic Dis*. 2009;6:1–10. http://www.cdc.gov/pcd/issues/2009/jul/09_0013.htm. Accessed October 31, 2011.
44. Guide to Community Preventive Services. The community guide. http://www.the communityguide.org/index.html. Accessed October 31, 2011.

45. National Institute for Health and Clinical Excellence. NICE public health guidance: prevention of cardiovascular disease at population level. www.nice.org.uk/guidance/PH25. 2010.
46. Dietary Guidelines Advisory Committee. *Report of the Dietary Guidelines Advisory Committee With Dietary Guidelines for Americans, 2010, to the Secretary of Agriculture and the Secretary of Health and Human Services*. Washington, DC: US Department of Agriculture, Agricultural Research Science; 2010.
47. Dall TM, Fulgoni VL, Zhang Y, Reimers KJ, Packard PT, Astwood JD. Potential health benefits and medical cost surveys form calories, sodium, and saturated fat reductions in the American diet. *Am J Health Promot*. 2009;23:412–422.
48. Zatonski WA, Willett W. Changes in dietary fat and declining coronary heart disease in Poland: population-based study. *BMJ*. 2005;331:187–1879.
49. Dowse GK, Gareeboo H, Alberti KG, Zimmer P, Tuomilehto J, Purran A, Fareed D, Chitson P, Collins VR, Hemraj F. Changes in population cholesterol concentrations and other cardiovascular risk factor levels after five years of the non-communicable disease intervention programme in Mauritius. *BMJ*. 1995;311:1255–1259.
50. Dietary Guidelines Advisory Committee. *Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans*. 2010;table A3.11, p 233. http://www.cnpp.usda.gov/DGAs2010-PolicyDocument.htm. Accessed October 31, 2011.
51. Food Standards Agency. *Consultation on the FSA Strategy 2010–2015*. London, UK: Food Standards Agency; 2009.
52. US Department of Health and Human Services. *Physical Activity Guidelines for Americans*. Washington, DC: US Department of Health and Human Services; 2008. UDPHP publication No. U0036. http://www.health.gov/paguidelines. Accessed October 31, 2011.
53. Black JL, Macinko J. Neighborhoods and obesity. *Nutr Rev*. 2008;66:2–20.
54. Casagrande SS, Whitt-Glover MC, Lancaster KJ, Odoms-Young AM, Gary TL. Built environment and health behaviors among African Americans: a systematic review. *Am J Prev Med*. 2009;36:174–181.
55. Papas MA, Alberg AJ, Ewing R, Helzsouer KJ, Gary TA, Classen AC. The built environment and obesity. *Epidemiol Rev*. 2007;29:129–143.
56. Matson-Koffman DM, Brownstein JN, Neimer JA, Greaney ML. A site-specific literature review of policy and environment interventions that promote physical activity and nutrition for cardiovascular health: what works? *Am J Health Promot*. 2005;19:167–193.
57. Carnethon M, Whitsel LP, Franklin BA, Kris-Etherton P, Milani R, Pratt C, Wagner G. Worksite wellness programs for cardiovascular disease prevention: a policy statement from the American Heath Association. *Circulation*. 2009;120:1725–1741.
58. Hagberg LA, Lindholm L. Cost-effectiveness of healthcare: broad interventions aimed at improving physical activity. *Scand J Public Health*. 2006;34:641–653.
59. Wang G, Macera CA, Scudder-Soucie B, Schmid T, Pratt M, Buchner D. A cost-benefit analysis of physical activity using bike/pedestrian trails. *Health Promot Pract*. 2005;6:174–179.
60. *Secondhand Smoke Exposure and Cardiovascular Effects: Making Sense of the Evidence*. Washington DC: Institute of Medicine; 2009.
61. Decicca P, Kenkel D, Mathius A. Cigarette taxes and the transition from youth to adult smoking: smoking initiation, cessation, and participation. *J Health Econ*. 2008;27:904–917.
62. Carpenter C, Cook PJ. Cigarette taxes and youth smoking: new evidence from national, state, and local Youth Risk Behavior Surveys. *J Health Econ*. 2008;27:287–299.
63. Farrelly MC, Pechacek TF, Thomas KY, Nelson D. The impact of tobacco control programs on adult smoking. *Am J Public Health*. 2008;98:304–309.
64. Centers for Disease Control and Prevention. Tobacco guide to community preventive services: tobacco use. www.thecommunityguide.org/tobacco.
65. Secker-Walker R, Gnich W, Platt S, Lancaster T. Community interventions for reducing smoking among adults. *Cochrane Database Syst Rev*. 2002:CD001745.
66. Land T, Warner D, Paskowksky M, Cammaerts A, Wetherell L, Kaufmann R, Zhang L, Malarcher A, Pechacek T, Keithly L. Medicaid coverage for tobacco dependence treatments in Massachusetts and associated decreases in smoking prevalence. *PLoS One*. 2010;5:e9770.
67. Glantz SA. Meta-analysis of the effects of smoke-free laws on acute myocardial infarction: an update [letter]. *Prev Med.* 2008;47:452–453.
68. Pell JP, Haw S. Cobbe S, Newby DE, Pell A CH, Fischbacher C, McConnachie A, Pringle S, Murdoch D, Dunn F, Oldroyd K, MacIntyre P, O'Rourke B, Borland W. Smoke-free legislation and hospitalization for acute coronary syndromes. *N Engl J Med*. 2008;389:482–491.
69. Stanley K. Control of tobacco production and use. In: Jamison DT, Mosley WH, Measham AR, Bobadilla JL, eds. *Disease Control Practices in Developing Countrie*s. Oxford, UK: Oxford University Press. 1993;703–723.
70. *WHO Framework Convention on Tobacco Control*. Geneva, Switzerland: World Health Organization; 2003.
71. National Commission on Prevention Priorities. Identifying the most beneficial and cost-effective prevention services. http://www.prevent.org/initiatives/national-commission-on-prevention-priorities.aspx.
72. Affordable Care Act: laying the foundation for prevention. http://www.healthreform.gov/newsroom/acaprevention.html. Accessed October 31, 2011.
73. Weisfeldt ML, Everson-Stewart S, Sitlani C, Rea T, Aufderheide TP, Atkins DL, Bigham B, Brooks SC, Foerster C, Gray R, Ornato JP, Powell J, Kudenchuk PJ, Morrison LJ. Ventricular tachyarrhythmias after cardiac arrest in public versus at home. *N Engl J Med*. 2011;364:313–321.
74. Caffrey SL, Willoughby PJ, Pepe PE, Becker LB. Public use of automated external defibrillators. *N Engl J Med*. 2002;347:1242–1247.
75. Folke F, Lippert FK, Nielsen SL, Gislason GH, Hansen ML, Schramm TK, Sorensen R, Fosbol EL, Andersen SS, Rasmussen S, Kober L, Torp-Pedersen C. Location of cardiac arrest in a city center: strategic placement of automated external defibrillators in public locations. *Circulation*. 2009;120:510–517.
76. Atkins DL. Public access defibrillation: where does it work? *Circulation.* 2009;120:461–463.
77. Pearson TA. The prevention of cardiovascular disease: have we really made progress? *Health Aff (Millwood)*. 2007;26:49–60.
78. US Department of Health and Human Services. *Update to A Public Health Action Plan to Prevent Heart Disease and Stroke*. Atlanta, GA: Centers for Disease Control and Prevention; 2008.
79. *Gaining Health: The European Strategy for the Prevention and Control of Noncommunicable Diseases*. Copenhagen, Denmark: World Health Organization Regional Office of Europe; 2006.

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