

23

Population Nutrition, Health Promotion, and Government Policy

Norman J. Temple and Marion Nestle

KEY POINTS

- Health promotion campaigns of various types have been conducted: in communities, at worksites, and in physician offices. The most common targets have been smoking, exercise, dietary fat, and intake of fruit and vegetables. The aim has most often been to reduce excess weight, lower the blood cholesterol and blood pressure, and prevent coronary heart disease (CHD). Results of these campaigns have been mixed. Some have achieved very little whereas others have met with moderate success. Typically, target outcomes have been improved by a few percentage points and this should reduce the risk of CHD by about 5–15%.
- In the light of this limited success we argue in support of government policy initiatives to improve population health. In particular, by use of taxes and subsidies the price of various foods can be changed so as to shift consumption patterns to healthier foods. Other policy measures can include restrictions on advertising of unhealthy food, especially to children, and improved food labeling.
- Policy measures along these lines are likely to meet with resistance from the food industry.
- Low socioeconomic status, such as low income and poor education, is a major risk factor for poor health. This may be mediated via unhealthy lifestyle choices, such as a poor diet, as well as by psychological factors. Therefore, attempts to improve the population health will require action in this area.

1. INTRODUCTION

It is now generally accepted that lifestyle—diet, tobacco use, exercise—have a major impact on health, especially the Western diseases. However, there is a world of difference between awareness of these facts and their translation into preventive action.

Although the focus of this chapter is on nutrition in relation to health promotion, we also examine other areas, especially smoking and exercise. This is necessary because most health promotion campaigns take a broad lifestyle approach and simultaneously tackle nutrition, exercise, and smoking.

From: *Nutritional Health: Strategies for Disease Prevention, 2nd ed.*
Edited by: N. J. Temple, T. Wilson, and D. R. Jacobs © Humana Press Inc., Totowa, NJ

Trends toward a healthier lifestyle during the last 20–30 yr have been inconsistent. There has been an impressive fall by about half in smoking rates in men in many Western countries for the last 30 yr. The percentage of Americans who smoke dropped from 37.4% in 1970 to 22.5% in 2002 (1). In the United States deaths from coronary heart disease (CHD) have fallen by half since their peak in the late 1960s. Yet, at the same time, the United States has been struck by an epidemic of obesity. Between 1976 and 1980 and 1988 and 1994 obesity among adults jumped from 14.5 to 22.9% (2). This then climbed to 30.5% in 1999–2000 (3). A fast rising prevalence of overweight and obesity has also been reported from other Western countries (4).

Between 1972 and 1998, Americans increased their consumption of fruit and vegetables (excluding potatoes) by about one serving per day (5), an underwhelming rate of progress.

Moreover, half of Americans eat no fruit on any given day (6). In the years 1985–2000 the available food energy in the United States increased by 300 kcal/d. This increased energy came largely from refined grains (46%), sugars (24%), and added fats (23%), but with a mere 8% coming from fruit and vegetables (7).

This poor rate of progress in the area of diet should be seen as part of a more general problem that large sections of the population give a low priority to a healthy lifestyle. For instance, the proportion of middle-aged adults in England engaged in at least moderate exercise, such as a brisk walk for at least 30 min on five or more days each week, is no more than one-half of men and one-quarter of women (8). In the United States about one third of adults achieve this level of exercise (9), whereas another one-third report no leisure-time physical activity at all (10).

2. HEALTH PROMOTION CAMPAIGNS

During the 1970s the intimate connection between lifestyle and health became increasingly apparent. As a result many people assumed that the next step was to disseminate this information to the public and exhort lifestyle changes, action deemed sufficient to bring about the necessary changes. However, a review of 24 evaluations of the effectiveness of using the mass media across a range of health topics found little evidence of behavior change as a result of education alone (11). Here we look at various types of health promotion campaigns, most of them focused on risk factors for cardiovascular disease.

2.1. *Campaigns in Communities*

A number of community interventions have used the mass media combined with various other methods to reach the target population. Three major projects were carried out in the United States during the 1980s. Their aims were to lower elevated levels of blood cholesterol, blood pressure, and weight, to cut smoking rates, and to persuade more people to exercise. Each program lasted 5–8 yr and succeeded in implementing its intervention on a broad scale, involving large numbers of programs and participants. In the Stanford Five-City Project, conducted by Farquhar and colleagues (12) in California, two intervention cities received health education via TV, radio, newspapers, other mass-distributed print media, direct education, and schools. On average each adult was exposed to 26 h of education, achieved at the remarkably low per capita cost of \$4/yr (i.e., about 800 times less than total health care costs). A similar project was the Minnesota Heart

Health Program, which included three intervention cities and three control cities in the upper Midwest (13). A third project was the Pawtucket Heart Health Program in which the population of Pawtucket, RI, received intensive education at the grass roots level: schools, local government, community organizations, supermarkets, and so forth, but without involving the media (14).

An analysis combined the results of the three studies so as to increase the sample size to 12 cities (15). Improvements in blood pressure, blood cholesterol, body mass index, and smoking were of very low magnitude and were not statistically significant; the estimated risk of CHD mortality was unchanged. These results are mirrored by two other community projects: the Heart To Heart Project in Florence, SC (16), and the Bootheel Heart Health Project in Missouri also showed little success (17).

One factor contributing to the lack of effect may have been secular trends; the projects took place at a time when American lifestyles were becoming generally more healthy and CHD rates were falling. This suggests that when a population starts receiving health education, even if little more than reports in the mass media and government policy pronouncements, large numbers of people will decide to adopt a healthier lifestyle. A health promotion campaign superimposed on such secular trends may have little *additional* benefit. However, we cannot discount the possibility that different types of intervention might be successful, whereas those described above were not.

Fortunately, we have some examples of reasonably successful community projects for heart disease prevention. One of the earliest and most informative of such projects was conducted in North Karelia, a region of eastern Finland that had an exceptionally high rate of the disease (18). The intervention began in 1972 before much health information had reached the population. Nutrition education was an important component of the intervention. During the next few years, CHD rates in North Karelia fell sharply. Later, an intensive educational campaign spread to the rest of the country leading to a national drop in CHD rates (19).

Two other European studies also achieved some success. Positive results were seen in the German Cardiovascular Prevention Study (20), which took place from about 1985–1992, when there was no particularly favorable trend in risk factors for the population as a whole. It was carried out in six regions of the former West Germany using a wide-ranging approach similar to that used in the American community studies. The intervention caused a small decrease in blood pressure and serum cholesterol (about 2%) and a 7% fall in smoking, but had no effect on weight. Action Heart was a community-based health promotion campaign conducted in Rotherham, England (21). After 4 yr, 7% fewer people smoked and 9% more drank low-fat milk, but there was no change in exercise habits, obesity, or consumption of wholemeal bread.

Two recent community campaigns are of particular interest because each was narrowly focused on changing only one aspect of lifestyle and used paid advertising as a major intervention strategy. The 1% Or Less campaign aimed to persuade the population of two cities in West Virginia to switch from whole milk to low-fat milk (1% or less) (22). Advertising in the media was a major component of the intervention (at a cost of slightly less than \$1 per person) together with supermarket campaigns (taste tests and display signs), education in schools, as well as other community education activities. Low-fat milk sales, as a proportion of total milk sales, increased from 18 to 41% within just a few weeks. The intervention campaign was repeated in another city in West Virginia; this

time only paid advertising was used (23). Low-fat milk sales increased from 29 to 46% of total milk sales. An Australian intervention campaign also used paid advertising as a major component (24). The campaign ran in the State of Victoria from 1992–1995 and aimed to increase consumption of fruit and vegetables. Significant increases in consumption of these foods was reported (fruit by 11% and vegetables by 17%).

Taken together, the community intervention studies indicate that small changes in cardiovascular risk factors can be made by the methods used to date. The evidence is suggestive that interventions focused on a small number of changes and using paid advertising can achieve much success.

2.2. Worksite Health Promotion

As an alternative to health promotion using a community intervention approach other interventions have focused on the worksite. A pioneering project of this type, which started in 1976, was carried out in Europe by the World Health Organization. The project was conducted for 6 yr in 80 factories in Belgium, Italy, Poland, and the United Kingdom with the aim of preventing CHD (25,26). The trial achieved modest risk factor reductions (1.2% for plasma cholesterol, 9% for smoking, 2% for systolic blood pressure, and 0.4% for weight); these were associated with a 10% reduction in CHD.

At around the same time Live for Life was carried out by the Johnson & Johnson company in the United States. This comprehensive intervention was started in 1979 and lasted 2 yr. Employees exposed to the program showed significant improvements in smoking behavior, weight, aerobic capacity, incidence of hypertension, days of sickness, and health care expenses (27).

Another worksite project took place in New England (28). Employees were encouraged to increase their intake of fiber and to reduce their fat intake. Compared with the control sites, the program had no effect on fiber intake but fat intake fell by about 3%. A few years later the research team reported that they succeeded in increasing employees' intake of fruit and vegetables by 19% (0.5 serving/d) using an approach that targeted employees and their families (29). A similar project in Minnesota offered employees weight control and smoking cessation programs (30). The program had no effect on weight but the prevalence of smoking was reduced by 2% more than occurred in the control worksites.

2.3. Health Promotion in the Physician's Office

In 1994 two British studies reported the effects of intervention carried out by nurses in the offices of family physicians. The aim was to improve cardiovascular risk factors. Each study was a randomized trial aimed at cardiovascular screening and lifestyle intervention. Both studies achieved only modest changes despite intensive intervention. The OXCHECK study reported no significant effect on smoking or excessive alcohol intake but did observe small significant improvements in exercise participation, weight, dietary intake of saturated fat, and serum cholesterol (31,32). The Family Heart Study achieved a 12% lowering of risk of CHD (based on a risk factor score) (33). Similar findings came from an American study. Patients were given mailed personalized dietary recommendations, educational booklets, a brief physician endorsement, and motivational counseling by phone. After 3 mo the intervention group had increased its consumption of fruit and vegetables by 0.6 serving/d but there was no change in intake of red meat or dairy products (34).

Wilcox and colleagues (35) reviewed 32 intervention studies carried out in a medical setting. They concluded that:

Overall, these interventions tended to produce modest but statistically significant effects for physical activity or exercise, dietary fat, weight loss, blood pressure, and serum cholesterol... Whereas small by conventional statistical definitions, these findings are likely to be meaningful when considered from a public health perspective.

A variation of the above trials is the targeting of patients at high risk of CHD, probably the most cost-effective form of intervention (36). A study from Sweden exemplifies this approach. Subjects at relatively high risk of cardiovascular disease received either simple advice from their physician or intensive advice (five 90-min sessions plus an all-day session) (37). The intensive advice had a modest impact; it reduced the risk of CHD by approx 6%. Two highly successful randomized, controlled trials, one in the United States and one in Finland, were carried out on overweight subjects with impaired glucose tolerance, the goal being to prevent the development of type 2 diabetes (38,39). The interventions consisted of physical activity and dietary change. In both studies the estimated risk reduction was about 58%. These studies are more fully described in Chapter 5. In general, interventions focused on high-risk subjects have been more successful than other interventions (40)

The major deficiency of the high-risk approach, as Rose (41) has pointed out, is that it only affects a minority of future cases: the 15% of men at “high risk” of CHD account for only 32% of future cases. Therefore, to achieve a major effect on CHD it is necessary to target the entire population. This logic also applies to other diseases related to diet and lifestyle practices, such as stroke and cancer.

2.4. Health Promotion and the Individual

What these projects teach us is that appealing to individuals to change their lifestyles will be effective in some instances but not in others and can therefore be frustratingly difficult. Although some projects have achieved a moderate degree of success, typically progress has amounted to no more than a few percentage points. This might be expected to reduce the risk of CHD by about 5–15%. Although this is certainly beneficial, it will not, however, affect the majority of people at risk. Thus exhortations to the individual, whether via the media, in the community, at the worksite, or in the physician’s office, are most unlikely to turn the tide of the Western diseases.

Myriad factors influence people’s lifestyle behavior besides concerns about how to protect health. Social factors, such as housing, employment, and income also shape people’s attitudes, as does education. Advertising directly affects what people want and prices determine whether they can afford it. We are also creatures of habit and custom; resistance may therefore be expected when lifestyle modification demands changes in longstanding behavior and goes against fashion or peer pressure. We must also bear in mind that individuals have little control over many aspects of their physical environment, such as pollution and food contamination. It is probably naïve, therefore, to expect dramatic results from interventions that merely exhort the individual to lead a healthier lifestyle. Indeed, this has sometimes been characterized as “victim blaming.”

This is in no way to dismiss interventions aimed at encouraging people to improve their lifestyle. Quite the contrary, minor changes can make valuable contributions to public

health that more than justify the expense and effort involved. For instance, Jeffery and associates (30) concluded that a smoking cessation program at a worksite costs about \$100 to \$200 per smoker who quits, whereas the cost to the employer for each employee who smokes is far greater. Similarly, Action Heart estimated that the cost per year of life gained was a mere 31 (British) pounds (21).

Health promotion, therefore, can be a cost-effective way to improve lifestyles and thereby improve the health of large numbers of people (42,43). This is emphasized by the fact that in the United States poor dietary practices cost an estimated \$71 billion/yr in lost productivity, premature deaths, and medical costs (44). More research is required to determine why different health promotion projects have achieved such varying levels of success. Would campaigns be more successful if the focus was on one lifestyle change rather than many? Is paid advertising the best means to use scarce resources?

3. GOVERNMENT POLICY

Effective interventions may need to tackle the factors that determine how people make food choices. Such interventions require the implementation of policies, especially by governments. In the words of Davey Smith and Ebrahim (45):

“...even with the substantial resources given to changing people’s diets the resulting reductions in cholesterol concentrations is disappointing. [Health promotion programs] are of limited effectiveness. Health protection—through legislative and fiscal means—is likely to be a better investment.”

Governments have a variety of powers at their disposal that can be put into service. One approach, which relies entirely on voluntary cooperation, is to issue statements of policy. However, these can easily amount to no more than hollow declarations as is illustrated by government policies on tobacco in many countries. On the other hand, policy statements can serve as a clarion call to action. For instance, British and American government policy on diet and disease, in conjunction with the media and medical science, helped change the climate of opinion so that it is now widely accepted that diets should preferably be much lower in fat and richer in fiber.

3.1. *The Effect of Price on Sales*

Prominent among available government powers are legislation and the use of taxation and subsidies. Action on tobacco control most graphically illustrates the necessity for placing these powers at the service of health promotion. Educational efforts over the last three decades have been enormously important in persuading millions of people to quit smoking. Nevertheless, smoking rates are still well more than half of their level of 30 yr ago. There is convincing evidence that price hikes are an effective means to reduce smoking rates (i.e., there is price elasticity) (46). It has been estimated that a 10% increase in price reduces tobacco consumption by about 5%, especially among the lower socio-economic groups (47). The Canadian experience is particularly illuminating. The prevalence of smoking in young Canadians fell by half during the 1980s in tandem with a doubling of the price. This trend was reversed in the early 1990s when the price was slashed in an attempt to reduce smuggling from the United States (48). Price increases appear to be a far more effective means of tobacco control than education or media campaigns (49).

Alcohol intake shows a similar price elasticity to tobacco intake: a price rise of 10% causes a decrease in consumption by 3–8% (50). Studies in Eastern Europe, especially Poland and the former Soviet Union, have demonstrated that pricing, sometimes in combination with rationing, sharply reduces consumption and associated mortality (51).

The lesson we learn from tobacco and alcohol is, first and foremost, that price increases are an effective vehicle to lower consumption.

What applies to tobacco and alcohol also applies to food. By means of taxes and subsidies fruit, vegetables, and wholegrain cereals might become more attractively priced in comparison with less healthy choices. This would most likely induce many people to shift their diets in a healthier direction. Recommendations along these lines in the area of food and nutrition policy were advocated by the World Health Organization (52) at the Adelaide Conference in 1988. The policy recommendation given was: “Taxation and subsidies should discriminate in favor of easy access for all to healthy food and improved diet.”

Jeffery, French, and colleagues in the United States carried out a series of studies that demonstrated the potential of policy interventions, especially of low prices, to increase the consumption of healthy food choices. In one study, investigators reduced by half the price of low-fat snacks sold in vending machines in worksites and secondary schools; purchases of these foods increased by 93% (53). In a worksite cafeteria the range of fruit and salad ingredients was increased at the same time as the price was halved. As a result purchases trebled (54). In a similar study conducted in a high school cafeteria, prices for fruit, carrots, and salads were halved. This led to a fourfold increase in sales of fruit, a twofold increase for carrots, and a slight increase for salads (55).

3.2. Advertising, Marketing, and Labeling of Food

Another area where policy interventions could positively affect food choices concerns food advertising. The annual advertising budget in 2003 for Coca-Cola, Burger King, and McDonald’s were \$473, \$524 million, and \$619 million, respectively (56). In stark contrast, the education component of the National Cancer Institute-sponsored 5-a-Day campaign to promote fruit and vegetable consumption is under a million dollars. Only about 2.2% of the food advertising budget is used to promote consumption of unrefined foods such as fruits, vegetables, whole grains, and beans (57). The extent to which these huge imbalances in advertising budgets affect people’s actual diets is not known but is almost certainly significant (58). Common sense dictates that if advertising did not work, the advertisers would not be wasting their money.

A particular issue is food advertising on children’s TV. A study of advertisements appearing on Saturday morning TV in the United States found that 44% were for fats, oils, and sugar, 23% were for highly sugared cereals, and 11% for fast-food restaurants (59). None were for fruit and vegetables. The authors concluded that: “The diet that is presented on Saturday morning television is the antithesis of what is recommended for healthful eating for children.” Similar findings were reported for Canadian TV (60).

Advertising is but one part of the wider production and marketing strategy of the food industry. James and Ralph (61) pointed out that in response to demand, manufacturers sell foods with less fat but the missing fat often reappears in “added value” foods, which are often little more than concoctions of fat, sugar, and salt. James (62) made the compelling point that the food industry promotes high-fat food because it is so profitable, whereas at the same time food labeling is “completely confusing” (with particular reference to

Britain). The system is, in theory, based on “consumer choice” but, in reality, choices become largely uninformed decisions. Now, there have certainly been serious efforts in recent years to make food labels more user-friendly but there is still a long way to go. For example, large numbers of consumers no doubt fail to realize that beverages, such as “fruit nectar” and “fruit beverage,” have only a small fraction of the fruit juice of a product labeled as “fruit juice.” To make matters worse these beverages typically have images of fruit on their containers. We really don’t know what proportion of consumers actually read the small print and deduce what they are really buying. A more honest label for such drinks would be “fruit-flavored sugar water.”

3.3. Government Policy and Food

The above discussion suggests that government policies concerning food prices and, to a lesser extent, food advertising and labeling may be an effective means to induce desirable changes in eating patterns.

Here we offer some specific suggestions regarding how existing government policies could be modified along the above lines so as to encourage healthier diets (63,64).

1. Subsidies paid to milk producers could be changed to favor low-fat milk. Likewise, by the use of such means as subsidies, grading regulations, and labeling, and perhaps even taxation, the sale of low-fat meat could be encouraged over high-fat varieties.
2. There is always scope for improved food labels so as to facilitate purchase of foods with a low content of fat, especially saturated fat. In addition, labeling and nutrition information should be extended to areas presently outside the system, especially restaurant menus and fresh meat.
3. By means of regulations and rewards, schools could be encouraged to sell meals of superior health value while restricting the sale of junk food. Similar policies could be applied to other institutions under government control, such as the military, prisons, and cafeterias in government offices.
4. Television advertising could be regulated so as to control the content, duration, and frequency of commercials for unhealthy food products, especially when the target audience is children.

The approach discussed above was well put by Blackburn (65):

...even the newer community-based lifestyle strategies continue to assign much of the burden of change to the individual. A shift of focus to reducing, by policy change, many widespread practices that are life-threatening, while enhancing life-supportive practices, should redirect the currently misplaced emphasis on achieving ‘responsible’ behavior and its purported difficulty. For example, local communities may more appropriately be considered to have a ‘youth tobacco access problem,’ approachable in part by regulation, than a ‘youth smoking problem,’ approachable mainly by education. Policy interventions may also be designed to make preventive practice more economical, as well as to encourage the development of more healthy products by industry. They may be a partial answer to another major paradox: although unhealthy personal behavior is medically discouraged for individuals, the whole of society legalizes, tolerates, and even encourages the same practices in the population.

AU: please
specify where
“above.”

AU: please
specify
where above.

Schmid et al. (66) summed up the approach discussed here:

Health departments that support disincentives for high-fat foods, tax breaks for cafeterias that offer healthy food choices, policies that require zoning ordinances to include sidewalks, or school facilities open to the public might be labeled radical or experimental today; tomorrow, however, they may be considered prudent stewards of the public health.

We must at this point inject a note of caution. Although the policy proposals discussed here appear to make excellent sense, there is a lack of solid research evidence to demonstrate their effectiveness (67).

The problem of lead pollution is an excellent illustration of what can be achieved by governmental action. In the 1970s regulations implemented by the American government forced major reductions or removal of lead from gasoline, paint, water, and consumer products. As a result by the early 1990s the blood level of the average American child was less than one-quarter of what it had been in the late 1970s (68,69). Another remarkable success story concerns folic acid. After it was discovered that giving supplements of the vitamin to women during early pregnancy prevents neural tube defects, it became mandatory, starting in 1998, to add it to cereals in both the United States and Canada. This has apparently caused a reduction in the incidence of neural tube defects by approx 20–78% (70–72).

3.4. Barriers Against Public Health Policies

Although many might consider the policies discussed here to be worthy of implementation, it must be appreciated that barriers exist. In particular, industry profits enormously from the sale of highly processed food and has often shown itself to be resistant to change. In this regard industry often secures government support.

The history of attempts to enact legislative control over tobacco illustrate how effective an industry can be when it uses a large budget in attempts to delay, dilute, or stop laws. There is clear evidence regarding the likely reason why the US Congress has been so lethargic when it comes to antismoking legislation. In 1991 and 1992 the average senator received \$11,600 per year from the tobacco industry (73). In the opinion of the researchers who carried out this study: “The money that the tobacco industry donates to members of Congress ensures that the tobacco industry will retain its strong influence in the federal tobacco policy process.” Similarly, researchers looked at the California legislature and concluded: “Legislative behavior is following tobacco money rather than reflecting constituents’ prohealth attitudes on tobacco control” (74).

If the tobacco industry can achieve so many successes, then it will likely be much easier for the food industry to thwart interventions that threaten its profits. This is because the relationship between diet and disease is far less clear than is the case with tobacco. Indeed, there is ample evidence that governments are sympathetic to the wishes of the agricultural and food industries. Typically, although the health arm of governments encourages people to eat less fat, the departments responsible for the agricultural and food industries are largely concerned with maintaining high sales. James and Ralph (61) asserted that: “Analysis of different policies suggest that health issues are readily squeezed out of discussion by economic and vested interests.”

There is considerable evidence of how industry has successfully pressured governments to bow to their wishes on questions of nutrition policy. As discussed by Nestle (75), the meat industry has been particularly effective in rewriting dietary guidelines. In the late 1970s the goal was “eat less meat.” This then became “choose lean meat.” By 1992 people were encouraged to consume at least two or three servings daily. There is also evidence that the 1992 version of Canada’s Food Guide was similarly modified under pressure from the food industry (76).

Discussing the question of salt Goodlee (77), assistant editor of the *British Medical Journal*, put it as follows:

...some of the world’s major food manufacturers have adopted desperate measures to try to stop governments from recommending salt reduction. Rather than reformulate their products, manufacturers have lobbied governments, refused to cooperate with expert working parties, encouraged misinformation campaigns, and tried to discredit the evidence... The tactics over salt are much the same as those used by other sectors of industry. The Sugar Association in the United States and the Sugar Bureau in Britain have waged fierce campaigns against links between sugar and obesity and dental caries.

The pressure exerted by the food industry in protection of its financial welfare is further explored in Chapter 22.

3.5. National Nutrition Policies: Examples

One pioneering project was the Norwegian Nutrition and Food Policy (78). Implemented in 1976 it recognized the need to integrate agricultural, economic, and health policy. The policy included consumer and price subsidies, marketing measures, consumer information, and nutrition education in schools. Unfortunately, the policy clashed with policies aiming to stimulate agriculture. As a result subsidies went to pork, butter, and margarine rather than to potatoes, vegetables, and fruit. Despite these setbacks the policy has achieved some success in moving the national diet in the intended direction (79).

Another noteworthy effort, which implemented several of the policies discussed here, was Heartbeat Wales carried out in Wales from 1985 to 1990 (80). This project was carried out in Wales with the aim of preventing CHD. Specific measures included better food labeling, price incentives, and greater availability of healthier food. The active support was enlisted of catering departments and a food retailer. Unfortunately, the degree of success of this intervention is not known (81).

3.6. Are Nutrition Policies Acceptable to the Public?

An important question concerns the extent to which the public would accept the suggested policies. The issues of seat belt use and drunk driving illustrate that when legislation is implemented and the public is educated regarding their importance, there is a high degree of acceptance. A study by Jeffery and colleagues (82) in the upper Midwest of the United States indicated widespread support for regulatory controls in the areas of alcohol, tobacco and, to a lesser extent, high-fat foods, especially with respect to children and youths. If such policies are acceptable to Americans, then they are also likely to be acceptable in other countries.

4. SOCIOECONOMIC STATUS AND HEALTH

One area of importance is the relationship between socioeconomic status (SES) and health. Low SES is strongly and consistently associated with a raised mortality rate. This applies to total mortality as well as to death from CHD and cancer. The risk ratios are in the range 1.5–4, clearly making SES a major determinant of health. Various measures of SES have been examined—income, social status of job, being unemployed, area of residence, and education—and each seems to manifest a similar relationship to mortality (83–89).

Various studies have investigated why SES is associated with increased mortality. In general, lower SES is associated with higher rates of smoking and a diet of lower nutritional quality. Is SES merely a proxy measure of lifestyle? Or does SES affect health by a more direct mechanism? This question is of much more than mere theoretical importance and has a bearing on health strategies. If people of low SES are unhealthy because they lead an unhealthy lifestyle, then the solution lies in encouraging changes in their lifestyles. However, if a low SES is intrinsically unhealthy, then the solution lies elsewhere.

Our best evidence is that both possibilities are partially correct. After correcting for confounding variables, especially smoking, exercise, blood cholesterol, blood pressure, and weight, most studies have found that the strength of the association between SES and mortality is reduced by about one-quarter or one-half (83,86,90,91). This indicates that people with lower SES tend to lead a less healthy lifestyle and this partly explains their poorer health.

However, this still leaves half to three-quarters of the association between SES and mortality unexplained. In one study the relationship between diet and SES was investigated (92).

This revealed that people of low SES tend to eat a less nutritious diet. Consistent with this, Drewnowski (93) showed in his cost analysis that energy-dense foods, such as sugar, oil, fried potatoes, and refined grains, provide energy at far lower cost than lean meat, fish, fresh vegetables, and fruit. This helps explain why such conditions as hypercholesterolemia, hypertension, and overweight are associated with low SES. Nevertheless, it appears that much of the association between SES and mortality cannot be explained by lifestyle and must therefore be a more direct consequence of low SES.

Psychological factors appear to play an important role in explaining the association between SES and mortality (87,94). The psychological factor most closely associated with risk of poor health is lack of control at work (94–96). We can speculate that other psychological factors, such as resentment, frustration, and a feeling of disempowerment, all contribute to poor health among low-income groups. Whatever the precise mechanisms, there is little doubt that structural elements of inequality within Western societies—economic, educational, social status—lead to reduced health.

But what should be done about this? An effective strategy to deal with the challenge of low SES may have to include efforts to reduce socioeconomic inequalities. If people of lower SES could be persuaded to adopt the same lifestyle, including diet, as those of higher SES, perhaps as much as half of the problem would likely disappear. Therefore, dietary advice is still worth the effort.

5. CONCLUSIONS

Based on the close association between various measures of SES and health, an essential component of enhancing a population's health must be measures to improve health-oriented policies, including the SES of the more deprived sections of the population. This means serious measures by the public health sector to counter such widespread problems as poverty and poor education. In countries where there is a strong tradition of social welfare, such measures can be undertaken by the government. Where more individualistic and business-oriented ideologies exist, implementing such measures are a greater challenge. The private sector would need to act, e.g., through charitable and other non-governmental organizations and private schools. The goal to have both a healthy population and a healthy economy would seem more difficult to realize under such governmental systems; nevertheless, a healthy workforce and population is ultimately in the interest of business. Such societies must also find a way to public health.

This was well put by James (62) with specific regard to obesity:

The needed transformation in thinking on transport, environment, work facilities, education, health and food policies, and perhaps in social and economic policies is unlikely when governments are wedded to individualism, but without these changes to enhance physical activity and alter food quality, societies are doomed to escalating obesity rates.

This viewpoint applies to the relationship between nutrition and all diseases related to it. Where the primary force driving government policy is economics, governments and the public health sector must be encouraged to prioritize maintenance and improvement of the national health. The weight of evidence strongly suggests that when governments reorientate toward economic issues, they lose sight of nutrition policies, and national health can easily become a distant priority. In that case the failure of the government and business sectors to work together for the public health may lose great opportunities for the prevention of such diseases as cancer and CHD.

The philosophy discussed here need not stop at nutrition: what applies to nutrition certainly applies to other areas of lifestyle, especially to smoking. Exercise also lends itself to policy initiatives. What is the point in telling people to exercise if there is a lack of appropriate facilities? What is the point in telling people to cycle if the roads are too dangerous for bikes? What is needed is a comprehensive view of human health that takes all such factors into consideration.

As the century unfolds people may look back with incredulity on today's world where narrow commercial interests and government *laissez-faire* predominate while the national health founders. More optimistically, an innovative marriage of business interests, individualism, and recognition of community health needs will emerge.

ACKNOWLEDGMENT

The work in this chapter done by NT was partly carried out at the Chronic Diseases of Lifestyle Programme, Medical Research Council, Cape Town, South Africa.

REFERENCES

1. National Center for Chronic Disease Prevention and Health Promotion. Smoking Prevalence Among U.S. Adults. www.cdc.gov/tobacco/research_data/adults_prev/prevali. Last accessed January 11, 2005.
2. Flegal, KM, Carroll MD, Kuczmarski RJ, Johnson CL. Overweight and obesity in the United States: prevalence and trends, 1960–1994. *Int J Obesity* 1998; 22:39–47.
3. Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999–2000. *JAMA* 2002; 288:1723–1727.
4. Siedell JC. Obesity in Europe: scaling an epidemic. *Int J Obesity* 1995; 19(Suppl. 3):S1–S4.
5. Krebs-Smith SM, Kantor LS. Choose a variety of fruits and vegetables daily: understanding the complexities. *J Nutr* 2001; 131(2S-1):487S–501S.
6. Tippet KS, Cleveland LE. . In: Frazao E, ed. *America's Eating Habits: Changes and Consequences*. USDA/ERS, Washington DC, April 1999. Agricultural Information Bulletin Number 750, pp. 51–70.
7. Putnam J, Allshouse J, Kantor LS. U.S. per capita food supply trends: more calories, refined carbohydrates, and fats. *Food Review* 2002; 25:2–15.
8. Activity and Health Research. Allied Dunbar National Fitness Survey, a Report on Activity Patterns and Fitness Levels: Main Findings. Sports Council and Health Education Authority, London, 1992.
9. Jones DA, Ainsworth BE, Croft JB, Macera CA, Lloyd EE, Yusuf HR. Moderate leisure-time physical activity: who is meeting the public health recommendations? A national cross-sectional study. *Arch Fam Med* 1998; 7:285–289.
10. Anon. Self-reported physical inactivity by degree of urbanization—United States, 1996. *MMWR Morb Mortal Wkly Rep* 1998; 47:1097–1100.
11. Redman S, Spencer EA, Sanson-Fisher R. The role of the mass media in changing health-related behavior: a critical appraisal of two models. *Health Prom Int* 1990; 5:85–101.
12. Farquhar JW, Fortmann SP, Flora JA, et al. Effects of communitywide education on cardiovascular disease risk factors. The Stanford Five-City Project. *JAMA* 1990; 264:359–365.
13. Luepker RV, Murray DM, Jacobs DR, et al. Community education for cardiovascular disease prevention: risk factor changes in the Minnesota Heart Health Program. *Am J Public Health* 1994; 84:1383–1393.
14. Carleton RA, Lasater TM, Assaf AR, Feldman HA, McKinlay S, Pawtucket Heart Health Program Writing Group. The Pawtucket Heart Health Program: community changes in cardiovascular risk factors and projected disease risk. *Am J Public Health* 1995; 85:777–785.
15. Winkleby MA, Feldman HA, Murray DM. Joint analysis of three U.S. community intervention trials for reduction of cardiovascular risk. *J Clin Epidemiol* 1997; 50:645–658.
16. Goodman RM, Wheeler FC, Lee PR. Evaluation of the Heart To Heart Project: lessons from a community-based chronic disease prevention project. *Am J Health Promot* 1995; 9:443–455.
17. Brownson RC, Smith CA, Pratt M, et al. Preventing cardiovascular disease through community-based risk reduction: the Bootheel Heart Health Project. *Am J Public Health* 1996; 86:206–213.
18. Puska P, Nissinen A, Tuomilehto J, et al. The community based strategy to prevent coronary heart disease: conclusions from the ten years of North Karelia project. *Ann Rev Public Health* 1985; 6:147–193.
19. Valkonen T. Trends in regional and socio-economic mortality differentials in Finland. *Int J Health Sci* 1992; 3:157–166.
20. Hoffmeister H, Mensink GB, Stolzenberg H, et al. Reduction of coronary heart disease risk factors in the German Cardiovascular Prevention study. *Prev Med* 1996; 25:135–145.
21. Baxter T, Milner P, Wilson K, et al. A cost effective, community based heart health promotion project in England: prospective comparative study. *BMJ* 1997; 315:582–585.
22. Reger B, Wootan MG, Booth-Butterfield S, Smith H. 1% Or Less: a community-based nutrition campaign. *Public Health Rep* 1998; 113:410–419.

23. Reger B, Wootan MG, Booth-Butterfield S. Using mass media to promote healthy eating: A community-based demonstration project. *Prev Med* 1999; 29:414–421.
24. Dixon H, Boland R, Segan C, Stafford H, Sindall C. Public reaction to Victoria's "2 Fruit 'n' 5 Veg Day" campaign and reported consumption of fruit and vegetables. *Prev Med* 1998; 27:572–582.
25. World Health Organisation European Collaborative Group. European collaborative trial of multifactorial prevention of coronary heart disease: final report on the 6-year results. *Lancet* 1986; i:869–872.
26. World Health Organisation European Collaborative Group. Multifactorial trial in the prevention of coronary heart disease. *Eur Heart J* 1983; 4:141–147.
27. Breslow L, Fielding J, Herrman AA, Wilbur CS. Worksite health promotion: its evolution and the Johnson & Johnson experience. *Prev Med* 1990; 19:13–21.
28. Sorensen G, Morris DM, Hunt MK, et al. Work-site nutrition intervention and employees' dietary habits: the Treatwell program. *Am J Public Health* 1992; 82:877–880.
29. Sorensen G, Stoddard A, Peterson K, et al. Increasing fruit and vegetable consumption through worksites and families in the Treatwell 5-a-Day Study. *Am J Public Health* 1999; 89:54–60.
30. Jeffery RW, Forster JL, French SA, et al. The Healthy Worker Project: a work-site intervention for weight control and smoking cessation. *Am J Public Health* 1993; 83:395–401.
31. Imperial Cancer Research Fund OXCHECK Study Group. Effectiveness of health checks conducted by nurses in primary care: results of the OXCHECK study after one year. *BMJ* 1994; 308:308–312.
32. Imperial Cancer Research Fund OXCHECK Study Group. Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *BMJ* 1995; 310:1099–1104.
33. Family Heart Study Group. Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British Family Heart Study. *BMJ* 1994; 308:313–320.
34. Delichatsios HK, Hunt MK, Lobb R, Emmons K, Gillman MW. EatSmart: efficacy of a multifaceted preventive nutrition intervention in clinical practice. *Prev Med* 2001; 33(2 Pt 1):91–98.
35. Wilcox S, Parra-Medina D, Thompson-Robinson M, Will J. Nutrition and physical activity interventions to reduce cardiovascular disease risk in health care settings: a quantitative review with a focus on women. *Nutr Rev* 2001; 59:197–214.
36. Field K, Thorogood M, Silagy C, Normand C, O'Neill C, Muir J. Strategies for reducing coronary risk factors in primary care: which is most cost effective? *BMJ* 1995; 310:1109–1112.
37. Lindholm LH, Ekblom T, Dash C, Eriksson M, Tibblin G, Schersten B. The impact of health care advice given in primary care on cardiovascular risk. *BMJ* 1995; 310:1105–1109.
38. Tuomilehto J, Lindstrom J, Eriksson JG, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 2001; 344:1343–1350.
39. Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002; 346:393–403.
40. Ammerman AS, Lindquist CH, Lohr KN, Hersey J. The efficacy of behavioral interventions to modify dietary fat and fruit and vegetable intake: a review of the evidence. *Prev Med* 2002; 35:25–41.
41. Rose G. *The Strategy of Preventive Medicine*. Oxford University Press, Oxford, 1992.
42. Aldana SG. Financial impact of health promotion programs: a comprehensive review of the literature. *Am J Health Promot* 2001; 15:296–320.
43. Golaszewski T. Shining lights: studies that have most influenced the understanding of health promotion's financial impact. *Am J Health Promot* 2001; 15:332–340.
44. Frazao E. High costs of poor eating patterns. In: Frazao E, ed. *America's Eating Habits: Changes and Consequences*. Washington, DC: USDA/ERS, April 1999. Agricultural Information Bulletin Number 750, pp. 5–32.
45. Davey Smith G, Ebrahim S. Dietary change, cholesterol reduction, and the public health—what does meta-analysis add? *BMJ* 1998; 316:1220.
46. Meier KJ, Licari MJ. The effect of cigarette taxes on cigarette consumption, 1955 through 1994. *Am J Public Health* 1997; 87:1126–1130.
47. Townsend J. Price and consumption of tobacco. *Br Med Bull* 1996; 52:132–142.
48. Stephens T, Pedersen LL, Koval JJ, Kim C. The relationship of cigarette prices and no-smoking bylaws to the prevalence of smoking in Canada. *Am J Public Health* 1997; 87:1519–1521.
49. Townsend J, Roderick P, Cooper J. Cigarette smoking by socioeconomic group, sex, and age: effects of price income, and health publicity. *BMJ* 1994; 309:923–927.

50. Anderson P, Lehto G. Prevention policies. *Br Med Bull* 1994; 50:171–185.
51. Zatonski W. Alcohol and health: what is good for the French may not be good for the Russians. *J Epidemiol Commun Hlth* 1998; 52:766, 767.
52. World Health Organisation Regional Office for Europe. The Adelaide Recommendations: Healthy Public Policy Regional Office for Europe. World Health Organisation, Geneva, 1988.
53. French SA, Jeffery RW, Story M, et al. Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study *Am J Public Health* 2001; 91:112–117.
54. Jeffery RW, French SA, Raether C, Baxter JE. An environmental intervention to increase fruit and salad purchases in a cafeteria. *Prev Med* 1994; 23:788–792.
55. French SA, Story M, Jeffery RW, et al. Pricing strategy to promote fruit and vegetable purchase in high school cafeterias. *J Am Diet Assoc* 1997; 97:1008–1010.
56. Advertising Age, Advertising Age. 100 Leading National Advertisers: 49th Annual Report. June 28, 2004.
57. Gallo AE. Food advertising in the United States. In: Frazao E, ed. *America's Eating Habits: Changes & Consequences*. USDA, Washington, DC, 1999.
58. Nestle M, Wing R, Birch L, et al. Behavioral and social influence on food choice. *Nutr Rev* 1998; 56:S50–S64.
59. Kotz K, Story M. Food advertisements during children's Saturday morning television programming: Are they consistent with dietary recommendations? *J Am Diet Assoc* 1994; 94:1296–1300.
60. Ostbye T, Pomerleau, White M, Coolich M, McWhinney J. Food and nutrition in Canadian "prime time" television commercials. *Can J Public Health* 1993; 84:370–374.
61. James WPT, Ralph A. National strategies for dietary change, In: Marmot M, Elliott P, eds. *Coronary Heart Disease. From Aetiology to Public Health*. Oxford University Press, Oxford, UK, 1992, pp. 525–540.
62. James WPT. A public health approach to the problem of obesity. *Int J Obesity* 1995; 19(Suppl 3):S37–S45.
63. Nestle M, Jacobson MF. Halting the obesity epidemic: a public health policy approach. *Public Health Rep* 2000; 115:12–24.
64. Jacobson MF, Brownell KD. Small taxes on soft drinks and snack foods to promote health. *Am J Public Health* 2000; 90:854–857.
65. Blackburn H. Community programmes in coronary heart disease prevention health promotion: changing community behaviour. In: Marmot M, Elliott P, eds. *Coronary Heart Disease. From Aetiology to Public Health*. Oxford University Press, Oxford, UK, 1992, pp. 495–514.
66. Schmid TL, Pratt M, Howze E. Policy as intervention: environmental and policy approaches to the prevention of cardiovascular disease. *Am J Public Health* 1995; 85:1207–1211.
67. Finkelstein E, French S, Variyam JN, Haines PS. Pros and cons of proposed interventions to promote healthy eating. *Am J Prev Med* 2004; 27(3 Suppl):163–171.
68. Pirkle JL, Brody DJ, Gunter EW, et al. The decline in blood lead levels in the United States. *JAMA* 1994; 272:284–291.
69. Brody DJ, Pirkle JL, Kramer RA, et al. Blood lead levels in the US population. *JAMA* 1994; 272:277–283.
70. Honein MA, Paulozzi LJ, Mathews TJ, Erickson JD, Wong LY. Impact of folic acid fortification of the US food supply on the occurrence of neural tube defects. *JAMA* 2001; 285:2981–2986.
71. Gucciardi E, Pietrusiak MA, Reynolds DL, Rouleau J. Incidence of neural tube defects in Ontario, 1986–1999. *CMAJ* 2002; 167:237–240.
72. Liu S, West R, Randell E, et al. A comprehensive evaluation of food fortification with folic acid for the primary prevention of neural tube defects. *BMC Pregnancy Childbirth* 2004 27; 4(1):20.
73. Moore S, Wolfe SM, Lindes D, Douglas CE. Epidemiology of failed tobacco control legislation. *JAMA* 1994; 272:1171–1175.
74. Glantz SA, Begay ME. Tobacco industry campaign contributions are affecting tobacco control policymaking in California. *JAMA* 1994; 272:1176–1182.
75. Nestle M. *Food Politics. How the Food Industry Influences Nutrition and Health*. University of California Press, Berkeley, CA, 2002.
76. Anon. Industry forced changes to food guide, papers show. *Toronto Star*, 1993 (January 15):A2.
77. Goodlee F. The food industry fights for salt. *BMJ* 1996; 312:1239, 1240.
78. Klepp K, Forster JL. The Norwegian Nutrition and Food Policy: an integrated approach to a public health problem. *J Public Health Policy* 1985; 6:447–463.

AU:Please
clarify vol#
and pg range
in ref 72

79. Norum KR, Johansson L, Botten G, Bjornboe G-EA, Oshaug A. Nutrition and food policy in Norway: effects on reduction of coronary heart disease. *Nutr Rev* 1997; 55:S32–S39.
80. Corson J. Heartbeat Wales: a challenge for change. *World Hlth Forum* 1990; 11:405–411.
81. Tudor-Smith C, Nutbeam D, Moore L, Catford J. Effects of the Heartbeat Wales programme over five years on behavioural risks for cardiovascular disease: quasi-experimental comparison of results from Wales and a matched reference area. *BMJ* 1998; 316:818–822.
82. Jeffery RW, Forster JL, Schmid TL, McBride CM, Rooney BL, Pirie PL. Community attitudes toward public policies to control alcohol, tobacco, and high-fat food consumption. *Am J Prev Med* 1990; 6:12–19.
83. Bucher HC, Ragland DR. Socioeconomic indicators and mortality from coronary heart disease and cancer: a 22-year follow-up of middle-aged men. *Am J Public Health* 1995; 85:1231–1236.
84. Lin RJ, Shah CP, Svoboda TJ. The impact of unemployment on health: a review. *Can Med Ass J* 1995; 153:529–540.
85. Sorlie PD, Backlund E, Keller JB. US mortality by economic, demographic, and social characteristics: The National Longitudinal Mortality Study. *Am J Public Health* 1995; 85:949–956.
86. Davey Smith G, Neaton JD, Wentworth D, Stamler R, Stamler J. Socioeconomic differentials in mortality risk among men screened for the Multiple Risk Factor Intervention Trial: I. White men. *Am J Public Health* 1996; 86:486–496.
87. Lynch JW, Kaplan GA, Cohen RD, Tuomilehto J, Salonen JT. Do cardiovascular risk factors explain the relation between socioeconomic status, risk of all-cause mortality, cardiovascular mortality, and acute myocardial infarction? *Am J Epidemiol* 1996; 144:934–942.
88. Morris JN, Blane DB, White IR. Levels of mortality, education, and social conditions in the 107 local education authority areas of England. *J Epidemiol Commun Hlth* 1996; 50:15–17.
89. Mackenbach JP, Kunst AE, Cavelaars AEJM, Groenhof F, Geurts JJM. Socioeconomic inequalities in morbidity and mortality in western Europe. *Lancet* 1997; 349:1655–1659.
90. Morris JK, Cook DG, Shaper AG. Loss of employment and mortality. *BMJ* 1994; 308:1135–1139.
91. Pekkanen J, Tuomilehto J, Uutela A, Vartiainen E, Nissinen A. Social class, health behaviour, and mortality among men and women in eastern Finland. *BMJ* 1995; 311:589–593.
92. Dubois L, Girard M. Social position and nutrition: a gradient relationship in Canada and the USA. *Eur J Clin Nutr* 2001; 55:366–373.
93. Drewnowski A. Obesity and the food environment: dietary energy density and diet costs. *Am J Prev Med* 2004; 27(3 Suppl):154–162.
94. Marmot MG, Bosma H, Brunner E, Stansfield S. Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet* 1997; 350:235–239.
95. North FM, Syme SL, Feeney A, Shipley M, Marmot M. Psychosocial work environment and sickness absence among British civil servants: The Whitehall II Study. *Am J Public Health* 1996; 86:332–340.
96. Johnson JV, Stewart W, Hall EM, Fredlund P, Theorell T. Long-term psychosocial work environment and cardiovascular mortality and among Swedish men. *Am J Public Health* 1996; 86:324–331.