

Chapter 18

Population Nutrition and Health Promotion

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• Prevention of coronary heart disease • Government policy • Socioeconomic status

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, and dietary, such as intake of fruits and vegetables. The aim has most often been to reduce excess weight, lower the blood cholesterol, blood pressure, and blood glucose, and prevent coronary heart disease (CHD).
- Results of these campaigns have been mixed. Some have achieved very little while 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 of individually oriented health promotion programs, we argue in support of government policy initiatives in order to improve population health. This includes use of taxes and subsidies to adjust the price of various foods 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.

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- Policy measures along these lines are likely to meet with resistance from the food industry.
- Low socioeconomic status (SES), 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 focused on engaging or affecting these disadvantaged people.

18.1 Introduction

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

While 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 many health promotion campaigns take a broad lifestyle approach and simultaneously tackle nutrition, exercise, and smoking.

Trends towards a healthier lifestyle and better health over recent decades have been inconsistent. In the USA, deaths from coronary heart disease (CHD) have fallen by half since their peak in the late 1960s. Yet, at the same time, the USA has been struck by an epidemic of obesity. Between 1976–1980 and 1988–1994 obesity among adults jumped from 14.5 to 22.9% [1]. This then climbed to 30.5% in 1999–2000 [2]. Since then the curve seems to have flattened: in 2007–2008, the prevalence of adults who were overweight was 68%, of whom 32% were obese [3]. Much the same trend is seen with American children and adolescents: an enormous rise in the prevalence of overweight and obesity between the years 1980 and about 2000, followed since then by a flatter curve [4]. A fast rising prevalence of overweight and obesity has also been reported from all other Western countries [5].

Despite vast amounts of dietary information being disseminated, there has been an underwhelming rate of progress in improving the American diet. Between 1970 and 2007, Americans made little change in their consumption of fruits and vegetables. It is currently around 2–3 servings/day, about half the recommended intake [6]. The trend for intake of whole grains has moved in the wrong direction and is now about one-third of the recommended intake [6].

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. There was an impressive fall by about half in smoking rates in men in many Western countries starting around 1970. But in the USA this progress seems to have slowed to a crawl since around 1990: the proportion of Americans who smoke is stuck at about one in four [7]. About half of adults state that they engage in regular physical activity, a figure that has changed little in recent years [7–9]. Things are no better in the UK: about 30% of British adults reported that they engage in at least moderate physical activity for at least 30 min on at least 5 days each week [10].

18.2 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. Here we look at various types of health promotion campaigns, most of them focused on risk factors for cardiovascular disease (CVD).

18.2.1 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 USA 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 take exercise. Each program lasted 5–8 years 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 et al. [11] 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/year (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 [12]. A third project was the Pawtucket Heart Health Program in which the population of Pawtucket, Rhode Island received intensive education at the grass roots level: schools, local government, community organizations, supermarkets, and so forth, but without involving the media [13].

An analysis combined the results of the three studies so as to increase the sample size to 12 cities [14]. Improvements in blood pressure, blood cholesterol, BMI, 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: little success was seen in the Heart To Heart Project in Florence, South Carolina [15] and the Bootheel Heart Health Project in Missouri [16].

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.

Fortunately, we have some examples of reasonably successful community projects for heart disease prevention. One of the earliest and most successful such

projects was conducted in North Karelia, a region of eastern Finland which had an exceptionally high rate of the disease [17]. Indeed, Finnish men had the distinction of having the highest mortality rate in the world for CHD. The intervention began in 1972 before much health information had reached the population. Nutrition education was an important component of the intervention. Over the next few years, CHD rates in North Karelia fell sharply. Between 1972 and 2007, CHD mortality in middle-aged men fell by an astonishing 80% [18]. This can be largely explained by changes in risk factors: serum cholesterol declined by 22% while sharp decreases were also seen for blood pressure and smoking. An intensive educational campaign spread to the rest of Finland 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 to 1992, when there was no particular 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 years, 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 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 a dollar 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 to 1995 and aimed to increase consumption of fruits and vegetables. Significant increases in consumption of these foods were reported (fruits by 11% and vegetables by 17%).

Another area where campaigns have been narrowly focused on trying to change just one aspect of lifestyle has been those attempting to increase levels of exercise. Numerous such interventions have been carried out and some encouraging results have appeared. Several dozen interventions have tried to persuade people to engage in more walking. A systematic review of these concluded that people can be encouraged to walk more by interventions tailored to their needs, targeted at the most sedentary or at those most motivated to change, and delivered either at the level of the individual or household or through group-based approaches [25]. By this means, interventions can potentially increase walking by up to 30–60 min/week on average.

Several dozen interventions have also attempted to increase exercise levels among children and adolescents [26]. Results have been very mixed. The authors of a systematic review concluded that: "For adolescents, multicomponent interventions and interventions that included both school and family or community involvement have the potential to make important differences to levels of physical activity and should be promoted." [26].

A recent study that is worthy of attention is Romp & Chomp [27]. This is a community-wide, multisetting, multistrategy intervention conducted on young children in Australia from 2004 to 2008. The goals of the intervention were to reduce the prevalence of obesity by improving diets and encouraging children to engage in more exercise. This intervention was carried out in the city of Geelong with a target group of 12,000 children. Despite the ambitious scope of the intervention it did achieve its goals.

The investigators summarize the current situation as follows:

Early-childhood settings in the intervention areas are now places in which fruit, vegetables, and water are promoted and packaged snacks and sweet drinks are restricted or discouraged. Driving these changes has been the implementation and enforcement of effective policy, cultural changes within organizations, and capacity-building with early-childhood teachers and caregivers. The consistency and continued reinforcement of messages across the community was a key factor in the success of the intervention, in addition to the capacity building of a willing and influential group of gatekeepers (early-childhood workers). Utilizing capacity-building and policy-based strategies also increases the potential of the intervention to benefit future cohorts of children.

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 when well planned.

18.2.2 *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 over 6 years in 80 factories in Belgium, Italy, Poland, and the UK with the aim of preventing CHD [28, 29]. 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 USA. This comprehensive intervention was started in 1979 and lasted 2 years. Employees exposed to the program showed significant improvements in smoking behavior, weight, aerobic capacity, incidence of hypertension, days of sickness, and health-care expenses [30].

Another worksite project took place in New England [31]. 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 fruits and vegetables by 19% (0.5 serving/day) using an approach that targeted employees and their families [32]. A similar project in Minnesota offered employees weight control and smoking cessation programs [33]. No effect was seen on weight but the prevalence of smoking was reduced by 2% more than occurred in the control worksites.

The above reports represent a small selection of large numbers of such interventions that have taken place. The American Heart Association recently reviewed the subject [34]. One of their conclusions is that interventions at the worksite can be highly cost-effective, saving employers several dollars for each dollar invested.

18.2.3 Health Promotion in the Physician's Office

In 1994, two British studies reported the effects of health promotion activities 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 [35, 36]. The Family Heart Study achieved a 12% lowering of risk of CHD (based on a risk factor score) [37]. Similar findings came from an American study where patients were given mailed personalized dietary recommendations, educational booklets, a brief physician endorsement, and motivational counseling by phone. After 3 months the intervention group had increased its consumption of fruits and vegetables by 0.6 serving/day but there was no change in intake of red meat or dairy products [38].

Wilcox et al. [39] 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 [40]. A study from Sweden exemplifies this approach. Subjects at relatively high risk of CHD received either simple advice from their physician or intensive advice (five 90-min sessions plus an all-day session) [41]. The intensive advice had a modest impact; it reduced the risk of CHD by approximately 6%. Two highly successful randomized controlled trials, one in the USA and one in Finland, were carried out on overweight subjects with

impaired glucose tolerance, the goal being to prevent the progression to type 2 diabetes [42, 43]. 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 Chap. 7 by Temple and Steyn. In general, interventions focused on high-risk subjects have been more successful than other interventions [44].

The major deficiency of the high-risk approach, as Rose [45] 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, such as stroke and cancer.

18.2.4 Computer-Based Health Promotion

In recent years, many health promotion programs have been developed that use computers for delivering information. This is a diverse field with programs targeting exercise, diet, obesity, and smoking. Promising findings have been reported from many interventions [46–49].

18.2.5 Health Promotion and the Individual

What the above 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. While 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%. While 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 chronic diseases of lifestyle.

Pennant et al. [50] recently carried out a systematic review that assessed the effectiveness of community programs for the prevention of CVD. They included only those interventions that targeted the whole population living within a defined geographic area. Their conclusions are similar to the comments made above. Overall, systolic blood pressure was reduced by 2.9 mmHg, total cholesterol level by 0.01 mmol/L, and smoking prevalence by 1.7%. The estimated decrease in 10-year CVD risk was 9.1%. This is relative risk, meaning the proportion of cases prevented. The estimated decrease in absolute risk was 0.65%, indicating that one case of CVD would be prevented during 10 years for every 150 people in the target population. The authors of this review were unable to identify factors that made program success more likely.

A remarkable feature about the studies reviewed by Pennant et al. [50] is that almost every one of them was done before the year 2000 (35 were carried out

between 1970 and 2000 but only one between 2000 and 2008). This suggests that in the field of health promotion the hare has been replaced by a tortoise! The one area where significant progress has been made in recent years is the development of computer-based interventions.

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, food contamination, and where and what kinds of foods are sold. 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 [33] concluded that a smoking cessation program at a worksite costs about \$100–\$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 educate and persuade large numbers of people to lead a healthier lifestyle and thereby improve their health [51, 52]. 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 utilize scarce resources?

18.3 Government Policy

18.3.1 *The Case for Public Health Policies*

While health promotion is a valuable and cost-effective means to improve the health of the population, it clearly has major limitations. We now turn our attention to an alternative strategy.

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 [53]: "... even with the substantial resources given to changing people's diets the resulting

reductions in cholesterol concentrations are disappointing. [Health promotion programs] are of limited effectiveness. Health protection—through legislative and fiscal means—is likely to be a better investment.” These words were published in 1998 but there is no reason to think differently today.

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. This is well illustrated by government policies on tobacco which, for many years and in many countries, meant very little. On the other hand, policy statements can serve as a clarion call to action. For instance, British and American government policy on diet, lifestyle, and disease, in conjunction with the media and medical science, helped change the climate of opinion so that it is now widely accepted that, for example, people should exercise more and diets should contain more fruits and vegetables.

But governments have other powerful tools that can bring about positive changes in lifestyle across much of the population. This whole subject is discussed in more detail in Chap. 23 by Temple. Here we summarize the key points.

For many products, there is a relationship between price and sales. This has been clearly shown for tobacco and alcohol and certainly applies to food. By means of taxes and subsidies, fruits, vegetables, and wholegrain cereals can be made more attractively priced in comparison with less healthy choices, such as beverages containing sugar. This would most likely induce many people to shift their diets in a healthier direction.

Food advertising is another area where policy interventions might positively affect food choices. The annual worldwide advertising budgets in 2010 for Burger King, Coca-Cola, PepsiCo, and McDonald's were \$392 million, \$758 million, \$1.01 billion, and \$1.3 billion, respectively [54]. In stark contrast, the money allocated by federal and state governments for promoting consumption of unrefined foods, such as fruits, vegetables, whole grains, and beans, is minuscule. The extent to which these vast imbalances in advertising budgets affect people's actual diets is not known but is almost certainly significant [55]. 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. It is overwhelmingly (80–90%) for unhealthy food choices or for fast-food restaurants and helps boost sales of the advertised foods. This advertising has been linked to the risk of obesity in children and adolescents.

Advertising is but one part of the wider production and marketing strategy of the food industry. Manufacturers sell foods with less fat but the missing fat often reappears in foods that are often little more than concoctions of fat, sugar, white flour, and salt. The food industry promotes these foods because they are so profitable. At the same time food labeling is a minefield of confusion for large sections of the population, as detailed in Chap. 17. The system is, in theory, based on “consumer choice” but, in reality, choices are largely uninformed.

The above information compels the view that government policies in such areas as the pricing, advertising, and labeling of food may be an effective means to induce desirable changes in eating patterns.

Here we offer some specific suggestions as to how existing government policies could be modified along the above lines so as to encourage healthier diets [56].

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 much scope for improved food labels so as to facilitate purchase of foods with a low content of saturated fat, sugar, and salt. In addition, labeling and nutrition information should be extended to areas presently outside the system, such as 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. TV advertising could be regulated so as to control the content, duration, and frequency of advertising for unhealthy food products, especially when the target audience is children.

The approach discussed earlier was well put by Blackburn in an article published in 1992 [57]:

... 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: while unhealthy personal behavior is medically discouraged for individuals, the whole of society legalizes, tolerates, and even encourages the same practices in the population.

We must at this point inject a note of caution. While the policy proposals discussed here appear to make excellent sense, there is a lack of solid research evidence to demonstrate their effectiveness [58].

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 [59, 60]. 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 (NTD), it became mandatory, starting in 1998, to add it to cereals in both the USA and Canada. This has almost certainly been responsible for a major reduction in the incidence of NTD by ~20–78% [61–63].

18.3.2 *Barriers Against Public Health Policies*

While many might consider the policies discussed here to be worthy of implementation, it must be appreciated that there are barriers that need to be overcome. 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 utilizes a large budget, much of it used for contributions to political parties, in attempts to delay, dilute, or stop laws. There is clear evidence that this is a major reason why the US Congress has for decades been so lethargic when it comes to antismoking legislation. The inherent conflict of interest also promotes government inaction; cigarette companies support the government through tax revenues.

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, while the health arm of governments encourages people to eat a healthier diet, the departments responsible for the agricultural and food industries are mainly focused on maintaining high production and sales.

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 [64], 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. More recent US dietary guidelines urge reduction of "solid fats and added sugars" (SoFAS), continuing a long tradition of using nutrients as euphemisms for foods, in this case meat and sodas, for example [65].

The pressure exerted by the food industry in protection of its financial welfare is further explored in Chap. 22 by Nestle and Wilson.

18.3.3 *National Nutrition Policies: The Example of Norway*

These barriers to effective nutrition policies help explain why national governments have rarely implemented national nutrition policies. One of the rare examples is the case of Norway. The Norwegian Nutrition and Food Policy is a pioneering project that was implemented in 1976 [66]. 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 fruits. Despite these setbacks, the policy has achieved some success in moving the national diet in the intended direction [67].

Most governments have de facto nutrition policies for such things as school meals and food assistance to the poor, but these are usually disconnected from other areas of food policy. The massive U.S. farm legislation, for example, governs such matters as agricultural subsidies (roughly 15% of authorized spending), food assistance programs (67%), and the rest for conservation, organic production, research, and other programs [68]. Food advocates are becoming increasingly active in attempts to bring agricultural and nutrition assistance policies in line with health promotion policies.

18.3.4 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, drunk driving, and bans on smoking in many indoor public places illustrate that when legislation is implemented and the public is educated as to its importance, there is a high degree of acceptance.

18.4 Campaigns Against Obesity

It was established during the 1950s and 1960s that smoking is a major cause of disease and death. Finally, in the 1980s, governments in many countries started to take the problem seriously. Even in countries where smoking had been long accepted as almost normal, such as France, Ireland, and China, the governments have implemented tough policies, such as a ban on smoking in many indoor public places. This story is now starting to be repeated with obesity.

Many of the policies advocated above have come together in campaigns that have focused on curbing the obesity epidemic. An excellent—but, alas, rare—example of the implementation of a broad strategy comes from an intervention carried out in France [69]. Children in schools in two towns were given nutrition education. This program was launched in 1992 and expanded somewhat after 1997 to the adult population of the towns. From 1999 there was even wider community activity in support of more physical activity and a healthier lifestyle. At the same time there was much media interest. The BMI of children aged 5–12 years was measured in 2004 and compared with two other towns that received no intervention. The findings revealed that the children in the intervention towns had a lower BMI (15.7 vs. 16.5) and a lower prevalence of overweight or obesity (7.4% vs. 19.4% in boys; 10.4% vs. 16.0% in girls). This is a remarkable degree of success.

18.5 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 with mortality [70–76].

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. But, 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 a quarter or a half [70, 73, 77, 78]. A recent British cohort study that included four separate assessments of lifestyle during the follow-up period, in addition to the baseline check, found that 72% of the association between SES and risk of death was now explained by lifestyle, especially exercise, diet, and alcohol intake [79]. These reports indicate that people with lower SES tend to lead a less healthy lifestyle and this partly explains their poorer health.

But this still leaves much of the association between SES and mortality unexplained, somewhere between one quarter and three quarters. Many studies carried out in Europe and North America have demonstrated that people of low SES tend to eat a less nutritious diet [80]. Consistent with this, Drewnowski [81] 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 obesity 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 [74, 82]. The psychological factor most closely associated with risk of poor health is lack of control at work [82–84]. 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 must include efforts to reduce socioeconomic inequalities [85]. But 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. Dietary advice is still worth some effort although approaches that change the food environment to make it easier for low-income groups to have access to and to afford healthier foods stand a better chance of being effective.

18.6 Government Policy: Some Final Comments

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 to counter such widespread problems as poverty and poor education, and reducing income inequities. In countries where there is a strong tradition of social welfare, appropriate measures can be undertaken by the government. Where more individualistic and business-oriented ideologies are the norm, as in the USA, implementing such measures presents a much greater challenge. The private sector would need to act, for example, through charitable and other nongovernmental organizations and private schools. The goal of achieving 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 viewpoint applies to the relationship between nutrition and the diseases related to it. When governments are focused on economic issues, they lose sight of nutrition policies, and national health can easily become a low priority. In that case the failure of the government and business sectors to work together for the public health may cause the loss of great opportunities for the prevention of such diseases as cancer and CHD. In these circumstances governments must be pressured to implement policies for the improvement of the national health.

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 flounders. More optimistically, an innovative meshing of business interests, individualism, and recognition of community health needs will emerge.

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