

Changing the diet of a nation: Population/regulatory strategies for a developed economy

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The principal nutritional problems of developed economies are related to the excessive and unbalanced intake of energy and nutrients. During the 20th century, as economies improved and food production became more efficient, conditions related to undernutrition were replaced by epidemics of coronary heart disease, certain cancers and other chronic conditions related to food overconsumption. In developed countries such as the United States, obesity became the predominant public health nutrition problem. To prevent obesity, people must consume less energy and be more active, but the food supplies of developed economies offer their populations amounts of energy that greatly exceed physiological need. Food overproduction causes competition in the food industry, limits its expansion, and leads food producers to invest heavily in marketing. To increase sales, food companies must encourage people to consume more of their products, substitute their products for others or develop new markets. Such efforts create an environment in which food is readily available at all times and readily overconsumed. Marketing expenditures for any single food product greatly exceed the total amounts available to governments for national campaigns to prevent chronic diseases. Existing government policies often support this environment through price supports and other means. To reverse obesity and its health consequences, governments need to consider ways to address the food environment through policies in education, agriculture, school meals, pricing, taxation and other means, as well as to develop mechanisms to fund new programme initiatives.

Key words: diet, dietary guidelines, dietary change, population strategies.

Introduction

From the perspective of diet and health, the 20th century marked a period of revolutionary change. At the beginning of the century, the leading causes of death and disability throughout the world were infectious diseases related, in part, to deficiencies in intake of energy and essential nutrients. Even in countries such as the United States, malnutrition was widespread and classic vitamin and mineral deficiency syndromes were epidemic. Many people consumed diets limited in variety, which were based on just a few foods as principal energy sources, and derived from foods grown locally, harvested seasonally and stored over the winter. Now, at the beginning of the 21st century, chronic diseases such as coronary heart disease, certain cancers, diabetes mellitus and stroke are the predominant causes of death in industrialized economies, and are rapidly becoming major health problems in developing countries as well.¹ These chronic conditions and their principal risk factors; that is, obesity, high blood cholesterol and high blood pressure, are linked to excesses and imbalances in food intake rather than to dietary deficiencies.

In the United States, obesity has become the single most important health problem related to diet. Despite public health warnings dating back to the 1950s, the prevalence of obesity has increased sharply among American adults, adolescents and children. From the late 1970s to the late 1980s, the prevalence of *overweight* (body mass index (BMI) > 25) rose from 25 to 35% among American adults, from 8 to 14% among children aged 6–11 years and from 6 to 12% among adolescents.^{2,3} Just from 1991 to 1998, the prevalence of

obesity (BMI > 30), increased from 12 to nearly 18% among American adults.⁴

The deleterious effects of overweight on chronic disease risk, morbidity and mortality are well established^{5,6} as is its cause: an excessive intake of energy intake relative to energy output. Available data suggest little change in activity patterns among Americans during the past decade or so⁷ but they do indicate an increase in overall energy intake; that is, from 1774 kcal/day (7.4 MJ) in 1989–91⁸ to 2002 kcal/day (8.4 MJ) in 1994–96.⁹ No matter how imprecise these data, they help explain why average bodyweights are increasing so significantly. Thus, it is intuitively obvious that successful prevention strategies must address both elements of the equation – energy intake as well as expenditure – at the societal as well as individual levels.¹⁰

Obesity and other leading diet-related chronic conditions are the result of consuming too much energy, saturated fat, cholesterol, sugar, salt and alcohol, but not enough fibre, vitamins, minerals and phytochemicals. When this nutritional profile is translated into food choices, it defines a dietary pattern that is excessive in overall food intake. It is particularly excessive in meat, dairy foods, processed snacks, baked goods, soft drinks and, sometimes, alcoholic beverages, and inadequate in intake of foods of plant origin; that is, fruit,

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vegetables and whole grains. Evidence suggesting that chronic disease risks could be reduced by reversing this pattern has been available consistently for nearly 50 years.¹¹

To prevent obesity, people need to eat less and be more active, and dietary guidance policies throughout the world are designed to promote these goals. Typically, dietary guidelines suggest balancing food intake with physical activity, and making food choices that will reduce chronic disease risks. They define a distinct dietary pattern that derives most of the daily energy from grains, vegetables and fruits, with less energy from meat and dairy foods, and even less from fats and sweets.¹² In the United States, this pattern is illustrated by the Food Guide Pyramid in Fig. 1. People are supposed to eat more of the foods from the base of the Pyramid (the plant food groups) and to eat less of those foods from the upper sections (meat, dairy and processed foods).¹³ Few Americans, however, follow such advice.⁹

The reasons for the discrepancy between advice and practice derive not only from the historic determinants of food choice; that is, geography, climate, trade, economic status and culture, but also from the changes in food production, distribution and processing that have occurred during the past century. In the United States, these changes have involved a transition in agriculture from small to gigantic farms; in husbandry from small herds and flocks to industrialized production of hundreds of thousands of animals; in food processing from home canning to massive production of packaged food products; in retailing from small stores to huge supermarkets; and in distribution from consumption of locally grown foods to those transported from countries around the world. Collectively, these transitions have resulted in a food system that offers people an enormous variety of fresh and processed foods throughout all seasons of the year at a relatively low cost, thereby promoting overconsumption. At the same time, the transitions have also promoted increasingly sedentary lifestyles.¹⁴ The shift to industrial agriculture was accomplished by machines, by massive population shifts from rural to urban areas, and by automobiles, telephones, elevators,

washing machines and other labour-saving devices. Television sets and computers have only accelerated such trends.

Food system barriers

At issue is how to encourage more healthful food choices within the context of the current food system. This system is deeply connected to global marketplaces and it constitutes very big business. In the United States in 1996, sales of food and beverages (including alcoholic beverages) reached nearly \$800 billion.¹⁵ In 1998, 47% of that amount was spent on meals and drinks consumed outside the home in restaurants, fast-food outlets, schools, hotels, airports, movie theatres and, these days, in book and clothing stores.¹⁶ Food is readily available to Americans in about 170 000 fast-food restaurants¹⁷ and 3 million soft drink vending machines.¹⁸ Food eaten outside the home, on average, is higher in fat and energy than food prepared at home,¹⁶ as are many processed foods, but companies must promote greater consumption of *all* foods if they are to satisfy the demands of company executives and stockholders. To prevent obesity and other chronic diseases, however, people must eat less or make better food choices.

The need for competition in the food industry is readily explained by the amount of energy available in a country's food supply. In the United States, for example, the food system supplies 3800 kcal/day (15.9 MJ) for every man, woman and child in the country, an increase of 500 kcal/day (2.1 MJ) since 1970.¹⁹ This level is nearly twice that needed to meet the energy requirements of most women, one-third more than that needed by most men, and far higher than that needed by babies, young children and the sedentary elderly.²⁰ Although as much as 1100 kcal (4.6 MJ) is wasted (e.g. as oil for frying potatoes)²¹ the per capita availability of even 2700 kcal/day (11.3 MJ) indicates a huge surplus and constitutes a major problem. Because the number of calories that any one person can consume has a finite limit, a choice of any one food precludes choice of another. This factor alone suggests why the annual growth rate of the American food industry is only about 1% annually, and has been at this low level for many years.¹⁵



Figure 1. Food Guide Pyramid. A guide to daily food choices.

Selling 'eat more'

To expand market share, food companies must reach new customers, increase sales of product to existing customers, or do both – goals aimed at getting people to *eat more*. To achieve these goals, food companies use direct and indirect means. They promote sales directly through new product development, advertising, marketing, larger serving sizes and appeals to new audiences. They do so indirectly by pressuring government authorities to relax restrictive regulations on the safety or claims that can be made for their products, and through efforts to convince health authorities and nutrition professionals either to endorse their products as healthy or to refrain from suggesting that people should eat less of them.

Direct methods

Companies increase the profitability of their products by 'adding value' to basic food commodities. In 1998, only 20% of food expenditures went to food producers (the 'farm value') whereas the remaining 80% constituted added value in the form of labour, packaging, transportation, advertising

and profit.²² For example, potatoes are quite inexpensive to consumers, but peeled, sliced, fried and packaged as potato chips, they cost more and are far more profitable. Like most processed foods to which fat, sugar and salt have been added, they are higher in calories and are of lower nutritional quality.

From a business standpoint, it makes sense to add value to basic foods. Thus, economic considerations are the driving force for the creation of new food products. The current food marketplace includes 240 000 packaged foods from American manufacturers alone, and an average supermarket offers about 35 000 of them at any one time.²³ Every year, manufacturers introduce large numbers of new food products into the marketplace – more than 11 000 in 1998.²⁴ Among these products, three-quarters are candies, condiments, breakfast cereals, beverages, bakery products and dairy novelties; almost none of them anything a nutritionist might want to recommend. Many new products fail but the successes stimulate the creation of others.

To inform the public about such products, food companies spend more than \$11 billion annually on electronic and print media, and another \$22 billion or so on coupons, games, incentives, trade shows and discounts.¹⁵ In 1998, United States advertising costs for any single popular candy bar were \$10 million to \$50 million; Classic Coca-Cola alone was \$115.5 million, and for McDonald's just over a *billion* dollars. In the United States alone that year, the Kellogg's company spent nearly \$280 million to advertise breakfast cereals and \$34 million to advertise Eggo frozen waffles.²⁵ Such figures dwarf the annual expenditures of the United States government on campaigns to promote increased consumption of fruit and vegetables (\$1 million)²⁶ or reduce blood cholesterol levels (\$1.5 million).²⁷

Companies also encourage sales — and overeating — by increasing the sizes of the servings and packages they offer. Beginning in the late 1970s, accelerating through the 1980s and continuing ever since, manufacturers began introducing larger food packages and portions as a means to appeal to consumers' sense of value. It is not unusual for table-service restaurants to serve meals that provide 2000 kcal (8.4 kJ) each for lunch or dinner.²⁸ The package and serving sizes of soft drinks, popcorn, french fries and many other foods have increased greatly in the past decade.²⁹ In the 1950s, for example, Coca-Cola could be purchased only in 6.5 oz bottles; single-serving containers expanded first to 12 oz cans and, more recently, to 20 oz bottles.³⁰ Larger servings not only provide more calories but also promote consumption of more calories.³¹

Indirect methods

In the United States, food companies work through elected officials and government agencies to oppose restrictive legislation and rules that might adversely affect sales of their products, and to promote legislation that is favourable to their products. Private food companies have obtained laws granting patent extensions and have successfully opposed laws requiring safety restrictions. Most visibly, food and supplement companies have worked through Congress and federal agencies to allow them to market their products using an increasing number and variety of health claims. Food package labels now may state that their products lower cholesterol

levels, fight cancer or prevent heart disease ('when consumed as part of a healthy diet'). Congress has increasingly permitted food and supplement manufacturers to make 'statements of structure/function' just short of claims that the product prevents disease. For example, labels may state that a product supports healthy digestive or immune function, whether or not substantial evidence supports that contention, as long as the statement is accompanied by a disclaimer that it has not been evaluated by the Food and Drug Administration and the product is not 'intended to diagnose, treat, cure or prevent any disease.' Such statements are well documented to increase sales of particular products as well as whole categories of foods.³² Finally, food companies go to considerable lengths to encourage food and nutrition professionals to view their products as making positive contributions to healthful diets, and to make a policy of maintaining that there is no such thing as a good or a bad food.³³ Table 1 lists ways in which the Procter & Gamble company, for example, has encouraged nutrition professionals to endorse snack foods prepared with its artificial fat, olestra.³⁴

Example: Marketing to children

Marketers have long known that children make attractive customers, but attention to this group, and to younger and younger members within it, has increased sharply in recent years. The reasons for this shift are easy to understand; children control billions of dollars in discretionary money and influence even more billions, and trends in society have created an environment that grants them increasing responsibility for purchase decisions. A recent analysis found the income of US children aged 4–12 to exceed \$27 billion and to influence parental spending of \$188 billion annually.³⁵ Food companies spare no effort to reach children. Soft drink companies unapologetically name 8- to 12-year-olds as marketing targets³⁶ and McDonald's produces commercials, advertisements and a web site aimed specifically at children aged 8–13 years.³⁷ Early in 2000, the Quaker Oats company initiated a \$15 million 5 months long campaign that was entirely targeted to young children to promote sales of its heavily sugared Cap'n Crunch cereal.³⁸ Such campaigns are so ubiquitous as to be considered normal practice.³⁷

To reach children, food marketers employ a variety of methods, all highly successful.³⁹ They spent \$12.7 billion on such campaigns in 1997.⁴⁰ To aid this effort, researchers have defined the basic elements of package design, typefaces, illustrations and advertisement content most likely to stimulate purchase interest by boys or girls of particular ages.⁴¹ They justify this research on the grounds of freedom of speech, but also as a 'public service', saying that advertising contributes to nutrition education through encouraging children to eat breakfast or healthier food products.⁴² Marketers maintain that no one food contributes to obesity more than any other and that exercise, rather than diet, is the key to weight control.⁴¹ Such views have led various associations of paediatricians and child psychologists to demand restrictions on the use of such research by advertisers of foods and other products.⁴³

The use of television to market products to children particularly concerns such groups. That televised commercials influence the food choices, preferences and demands of children – particularly younger children – has been well under-

Table 1. Activities supported by the Procter & Gamble company to promote snack foods made with olestra to professionals, the media and consumers through direct funding or indirect corporate sponsorship (partial list)

Nutrition, food and health professionals
Organizations
American Council on Science and Health: educational grant
American Diabetes Association: educational grant
American Dietetic Association: educational grant, website and print educational materials
American Heart Association: conference
American Public Health Association: booth at annual exhibit
National Women's Health Resource Center: educational grant
International Life Sciences Institute (ILSI): corporate and conference sponsorship
Society for Nutrition Education: focus groups at annual meeting
Tufts University: conference grant
Publications
American Journal of Clinical Nutrition: corporate sponsorship
Annals of the New York Academy of Sciences: ILSI conference proceedings ²⁹
Journal of Nutrition: supplement on Procter & Gamble olestra research ²⁰
Journal of Nutrition Education: corporate sponsorship
Journal of the American Dietetic Association: Olean advertisements
Journal of the American Medical Association: Olean advertisements
New England Journal of Medicine: Olean advertisements
Nutrition Reviews: Tufts conference proceedings ²⁸
Individuals
Research grants
Consulting funds
Travel to conferences
Travel to FDA hearings
Honoraria
Educational brochure for physicians, nurses, dietitians
Research bibliographies, articles and summaries
Personal visits and consultations
Educational materials: pamphlets, illustrations, information kits
Website information on research and clinical effects
Videotapes
Office displays
Olestra oil samples (to chefs)
Olestra dinners
Samples of Wow! chips and Pringles
Sample kits for classes and groups
Media
Press releases
Personal visits
Press conferences
Research summaries
Samples
Olestra dinners: food editors and writers
Consumers
Test-market campaigns
Television commercials
Print advertisements
Videotapes
Public relations campaigns
Newspaper and magazine articles
Consumer education pamphlets
Website (http://www.olean.com)
Packet for junior high and high school students
Free samples
Toll-free telephone information number

Adapted from Nestle.³⁴

stood since the early 1970s.⁴⁴ American children are bombarded daily with dozens of television commercials promoting fast foods, snack foods and soft drinks.⁴⁵ Advertisements for such products are now commonplace in schools through the introduction of Channel One, a private venture that provides television 'news' programmes in exchange for mandatory viewing of commercials by students⁴⁶ and school-district contracts for exclusive marketing of one or another soft drink in vending machines and sports facilities.⁴⁷ Viewing of food commercials is closely correlated with children's energy intake,⁴⁸ a finding consistent with the connection between hours spent watching television and obesity.^{49,50} Researchers, impressed by the strong connection between television-watching and levels of blood cholesterol in children, have concluded that questions about viewing habits can convey more precise information about early risk for heart disease than any conventional questions about family history.⁵¹ Other researchers have suggested that turning off the television set might be an exceptionally promising approach to prevention of childhood obesity.⁵²

Particularly alarming are reports that televised food commercials stimulate 'antisocial' behaviour in children, and not just inappropriate demands for advertised products.⁵³ Beer commercials, for example, influence fifth and sixth graders to have more favourable beliefs about drinking, greater knowledge of beer brands and slogans, and more strongly stated intentions to drink beer as an adult.⁵⁴ An analysis of food commercials aimed at children demonstrates that they depend on 'socially negative' material: violence (62%), conflict (41%), trickery (20%) or some combination of these three features (64%).⁵⁵ Such findings explain why public health organizations encourage replacement of television viewing with other activities likely to be more constructive and better for health.⁵⁶

One reason for such concerns is that marketing efforts tend to focus on foods high in energy but low in essential nutrients. A typical soft drink, for example, contains 150 kcal (0.6 MJ) from added sugars but little else of nutritional value. One study reported that one-quarter of adolescents consumed more than 26 oz (728 mL) of soft drinks per day; these children took in nearly 200 kcal/day (0.8 MJ) more than non-users and they drank much less milk or fruit juice.⁵⁷ The extra energy is more than sufficient to account for rising rates of obesity³ and other chronic disease risk factors among American schoolchildren.⁵⁸ Nevertheless, soft drink companies employ a great range of methods to place soft drinks within easy reach of children and to encourage purchases. Table 2 lists some of the methods used by soft drink companies to market sodas to children both in and out of school. Partially as a result of such marketing efforts, the diets of most American children do not come close to meeting dietary recommendations. The average child, for example, obtains 50% of energy intake from added fat and sugar (35 and 15%, respectively), and only 1% of American children regularly consume diets that meet recommended patterns of food intake.⁵⁹ Such observations immediately suggest the need for policies to protect children from such commercial intrusions.

Policy approaches to obesity prevention

In the present food environment, any reversal of trends toward obesity will take more than individual counselling,

and no quick-and-easy solutions should be expected at either the individual or societal levels. Substantial involvement of government will be needed at all levels, not least because government policies and programmes such as dairy supports, meat standards, food labels, school meals, generic marketing programmes and research support *already* influence many of the environmental determinants of poor diets and sedentary lifestyles.⁶⁰ Table 3 summarizes various suggestions set forth in recent years for policy modifications in various areas.^{14,61,62} Each of these suggestions could benefit from serious discussion, pilot-testing, evaluation and analysis, as the examples discussed later indicate. Although unlikely to eliminate the problem of obesity, such suggestions might help to produce small — but valuable — reductions in chronic disease risk factors. Even modest weight loss, for example, confers substantial health and economic benefits.⁶³

Implement national goals

National goals for reducing obesity have been established in the United States since 1980, and have included targets not only for percentage reductions in prevalence, but also for increases in the proportion of schools that teach principles of weight maintenance, worksites that offer weight management programmes and primary care providers who provide weight reduction services. Goals also address the need to increase physical activity among children and adults, encourage the consumption of more healthful diets, increase the use of nutrition labels, reduce sources of unnecessary energy in foods and meals, and improve access to community facilities for physical activity.⁶⁴ From its inception, the goals-setting process established the role of government as being to ‘lead, catalyse and provide strategic support’ for implementation through collaboration with professional and industry

Table 2. Examples of methods used by soft drink companies to market their products to children in and out of school

Marketing methods targeted to children
Television advertising
Internet advertising
Internet interactive computer games
Toys, clothing and other items with logos
Discount cards, coupons
Telephone cards
Celebrity endorsements
Motion picture sponsorship
Product placements in movies
Supermarket placements
Fast food chain tie-ins
Prizes
Marketing methods targeted to children at school
Channel One (required television watching, with commercials)
Soft drink ‘pouring rights’ agreements
Logos on vending machines, supplies, sports facilities
Hallway advertising
Advertisements on school buses
Sports uniforms, scoreboards
Contests
Free samples
Coupons for fast food
Club and activity sponsorship
Sponsorship of school sports, other events
Teaching materials

groups.⁶⁵ Political and funding realities prevent government agencies from implementing programmes to achieve health objectives.

This inability is unfortunate, especially because federal actions that might help prevent obesity have been recognized since the late 1970s. A 1977 conference organized by the National Institutes of Health thoroughly reviewed social and environmental influences on obesity, and issued a list of highly specific proposals for government actions.⁶⁶ These ranged from coordinated federal education and model school programmes to changes in regulations for meat grades, advertising, taxes and insurance premiums. The conference report recommended, for example, that national health insurance programmes recognize obesity as a disease and provide benefits for its treatment, that obesity counselling should be covered by health insurance programmes for the indigent, and that funding should be provided for demonstration projects at worksites.⁶⁷ Needless to say, such expensive recommendations were not implemented. The most recent strategic plan emphasizes the need to reverse trends in obesity but does not explain how this might be done beyond calling for ‘a concerted public effort’ in that direction.⁶⁴

State nutrition messages explicitly

Because dietary guidelines affect food sales, government agencies tend to phrase them in euphemisms. Any suggestion to eat less of a food or food group is certain to elicit protests

Table 3. Government policies that could help reduce the prevalence of obesity

Education
Fund statewide health promotion campaigns
Train health education teachers in obesity prevention
Ban food commercials in schools
Restrict consumption of foods of low nutritional value in schools
Food labelling and advertising
Require nutrition labelling on fast-food containers
Restrict advertising of high-calorie, low-nutrient foods during children’s programmes
Require print food advertisements to disclose caloric contents
Health care and training
Require nutrition in medical and nursing education
Require medical practitioners to learn how to counsel patients needing behaviour changes
Fund research on methods for promoting healthy diet and activity patterns
Revise health insurance regulations to reimburse health-care providers for obesity intervention
Taxes
Tax high-calorie, low-nutrient foods to generate funds for anti-obesity campaigns
Subsidize the costs of low-calorie nutritious foods
Provide tax incentives for weight management programmes
General policy development
Fund a coordinated, national campaign to prevent obesity, involving all relevant agencies
Fund a national monitoring system to track rates of obesity
Fund a report that synthesizes current research on obesity prevention and treatment
Establish and fund an evaluation system for all federal anti-obesity measures

Adapted from Nestle and Jacobson.¹⁴

from its producers, and the history of dietary recommendations is replete with examples of such opposition, most recently the release of the Department of Agriculture's Food Guide Pyramid.⁶⁸ United States dietary guidelines are revised every 5 years; the current proposals are based on 'ABC' precepts: Aim for fitness, Build a healthy base, Choose sensibly.⁶⁹ Table 4 lists the specific guidelines. The new guidelines emphasize obesity as a public health problem, although the word 'aim' suggests little expectation that people will follow this advice. The hierarchical precepts of the Pyramid that follow are also suggested passively ('let the Pyramid guide...'). Only the 'eat more' guidelines are expressed directly and positively ('eat a variety') and in terms of foods. In contrast, the 'eat less' guidelines refer to *nutrients*, saturated fat and cholesterol, not to the major food sources of these nutrients; that is, meat, dairy and fried foods. They refer to sugars but not to soft drinks, sugar-sweetened fruit drinks and baked goods; they refer to salt but not to corn chips or pretzels. Other terms in the guidelines and Pyramid also require deconstruction, as shown in Table 5. More explicit advice might help people make more appropriate food choices.

Use advertising

Numerous, small-scale education programmes have improved dietary knowledge, attitudes and behaviour, especially when their methods were simple, easy to follow and repeated frequently.¹⁶ If advertising sells candy and soft drinks, it also can sell healthy foods to a broader audience. As just one example, an advocacy group was able to demonstrate a doubling of the market share of low-fat and fat-free milk in several communities through an intensive, 7 week paid advertising and public relations campaign that cost as little as

Table 4. Dietary guidelines for Americans, 2000⁶⁹

Aim for fitness	
Aim for a healthy weight	
Be physically active each day	
Build a healthy base	
Let the Pyramid guide your food choices	
Eat a variety of grains daily, especially whole grains	
Eat a variety of fruits and vegetables daily	
Keep foods safe to eat	
Choose sensibly	
Choose a diet that is low in saturated fat and cholesterol and moderate in total fat	
Choose beverages and foods to moderate your intake of sugars	
Choose and prepare foods with less salt	
If you drink alcoholic beverages, do so in moderation	

Table 5. Dietary advice for Americans: Clarification of terms

Term	Translation
Grains, vegetables, fruits	Eat a largely plant-based diet
Low in saturated fat and cholesterol	Eat less red meat, fewer dairy foods
Variety	Eat foods low in fat, saturated fat, cholesterol, sugar and salt
Choose	Eat less
Moderate	Eat less
2–3 Servings of meat per day	Eat less red meat
2–3 Servings of dairy per day	Eat fewer high-fat dairy products

22 cents per person.⁷⁰ This example illustrates that advertising can be an affordable, effective method for promoting dietary change, even in the context of media advertising for less nutritious foods. Similar campaigns could be developed to encourage people to eat less or to be more active.

Regulate television commercials

Although children of all ages are influenced to request products they see advertised on television, children younger than eight or 10 years are unable to distinguish advertising from programme content.⁵³ The average American child spends more than 3 hours daily watching television and another 3 or 4 hours with other media.⁷¹ Watching television is a sedentary activity that exposes viewers to countless commercials for high-calorie candy, snacks, fast foods and soft drinks, especially during hours commonly watched by children under the age of 10. In the United States, Congress has passed laws restricting the ability of the Federal Trade Commission to regulate television commercials during children's programme hours.⁷² The laws could — and should — be changed. In addition, government and private agencies could sponsor more extensive campaigns to replace television viewing with more interesting energy-expending alternatives.⁷³

Adjust food prices

Price is a factor in food purchases, and foods high in calories and low in nutrient density often are low in cost. Researchers have demonstrated that a 50% reduction in the prices of fruits and vegetables in vending machines and cafeterias induced a doubling in their sales.⁷⁴ Such findings suggest that policies designed to decrease prices of more healthy foods and increase prices of foods high in energy might improve diets and help reduce obesity.⁷⁵ Such measures might include provision of regulatory or other incentives to restaurants to adjust meal prices or offer free salads with meals.

Adjust tax policies

The principal barrier to meaningful health promotion programmes is almost always lack of funds, and major national campaigns to address obesity and other chronic disease risk factors are costly. The expense, however, is easily justifiable in comparison to the annual health-care costs of obesity and its consequences, which are variably estimated to be from as high as 4%⁷⁶ to nearly 6% of total US health-care expenditures, or up to \$52 billion in 1995 dollars.⁷⁷ In contrast, US state and federal agencies fund virtually no anti-obesity measures beyond basic research. In 1999, Congress did grant \$5 million to the Centers for Disease Control and Prevention for discretionary programmes in nutrition and obesity, thereby establishing a small but useful precedent in the right direction.

To compensate for the failure of legislatures to apply general revenues to anti-obesity measures, others have suggested that revenues from taxes on undesirable foods be used to discourage purchases⁷⁸ and to subsidize the costs of more healthy foods.⁷⁹ While onerous taxes on commonly purchased products would be highly unpopular and politically unrealistic, taxes too small to affect overall sales might be feasible. For example, a tax of 0.67 cents on each 12 oz can of non-diet soft drink — a level too low to raise serious con-

cerns about its regressive nature — could generate \$1 billion in annual revenues, which is more than sufficient to mount a major national anti-obesity campaign.¹⁴ Such a tax should be politically feasible. Existing taxes on cigarettes and alcohol are supported by large public majorities, especially when the funds are used for health purposes.⁸⁰ Two states currently tax soft drinks, and 45% of adults would support a 1 cent tax on a can of soft drink, pound of potato chips or pound of butter if the revenues funded a national health education programme.⁸¹

Conclusion

From this discussion, it should be evident that attempts to overcome trends in obesity must address the effects of food overproduction on industry marketing practices; they also need to address the disparity between corporate and governmental resources for 'educating' the public. Suggestions along the lines of those given here have been criticized as simplistic, unrealistic, unfriendly to consumers and unlikely to be effective.⁸² As an alternative, critics suggest that the food industry create functional or fabricated foods that consumers can substitute for foods currently marketed. In the United States, at least, such an approach is unlikely to benefit all but the wealthiest and better-educated citizens, and to raise ethical questions about the marketing of high-calorie foods as 'healthy'.⁸³ Despite the introduction of thousands of nutritionally enhanced food products,⁸⁴ rates of obesity have continued to rise. For this reason alone, government intervention is worth trying. One point of these suggestions is to illustrate that federal policies already affect food choices and could be modified to favour public health goals rather than those of industry. Furthermore, it should be evident from these examples that similar policy changes could be directed towards encouraging people to eat more fruits and vegetables,⁸⁵ exercise more or follow other dietary guidelines. Even better, federal nutrition policies and programmes could be coordinated to constitute a national effort that is truly committed to improving patterns of dietary intake. Finally, the futility of present efforts demonstrates the need for research on which to base more effective public health policies. Ending the obesity epidemic will require much greater knowledge of the elements of effective diet and activity strategies than is currently available. Governments must fund research that extends beyond genetic and metabolic studies to encompass — and emphasize — population-based, community-wide behavioural interventions, policy development and programme evaluation.

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