THE EVOLUTION OF NATIONAL NUTRITION POLICY[1]

David A. Kessler
Department of Health and Human Services, Food and Drug Administration, Rockville, Maryland 20857

KEY WORDS: dietary guidelines, food labels, health claims, nutrition monitoring

CONTENTS

ABSTRACT

Domestic regulatory efforts in the area of nutrition historically have focused on achieving and sustaining the highest possible level of food safety and availability. More recently, the linkages between certain dietary practices and the risk of chronic, degenerative diseases have also become a significant focus of public policy.

In order to promote good nutrition practices, the Food and Drug Administration (FDA) now requires a detailed and informative Nutrition Facts food label on virtually all food packages. Other public policies promoted by the FDA and others include increasing public knowledge of the relationship between diet and health; promoting unified food and nutrition policies among

[1]The US government has the right to retain a nonexclusive, royalty-free license in and to any copyright covering this paper.

all government agencies; educating the American consumer about sound dietary practices; and encouraging the development of technologies that may result in more healthful, more abundant, and more affordable foods.

INTRODUCTION

No other industry in the world is as large as the American food production industry (9). Because the domestic food supply is as safe as it is plentiful, consumers can purchase abundant and diverse products that are unadulterated and free from microbial or chemical contamination. Advances in nutrition science and food fortification have virtually eliminated many once common diseases of vitamin deficiency, including pellagra, rickets, scurvy, and beriberi. Although malnourishment is a lingering problem in some communities, the majority of American consumers are now safely and adequately fed.

Until quite recently, domestic regulatory efforts in the area of nutrition policy were focused on achieving and sustaining this high level of safety and availability. Today, however, epidemiologists, clinical investigators, and nutrition scientists have shifted their attention to linkages between certain dietary practices and the risk of chronic, degenerative diseases, including hypertension, coronary heart disease, cancer, stroke, and diabetes. As a result, problems associated with overnutrition, high consumption of fats, and low intake of fruits, vegetables, and grains have gained urgency. The need to identify and implement public policies to combat "nutritional deficiencies of affluence" (13) and to promote good nutrition practices is now widely recognized. One of the most significant responses to this need is the easy-to-read Nutrition Facts food label now required on virtually all food packages.

In this review, I examine the evolution of present-day national nutrition policies, the status of current scientific knowledge, the opportunities to create a more unified food and agricultural policy, and the regulatory role of the Food and Drug Administration (FDA) as the scientific understanding of nutrition becomes more sophisticated.

A HISTORICAL OVERVIEW

As the nation transformed itself from a largely agrarian society in the nineteenth century to an industrial and technological society on the cusp of a new millennium, dramatic shifts occurred in food production. In 1880, 100 hours of labor were required to produce 100 bushels of corn; by 1974, just four hours of labor were necessary to obtain the same yield. Farm output almost quadrupled during this time period, while household spending on food plunged from 40% of income to just 16 or 17% (14). The current abundance and variety of the relatively inexpensive American food supply is dramatized by the fact that

as recently as 1951, a typical supermarket stocked only 1500 items, whereas today, it may stock 30,000 items, according to the Food Marketing Institute. These developments were no accident—agricultural policies in the United States have traditionally been fueled by the desire to increase production and to develop efficient distribution systems. To the extent that a formal domestic nutrition policy existed, it was targeted primarily at preventing the acute diseases associated with vitamin and mineral deficiencies.

American agriculture began to attain unprecedented productivity as the distance between food producers in rural areas and the ultimate food consumers widened. Economies of scale and growing urbanization encouraged food industries to operate on a nationwide basis. Unfortunately, the absence of federal regulation at the turn of the century led to an epidemic of food adulteration, fraudulent labeling, and other unscrupulous practices. There were documented reports of arsenic in vinegar, sulfuric acid in pickles, wood chips in bread, and formaldehyde in milk. Manufacturers made bold and completely unsubstantiated claims about their products. For example, food was marketed to cure cancer, prevent baldness, and restore health and vitality. In an effort to curb chemical and bacterial contamination and end egregious mislabeling practices, Congress enacted the Pure Food and Drugs Act of 1906 (22). Backed by this statutory authority, the Bureau of Chemistry of the United States Department of Agriculture (USDA), the predecessor of the FDA, moved quickly to clean up the food supply and to eliminate misleading claims.

Over the next several decades, vitamins, minerals, and amino acids were discovered and agricultural pesticides and food additives came into more common use. Congressional support mounted for further protective legislation, including assurances that chemicals used increasingly in food were safe. In 1938, the Federal Food, Drug, and Cosmetic Act replaced the 1906 act, and together with subsequent amendments, it remains the statutory framework under which the FDA operates today (3). In addition to implementing other safeguards to preserve the integrity of the food supply, the new legislation authorized the FDA to create "standards of identity" specifying the ingredient composition of cheeses, frozen desserts, and canned fruits and vegetables as well as the nutrient fortification of cereals and breads, milk, and macaroni and noodle products. For example, vitamin D is required in milk, and B vitamins and iron must be added to cereal grain products. Additionally, the 1938 act required that claims of special dietary properties be based on sound science and that label information be truthful and not misleading. The phrase "not misleading" also prohibited manufacturers from withholding information needed to make the label meaningful to consumers.

Also in 1938, the FDA created a federal laboratory to provide quantitative analytic data on the nutrient composition of foods for enforcement purposes. Coupled with industrial and academic efforts, this laboratory helped provide

a scientific basis for rational food fortification, including the addition of vitamins A and D to milk and the addition of iron, niacin, riboflavin, and thiamin to flour. World War II and the Korean War were the impetus for other food-related activities, most notably efforts to combat malnutrition and hunger overseas. On the domestic front, public concern about chemical additives in the food supply again dominated the agenda, and Congress responded with the Food Additives Amendment of 1958 (4) and the Color Additives Amendment of 1960 (6). These amendments placed the burden of safety testing on the manufacturer rather than on the FDA and mandated FDA review of manufacturer-provided data on additives prior to their use in marketed products. The statute required that the FDA make reasonably certain that consuming the additives under their intended conditions of use would cause no harm before approving those additives for use in food.

Although research on nutrient identification and metabolic function, including deficiency diseases, had been conducted for more than a decade, the field of nutrition received only minimal attention from health policy experts until 1969. That year, President Richard Nixon convened the White House Conference on Food, Nutrition, and Health, appointing renowned nutritionist Jean Mayer as its chair (31). This conference laid the groundwork for the shift of the public policy debate from preventing nutritional deficiencies to clarifying the relationship among diet, health, and chronic disease.

As the scientific foundation for these relationships evolved, Congressional hearings were held, and dietary goals designed to reduced the risk of chronic diseases were developed by the US Senate Select Committee on Nutrition and Human Needs (30). Subsequently, the USDA and the Department of Health, Education, and Welfare, now the Department of Health and Human Services (DHHS), began to formulate the "Dietary Guidelines for Americans." These guidelines, which have often provoked vigorous discussion, were initially released in 1980 and subsequently updated in 1985 and 1990 (25). Another revision will be released in late 1995. Other important documents that outlined the scientific foundation for dietary recommendations and that proposed public policies to implement those recommendations include the 1987 Surgeon General's Report on Nutrition and Health (28), the 1988 publication entitled "Diet and Health: Implications for Reducing Chronic Disease Risk" (2), and the nutrition sections of the 1991 publication entitled "Healthy People 2000—National Health Promotion and Disease Prevention Objectives, 2000" (11).

UNIFYING FOOD AND AGRICULTURAL POLICIES

The growing scientific basis for the relationship between diet and health has underscored the importance of unifying food and agricultural policy. The federal government has enormous influence over the mix, characteristics, and

price of food produced both domestically and abroad. The challenge it faces today is how to use that influence to promote intelligent nutritional choices.

When the USDA was established in 1862, agricultural policy and food policy were considered synonymous, but that link has weakened over the years. More recently, domestic policies designed to maximize public health have vied for priority with the economic and social objectives of producing food in sufficient quantity, quality, and diversity at an affordable price and of providing stability to the farmer. Likewise, the exigencies of international trade have sometimes abutted domestic requirements for food labeling, food composition standards, good manufacturing practices, food additives, action levels against contamination, and nutrient fortification. For example, most countries do not require ingredients to be listed unless they comprise 25% of the product. In contrast, US policies require that all functional ingredients be listed (12a).

Public food assistance programs are an example of domestic policies. The USDA purchases excess farm goods, such as butter, milk, cheese, and peanut butter, at market price from American farmers and distributes them to federally administered food delivery programs, such as the National School Lunch Program and the Special Supplemental Food Program for Women, Infants, and Children (WIC). Because this initiative was designed to sustain commodity prices and support the farmer, few questions were raised about the wisdom of subsidizing high-fat commodities and distributing them to program recipients.

As the relationship of diet to health became clearer, however, the USDA shifted its attention to the nutritional needs of food recipients and recently proposed a rule mandating that school lunches meet national dietary guidelines (26). In addition to reducing the fat intake of school children, this policy is intended to have a long-range impact on the food choices children make later in life and, ultimately, to reduce the nation's health care bill. A similar strategy could be implemented with WIC's food distribution component.

Healthful food and agricultural policy can also converge in numerous other ways. Currently, milk prices are determined not only by volume but also by the percentage of butterfat content; more butterfat commands a higher price. It may therefore be appropriate to adjust dairy supports to encourage manufacturers to produce products lower in fat. Likewise, by specifying an 18% rather than a 22% fat content for its hamburger purchases, the government has a significant influence on the beef market. Governmental policies also affect the quality and availability of highly nutritious fruits and vegetables. The current grading system, which primarily regulates the appearance of produce, may encourage unnecessary pesticide use. As a USDA spokesman has noted, agricultural policies will ideally spur the production of healthier foods; at the very least, they should not give producers an economic incentive to disregard consumer desire for a more nutritional diet (21).

HOW THE NATION EATS

An effective national nutrition policy must be based on a solid foundation of information about food consumption patterns, nutrient composition of an optimal diet, and linkages between diet and health. Additionally, it requires an understanding of the best ways to develop and publicize scientifically credible guidelines designed to encourage the consumption of healthy diets. In order to modify food habits, e.g. by decreasing fat intake and increasing fruit and vegetable consumption, one must also understand the dynamic interplay between food selection and culture, socioeconomic status, urbanization, educational achievement, and product availability. Marketing and advertising, nutrition education and labeling, agricultural policies, and technology also have an impact on food selection in ways that need to be better elucidated.

Securing baseline data on the dietary and nutritional status of the population is the first step toward developing a comprehensive nutrition policy. These data are collected through a federal nutrition monitoring system, which is cobbled together from numerous surveys and surveillance efforts. Taken together, these monitoring efforts create a picture of the type and amount of food eaten by Americans; of shifting consumer knowledge about, or preferences for, certain kinds of foods; and of the composition, including essential nutrients, of the foods eaten. They also provide information on dietary exposure to food additives, contaminants, and pesticides; on the prevalence of nutrition-related health problems; and on the availability of food for consumption. Numerous public policies and consumer guidelines depend to some extent on these data. These include the evaluation of options for safe and desirable levels of food fortification; the development and monitoring of the effectiveness of initiatives to reduce fat consumption and educate the public about dietary saturated fat and cholesterol; the development of reference standards for nutrient intakes, such as food label information about vitamins and other nutrients; and the development of reference serving sizes for food labels designed to reflect actual consumption practices. In addition, these data influence the evaluation of proposed health claim requirements against criteria for defining foods eligible to bear the claim and for limiting the message to a total dietary context as well as the design of programs that provide appropriate benefit levels for recipients of food assistance programs.

Despite the multiple uses for these data, the current monitoring system has certain limitations. A 1992 study found that 70 separate survey, surveillance, and research activities are conducted by 22 different agencies of the federal government (12). To add to the complexity, some of these surveys are conducted annually, others are done biannually, and still others are completed approximately every 5 years. Some of these surveys collect disappearance data, which are per capita estimates of domestic shipments of commodities to pri-

mary buyers. When this information is inaccurately interpreted to represent intake by individuals, consumption may be significantly overestimated (10). Differences in survey methods, sampling design, population descriptors, and the format of reported results impede intersurvey comparisons and make it difficult to integrate data from more than one data set.

The FDA relies heavily on two key components of the nutrition monitoring system. Information on approximately 30,000 people is included in the National Health and Nutrition Examination Survey (NHANES), conducted by the National Center for Health Statistics, an arm of the Centers for Disease Control and Prevention. Survey goals include estimating the prevalence of selected diseases and risk factors, assessing the health and nutritional status of the nation's population, and providing information on the interrelationships between health and nutrition. The most recent NHANES was conducted from 1988 to 1994; the next survey is scheduled to begin in 1997. Another key data set used by the FDA comes from the Continuing Survey of Food Intakes by Individuals, last conducted by the USDA from 1989 to 1991, which collected data on the food consumption of 15,000 individuals. The next of these surveys is being conducted from 1994 to 1996.

Unfortunately, the differing data-gathering techniques of these surveys sometimes result in inconsistent and contradictory information about food consumption. This discrepancy is symptomatic of a broader problem observed by expert panels convened over the past 15 years to review the nation's nutrition monitoring system. These experts have consistently cited methodological inconsistencies and pointed out the need for more valid measurements of nutrient composition, better data on population subgroups and geographic areas, improved methodologies for estimating dietary intakes, and higher survey response rates (5, 16–19, 24, 29).

To address these criticisms, Congress in 1990 enacted the National Nutrition Monitoring and Related Research Act (15), which required the USDA and the DHHS to strengthen the research base for nutrition monitoring and to establish dietary guidelines. In response, the two Cabinet-level departments jointly issued a 10-year plan known as the National Nutrition Monitoring and Related Research Program (NNMRRP) in June 1993. This program is designed to secure high-quality, comparable data on a continuous and coordinated basis. It also identifies ways to enhance state and local data collection capabilities, to improve nutrition monitoring within certain population subgroups, and to disseminate research results more widely. An interagency board, chaired jointly by the assistant secretaries of the USDA and the DHHS, has been created to bring together key decision makers from all federal agencies involved in nutrition monitoring activities. Additionally, the plan convened a National Nutrition Monitoring Advisory Council with experts drawn from outside the federal government to provide technical advice and to encourage

more effective sharing of information and data. Although the plan's success is highly resource dependent, the initiative represents a promising effort to share resources, coordinate food policies, and foster communication.

THE WIDENING MANDATE OF THE FDA

The FDA's regulatory authority over food has an important impact on Americans' knowledge about food and on their consumption choices. The FDA is responsible for the safety and labeling of foods. Its jurisdiction covers a range of important nutrition-related food issues, including fortification, infant formulas, medical foods, and dietary supplements. As the FDA continues to meet traditional statutory mandates to preserve the integrity of the food supply, it is broadening its involvement in scientific and policymaking activities designed to promote nutrition as a tool of good health. The Nutrition Labeling and Education Act (NLEA) of 1990, an amendment to the Federal Food, Drug, and Cosmetic Act of 1938, gives the agency explicit authority for the current emphasis on sound nutrition (20).

Historically, acute and global hazards in the form of unsafe products that caused almost immediate serious illness or death to anyone who consumed them have posed the most dire threat to the food supply. Consequently, across-the-board use restrictions on food ingredients as well as product bans and seizures have been the standard regulatory tools of the FDA. Although emerging pathogens can still present an enormous challenge, the science linking nutrition and health has become more sophisticated, forcing us to confront the role of macronutrients in good health. As a result, a need for new regulatory strategies has emerged. Finding ways to encourage or discourage the level of use of certain substances, e.g. saturated fat or sodium, is a complex task because these substances affect health in subtle ways, often over a long period of time. Ensuring adequate, but not excessive, consumption of specific nutrients presents another challenge. For example, vitamin A is crucial to good health but teratogenic when consumed in excess. The FDA must also deal appropriately with products that simultaneously pose a hazard and offer a potential benefit to specific segments of the population.

To protect and inform the American consumer, the FDA uses labeling, such as warning statements, and other public education tools. It also encourages scientific inquiry and, where possible, conducts its own research to strengthen nutrition policy focused on preventing chronic, degenerative diseases and serious adverse reactions.

Nutrition Labeling and Health Claims

As part of its mission to protect American consumers, the FDA determines the format and content of food labels and evaluates the scientific basis for health

claims. Interest in nutrition labeling was largely an outgrowth of the 1969 White House Conference on Food, Health, and Nutrition. Although ingredients had been labeled on most foods for many years, regulations issued in 1973 made much more extensive nutrient information available to consumers and established the US Recommended Dietary Allowances (subsequently renamed reference daily intake, or RDI) as guidelines for a healthier diet (23).

The passage of the NLEA in 1990 heralded the first major food labeling reform in almost 20 years. The purpose of regulations promulgated by the FDA (8) and the USDA (27) to implement the act was threefold: to clear up confusion that has surrounded nutrition labeling for years; to help consumers choose healthier diets; and to give food companies an incentive to improve the nutritional qualities of their products. A uniform, easy-to-read Nutrition Facts label is now required for virtually all foods and must list per-serving quantities of 14 mandatory items of nutrition information in the following order: calories, calories from fat, total fat, saturated fat, cholesterol, sodium, total carbohydrate, dietary fiber, sugars, protein, vitamin A, vitamin C, calcium, and iron. Additionally, standard reference serving sizes have been established to facilitate comparisons between products, and dietary terms such as low-fat, cholesterol-free, and high-fiber have been defined.

Under the NLEA, the FDA also established a point-of-purchase program to encourage retailers to post nutrition information about unlabeled but frequently consumed commodities, specifically raw fruits and vegetables and fish. A similar program was established by the USDA for raw, single-ingredient meat and poultry products. To encourage participation, the law states that both programs will remain voluntary only if the nation's retailers demonstrate substantial compliance. A sample of 2000 retail establishments must be surveyed every 2 years to determine whether they are complying with the posting guidelines; if substantial compliance is not demonstrated, the agency will propose regulations that mandate the posting of nutritional data.

Although the FDA recognized its obligation to prohibit unsupported or exaggerated claims, it also acknowledged that under the NLEA, the industry should be allowed to make appropriate claims for the health benefits of a food product. The FDA therefore examined the validity of 10 specific claims as required by the NLEA. To date, eight relationships between nutrients and disease are authorized for inclusion on food labels: calcium and osteoporosis; fat and cancer; saturated fat and cholesterol and coronary heart disease; fiber-containing grain products, fruits, and vegetables and cancer; fiber-containing grain products, fruits, and vegetables and coronary heart disease; sodium and hypertension; fruits and vegetables, which are good sources of substances such as antioxidant vitamins, and cancer; and folic acid and neural tube birth defects.

Although some critics have not been satisfied with the way the FDA approved health claims for food, the case of folic acid illustrates the complexity

of the issues the agency faces in deciding whether to authorize a health claim. With the support and participation of the FDA, the US Public Health Service in 1992 advised all women capable of becoming pregnant to consume at least 0.4 mg folic acid (but no more than 1 mg) because the nutrient was found to be associated with a reduced risk of giving birth to a child with spina bifida or another neural tube defect. In 1993, the FDA proposed to authorize the use of a health claim for folic acid in dietary supplements. This decision was reached after carefully weighing how a health claim could be safely implemented. The absence of scientifically verified data on both the amount of folic acid in food and the amount consumed by the US population made it difficult to determine the likelihood of improving the folate intake of target women while minimizing the potential for safety problems stemming from overconsumption. For example, in some persons with marginal vitamin B_{12} nutritional status, folic acid may mask pernicious anemia, a symptom that may allow disease to be detected and treated early. Thus, the FDA had to consider not only the beneficial impact of a health claim for the small number of women at risk of a neural tube defect–affected pregnancy but also the safety of consumers who were not in the target population and who might be unintentionally harmed by passive exposure to higher folate levels in food. Because what is safe or desirable to one group may be worthless or even dangerous to another, the differing needs of various sectors of the population will present an ongoing challenge as the agency considers other health claims or fortification options for foods.

Medical Foods

Medical foods are another regulatory issue on the FDA's agenda. Medical foods are defined as foods or diets that are administered under a physician's supervision to manage specific medical conditions. For example, specially formulated total diets are designed to reduce respiratory needs of patients with severe lung damage who are being weaned from ventilators. Other examples of medical foods are foods formulated with exclusions, such as special amino acid profiles for liver disease or void of those amino acids that contribute to phenylketones in the case of phenylketonuria, and liquid long-term maintenance diets for individuals who are temporarily unconscious. Each type of medical food has unique characteristics and regulatory issues that must be addressed. Accurate labeling and adherence to strict product quality controls and good manufacturing processes need to be followed. Additionally, some products should be evaluated for their clinical effectiveness in producing purported benefits. The FDA is currently developing a regulatory strategy for this diverse group of products that would help ensure their safety and effectiveness without undue regulatory burdens.

CONCLUSION

In the United States and other developed nations, the effort to create a safe and abundant food supply has exceeded expectations. Today, the primary challenges of public policy are to ensure continued safety while increasing public knowledge of the relationship between diet and health; to promote unified food and agricultural policies; to educate the American consumer about sound dietary practices; and to encourage the development of technologies that may result in more healthful, more abundant, and more affordable foods. To be effective and relevant, national policies must draw upon knowledge from the historically independent fields of nutrition science, toxicology, microbiology, physiology, agriculture, epidemiology, medicine, and public health. Improving communication and coordination among the various players in government, industry, agriculture, public health, and the environmental and consumer sectors is crucial.

For the FDA, there can be no retreat from the traditional mission of safeguarding the food supply. The agency remains vigilant against food-borne microbial, viral, and parasitic diseases and continues to monitor the use of chemical additives and to evaluate new technology. At the same time, it plays an important role in promoting public awareness of nutrition, ascertaining the validity of health claims for food, ensuring the nutritional adequacy and safety of the US food supply, and encouraging the convergence of food and agricultural policies.

Numerous public policy initiatives, both within and beyond the FDA's jurisdiction, may directly affect the nation's health. The widespread use of the Nutrition Facts label is an example. According to a national survey conducted in preparation for the American Dietetics Association's annual meeting in 1994, nearly 70% of dietitians said the new food label has changed the way their clients shop for food. Perhaps even more significantly, the label has affected the food choices of almost two thirds of the dietitians themselves (7). The growing demand for foods low in fat, saturated fat, sodium, and cholesterol and for foods with higher levels of fiber, complex carbohydrates, and other valued nutrients further indicates that educating consumers about the relationship between diet and health can result in beneficial changes in consumption patterns.

Nutrition education needs to begin with elementary-school children and should continue through the school years and beyond. Governmental bodies must also find ways to encourage, or at least not to obstruct, the growth and production of more nutritional foods. Likewise, the continuation of recent efforts to structure federal support for school lunch and food subsistence programs to subsidize healthier food commodities is desirable.

Nutrition policies are also needed on the international front. Most interna-

tional activities in the area of nutrition have been geared primarily toward reconciling differing food safety and quality requirements in order to facilitate international trade in foodstuffs. As a result, certain domestic policies have created a tempest abroad. For example, the FDA's stringent new food-labeling requirements, which apply to imported as well as domestic products, have caused some nations to accuse the United States of enacting artificial trade barriers. Fortunately, numerous international bodies, such as groups within the World Health Organization (WHO), the United Nations Food and Agriculture Organization (FAO), and the Secretariat for the Joint FAO/WHO Codex Alimentarius Commission, are actively involved in food issues. The ongoing scientific dialogue within these forums suggests that existing channels of communication can be used to address nutrition-related issues.

Progress must also be made in the area of clinical research. Access to cutting-edge scientific information is the sine qua non of product evaluation, and much remains to be learned. Increased support from academic institutions and federal agencies would be of enormous value in helping to generate more comprehensive data on which the FDA and other agencies can base sound nutritional policies. With only 4% of the National Institutes of Health's biomedical research budget currently being spent on nutrition-related activities, there is clearly room for growth (1). For example, convincing parallels have been drawn between consumption of saturated fats and heart disease, but investigators do not agree on which or how many fatty acids are involved. Likewise, more fully informed decisions about health claims and appropriate fortification depend in part on securing more data about food sensitivities in population subgroups, including children, the elderly, pregnant women, and individuals with allergies or compromised medical status. Investigators also need to increase their knowledge of unsafe levels of nutrients, including those generally recognized as safe at certain doses, in order to regulate high intakes appropriately.

Another avenue of investigation is the relationship between a vegetarian diet and lower rates of cardiovascular disease; mechanisms to explain this epidemiological observation have yet to be identified. Similarly, markers for cancer more immediate than tumor growth or death are needed to determine the impact of diet on disease progression. Such data may accumulate as the tools of molecular biology begin to be applied to the link between nutrition and disease.

In addition to plugging scientific holes, sociological and psychological research may offer insights into patterns of food consumption. For example, more information about cultural influences on eating habits and the most effective tools for modifying behavior would be useful. Research attention should also be directed at the relative impact of various strategies for altering diet; for example, policymakers should be able to determine whether food-buying patterns are more readily altered by pricing or by education.

Although scientific knowledge about the interrelationship of diet, degenerative disease, and good health is in its infancy, both known and suspected linkages are increasingly influencing the direction of public policy. As we approach the new millennium, the potent combination of accumulated clinical findings, prudent regulation, and growing public awareness may result in measurable health improvements for many Americans.

Literature Cited

1. *16th Annu. Rep. Natl. Inst. Health Program Biomed. Behav. Nutr. Res. Train.* 1993. Bethesda, MD. NIH Publ. No. 93-2092
2. *Diet and Health: Implications for Reducing Chronic Disease Risk.* 1989. Washington, DC: Natl. Acad. Press
3. *Federal Food, Drug, and Cosmetic Act.* 1938. PL 75-717, 52 Stat. 1040 as amended USC 301-392 (21982)
4. *Federal Food, Drug, and Cosmetic Act.* 1958. Food Additives Amendment. Sect. 409, 348a
5. Fed. Am. Soc. Exp. Biol., Life Sci. Res. Off. 1989. *Nutrition Monitoring in the United States: An Update Report on Nutrition Monitoring.* Sponsored by USDA DHHS. Hyattsville, MD
6. *Federal Food, Drug, and Cosmetic Act.* 1960. Color Additives Amendment. Sect. 706, 376
7. Fletcher P. 1994. The food industry and your health: where we are and what's ahead. Presentation at the 77th Annu. Meet. Am. Diet. Assoc., Orlando, FL
8. Food Drug Admin., Dep. Health Hum. Serv. 1993. Food labeling; general provisions; nutritional labeling; label format; nutrient content claims; health claims; ingredient labeling; state and local requirements; and exemptions; final rules, 21 CFR Part 1, et al. 58:3 *Fed. Regist.* 2079
9. Forbes A. 1994. National nutrition policy, food labeling, and health claims. In *Modern Nutrition in Health and Disease,* ed. ME Shils, JA Olson, M Shike, 2:1626–57. Philadelphia: Leaf & Febiger. 8th ed.
10. Glinsmann WH, Irausquin H, Park YK. 1986. Evaluation of the health aspects of sugars contained in carbohydrate sweeteners. *J. Nutr.* 116(11)S1–216
11. Healthy People 2000 Working Group. 1991. Nutrition. In *Healthy People 2000: National Health Promotion and Disease Prevention Objectives.* Washington, DC: GPO. See also *Healthy People 2000: Progress Review: Nutrition.* July 1994
12. Interagency Board Nutr. Monit. Relat. Res. 1992. *The Directory of Federal and State Nutrition Monitoring Activities.* HHS Publ. No. (PHS) 92-1255-1

12a. Joint FAO/WHO Food Standards Programme, Codex Alimentarius Comm. 1992. Section 4.2.1.3. of the Codex General Standard for the Labelling of Prepackaged Foods [Codex Stan 1-1985 (Rev. 1-1991)]. *Codex Alimentarius* 1:27, General Requirements, Rome. 2nd ed.

13. Miller SA. 1980. *Public policy and the kinetics of dietary change.* Presented at Am. Dental Assoc. Annu. Workshop Conf. Foods, Nutr., Dental Health Program, 4th, Chicago, Ill.
14. Miller SA. 1985. *Food safety and health: A scientific and legislative perspective.* Presented at 13th Int. Congr. Nutr., Brighton, UK
15. *National Nutrition Monitoring and Related Research Act of 1990.* PL 101-445, 104 Stat. 1034, 7 USC, 5301
16. Natl. Acad. Public Admin., Panel Rev. Health Nutr. Exam. Surv. 1981. *Improving the Health and Nutrition Examination Survey: An Evaluation by a Panel of the National Academy of Public Administration.* Hyattsville, MD: HHS/NCHS
17. Natl. Res. Counc., Comm. Food Consum. Patterns. 1981. *Assessing Changing Food Consumption Patterns.* Washington, DC: Natl. Acad. Press
18. Natl. Res. Counc., Food Nutr. Board,

Comm. Life Sci. 1984. *National Survey Data on Food Consumption: Uses and Recommendations.* Washington, DC: Natl. Acad. Press

19. Natl. Res. Counc., Subcomm. Criteria Diet. Eval., Coord. Comm. Eval. Food Consum. Surv., Food Nutr. Board, Comm. Life Sci. 1986. *Nutrient Adequacy: Assessment Using Food Consumption Surveys.* Washington, DC: Natl. Acad. Press
20. *Nutrition Labeling and Education Act.* 1990. PL 101-535, 104 Stat. 2353, 21 USC, 301
21. O'Brien PM. 1994. *Linking nutrition and food and agricultural policies.* Presented at Meet. Challenge: Health, Safety Food Am., Off. Sci. Technol. Policy, Exec. Off. President, Nov. 22. Washington, DC
22. *Pure Food and Drugs Act.* 1906. 34 US Stat. at Large 768
23. Regulations for the enforcement of the *Federal Food, Drug and Cosmetic Act* and the *Fair Packaging and Labeling Act*; nutrition labeling. Part I. Jan. 19, 1973. 38 FR 2125
24. US Dep. Agric., Dep. Health Hum. Serv. 1986. *Nutrition Monitoring in the United States: A Progress Report from the Joint Nutrition Monitoring Evaluation Committee.* Hyattsville, MD
25. US Dep. Agric. Dep. Health Hum. Serv. 1990. *Nutrition and Your Health: Dietary Guidelines for Americans.* Washington, DC: GPO. 3rd ed.
26. US Dep. Agric., Food Nutr. Serv., 1994. National school lunch program and school breakfast program: nutrition objectives for school meals. Proposed Rule 7CFR Parts 210 and 220. 59:111. *Fed. Regist.* 30217
27. US Dep. Agric. Food Safety Inspection Serv. 1993. Nutrition labeling of meat and poultry products; Final Rule, 9 CFR Parts 317, 320, and 381. 58:3 *Fed. Regist.* 632
28. US Dep. Health Hum. Serv., Public Health Serv. 1988. *The Surgeon General's Report on Nutrition and Health,* DHHS Publ. No. 88-50211. Washington, DC: GPO
29. US Gen. Account. Off. 1994. *Nutrition Monitoring: Progress in Developing a Coordinated Program.* Washington, DC: GAO/PEMD-94-23
30. US Senate Select Comm. Nutr. Hum. Needs. 1977. *Dietary Goals for the United States. Washington, DC: GPO. 22nd ed.*
31. White House Conference on Food, Nutrition and Health—Final Rep. 1970. Washington, DC: GPO