Developing and implementing food-based dietary guidance for fat in the diets of children\textsuperscript{1–3}

G Harvey Anderson and Stanley H Zlotkin

**ABSTRACT** This article discusses the process by which a country can effectively solve health problems through recommended changes in the nutrient content of the diet. Each country must consider not only the development of scientific guidelines suitable for its population, but also strategies for effective food-based dietary guidance to achieve the goal. This is best done by integrating health and dietary goals when forming scientific guidelines and by developing effective partnerships among the many sectors that influence the food supply and food selection. Using fat intake in children as an example, this article describes the determinants of success in achieving the goals of science-based dietary guidelines through food-based dietary guidance. *Am J Clin Nutr* 2000;72(suppl):1004S–9S.

**KEY WORDS** Food-based dietary guidelines, fat intake, children

**INTRODUCTION**

Science-based dietary guidelines are designed to provide guidance on the composition of a healthy diet (e.g., reduction in fat intake). These guidelines are effective only if they achieve the proposed dietary change. If such guidelines are isolated from food-based information and strategies for the target population, they are not likely to succeed\textsuperscript{(1)}.

A recent Food and Agriculture Organization/World Health Organization (FAO/WHO) consultation report describes the rationale for using food-based dietary guidelines to improve the food consumption patterns and nutritional well-being of individuals and populations\textsuperscript{(2)}. Examples of food-based guidelines include the food guides of Canada (food rainbow)\textsuperscript{(3)} and the food guide pyramid of the United States\textsuperscript{(4)}. Because of the importance of dietary practices in nutrition-related diseases, it is important that food-based guidelines be developed specifically for each country. To be effective, such guidelines must communicate within a sociocultural context and focus on locally available foods\textsuperscript{(2)}.

The purpose of this article is not to argue whether fat should or should not be reduced in the diet of children, but rather to focus instead on considerations that must be made to achieve the dietary change required when a scientific analysis concludes that a nutrient change should be made.

**FAT CONSUMPTION: GLOBAL TRENDS**

A powerful influence on nutrient intake is food and nutrient availability, which is determined by the country’s production and importation and by distribution and utilization within the population. For example, although fat available for human consumption worldwide increased from 49–68 g·person\textsuperscript{−1}·d\textsuperscript{−1} between 1961 and 1990, there remain great disparities in fat availability among geographic regions of the world\textsuperscript{(5)}. In developed countries fat availability increased from 93 to 128 g, whereas in developing countries it increased from 28 to 49 g/person. Thus, many countries have an insufficient supply of fat, whereas other countries have an excess. In 1990, 72 countries that represented >63% of the world’s total population had <60 g fat·person\textsuperscript{−1}·d\textsuperscript{−1} available for consumption (Table 1). The extremes in the distribution of fat availability are represented by countries such as Rwanda, Cambodia, and Bangladesh, which have <20 g, and Ireland, Denmark, Luxembourg, and Belgium, which have 170 g fat·person\textsuperscript{−1}·d\textsuperscript{−1} available for consumption.

The amount of available fat that is actually consumed probably varies greatly among countries. In the United States, 151 g dietary fat·person\textsuperscript{−1}·d\textsuperscript{−1} are available for consumption\textsuperscript{(5)}, yet dietary surveys show that fat intakes average less than two-thirds of this amount. Trimming of animal fats and the disposing of deep-frying oils are examples of activities contributing to the wastage of available fat. In developing countries, such wastage is much less of a luxury. Because fat availability data provide only crude estimates of the possible intakes of individuals, food intake surveys must be conducted to determine actual intakes and the distribution of fat among various groups in the population. These data are essential for planning the national food supply and for developing and implementing dietary guidance.

Most members of the population in developed countries are consuming more than the recommended ≤30% of energy from fat\textsuperscript{(6)}. As a result, fat intake reduction is the common theme of dietary guidance. Conversely, in many developing countries, fat availability is too low to provide adequate consumption, judged to be 15–20% of energy, and ensure sufficient energy in the diet\textsuperscript{(5)}. This problem of inadequacy may be peculiar to rural areas as

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opposed to urban areas. Increasing fat availability may in fact be a risk factor for chronic disease in urban areas. Thus, in developing countries, national planning should consider both the problems of inadequacy and excess. Fat distribution within the country must receive attention.

On the basis of the large variation in fat availability worldwide as well as within countries, it is clear that dietary guidelines for the diverse populations of the world must be specific to the needs of geographic regions. Providing the appropriate quantity and composition of fat in the food supply to achieve health goals will not result from the formulation of science-based dietary guidelines. Such guidelines can only be one component of a country’s comprehensive nutrition policy. They must be embraced by all agencies of government, the food industry, and health professionals, and appropriately applied to be effective (7).

### ACHIEVING DIETARY CHANGE

Whether the objective is to prevent nutrient-deficiency diseases or to ameliorate chronic diseases, dietary change is not easily achieved. Achieving the goal of a healthy population requires quantitative information on nutrient requirements, evaluation of diet and disease relations in the population of concern, knowledge of determinants of the food supply, and effective partnerships among government, the food industry, and health professionals.

Nutrient standards [eg, the US recommended dietary allowances (8) or the recommended nutrient intakes of Canada (9)], contain quantitative data on nutrient requirements based on nutrition science. Dietary guidelines may be quantitative, eg, “choose a diet low in fat (≤30% of energy)” or qualitative, eg, “eat a variety of foods,” but they are science-based. They reflect a consensus of judgment on the nutrient intake changes required to improve the health of a population. Food guides suggest which foods will help an individual meet both quantitative nutrient needs and more qualitative goals of the dietary guidelines.

A fundamental assumption of the dietary guidelines and food guides is that consumer knowledge will lead to improved food choices and that food availability will then reflect these choices. It is clear that this assumption is only partially correct. For example, the message that meat and meat products are high in fat has led to a reduction in their consumption, which indicates that the consumer has responded to the guideline message. On the other hand, an increase in iron deficiency in women of Australia has occurred, which suggests that they are uninformed about how to find a source of iron that replaces available iron from meat (10). The message in the United States to increase fruit and vegetable consumption to 5 servings/d is not bringing about the desired change, perhaps for many reasons. However, if it did occur, the agricultural production of fruit and vegetables would need to be doubled. This target would appear to be unrealistic, because production of fruit and vegetables has increased by only 10–15% from 1970 to 1990 (11). These and similar observations suggest that a more complete understanding of the multitude of factors affecting food availability is required for dietary guidelines to be effective.

Because of the recognized complexity of achieving dietary change, an FAO/WHO advisory group convened in 1995 to discuss the preparation and use of food-based dietary guidelines and to recommend strategies to make such strategies more effective (2). It was recommended that food-based dietary guidelines embrace a broad, multisectorial approach to achieve science-based health goals.

### Science-based dietary guidelines

Science-based dietary guidelines are generally expressed in scientific terms with quantitative recommendations on nutrient requirements and on food components that affect chronic disease (6, 12). The recommendations are advisory statements based on the best available scientific evidence of associations between diet and disease. Science-based dietary guidelines suggest changes in the average diet to achieve healthier populations. They are appropriate for use by policymakers, health professionals, and the food industry. Unfortunately, the impact of these guidelines on modifying the diets of individuals appears to be small.

Developed countries have taken the primary initiative to develop science-based dietary guidelines. Quantitative estimates of nutrient requirements, eg, the US recommended dietary allowances, have been published for nearly 60 y. However, guidelines aimed at the prevention of chronic disease emerged only in the 1970s. The first national dietary guideline appeared in Scandinavia in 1968 (12), Canada’s first authoritative dietary statement emerged in 1976, and the first edition of the dietary goals for the United States appeared in 1977. By the early 1980s, government-generated dietary guidelines existed in all affluent countries.

Dietary guidelines produced between 1981 and 1989 in 17 industrialized and developing countries were summarized by a WHO study group in 1990 (6). Most guidelines make similar recommendations to maintain energy balance (13), decrease fat to ≤30% of energy (13), decrease saturated fat (13), decrease free (added) sugars (14), increase complex carbohydrates (15), and decrease sodium (16). For some countries, the recommendations have already changed on the basis of advances in scientific data.

The fact that the evidence of diet-disease relations is not absolutely clear is illustrated by the evolution of the guidelines within a country and by variation among countries in the interpretation of the same data. This variation can be illustrated by the recent recommendations for Canada and the United States on energy balance, sugar consumption, and fat intake in children’s diets.

The nutrition recommendations for Canadians suggest that the goal of healthy body weight be achieved by a combination of healthy eating and physical activity (14). The goal to reduce fat to ≤30% of energy for all members of the population >2 y of age has been reconsidered. It is now recommended that this goal be gradually implemented for children so that it is not achieved until linear growth is completed (17). The Canadian recommendations no longer include a reduction in free sugar intake (Table 2). This change arose from evaluations showing that intakes of added sugars (10–12% of energy) were consistent with the selection of healthy diets (15, 16).

### Table 1

<table>
<thead>
<tr>
<th>Number of countries</th>
<th>Number of inhabitants</th>
<th>Fat intake</th>
<th>Dietary fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>229</td>
<td>&lt;30</td>
<td>10</td>
</tr>
<tr>
<td>63</td>
<td>3036</td>
<td>30–59.9</td>
<td>18</td>
</tr>
<tr>
<td>64</td>
<td>1198</td>
<td>60–119.9</td>
<td>27</td>
</tr>
<tr>
<td>29</td>
<td>752</td>
<td>&gt;120</td>
<td>38</td>
</tr>
</tbody>
</table>

1 Adapted from reference 5.
The most recent dietary guidelines for Americans (Table 3) emphasize the maintenance of healthy body weights, but also include the notion that energy balance is determined both by food intake and physical activity (13). They continue to recommend that fat provide ≤30% of dietary energy, suggesting that this is applicable to all in the population >5 y of age. They recommend that sugars be used in moderation, but also state that current intakes of sugars are not associated with chronic disease, except for dental caries. The rationale for the changes occurring from 1990 to 1995 is shown in Table 3 (18).

National dietary guidelines are consensus documents that reflect the membership of the committee assigned to produce the guidelines. They also change with new knowledge. Committees given the responsibility of developing science-based guidelines must pay close attention to the criteria for evaluating information on the diet-disease relation (19). These criteria include the strength of the association, dose-response relation, temporally correct association, consistency of association, specificity of association, and biological plausibility. Evidence-based methodology should be applied so that the strengths of the recommendations are understood by those implementing the guidelines (20).

Although it is clear that dietary guidance for a population should be science-based, it cannot be imported without modification. Each country should use the best scientific knowledge available to develop dietary guidelines appropriate to its population. Developing countries should produce guidelines that consider the needs of their own populations, as developed countries have done. As discussed earlier, the focus on fat intake reduction in a developed country may not be desirable as the focus for the majority, who have serious problems of malnutrition embracing developed countries’ guidelines, which apply to the minority of the population with the luxury of excess food instead of to the majority, who have serious problems of malnutrition because of lack of food and who have diets of insufficient variety and composition. For example, the dietary guidelines for Thailand and Malaysia provide negative statements about fat and sugar consumption, implying that overconsumption of these nutrients contributes to health problems. Is this advice valid for the majority of the population? In contrast, Indonesia and the Philippines provide more general guidance toward a diet that contains the essential nutrients with less emphasis on chronic disease (21). This approach is more appropriate for a population in which inadequacy of nutrient intake remains a concern.

Developing food-based dietary guidelines

The achievement of nutritional health goals, as depicted in science-based dietary guidelines, is unlikely unless considerable effort is made to translate the science-based guidelines into action. Food-based dietary guidance must consider many aspects of the target population. The FAO/WHO consultation group suggested that the development of food-based dietary guidelines (FBDGs) should be informed not only by science-based public health issues, but also by the social, economic, agricultural, and environmental factors affecting food availability and eating patterns. They also suggested that FBDGs provide positive messages encouraging enjoyment of appropriate dietary intakes and acknowledging that a wide range of dietary patterns can be consistent with good health (2). The principles for developing FBDGs are summarized in Table 4 (22).

To be effective in bringing about dietary change and achieving health goals, FBDGs should be practical and the recommended foods should be available, accessible, and affordable. Important issues to consider are comprehensibility, cultural accessibility, the government and regulatory environment, the role of the food industry, the role of health professionals, and communications. FBDGs should be adaptable enough for use by all people and should be easy to understand.

Governments, the food industry, and health professionals have an important role to play in supporting the FBDGs. Governments

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**TABLE 3**

Comparison of the 1990 and 1995 Dietary Guidelines for Americans

<table>
<thead>
<tr>
<th>1990 Guideline</th>
<th>1995 Guideline</th>
<th>Rationale for proposed change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Eat a variety of foods.</td>
<td>1) Eat a variety of foods.</td>
<td>No change.</td>
</tr>
<tr>
<td>2) Maintain a healthy weight.</td>
<td>2) Balance the food you eat with physical activity. Maintain or improve your weight.</td>
<td>New emphasis on energy balance.</td>
</tr>
<tr>
<td>3) Choose a diet low in fat, saturated fat, and cholesterol.</td>
<td>4) Choose a diet with plenty of grain products, vegetables, and fruit.</td>
<td>No change in wording. Priority changed from third to fourth.</td>
</tr>
<tr>
<td>4) Choose a diet with plenty of vegetables, fruit, and grain products.</td>
<td>3) Choose a diet low in fat, saturated fat, and cholesterol</td>
<td>Increased focus on plant foods, consistent with food guide pyramid. Priority changed from fourth to third.</td>
</tr>
<tr>
<td>5) Use sugars only in moderation.</td>
<td>5) Choose a diet moderate in sugars.</td>
<td>Negative connotation of “only” removed; focus on total diet.</td>
</tr>
<tr>
<td>6) Use salt and sodium only in moderation.</td>
<td>6) Choose a diet moderate in salt and sodium.</td>
<td>Emphasize that foods themselves are the source of most dietary sodium.</td>
</tr>
<tr>
<td>7) If you drink alcoholic beverages, do so in moderation.</td>
<td>7) If you drink alcoholic beverages, do so in moderation.</td>
<td>No change.</td>
</tr>
</tbody>
</table>

1 From reference 18.
**TABLE 4**

Key principles for developing food-based dietary guidelines (FBDGs)\(^1\)

<table>
<thead>
<tr>
<th>Dietary patterns</th>
<th>Practicality</th>
<th>Comprehensibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total diet, rather than nutrients or individual foods, should be addressed.</td>
<td>The recommended foods or food groups should be affordable, widely available, and accessible.</td>
<td>FBDGs should be easily understood by the general public, taking into account different levels of literacy in the population. The terminology used must be simple and must refer to foods, rather than nutrients, wherever possible.</td>
</tr>
<tr>
<td>Dietary guidelines need to reflect food patterns rather than numerical nutrient goals.</td>
<td>FBDGs should recognize the social, economic, agricultural, and environmental conditions affecting foods and eating patterns.</td>
<td>Food groups should be chosen that make sense to the public. Visual presentation must be easily understood. Testing of the FBDGs is essential before dissemination.</td>
</tr>
<tr>
<td>Various dietary patterns can be consistent with good health.</td>
<td>FBDGs should be flexible for use by people with different lifestyles as well as people of different ages and different physiologic conditions.</td>
<td>Cultural acceptability</td>
</tr>
</tbody>
</table>

\(^1\) From reference 22.

need to incorporate the guidelines into permanent nutrition policy to protect them from temporary changes in political or economic situations (23). The food industry can play an important role in developing as well as supporting the guidelines by responding to the needs of consumers. Educational, financial, and marketing incentives can be used to overcome initial reluctance of food producers to cooperate. Health professionals play an important role in imparting the information in FBDGs in a meaningful way. Communication must be established through programs that effectively change eating habits through an understanding of what motivates consumers’ food behavior. When consumers are informed and educated, they demand healthier foods (23). FBDGs are commonly communicated in the form of posters, brochures, and radio and television messages (22). Educational materials containing explanations and specific information on serving sizes for traditional and packaged foods compared with home-produced foods can be developed to support FBDGs (22).

The steps that have been suggested for the development of effective FBDGs are as follows (2):

1) Form a working group of representatives of agriculture, health, food science, nutritional science, consumers, food industry, communications, and anthropology.
2) Gather information on nutrition-related diseases, food availability, and food intake patterns in a country.
3) Identify through full discussion a set of major nutrition-related health problems for which dietary guidelines could be useful.
4) Evaluate the general food production and supply situation through consideration of current practices, subsidies, and other governmental policies to see if FBDGs can be implemented under the present situation.
5) Draft a set of FBDGs, followed by background or back-up statements for each guideline and circulate them to all working-group members.
6) Pilot test the wording of the guideline statements with consumer groups; revise and check.
7) Finalize the background statements and send them to special-interest groups in the country (and possibly internationally) for comment. Once again, meet to consider changes in view of the responses, and draft a final report.
8) Conclude the draft, adopt, publish, and disseminate the final report. Begin implementation.

These steps toward the development of FBDGs, as recommended by the FAO/WHO committee (2), take considerable effort, organization, and time. The same process could logically be applied to the development of all nutrition and food policies. If these steps are taken, the outcome is more likely to result in effective implementation by the food industry and nutrition educators.

**Implementing food-based dietary guidelines**

Most FBDGs include some type of food group structure (1). Both Canada and the United States have developed new food guides that incorporate their national science-based dietary guidelines. In their early development, the food guides concentrated on expressing a dietary pattern that would provide the individual with the essential nutrients in recommended amounts. More recent food guides recommend a dietary pattern aimed not only at meeting the requirements for essential nutrients, but also at contributing to the prevention of chronic disease.

Both the Canadian and American food guides are similarly centered on food groups that represent the food supply and both have a new category: foods that include sugars and fats and oils. However, these 2 guides also illustrate that food guides are a national product, even though the foods available to the population are similar.

The Canadian food guide incorporates the 4 food groups in a rainbow design (3). Meat and alternatives are arranged along the small, inner arc, next are the milk products, then vegetables and fruits, and then finally grain products along the large, outer arc. The design gives the visual cue that the greatest quantity of food should be selected from the grains group. A category of “other foods” is identified as not being part of any particular food group and includes foods that are mostly fats and oils, sugar, high-fat or high-salt snack foods, beverages, herbs, spices, and condiments. It is acknowledged that “These foods can be used in making meals and snacks and are often eaten with foods from the four food groups,” but it is recommended that they be consumed in moderation. Instructions on using this food guide include advice on reducing fat, but no mention is made of sugar.

The US food guide (13) is in the form of a pyramid showing 5 food groups, with the grain group at the base. The vegetable and fruit groups share the next level of the pyramid and on top of these are the milk and meat groups, again sharing equally the next level in the pyramid. The visual impression is that one should consume less of those foods higher up the pyramid. At the very top of the pyramid is the category of fats, oils, and sweets. The consumer is advised that “These foods supply calories, but little or no vitamins and minerals.”

Food guides are generally designed to apply to all age groups >2 y of age. Thus, in the United States and Canada, they are
DIETARY GUIDANCE FOR CHILDREN

There is no disagreement on the fact that dietary guidance for children should be such that sufficient intake of energy and essential nutrient occurs to support growth and development, and food guides are consistent with this goal. However, the agent by which dietary guidance should be provided during childhood to prevent chronic disease is less clear. The development of FBDGs specifically for children will only be effective if the food supply and food choice is consistent with the guidance.

In planning to modify the fat intake of children's diets in countries in which intake is high, several key questions must be answered, which include the following:

1) Does modification of diets in childhood prevent chronic disease? If so, which disease or diseases?
2) Will dietary change affect growth and development?
3) Can children meet energy requirements on energy-dilute diets? If so, at what age?
4) Will nutrient intakes be compromised?
5) Is there a monitoring system in place to evaluate dietary change?

These same questions can be applied to countries in which dietary intakes of fat are low in children. Depending on the answers, a changing food supply must be provided along with appropriate food-based guidance. However, the food-based dietary guidance will be very different and will depend on the economic status of the country. For example, if the goal is to increase the dietary intake of fat in a developing country, an inexpensive fat source must be found and food guidance must be provided so that it is used appropriately. Conversely, if the national dietary guideline sets a target for children to reduce fat intake to between 20% and 30% of energy, then the changes required in the food supply to achieve the goal must be feasible. One might expect that a recommendation targeted at children would have evaluated the composition of the food supply needed to achieve the goal.

In developed countries, it has not been concluded that prevention of chronic disease begins in childhood and that food-based guidance for children is necessary. For example, although excess fat intake is recognized as contributing to chronic disease in both Canada and the United States, the 2 countries do not agree on the most appropriate application of the guideline to children (20, 24). In Canada, it is recommended that there be a gradual transition from the high-fat infant diet to a diet containing <30% of energy as fat from 2 y of age until the completion of linear growth (17). In contrast, the American Academy of Pediatrics recommends that each child between the ages of 2 and 18 y consume an average of <30% but not <20% of energy from fat (25); the US dietary guidelines recommend the goal of ≤30% of energy as fat for all the population >5 y of age (13). This argument may be little more than an academic debate, however. In the presence of a food supply with a ready excess of available fat, it is difficult to see a way to affect dietary change for children.

Many children of the world face the problem of too little fat in the diet. From infancy to adolescence, a predictable change in diet composition occurs. Infants are exposed to a very-high-fat diet from infant formula and mother’s milk, which contains 50–60% of energy as fat (26). The infant’s diet contains less fat as the child develops into a toddler and then into a young child who will eat increasing amounts of the family’s table food. A decrease in fat intake, from 50–60% to 30–40% of energy intake would be the usual extent of the change in macronutrient composition of the diet of young children in the industrialized world. For children in developing countries, the change in diet composition is much more extreme. Fat intake decreases from 55–60% of energy in milk to as little as 10–15% in a primarily cereal-based diet. Clearly, the ability of a young child to adapt to a high-carbohydrate, energy-dilute diet is limited (27). In these countries, concerted efforts are being made to ensure ready availability of dietary fat, but economics and distribution of fat within the population are the primary barriers to achieving this dietary goal.

In summary, a change in the nutrient content of the diet cannot be made on the basis of scientific guidelines alone. Although it is clear that each country should develop scientific guidelines suitable for its population, it must also develop effective FBDGs to achieve the goal of effectively solving health problems. This is best done by integrating health considerations and dietary goals when forming such scientific guidelines and by developing effective partnerships among the many sectors that influence food supply and food selection.

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