COUNTERPOINT

IN DEFENSE OF THE USDA FOOD GUIDE PYRAMID

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Since its release in 1992, the USDA Food Guide Pyramid has been widely distributed and recognized, and highly influential. Despite criticisms on numerous grounds, the Pyramid represents a significant advance over previous federal food guidance materials. A few adjustments to the Pyramid's design would respond to many concerns of critics, and would further strengthen and clarify its messages.

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Every 5 years since 1980, the US Department of Health and Human Services (HHS) and the US Department of Agriculture (USDA) have issued a joint statement of dietary guidance policy for health promotion and disease prevention—the *Dietary Guidelines for Americans*.[1] The most recent edition appeared in 1995. It advises Americans to eat a variety of foods; to balance food intake with physical activity; to choose a diet with plenty of grain products, vegetables, and fruits but low in fat, saturated fat, and cholesterol and moderate in sugars, salt, and sodium; and to drink alcoholic beverages in moderation, if at all.[2]

Although these Guidelines govern the content of all government nutrition programs and educational materials, they are not generally known or understood by the public.[3,4] Thus, in 1992, USDA issued a *Food Guide Pyramid* to help people apply the Guidelines to their own diets.[5] The Pyramid (see Fig. 1) depicts a hierarchical dietary pattern in which most daily food servings are from the grain, vegetable, and fruit groups, with fewer servings from the milk and meat groups, and even fewer from foods high in fat and sugar.

In its 6 years of existence, the Pyramid has become the most widely distributed and best recognized nutrition education device ever produced in this country. It appears in nutrition education materials, posters, and textbooks, in advertisements and package labels, in cookbooks, and on board games. It is recognized by an astonishing 67% or more of American adults.[6] It is demonstrably iconographic as it has spawned numerous analogs illustrating specific dietary patterns. By any criterion of recognition or dissemination, the Pyramid has been highly influential.

This influence, however, has been achieved at the price of controversy. Even before its release, the Pyramid elicited intense criticism, and it has continued to stimulate lively debates. At first, producers of meat, dairy, and processed foods complained that the Pyramid's hierarchical design would diminish sales of their products.[7] Other critics challenged its conceptual framework, scientific basis, and effectiveness as a teaching tool.[8]

More recent concerns about the Pyramid occur in the context of widespread public misunderstanding of the meaning of nutrition advice,[6] of

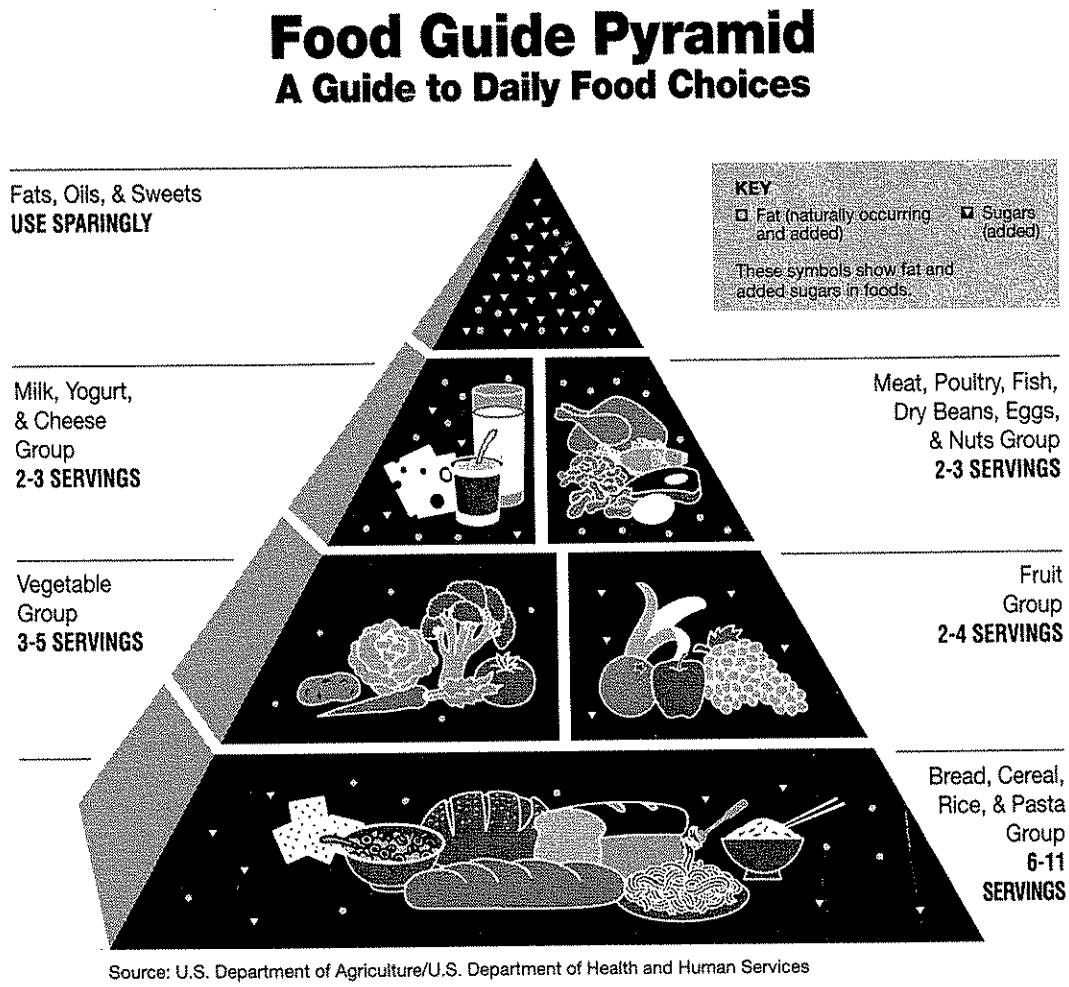

Figure 1. The 1992 USDA Food Guide Pyramid.

media research reports that appear to conflict with dietary advice, and of increasing confusion—even among experts—about the applicability of public health recommendations to the dietary practices of individuals.[9] In this context, critics have challenged the value of even such basic advice as avoiding overweight[10] or, as discussed previously,[11] eating more fruits and vegetables. Alliances of nutrition societies, federal agencies, and food industry groups have only added to the confusion by arguing that no foods should be categorized as good or bad.[12] Such advice implies that food group hierarchies, such as those in the Pyramid, may be inappropriate.

In 1996, USDA revised the Pyramid to reflect the 1995 Dietary Guidelines.[5] As HHS and USDA develop the fifth Guidelines edition scheduled for 2000, it is worth reviewing the substantial advances in dietary guidance policy represented by the Pyramid's design and content, and considering ways to improve on its substantial strengths.

HISTORICAL PERSPECTIVE

Table 1 summarizes key events in the Pyramid's history. This history begins in 1862 when Congress established the USDA with a mandate to advise the public about agricultural topics.[7] In 1916, USDA began to issue food guides to help Americans prevent nutritional deficiencies.[13] After World War II, as chronic diseases increasingly displaced deficiencies as the principal nutrition problems in the United States, new food guides were needed to address these conditions.[14] USDA published its last food guide devoted solely to addressing nutrient deficiencies, known familiarly as the Basic Four, in 1958.[15]

By that time, researchers already had associated diet with risks for coronary heart disease, and were providing dietary guidelines similar to those used today.[16] Two decades later, as research increasingly sup-

the evidence linking diet to chronic disease risk,[21,22] and Congress passed the Nutrition Labeling and Education Act—all of which influenced the Pyramid's design and content. From 1988 to 1990, USDA and Porter-Novelli developed, tested, peer-reviewed, and revised the Pyramid brochure, and completed all necessary federal reviews and clearances. In April 1991, the USDA Secretary abruptly canceled the Pyramid's publication on the grounds that it needed further testing with low-income adults and schoolchildren. Much evidence, however, suggested an alternative explanation—pressure from meat and milk producers concerned that the design was unfavorable to their products. The Pyramid's withdrawal led to unrelenting press reports of the apparent conflict between USDA's dual mandates to promote agricultural products and the health of the public.[7] One year later, after completion of additional research, USDA finally issued the brochure.

In 1996, USDA revised the brochure to make it consistent with the 1995 Dietary Guidelines.[5] Two recent events suggest that further revisions will most certainly be needed; the NRC is replacing RDAs with Dietary Reference Intakes,[23] and HHS and USDA have appointed a committee to prepare the next Dietary Guidelines.

CRITICAL PERSPECTIVE

Upon release of the Pyramid in 1992, some nutrition and industry groups lauded it as an improvement over the Basic Four, but others criticized it.[8] Table 2 classifies and

Table 2. Principal problem categories and criticisms of the 1992 USDA Food Guide Pyramid

Problem category	The Pyramid does not, but should:
Geometric	• Represent a pyramid (it is a triangle).
Botanic	• Classify fruits and vegetables appropriately (ie., tomatoes and peppers are fruits).
Ideologic	• Emphasize that all food groups are equivalent and that there are no good or bad foods.
Biochemical	• Recognize the biochemical equivalency of sugars and starches in the body.
	• Ensure adequate intake of essential fatty acids.
	• Distinguish the health impact of total fat relative to that of saturated, monosaturated, polyunsaturated, and trans-saturated fatty acids.
Gastronomic	• Emphasize whole, minimally processed—as opposed to refined—grains.
	• Separate beans (a vegetable) from meats.
	• Equate fresh beans (in vegetable group) with dried beans (meat group).
	• Distinguish high- from low-fat meat and dairy products.
	• Emphasize non-tropical oils opposed to tropical oils and animal fats.
	• Distinguish high- from low-fat cooking methods.
Pedagogic	• Guide educators to place commonly consumed foods in appropriate groups.
	• Explain serving sizes adequately or consistently.
	• Convey the complexities of information about nutrition and health.
Conceptual	• Distinguish serving recommendations that should be considered upper limits (meat and high-fat dairy foods) from those that should be considered lower limits (grain, fruit, and vegetable groups).
	• Meet the concerns and needs of vegetarians.
	• Reflect current *Dietary Guidelines,* emphasizing plant-based diets and including physical activity, salt, and appropriate use of alcohol.
	• Reflect replacement of Recommended Dietary Allowances (RDAs) by new Dietary References Intake (DRI) standards.

Table 1. Key events relevant to the history of the USDA Food Guide Pyramid[7,20]

1958	USDA issues *Daily Food Guide* ("*Basic Four*") to help the public prevent nutritional deficiencies.
1977	Senate Committee releases 1st and 2nd editions of *Dietary Goals for the United States* to prevent chronic diseases.
1979	USDA issues *Hassle-Free Guide to a Better Diet,* adding a 5th group to the *Basic Four* and emphasizing vegetables, fruits, grains.
1980	The Department of Health, Education, and Welfare (HEW) and USDA jointly issue *Dietary Guidelines for Americans.* The National Research Council (NRC) issues 9th edition of the *Recommended Dietary Allowances* (RDAs).
1981	USDA initiates a 3-year research program to design a food guidance system to meet RDAs and *Dietary Guidelines.*
1984	USDA presents research results as a *Food Wheel* for the American Red Cross.
1985	The Department of Health and Human Services (HHS) and USDA issue the 2nd edition of the *Dietary Guidelines.*
1988	USDA hires Porter-Novelli to develop and test graphic designs for the food guide; deems the Pyramid most effective. HHS issues *Surgeon General's Report on Nutrition and Health.*
1989	NRC publishes the 10th edition of the RDAs and the *Diet and Health* Report.
1990	USDA develops, submits for peer review, tests, and revises Pyramid brochure and graphic, completes clearance procedures. HHS and USDA issue 3rd edition of the *Dietary Guidelines.* Congress passes Nutrition Labeling and Education Act (NLEA).
1991	USDA withdraws Pyramid, hires Bell Associates to conduct further research.
1992	USDA issues *Food Guide Pyramid.*
1994	NLEA takes effect.
1995	HHS and USDA issue 4th edition of the *Dietary Guidelines.*
1996	USDA updates Pyramid to be consistent with the 1995 *Dietary Guidelines* and Daily Values on food labels.
1997	NRC issues the first set of Dietary Reference Intakes (DRIs) as replacements for RDAs. HHS and USDA request nominations for committee to develop 5th edition of the *Dietary Guidelines.*
1998	USDA and HHS announce appointment of 5th *Dietary Guidelines* Advisory Committee.

ported the value of such advice, a Senate committee issued Dietary Goals with numerical targets for reducing fat, saturated fat, and cholesterol, and with suggestions for changes in food intake that would be needed to achieve the goals.[17] USDA responded to this challenge by developing a food guide to prevent chronic as well as deficiency diseases in 1979; it rearranged the groups to emphasize those from plants, and suggested restrictions on a fifth group-fats/sweets/alcohol.[18]

In 1980, federal agencies issued the first Dietary Guidelines; with minor word changes, the initial precepts have been retained throughout subsequent editions.[1] Also in 1980, the National Research Council (NRC) issued the ninth revision of Recommended Dietary Allowances (RDAs) for intake of single nutrients that would prevent deficiencies in most healthy people.[19]

Thus, by 1981, USDA nutritionists were well prepared to begin researching a food guide that would encompass Dietary Guidelines, RDAs, and dietary survey results, and would address prevention of nutrient excesses and imbalances as well as deficiencies.[20] Three years later, USDA presented its research in the form of a Food Wheel designed for the American Red Cross. When it became clear that the Wheel was difficult for the public to understand, the agency recruited a marketing research firm, Porter-Novelli, to develop and test more comprehensible graphic designs.

Between 1981 and 1990, HHS and USDA issued the second and third editions of the Dietary Guidelines, the NRC released the 10th edition of the RDAs, HHS and NRC produced comprehensive reviews of

associated with prevention of chronic as well as deficiency diseases. Evidence for the substantial health benefits of exclusively[37] or largely plant-based diets has been well reviewed.[38] On the basis of such evidence, health authorities throughout the world consistently recommend Pyramid-like dietary patterns for overall health promotion,[39] most notably for prevention of coronary heart disease[40] and cancer.[41,42]

Hierarchical Proportions

USDA's 1958 Basic Four guide displayed the milk, meat, fruit and vegetable, and bread and cereal groups as squares of roughly equivalent size.[15] The 1979 Hassle-Free Guide was the first to introduce hierarchies in food groups. It displayed the groups stacked one above the other with vegetables/fruits at the top, followed in descending order by bread/cereals, milk/cheese, meat/poultry/fish/beans, and a fifth band at the bottom of fats/sweets/alcohol.[18] In response to protests from producers of foods in the lower echelons, USDA soon ceased issuing this guide.[7]

USDA staff intended the Pyramid as hierarchical to convey proportionality. More healthful diets are low in saturated fat and high in grains, fruits, and vegetables. The principal sources of saturated fat in American diets are fats and oils (41%), meat (26%), and milk-group foods (24%).[43] The Pyramid illustrates hierarchies through the relative number of plant-group servings (11–20 in total) as compared to meat- and milk-group servings (4–6), and through the placement of meat, milk, and fats and oils in the narrower portions of the design.

Healthful Dietary Pattern

The dietary pattern displayed in the Pyramid represents an improvement over current food intakes in the United States. Table 3 compares Pyramid serving recommendations to those reported as available in the food supply and as consumed by adults in dietary intake surveys. USDA estimates that the US food supply provides about 9 daily grain servings per capita, 3 of vegetables, 1.5 of fruits, about 2 each of dairy and meat foods, but more fats, oils, and sugars than is recommended.[44] Such data should not be interpreted as indicating a shortfall in food availability; per capita figures include infants and children as well as adults. They do suggest some imbalances in food production, however, that could be corrected by increasing the supply of fruits and vegetables and decreasing supplies of processed foods containing fat and sugar.[45]

USDA 1996 survey data also indicate an imbalance between current and recommended dietary patterns.[46] These data are constructed by disaggregating recipes for mixed dishes, and allocating weights of single food ingredients to appropriate Pyramid categories.[47] Thus, the flour in cookies contributes to grain servings, apples in pies contribute to fruit servings, and potatoes in chips contribute to vegetable servings, as do tomatoes in ketchup. This method may yield more precise data on nutrient intake, but it shifts foods high in fat and sugar from the peak to the lower tiers of the Pyramid. Even so, these data reveal excessive intake of servings from the meat and fats/oils/sweets groups,

Table 3. Food group servings available to or consumed by American adults as compared to Pyramid recommendations

	Number of servings			
	Pyramid recommendations		Dietary intake surveys	
Food groups	Servings	Food supply[43]	USDA[46]	Meat Board[50]
Grains	6–11	9.4	6.8	5.8
Vegetables	3–5	3.1	3.4	2.4
Fruits	2–4	1.5	1.6	1.0
Dairy	2–3	<2.0	1.5	1.2
Meat	2–3	2.0	4.5	2.8
Fats, oils, sweets				4.1

summarizes the principal criticisms; these range from the trivial (*eg*, geometric,[24] botanic[25]) and flawed (some biochemical concerns[26]), to the fundamental. Among the latter are questions about the assignment of certain foods to groups,[27] definitions of serving sizes,[24,28] and lack of distinctions among high- and low-fat foods, saturated and unsaturated fats, and servings meant to be upper limits (meat, milk, fat and sugar groups) from those meant to be lower limits (grains, fruits, vegetables).[29,30] More recent concerns focus on the need to update the Pyramid to reflect a stronger emphasis on plant-based diets, and to include guidance about physical activity, salt, and alcohol.[31]

It is difficult to imagine how any single graphic design might address the full range of such criticisms, or even those that are most valid. Other groups have attempted to correct some of the Pyramid's perceived inadequacies by creating their own versions to reflect, for example, Mediterranean,[31] Asian,[32] or vegetarian diets.[33] Whether such alternatives may be complementary or competing,[34] they solve some, but not all, of the problems of the USDA Pyramid and may well present others. It is always difficult to untangle science from values in developing clear and unambiguous dietary messages.[35] Thus, the positive contributions of the USDA Pyramid are well worth review and emphasis.

POSITIVE CONTRIBUTIONS

The Pyramid derived from an 11-year process of conceptualization, research, and testing. Its dietary pattern is largely based on plant foods—grains, fruits, and vegetables—with fewer portions of foods from the meat and milk groups. That this pattern is far more healthful than diets typically consumed by Americans is well supported by recent research.

Conceptual Basis

USDA nutritionists intended the Pyramid to display a dietary pattern that would meet two goals at once: provide a balance and quantity of nutrients sufficient to meet RDAs, but also to meet targets for reduced intake of fat, saturated fat, cholesterol, salt, and sugar. Furthermore, USDA staff wanted the Pyramid to convey three key concepts: variety, moderation, and proportionality. They defined *variety* as the number of different kinds of foods within and among groups, *moderation* as the need to eat less of foods high in fat and sugar, and *proportionality* as hierarchical—more servings should be consumed from some food groups than others.[20] Thus, unlike previous USDA food guides, the Pyramid derived from an established conceptual framework.

Research Basis

The content and design of the Pyramid were established during three distinct phases of research. In the first phase (1981–1984), USDA nutritionists selected nutritional goals, defined food groups, calculated the number of daily servings, assigned serving sizes, and created the Food Wheel. Because this design did not readily convey moderation or proportionality, USDA soon abandoned it but continued to use the food groups and serving numbers in publications throughout the mid-1980s. In the second phase, which began in 1988, Porter-Novelli tested several designs for conveying key concepts to adults who had at least a high school education and average income. Focus-group research indicated that this audience preferred food groups to be displayed in bands within an equilateral triangle ("pyramid"), and that this design best conveyed the key concepts.[7,20]

The third phase began in 1991 after USDA withdrew the Pyramid from publication. The agency contracted with a consulting firm, Bell Associates, to compare alternative designs among participants in food assistance programs.[36] Bell used focus-group research to test the Pyramid against bowls, pie charts, and shopping carts among diverse groups of children and adults. This research found industry representatives to prefer pie chart and bowl designs that did not "stack" the food groups, but nutrition professionals to prefer pyramids that better conveyed the desired messages. At that point, the field narrowed to two design options, pyramids and bowls. Bell then collected opinions about pyramid and bowl shapes from more than 3000 children and low-income adults. Eventually, analysis of the results indicated that both designs effectively conveyed the need for variety in food intake, but the Pyramid better indicated moderation and proportionality.[7,20,36]

Overall, USDA staff labored more than a decade to ensure that the Pyramid's principal features—food groups, serving numbers, and serving sizes—were substantiated by research, reviewed by experts, and understood by intended users. No food guide, USDA or other, has ever been researched to anywhere near this extent.

Scientific Support

Since 1992, the healthfulness of diets based largely on foods of plant origin has received increasing research support. Plant foods are the sole dietary sources of fiber, vitamin C, carotenoids, and phytochemicals, and are principal, although not exclusive, sources of folate, vitamins A and E, and other nutrients

but inadequate servings from the fruit and milk groups.

These data also reveal more specific dietary problems. Consumption of milk is especially low among teenagers who have replaced it with soft drinks. Vegetable servings may appear adequate, but only one-fourth serving comes from dark-green vegetables, and at least half the total derive from fast food garnishes—fresh and frozen potatoes, canned tomatoes, iceberg lettuce, and onions. Excluding fried potatoes reduces vegetable servings below three per day.[48,49] A 1994 survey by the Beef Board identified even greater imbalances.[50] Overall, diets could be improved by adding some servings of fruits and vegetables, and subtracting some servings of meat and other sources of saturated fat. Small dietary changes of this type are achievable and could greatly improve overall health.

Standard for Comparison

Table 3 also illustrates that Pyramid proportions and servings constitute a convenient standard for evaluation of dietary intake patterns. Serving counts contribute to at least half the score of one index of healthy eating.[51] Other researchers have used the Pyramid to assess the quality of foods advertised on children's television programs,[52] and to evaluate its effect on advertising in culinary and health magazines.[53] Such uses extend the influence of the Pyramid beyond dietary advice.

Adaptability

The Pyramid was designed to improve standard American eating patterns; if followed, it would do so. Its design is demonstrably easy to adapt to the particular food preferences and traditions of individuals, groups, and cultures. Pyramids for Mediterranean[31] and vegetarian[32] dietary patterns were developed from explicit conceptual systems; others diet Pyramids are more impressionistic. One vegetarian group, for example, suggests removal of the meat, milk, and fats/oils/sweets sectors, creating a Food Guide Trapezoid.[54] Regardless of origin, all pyramids designed to advise the public about diet and health share a common emphasis on reducing saturated fat, and on consuming a greater proportion of food energy from plant sources.

TOWARD THE NEXT REVISION

At issue is whether the Pyramid represents an ideal dietary pattern and, if less than ideal, how it might be improved. Diets of widely varying composition—Asian versus Mediterranean patterns, for example—are associated with excellent health. Such patterns differ in characteristic foods, types and amounts of fat, and use of alcohol, but share a common reliance on grains, vegetables, and fruits as energy sources, with minimal use of foods high in saturated fat. The Pyramid readily encompasses both of these patterns, and others, with minimal modifications.

Although it is unlikely that any one graphic design can respond to the complexities of current information about diet and health, some adjustments to the Pyramid could further strengthen and clarify its messages. Revisions to the Pyramid might well incorporate design elements that:

- Clarify the food-group categorization of beans and nuts.
- Translate the fats, oils, and sweets category into foods that represent their principal dietary sources.
- Adjust the proportions of the food groups to place greater emphasis on grains, fruits, and vegetables, and to minimize servings that are major sources of saturated fat.
- Convert portion sizes and numbers to amounts that better reflect the typical daily intake of adults.

Such changes could make the Pyramid an even more useful vehicle for translation of research and policy into practical dietary advice to improve the health of Americans.

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BOOKSHELF

Nutrition for Sport and Exercise: Second Edition, by Jacqueline R. Bruning, Ph.D., R.D., Assistant Professor, University of Colorado-Colorado Springs, Colorado Springs, CO, and Suzanne Nelson Steen, D.Sc., R.D., Chair, Department of Nutrition Education, Graduate Division, Immaculata College, Immaculata, PA. An Aspen Publication, Aspen Publishers, Inc., Gaithersburg, MD, 1998.

Creative Healing: How to Heal Yourself by Tapping Into Your Hidden Creativity, by Michael Samuels, M.D., and Mary Rockwood Lane, R.N., M.S.N., Harper-SanFrancisco, 353 Sacramento Street, Suite 500, San Francisco, CA, 94111-3653, ISBN 0-06-251518-7. The book presents readers with the inspiring ways in which the arts (painting, writing, music, and dance) can free the spirit to heal enabling one to improve one's health, attitude, and a sense of well-being by immersing oneself in creative activity.

Newsletters/Journals Received

Vegetarian Nutrition and Health Newsletter, by Patricia K. Johnston, Dr.PH., M.S., R.D., Editor, Loma Linda University, 1707 Nischolthel, Loma Linda, CA 92358. Contains latest information on Vegetarianism and includes practical information.

Exploring Healthy Eating, Activities for Parents and Children Together. Prepared by Center on Hunger, Poverty and Nutrition Policy, School of Nutrition Science and Policy Tufts University with HIPPY USA, 132 Curtis Street, Medford, MA. This booklet provides a series of nutrition topics for parents. Each page is a camera-ready handout offering useful information on eating habits, feeding tips, and creative activities for parents and children to do together.

Worksite Nutrition: a Guide to Planning, Implementation and Evaluation, developed by the Office of Disease Prevention and Health Promotion, Public Health Service, U.S. Department of Health and Human Services in collaboration with the American Dietetic Association. 2nd ed. Chicago, IL: The American Dietetic Association, 1993. Developed for dietitians, program planners, and others health care professionals as a resource to help improve the nation's health by expanding the information, activities, and services available to people at the workplace to facilitate healthy food choices.