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Recommended Dietary Allowances: More Research and Better Food Guides Needed. CED-78-169; B-164031(3). November 30, 1978. 39 pp. + 13 appendices (27 pp.).

Report to Rep. James H. Scheuer, Chairman, House Committee on Science and Technology: Domestic and International Scientific Planning and Analysis Subcommittee; by Elmer B. Staats, Comptroller General.

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Despite the importance of recommended dietary allowances in planning diets, evaluating nutritional contents of food, establishing guidelines for food labeling, and developing new food products, they have limitations and can be used properly only when these limitations and their meaning are understood. The recommended dietary allowances are considered to be too complex for use by the consumer and are intended to be used by the professional nutritionist or dietitian. Although they provide a reasonable standard for use by nutrition professionals in planning and evaluating diets, a diet which provides the recommended dietary allowances does not necessarily ensure adequate nutrition. Recommendations: The Secretaries of Agriculture and Health, Education, and Welfare should have the National Academy of Sciences assist in identifying nutrition research needs and in establishing research priorities relating to human nutritional requirements. This assessment should be used to improve and expand Federal research on human nutritional requirements. The Committee on Dietary Allowances should use the research results to expand and extend the recommended dietary allowances to additional nutrients and direct them toward more specific population groups. The Secretaries should also request a qualified and respected body of experts to assist in the departmental planning efforts of developing food guides for the

consumer to supplement other Government nutrition education efforts. These guides should help the consumer to develop diets that satisfy the recommended dietary allowances and nutrition guidelines and should address the current nutrition concerns regarding food components, lifestyle factors, and diet and health. (Author/SC)

8476

REPORT BY THE

Comptroller General

OF THE UNITED STATES

Recommended Dietary Allowances: More Research And Better Food Guides Needed

Recommended dietary allowances are guidelines for nutrient intakes to ensure a healthy population. The allowances are adequate for their intended purpose of serving as guidelines for use by nutrition professionals. However, they do not address some current concerns on diet and health. More research and a better translation of the allowances into food guides for the consumer is needed.

CED-78-169
NOVEMBER 30, 1978

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-164031(3)

The Honorable James H. Scheuer
Chairman, Subcommittee on Domestic
and International Scientific
Planning, Analysis and Cooperation
Committee on Science and Technology
House of Representatives

Dear Mr. Chairman:

As requested in your November 3, 1977, letter, this report discusses the recommended dietary allowances; their characteristics, limitations, and uses; how they are established; and how they compare with nutritional guidelines of other nations.

The report contains recommendations to the Secretary of Agriculture and to the Secretary of Health, Education, and Welfare to have the National Academy of Sciences assist in identifying nutrition research needs and in establishing priorities and to have a qualified and respected body of experts, such as the National Academy of Sciences, participate in planning and reviewing departmental efforts in developing food and nutritional guides for the consumer.

We orally briefed you on June 29, 1978, about the information and our recommendations and testified at your Subcommittee hearing on the recommended dietary allowances on July 10, 1978.

We have obtained comments from the Departments of Agriculture and of Health, Education, and Welfare and from the National Academy of Sciences. Their comments are incorporated in the report where appropriate.

As agreed with your office, we are sending copies of this report to the agencies involved, appropriate congressional committees, and interested parties.

Sincerely yours,

Elmer B. Staats

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE SUBCOMMITTEE ON DOMESTIC AND INTERNATIONAL SCIENTIFIC PLANNING, ANALYSIS AND COOPERATION, COMMITTEE ON SCIENCE AND TECHNOLOGY HOUSE OF REPRESENTATIVES

RECOMMENDED DIETARY ALLOWANCES: MORE RESEARCH AND BETTER FOOD GUIDES NEEDED

D I G E S T

Despite the importance of recommended dietary allowances (RDA) in planning diets, evaluating nutritional contents of food, establishing guidelines for food labeling, and developing new food products, they have limitations and can be used properly only when these limitations and their meaning are understood. They

--are intended for groups of healthy people and do not cover special nutrient needs associated with an individual's physical abnormalities or the use of drugs;

--overstate the nutrient requirements of most individuals to ensure that the needs of nearly all are met;

--do not cover all essential nutrients because, for some, there is insufficient evidence to estimate human needs; and

--are based on limited data and on small samples of people due to the complexities and cost of human nutrition research.

RDAs are established and updated by the Food and Nutrition Board of the National Research Council, National Academy of Sciences, with financial support from the National Institutes of Health, Department of Health, Education, and Welfare. First established in 1941, RDAs are revised periodically as new evidence becomes available. The Board's Committee on Dietary Allowances, composed of nutrition experts from academia, medical centers, and Government, accumulates and evaluates new information on human nutrient requirements

and recommends to the Board any changes or additions to the RDAs. (See pp. 15 to 18.)

The RDAs are considered to be too complex for use by the consumer and are intended to be used by the professional nutritionist or dietitian. Proper use of the RDAs requires that the recommended nutrient intakes be matched with the nutrient content of countless combinations of foods and diets developed from a variety of foods to make sure that nutrient requirements are met.

GAO believes the RDAs are a reasonable standard for use by nutrition professionals in planning and evaluating diets. However, a diet which provides the RDAs does not necessarily ensure adequate nutrition. Even when the food supply provides nutrients in excess of the RDA, some people may not be adequately nourished because food intakes vary greatly among individuals and some people may not eat enough, even of a fully adequate diet, to meet their nutritional needs. In addition, the requirements for some nutrients have not been established. The Food and Nutrition Board recommends that RDAs be provided from as varied a selection of foods as is practicable to help ensure that nutritional needs are met.

NEED FOR IMPROVED TRANSLATION OF RDAS AND CURRENT NUTRITION CONCERNS INTO FOOD GUIDES

One of the greatest potentials for RDA to affect public health lies in their translation to food selection guides for consumer use. Unfortunately, RDAs are too complex for general public understanding. The complexity of matching RDAs with nutrient contents of unlimited numbers of food combinations make it impractical for individuals to use RDA directly in planning diets. (See p. 35.)

Current nutrition concerns center on the statistical link between common degenerative diseases and diet and other lifestyle factors. Cause-affect relations have not been established, but these statistical

relations suggest that the consumption of too much fat, saturated fat, cholesterol, sugar, sodium (or salt), and too little fiber may be causing or contributing to diseases common in the United States. Other lifestyle factors similarly implicated in these diseases include smoking, lack of physical activity, alcohol, and stress. (See p. 35.)

Current nutritional concerns regarding these food components and lifestyle factors have not been effectively addressed by the Food and Nutrition Board's RDA report for professionals, the Department of Agriculture's Daily Food Guide for consumers, and the Food and Drug Administration's U.S. RDAs for food labeling. (See p. 35.)

RECOMMENDATIONS

The Secretaries of Agriculture and of Health, Education, and Welfare should have the National Academy of Sciences, as part of its RDAs revision process, assist in identifying nutrition research needs and in establishing research priorities relating to human nutritional requirements. This assessment of nutrition research needs should be used to improve and expand Federal research on human nutritional requirements. The Committee on Dietary Allowances should use the research results to expand and extend the RDAs to additional nutrients and direct them toward more specific population subgroups. This recommendation should not preclude either Departments from obtaining additional assistance of other organizations which have an interest in, and could contribute to, the assessment of nutrition research needs. (See p. 35.)

The Secretaries of Agriculture and of Health, Education, and Welfare should also request a qualified and respected body of experts, such as the National Academy of Sciences, to assist in the departmental planning efforts of developing food guides for the consumer to supplement other Government nutrition education efforts. This body of experts should also be used to periodically

review the progress made toward the development of these guides and evaluate the effectiveness of these guides when completed. These guides should help the consumer to develop diets that satisfy the RDAs and nutrition guidelines discussed in the RDA report. The guides should also address the current nutrition concerns regarding food components, lifestyle factors, and diet and health. (See p. 36.)

AGENCY COMMENTS

In commenting on this report, the Departments of Agriculture and of Health, Education, and Welfare (HEW) said that further research and translation of the RDAs into food guides for the consumer is needed and is the responsibility of both Departments.

Agriculture and HEW said they had established a joint steering committee to oversee the development of dietary/nutritional goals and guidelines for the public.

The National Academy of Sciences said it found the report to be sound and the assessment of problems relating to RDAs to be useful, objective, and accurate. (See pp. 36 to 38, and app. X to XII for these agency comments and GAO's response.)

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ABBREVIATIONS

FAO	Food and Agriculture Organization
FDA	Food and Drug Administration
GAO	General Accounting Office
HEW	Department of Health, Education, and Welfare
RDAs	recommended dietary allowances
USDA	U.S. Department of Agriculture
U.S. RDAs	U.S. Recommended Daily Allowances
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

Recommended dietary allowances (RDAs) are the amounts of essential nutrients considered, on the basis of available scientific knowledge, adequate to meet the known nutritional needs of practically all healthy persons in the United States. At least 45 and as many as 50 nutrients, including amino acids (the building blocks of body protein), vitamins, fatty acids, mineral elements, and water, are now recognized as essential to the human diet. The body also needs a supply of energy, obtained primarily from fats and carbohydrates and measured in calories, to function normally. As long as the overall diet supplies all the essential nutrients and adequate calories, the body can make the many additional compounds required for life. (See app. I for a list of essential nutrients.)

RDAs are developed and updated by the Food and Nutrition Board 1/ of the National Research Council, National Academy of Sciences. The Board's report on RDAs discusses the available scientific evidence on human requirements of most of the essential nutrients and recommends intake levels for specific nutrients when, in the opinion of the Board, enough evidence is available. The Board's recommendations are summarized in a table in the RDAs report. (See app. II.)

RDAs play an important role in our society because they are used to plan diets, evaluate nutritional content of foods, interpret food consumption records, and establish guidelines for food labeling. Major defects or inaccuracies in RDAs or in their application could affect the health of individuals and reduce the effectiveness of Federal programs which use RDAs.

The 1977 nutrition hearings of the Subcommittee on Domestic and International Scientific Planning, Analysis and Cooperation, House Committee on Science and Technology, demonstrated some confusion about RDA identification and use. With this in mind, the Subcommittee Chairman requested us to examine and report on the RDAs to aid the Subcommittee in its oversight hearings on RDAs during July 10 to 13, 1978. (See app. XIII.) We testified before the Subcommittee on July 10 and presented our conclusions and recommendations regarding the RDAs.

1/Originally the Committee on Foods and Nutrition.

HISTORY

As one part of the National Nutrition Program started in the 1940s, the Food and Nutrition Board was set up in the National Research Council to advise Government agencies on food and nutrition problems. Recognizing the need for dietary standards, the Board established the Committee on Dietary Allowances to develop recommended amounts of various nutrients for the Armed Forces and the general population. The Committee worked for over a year, evaluating existing evidence and soliciting comments and suggestions from other nutrition specialists, before making recommendations which the Board and the National Nutrition Conference adopted in 1941 as goals to aim at until further research justified changes.

The RDAs have been revised periodically. The 1943, 1945, and 1948 RDAs editions included calories and nine nutrients and classified adults according to activity--sedentary, moderately active, and very active. Beginning in 1953, adults were classified by age, estimated calorie needs were reduced, and separate classifications of activity level were no longer used. In 1958 and 1963 the estimated calorie requirements were lowered still more, and some reductions were made in recommendations for water-soluble vitamins, especially for males. The major change in 1968 was the increase of nutrients from 9 to 16. Some minor changes in recommendations for other nutrients were also made.

In the 1974 edition, new introductory sections were added explaining (1) the bases for estimating the allowances and some of the factors that influence nutritional needs and (2) some of the precautions to take in using the allowances. Other major changes included reduced allowances for protein, vitamin C (ascorbic acid), and vitamins B12 and E. An allowance for zinc was added.

COVERAGE OF RDAs

The 1974 RDAs report recommends intake levels for energy, protein (covering 9 essential amino acids), 10 vitamins, and 6 minerals, thus covering 25 of the 45 to 50 known essential nutrients.

RDAs are not provided for diet components such as sugar, fiber, sodium (or salt), fat, and cholesterol which are suspected as being linked to common degenerative diseases. Some are outside the scope of RDAs because they are not dietary essentials for humans. For sodium, which is

essential, there is not enough scientific data on which to base an allowance.

Scientific knowledge of variations in nutrient requirements caused by interactions and availability is limited. Where scientific studies have demonstrated that these might affect the normal, healthy population, such information is included in the text of the RDAs report.

USES OF RDAs

RDAs are used as guides for

--planning and procuring food supplies for population groups,

--interpreting food consumption records,

--establishing standards for food assistance programs,

--evaluating the adequacy of food supplies in meeting national nutritional needs,

--developing nutrition education programs,

--developing new products by industry, and

--establishing guidelines for nutritional labeling of foods.

Using RDAs to plan menus requires matching the body's nutrient needs with the nutrient contents of foods to ensure that the selected diet satisfies requirements. The large number of essential nutrients and the uncounted menu or food combinations possible make this task appear formidable. In practice, the selection of foods on the basis of a food group system can be used successfully to provide adequate diets. Food composition tables and computer techniques can help to provide more dependable, large-scale food service operations.

CURRENT STATUS

In May 1974 the Board began work on a 5-year plan to update the RDAs for the ninth edition, under a contract with the National Institutes of Health, Department of Health, Education, and Welfare, at an estimated cost of $205,000. Work is nearing completion, and publication is expected in early 1979.

The ninth RDAs edition will differ from previous editions in one important aspect. For the first time, "provisional RDAs" will be presented for about 10 essential nutrients where scientific evidence is insufficient to establish specific RDAs. (See app. III.) Provisional RDAs will be presented in terms of ranges of safe levels of intake and will provide some guidance on those nutrients which are of concern due to possible toxic effects.

CHAPTER 2

CHARACTERISTICS AND LIMITATIONS OF RDAs

RDAs have been criticized for a number of reasons, including being based on limited data and on small samples of people, for overstating the needs of most individuals, for being limited to the needs of healthy people, and for not covering all the essential nutrients. Most of the criticisms of RDAs we encountered appeared to be either a reflection of the limited scientific knowledge of human nutrition or inherent in the scope or purpose of the RDAs.

STATISTICAL CONCEPT UNDERLYING RDAs

The ideal method for developing RDAs would be to

--determine the average nutrient requirements for a healthy and representative sample of individuals grouped by such criteria as age, sex, body size, activity level, and environmental conditions;

--determine the variability of the requirements among individuals sampled within each group; and then

--calculate how much the average requirements must be increased to meet the needs of most individuals within the group.

The ideal method is a goal, which can rarely, if ever, be achieved because of insufficient evidence on human nutrient requirements and the variability of requirements between individuals. RDAs are estimated from available scientific evidence which is not complete enough to allow the statistical precision of the ideal method. However, RDAs are based on the statistical assumption that individual variation in a nutrient requirement is distributed in a bell-shaped curve above and below the mean requirement for a population group. RDAs overstate the needs of most individuals. To meet the nutrient needs of those individuals with high requirements, RDAs are set at a level higher than the requirements for an average person. Thus, in dietary surveys of population groups or in assessments of nutritional status of individuals, RDAs can only point to areas of risk or potential deficiencies. To positively demonstrate a deficiency would require clinical or biochemical tests of individuals to determine their specific requirements.

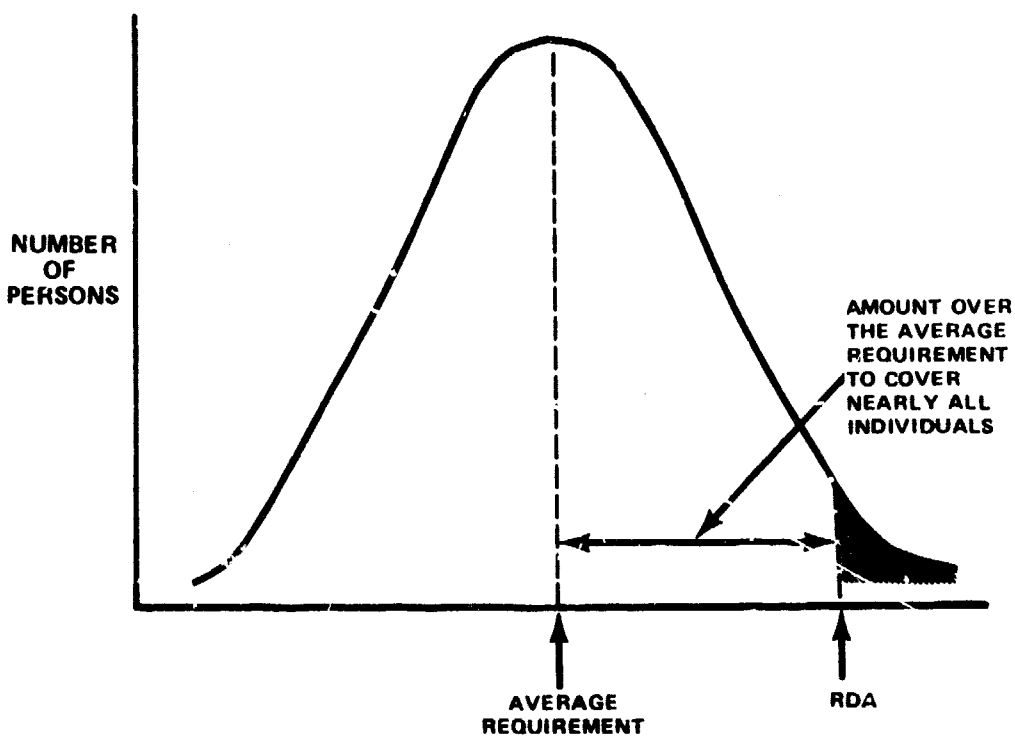
The basis for estimating RDAs is such that, even if a person habitually consumes less than the RDA, his or her

diet is not necessarily inadequate. However, the farther the habitual intake falls below the RDA and the longer the low intake continues, the greater is the risk of deficiency.

RDAs are presented as daily allowances for simplicity; however, this does not mean that diets must provide the RDAs in full each day. The body can store some nutrients for later use and can tolerate inadequate intakes for short durations without harm. Diets that provide the RDAs as an average over a 5- to 8-day period are considered acceptable.

The relationship of the variability of nutrient requirements among individuals to the allowance for that nutrient is shown in the following chart.

NORMAL DISTRIBUTION CURVE OF THE VARIABILITY OF REQUIREMENTS AMONG INDIVIDUALS



The Committee on Dietary Allowances seeks to set RDAs at levels sufficiently above the average requirement to cover the needs of about 97 percent of healthy individuals. Thus they exceed the nutrient requirements of nearly all individuals, although a few individuals may need more.

The RDAs are partially tailored to individual variations in requirements by expressing allowances for different age and sex groups. Within these groups, however, people's needs further vary due to such factors as genetic differences, body size, physiological state, and activity patterns.

USE OF RDAs BY INDIVIDUALS

RDAs were initially developed to guide Government planning of food supplies for population groups. The Food and Nutrition Board directs its RDA report to the nutrition professional. The task of matching RDAs with countless possible food combinations to plan diets is too complicated for a layperson.

Until recently, laypersons, or consumers, generally encountered RDAs only indirectly by a diet guide consisting of four food groups devised by the U.S. Department of Agriculture (USDA). (See p. 23.) The USDA developed this food group guide to translate the RDAs into a simpler food-based tool suitable for consumers' use in diet planning. More recently, the Food and Drug Administration (FDA) developed "United States Recommended Daily Allowances" (U.S. RDAs) based on the RDAs to be used in food labeling for consumers. The U.S. RDAs are simplified by reducing the number of age and sex categories. Labeling foods with U.S. RDAs is a tool for comparing individual foods.

RDAs APPLY TO HEALTHY PEOPLE

RDAs provide for the needs of most healthy people. They do not take into account special needs arising from (1) infections, metabolic disorders, chronic diseases, or other abnormalities that require special dietary treatment or (2) the use of certain pharmaceutical preparations, such as oral contraceptives. These are considered to be special problems, outside the scope of the RDAs.

Scientists involved with the Board's Committee on Dietary Allowances and the Committee on Clinical Nutrition stated that it would not be possible or practical to establish RDA-type guides covering all diseases and the possible variations in severity. The task of setting RDAs even for healthy individuals is constrained by incomplete knowledge.

We found that hospitals do use RDAs to plan or evaluate basic menus. This is an appropriate use of the RDAs. (See p. 21.) Physicians may use RDAs as a starting point and make appropriate adjustments to meet a patient's specific and unique needs due to disease or injury.

RDAs HAVE NOT BEEN ESTABLISHED FOR ALL ESSENTIAL NUTRIENTS

Essential nutrients are those chemical elements or compounds the body cannot manufacture for itself and thus must be consumed from the environment to sustain life and promote growth. RDAs are established for essential nutrients when, in the judgment of the Board, the scientific evidence is sufficient to recommend a specific level of consumption. Thus far RDAs have been established for protein (covering 9 essential amino acids) and 16 other essential nutrients.

In the introductory section of the RDAs report, the Board warns that RDAs have not been established for all essential nutrients and that additional nutrients may someday be proven essential. To help ensure that nutritional needs are met, the Board recommends that RDAs be provided from as varied a selection of foods as is practicable.

In addition to the nutrients for which RDAs have been established, the text of the RDAs report includes the scientific knowledge of human requirements for most of the other essential nutrients. Some guidance is provided on the function of the nutrient in the body and the amounts contained in the average diet.

Ten of the essential nutrients for which RDAs have not been established are planned for inclusion in a new "provisional allowances" table in the ninth RDAs edition. Since there is insufficient evidence to recommend a specific intake level, the provisional RDAs will be presented in terms of ranges of safe levels of intake. The Committee on Dietary Allowances developed the provisional RDAs in response to a growing need for guidance on intakes of certain nutrients which may be toxic and because of concern over the impact of processed and manufactured foods on the quality of the diet.

RDAs FOR ENERGY

Energy is defined as the power to do work, and the source of energy is a dietary essential. It is not a specific chemical substance like the essential nutrients. The body can obtain energy from various nutrient sources, including proteins, carbohydrates, fats, and alcohol.

The energy RDAs differ from the RDAs for specific nutrients. The energy allowance is set at the average intake needed in the population to balance with energy output, assuming light-to-sedentary physical activity. In contrast, RDAs for specific essential nutrients represent intakes sufficiently above average requirements to satisfy the needs of nearly all individuals.

Body size, physical activity, and environmental factors, such as climate, are factors that determine energy needs. The energy requirement must be more precise than the requirements of other nutrients because an imbalance in a person's energy intake can lead to overweight or obesity. An average energy intake is used to discourage overconsumption of energy that would lead to obesity, whereas overconsumption of specific essential nutrients at levels near the RDAs pose no such health risk. Thus the energy RDAs simply provide an average energy need to guide dietitians or food planners for groups of individuals. To emphasize the uniqueness of the energy recommendation, the current Committee on Dietary Allowances proposes segregating it from the RDAs for specific essential nutrients in the pending ninth RDAs edition.

RDAs COVERAGE OF OTHER FOOD COMPONENTS

Under the heading "Source of Energy," the RDAs report briefly discussed (1) carbohydrates, including sugars and fiber, (2) fat, and (3) desirable proportions and types of carbohydrate and fat in the diet. The Board makes no recommendations for intakes of these food components but cites the research findings and recommendations of others, such as the American Heart Association.

NUTRIENT NEEDS VARY WITH DIET AND LIFESTYLE FACTORS

Nutrients interact with other nutrients, drugs (including alcohol, oral contraceptives, and laxatives), smoking, exercise, and stress. Some of those nutrient interactions are discussed in the RDAs report under the particular nutrient involved. The Committee on Dietary Allowances addresses nutrient interactions to the extent that it is important, when there is scientific evidence indicating a variation in nutrient requirements due to interactions, and/or when a practical problem might occur.

Nutrient interactions which may be covered in the next revised RDAs edition include

--protein and calcium relationship,

--iron and vitamin C relationship,

--the effects of smoking on nutrient requirements, and

--the effects of stress on nutrient requirements.

The effects of foods and drugs on each other can determine whether the body is getting adequate nutrients and whether the drugs are effective. Drugs may act in various ways to impair nutrition, such as

--speeding up the excretion of certain nutrients,

--preventing the absorption of nutrients, or

--interfering with the body's ability to convert nutrients into usable forms.

For example, oral contraceptives are known to lower blood levels of vitamin B6. The Committee on Dietary Allowances recognized this relationship in the 1974 RDAs report.

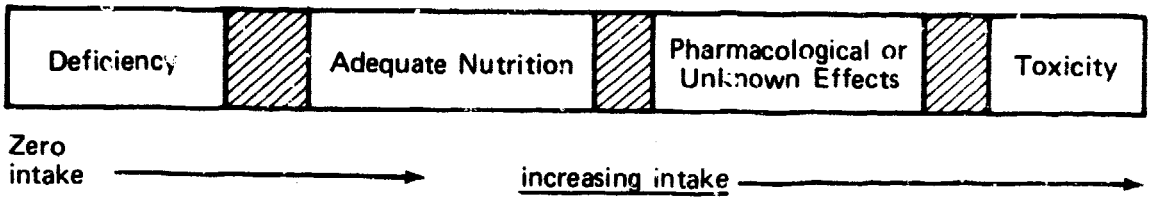
The uses of cigarettes and oral contraceptives lower blood levels of vitamin C. However, according to one of the nutrition scientists on the Committee on Dietary Allowances, the significance of these effects in terms of vitamin C requirements has not been clarified.

Additional research is needed to identify many nutrient interactions and to more fully determine the degree to which they affect human nutritional requirements. Department of Health, Education, and Welfare officials told us that research was needed in the area of nutrient interactions, but because it is very difficult and comprehensive and would require enormous resources and years to accomplish, they felt that research should first be directed at developing a better methodology for conducting research in this area.

PHARMACOLOGICAL OR TOXIC INTAKES OF NUTRIENTS

Above the range of safe, normal nutritive intakes, higher levels of intakes may have pharmacologic or toxic effects. The varying effects of different nutrient intakes, ranging from deficiencies produced by low intakes to toxicity from very high intakes, are shown below.

Nutrient Effects Over Range of Possible Intakes



Note: Shaded areas represent imprecision of divisions due to variations among individuals.

Pharmacologic or druglike effects of large doses of certain nutrients are considered therapeutic uses and are outside the scope of RDAs.

The RDAs report notes that most nutrients are tolerated well in amounts that exceed the allowance by as much as two or three times but warns that very high intakes of a few nutrients, such as vitamins A and D and certain trace elements, can be toxic. The eighth RDAs edition advises consumption of varied and balanced diets as a means to avoid excessive intakes of trace minerals.

SIMILARITIES AND DIFFERENCES IN RDAs AND U.S. DIETARY GOALS

Scientific studies of disease patterns have implicated several dietary components as possible contributors to degenerative diseases common in the United States. The dietary risk factors have recently been addressed in reports by the former Senate Select Committee on Nutrition and Human Needs. This Committee's "Dietary Goals for the United States," second edition, is controversial and has been published with a volume of supplemental views, containing conflicting opinions. We have contrasted the Dietary Goals with the RDAs report.

Purposes contrasted

The intent of the RDAs is to define intake goals only for dietary essentials; that is, food components that must be in the human diet to maintain health and growth. The absence or deficiency of a dietary essential will positively result in nutritionally caused deficiency or disease.

In contrast, the Dietary Goals seeks to define goals for the intake of diet components--regardless of their essentiality to humans--which may be related to diseases that are common causes of death in the United States, as well as the promotion of good health. However, diet is only one of several factors linked to these diseases. Therefore, positive conclusions that disease will occur from a nonconforming diet cannot be made.

Scopes contrasted

The Dietary Goals makes recommendations for several dietary essentials--energy, sodium, and fats--which are within the defined scope of the RDAs. And the RDAs report discusses health implications of most of the remaining nonessential diet components for which dietary goals have been established. The RDAs report, however, does not recommend consumption levels for the nonessential nutrients encompassed in the Dietary Goals. The table on the following page summarizes the RDAs report's coverage of nutrients included in the Dietary Goals.

Translation to food guides

The "Dietary Goals For the United States," second edition, supplements the Dietary Goals with guidance on food selection and preparation to achieve the goals. In contrast, the RDAs must be used with a knowledge of foods and sources of nutrients to plan diets.

RDA Report's Coverage of Nutrients Included in U.S. Dietary Goals

Diet component	U.S. Dietary Goal	Dietary essential?	RDA report coverage
Energy	Intake equals expenditure	Yes	RDAs established; states need to adjust food consumption and physical activity to achieve desirable weight
Sodium	Limit salt intake to 5 grams per day	Yes	No RDAs established; provisional RDA proposed
Fats	Reduce to 30 percent of total energy intake	Yes (specific fatty acids are essential)	No RDAs established; cites American Heart Association goal of not to exceed 35 percent of energy
Saturated fats	Reduce to about 10 percent of total energy intake	No	Mentions link to coronary heart disease and cites American Heart Association goal of less than 10 percent of calories
Cholesterol	Reduce intake to 300 milligrams per day	No	States dietary modifications appear to be indicated for individuals at risk
Complex carbohydrate and naturally occurring sugar	Increase intake to about 48 percent of energy	No	Suggests substituting when fat intake is reduced; cites evidence linking diets high in sticky forms of sugar to dental caries
Refined and processed sugars	Decrease consumption to about 10 percent of energy intake	No	Cites evidence linking diets high in sticky forms of sugar to dental caries

CONCLUSIONS

RDAs have certain limitations which are either inherent in their intended purpose or result from the limited availability of scientific knowledge on human nutrition. We believe the RDAs can be used properly only when their meaning and limitations are understood. The RDAs

--are intended for groups of healthy people and do not cover special nutrient needs associated with an individual's physical abnormalities or the use of drugs;

--overstate the nutrient needs of most individuals to ensure that the needs of nearly all are met; and

--do not cover all essential nutrients because, for some, there is insufficient evidence to estimate human needs.

The RDAs generally are considered to be too complex for use by the consumer and are intended to be used by the professional nutritionist or dietitian. Proper use of the RDAs requires that the recommended nutrient intakes be matched with the nutrient content of countless combinations of foods and diets developed from a variety of foods to ensure that unknown nutrient requirements are met. Even when the matching process is properly done, RDAs can only provide indications of diet adequacy or inadequacy since the nutrient requirements of specific individuals are usually unknown.

CHAPTER 3

PROCESS OF ESTABLISHING RDAs

RDAs are established and updated by the Food and Nutrition Board. The Committee on Dietary Allowances, composed of nutrition experts, evaluates new information on human nutrition and recommends to the Board any changes to the RDAs. Study groups or workshops involving other scientists and users are convened for indepth study of particularly difficult or controversial aspects of the RDAs.

The task of establishing and revising RDAs is not simple because of

--a limited nutrition research data base and the use of considerable scientific judgement and

--difficulty in deciding upon the appropriate criteria for determining when the requirements for some nutrients have been met.

NATIONAL ACADEMY OF SCIENCES NATIONAL RESEARCH COUNCIL

The National Academy of Sciences is a federally chartered, private society of scholars in scientific and engineering research dedicated to furthering science and its use for the general welfare. Its charter, passed by the Congress in 1863, empowered the National Academy to create its own organization and bylaws and called upon it to serve as an official adviser, upon request and without fee, to the Federal Government on any question of science or technology.

Most of the National Academy's activities are carried out by the National Research Council, established by the National Academy in 1916. A primary objective of the Council is to bring together scientists of exceptional competence to deal with scientific problems and to exchange information to further research. Because of the breadth of its interests, the Council can organize multidisciplinary task forces to investigate problems of national importance.

Food and Nutrition Board

The Board was established in 1940, under the Division of Biology and Agriculture, Assembly of Life Sciences of the National Research Council. The Board, drawing upon the knowledge and expertise of scientists from academia, Government, and industry, serves as an advisory body in the field

of food and nutrition, promotes research, and helps interpret nutritional science in the interests of public welfare. The Board aims to provide leadership and guidelines in all areas that will help to ensure the availability of the quantities and kinds of foods necessary to maintain the health and productivity of the United States and other populations. The Board acts on its own initiative and in response to requests from public agencies.

The Board is active in areas of dietary standards, nutrition and health, food safety, food chemicals specifications, food resources, and international nutrition programs. Some of the Board's guides include

--recommended dietary allowances,

--principles and procedures for the evaluation of the safety of foods,

--specifications of identity and purity for food chemicals, and

--guidelines for nutrient fortification of foods.

Committee on Dietary Allowances

Developing and revising the RDAs is a major ongoing activity of the Board. For each revision, a committee on dietary allowances is established to evaluate new information on human nutrient requirements and recommend changes in the RDAs to the Board. (See app. IV.)

Appointments to the Committee are made by the National Academy with the advice of the Board and the Assembly of Life Sciences of the National Research Council.

The Board recommends candidates for the Committee on Dietary Allowances membership, with the objective of providing the whole Committee with indepth expertise on all the essential nutrients. The Board's recommendations are presented first to the Assembly of Life Sciences for review and modification or approval and then to the National Academy for further review and ultimate selection.

In addition to reviewing the qualifications of prospective Committee members, the National Academy investigates members' consulting ties and investments for any actual or apparent conflicts of interest which could appear to bias Committee decisions. The Board's recommendations generally are accepted by the Assembly and the National

Academy, but either body may--and occasionally does--deviate from the Board's recommendations. The final selection of Committee members is made by the National Academy.

In recent years the Board and the Committee have been criticized for being biased toward the food industry. In 1977 the Visiting Committee of the National Academy of Sciences studied the Board and found no justification for claims of possible bias. In February 1976, after special hearings on FDA regulations on food for special dietary uses and cross-examination of a representative of the Board and the Committee, the United States Court of Appeals for the Second Circuit also found no evidence of bias.

PROCEDURES OF ESTABLISHING RDAs

Once established, the Committee on Dietary Allowances reviews the current edition of the RDAs, identifies special problems, and plans the format for the revised edition. It next reviews the major reference works from all over the world and selects the most valid publications to consider in revising the RDAs. Its members are then assigned to review the data on specific nutrients or groups of nutrients in greater detail.

Groups or workshops may be convened to study indepth particularly difficult or controversial aspects of the RDAs to obtain a consensus of opinion from a broader representation of the scientific community than can be encompassed in the Committee structure. For the revision currently in process, a special workshop was also held to determine how the RDAs could be made more useful to those professionals who ultimately use the RDAs. Individual Committee members may also seek the informal advice and counsel of nutrition experts outside the Committee.

Committee members prepare drafts of the section for which they are responsible, sometimes with the help of subcommittees. At intervals over a 3- to 4-year period, each draft is further reviewed by the entire Committee. After the various suggestions have been incorporated, the drafts are submitted to the Board for review and again revised on the basis of its comments and suggestions. Once the Board is satisfied, the draft is submitted to the Assembly of Life Sciences of the National Research Council for further review, comment, and approval.

Each report of a study committee of the Council is reviewed by an independent group of qualified individuals according to procedures established and monitored by the

Report Review Committee of the National Academy of Sciences. Distribution of the report is approved by the President of the National Academy upon satisfactory completion of the review process.

ADEQUACY OF SCIENTIFIC EVIDENCE

There are four guiding principles the Committee on Dietary Allowances follows in developing its recommendations.

--Scientific evidence about requirements of human subjects, and how requirements change with age and physiological state, should be the starting points for developing an allowance.

--In extrapolating from an average requirement to a recommended allowance, individual variability should be taken into account.

--If there are factors, such as incomplete absorption that influence the utilization of the nutrient after it has been ingested, the allowances should be adjusted to take them into account.

--In the case of foods that contain precursors (forerunners or other forms) of a nutrient, efficiency of conversion of the precursors should be considered.

For most nutrients, judgment is required in extrapolating from requirements to allowances. Even for nutrients about which the greatest amount of direct information is available concerning human requirements, the knowledge is usually applicable only to infants and young adults. For very few of these nutrients is there enough information to permit calculation of a highly reliable estimate of variations among individuals. For most nutrient requirements, it must be assumed that variability is in the same range as that for the few nutrients that have been studied extensively. For nutrients that are not completely absorbed, values for efficiency of absorption tend to be highly variable. Also it is difficult to decide upon the appropriate criterion for determining when the requirements for some nutrients have been met. The criterion may be considered as an amount just in excess of that needed to prevent deficiency signs, it may be considered as an amount that ensures saturation of tissues, and it may be judged to be somewhere between these extremes and to be the amount needed to maintain a particular concentration in blood or a particular

level of urinary excretion. Adequacy thus becomes a matter of judgment.

There is more scientific evidence available for estimating allowances for protein and energy than for most other nutrients. Allowances for most nutrients must be estimated from much less, and frequently less reliable, information; therefore, the element of judgment looms larger. For some nutrients, evidence on human nutrient requirements is available from human experiments; however, as previously stated, such data usually is based on studies of either infants or young adults. Human experiments are costly, and usually cover a small number of subjects for short durations. Also certain types of human experiments are not possible for ethical reasons. Thus requirement estimates must often be derived from limited information.

For some nutrients the requirement must be assessed largely from one or two experimental trials on a small number of subjects. For other nutrients there are so few experiments on human subjects that requirements must be estimated either from information about the requirements of other mammals or from information about the minimum amount of the nutrient known, from food analyses and dietary surveys, to be consumed by apparently healthy people.

NINTH EDITION

In May 1974 the Board began work on a 5-year plan to update the RDAs for the ninth edition. Panels were formed to consider problems of calcium, phosphorous, and magnesium nutriture and the role of fiber in the diet, and workshops were convened to consider the needs--and ways to meet the needs--for iron, zinc, folate, and vitamin B6. A workshop was held for professionals using RDAs in food service, dietatic counseling, the food industry, and nutrition education to review and define the appropriate uses of RDAs and to review a means for communicating their meaning and proper application to the professional community and the lay public. Also a symposium was held with members of the Federation of American Societies for Experimental Biology to allow other scientists to have some input into the process of revising the allowances. The ninth edition is now nearing completion and is expected to be published early in 1979.

CONCLUSIONS

The procedures used in establishing the RDAs are designed to be as scientifically accurate as practicable. The RDAs are based on limited scientific data and on small

samples of people due to the complexities and cost of human nutrition research. Considerable judgement is involved in estimating the allowances. We believe, however, that the participation of numerous experts in the judgmental process, all of whom are chosen for their technical competence, is a reasonable approach to a difficult task.

CHAPTER 4

USES OF RDAs

RDAs are used by nutritionists, nutrition educators, health professionals, and administrators to plan diets and provide food supplies for groups, evaluate the adequacy of diets, provide nutrition education, establish guidelines for nutritional labeling, and develop new food products. RDAs are also used to conduct and report nutrition research.

PLANNING DIETS AND PROVIDING FOOD SUPPLIES FOR GROUPS

Many organizations use RDAs in developing or analyzing their menus, although some adjust the RDAs to supply the nutrients necessary for their specific population group. For example, the physical characteristics and activity levels of military personnel tend to be different from the average population on which the RDAs are based. Consequently, the Department of Defense, in developing its menus, uses the RDAs as a basic standard and adjusts the allowances for certain nutrients to cover its specific needs.

Although RDAs are designed for groups of healthy people, the military, Veterans Administration, and private hospital dietitians use RDAs in planning their basic hospital menus because there is no better standard. In fact, the Joint Commission on Accreditation of Hospitals, in its draft standards, recommends that

> "The standards for nutritional care in the [hospital's] diet manual/handbook should be in accordance with the Recommended Daily [Dietary] Allowances* * *."

In practice, however, basic hospital menus are often modified, at the direction of physicians, to meet the patients' specific needs and medication.

Many federally funded programs, which provide either food and/or financial assistance for food, use the RDAs as their nutritional standards or guidelines. (App. V lists some of these programs.) One program, Title VII of the 1965 Older Americans Act, requires that each meal served to program participants meet one-third of the RDAs.

The National School Lunch Program requires that lunches served by participating schools must meet standards prescribed by the Secretary of Agriculture. The standard prescribed is commonly called a Type A lunch. The Secre-

tary's goal in requiring Type A lunches, although not promulgated as a formal requirement, is to provide students, over time, with one-third of their RDAs (except for calories). The RDAs used to develop the Type A lunch standard were those developed in 1968. In September 1977 USDA published proposed revisions of the school lunch nutritional requirements to bring the program into conformance with the 1974 revisions of the RDAs. According to a USDA official, these revisions will not be made final until at least 1979 when the new RDAs will be published. This official was unable to provide plans for incorporating the 1979 RDAs into the National School Lunch Program.

EVALUATING ADEQUACY OF DIETS

For many years surveys aimed at identifying and assessing major nutritional problems have been made in the United States. Six major surveys have been made since 1964. Two USDA Nationwide Food Consumption Surveys (1965-66 and 1977-78) focused on changes in the household food consumption patterns of their respective decades, with particular emphasis on changes among low-income groups. 1/ The Ten State Nutrition Survey (1968-70), made by the Department of Health, Education, and Welfare (HEW), focused on the low-income population of 10 selected States and New York City and based its nutritional assessment on body measurements, physical examinations, biochemical determinations, dental examinations, dietary interviews, and food pattern evaluations. 2/

The Preschool Nutrition Survey (1968-70), supported by an HEW grant, provided an overview of the nutritional status of children 1 to 6 years of age, based on consumption and biochemical data. Finally, two HEW Health and Nutrition Examination Surveys (1971-75 and 1976-79), were performed on representative samples of the general population and used consumption and biochemical data to evaluate nutritional status.

Two survey officials stated that RDAs were set higher than most persons' needs and that a lower value or a fraction of the RDA values generally was used as an indicator

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1/ GAO report, "Nationwide Food Consumption Survey: Need For Improvement and Expansion," CED-77-56, Mar. 25, 1977.

2/ GAO report, "Evaluation of Efforts to Determine Nutritional Health of the U.S. Population," B-164031(3), Nov. 20, 1973.

of potential nutritional deficiencies in nutritional surveys. The nutritional standards used to evaluate data from the six major nutritional surveys incorporated modifications of RDAs to varying degrees. Five of the surveys used a combination of RDAs for some nutrients and lower values for other nutrients to evaluate survey data, whereas the Preschool Nutrition Survey used lower values for all the nutrients.

PROVIDING NUTRITION EDUCATION

Depending on the audience, two methods are used to teach nutrition education: using RDAs or listing foods into groups. Professionals and students in the nutrition field usually are taught about RDAs; however, RDAs are often translated into basic food groups for consumer education since they are too technical.

The guide frequently used is the USDA Daily Food Guide. (See app. VI.) This guide divides foods that are good sources of nutrients into four food groups--milk, meat, fruits and vegetables, and bread and cereals. It is based on the 1953 RDAs, the 1948 Nationwide Food Consumption Survey data, and national food supply statistics. Although the concept was reevaluated after the 1965-66 Nationwide Food Consumption Survey and the 1968 RDAs, no major changes were made to the food groups. USDA is planning to reevaluate the food group guide in terms of the 1977-78 Nationwide Food Consumption Survey data and the 1979 RDAs.

Many criticisms of the four food groups have been expressed by consumer group representatives and others. These critisisms follow:

--The nutritional composition of foods within a respective group may vary. Thus a person could, conceivably, make consistently poor food choices from any one group.

--The four food groups do not include some manufactured food; that is, fabricated or mixed foods.

--The four food groups underemphasize starches, including fruits, vegetables, and grains; and they place too much emphasis on animal protein.

--The four groups are ineffective as a nutrition guide because almost any type of diet can fit under the groups. For example, a diet grossly high in fat, sugar, salt, and calories can meet the requirements of the guide.

--The four basic food groups do not address today's nutrition problems; that is, they contain too much cholesterol and fat.

USDA did not comment on these criticisms of the four food groups. A USDA official told us that the Department did not wish to comment on these criticisms.

Other approaches to nutrition education have also been introduced, some of which follow.

--The State of California Department of Health's revised Daily Food Guide for women, which includes six food groups: protein, milk and milk products, breads and cereals, vitamin C-rich fruits and vegetables, dark green vegetables, and other fruits and vegetables. This revised guide can meet the RDAs for all nutrients except iron, folacin, and calories.

--The Expanded Food and Nutrition Education Program in New York stresses what officials believe are the four most important nutrients--vitamins A and C, calcium, and iron. For example, rather than stressing a milk group, they discuss calcium and foods that are rich in that nutrient.

--The nutrient approach discusses nutrients, why they are needed, their interrelationships, and food sources. According to a nutritionist, the nutrient approach may be too unwieldy and too complex.

RDAs are considered tools of the trade in the nutrition field and are used in the nutrition education of students considering careers in food service. In the Federal programs we examined, funding agencies frequently provided materials to program administrators to assist them in providing nutritional services, including education. Generally, these materials make reference to RDAs as the standards on which to base nutrition services.

ESTABLISHING GUIDELINES FOR NUTRITIONAL LABELING AND DEVELOPING NEW FOOD PRODUCTS

Food manufacturers use RDAs indirectly in food labeling since they are the basis for the U.S. Recommended Daily Allowances. (See app. VII for a description of how FDA established U.S. RDAs.)

Federal regulations require that all foods having a nutrient added or for which a nutritional claim is made must list on the label such information as serving size; servings per container; calorie, protein, carbohydrate, and fat content; and the U.S. RDAs percentage of certain nutrients.

Foods exempt from the labeling requirement include fresh fruits and vegetables; food supplied for institutional use, provided nutritional information is supplied directly to the institution; bulk foods used solely in manufacturing other products; and foods for special dietary uses, except for dietary supplements in food form such as cereals with over 50 percent of one or more U.S. RDAs.

The label must include the U.S. RDA percentage for eight specific nutrients unless the product contains less than 2 percent of the U.S. RDAs for five or more of the nutrients. These nutrients and the order in which they must be listed are protein, vitamin A, vitamin C, thiamine, riboflavin, niacin, calcium, and iron. In addition, any other vitamin or mineral with a U.S. RDA value that has been added to the food must be listed. Other vitamins and minerals with U.S. RDA values which naturally occur may be listed.

A single set of U.S. RDAs for adults and children 4 or more years of age is used for labeling most foods. Three other sets of U.S. RDAs are used for labeling foods intended for (1) children under 4 years, (2) infants, and (3) pregnant and lactating women.

Consumer group representatives and nutritionists have several reservations about the use of U.S. RDAs. Consumers may have a false sense of nutritional security by believing that eating foods with 100 percent of the U.S. RDAs of 8 to 10 vitamins and minerals will provide them with all the nutrients they need. In addition, consumers may believe that they need not be concerned about what else they eat. In fact, neither the U.S. RDAs nor the RDAs cover all the essential nutrients, and diets should be selected from a variety of foods to ensure that nutritional needs are met. Another concern is that the U.S. RDAs overstate nutrient requirements for many individuals since they are generally based on the highest RDAs within the group. This overstatement is then passed on to the consumer through nutritional labeling and advertising.

FDA has begun a review of food labeling due, in part, to criticisms of nutritional labeling. This review will

include consumer research and public hearings held in conjunction with USDA and the Federal Trade Commission.

The food industry also uses RDAs in developing new food products. According to food industry officials, the nutritional composition of proposed new food products are compared with similar existing food products to help guide product development. Also nutritional composition is considered in decisions about whether or not to fortify foods. In both instances the nutritional standards used are RDAs.

There are some questions about the value of fortifying food. Consumer group representatives, nutritionists, and educators stated that, although fortification is sometimes appropriate to prevent disease (such as adding vitamin D to milk to prevent rickets), it is not always necessary and may have detrimental effects on diet habits. They gave the following illustrations of problems associated with fortifying foods.

--During processing, foods frequently lose various nutrients. Through fortification, some of these nutrients are replaced. However, the processed food still lacks some nutrients that were contained in the natural foods they replaced. This may mislead people into believing that all processed and fortified foods are as nutritionally complete as the natural foods.

--Stressing fortified foods can encourage consumers to eat foods which have high fat and cholesterol content which may contribute to heart disease or other health problems.

CONDUCTING AND REPORTING OF RESEARCH

The scientific community uses RDAs in food, nutrition, and health studies as standards for measuring nutrient levels, describing research results, and writing scientific papers. According to a National Institutes of Health official, the Institutes now support about 80 clinical research centers which use RDAs in studying various aspects of human nutrition.

CONCLUSIONS

RDAs serve as the baseline nutritional standard in planning diets and providing food supplies for groups, evaluating the adequacy of diets, providing nutrition education, establishing guidelines for nutritional labeling and

developing new food products, and conducting and reporting of nutrition research. Users of RDAs generally agree that the RDAs are good nutritional standards.

Because of their complexity, RDAs have been translated into other forms. Consumers, therefore, often do not come into contact with, or are not knowledgeable of, RDAs. The consumer is affected more by translations of the RDAs into such things as food groups used in menu planning and nutrition education and U.S. RDAs used in nutritional labeling.

CHAPTER 5

COMPARISON OF RDAs WITH NUTRITIONAL GUIDELINES OF CANADA, THE UNITED KINGDOM, AND FAO/WHO

At least 24 countries have established nutritional guidelines to satisfy their specific needs. In addition, international guidelines have been established to assist various countries plan production or import of adequate food supplies to meet the needs of their populations.

Comparing the nutrient intake recommendations of Canada, the United Kingdom, and the Food and Agriculture Organization of the United Nations/World Health Organization (FAO/WHO) with the RDAs of the United States shows fairly uniform recommendations for some nutrients and much less uniformity for others. Reasons for the differences are not always clear. Nutrient requirements, however, differ among population groups due to physical, environmental, social, and dietary characteristics. Moreover, considerable judgment is involved in extrapolating from the limited scientific evidence to the allowances.

OBJECTIVES OF GUIDELINES

Each of the nutritional guidelines was developed for identifying the daily amount of energy and essential nutrients considered to be sufficient for the maintenance of health in nearly all people. Each of the recommended nutrient intakes are set at levels judged sufficiently in excess of average requirements to cover the needs of most healthy individuals. Recommended energy intakes, on the other hand, are set at levels judged sufficient to meet the average requirements with no margin of safety. The different basis is justified because individuals who consume nutrients at the recommended levels, even though their needs might be less, would suffer no ill effects, while consumption of more energy than needed would lead to obesity.

The recommendations do not imply that each nutrient must be met in full every day. The body can store some nutrients in sufficient quantity to last for at least a few days and thus can accommodate irregular intakes.

PROCESS

The RDAs and FAO/WHO guidelines are developed by committees of nutrition experts, independent of Government authority. The Canadian and United Kingdom guidelines,

while also developed by committees of experts, are subject to review and approval by Government organizations.

Experts are chosen to serve on the committees on the basis of their expertise in the general area of nutrition, and each committee member is usually an expert in a particular nutrient or group of nutrients. FAO/WHO also attempts to select committee members, to the extent possible, to obtain an equitable representation among member countries.

Each of the guidelines are developed in a similar manner. Committees gather reports of pertinent research conducted all over the world and evaluate the evidence and make judgments as to the levels of nutrient consumption that would satisfy the needs of the majority of the healthy population.

COMPARISON OF RECOMMENDED NUTRIENT INTAKE TABLES

The four guidelines recommend levels of nutrient intake by age and sex groups, with separate recommendations for pregnant and lactating women. There is no uniformity in the division of the groups. FAO/WHO presents recommendations for 14 groups; the RDAs, 17; Canada, 20; and the United Kingdom, 21. For adults, the United Kingdom also provides different recommendations based on activity level; that is, sedentary, moderately active, or very active.

The RDAs and Canadian guidelines recommend intake levels for energy and 17 nutrients; FAO/WHO, energy and 11 nutrients; and the United Kingdom, energy and 9 nutrients. (See table on the following page.) The RDAs and Canadian guidelines, last revised in 1974 and 1975, respectively, are more current than those of FAO/WHO (established or revised piecemeal between 1961 and 1972) and the United Kingdom (last revised in 1969). This, in part, may account for the difference in the number of nutrients covered. The differences may also be attributable to differences of opinion as to the adequacy of scientific evidence for some nutrients to support recommending a specific intake level.

Nutrients Listed in Tables of Recommended Dietary Intakes of Canada, FAO/WHO, the United Kingdom, and the United States

Nutrient	Canada	FAO/WHO	United Kingdom	United States
Energy	X	X	X	X
Protein	X	X	X	X
Vitamin A	X	X	X	X
Vitamin D	X	X	X	X
Vitamin E	X			X
Vitamin C	X	X	X	X
Folacin	X	X		X
Niacin	X	X	X	X
Riboflavin	X	X	X	X
Thiamin	X	X	X	X
Vitamin B6	X			X
Vitamin B12	X	X		X
Calcium	X	X	X	X
Phosphorus	X			X
Iodine	X			X
Magnesium	X			X
Zinc	X			X
Iron	X	X	X	X
Total	18	12	10	18

It should be noted that, in comparing the recommended nutrient intake levels of the four guidelines, different assumptions are made which affect at least some of the recommendations. The RDAs for adults are based on a 70-kilogram (154-pound) male and 58-kilogram (128-pound) female; Canada assumes a 70-kilogram male and 56-kilogram female, while FAO/WHO and the United Kingdom assume 65-kilogram males and 55-kilogram females. The RDAs for adults assume a light-to-sedentary activity level, FAO/WHO assumes a moderately active activity level and Canada assumes a light-to-moderate activity level. As previously stated, the United Kingdom presents recommendations for three activity levels.

Weight and activity levels both affect the energy intake recommendations, which, in turn, affect at least some of the nutrient intake recommendations. Recommended intakes of protein, vitamin C, vitamin D, calcium, and iron of the United States, Canada, the United Kingdom, and FAO/WHO are shown in appendix IX. The recommendations are those for

males, and, in the case of the United Kingdom, recommendations for sedentary activity levels are used.

REASONS FOR DIFFERENT NUTRIENT INTAKE RECOMMENDATIONS

Nutrient intake recommendations are, primarily, based on knowledge of human requirements, which are known to vary between individuals and population groups. Factors affecting human requirements include (1) physical characteristics (age, sex, prior nutritional state, health, rate of growth, stage of maturity, and genetic background), (2) environmental characteristics (temperature, climate, and presence of infectious organisms or parasites), (3) social characteristics (physical activity, type of clothing worn, and sanitary conditions), and (4) dietary characteristics (the efficiency with which nutrients are absorbed and used by the body is influenced by the composition and nature of the foods consumed). Moreover, there is limited information on human requirements, the variability of requirements between individuals, and the factors influencing the absorption of nutrients consumed. Consequently, committees responsible for developing nutrient intake recommendations must use considerable judgment in interpreting and extrapolating information from the information that is available.

The texts accompanying each of the recommended nutrient intake tables generally do not contain enough information to determine specifically why the recommendations differ. General reasons for some of the differences follow.

Protein--The Canadian, FAO/WHO, and RDA recommendations are all set at levels judged sufficient to meet the needs of most healthy people. The United Kingdom also computed the intake level which should meet the needs of most healthy people but went one step further. The report on the "Recommended Intakes of Nutrients for the United Kingdom" states:

> "Diets containing protein at the level of the minimum requirement would be unlikely to be palatable; furthermore, the recommended intakes of some of the other nutrients such as riboflavine and nicotinic acid, and satisfactory amounts of other B vitamins often found in association with dietary protein, might not be provided. For these reasons we have increased the recommended intake of protein above the minimum requirement so that it approaches more closely known dietary habits. An arbitrary value of 10 percent of the total energy requirement has been chosen for the recommended intake of protein since few diets in the UK [United Kingdom] provide less * * *."

In essence, the United Kingdom report presents two intake levels for protein, a recommended level based on customary dietary habits for use in planning diets, and a minimum level based on average requirements for use in assessing the adequacy of the protein content of diets.

Vitamin C--The Canadian, FAO/WHO, and United Kingdom recommendations are set at levels judged sufficient to prevent deficiency symptoms while the RDAs are set at a level judged sufficient to "maintain an adequate body pool."

Vitamin D--The different recommendations for vitamin D appear to result from two factors: (1) there is no information concerning the precise requirement for older children and adults and (2) although vitamin D can be formed by exposure of the skin to sunlight, the amount formed is dependent on such variables as the length and intensity of exposure and the color of the skin. There is no RDA for vitamin D beyond age 22 "Since the requirement for the normal healthy adult seems to be satisfied by nondietary sources * * *."

Calcium--Estimating calcium requirements is difficult because specific symptoms of calcium deficiency in humans are not known, and the body has the capacity to adapt to varying levels of intake. The reasons for the different intake recommendations are not clear but generally reflect (1) the customary consumption of the various populations and (2) the lack of evidence to justify changing the customary consumption.

Iron--The reasons for the different iron intake recommendations are not clear, but they generally seem to be related to the types of foods normally consumed. The amount of iron absorbed by the body depends on the amount and chemical nature of the iron in the ingested food and interactions with other nutrients in the diet. The presence of meat protein, for example, has been shown to double the absorption of one type of iron. FAO/WHO recommends two levels of iron intake, a lower level when over 25 percent of calories in the diet come from animal foods and a higher level when animal foods represent less than 10 percent of calories.

CONCLUSIONS

The limited scientific evidence on human nutrient requirements, nutrient interactions, and the way nutrients are absorbed and used by the body requires considerable judgment in recommending nutrient intake levels based on the data which is available. Given the limitation of available scientific evidence, different committees have had differing

nutrient intake recommendations. We found no evidence to suggest that any of the tables of recommended nutrient intake we reviewed is better than any of the others. Also, since the efficiency with which nutrients are absorbed and used by the body is influenced by the composition and nature of the foods consumed, and since human requirements vary between population groups due to physical, environmental, social, and dietary characteristics, we believe it is not feasible to expect standardization of nutrient intake recommendations among the countries.

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS, AND AGENCY COMMENTS AND OUR EVALUATION

CONCLUSIONS

The establishment of RDAs requires considerable judgment in estimating human nutritional needs from limited available scientific evidence. Although our review did not assess these scientific judgments, we believe the process by which RDAs are established is reasonable. The RDAs are adequate for their intended purpose, that is, to serve as guidelines for recommended nutrient intakes until such time as additional evidence becomes available to justify changes. The RDAs are revised periodically to show changes in scientific knowledge of human nutritional requirements.

We believe the participation of numerous experts throughout the RDAs committee process, all of whom are chosen for their technical competence, is a reasonable approach to follow in setting and updating the RDAs.

Additional research is needed, however, to expand the knowledge of nutrient requirements of many age and sex groups and to establish RDAs for the remaining essential nutrients. The Committee on Dietary Allowances is in an excellent position to determine nutrition research needs and priorities since it reviews the literature during the process of updating the RDAs.

Criticisms, limitations, and problems associated with the RDAs appear to be the result of limited scientific knowledge of human nutritional requirements and/or misunderstandings of the scope and purpose of the RDAs.

We believe the RDAs are a reasonable standard for use by nutrition professionals in planning and evaluating diets. However, a diet which provides the RDAs does not necessarily ensure adequate nutrition. Even when the food supply provides nutrients in excess of the RDA, some people may not be adequately nourished because food intakes vary greatly among individuals and some people may not eat enough, even of a fully adequate diet, to meet their nutritional needs. In addition, the requirements for some nutrients have not been established. The Food and Nutrition Board recommends that RDAs be provided from as varied a selection of foods as is practicable to help ensure that nutritional needs are met.

One of the greatest potentials for RDAs to affect public health lies in their translation to food selection guides for consumer use. Unfortunately, RDAs are too complex for general public understanding. The complexity of matching RDAs with nutrient contents of unlimited numbers of food combinations makes it impractical for individuals to use RDAs directly in planning diets. The Board publishes the RDAs for nutrition professionals; it does not translate them into simpler food selection guides for consumers. Two widely used translations or simplifications of RDAs are the USDA's Daily Food Guide and FDA's U.S. RDAs. Nutrition scientists, educators, and consumer groups we interviewed cited various shortcomings of both consumer guides. FDA and USDA have plans to review and revise these guides to make them more effective.

Current nutrition concerns of the public appear to be on the statistical link between common degenerative diseases and diet and other lifestyle factors. Cause-effect relations have not been established, but these statistical relations suggest that the consumption of too much fat, saturated fat, cholesterol, sugar, sodium (or salt), and too little fiber may be causing or contributing to diseases common in the United States. Other lifestyle factors similarly implicated in these diseases include smoking, lack of activity, alcohol, and stress.

Current nutritional concerns regarding these food components and lifestyle factors have not been effectively addressed by either the Board's RDA report for professionals, USDA's Daily Food Guide for consumers, or FDA's U.S. RDAs for food labeling.

RECOMMENDATIONS

We recommend that the Secretaries of Agriculture and of Health, Education, and Welfare have the National Academy of Sciences, as part of its RDAs revision process, assist in identifying nutrition research needs and in establishing priorities relating to human nutritional requirements. This assessment of nutrition research needs should be used to improve and expand Federal research on human nutritional requirements. The Committee on Dietary Allowances should use the research results to expand and extend the RDAs to additional nutrients and direct them toward more specific population subgroups. This recommendation should not preclude either USDA or HEW from obtaining additional assistance of other organizations which have an interest in, and could contribute to, the assessment of nutrition research needs.

We recommend also that the Secretaries of Agriculture and of Health, Education, and Welfare request a qualified and respected body of experts, such as the National Academy of Sciences, to

--assist in the departmental planning efforts of developing food planning and food choice guides for the consumer to supplement other Government education efforts;

--periodically review the progress made toward the development of these guides by the Departments; and

--evaluate the effectiveness of these guides when completed.

These guides should

--help the consumer to develop diets that satisfy the RDAs and nutrition guidelines discussed in the RDA report;

--address the current nutrition concerns regarding food components, lifestyle factors, and diet and health; and

--be developed by a multidisciplinary team of medical, nutrition, and food scientists; practitioners; and educators as well as user-consumer group representatives to provide balance between scientific accuracy and practicality.

Representatives from the National Research Council's Food and Nutrition Board, the Board on Agriculture and Renewable Resources, and the Commission on Sociotechnical Systems should be involved in the National Academy of Sciences' advisory role.

AGENCY COMMENTS AND OUR EVALUATION

The National Academy of Sciences, USDA, and HEW reviewed and commented on our report. (See apps. X through XII.) In addition to considering these written comments, we met with agency officials and discussed the report and our recommendations. Their comments and suggestions were considered in preparing the final report.

The National Academy said they found the report to be sound and the assessment of problems relating to RDAs to be useful, objective, and accurate. The National Academy said the report should be helpful to the Congress.

USDA said the report accurately outlines the limitations and shortcomings of the RDAs. USDA concurs with the need to identify nutrition research needs, establish priorities relating to human nutrition requirements, and develop food plans and food choice guides for consumers. It also recognizes the need to include sugar, fiber, sodium, fat, and cholesterol in the RDA, and the inclusion of special nutrition situations (e.g., metabolic disorders, etc.).

USDA disagrees with our recommendation that further research and translation of the RDAs into food guides should be a responsibility assigned to the Food and Nutrition Board. USDA feels that the Food and Agriculture Act of 1977 designated USDA as the lead Government agency to conduct human nutrition research and consumer nutrition education. We are not recommending that the Board be assigned the responsibility of conducting the research and developing the food guides. Instead, we are recommending that the Board assist in identifying nutrition research needs and priorities because it is in an excellent position to do this task and because it reviews the literature during the process of updating the RDAs. The research would be conducted by USDA, HEW, and universities.

In commenting on our recommendation that the National Academy assist in identifying nutrition research needs and establishing priorities, HEW said that the National Institutes of Health had already asked the National Academy to develop recommendations for research needs as they relate to the RDAs and the "Dietary Goals for the United States" prepared by the former Senate Select Committee on Nutrition and Human Needs.

In view of the agencies' comments, we have revised our second recommendation. We had originally proposed that the National Academy of Sciences develop food guides. HEW said, however, that the National Academy may not be the most appropriate group to develop food guides for the consumer. It believes the work should be done by USDA and HEW either in-house or through contracts with qualified individuals or organizations. HEW said the National Academy should be requested to periodically review the progress made toward the development of food planning and food choice guides by the Departments and should review these guides when completed.

We believe that a joint USDA-HEW effort to develop food guides for the consumer is needed for a unified and comprehensive set of guides. We also believe, however, that the involvement of a qualified and respected body of experts,

such as the National Academy of Sciences, in the planning and evaluation of these guides could help resolve potential controversies and differences of opinion and would help to make the guides more acceptable by the nutrition community and the public.

We are encouraged by recent USDA and HEW actions creating intradepartmental and interdepartmental nutrition coordinating committees. Also, a joint USDA-HEW steering committee was recently established to begin plans for developing nutritional goals for the United States.

CHAPTER 7

SCOPE OF REVIEW

In determining the characteristics and limitations of the RDAs and the process of establishing the RDAs, we

--reviewed all editions of the RDAs;

--obtained observations and information from current and past members of the Committee on Dietary Allowances;

--attended a 3-day meeting of the Committee on Dietary Allowances and observed it in revising the RDAs for the 1979 edition; and

--obtained written observations on the RDAs from 13 individuals in research, education, and clinical practice of human nutrition.

To identify and determine the uses of RDAs, we met with

--officials and researchers of USDA and HEW agencies, the Department of Defense, and the Veterans Administration;

--representatives of consumer groups;

--research officials or representatives of the food industry, the vitamin supplements industry, and the health food industry;

--State nutritionists and extension personnel; and

--nutrition educators at several universities.

In our analysis of the nutritional guidelines of Canada, the United Kingdom, and FAO/WHO, we reviewed the published guidelines and interviewed officials of these countries and international organization.

APPENDIX I

THE ESSENTIAL NUTRIENTS

VITAMIN	RDA FOR HEALTHY ADULT MALE (MILLIGRAMS)	DIETARY SOURCES	MAJOR BODY FUNCTIONS	DEFICIENCY	EXCESS
WATER-SOLUBLE					
VITAMIN B-1 (THIAMINE)	1.5	Pork, organ meats, whole grains, legumes	Coenzyme (thiamine pyrophosphate) in reactions involving the removal of carbon dioxide.	Beriberi (peripheral nerve changes, edema, heart failure)	None reported
VITAMIN B-2 (RIBOFLAVIN)	1.8	Widely distributed in foods.	Constituent of two flavin nucleotide coenzymes involved in energy metabolism (FAD and FMN)	Reddened lips, cracks at corner of mouth (cheilosis), lesions of eye	None reported
NIACIN	20	Liver, lean meats, grains, legumes (can be formed from tryptophan)	Constituent of two coenzymes involved in oxidation-reduction reactions (NAD and NADP)	Pellagra (skin and gastrointestinal lesions, nervous, mental disorders)	Flushing, burning and tingling around neck, face and hands
VITAMIN B-6 (PYRIDOXINE)	2	Meats, vegetables, whole-grain cereals	Coenzyme (pyridoxal phosphate) involved in amino acid metabolism	Irritability, convulsions, muscular twitching, dermatitis near eyes, kidney stones	None reported
PANTOTHENIC ACID	5-10	Widely distributed in foods.	Constituent of coenzyme A which plays a central role in energy metabolism	Fatigue, sleep disturbances, impaired coordination, nausea (rare in man)	None reported
FOLACIN	.4	Legumes, green vegetables, whole-wheat products	Coenzyme (reduced form) involved in transfer of single-carbon units in nucleic acid and amino acid metabolism	Anemia, gastrointestinal disturbances, diarrhea, red tongue	None reported
VITAMIN B-12	.003	Muscle meats, eggs, dairy products, (not present in plant foods)	Coenzyme involved in transfer of single-carbon units in nucleic acid metabolism	Pernicious anemia, neurological disorders	None reported
BIOTIN	Not established. Usual diet provides .15-.3	Legumes, vegetables, meats	Coenzyme required for fat synthesis, amino acid metabolism and glycogen (animal-starch) formation	Fatigue, depression, nausea, dermatitis, muscular pains	Not reported
CHOLINE	Not established Usual diet provides 500-900	All foods containing phospholipids (egg yolk, liver, grains, legumes)	Constituent of phospholipids. Precursor of putative neurotransmitter acetylcholine	Not reported in man.	None reported
VITAMIN C (ASCORBIC ACID)	45	Citrus fruits, tomatoes, green peppers, salad greens	Maintains intercellular matrix of cartilage, bone and dentine. Important in collagen synthesis.	Scurvy (degeneration of skin, teeth, blood vessels, epithelial hemorrhages)	Relatively nontoxic. Possibility of kidney stones.
FAT-SOLUBLE					
VITAMIN A (RETINOL)	1	Provitamin A (beta-carotene) widely distributed in green vegetables. Retinol present in milk, butter, cheese, fortified margarine.	Constituent of rhodopsin (visual pigment). Maintenance of epithelial tissues. Role in mucopolysaccharide synthesis.	Xerophthalmia (keratinization of ocular tissue), night blindness, permanent blindness	Headache, vomiting, peeling of skin, anorexia, swelling of long bones
VITAMIN D	.01	Cod-liver oil, eggs, dairy products, fortified milk and margarine.	Promotes growth and mineralization of bones. Increases absorption of calcium.	Rickets (bone deformities) in children. Osteomalacia in adults.	Vomiting, diarrhea, loss of weight, kidney damage
VITAMIN E (TOCOPHEROL)	15	Seeds, green leafy vegetables, margarines, shortenings	Functions as an antioxidant to prevent cell-membrane damage.	Possibly anemia	Relatively nontoxic
VITAMIN K (PHYLLOQUINONE)	.03	Green leafy vegetables. Small amount in cereals, fruits and meats	Important in blood clotting (involved in formation of active prothrombin)	Conditioned deficiencies associated with severe bleeding, internal hemorrhages	Relatively nontoxic. Synthetic forms at high doses may cause jaundice.

VITAMINS are organic molecules needed in very small amounts in the diet of higher animals. Most of the water-soluble (B complex) vitamins act as coenzymes, or organic catalysts; the four fat-soluble vitamins (A, D, E and K) have more diverse functions. Although low vitamin intake can result in deficiency disease, the misguided use of high-potency vitamin pills can also have undesirable effects.

APPENDIX I

THE ESSENTIAL NUTRIENTS

MINERAL	AMOUNT IN ADULT BODY (GRAMS)	RDA FOR HEALTHY ADULT MALE (MILLIGRAMS)	DIETARY SOURCES	MAJOR BODY FUNCTIONS	DEFICIENCY	EXCESS
CALCIUM	1,500	800	Milk, cheese, dark green vegetables, dried legumes	Bone and tooth formation Blood clotting Nerve transmission	Stunted growth Rickets osteoporosis Convulsions	Not reported in man
PHOSPHORUS	860	800	Milk, cheese, meat, poultry, grains	Bone and tooth formation Acid base balance	Weakness, demineralization of bone Loss of calcium	Erosion of jaw (lossy jaw)
SULFUR	300	(Provided by sulfur amino acids)	Sulfur amino acids (methionine and cystine) in dietary proteins	Constituent of active tissue compounds, cartilage and tendon	Related to intake and deficiency of sulfur amino acids	Excess sulfur amino acid intake leads to poor growth
POTASSIUM	180	2,500	Meats, milk, many fruits	Acid-base balance Body water balance Nerve function	Muscular weakness Paralysis	Muscular weakness Death
CHLORINE	74	2,000	Common salt	Formation of gastric juice Acid base balance	Muscle cramps Mental apathy Reduced appetite	Vomiting
SODIUM	64	2,500	Common salt	Acid-base balance Body water balance Nerve function	Muscle cramps Mental apathy Reduced appetite	High blood pressure
MAGNESIUM	25	350	Whole grains, green leafy vegetables	Activates enzymes involved in protein synthesis	Growth failure Behavioral disturbances Weakness, spasms	Diarrhea
IRON	4.5	10	Eggs, lean meats, legumes, whole grains, green leafy vegetables	Constituent of hemoglobin and enzymes involved in energy metabolism	Iron deficiency anemia (weakness, reduced resistance to infection)	Siderosis Cirrhosis of liver
FLUORINE	2.6	2	Drinking water, tea, seafood	May be important in maintenance of bone structure	Higher frequency of tooth decay	Mottling of teeth Increased bone density Neurological disturbances
ZINC	2	15	Widely distributed in foods	Constituent of enzymes involved in digestion	Growth failure Small sex glands	Fever, nausea, vomiting, diarrhea
COPPER	1	2	Meats, drinking water	Constituent of enzymes associated with iron metabolism	Anemia, bone changes (rare in man)	Rare metabolic condition (Wilson's disease)
SILICON VANADIUM TIN NICKEL	.024 .018 .017 .010	Not established	Widely distributed in foods	Function unknown (essential for animals)	Not reported in man	Industrial exposures Silicon - silicosis Vanadium - lung irritation Tin - vomiting Nickel - acute pneumonitis
SELENIUM	.013	Not established (Diet provides .05-.1 per day)	Seafood, meat, grains	Functions in close association with vitamin E	Anemia (rare)	Gastrointestinal disorders, lung irritation
MANGANESE	.012	Not established (Diet provides 6-8 per day)	Widely distributed in foods	Constituent of enzymes involved in fat synthesis	In animals: poor growth, disturbances of nervous system, reproductive abnormalities	Poisoning in manganese mines: general red disease of nervous system
IODINE	.011	14	Marine fish and shellfish, dairy products, many vegetables	Constituent of thyroid hormones	Goiter (enlarged thyroid)	Very high intakes depress thyroid activity
MOLYBDENUM	.009	Not established (Diet provides .4 per day)	Legumes, cereals, organ meats	Constituent of some enzymes	Not reported in man	Inhibition of enzymes
CHROMIUM	.006	Not established (Diet provides .05-.12 per day)	Fats, vegetable oils, meats	Involved in glucose and energy metabolism	Impaired ability to metabolize glucose	Occupational exposures: skin and kidney damage
COBALT	.0015	(Required as vitamin B-12)	Organ and muscle meats, milk	Constituent of vitamin B-12	Not reported in man	Industrial exposure: dermatitis and diseases of red blood cells
WATER	40,000 (60 percent of body weight)	1.5 liters per day	Solid foods, liquids, drinking water	Transport of nutrients Temperature regulation Participates in metabolic reactions	Thirst, dehydration	Headaches, nausea Edema High blood pressure

ESSENTIAL MINERAL ELEMENTS are involved in the electrochemical functions of nerve and muscle, the formation of bones and teeth, the activation of enzymes and, in the case of iron, the transport of oxygen. The trace minerals nickel, tin, vanadium and silicon, previously considered to be health hazards, are now known to be essential for animals. Although they are so widely distributed in nature that primary dietary deficiencies are unlikely, changes in the balance among them may have important consequences for health.

THE ESSENTIAL NUTRIENTS

ESSENTIAL AMINO ACIDS	RDA FOR HEALTHY ADULT MALE (MILLIGRAMS)	DIETARY SOURCES	MAJOR BODY FUNCTIONS	DEFICIENCY	EXCESS
AROMATIC		FROM PROTEINS GOOD SOURCES Legume grains Dairy products Meat Fish ADEQUATE SOURCES Rice Corn Wheat POOR SOURCES Cassava Sweet potato	Precursors of structural protein, enzymes, antibodies, hormones, metabolically active compounds Certain amino acids have specific functions (a) Tyrosine is a precursor of epinephrine and thyroxine (b) Arginine is a precursor of polyamines (c) Methionine is required for methyl group metabolism (d) Tryptophan is a precursor of serotonin	Deficient protein intake leads to development of kwashiorkor and, coupled with low energy intake, to marasmus	Excess protein intake possibly aggravates or potentiates chronic disease states
PHENYLALANINE	1,100				
TYROSINE					
BASIC					
LYSINE	800				
HISTIDINE	Not known				
BRANCHED CHAIN					
ISOLEUCINE	700				
LEUCINE	1,000				
VALINE	800				
SULFUR-CONTAINING					
METHIONINE	1,100				
CYSTINE					
OTHER					
TRYPTOPHAN	250				
THREONINE	500				
ESSENTIAL FATTY ACIDS		Vegetable fats (corn, cottonseed, soy oils) Wheat germ Vegetable shortenings	Involved in cell membrane structure and function Precursors of prostaglandins (regulation of gastric function, release of hormones, smooth-muscle activity)	Poor growth Skin lesions	Not known
ARACHIDONIC	6,000				
LINOLEIC					
LINOLENIC					

ESSENTIAL AMINO ACIDS AND FATTY ACIDS cannot be synthesized in the body and must be present in food. Amino acids are the building blocks of body proteins; essential fatty acids are involved in the maintenance of cell membrane structure and function and serve as precursors of the prostaglandins, a family of hormone-like compounds that have diverse physiological actions in the body.

Source: "The Requirements of Human Nutrition," by Nevin S. Scrimshaw and Vernon R. Young. c. 1976 by Scientific American, Inc. All rights reserved.

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL
RECOMMENDED DAILY DIETARY ALLOWANCES,[a] Revised 1974

Designed for the maintenance of good nutrition of practically all healthy people in the U.S.A.

	Age	Weight		Height		Energy	Protein	Fat-Soluble Vitamins				Water-Soluble Vitamins							Minerals					
								Vitamin A Activity		Vitamin D	Vitamin E Activity[e]	Ascorbic Acid	Folacin[f]	Niacin[g]	Riboflavin	Thiamin	Vitamin B_6	Vitamin B_{12}	Calcium	Phosphorus	Iodine	Iron	Magnesium	Zinc
	(years)	(kg)	(lbs)	(cm)	(in)	(kcal)[b]	(g)	(re)[c]	(IU)	(IU)	(IU)	(mg)	(μg)	(mg)	(mg)	(mg)	(mg)	(μg)	(mg)	(mg)	(μg)	(mg)	(mg)	(mg)
Infants	0.0–0.5	6	14	60	24	kg × 117	kg × 2.2	420[d]	1,400	400	4	35	50	5	0.4	0.3	0.3	0.3	360	240	35	10	60	3
	0.5–1.0	9	20	71	28	kg × 108	kg × 2.0	400	2,000	400	5	35	50	8	0.6	0.5	0.4	0.3	540	400	45	15	70	5
Children	1–3	13	28	86	34	1,300	23	400	2,000	400	7	40	100	9	0.8	0.7	0.6	1.0	800	800	60	15	150	10
	4–6	20	44	110	44	1,800	30	500	2,500	400	9	40	200	12	1.1	0.9	0.9	1.5	800	800	80	10	200	10
	7–10	30	66	135	54	2,400	36	700	3,300	400	10	40	300	16	1.2	1.2	1.2	2.0	800	800	110	10	250	10
Males	11–14	44	97	158	63	2,800	44	1,000	5,000	400	12	45	400	18	1.5	1.4	1.6	3.0	1,200	1,200	150	18	350	15
	15–18	61	134	172	69	3,000	54	1,000	5,000	400	15	45	400	20	1.8	1.5	2.0	3.0	1,200	1,200	150	18	400	15
	19–22	67	147	172	69	3,000	54	1,000	5,000	400	15	45	400	20	1.8	1.5	2.0	3.0	800	800	140	10	350	15
	23–50	70	154	172	69	2,700	56	1,000	5,000		15	45	400	18	1.6	1.4	2.0	3.0	800	800	130	10	350	15
	51+	70	154	172	69	2,400	56	1,000	5,000		15	45	400	16	1.5	1.2	2.0	3.0	800	800	110	10	350	15
Females	11–14	44	97	155	62	2,400	44	800	4,000	400	12	45	400	16	1.3	1.2	1.6	3.0	1,200	1,200	115	18	300	15
	15–18	54	119	162	65	2,100	48	800	4,000	400	12	45	400	14	1.4	1.1	2.0	3.0	1,200	1,200	115	18	300	15
	19–22	58	128	162	65	2,100	46	800	4,000	400	12	45	400	14	1.4	1.1	2.0	3.0	800	800	100	18	300	15
	23–50	58	128	162	65	2,000	46	800	4,000		12	45	400	13	1.2	1.0	2.0	3.0	800	800	100	18	300	15
	51+	58	128	162	65	1,800	46	800	4,000		12	45	400	12	1.1	1.0	2.0	3.0	800	800	80	10	300	15
Pregnant						+300	+30	1,000	5,000	400	15	60	800	+2	+0.3	+0.3	2.5	4.0	1,200	1,200	125	18+[h]	450	20
Lactating						+500	+20	1,200	6,000	400	15	80	600	+4	+0.5	+0.3	2.5	4.0	1,200	1,200	150	18	450	25

[a] The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for more detailed discussion of allowances and of nutrients not tabulated. See Table I (p. 6) for weights and heights by individual year of age.

[b] Kilojoules (kJ) = 4.2 × kcal.

[c] Retinol equivalents.

[d] Assumed to be all as retinol in milk during the first six months of life. All subsequent intakes are assumed to be half as retinol and half as β-carotene when calculated from international units. As retinol equivalents, three fourths are as retinol and one fourth as β-carotene.

[e] Total vitamin E activity, estimated to be 80 percent as α-tocopherol and 20 percent other tocopherols. See text for variation in allowances.

[f] The folacin allowances refer to dietary sources as determined by *Lactobacillus casei* assay. Pure forms of folacin may be effective in doses less than one fourth of the recommended dietary allowance.

[g] Although allowances are expressed as niacin, it is recognized that on the average 1 mg of niacin is derived from each 60 mg of dietary tryptophan.

[h] This increased requirement cannot be met by ordinary diets; therefore, the use of supplemental iron is recommended.

APPENDIX II

APPENDIX III

NUTRIENTS FOR WHICH A PROVISIONAL RECOMMENDED DIETARY ALLOWANCE HAS BEEN ESTABLISHED

	Amount (per thousand calories)
Pantothenic acid	3.5 mg
Biotin	0.15 mg
Potassium	1.2 (1-3) gm
Sodium	1.5 (1-3.5) gm
Copper	1.0 mg
Manganese	1.0 mg
Chromium	0.025 mg
Selenium	0.025 mg
Molybdenum	0.07 to 0.25 mg
Fluoride (water)	0.75 to 2.0 mg

Note: This table is a draft proposal being considered by the Committee on Dietary Allowances, Food and Nutrition Board, for inclusion in the next RDAs revision.

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Walter Mertz, M.D., Nutrition Institute, Agricultural Research Service, Department of Agriculture, Beltsville, Maryland

George M. Owen, M.D., Human Nutrition Program, School of Public Health, University of Michigan, Ann Arbor, Michigan

Roy M. Pitkin, M.D., Department of Obstetrics and Gynecology, University Hospitals, University of Iowa, Iowa City, Iowa

Howerde E. Sauberlich, Ph.D., Department of Nutrition, Letterman Army Institute of Research, Presidio of San Francisco, California

APPENDIX IV

1974 COMMITTEE ON DIETARY ALLOWANCES MEMBERSHIP

FOOD AND NUTRITION BOARD, NATIONAL RESEARCH COUNCIL

NATIONAL ACADEMY OF SCIENCES

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John C. Bieri, Ph.D., Nutrition Biochemistry Section, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Bethesda, Maryland

Doris H. Calloway, Ph.D., Department of Nutritional Sciences, College of Agriculture, University of California, Berkeley, California

Lloyd J. Filer, Jr., M.D., Ph.D., University of Iowa, College of Medicine, Iowa City, Iowa

Stanley N. Gershoff, Ph.D., Department of Nutrition, Harvard University School of Public Health, Cambridge, Massachusetts

Howard N. Jacobson, M.D., Francis A. Countway Medical Library, Harvard Medical School, Cambridge, Massachusetts

Walter Mertz, M.D., Nutrition Institute, Agricultural Research Service, Department of Agriculture, Beltsville, Maryland

John F. Mueller, M.D., St Luke's Hospital, Denver, Colorado

MAJOR FEDERALLY FINANCED FOOD ASSISTANCE PROGRAMS

June 30, 1978

Agency and/or program	Authorizing act	Purpose of program	Nutritional requirements and/or goals
Department of Health, Education, and Welfare:			
Title VII nutrition program	Title VII of the 1965 Older Americans Act, as amended (42 U.S.C. 3045)	Provide low cost nutrition meals to the elderly who cannot afford to eat adequately, lack meal preparation skills, have limited mobility, or are lonely.	Require program participants to provide for at least 5 days a week, one meal a day which assures a minimum of one-third of the RDA.
Department of Agriculture:			
School Breakfast Program	Section 4, Child Nutrition Act of 1966, as amended (42 U.S.C. 1773)	Serve nutritious breakfasts to needy children or those who travel distances.	No RDA goal or requirement.
National School Lunch Program	Sections 4 and 11, National School Lunch Act, as amended (42 U.S.C. 1753)	Safeguard the health and well-being of the Nation's children and to educate children about proper food habits.	No RDA requirement. Goal of 1/3 of the student's RDA (except calories) over a 1-week period.
Summer Food Program	Section 13, National School Lunch Act, as amended (42 U.S.C. 1761)	Initiate, maintain, or expand food service programs to children in nonresidential public or private nonprofit institutions and residential public or private nonprofit summer camps.	Same nutritional standards for breakfast as the School Breakfast Program and lunch and dinner as the National School Lunch Program.
Child Care Food Program	Section 17, National School Lunch Act, as amended (42 U.S.C. 1766)	Initiate, maintain, or expand food service programs to children in child care centers.	Same nutritional standards for breakfast as School Breakfast Program and lunch and/or dinner as the National School Lunch Program.
Food Stamp Program	Food Stamp Act of 1964, as amended (7 U.S.C. 2011-2025)	Assist families in providing nutritious meals.	Show families through the Thrifty Food Plan how they can meet the RDA for all nutrients for which adequate reliable food composition data is available. This plan is the basis for food stamp allotment.
Special Supplemental Food Program for Women, Infants, and Children	Section 17, Child Nutrition Act of 1966, as amended (42 U.S.C. 1786)	Assist mothers in obtaining specified nutritious foods.	Attempt to provide the RDA for vitamins A and C, protein, iron, and calcium through the distribution of food packages.
Special Milk Program	Section 3, Child Nutrition Act of 1966, as amended (42 U.S.C. 1772)	Encourage consumption of fluid milk by children	No RDA goal or requirement.
Department of State			
Food for Peace	Agricultural Trade Development and Assistance Act of 1954, as amended (7 U.S.C. 1721-1735)	Provide assistance to alleviate hunger and malnutrition and to promote economic progress including agricultural development in the developing countries.	Goal of satisfying 25 to 30 percent of a person's minimum daily requirements instead of the RDAs. In sending food packages, the emphasis is on protein and calories.

APPENDIX V

FOOD for FITNESS

A DAILY FOOD GUIDE

LEAFLET NO. 434

U. S. DEPARTMENT OF AGRICULTURE

FOOD FOR FITNESS

A Daily Food Guide

MILK GROUP

Some milk for everyone

Children under 9 . 2 to 3 cups
Children 9 to 12 . 3 or more cups
Teenagers . . . . 4 or more cups
Adults . . . . . 2 or more cups

MEAT GROUP

2 or more servings

Beef, veal, pork, lamb,
Poultry, fish, eggs

As alternates—
dry beans, dry peas, nuts

VEGETABLE FRUIT GROUP

4 or more servings

Include—

A citrus fruit or other fruit or vegetable important for vitamin C

A dark-green or deep-yellow vegetable for vitamin A—at least every other day

Other vegetables and fruits, including potatoes

BREAD CEREAL GROUP

4 or more servings

Whole grain, enriched, or restored

Plus other foods as needed to complete meals and to provide additional food energy and other food values

APPENDIX VI

HOW U.S. RDAs ARE ESTABLISHED

In 1973, after proposing regulations, soliciting public comments, and holding public hearings, FDA established U.S. RDAs for protein and 19 vitamins and minerals essential for human nutrition. The U.S. RDAs were developed as a basis for nutritional labeling requirements, labeling foods for special dietary use, and standards of identity for dietary supplements. They replaced the minimum daily requirements which represented the minimum amount of a vitamin or mineral to maintain health. Although generally based on RDAs, the U.S. RDAs have not been changed as RDAs changed.

U.S. RDAs were issued for only four population groups, compared with 26 groups of the 1968 RDAs, to (1) minimize the number of standards, (2) facilitate food labeling and establish standards of identity for dietary supplements, and (3) avoid consumer confusion. The four population groups with distinctive nutritional requirements are infants through 12 months, children under 4 years of age, persons 4 years old and above, and pregnant or lactating women.

Thirteen of the U.S. RDAs for vitamins and minerals for each population group were based on the 1968 RDA values. The highest RDA value for each group was established as the U.S. RDA since the RDA ranges in the respective groups were small, and, according to a FDA official, no resulting health problems were expected. For example, the U.S. RDAs for adults and children over 4 years of age are generally the RDAs for a teenage boy. Therefore the U.S. RDAs are higher than required for many people. Many adults may need only about 75 percent of the U.S. RDA of most nutrients and children only about 50 percent.

The calcium and phosphorus U.S. RDAs for infants and children under 4 years of age are equivalent to the highest RDA values in their respective groups. However, the calcium and phosphorus U.S. RDAs for the other two groups were lower than the corresponding RDAs. Reasons cited for this were the physiological and technical problems associated with their physical bulk, wide range of RDA values depending on age, human requirements generally accepted in the United States, and lower values generally advocated by international nutrition groups.

Four U.S. RDAs were established for nutrients essential in human nutrition not covered by RDAs. These are biotin, pantothenic acid, copper, and zinc. The table of the 1968

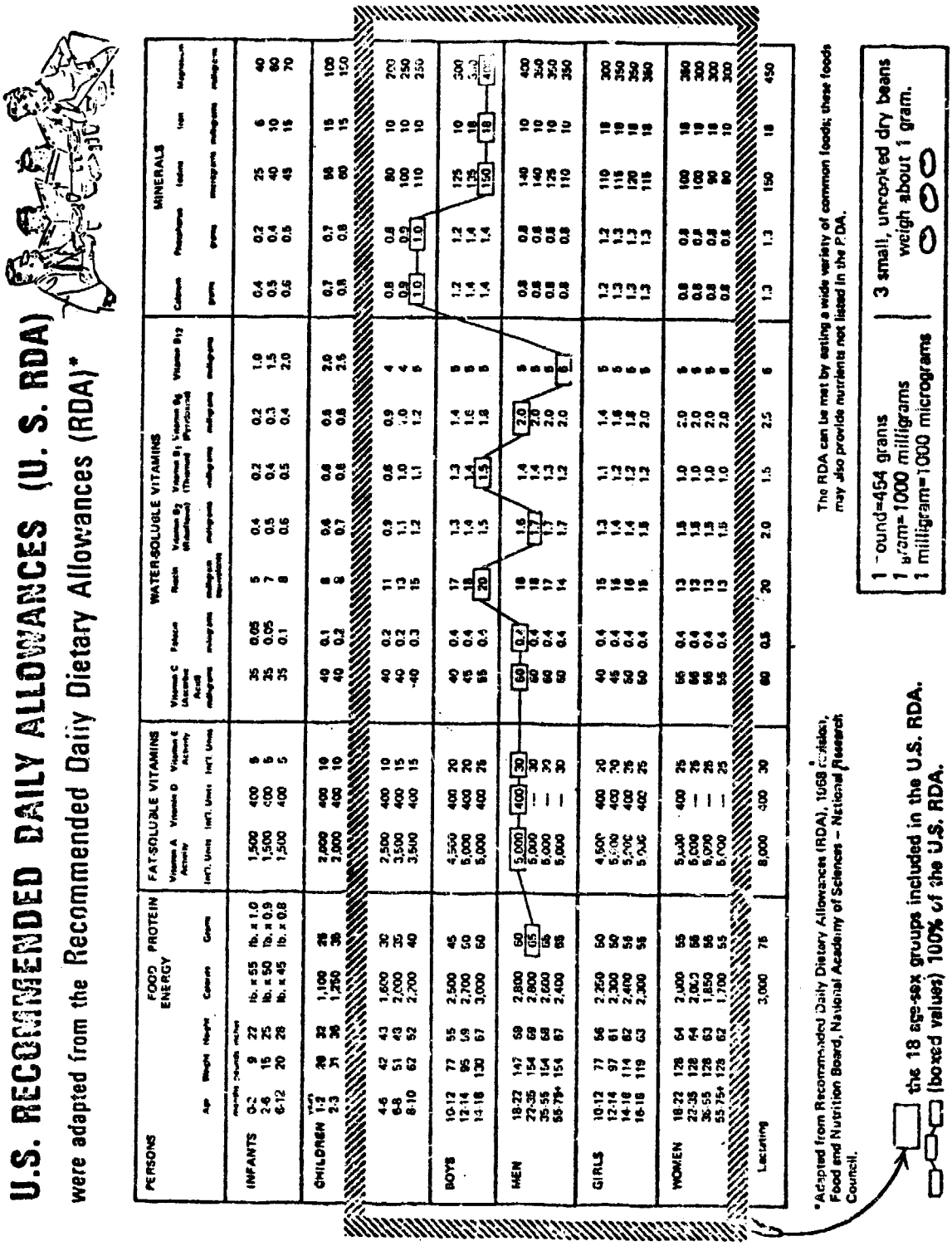
RDA manual did not contain these nutrients; however, a range of daily adult intake was given in the narrative section. This information was the basis for the U.S. RDA values.

Although the RDAs were revised in 1974, the U.S. RDAs were not changed because changes from the 1968 RDAs were only reductions in values and not considered of health significance by FDA. Also only one new set of RDA values was established for zinc, and the existing U.S. RDA values corresponded with the RDA levels.

A new revision of the RDAs is expected to be issued in 1979. According to a FDA official, the U.S. RDAs will be revised to reflect changes in RDAs. Also U.S. RDAs will be considered for those nutrients for which provisional recommended allowances are established. In the future, FDA expects to revise the U.S. RDAs for other changes to the RDAs.

In February 1978 the United States Court of Appeals for the Second Circuit voided the regulation requiring labeling of foods for special dietary use and standards of identity for diet supplements for vitamin and mineral products. However, the establishment of the U.S. RDAs and their use in nutritional labeling was not affected.

APPENDIX VIII



U.S. RECOMMENDED DAILY ALLOWANCES (U. S. RDA)

were adapted from the Recommended Daily Dietary Allowances (RDA)*

PERSONS	Age	Weight	Height	FOOD ENERGY Calories	PROTEIN Grams	FAT-SOLUBLE VITAMINS Vitamin A Activity Int'l. Units	Vitamin D Int'l. Units	Vitamin E Activity Int'l. Units	WATER-SOLUBLE VITAMINS Vitamin C (Ascorbic Acid) milligrams	Folacin micrograms	Niacin milligram equivalents	Vitamin B2 (Riboflavin) milligrams	Vitamin B1 (Thiamin) milligrams	Vitamin B6 (Pyridoxine) milligrams	Vitamin B12 micrograms	MINERALS Calcium grams	Phosphorus grams	Iodine micrograms	Iron milligrams	Magnesium milligrams
INFANTS	0-0.5	9	22	lb. x 55	lb. x 1.0	1,500	400	5	35	0.05	5	0.4	0.2	0.2	1.0	0.4	0.2	25	6	40
	0.5-1	15	25	lb. x 50	lb. x 0.9	1,500	400	5	35	0.05	7	0.5	0.4	0.3	1.5	0.5	0.4	40	10	60
	1-2	20	28	lb. x 45	lb. x 0.8	1,500	400	5	35	0.1	8	0.6	0.5	0.4	2.0	0.6	0.5	45	15	70
CHILDREN	1-3	28	32	1,100	25	2,000	400	10	40	0.1	8	0.6	0.6	0.6	2.0	0.7	0.7	55	15	100
	2-3	31	36	1,250	35	2,000	400	10	40	0.2	9	0.7	0.8	0.8	2.5	0.8	0.8	60	15	150
	4-6	42	43	1,600	30	2,500	400	10	40	0.2	11	0.9	0.8	0.9	4	0.8	0.8	80	10	200
	6-8	51	48	2,000	35	3,500	400	15	40	0.2	13	1.1	1.0	1.0	4	0.8	0.8	100	10	250
	8-10	62	52	2,700	40	3,500	400	15	40	0.3	15	1.2	1.1	1.2	5	1.0	1.0	110	10	250
BOYS	10-12	77	55	2,500	45	4,500	400	20	40	0.4	17	1.3	1.3	1.4	5	1.2	1.2	125	10	300
	12-14	95	59	2,700	50	5,000	400	20	45	0.4	18	1.4	1.4	1.6	5	1.4	1.4	125	18	350
	14-18	130	67	3,000	60	5,000	400	25	55	0.4	20	1.5	1.5	1.8	5	1.4	1.4	150	18	400
MEN	18-22	147	69	2,800	60	5,000	400	30	60	0.4	18	1.6	1.4	2.0	5	0.8	0.8	140	10	400
	22-35	154	69	2,800	65	5,000	—	30	60	0.4	18	1.7	1.4	2.0	5	0.8	0.8	140	10	350
	35-55	154	68	2,600	65	5,000	—	30	60	0.4	17	1.7	1.3	2.0	5	0.8	0.8	125	10	350
	55-75+	154	67	2,400	65	5,000	—	30	60	0.4	14	1.7	1.2	2.0	5	0.8	0.8	110	10	350
GIRLS	10-12	77	56	2,250	50	4,500	400	20	45	0.4	15	1.3	1.1	1.4	5	1.2	1.2	110	18	300
	12-14	97	61	2,300	50	5,000	400	20	45	0.4	16	1.4	1.2	1.6	5	1.3	1.3	115	18	350
	14-18	114	62	2,400	55	5,000	400	25	50	0.4	16	1.4	1.2	1.8	5	1.3	1.3	120	18	350
	18-22	119	63	2,300	55	5,000	400	25	50	0.4	15	1.5	1.2	2.0	5	1.3	1.3	115	18	350
WOMEN	18-22	128	64	2,000	55	5,000	400	25	55	0.4	13	1.5	1.0	2.0	5	0.8	0.8	100	18	300
	22-35	128	64	2,000	55	5,000	—	25	55	0.4	13	1.5	1.0	2.0	5	0.8	0.8	100	18	300
	35-55	128	63	1,850	55	5,000	—	25	55	0.4	13	1.5	1.0	2.0	5	0.8	0.8	90	18	300
	55-75+	128	62	1,700	55	5,000	—	25	55	0.4	13	1.5	1.0	2.0	5	0.8	0.8	80	10	300
Lactating				3,000	75	8,000	400	30	80	0.5	20	2.0	1.5	2.5	6	1.3	1.3	150	18	450

*Adapted from Recommended Daily Dietary Allowances (RDA), 1968 revision, Food and Nutrition Board, National Academy of Sciences – National Research Council.

The RDA can be met by eating a wide variety of common foods; these foods may also provide nutrients not listed in the RDA.

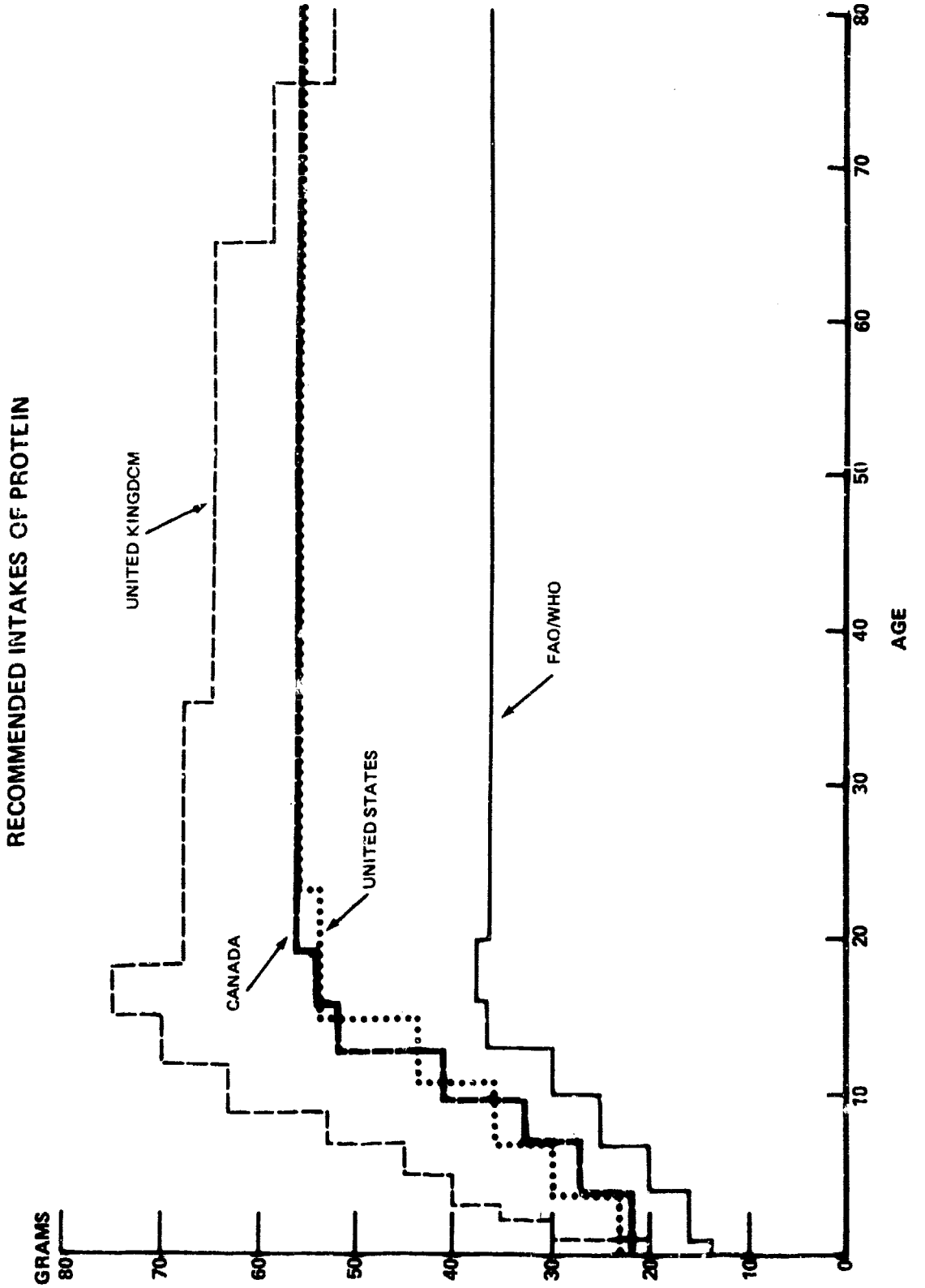
1 pound=454 grams
1 gram=1000 milligrams
1 milligram=1000 micrograms

3 small, uncooked dry beans weigh about 1 gram.

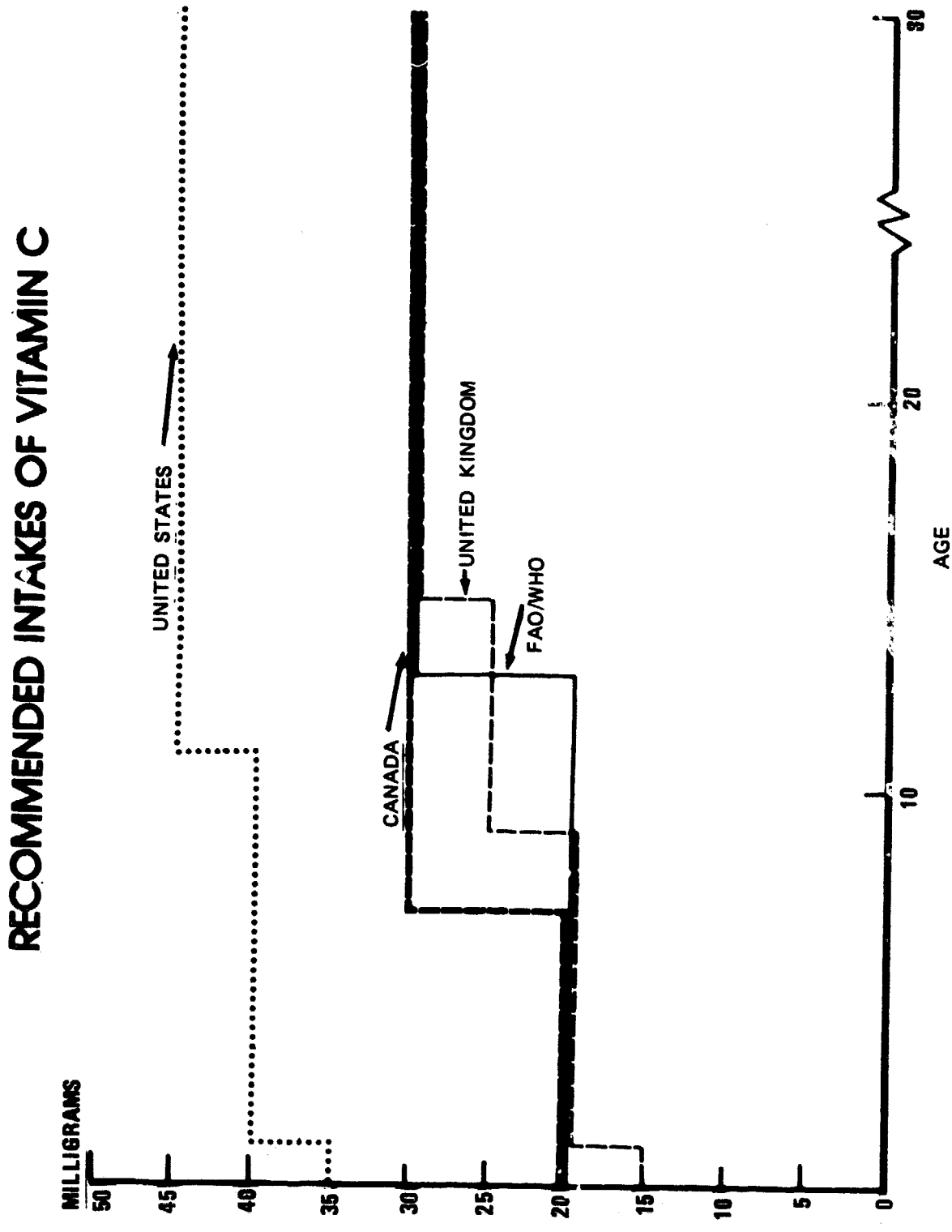
the 18 age-sex groups included in the U.S. RDA.
(boxed values) 100% of the U.S. RDA.

Source: Universal Cooperatives, Inc., prepared by Mary Ruth Nelsen

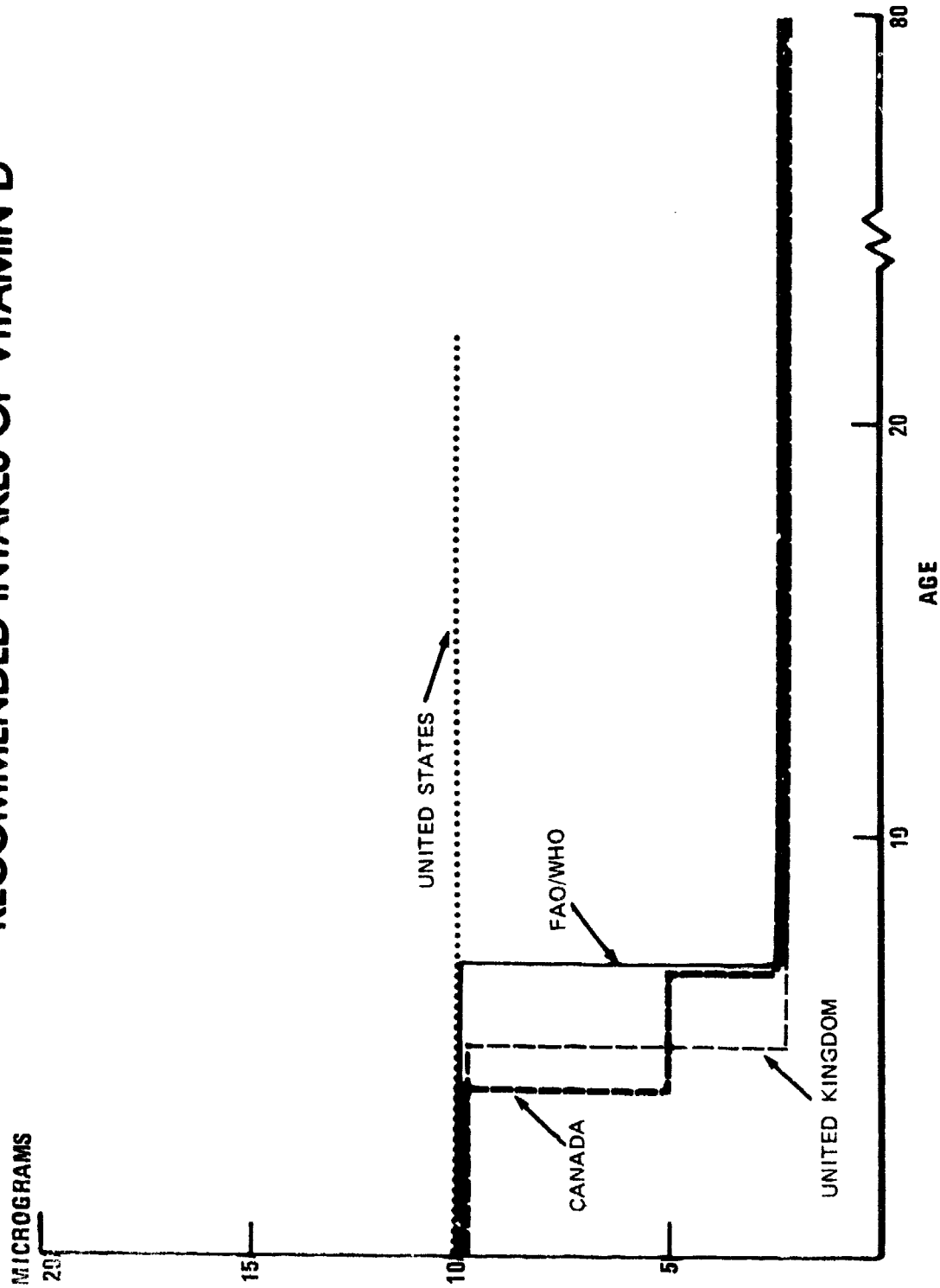
APPENDIX IX


RECOMMENDED INTAKES OF PROTEIN
GRAMS
80
70
60
50
40
30
20
10
0
AGE
10
20
30
40
50
60
70
80
UNITED KINGDOM
CANADA
UNITED STATES
FAO/WHO

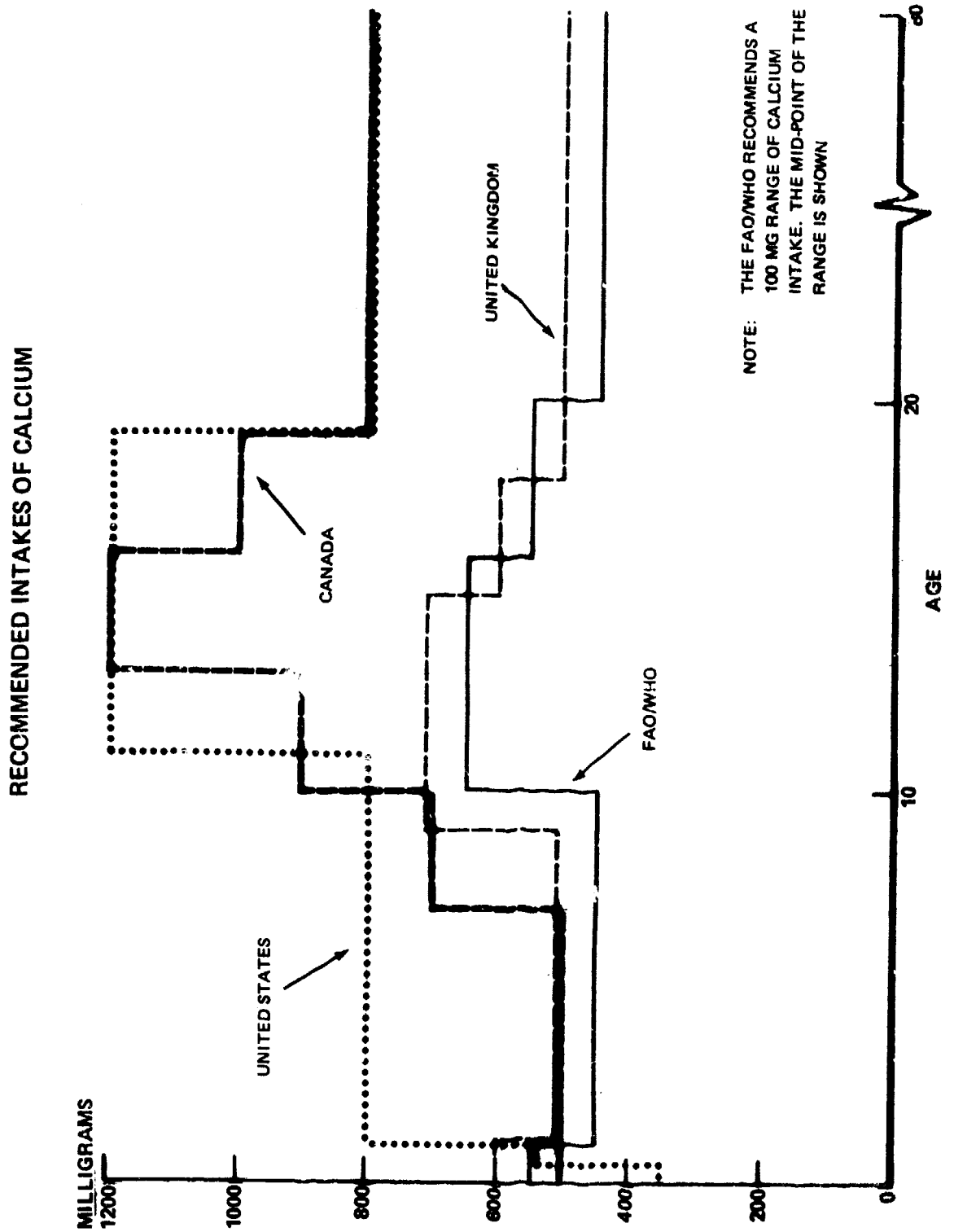
APPENDIX IX


RECOMMENDED INTAKES OF VITAMIN C
MILLIGRAMS
50
45
40
35
30
25
20
15
10
5
0
UNITED STATES
CANADA
UNITED KINGDOM
FAO/WHO
10
20
80
AGE

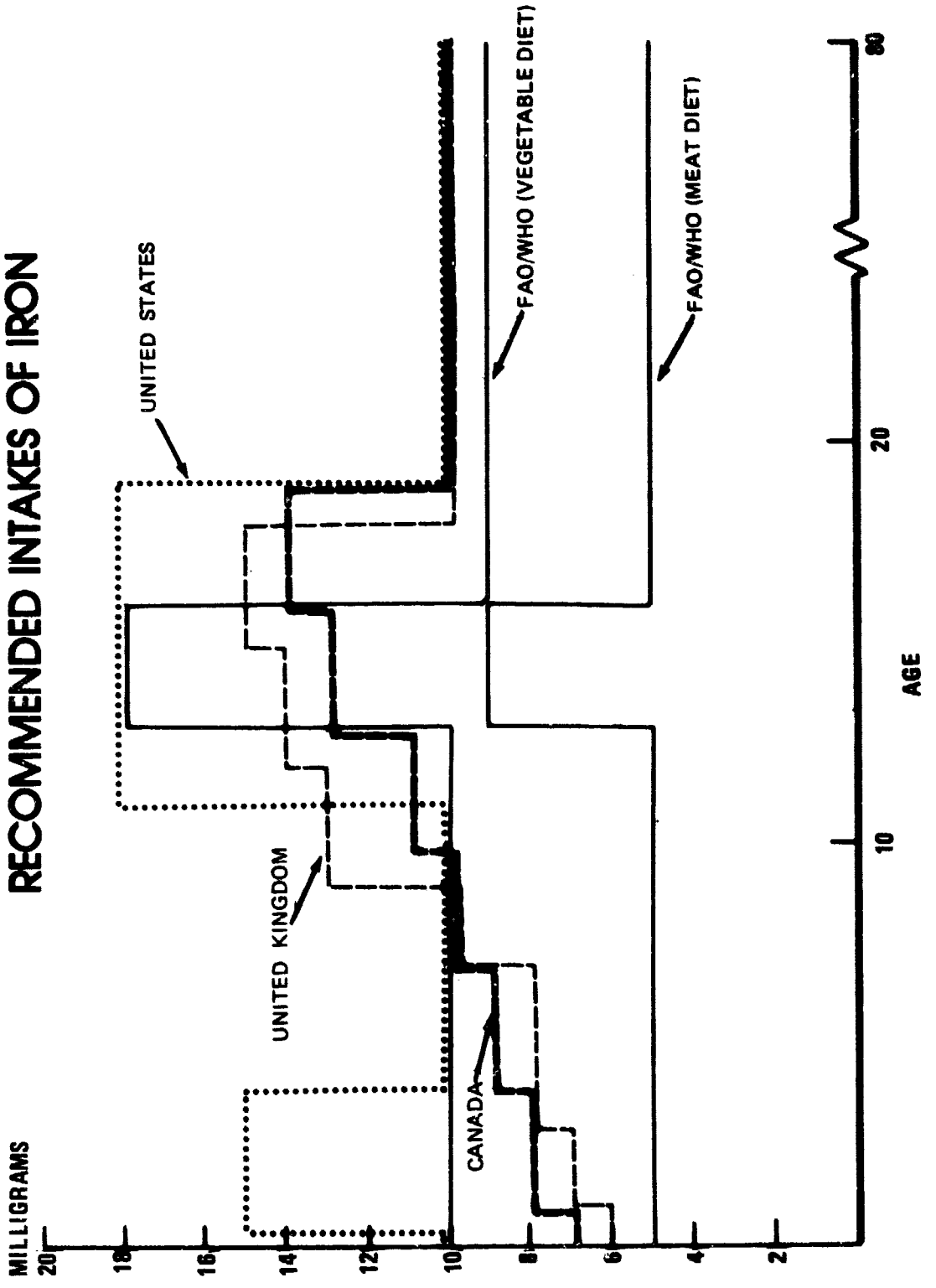
APPENDIX IX


RECOMMENDED INTAKES OF VITAMIN D
MICROGRAMS
20
15
10
5
UNITED STATES
FAO/WHO
CANADA
UNITED KINGDOM
1
10
20
80
AGE

APPENDIX IX


RECOMMENDED INTAKES OF CALCIUM
MILLIGRAMS
1200
1000
800
600
400
200
0
10
20
60
AGE
CANADA
UNITED KINGDOM
FAO/WHO
UNITED STATES
NOTE: THE FAO/WHO RECOMMENDS A 100 MG RANGE OF CALCIUM INTAKE. THE MID-POINT OF THE RANGE IS SHOWN

APPENDIX IX


RECOMMENDED INTAKES OF IRON
MILLIGRAMS
20
18
16
14
12
10
8
6
4
2
UNITED STATES
UNITED KINGDOM
CANADA
FAO/WHO (VEGETABLE DIET)
FAO/WHO (MEAT DIET)
10
20
80
AGE

APPENDIX X

NATIONAL ACADEMY OF SCIENCES

OFFICE OF THE PRESIDENT
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

September 13, 1978

Mr. Henry Eschwege
Community and Economic Development
Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

We were pleased to have your letter of 27 August and the draft report entitled "Recommended Dietary Allowances: Additional Research and Translation Into Food Guides Needed." Overall, my colleagues and I found your report to be sound and the assessment of problems relating to RDAs to be useful, objective and accurate; the report should indeed be helpful to Congress and the nation.

There are, however, a few inaccuracies in the report that seriously concern me and some minor points that warrant attention. These are listed below in what is, more or less, the order of declining importance.

[See GAO note.]

We hope that the comments above will be helpful since we share with the GAO and the Congress concern that the report be as free as possible from inaccuracies or potentially misleading statements.

Finally, may I express my sincere appreciation to you for the opportunity to review this report.

Sincerely yours,

Philip Handler
President

GAO note: Deleted agency comments pertained to matters no longer in final report or suggestions by the agency that were incorporated in the report.

APPENDIX XI

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

September 13, 1978

Dr. Henry Eschwege
Director, Community and Economic
Development Division
United States General Accounting Office
Washington, D.C. 20548

Dear Dr. Eschwege:

Enclosed please find a response to your draft report to Congress entitled "Recommended Dietary Allowances: Additional Research and Translation into Food Guides Needed."

Our response is prepared for discussion purposes when our Department representatives meet with Mr. Thomas Kai and Mr. William Gahr of your office on September 13, 1978.

We hope that these comments will be of assistance in preparing the final report to Congress.

Sincerely,

ANSON R. BERTRAND
Director
Science and Education Administration

LEWIS B. STRAUS
Administrator
Food and Nutrition Service

Enclosure

Response to: Draft of a Proposed Report
"RECOMMENDED DIETARY ALLOWANCES: ADDITIONAL RESEARCH AND TRANSLATION INTO FOOD GUIDES NEEDED"

The GAO report appears to offer an accurate history of the creation of Food and Nutrition Board and of the process by which it establishes the Recommended Dietary Allowances (RDA). Further it accurately outlines the limitations and shortcomings of the RDAs. USDA takes no issue with these aspects of the report.

Similarly, USDA concurs with the report recommendations of the need to:

1. identify nutrition research needs,
2. establish priorities relating to human nutrition requirements,
3. develop food plans and food choice guides for consumers.

USDA also recognizes the need for inclusion of sugar, fiber, sodium, fat, and cholesterol in the RDA and for attention to special nutrition need situations (e.g., metabolic disorders, etc).

However, USDA takes issue with the GAO recommendation that further research needed in these areas and the translation of the RDAs into food guides and consumer information should be a responsibility assigned to NRC's Food and Nutrition Board. Title XIV of the Food and Agriculture Act of 1977 (PL 95-113) clearly designated USDA as the lead Government agency to conduct human nutrition research and consumer nutrition education.

Consistent with this legislative intent, USDA has recently undergone a major reorganization resulting in the creation of the Science and Education Administration (SEA) which is responsible for implementing this mandate.

To insure maximum coordination a Human Nutrition Research Center was created under SEA to supervise these research activities. Thus USDA is uniquely equipped and prepared to continue and expand research on nutrient needs and available food resource alternatives for meeting these nutrient needs.

SEA supervises research in three areas: (a) human requirements for nutrients, (b) food composition and improvement, and (c) food consumption and use. This research is conducted in eight locations including the Nutrition Institute at Beltsville, Maryland, the Consumer and Food Economics Institute at Hyattsville, Maryland, the Human Nutrition Lab at Grand Forks, North Dakota, the Plant, Soil, and Nutrition Lab at Ithaca, New York, and Human Nutrition activities at the Eastern, Western, and Northern Regional Research Centers and at the Richard B. Russell Research Center. Two additional human research facilities will soon be added at Tufts University and Baylor University.

USDA also conducts a Household Food Consumption Survey which provides consumer food practices data not collected by any other Government entity. This data will be incorporated into the joint USDA-DHEW Nutritional Status Monitoring System required in the 1977 Farm Act.

A Human Nutrition Policy Committee created in response to the Food and Agriculture Act of 1977 will coordinate the Department's responsibilities and activities for food assistance, food safety, quality, research, and education. The purpose of the Committee is to ensure consistency between the Department's research findings and practices in programs and education services conducted by the Department.

USDA has historically been the lead Government agency in establishing consumer food guides. The BASIC FOUR, used more extensively than any other consumer food guide, originated from USDA. It is currently being revised to reflect the revised RDAs and the findings of the Department's Household Consumption Survey which will be completed soon.

USDA has also translated the RDAs into meal requirements for use in the National School Lunch Program (NSLP). Additionally each time the RDAs are revised, meal requirements are reviewed and revised as needed to reflect changes in the RDA. A recent revision of those guides issued this summer as interim regulations, represents the most significant changes proposed in the NSLP meal requirements since inception of the program in 1946. After field testing, final regulations are expected by the summer of 1979.

Recognizing the confusion which consumers experience as they face the various food guides published by different Government entities, USDA has formed a joint working group with DHEW to produce nutritional guidelines for consumer use. In their existing form the RDAs are useful to scientists and nutritionists but offer little or no information to consumers who can not translate the allowances into foods and diet patterns. The joint working group will attempt to fill this void.

USDA is in a unique position to communicate these food guides to consumers. Unlike any other Government or private agency, USDA has an existing and operative mechanism in its Food and Nutrition Education Program under Agriculture Extension Services through which to communicate food guides and recommended allowances to consumers through education program.

There is, as the GAO report points out, a need for the unbiased determination of recommended dietary allowances. There is also a need for some direction from such a scientific body in establishing research priorities in the area of human nutrient needs. The NRC's Food and Nutrition Board has offered this service in the past and can unquestionably continue to fulfill this role.

APPENDIX XI

However, USDA feels that to assign to the Food and Nutrition Board any primary responsibility to conduct research in human nutrition needs, to translate these nutrient needs into consumer food guides, and to communicate the food guides to consumers could further fragment and duplicate existing federal nutrition research and consumer education activities. Although Food and Nutrition Board has been actively involved in establishing the Recommended Dietary Allowances, it is not currently involved in conducting nutrient research and has no existing mechanism for consumer education.

The recommendation that Food and Nutrition Board join these efforts is inconsistent with GAO's previous criticisms of unnecessary duplication and fragmentation in the area of human nutrition research and education.

USDA feels that before a report is sent to Congress recommending that an additional agency be asked to join these efforts, GAO should first examine the existing capacity within federal agencies to conduct this work.

USDA has in the past and will continue to address these concerns with human nutrient needs. The Food and Agriculture Act of 1977 clearly delegates to USDA the authority and responsibility to continue and expand its research and consumer education activities in these areas. USDA has affirmatively committed itself to meet this mandate through its recent reorganization.

GAO note: See GAO evaluations of these comments on pages 37 and 38.

APPENDIX XII

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE ASSISTANT SECRETARY FOR HEALTH
WASHINGTON, D.C. 20201

September 19, 1978

Mr. William Gahr
Assistant Director
Community and Economic
Development Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Gahr:

We appreciate the opportunity to comment on the draft General Accounting Office (GAO) report entitled "Recommended Dietary Allowances: Additional Research and Translation into Food Guides Needed." We in the Department of Health, Education, and Welfare (HEW) commend the GAO for its accurate and insightful report on the purpose and value of the RDAs. Comments provided here are intended to reinforce and expand on those made during the meeting of September 5 with Mr. Thomas Kai of GAO.

GAO Recommendations

The GAO recommends that the Congress direct the Secretaries of Agriculture (USDA) and HEW to request the assistance of the National Academy of Sciences (NAS) in identifying nutrition research needs and establishing priorities relating to human nutritional requirements (page vii of the report). We believe this recommendation is unnecessary in that the National Institutes of Health (NIH) have supported the Committee on Dietary Allowances of the Food and Nutrition Board, NAS, since its inception. The NIH presently is funding the Committee's work on the preparation of the 9th edition of Recommended Dietary Allowances. In addition, the NIH has asked the Committee, under contract, to develop recommendations for research needs as they relate to the RDAs and the report on Dietary Goals for the United States, prepared by the Senate Select Committee on Nutrition and Human Needs.

While these efforts are appropriately undertaken by the NAS, there are other organizations which have an interest in, and could contribute to, the assessment of nutrition research needs (i.e., relative to human nutritional requirements). Recognizing this, we would prefer that, as a general rule, GAO recommendations not specifically require that HEW work with a particular organization or group, but allow sufficient latitude for the Department to determine how best to accomplish a recommended action. This comment applies to GAO's second recommendation as well.

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On page viii of the report, GAO recommends that the Congress direct HEW and USDA to request the NAS to develop food planning and food choice guides for the consumer to supplement other government nutrition education efforts. Our position is that the NAS may not be the most appropriate group to develop such guides. We believe this function is more appropriately performed by USDA and HEW either in-house or through contracts with qualified individuals or organizations. The NAS should, however, be requested to periodically review the progress made toward the development of food planning and food choice guides by the Departments, and should evaluate these guides when completed.

In an effort to better respond to the needs of consumers for more useful, up-to-date information about nutrition, diet, and health, HEW and USDA have established a joint steering committee to oversee the development of dietary guidelines for the public. Although it is too soon to say definitively what the scope of the guidelines will be, they will be based, in part, on the RDAs and will address current nutrition concerns. Any effort to develop food planning and food choice guides should be coordinated with this and related HEW and USDA efforts in nutrition information and nutrition education.

Technical Comments

We suggest the following technical changes in the report:

[See GAO note.]

We hope these comments are helpful.

Sincerely yours,

J. Michael McGinnis, M.D.
Deputy Assistant Secretary for Health
(Special Health Initiatives)

GAO note: Deleted agency comments pertained to matters no longer in final report or suggestions by the agency that were incorporated in the report.

APPENDIX XIII

COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515

November 3, 1977

Elmer B. Staats
Comptroller General
U. S. General Accounting Office
441 G Street, N.W.
Washington, D.C.

Dear Mr. Staats:

Between July 26 and August 4, 1977, the Science and Technology Subcommittee on Domestic and International Scientific Planning, Analysis, and Cooperation (DISPAC), of which I am the Chairman, held an extensive Nutrition-Related Oversight Review. Three days each were devoted to the topics of nutrition surveillance and monitoring and overall human nutrition research priorities and activities.

In the planning as well as the follow-up phases of the Subcommittee's activities pertaining to this Oversight Review, my staff has received a considerable amount of assistance from various divisions within the U.S. General Accounting Office. This assistance has been greatly appreciated, and it is precisely because G.A.O. expertise and experience have been so helpful and readily available that I would like to make a request for further assistance.

During the hearings on overall human nutrition research priorities and activities, in the United States as well as other parts of the world, it became apparent that there is considerable confusion surrounding the identification and use of RDA's (Recommended Dietary Allowances).

Very briefly, RDA's are the levels of intake of essential nutrients considered to be adequate to meet the known nutritional needs of practically all healthy persons in the United States. They are developed and updated by the Food and Nutrition Board of the National Research Council, National Academy of Sciences.

RDA's have been used as a guide for:

- planning and procuring food supplies for population groups;
- interpreting food consumption records;
- establishing standards for public assistance programs;

APPENDIX XIII

- evaluating the adequacy of food supplies in meeting national nutritional needs;
- developing nutrition education programs;
- developing new food products by industry; and
- establishing guidelines for nutritional labeling of foods.

Given these uses of RDA's, any defects or inaccuracies in either the RDA's themselves or in their application could cause problems in the nutritional health and wellbeing of the American people, as well as jeopardize the effectiveness of Federal programs designed on the basis of RDA's.

RDA's have been criticized for a number of reasons. Since RDA's appear to play an important role in our society, these criticisms should be investigated and either verified or refuted. The following are among the criticisms:

- RDA's are limited to healthy persons;
- RDA's do not cover all the essential nutrients (and non-nutrient components of food);
- RDA's are based on limited information or on studies based on small and unrepresentative samples;
- RDA's are intended for groups of people and not useful for a particular individual;
- RDA's overstate the nutrient needs for most individuals; and
- RDA's do not provide the upper and lower limits or margins of safety and the related risks.

The DISPAC Subcommittee is planning to conduct oversight hearings on RDA's sometime in June or July 1978. I would greatly appreciate it if the General Accounting Office would conduct an extensive review of the RDA's and would provide the Science and Technology Committee with briefing materials for the hearings, by May 1978, and a more extensive report thereafter.

It would be very useful if the GAO report would address the following areas of concern in order to offer the Committee a balanced understanding of the factors involved in RDA's.

(a) examination of the process by which RDA's are established in order to determine if this process serves the best interest of human nutrition;

(b) determination of the uses of RDA's, especially in Federal programs;

(c) examination of the limitations of RDA's;

(d) discussion of the nutritional/health, social, economic and political impacts and implications of RDA's;

(e) comparison of RDA's of the United States with other standards established by the FAO/WHO and other nations; and

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(f) concluding, if possible, with whether a different set of nutritional standards is needed, or if the current U.S. RDA's provide the best available set of standards.

The Honorable Olin Teague, Chairman of the House Science and Technology Committee, has had a great interest in the nutrition-related activities of the DISPAC Subcommittee, and he has personally expressed an interest in this investigation into RDA's.

This is a rather formidable request and I would greatly appreciate the assistance of the G.A.O. in this undertaking. My staff have always benefitted from the opportunity to work with G.A.O. staff, and I look forward to hearing whether and when the project outlined in this letter can be conducted by your Office.

With every warm best wish,

Yours,

JAMES H. SCHEUER, Chairman
Subcommittee on Domestic and
International Scientific Planning,
Analysis and Cooperation

(09713)

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