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Implications and Recommendations

While developing the guidance for use of the Dietary Reference Intakes (DRIs) in planning diets for groups and individuals, several crucial areas have been identified for which data and techniques do not exist or for which additional knowledge is needed. This chapter synthesizes and prioritizes these needs. Research recommendations to improve the uses of the DRIs as applied to dietary assessment have been delineated (IOM, 2000a). As part of a necessary cycle of assessment, planning, implementation, and reassessment, a number of the research recommendations proposed for dietary assessment apply to dietary planning as well. These recommendations, which address issues such as the need to improve estimates of nutrient requirements and the quality of dietary intake data, are reiterated here. The recommendations in this chapter have been prioritized, and those presented under the first heading should be given the highest priority for research and development funding.

DIETARY PLANNING FOR GROUPS

Pilot test the proposed approach to planning for a low group prevalence of inadequacy.

The approach to group planning proposed in this report focuses on planning for intakes rather than meals offered or served and on the distribution of usual intakes rather than on mean intake. This approach aims to achieve a low prevalence of inadequate and excessive intakes of nutrients. However for some nutrients, achieving a

low prevalence of inadequacy may require a considerable repositioning of the usual nutrient intake distribution, thus targeting a higher median intake than may have been customary when previous planning activities focused on the Recommended Dietary Allowance. Before large-scale implementation of such changes, practical pilot testing of this approach will be useful to assess whether a low prevalence of inadequacy can be achieved while meeting other important goals (e.g., avoiding excessive consumption of energy, maintaining nutrient intakes below the Tolerable Upper Intake Level [UL], and avoiding unnecessary food waste).

Determine how different nutrition interventions affect intake distributions.

It cannot be assumed that an intervention designed to increase the intake of a nutrient will result in a simple upward shift in nutrient intakes without changing the shape of the intake distribution or the between-person variation in usual nutrient intake. Different types of nutritional interventions may have very different effects on both the magnitude and shape of the intake distribution. A nearly complete distribution shift may be possible with interventions involving mandatory fortification of whole diets that have limited variety, such as emergency relief rations, or diets with a limited number of widely consumed staple foods in economically depressed areas of the world.

Successful government-sponsored fortification of varied diets, as is the case in the United States and Canada, depends on an appropriate selection of food vehicles that are similarly consumed by most people. Other nutritional interventions, based on supplementation recommendations, industry-initiated fortification of specific foods, increased food choices, or nutrition education approaches, have less predictable effects on the nutrient intake distribution. Some interventions may move the median intake while expanding the range and variation, resulting in little improvement or movement up or down at the extreme tails of the distribution. It is also possible that targeted interventions may affect primarily individuals in the tail of a distribution, thus changing the shape and benefiting those in greatest need of dietary improvement. Examination and publication of intake distributions before and after an intervention, with a systematic collection of this type of data, would allow a more informed selection of methods for planning a dietary intervention.

Determine the intake distributions of specific population groups.

Methods have been outlined in this report to estimate the distribution of usual intakes in a group and apply this estimate to position or target the distribution of usual intakes so that there is a low prevalence of dietary inadequacy or excess. Data on dietary intakes may be available for large groups, either from national population surveys or surveys of large groups (e.g., participants in the National School Lunch Program; the Supplemental Nutrition Program for Women, Infants, and Children; or specific branches of the military). However, often such information has not been reported in a manner that facilitates the estimation of variation in the usual intake of individuals. Information is generally minimal or lacking on the nutrient intake distributions of other groups such as children in different daycare settings, hospitalized patients, or residential long-term care homes or other institutional settings (with or without selective menus). For smaller settings where the on-site assessment of intake distributions may not be practical, planning for a low prevalence of inadequate intakes can be facilitated by descriptive data on the size and shape of intake distributions associated with similar settings. In addition, there is a paucity of population-level dietary intake data in Canada and on some underserved subgroups in the United States (e.g., Native Americans on reservations or inner city populations).

Conduct further research on the relationship between foods offered and nutrient intake in the context of group planning.

Although the framework for group planning focuses on the distribution of nutrient intakes as the ultimate goal, planners generally can control only what is offered and served to individuals in the group. More work is needed to provide guidance to planners on how food and nutrient offerings relate to food and nutrient intakes in various populations and how the relationship between offering and intake varies according to planning contexts.

Develop and evaluate dietary planning strategies for heterogeneous groups, including a nutrient-density approach to dietary planning.

Groups may be heterogeneous in ways (e.g., life stage and gender) that result in multiple requirement levels within the same group. The nutrient density approach is suggested here as a method to plan diets to achieve adequate amounts of nutrients for all group

members based on those with the highest requirements. This approach involves planning for a minimum nutrient density in proportion to the energy content of the diet. Research is needed to determine the practical usefulness of planning for a target nutrient density, to determine if the applicability of the nutrient density approach is limited to situations with predetermined food allocations or restricted food choices (e.g., emergency relief rations), and to determine if this approach would be practical in situations offering a wide variety of food choices where the nutrient density is more dependent on food selection than on total food access to meet energy needs.

For situations in which nutrient density approaches are deemed useful, further development of data and methods is needed to estimate the median and distribution associated with nutrient requirements when expressed as a proportion of energy, either by statistical derivation from the present Estimated Average Requirements (EARs), or as a goal for future revisions of the Dietary Reference Intakes.

Further research is also necessary to determine how intake distributions for all nutrients are affected when plans for heterogeneous groups involve targeting the aggregate or average requirement of specific nutrients for all individuals within a group versus targeting the maximum individual requirement for the whole group. Criteria are needed to determine when to apply each of these approaches based upon current knowledge used to derive the EARs and ULs, studies of intake distributions, and the effects of interventions (see the analysis of folate intake distributions by Lewis and colleagues [1999]). These criteria should consider the impact of such goal setting on the food supply and resulting distribution of intakes.

RESEARCH TO IMPROVE THE QUALITY OF DIETARY INTAKE DATA

As discussed in the preceding chapters, planning diets, at either the individual or group level, involves setting goals for what nutrient intakes should be. Thus, in order to plan effectively, high-quality data are needed on dietary intake of nutrients.

Much has been written about ways to improve the quality of the intake data on which assessments are based (IOM, 2000a); some of the topics are revisited here along with specific areas in which research is still needed.

Important advances to improve the application of human nutrient requirement estimates have been made with the further devel-

opment and refinement of statistical procedures to reduce, if not eliminate, the distorting effect of random error in dietary data (Nusser et al., 1996). The remaining issue of paramount importance in dietary data collection and analysis is the presence and true extent of bias (such as under- or overreporting of food intake) and the accuracy of food composition databases.

Research is needed to develop and validate statistical procedures to identify and correct for both under- and overreporting in self-reported intake data for energy and other nutrients.

This is a relatively unexplored field. Methods for directly estimating bias regarding energy intake have been developed and used to demonstrate that the problem is serious. While the underreporting of energy has now been well documented, it is unclear how this affects the accuracy of self-reported nutrient intakes. Research into this question has been limited by the absence of reference biomarkers of intake for many nutrients. Efforts have begun in the management of bias during data analysis, but these are far from satisfactory at present. Unfortunately, the methods available to reduce bias caused by energy underreporting do not provide an appropriate correction of underreporting for dietary intake data to be used in assessment and planning applications of the Dietary Reference Intakes (DRIs). The handling of bias is a high-priority area of research awaiting new initiatives and innovative approaches.

Better ways to quantify the intake of supplements are needed.

Methods for collecting accurate supplement intake data have not been widely investigated. For the Third National Health and Nutrition Examination Survey, different instruments were used to collect food intake data and supplement intake data, and the correct methodology for combining these data is uncertain. Furthermore, the intake distribution from supplements usually cannot be adjusted because the data do not permit the estimation of the day-to-day variability in supplement intake. Plans for the Fourth National Health and Nutrition Examination Survey attempt to address some of these issues. Despite the difficulties in maintaining a supplement composition database for the rapidly changing market, investigation of better methods of quantifying supplement intakes is a high-priority research area.

Food composition databases need to be updated to include the forms and units that are specified by DRIs.

Analysis of various forms of certain nutrients (e.g., α - versus γ -tocopherol) may be required. The DRI recommendations also imply that databases need to separate nutrients inherent in foods from those provided by fortification, particularly when intakes are compared with the Tolerable Upper Intake Level for nutrients (e.g., niacin). It has been suggested (IOM, 1998a, 2000b) that food composition databases report nutrients by weight and by equivalents to allow for rapid updates when more is known about bioavailability. Thus, it may also be necessary to change the units of measurement (e.g., dietary folate equivalents, as suggested for folate [IOM, 1998a]; the milligrams of α -tocopherol, suggested for vitamin E in place of α -tocopherol equivalents [IOM, 2000b], and new biological conversion rates for β -carotene to vitamin A as suggested for retinol activity equivalents in place of retinol equivalents [IOM, 2001]).

GUIDANCE FOR DIETARY PLANNING

Review and, where necessary, revise existing food guides.

Changes in recommended intakes of various nutrients, combined with rapid changes in the amount and number of nutrients and types of foods that are fortified (particularly in the United States), necessitate review of existing food guides and continuation of the periodic review of dietary guidance such as the Dietary Guidelines for Americans and Canada's Guidelines for Healthy Eating.

Develop technical tools for the professional.

There is a need to develop analytical tools that support implementation of recommendations for using the Dietary Reference Intakes (DRIs) for professional dietary assessment and planning, as well as for general guidelines for professionals to evaluate such tools. Industry and academia should explore development and production of accurate and convenient tools, expanding on the availability and use of sophisticated hand-held calculators and computers and easy Internet access to a spectrum of data and software.

Communicate with and educate nutrition professionals.

For full implementation and use of the DRIs, communication

strategies are needed to effectively educate nutrition professionals on how the DRI recommendations can be practically and effectively applied. The DRIs are more complex than past efforts (NRC, 1989; Health Canada, 1990b) and draw more and more from the realms of the basic sciences and mathematics. There is a need to formally examine how to best integrate this information into the education of nutrition professionals.

Assess application of the DRIs for food and supplement labeling.

The DRIs provide updated nutrient intake recommendations with scientific justification and extensive documentation. For some nutrients (e.g., folate and vitamin B₁₂), the need to evaluate appropriate labeling information in both the United States and Canada is recognized to convey the recommendation for synthetic sources. Developing and testing a labeling format that conveys the meaning and use of the Tolerable Upper Intake Level may be especially helpful to consumers.

Develop and evaluate food guides for group planning.

Planning for groups to have a low prevalence of inadequate dietary intakes involves methods different from those used in planning for a low risk of dietary inadequacy for individuals. However, in both cases, the emphasis should be on food sources of nutrients. In the United States food-based menu planning guides have long been part of specifications for professionals to use in planning the food offered in various nutrition programs such as the National School Lunch Program. Convenient-to-use, food-based guidelines for menu planning for specific groups should be developed to assist professionals in planning for a low group prevalence of inadequate or excessive intakes. As with the pilot testing of group planning methodologies already mentioned, such guides will need to be evaluated.

RESEARCH TO IMPROVE ESTIMATES OF NUTRIENT REQUIREMENTS

Even for nutrients for which an Estimated Average Requirement (EAR) is available, requirement data on which the EAR is based are typically scarce and usually only for adults. Such EARs and Recommended Dietary Allowances (RDAs) are often based on just a few experiments or studies with very small sample sizes, and therefore

considerable uncertainty exists about the true median and standard deviation of the distribution of requirements within a group. Given the importance of median and distribution of requirements in both assessment and planning, additional carefully conducted research is needed in this area to accomplish the tasks discussed below.

Improve existing estimates of the EAR and RDA.

There is need to both improve the database of controlled experimental studies relevant to the EAR, as well as to broaden the approach to estimating requirements. Congruence of evidence should be expected from different sources, including population based and clinical investigations as well as experimental and factorial approaches, before being truly confident in an EAR.

Provide better information on requirements so it becomes possible to establish an EAR (and thus an RDA) for nutrients that currently have Adequate Intakes (AIs).

Research that allows replacement of the AIs with EARs for age groups older than infants will allow for additional applications. As discussed in earlier chapters, EARs present more possibilities for assessing individual and group prevalence of inadequacy and especially for planning for low group prevalence of inadequacy.

Improve estimates of the distribution of requirements so that the appropriate method for assessing the prevalence of inadequacy for groups can be determined (cut-point method versus probability approach).

Research in this area is also needed to enable more accurate applications of the Dietary Reference Intakes to specific individuals and populations. Adjustment factors for considerations such as body size, physical activity, and intakes of energy and other nutrients may be appropriate but are often unknown. Studies to evaluate nutrient requirements or adverse effects should provide individual data where possible to allow estimation of their distributions.

Identify factors that can alter the upper intake levels that can be tolerated biologically.

Establishment of Tolerable Upper Intake Levels (ULs) provides an opportunity to evaluate the risk of adverse effects for individuals

and populations and is an extremely important step forward in assessing nutrient intakes. Research to allow ULs to be set for all nutrients should be undertaken in carefully controlled settings. In addition, information on the distribution of adverse effects via dose-response data (e.g., risk curves) would allow greatly expanded applications of the UL, particularly for population groups. More information is needed on ways to identify and conceptualize the risk of exceeding the UL.