



Discussion Paper BRIEFS

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Discussion Paper 92

Assessing the Potential for Food-Based Strategies to Reduce Vitamin A and Iron Deficiencies: A Review of Recent Evidence

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Balanced diets are not accessible for a large proportion of the world's population, particularly those who live in developing countries. Many populations subsist on staple plant-based diets that often lack diversity (and also quantity sometimes), which may result in micronutrient deficiencies. Vitamin A and iron deficiencies are among the nutritional deficiencies of greatest public health significance in the world today. Because they disproportionately affect children and women during their reproductive years, they hinder both the development of individual human potential and the national social and economic development.

The most popular approaches to address vitamin A and iron deficiencies include the distribution of vitamin supplements, food fortification, nutrition education, and food-based strategies. Also referred to as dietary modification, food-based approaches use a combination of agriculture, education and nutrition strategies to increase the production, availability, access to, and consumption of micronutrient rich foods.

Food-Based Approaches Neglected

In recent years, food-based interventions have been largely driven by nongovernmental organizations and other local institutions, and often overshadowed by national campaigns to reduce micronutrient malnutrition through capsule distribution and food fortification programs. Perceived to be less cost-effective, and certainly requiring a longer time horizon to achieve results, compared to supplementation or fortification interventions, food-based interventions have been neglected by national strategies to combat micronutrient deficiencies. And yet, these strategies may provide the only sustainable approach at the community level to improve the intake of iron and vitamin A through culturally acceptable changes in dietary intakes. This review explores the recent evidence of the impact and effectiveness of food-based strategies, in an effort to reexamine the potential of food-based strategies to reduce micronutrient malnutrition.

Objectives of the Review

The objective of the review was to synthesize current knowledge and experience with food-based approaches to reduce vitamin A and iron deficiencies, to highlight some of the lessons learned, and to identify knowledge gaps and

research priorities. The main strategies reviewed are food-based interventions that aim at (1) increasing the production, availability and access to vitamin A and iron-rich foods through the promotion of home production; (2) increasing the intake of vitamin A and iron-rich foods through nutrition education, communication, social marketing and behavior change programs; and (3) increasing the bioavailability of vitamin A and iron in the diet through home preservation or processing techniques. Plant breeding strategies are also briefly discussed because of their potential to increase the content of vitamin A and iron in the diet.

Strategies to Increase Production and/or Intake of Micronutrient-Rich Foods

Building on two previous reviews of home gardens from the 1980s and early 1990s, this review covers evidence from ten new projects published between 1995 and 1999. Compared to previous studies, the new set of studies focuses more on community participation aspects and on the careful selection of appropriate sets of interventions for specific contexts. Design and implementation strategies have also greatly improved. Consistent with findings from earlier reviews, this synthesis highlights the effectiveness of home gardening interventions, especially when combined with promotional and education interventions, to improve vitamin A intake and nutrition. The review also suggests a positive impact of interventions to promote small animal husbandry and fishponds, or increased intake of cheap sources of animal products for the control of iron deficiency. A key element of

success in this new generation of food-based interventions seems to be the emphasis on well-designed communication and behavior change strategies. In spite of these encouraging findings, there is still an urgent need for better and more rigorous evaluations of

food-based interventions to demonstrate their efficacy, effectiveness, feasibility, sustainability, cost-effectiveness, and their impact on micronutrient status and other outcomes such as home production, household income, and women's control over resources.

Strategies to Increase Bioavailability of Vitamin A and Iron

Various home processing techniques can be used to either increase the bioavailability of micronutrients or to ensure their

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retention during preparation, cooking, processing, or preservation. For provitamin A compounds, the main issue is to extend the availability of provitamin A-rich foods beyond the season in which they are in abundance. This can be achieved through solar drying or the production of leaf concentrates. For iron from plant foods (nonheme iron), the most crucial issue is to increase its bioavailability by either reducing the presence of inhibitors of absorption (such as phytic acid or tannins), or increasing the use of promoters (such as ascorbic acid). Home processing techniques such as germination, fermentation, and amylase treatment are known to be effective in reducing the amount of phytic acid in cereals and legumes, and in promoting the absorption of nonheme iron. Avoiding tea and coffee during the meal, or including citrus fruits (rich in ascorbic acid) are other effective approaches to improve nonheme iron absorption. A few recent studies also showed that cooking in iron pots increased the intake of bioavailable iron in the foods and improved iron status.

Our review of these strategies reveals two contrasting facts. On the one hand, it is clear that the technologies do exist to address some of the main concerns about the bioavailability of vitamin A and iron. Many of the technologies reviewed seem to involve simple, low cost home processing techniques, which in some cases are even part of the traditional background of the targeted populations. On the other hand, the lack of experience in promoting, implementing, and evaluating these available technologies in community trials is disconcerting. More research is needed to explore the full potential of these approaches for the control of vitamin A and iron deficiencies.

Plant Breeding Strategies

Plant breeding strategies are promising because of their immense potential to improve the dietary quality of populations relying mainly on cereal staples. However, they are at a very early stage compared to other approaches and the information on their potential efficacy and effectiveness is not yet available. Additional studies on human bioavaila-

bility are needed to understand the potential contribution of plant breeding to the global strategy to alleviate micronutrient deficiencies.

Conclusions

Significant progress has been achieved in the past 10 years in the design and implementation of food-based approaches, particularly with respect to the new generation of projects integrating production and nutrition education and behavior change strategies. Yet, little has been done to rigorously evaluate their efficacy, effectiveness, feasibility, cost-effectiveness, sustainability and their impact on the diets and nutritional status of at-risk populations. Food-based approaches are complex, requiring a set of integrated activities and a wide variety of inputs and outcomes to be measured. Their impact is more difficult to evaluate than that of other strategies such as capsule distribution programs, because they cannot be evaluated using randomized placebo-controlled trials. However, it is critical to demonstrate both the efficacy and the effectiveness of food-based strategies in order to provide the most basic information to further promote their use in the fight against micronutrient malnutrition. The same question as that posed in previous reviews decades ago remains at the end of the present review: what really can be achieved with food-based interventions to control vitamin A and iron deficiencies? Food-based approaches could be an essential part of the long-term global strategy to alleviate vitamin A and iron deficiencies but their real potential is still to be explored.

Keywords: micronutrient malnutrition, human nutrition, food

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