Micronutrient supply based on the Food Balance Sheet and the prevalence of inadequate intakes in Madagascar

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Introduction

In the international development context, nutritional issues, including micronutrient deficiency ("hidden hunger"), are one of the highest-priority global challenges and have been drawing concern in recent years. This study aimed to identify nutritional supply from the Food Balance Sheet (FBS) of the Food and Agriculture Organization (FAO), an open-access national database, in the case of Madagascar.

Madagascar is one of the countries most severely struggling with malnutrition, with about half of all children aged <5 years showing stunted growth1. As a mixture of African and Asian culture, their food consumption is unique. People consume high amount of rice, in fact, Madagascar is the largest rice producing country in Africa with its annual rice supply per capita amounting to 103 kg (FAO 2013).

Data

Nutrient supply was estimated from the 2009–2013 (considering annual variation) food supply data of FBS. The ratio of food items included in each categories were assumed with the advice from dietitian officers and other specialists in Madagascar. The food supplies were converted into nutrient amounts based on the nutrient contents in the food composition tables of the US Department of Agriculture, supplemented with the data from the table of food composition used in Madagascar and from the standard tables of the food composition in Japan.

Nutrient requirement was calculated from the estimated average requirement (EAR) suggested by the Institute of Medicine, with adjustment of the population distribution obtained from the UN Department of Economic and Social Affairs (UNDESA), including age, sex, and pregnancy/lactation status.

Method

Among the micronutrients, Calcium, Iron, Zinc, vitamin C, Thiamin, Riboflavin, Niacin, Folate (DEF), Vitamin B_{12}, Vitamin A (RAE) were selected, as these nutrients commonly are the cause of major nutritional deficiency in developing countries.

We explored the following two things.

(1) Comparison of the averages of the selected nutrient supply and requirement.

(2) Estimation of the population prevalence of inadequate nutrient intake by the EAR cut-point method. Iron is not considered here, as the method is inappropriate owing to its asymmetrical requirement distribution[2]. The intake distribution was assumed as log-normal for all micronutrients. Inter-individual coefficient variations were set for each nutrient by referring to a previous study, ranging from 0.25 to 1.75[3].

Results

(1) The result implies deficiency of several micronutrients such as calcium (34%) and vitamin A (40%).

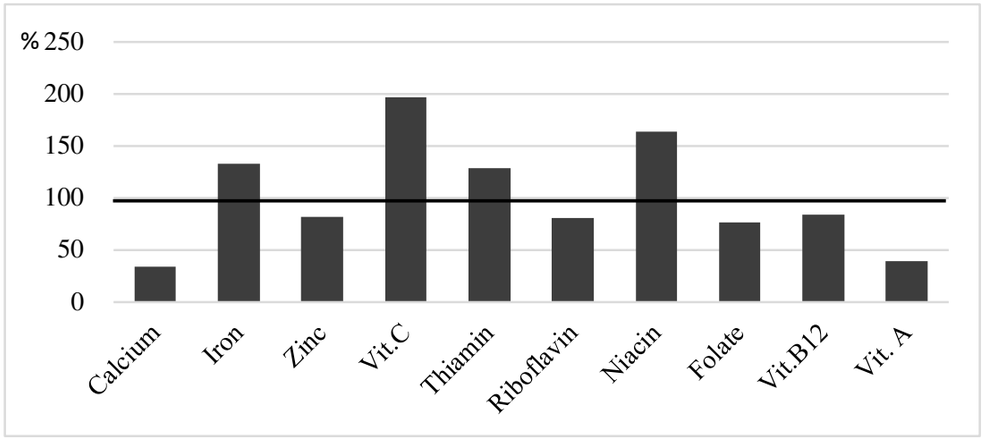

Figure 1 Percentage of calculated mean daily nutrient supply per capita to the population-adjusted mean requirement

(2) More than half of the population did not meet the intake requirements of many micronutrients; especially, calcium and vitamin A deficiencies are present in almost the entire population (100% and 98%, respectively).

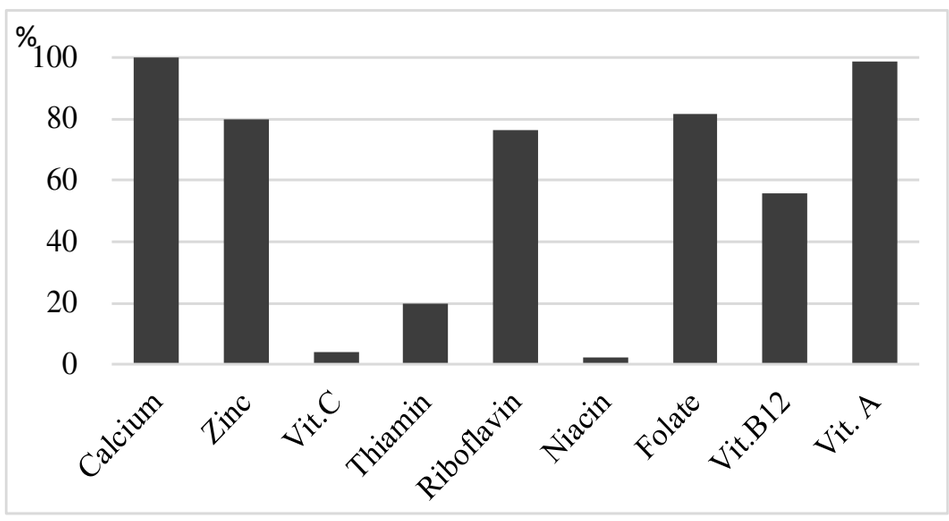

Figure 2 Estimated population prevalence (%) of inadequate micronutrient intakes

Discussion

Although using the FBS has some limitations such as its inability to consider seasonal, regional, or individual differences, it has the advantage of easy accessibility and is considered as an effective approach. This study could provide information on the lack of several nutrient supplies and prevalence of populations with inadequate micronutrient intakes in Madagascar.

References

1. UNICEF-WHO-The World Bank (2017) Joint child malnutrition estimates. http://www.who.int/nutgrowthdb/estimates2016/en/ (accessed March 2018).
2. IOM (2005) Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients). Washington, DC: The National Academies Press.
3. Beal T, Massiot E, Arsenault JE et al. (2017) PLOS One 12(4), e0175554.

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