PRIORITY MICRONUTRIENT DENSITY IN FOODS

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INTRODUCTION

Despite concerted efforts to improve diet quality and reduce malnutrition, micronutrient deficiencies remain widespread globally, especially in low and middle-income countries and among population groups with increased needs, where diets are often inadequate in iron, zinc, folate, vitamin A, calcium and vitamin B12. There is a need to understand the density of these micronutrients ('priority micronutrients') and their bioavailability across diverse foods and the suitability of these foods to help meet requirements for populations with high burdens of micronutrient malnutrition, particularly children, adolescents, women of reproductive age and pregnant people. The purpose of our study was to identify the top food sources of these commonly lacking micronutrients, which are essential for optimal health, to support efforts to reduce micronutrient malnutrition among various populations globally.

METHODOLOGY

We built an aggregated global food composition database by compiling data from multiple national and regional food composition tables and calculated recommended nutrient intakes for five population groups with varying requirements. We accounted for iron bioavailability based on the proportion of heme to non-heme iron contained in foods, and for zinc bioavailability based on the phytate content of foods. An approach was developed to rate foods according to their density in each and all priority micronutrients. In particular, foods were classified into one of four levels of micronutrient density based on the portion sizes (calories and grams) needed to provide one-third (for individual nutrients) or an average of one-third (for the aggregate score) of recommended intakes of vitamin A, folate, vitamin B12, calcium, iron and zinc for the five included population groups.

RESULTS

Priority micronutrient density scores may change depending on the population, given differences in recommended nutrient intakes. While the aggregate micronutrient density ratings remained similar for all included population groups, individual ratings for specific micronutrients significantly varied across different groups, especially for iron and folate. In general, we found that the top sources of multiple priority micronutrients are organs, small

(dried) fish, dark green leafy vegetables (DGLVs), bivalves, crustaceans, beef, goat meat, eggs, milk, cheese and canned fish with bones. Lamb, mutton, goat milk and pork are also good sources, and to a lesser extent, yogurt, fresh fish, pulses and teff.

DISCUSSION

In general, animal-source foods such as organs, shellfish, small fish, beef, goat meat, eggs, milk and cheese are the top sources of multiple priority micronutrients. Lamb, mutton, goat milk and pork are also good sources, followed by yogurt and fresh fish. Among plant-source foods, DGLVs are a top source of several priority micronutrients, and pulses and teff, a traditional grain, are also decent sources. Fortunately, many of these foods are available and affordable for most populations globally, such as organs, small fish, eggs and dairy for animal-source foods, and DGLVs, pulses and traditional grains for plant-based foods. Our results provide insight into which foods to prioritise to fill common micronutrient gaps and reduce undernutrition, and which could be integrated into food, agriculture, and nutrition policies and programs. These ratings could also be used to assess food affordability and environmental impact based on priority micronutrient density. While plant-source foods generally have lower environmental impacts than animal-source foods per unit protein, energy or mass, this generalisation may not hold when considering the higher nutrient density of many animal-source foods.