Billions worldwide consume inadequate levels of micronutrients critical to human health

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Key points:

* More than half of the global population consumes inadequate levels of several micronutrients essential to health, including calcium, iron, and vitamins C and E.
* Micronutrient deficiencies may be more severe than previously thought and may differ between males and females.
* The results provide a roadmap for taking action by showing which population groups are at risk of deficiency for specific nutrients.

Boston, MA—More than half of the global population consumes inadequate levels of several micronutrients essential to health, including calcium, iron, and vitamins C and E, according to a new study by researchers at Harvard T.H. Chan School of Public Health, the University of California, Santa Barbara, and the Global Alliance for Improved Nutrition (GAIN). It is the first study to provide global estimates of inadequate consumption of 15 micronutrients critical to human health.

The study will be published in The Lancet Global Health on DATE.

Micronutrient deficiencies are one of the most common forms of malnutrition globally, and each deficiency carries its own health consequences, from adverse pregnancy outcomes, to blindness, to increased susceptibility to infectious diseases. Previous research estimated the amount of micronutrients available to people and consumed by people; this study evaluates whether these intakes meet requirements recommended for human health and looks at the deficiencies specifically facing men and women across their lifespans.

“Our study is a big step forward,” said co-lead author Chris Free, research professor at UCSB. “Not only because it is the first to estimate inadequate micronutrient intakes for 34 age-sex groups in nearly every country, but also because it makes these methods and results easily accessible to researchers and practitioners.”

The researchers used data from the Global Dietary Database, the World Bank, and dietary recall surveys in 31 countries to compare nutritional requirements with nutritional intake among 185 countries’ populations. (They have made this data, as well as code to analyze it, freely available.) Populations were divided between males and females in 17 age groups: zero to 80 in five-year groups and an 80+ years old group. Fifteen vitamins and minerals were studied: calcium, iodine, iron, riboflavin, folate, zinc, magnesium, selenium, thiamin, niacin, and vitamins E, C, B6, A, and B12.

The study found significant intake inadequacies for nearly all of the evaluated micronutrients. Inadequate intake was especially prevalent for calcium (72% of the global population), iodine (68%), vitamin E (67%), and iron (65%). More than half of people consumed inadequate levels of riboflavin, folate, and vitamins C and B6. Intake of niacin was closest to sufficient, with 22% of the global population consuming inadequate levels, followed by thiamin (30%) and selenium (37%).

Estimated inadequate intakes were higher for women than men for iodine, vitamin B12, iron, and selenium within the same country and age groups. Conversely, men consumed inadequate levels of calcium, niacin, thiamin, zinc, magnesium, and vitamins A, C, and B6 compared with women. While patterns of micronutrient deficiency emerged more clearly on the basis of sex, the researchers observed that men and women ages 10-30 were most prone to low levels of calcium intake, especially in South and East Asia and sub-Saharan Africa. Calcium intake was also low across North America, Europe, and Central Asia.

“These results are alarming,” said Ty Beal, senior technical specialist at GAIN. “Most people—even more than previously thought, across all regions and countries of all incomes—are not consuming enough of multiple essential micronutrients. These gaps compromise health outcomes and limit human potential on a global scale.”

“The public health challenge facing us is immense, but practitioners and policymakers have the opportunity to identify the most effective dietary interventions and target them to the populations most in need,” added Christopher Golden, associate professor of nutrition and planetary health at Harvard Chan School.

The researchers noted that lack of available data, especially on individual dietary intake worldwide, may have limited their findings.

Simone Passarelli, former doctoral student and postdoctoral research fellow in the Department of Nutrition at Harvard Chan School, served as co-lead author. She received funding from the National Institutes of Health (training grant 2T32DK007703-26).

“Global estimation of dietary micronutrient inadequacies,” Simone Passarelli, Christopher M. Free, Alon Shepon, Ty Beal, Carolina Batis, Christopher D. Golden, The Lancet Global Health, DATE, doi: TK