


Exchange program research provides critical nutrition recommendations in Tanzania

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Information

Branded Crops and Information

Branded Crops and Information with Flag



IRON DEFICIENCY

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What happens when you don't get enough iron?

- Reduced ability to do physical labor
- Impaired mental development and learning capacity
- Anemia

What are good sources of iron?

- Meat
- Biofortified Beans
- Biofortified Millet
- Fortified Flour

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Example of information provided to the information groups. Credit: *Global Food Security* (2024). DOI: 10.1016/j.gfs.2024.100745

Using a novel research methodology, researchers in the U.S. and Tanzania have identified new recommendations for reducing nutrient deficiency in the East African country.

Brandon McFadden, professor of agricultural economics and agribusiness and the Tyson Endowed Chair in Food Policy Economics

for the Arkansas Agricultural Experiment Station, said that a key recommendation from the study was for policymakers and public health officials in Tanzania to focus on education about [zinc deficiency](#).

"Zinc deficiency is a major health problem worldwide, particularly in developing countries, and a major health consequence is stunted growth for children," McFadden said.

The study, titled "Knowledge gaps about [micronutrient](#) deficiencies in Tanzania and the effect of information interventions," was [published](#) this month in the *Global Food Security* journal. The study identified [knowledge gaps](#) in understanding about micronutrient deficiencies.

Pius Kilasy, a co-author of the study from Tanzania, said the study will help his home country address a critical lack of knowledge.

"Findings from the study are very important to Tanzania," Kilasy said. "Understanding and managing to close the knowledge gap is very important in order to build a strong and stable workforce."

Kilasy currently works as a research officer for the Tanzania Agricultural Research Institute, an independent institute under the Tanzanian Ministry of Agriculture. He completed the research on micronutrient deficiencies as a master's student through an exchange program at the University of Delaware. McFadden previously conducted research and taught in Delaware before joining the Arkansas Agricultural Experiment Station in August 2022. The experiment station is the research arm of the University of Arkansas System Division of Agriculture.

Other co-authors of the study include Kelly Davidson, assistant professor of applied economics, and Leah Palm-Forster, associate professor of applied economics, with the department of applied economics and

statistics for the University of Delaware's College of Agriculture and Natural Resources.

Find the gap

As with many low-income countries, Tanzania is home to widespread micronutrient malnutrition. According to the research article, approximately 58% of children from ages 6-59 months are anemic in Tanzania. Thirty-four percent are vitamin A deficient, and up to 70% of hospitalized children in this age group are deficient in zinc. Similar surveys of women between the ages of 15 and 49 in Tanzania also show high rates of anemia—45%—and vitamin A deficiency—36%.

Anemia is a condition that causes weakness and shortness of breath due to a lack of healthy red blood cells to carry oxygen throughout the body, according to the Mayo Clinic.

In response to these high micronutrient malnutrition levels, McFadden said the Tanzanian government has developed education and vitamin supplementation strategies, including a focus on using biofortified foods.

"It's difficult for vitamin supplementation to be a long-lasting behavioral change," he said. "If you can increase the nutrient levels in staple foods, then perhaps it would be more effective, particularly in rural areas."

Biofortified [staple foods](#) are selectively bred varieties of staple crops high in specific micronutrients. For example, some varieties of biofortified rice provide high levels of zinc.

McFadden and his co-authors devised a set of survey experiments to find knowledge gaps in understanding iron, vitamin A and zinc deficiencies among residents of Tanzania.

"We were interested in the knowledge of the different micronutrient deficiencies. And then also knowledge about biofortified foods that can help reduce those deficiencies," McFadden said.

Measuring awareness

McFadden said that participants in the study were limited to residents of Tanzania between the ages of 18 and 49. Because the World Health Organization identified women as being at a higher risk for a micronutrient deficiency, McFadden said females were oversampled in the study. Out of a total of 1,029 respondents, 806 were female.

Respondents were randomly assigned to one of six research groups and were asked a series of questions about micronutrient deficiency to determine their baseline understanding, McFadden said.

Then, respondents received different educational information about micronutrient deficiencies based on their assigned group. Of the six groups, four received variations of educational information on micronutrient deficiencies. For some groups, the material included references to branded biofortified foods to evaluate the effect of food labeling. Additionally, a Tanzanian flag was placed on the educational materials in some groups to determine if it increased attention to the information.

There was also a group that was only presented with the branded crops information, as well as a control group, which received no educational information or reference to branded crops.

The effects of the interventions were then measured using a follow-up survey, McFadden said.

"Economists are very touchy about saying something causes something,"

he said. "But the great thing about experiments is you set up the experiment to find causal effects. We used a randomized group design to identify these knowledge gaps and then also used a nutrient randomized design with information so we could have a lot of confidence in our findings."

McFadden also noted that the study methodology provided a unique "internal reliability check." The study was focused on iron, vitamin A and zinc, but researchers also included questions about iodine deficiency in the baseline and follow-up surveys.

When it came to the educational interventions, the researchers only provided information about iron, vitamin A and zinc—not iodine. They could then compare the impact of providing educational materials for iron, vitamin A and zinc against the impact of providing no information about iodine. This allowed the researchers to validate the true effects of the different levels of educational information provided.

Prioritization is key

The initial baseline knowledge survey found that only about half of respondents were aware of zinc deficiency, compared to approximately 75% who were aware of vitamin A and iron deficiency, McFadden said.

"There's been a lot of programs targeted at vitamin A and iron," he said. "There was really a low awareness for zinc."

The study noted that women were more aware than men of the potential negative health outcomes from micronutrient deficiency. Respondents assigned to groups that received educational information were more likely to identify negative health outcomes for iron, vitamin A and zinc. High-poverty households were also found to have lower overall awareness of the negative health outcomes of micronutrient

malnutrition.

Of the different information groups, the researchers found that providing a combination of educational information, along with branded crop information, yielded the greatest improvement in reducing knowledge gaps about micronutrient deficiency.

The study concludes that "Tanzania should implement targeted communication strategies that provide information about the prevalence of micronutrient deficiencies and risk-reducing food options branded with targeted micronutrients to reduce knowledge gaps most effectively."

Given the relative lack of awareness about zinc, McFadden said the results of the study suggest prioritizing public communications on that specific micronutrient to those who are at higher risk of micronutrient malnutrition, like women.

"It's identifying those places, particularly that women in childbearing years, are likely to receive information," he said. "For example, any kind of women's clinic."

Kilasy said that worldwide hunger has become so common that research like this can help inform decision-makers "to look for various alternatives on solving community challenges that are arising due to lack of sufficient knowledge."

"This study is very essential," he said.

More information: Pius Kilasy et al, Knowledge gaps about micronutrient deficiencies in Tanzania and the effect of information interventions, *Global Food Security* (2024). [DOI: 10.1016/j.gfs.2024.100745](https://doi.org/10.1016/j.gfs.2024.100745)

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