Behavioral Nudges to Improve Child Consumption of Quality Protein Maize in Ethiopia

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Sector(s): Agriculture, Gender

Fieldwork: Ethiopian Public Health Institute

Location: Ethiopia

Sample: 610 households

Initiative(s): Agricultural Technology Adoption Initiative (ATAI)

Target group: Children under five Mothers and pregnant women

Outcome of interest: Food security Nutrition Stunting

Intervention type: Information Improved seeds Post-harvest storage

AEA RCT registration number: AEARCTR-0000786

Research Papers: Behavioural insights to support increased consumption of quality protein maize ..., Translating the impact of quality protein maize into improved nutritional statu..., Behavioural insights to support increased consumption of quality protein maize ...

Partner organization(s): International Maize and Wheat Improvement Center (CIMMYT) , Global Affairs Canada, Gates Foundation, UK International Development

Nutritionally improved crop varieties have the potential to increase children's nutrient intake and encourage growth. However, previous attempts to promote the adoption of these new crop varieties have faced various challenges. In Ethiopia, researchers conducted a randomized evaluation to assess the impact of behavioral nudges on household behaviors, like grain and flour storage, cooking, and consumption, as well as on childhood nutrition. The behavioral nudges were intended to encourage households to grow and earmark a more nutritious maize variety for children's consumption. They found that households improved grain storage and cooking practices, and children in those households ate more of the improved maize. However, there

were no effects on markers of undernutrition such as height-for-age and weight-for-age.

Policy issue

Globally, stunting (or low height-for-age) among children is the most prevalent form of undernutrition, and is associated with higher child mortality, poorer motor and cognitive development, long-lasting health issues, and lower educational attainment and economic productivity. According to World Bank estimates, a 1 percent loss in adult height due to childhood stunting is associated with a 1.4 percent loss in economic productivity.[1] Poor diet is a main contributor to undernutrition, but evidence suggests that biofortified crops—improved crop varieties with enhanced micronutrients—may improve dietary quality.

While previous research in tightly controlled settings has shown that replacing conventional maize with fortified varieties has led to improved growth among children, the introduction of biofortified foods have faced compliance challenges when widely introduced because people are often reluctant to change their cooking and eating practices. Insights from behavior change-based interventions, such as earmarking and labeling, may be successful in encouraging proper storage, cooking, and consumption. Can behavioral interventions improve traditional biofortified seed distribution programs by increasing household adoption and children's consumption of improved varieties? Furthermore, will increased consumption translate to improved growth?

Context of the evaluation

Child stunting and malnutrition are prevalent in Ethiopia, where two out of five children are stunted. Not only can malnutrition affect a child's ability to grow, learn, and ultimately succeed, it can also take a toll on the larger economy. National estimates suggest that poor child nutrition comes at a cost of US$4.7 billion per year, equivalent to 16.5 percent of Ethiopia's GDP. In the Oromia region of Ethiopia, where this study took place, 37 percent of children under five are stunted, and only 17.8 percent of children 6–23 months meet the WHO's minimum dietary diversity requirements. Diets of both children and adults in Ethiopia are heavily dependent on cereals and, in the last twenty years, maize has become a dominant food source. However, conventional maize is low in protein content.

Agriculture in the Oromia region is an important source of food, where over 90 percent of the population is rural and a majority of the food produced is consumed at home (60 percent of total cereal crop). To promote the uptake of biofortified maize, the Nutritious Maize for Ethiopia (NuME) Project develops, promotes, and disseminates a biofortified Quality Protein Maize (QPM) as an alternative to traditional varieties. NuME is a collaboration of the International Maize and Wheat Improvement Center with the Ethiopian Institute of Agricultural Research, Sasakawa Global 2000, the Ethiopian Public Health Institute, and other national and international partners. NuME organized field demonstrations to launch QPM in the region, where agriculture extension agents showed participants how to cultivate, store, and cook these varietals.



Woman stands among tall maize stalks in agricultural field.

Photo credit: D. Friesen/CIMMYT

Details of the intervention

Researchers conducted a randomized evaluation to test the impact of encouraging QPM adoption and consumption on adoption of seeds and best practices for storage and cooking as well as child nutrition. The study took place in twelve kebeles (the smallest administrative units comprising approximately 500 households).

Of households that attended NuME's demonstrations, 610 were randomly selected to receive adoption encouragement. About 320 of these households were provided no further intervention, while the remaining 290 were provided behavioral nudges to encourage allocating maize specifically for children's consumption in addition to the adoption encouragement program. Researchers randomized community health groups, (consisting of six households each and designed to facilitate interactions with community health workers, into one of two groups:

1. *Adoption encouragement (AE):* In 320 households, agriculture extension agents visited the household to offer free QPM seed and share information on the nutritional benefits of QPM to household heads and children's caregivers. After repeating key messages from the earlier QPM demonstrations, farmers were offered the option of ordering up to three two-kilogram bags of QPM seed to plant on their own land, which would yield enough grain to bring about meaningful improvements in child nutrition over the course of six months (e.g., the consumption of at least 150 grams of grain per day per child). AE households served as the comparison group in the evaluation of the behavioral nudges intervention.

2. *Adoption encouragement + behavioral nudges (AE+BN):* In addition to the adoption encouragement intervention described above, researchers offered 290 household heads and caregivers a behavioral nudge component designed to target children for consumption of QPM and to help families properly store and partition QPM. AE+BN households received information and programming at three points in time: just after maize was planted, just before the maize harvest, and just after the maize harvest. First, families received information on the benefits of QPM and the importance of targeting this product to young children. Second, about three to four months later, caregivers were invited to a group meeting with other female caregivers, where they received information on the importance of separating QPM from conventional maize. Caregivers also received grain and flour storage bags with labels as well as utensils and labels to earmark stored and cooked QPM for young children. Finally, key targeting messages were reinforced in a follow-up visit.

Researchers collected data on children's undernutrition (as measured by height-for-age and weight-for-age) at two timepoints: one to three months after maize harvesting and five to six months after harvest. Researchers also collected self-reported data on eight targeted behaviors of grain and flour storage, use of QPM in food preparation, and children's consumption of QPM. These behaviors were measured individually and then combined into an overall "compliance index." Behavioral data was only reported in the first survey round, since it was possible that families had run out of QPM five to six months after harvest.

Results and policy lessons

One to three months after harvest, AE+BN households showed meaningfully higher levels of targeted behaviors, including separate grain and flour storage, cooking, and feeding QPM to children, than AE households.

Overall adherence to targeted behaviors: AE+BN households reported performing 62.6 percent of targeted behaviors, which was 50 percent higher than the AE households (a 20.5 percentage point difference). This difference was equivalent to performing 1.6 more of the eight targeted behaviors.

QPM storage: AE+BN households were 39.7 percentage points and 46.5 percentage points more likely to not mix QPM grain and flour with other varieties, respectively, compared to AE households. These differences in storage practices represent a 100 percent and 179 percent improvement in behavior adoption, respectively. Improved storage of grains maintained the nutritional quality of the QPM, which is important for addressing low levels of protein intake among children.

QPM cooking: AE+BN households were 145 percent more likely to cook foods with QPM for their young children (a 14.4 percentage point increase from the AE households' average of 9.9 percent). On average, AE+BN households cooked foods with QPM 0.6 more days in the past week than AE households, who cooked on average 0.2 days a week (a 300 percent increase).

QPM feeding and consumption: AE+BN children were 17.3 percentage points (27.5 percent) more likely to have consumed QPM in the past week than the AE children. AE+BN children also consumed QPM an average of 0.9 more days during the week than the AE children, who consumed QPM on average 3.6 days a week (a 25 percent increase). AE+BN children were also 12.2 percentage points more likely to have consumed more QPM than the household head in the last week (a 313 percent increase relative to the AE children). Researchers suggest that the recommended way to cook QPM (in the form of porridge) made it more digestible for children and less attractive to adults, given adult preference for more solid foods, leading to observed improvements in child consumption.

While AE+BN households demonstrated meaningful behavioral changes, there were not meaningful changes in child nutrition. Researchers suggest that this could be explained by a number of reasons: the length of the program or amount of QPM was not sufficient to observe impacts, or there may have been impurities in the grain to reduce the efficacy. Therefore, researchers called for future research to further explore the relationship between consumption of improved crop varieties in real-world settings and subsequent changes in child nutrition and growth.

Cohen, Jessica, Margaret McConnell, Wafaie Fawzi, Nilupa Gunaratna, and Hugo de Groote. ‰ÛÏTranslating Adoption of Improved

Varieties into Nutritional Impact for Young Children: Proposal for an RCT Exploring Strategies to Increase Consumption of Quality Protein Maize in Ethiopia.‰Û J-PAL Agricultural Technology Adoption Initiative (ATAI) Funding Request.

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1. World Health Organization. □ 2014□ . “Global nutrition targets 2025: stunting policy brief.” World Health Organization. https://apps.who.int/iris/handle/10665/149019