

## Building the Evidence around PM2A in Burundi and Guatemala

From 2009–2018, the Food and Nutrition Technical Assistance III (FANTA) project, in collaboration with its partner the International Food Policy Research Institute (IFPRI), implemented a comprehensive research program to study the impact and cost-effectiveness of the preventing malnutrition in children under 2 approach (PM2A).<sup>1</sup> The research was conducted in Guatemala and Burundi, in the context of a U.S. Agency for International Development (USAID) Office of Food for Peace (FFP) development food security activity implementing PM2A. The goal of the studies was to build the evidence around PM2A, including how the approach could be best implemented in terms of optimal ration size, composition, and duration of assistance, among other research questions.

### Research Design

In Guatemala, IFPRI evaluated PROCOMIDA, implemented by Mercy Corps in Guatemala's Alta Verapaz department from 2010 to 2015. The aim was to assess PROCOMIDA's impact on child and maternal nutritional outcomes and its cost-effectiveness, and to determine how varying the food rations' composition and size in a PM2A program would affect the outcomes. Researchers randomly assigned health centers and their catchment areas to one of six research group arms, which included five versions of PM2A within PROCOMIDA and one control group (with no PROCOMIDA participation).



Photo credit: Mercy Corps

The five versions of PM2A within PROCOMIDA varied the amount of family ration provided to beneficiaries and/or the composition of individual ration given to the pregnant and lactating women and to the children under 2. The family ration included rice, pinto beans, and vegetable oil; the individual ration consisted of a corn-soy blend (CSB, a fortified blended food<sup>2</sup>). Variations on the individual rations' composition included micronutrient powder (MNP) and small quantity lipid-based nutrient supplements (SQ-LNS). The MNP used in the study contained 22 nutrients<sup>3</sup> to match the micronutrient content of SQ-LNS (but not its fat, protein, and carbohydrate content).

- 1 The Preventing Malnutrition in Children under 2 Approach (PM2A) is a food-assisted approach that targets health and nutrition interventions to all pregnant women, mothers of children 0–23 months, and children under 2 years—during the critical 1,000-day window of opportunity—in areas that are food-insecure.
- 2 The monthly full family ration (FFR) consisted of 4 kg of beans, 6 kg of rice, and 1.85 kg of oil. The reduced family ration (RFR) included 3 kg of beans, 3 kg of rice, and 0.925 kg of oil. Both the FFR and RFR were provided from enrollment at pregnancy until the child reached 24 months of age. The monthly individual ration consisted of either 4 kg CSB, 20 g/day of SQ-LNS (in 1 sachet for mothers, split into 2 sachets for children), or 60 sachets of MNP (2 per day).
- 3 While MNP formulations can vary, common formulations for children contain between 3 and 15 micronutrients. The Home Fortification-Technical Advisory Group recommends a 15-micronutrient formulation to address anemia and micronutrient deficiencies among children 6–23 months. The MNP formulation used in the PM2A research in Guatemala was a customized formulation designed to match the quantities of micronutrients in the SQ-LNS, but not SQ-LNS's fat, protein, and carbohydrates content. Because of the “bulkiness” of some of the additional nutrients in the PM2A formulation, as well as potential effects on palatability, the daily dose of MNP was divided into 2 sachets to be given daily (for both mothers and children).

All groups, except the control group, participated in the same behavior change communication (BCC) and health program components. Research participants were followed from pregnancy until the child turned 24 months of age, with data on maternal nutritional status, child growth, cognitive development, and anemia collected at eight time points. To understand the pathways through which PROCOMIDA had its desired effects, IFPRI also conducted a process evaluation. IFPRI also evaluated the cost-effectiveness of PROCOMIDA.

In Burundi, IFPRI evaluated Tubaramure, implemented by a consortium of NGOs led by Catholic Relief Services, in eastern Burundi from 2010 to 2014. The aim of the research was to assess the program's impact on maternal and child nutritional outcomes and its cost-effectiveness, and to evaluate how varying the timing and duration of providing food rations would affect these outcomes. Researchers randomly assigned study participants to one of four research groups, which included three versions of PM2A within Tubaramure and one control group.

In Tubaramure, both the family and individual rations included CSB and vegetable oil. All groups, except the control, participated in the same BCC and health program components. Three cross-sectional surveys were conducted to collect data on maternal nutritional status and birth outcomes, as well as child growth, infant feeding practices, morbidity, cognitive development, and anemia. The surveys were timed to assess outcomes at baseline, during program implementation, and at the end of the program. To understand the pathways through which the program would have its desired effects, IFPRI also evaluated the cost-effectiveness of the different study interventions and conducted a process evaluation.



Children monitored in the Tubaramure program in Burundi.

## Research Findings

### PM2A reduced child stunting in Guatemala and Burundi.

At 24 months, the prevalence of stunting in PROCOMIDA communities in Guatemala was 11.1 percentage points lower than in the control communities, and in Tubaramure communities in Burundi, the prevalence of stunting was 7.4 percentage points lower than in the control communities.

### Providing the FFR with CSB as the individual ration had the greatest impact on reducing stunting in Guatemala. However, the FFR plus CSB and the RFR plus CSB had some unintended negative effects.

In Guatemala, providing the FFR and CSB as the individual ration reduced stunting at 24 months of age by 11.1 percentage points. The FFR appeared to work as intended—motivating participation in the program's health, nutrition, and BCC components; protecting the individual ration; and reducing household hunger. The groups that did not receive an FFR or an RFR did not experience significant reductions in child stunting.

However, unexpectedly, mothers in the group that received CSB as the individual ration lost less weight postpartum, resulting in higher postpartum weight, presumably due to their consumption of CSB (including consuming CSB beyond the recommended 6 months postpartum). In addition, although the prevalence of anemia declined over time among children in all groups, and was less than 20 percent at 24 months of age, children who received CSB and the FFR or RFR had a significantly higher prevalence of anemia compared to the control group. A similar result was found among mothers.

### In Guatemala, providing the FFR and two sachets per day of a 22-micronutrient MNP as the individual ration had the second greatest impact on stunting while avoiding negative maternal and child effects.

Replacing the individual ration of CSB with an MNP containing 22 micronutrients had significant positive effects on child growth—stunting prevalence in the communities that received the FFR and MNP was 6.5 percentage points lower than the control communities—but did not cause unwanted effects on maternal weight, maternal anemia, or child anemia. Replacing the individual ration with SQ-LNS did not have significant effects on reducing stunting. As noted, the MNP used in the Guatemala PM2A research matched the micronutrient content of SQ-LNS.

**In Burundi, providing family and individual rations for the entire 1,000 days had the greatest impact on child stunting.**

The Tubaramure PM2A version that provided rations throughout the entire 1,000-day period had the greatest impact on stunting, reducing it by 7.1 percentage points. The PM2A version that provided rations from pregnancy to 18 months of age also had a significant, though smaller, effect on reducing stunting (5.2 percentage points). The version that provided no food during pregnancy had a marginally significant effect of 4.6 percentage points reduction in stunting.

**In Burundi, PM2A had a positive impact on anemia and hemoglobin in both mothers and children. The plausible pathways identified highlight the importance of addressing multiple determinants of anemia.**

In the control group, maternal and child anemia increased and hemoglobin levels decreased during program implementation, but the three Tubaramure PM2A versions had a protective effect on maternal and child anemia. The program also had significant impacts on intermediary factors addressed by Tubaramure that are known determinants of changes in hemoglobin and anemia levels, including dietary diversity, consumption of iron-rich foods, morbidity (e.g., fever), and current bed-net use for maternal anemia.

**In Burundi, PM2A improved child motor and language development and reduced child morbidity; in Guatemala, PM2A did not have significant impacts on child development or morbidity.**

In Burundi, Tubaramure had a protective effect on child morbidity (general morbidity symptoms as well as key symptoms such as fever, diarrhea, and vomiting), including after the program had concluded. All three versions of Tubaramure also had a protective effect on child development outcomes—including motor and language milestones. In Guatemala, there were no significant program impacts on child motor development scores, morbidity (e.g., prevalence of symptoms of illness), or care-seeking behaviors for dangerous illnesses, though there were modest improvements in the use of oral rehydration salts for diarrhea and medications for fever.

The cost of providing the PM2A program ranged from US\$857 to US\$1,081 per participant in Guatemala, and from US\$676 to US\$766 per participant in Burundi.

Food distribution costs formed the bulk of overall program costs (44% in Burundi and 30% in Guatemala), followed by costs associated with the BCC component (13% in Burundi and 17% in Guatemala). Health system strengthening activities accounted for 9 percent of program costs in Burundi and 12 percent of program costs in Guatemala. The most cost-effective option in Guatemala was providing the FFR plus CSB as the individual ration (US\$97 per participant per percentage point reduction in stunting), though this arm had negative effects on maternal weight and maternal and child anemia. The most cost-effective option in Burundi was the PM2A option that provided individual and family rations during the entire 1,000 days (US\$103 per participant per percentage point reduction in stunting).

The complete results for the studies are available on FANTA's website at: <https://fantaproject.org/research/impact-cost-effectiveness-pm2a>.

The research contributed greatly to the understanding of the impact, pathways, and cost-effectiveness of food-assisted maternal and child nutrition interventions, and supported FFP's evidence-based decision making in programming.



[www.fantaproject.org](http://www.fantaproject.org)

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