

EVALUATION SUMMARY INVESTMENT STUDIES

FORTIFIED BLENDED FOODS' IMPACT ON CHILDREN IN VULNERABLE HOUSEHOLDS



FACTS

- **INVESTMENT**

AFRICA IMPROVED FOODS

- **COUNTRY**

RWANDA

- **CONSULTANT**

CLINTON HEALTH ACCESS INITIATIVE
(CHAI)

COUNTRY FACTS

- Population: 13.4 Million (2021)
- GDP: US \$ 11.07 Billion (2021)
- 33% of children under 5 were stunted (World Bank, 2020)
- Household population and composition: The Rwandan population is relatively young; 42% of the population is age 0-14, while only 4% is age 65 or older (World Bank & NISR)

INTRODUCTION

In Africa, more than 40% of children are chronically malnourished, or stunted, resulting in impaired cognitive development and weakened immune systems (United Nations Children's Fund et al., 2021). Stunting is the single greatest predictor of death in children under five, and undernutrition is associated with 45% of child deaths, contributing to 3.1 million deaths annually (Black et al., 2013).

Chronic malnutrition remains a major public health challenge in Rwanda despite positive health and economic developments. In Rwanda, 33% of children aged 6 to 59 months are stunted according to the 2019-2020 Rwandan Demographic and Health Survey (National Institute of Statistics of Rwanda - NISR et al., 2021). Among these children stunting prevalence rises from 23% at 6-8 months to 39% at 18-23 months of age showing a marked increase during the window of time when complementary foods are typically introduced.

CONTEXT

The Clinton Health Access Initiative, the Government of Rwanda (GoR) and a set of private investors, among them Royal DSM, IFC and FMO (the Netherlands Development Bank) set up a local joint venture, named Africa Improved Foods (AIF), that produces fortified blended foods (FBF) located outside of Kigali, Rwanda.

Since becoming operational in late 2016, AIF has become a leading manufacturer of FBF in the region, with distribution of its products primarily through relief programmes of the World Food Programme (WFP) and the GoR. Additionally, AIF is also distributing the FBF directly to consumer (Nootri products) in retail markets in the region. AIF produces high quality standard FBF that previously were only produced in Europe.

CHAI worked with the WFP, Royal DSM, and Sight and Life, to develop a suite of nutrient-dense FBF products for young children and pregnant and lactating women (PLW) named “Shisha Kibondo”. The products can be produced locally, are based primarily on local agricultural products, and are suited to local eating habits. The formulation for children is based on WFP’s Super Cereal Plus, and contains maize, soybeans, soybean oil, sugar, skim milk powder, and a micronutrient blend. A separate formulation was developed for PLW that is designed to contribute towards meeting their increased macro- and micronutrient requirements during pregnancy and lactation. While processed complementary foods are available on the commercial market in Rwanda, these products are often not sufficiently nutritious, meanwhile the nutritious products are typically not affordable to the populations that need them most.

In 2017, the GoR established a national program to address the burden of malnutrition, which included an initiative aimed at distributing and promoting FBF to the poorest and most vulnerable households throughout the country. Through this program, the GoR had a five-year purchase agreement with AIF for the two FBF types. Both products are distributed under the “Shisha Kibondo” brand and are marked as *not for sale*.

The GoR distributes these products fully subsidized through the public health supply chain (health centers) to households with children 6 to 23 months of age and PLW in the lowest tier (“Ubudehe 1”) and in select districts to the same households in the second tier (“Ubudehe 2”) of the country’s national social support scheme. Ubudehe 1 includes very poor and vulnerable citizens who are homeless and unable to feed themselves without assistance. Ubudehe 2 includes citizens who are able to afford some form of rented or low-class owned accommodation, but who are not gainfully employed and could only afford to eat once or twice a day. Health centers throughout the country distribute FBF to these families on a monthly basis along with key messaging on the recommended use, preparation and storage practices.

FMO’S INVESTMENTS IN AIF

AIF was established in 2014, with the objective to provide a scalable and sustainable solution to malnutrition via local production of high-quality nutritious foods. FMO, through Building Prospects (BP), joined the Public Private Partnership (PPP) in 2015 by providing loan capital and taking an initial equity investment. In subsequent years, additional equity capital has been provided to support AIF in its growth.

EVALUATION OBJECTIVES

To understand the effectiveness of the nationwide provision of FBF to Ubudehe 1 children to decrease malnutrition, CHAI conducted an evaluation in collaboration with the GoR and technical advisors from the London School of Hygiene and Tropical Medicine (LSHTM). The evaluation was funded by the U.K. Foreign, Commonwealth and Development Office (FCDO), the Netherlands Development Bank (FMO), Sight and Life and Royal DSM. The impact evaluation was designed as a quasi-experimental¹ study, aiming to capture the change in stunting among 18-23 month old children before and after introduction of FBF. Secondary objectives were to understand the micronutrient status of Ubudehe 1 children 18-23 months of age in terms of anemia, iron deficiency and Vitamin A deficiency before and after the introduction of FBF.

The evaluation consisted of a baseline survey conducted in 2017, a midline survey in 2018, and an endline survey, originally scheduled for 2020, which was conducted in 2021 after being postponed due

¹ Using repeat cross-sectional surveys in randomly selected villages across Rwanda.

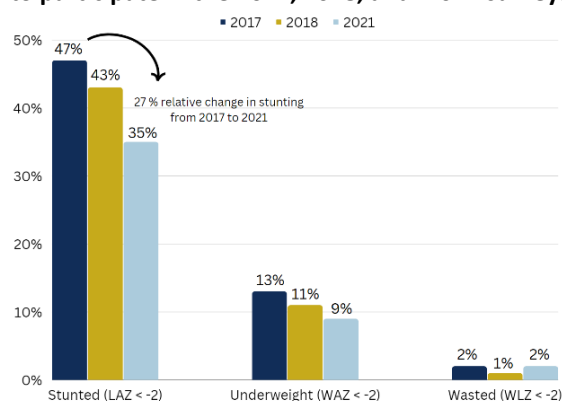
to the COVID-19 pandemic. The target sample size for each survey was 720 Ubudehe 1 children 18-23 months of age.

KEY FINDINGS

By 2021, over 85% of children living in the poorest households (Ubudehe 1) had ever consumed the FBF product. Consistent consumption of the FBF product remained constant from 2018 (the midline survey) to 2021 (the endline survey) despite challenges brought on by the COVID-19 pandemic. Nearly 60% of children 18-23 months living in the poorest households (Ubudehe 1) had reported consuming the FBF product in the last week and 55% of these same children reported consuming the product in the last 24 hours. We presume that the positive uptake described here is a direct result of the program's effort to ensure ongoing product education and promotion.

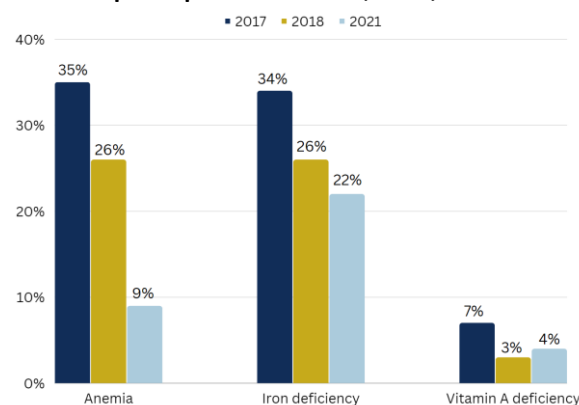
Nutritional status among children 18-23 months of age living in Ubudehe 1 improved substantially from 2017 to 2021 (Figure 1). The prevalence of stunting among children 18-23 months of age in Ubudehe 1 declined from 47% at baseline (2017) to 35% at endline (2021) - a relative change of 27%. During this same time, the proportion of children in Ubudehe 1 (18-23 months of age) who were considered underweight decreased from 13% to 9%. The percentage of children wasted stayed constant from 2017 to 2021; however, this represents only a very small proportion of children, less than 2% of children 18-23 months of age living in the poorest households.

Figure 1. Nutritional status among children 18-23 months of age from Ubudehe 1 randomly selected to participate in the 2017, 2018, and -2021 surveys



The statistical analysis to assess nutritional status of Ubudehe 1 children before and after the introduction of FBF showed that children living in Ubudehe 1 had a 40% reduction in the odds of being stunted and a 40% reduction in the odds of being underweight from 2017 to 2021 even after adjusting for factors such as child feeding practices, morbidity, micronutrient status, maternal characteristics as well as structural and sociodemographic determinants.

Figure 2. Micronutrient status among children 18-23 months of age from Ubudehe 1 randomly selected to participate in the 2017, 2018, and 2021 surveys



Notes:

- Anemia defined as hemoglobin <11.0 g/dl
- Iron deficiency classified as iron deficient if ferritin < 12ug/L, Serum transferrin receptor > 8.3 mg/L, or Body Iron Stores < 0 mg/L
- Vitamin A deficiency defined as Retinol Binding Protein (RBP) < 0.6 umol/L.

Secondary analyses were undertaken to understand the micronutrient status of Ubudehe 1 children before and after the introduction of FBF. These results indicated that Ubudehe 1 children had an 82% reduction in the odds of being anemic and a 54% reduction in the odds of being iron deficient² from 2017 (baseline) to 2021 (endline) even after adjusting for factors such as child feeding practices, morbidity, maternal characteristics as well as structural and sociodemographic determinants. No differences were observed in the rates of Vitamin A deficiency over time.

MAIN FINDINGS



- 27% relative change in stunting
- 82% reduction in the odds of being anemic and a 54% reduction in the odds of being iron deficient

DISCUSSION OF FINDINGS

These results are unusual and impressive both globally and locally, in that it's rare to show such substantial reductions in stunting especially among children living in the poorest households as household poverty is a known risk factor associated with stunted growth. Locally in Rwanda, a ten-percentage point reduction in stunting was observed among children 18-23 months of age from 2015 to 2019 according to recent Rwandan Demographic and Health Survey (RDHS) data (National Institute of Statistics of Rwanda - NISR et al., 2021). These findings align with the trends shown over time in our survey. However, the same data show that the prevalence of stunting did not decrease among children younger than five years living in the lowest wealth quintile in Rwanda, it remained constant at approximately 49% from 2015 to 2019 (National Institute of Statistics of Rwanda - NISR et al., 2021). This differs significantly from the 27% relative change observed among children who were randomly selected from the lowest tier of the national social support scheme (Ubudehe 1) and who would typically be thought to have poorer health outcomes.

We suspect that the greater reduction in stunting than would have been expected based on global and local evidence for several reasons. First, the program took a targeted approach to reaching the most vulnerable children as well as PLW with a food-based intervention by providing nutrient dense foods to both young children and PLW. The evaluation period was purposely long to ensure that the endline survey was conducted among children who had the opportunity to be fully exposed to the FBF product at all stages throughout the first 1,000 days of life including in utero up to 23 months of age. Second,

² Also adjusted for markers of acute and chronic inflammation.

we observed consistently high rates of daily and weekly consumption of the FBF product during the last three years of the evaluation (2018 to 2021) which could explain the improvements observed in nutritional status. Third, we observed general improvements over time to the socio-demographic and household characteristics of this very impoverished population. These factors are known drivers of improved linear growth. The GoR has made substantial efforts to improve the livelihood, health, and well-being of its population. These factors, in combination with the FBF program, likely contribute to the improved nutritional status observed among young children living in the poorest households..

This evaluation was subject to several limitations. For one, it lacked a control group, meaning a group of children that did not receive the FBF, because it was not considered ethical to withhold FBF from certain Ubudehe households for the purpose of the evaluation. Thus, there was no available counterfactual in Ubudehe 1 population. Additionally, we did not systematically monitor how our evaluation participants interacted with other nutritional or livelihood interventions that may have taken place during the assignment.

CONCLUSIONS

Despite the challenges encountered over the last several years due to the COVID-19 pandemic, we observed consistent consumption of FBF over time and statistically significant declines in chronic malnutrition as well as statistically significant improvements in micronutrient status from 2017 to 2021 among children living in the poorest households (Ubudehe 1) in Rwanda. The program achieved a greater reduction (27% relative change) in stunting among children living in the poorest households than was targeted at the outset of the project (16% relative change).

Stunting remains a major public health problem. The results of this evaluation, assessing the effectiveness of the national provision of FBF to the poorest and most vulnerable populations, provides a concrete solution to drive rapid and substantial reductions in childhood stunting. By ensuring adequate access to and consumption of nutrient-dense foods during the first critical 1,000 days of life we observed improvements in nutritional status as well as other health outcomes. These results speak to the success of this approach and highlights the impact of the Rwandan Government's commitment to comprehensive solutions to promote healthy child growth and development.

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