Guatemala uses Optifood to Enhance Dietary Diversity

The Context
In Guatemala, the prevalence of chronic malnutrition (indicated by stunting of children under five), is 47%, the sixth highest in the world. In the largely indigenous Western Highlands Departments of Totonicapán, Quiche, and Huehuetenango, stunting rates exceed 70%.\(^1\) Anemia is also a significant concern, affecting 24% of pregnant women and 32% of children under five, with the latter reaching as high as 70%\(^1\) for children between 9–17 months of age (the central phase of the complementary feeding period).\(^2\)

The long-term consequences of chronic malnutrition are no longer in question: it undermines both physical and cognitive development of children, leading to reduced educational achievement, and lower economic productivity as adults. Similarly, iron deficiency anemia contributes substantially to maternal deaths, perinatal mortality, and low birth weight and is also correlated with decreased cognitive development in children, and lower future earnings.\(^3\) As such, the high prevalence of malnutrition has far-reaching economic and social consequences for Guatemala as a nation.

Finally, it’s worth noting that in addition to ‘undernutrition’, Guatemala – and specially its poorer indigenous communities – struggles to respond to escalating rates of obesity and overweight, conditions that are also a consequence of inadequate diets”.

The Policy Questions
Poor nutrition status in the Western Highlands has been attributed to suboptimal infant and young child feeding practices, low dietary diversity, food insecurity and poor access to health services.\(^4\) In 2012, the Government of Guatemala (GoG) pledged to respond to the situation with integrated health, nutrition, agriculture and local governance projects, as outlined in its Zero Hunger Pact Plan.

To support this plan, the USAID-funded Food and Nutrition Technical Assistance III Project (FANTA) partnered with the Institute of Nutrition of Central America and Panama (INCAP) to use Optifood to address the following nutrition-oriented policy questions:

1. How nutritious is the local food supply in the Western Highlands?
2. Which nutrient gaps exist for key target groups, i.e. children 6 to 11 months, children 12 to 23 months, and pregnant and lactating women?
3. What food-based recommendations (FBRs) (based on locally available foods) could be promoted to improve the nutrient adequacy of these key target groups?

Optifood is a computer software program that analyzes the content and quality of existing local diets for key target groups, and determines the extent to which these diets could be optimized to improve nutrient content, within the context of the local food supply and dietary patterns. These optimized diets are used to develop food-based recommendations tailored to the local population.

The software identifies nutrient gaps in current diets and food supplies, and suggests locally available foods that could fill, or come as close as possible to filling them.

Optifood also helps identify the limits of local diets and food supplies in meeting nutrient needs and can test strategies for filling remaining nutrient gaps using alternative interventions such as introducing new natural, biofortified or fortified foods or supplements such as micronutrient powders that mothers can mix into their children’s porridge.

The Optifood software was developed by the London School of Hygiene and Tropical Medicine (LSHTM), in collaboration with the World Health Organization (WHO) FANTA, and Blue Infinity.

Information about accessing and using the tool can be obtained by writing to elaine.ferguson@lshtm.ac.uk.

Resources related to Optifood can be found on the FANTA and SPRING websites.

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1 2014-15 Demographic and Health Survey (DHS) (MSPAS et al. 2017; UNICEF 2017)
2 USAID Guatemala Nutrition Profile – February 2018
4 Development of Evidence-Based Dietary Recommendations for Children, Pregnant Women, and Lactating Women Living in the Western Highlands in Guatemala, FANTA III, FHI-360 and London School of Hygiene and Tropical Medicine. June 2014.
The Process

The first step towards addressing these questions was to collect dietary and market data for the priority target groups (young children and pregnant/lactating women). With assistance from FANTA, INCAP carried out a cross-sectional survey in Quiché and Huehuetenango departments, gathering information on dietary intake, market costs of locally-available foods as well as nutritional status (anthropometry), food security and household socio-economic conditions.

The dietary and food price data were analyzed using Optifood and used to develop a set of FBRs that considered dietary preferences and patterns; nutritional requirements (of each target group); and the cost and nutritional content of each locally available food. Optifood was also used to test the contribution of additional products such as supplements or fortified foods (to enhance nutrient intake) in instances where nutrient requirements could not be met using locally available foods in realistic amounts. Finally, the feasibility of FBRs were tested using qualitative Trials of Improved Practices (TIPS), and a Social and Behavior Change Communication (SBCC) strategy was designed to promote the FBRs.

Results

The Optifood analysis identified several “problem nutrients” (defined as nutrients for which the requirements are difficult to meet due to poor availability and affordability of local food sources, and/or local dietary patterns). The table below shows that breastfed children under 2 years of age would most likely be unable to consume adequate amounts of iron, zinc, and niacin using local foods in acceptable quantities. Furthermore, pregnant women would have difficulty consuming adequate amounts of iron, zinc, and folate, while diets of lactating mothers may lack zinc, vitamin B12, and vitamin C.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Breastfed Children</th>
<th>Non-breasted Children</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6-8 months</td>
<td>9-11 months</td>
<td>12-23 months</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>![●]</td>
<td>![●]</td>
<td>![●]</td>
</tr>
</tbody>
</table>

In response to these results, the FBRs that were developed placed emphasis on the consumption of locally available and affordable foods that could provide those problem nutrients, such as eggs, beans, vegetables, liver, and a fortified blended flour prepared as porridge for young children, and thick atole drink for women. For each target group, two sets of FBRs were developed and tested:
The first assumed a scenario that included local foods commonly consumed by the target groups, including fortified blended flours such as Incaparina and fortified oats, but without micronutrient supplementation (in the form of multiple micronutrient powders for infants and young children, and iron and folic acid supplements for women). The second set included the same as above, but also included micronutrient (MN) supplements. Importantly, it was found that for the youngest children, 6-8 months of age, micronutrient gaps were always present in the diet unless a supplement (such as the Chispitas micronutrient powder) was added. The table below details the FBR sets for children 6-8 months, without MN supplementation.

In combination with other foods, breastfed children 6-8 months should consume at a minimum:

<table>
<thead>
<tr>
<th>FOOD</th>
<th>Frequency per week</th>
<th>Servings per day</th>
<th>Estimated serving size (g)</th>
<th>Total quantity per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tortilla or other maize products</td>
<td>7</td>
<td>2</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Potatoes</td>
<td>3</td>
<td>1</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Beans</td>
<td>3</td>
<td>1</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Eggs</td>
<td>3</td>
<td>1</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Fortified-blended flour as porridge</td>
<td>3</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Meat, poultry, or fish</td>
<td>7</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

It is crucial that the FBRs generated by the Optifood analysis be tested in the community to ensure that they are acceptable to households, and feasible to implement in the quantities and frequencies recommended. Trials (TIPS – from Step 4 on previous page) are therefore used to answer questions such as: ‘Do caregivers have any difficulties putting these recommendations into practice? Is cost a problem? Are any of the recommendations hard to understand or follow? Do children like the combinations of food and recipes?

TIPS uses qualitative methods such as semi-structured interviews, key informant interviews, focus groups, and observations of agriculture / livestock practices to provide insights into factors such as availability and cost of foods; beliefs and preferences regarding children and women’s consumption of these foods; seasonality; agricultural practices; and time available for caregivers to engage in the recommended actions. These trials are an important step in exploring whether families would realistically be able to implement the recommended FBRs, see box to the right.

TIPS Findings

The findings from the trials showed that the FBRs were considered acceptable by the families who tried them, but there was a strong preference for liquid preparations, such as serving the broth from cooked beans instead of beans themselves and a watery atole drink made with fortified flour instead of a thicker porridge made from the same product, making these foods less nutrient-dense. Their beliefs and preferences, however, did not deter most women from trying the FBRs; mothers and pregnant and lactating women perceived them as a benefit to their own and their child’s well-being and were motivated to put them into practice.

The TIPS also found that putting the FBRs into practice with the recommended frequency and quantity was very difficult for families. The limited budget for family food, seasonal variation in home production and market prices, difficulties in accessing and storing fresh foods, and the cost and time associated with transport to markets all presented challenges.

Women cited physical availability of nutrient-dense foods, and their cost, as significant barriers, along with needing family support to select, purchase, prepare, and distribute the foods to pregnant and lactating women and young children in the household. Finally, the trials revealed a culture of sharing food equally among all family members, and most trial participants said they would need to have enough of a recommended food to provide it to the whole family in order to put an FBR into practice thus increasing the cost.
Use of the Results

- The FBRs formed the backbone of SBCC activities designed and implemented through the USAID-supported Nutri-Salud Community Nutrition project in the Western Highlands.
- The Ministry of Agriculture (MoA) developed extension messages that support the production of the nutritious foods identified by Optifood.
- The FBRs were used to develop recipes for nutritious meals with members of women’s groups in the Western Highlands. Recipe cards were formulated and then shared through the Women’s Group, Health and Agriculture networks for use in nutrition-related activities.
- The Optifood FBRs were incorporated into the both the e-learning platform and face-to-face training sessions for Ministry of Health (MoH) and Ministry of Agriculture staff.
- In the case of the Western Highlands, the former government program that distributed fortified blended flour to pregnant and lactating women and young children was not active in certain areas at the time of the TIPS. This posed a challenge to these families as they would need to purchase a substitute product (at a higher cost) to meet the FBRs.

Challenges to using Optifood in Guatemala

- One of the most significant challenges to applying the Optifood tool is the considerable time and cost of collecting high-quality (24-hour recall) dietary data from a randomized sample of individuals from each target group or the poor availability of good quality secondary individual dietary recall data. There is, however, promising research to show that secondary household-level consumption data can be adjusted for use with Optifood. Details can be found on the Optifood page of the FANTA-Optifood website.
- The expertise and attention required to prepare the dietary data and food-composition data for the analysis, and then to fully analyze the data for each target group, should not be underestimated. In particular, considerable effort is required to match local foods to existing food composition tables, examine the quality of the food composition values, impute missing values where needed, and prepare dietary data.
- There are limitations in using a cross-sectional survey that captures a ‘snapshot’ of dietary patterns and food costs during only one agricultural season. Qualitative methods that explore diets during other periods of the year are essential to develop FBRs that accommodate seasonal variation.

Opportunities and Unexpected Benefits

- Sections of the GoG have recently proposed new fortification legislation, which is a consequence of advocacy efforts by many organizations. The Optifood analysis contributed by helping to identify the precise problem nutrients for specific target groups and providing evidence about the difficulty in filling these gaps in the short term using locally available foods. Sugar is currently fortified with vitamin A throughout Guatemala and the proposed changes would see it fortified with iron/folic acid and zinc as well.
- Optifood’s cost-related findings were validated by women’s comments about their challenges in reaching markets and being able to pay for the foods in the FBRs. This has raised awareness among government and other stakeholders about how accessible nutritious foods actually are, and the need for measures to make nutritious diets more available and affordable.
- The substantial interest amongst government and non-government stakeholders in the Optifood analysis and process led to the formation of a multi-disciplinary group of technical experts who were trained in using the tool and analyzing data to answer further questions.
Finally, the Optifood process has made it clear that MN supplements and fortified complimentary foods are vital if families are to achieve nutrient adequacy in the Western Highlands of Guatemala in the short-term, given the current food supply. In this same vein, they emphasize the undeniable link between nutrition, agriculture and food systems, suggesting that in the long-term, affordability (of a nutritionally adequate diet) will depend heavily the government’s success in improving access to local markets, promoting agricultural production of a diversified diet, and improving storage of perishable, nutrient-dense food.

**Acknowledgements**

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