

Mapping Nutrition Interventions in Guatemala To Identify Opportunities to Improve Coverage and Coordination

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Research Article

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Abstract Background

Guatemala has one of the highest rates of chronic child malnutrition (stunting) in the world, with minimal improvements over time, despite intensifying efforts. In 2018, a mapping effort was conducted with nutrition stakeholders, modelled after similar successful efforts in other countries.

Methods

A public-private consortium used a survey to collect information from non-governmental nutrition stakeholders in Guatemala, including institutional name, sector, geographic areas of activities, and types of activities implemented. The survey data were used to populate an online mapping tool (ArcGIS Online). The distribution of institutions and programmatic activities at the departmental level was compared to child stunting prevalence using heat maps and linear regression. Geographic distribution of nutrition-specific and nutrition-sensitive activities aligning with Guatemala's four national strategy pillars (primary care services; education and behavior change; water sanitation and hygiene; and household income generation) were examined.

Results

5,861 program activities from 99 institutions were mapped. The majority of institutions were national non-governmental, community-based, or private sector organizations. Heat maps and statistical analysis demonstrated some misalignment between the distribution of resources versus national strategy priority areas and nutrition need. There were a low number of education and behavior change activities at a national level and relatively few primary care and health-sector strengthening activities in some priority departments.

Conclusions

Mapping stakeholder institutions and nutrition activities in Guatemala identified several areas where resource allocation could be optimized to better address child stunting. The mapping initiative has been incorporated into Guatemala's national planning process and can assist with future monitoring efforts.

Background

Guatemala is a middle-income country in Central America with one of the highest prevalences of stunting (low length/height for age) in the world. In recent years, efforts to combat stunting at a national level have intensified, but progress has been very slow, with the rate of stunting declining at less than 0.5% per year.(1)

An important feature of Guatemala's nutrition landscape is the extensive involvement of aid organizations who support the National Food and Nutrition Security System, including bilateral aid, nongovernmental organizations, and corporate partnerships.(2, 3) However, the efforts of these stakeholders are poorly coordinated, with no centralized regulatory authority or reporting, which may contribute to the slow national progress against stunting.

In other settings, national or regional mapping efforts have been successfully used to better understand the landscape of nutrition stakeholders and to identify gaps in coverage and opportunities for improved coordination. For example, in 2015, the government of Burkina Faso, along with the United Nations Network for Nutrition and REACH (Renewed Efforts Against Child Hunger and undernutrition), used mapping of nutrition interventions targeting malnutrition to build consensus on geographic strategies and priorities and increase accountability among stakeholders.(4) Similar work has also been conducted in Egypt, Ethiopia, Tanzania, Mozambique, and Uganda.(5–7)

Inspired by these efforts, we collaborated on an effort to collate, categorize, and map nutrition activities conducted by aid organizations in collaboration with Guatemala's Secretariat of Food and Nutrition Security (SESAN). In this short report, we use these data to visualize the geographic and sectorial distribution of nutrition initiatives in Guatemala, with the aim of highlighting potential gaps in coverage and resource distribution.

Methods

Description of Context

In December 2017, a public-private consortium was formed to pursue an effort to identify and map nutrition activities across non-governmental stakeholders in Guatemala, with endorsement from the Vice President of Guatemala, who oversees the National Strategy for the Prevention of Chronic Malnutrition. (8) The consortium included the Secretariat of Food and Nutrition Security (SESAN); two local nongovernmental organizations, the Fundación Desarrolla Guatemala para la Educación y Salud (FUNDEGUA) and Wuqu' Kawoq | Maya Health Alliance; and two U.S. partners, the Academy of Nutrition and Dietetics Foundation and the Duke Center for International Development.

Data Collection

The consortium designed a survey (see Supplementary Appendix) to collect information from aid organizations operating in Guatemala. The survey asked organizations to provide identifiable information including institutional name, sector, geographic areas of activities, and types of activities implemented, as well as anonymous information on total budget, monitoring and evaluation practices, beneficiaries, language proficiency, and institutional collaborations.

Survey data were collected via a secure website using the Qualtrics XM (Drive Provo, UT, USA) platform. The consortium invited 320 stakeholder institutions to complete the data collection survey from July 15– August 31, 2018 via an official announcement on SESAN's email list. Consortium members conducted direct and social media outreach to encourage organizations to complete the survey.

Data Visualization and Analysis

Identifiable data captured by the survey were displayed using an interactive web-based mapping tool created with ArcGIS Online (Redlands, CA, USA; see Supplementary Appendix Figure 1).

Survey data were imported into Stata Version 14 (College Station, TX, USA) and R Studio Software Version 3.4.1 (Vienna, Austria). We tabulated descriptive statistics (number and percentage) for characteristics of participating institutions. Implemented activities were grouped within the four priority areas of the National Strategy (provision of primary care services, education and behavior change, water sanitation and hygiene; and household income generation) and were also classified as either nutrition-sensitive or nutrition-specific following definitions proposed by Ruel and Alderman, and Hossain et al. (Supplementary Appendix Table 1).(8–10)

Linear regression was used to examine the correlation between implemented activities and departmental stunting prevalence, using data on population-level stunting prevalence from the 2014-2015 Demographic Household Survey.(11) The geographic distribution of stunting prevalence, institutions, nutrition-sensitive and nutrition-specific activities, and activities within each of the four national priority areas were visualized using heat maps generated in Datawrapper (licensed version, full copyright of all maps retained by authors, https://www.datawrapper.de/).

Ethical Approvals

Data collection for the mapping tool was determined to be exempt from ethics review by the Duke University (Durham, North Carolina, United States) and Maya Health Alliance (Tecpán, Chimaltenango, Guatemala) Institutional Review Board.

Results

Institution characteristics

Ninety-nine participating stakeholder institutions provided geographically localizable data on 5,861 nutrition-related activities. Organizational descriptive characteristics are summarized in Table 1. The majority of participating organizations were national non-governmental, community-based, or private sector organizations (59%), with bilateral aid, international non-governmental, religious, and academic organizations comprising the remainder. Overall, 42% of responding institution's activities were distributed in the six departments prioritized by the Government of Guatemala for their high rates of malnutrition and poverty, whereas the majority (58%) were located in non-priority departments. Nearly half (45%) reported conducting both nutrition-sensitive and nutrition-specific activities, whereas 22% conducted only nutrition-specific and 33% only nutrition-sensitive activities. Eighty-one percent of institutions reported an active monitoring and evaluation program. The five most commonly mentioned

program impact indicators included child growth (90%), breastfeeding and complementary feeding adequacy (65%), hygiene promotion (55%), micronutrient and food supplementation for women of childbearing age (25%), and prenatal care (23%).

Table 1

Key characteristics of institutions and nutrition-related activities in the national mapping effort.

Characteristic ¹	Percentage
Type of institution (n = 99)	3
Academic	5
National Religious	7
International Religious	13
Bilateral Aid Organization	13
International Nongovernmental Organization	27
National Nongovernmental Organization	15
Community Based Organization	17
Private Sector	
Geographic distribution of institutions (n=99)	8
Alta Verapaz	8
Huehuetenango	6
Quiché	7
San Marcos	8
Sololá	5
Totonicapán	57
Other 16 departments not prioritized by the National Strategy	
Yearly Institutional Budget (n=45)	38
US \$1,000-\$50,000	11
US \$50,000-\$100,000	51
More than US \$100,000	
Nutrition-specific vs. nutrition-sensitive activities (n=99)	22
Only nutrition-specific activities	33
Only nutrition-sensitive activities	45
Both nutrition-specific and nutrition-sensitive activities	

¹For each characteristic, the denominator of available responses is given in parentheses.

Characteristic ¹	Percentage
Has monitoring and evaluation strategy for program activities (n=74)	81
Ethnicity of program beneficiaries (n=76)	67
Мауа	12
Ladino/Mestizo	21
Not Tracked	
¹ For each characteristic, the denominator of available responses is given in parentheses.	

Geographic distribution of institutions and activities

We compared the geographic distribution of nutrition activities and institutions to child stunting prevalence and national priority areas. Figure 1 depicts the distribution of nutrition stakeholder institutions and activities compared to stunting prevalence in children under 5 years by department. Misalignments between strategic priority and resource allocation were apparent. For example, the department of Totonicapán has the highest prevalence of child stunting in the nation but has notably fewer institutions and activities than other regions (Figure 1A-C, solid arrow). Similarly, Chimaltenango has an intermediate prevalence of stunting but the highest institutional concentration in the country (Figure 1A-C, dashed arrow). Finally, Escuintla has relatively low prevalence of stunting, but a disproportionately high concentration of nutrition activities (Figure 1A-C, arrowhead). A linear regression of the number of active, responding institutions versus departmental stunting prevalence (Figure 2) shows that in general, priority departments. However, consistent with Figure 1, there are examples of relative under-resourcing of some priority departments (e.g., Totonicapán) and potential over-resourcing of some non-priority departments (e.g., Chimaltenango).

Distribution of nutrition-sensitive, nutrition-specific, and priority area activities

Based on both international guidelines and the Guatemalan National Strategy, effective nutrition policy requires complementary implementation of both nutrition-sensitive and nutrition-specific interventions. (8–10) Figure 3 gives the distribution of nutrition-sensitive and nutrition-specific interventions by department. Variability in optimal implementation was observed. Some high-priority departments (Huehuetenango, Figure 3A-B, dashed arrow) showed good balance between nutrition-sensitive and nutrition-specific interventions. However, others (Sololá, Figure 3A-B, solid arrow) showed a marked mismatch in implementation of nutrition-sensitive vs. nutrition-specific interventions, with more emphasis on nutrition-specific activities. We also mapped the distribution of activities according to the National Strategy's four priority areas (Figure 4).(8) Most notable in this visualization is the relative absence of primary care and health-sector strengthening activities in most of the priority departments other than Sololá (Fig. 4A) as well as the overall low number of education and behavior change activities at a national level (Fig. 4B).

Discussion And Conclusions

Here we report on findings from a 2018 nutrition stakeholder mapping effort in Guatemala, the first publicly available data set of its kind in the country, and compared the distribution of resources with departmental child stunting prevalence and the priorities of the National Strategy for the Prevention of Chronic Malnutrition.(8) Our visualizations showed some significant misalignments between the concentrations of institutions and nutrition activities and departmental prevalence of child stunting and national priority areas. However, in some cases, over-resourced, non-priority departments do have a stunting prevalence that is high in the global context, which needs to be considered in decisions about resource allocation. Complementary deployment of multi-sectoral nutrition-specific and nutrition-sensitive initiatives was inconsistent, with a balanced distribution of approaches in some departments but not others, and important potential deficiencies in activities aligned with key pillars of the National Strategy (especially primary care and education/behavior change) were noted.(8)

These findings should be interpreted cautiously, considering that only about one-third of nutrition stakeholders in the country responded to the survey. It is possible that there could be some systematic bias in the organizations that did and did not respond, in terms of location or focus area(s). However, our findings on resource mismatch are similar to those from other countries where stakeholder mapping has been used to understand the landscape of nutrition interventions. For example, in the last decade, Activity REACH (Renewed Efforts Against Child Hunger and undernutrition) has worked with 22 countries, including Egypt, Burkina Faso, Ethiopia, Tanzania, Mozambique, and Uganda, and used mapping to support planning and resource allocation processes.(4, 7) The initial efforts outlined in this paper laid the foundation for SESAN to adopt a similar approach. Importantly, the survey and visualization tools are being maintained by SESAN, with plans to update the visualizations going forward. We hope this will lead to ongoing conversations among stakeholders in Guatemala on how to more effectively allocate resources and collaborate to support the National Strategy for the Prevention of Chronic Malnutrition.(8)

Abbreviations

FUNDEGUA: Fundación Desarrolla Guatemala para la Educación y Salud

REACH: Renewed Efforts Against Child Hunger and Undernutrition

SESAN: Guatemalan Secretariat of Food and Nutrition Security

Declarations

Ethics approval and consent to participate

Determined to be exempt from ethics review by the Duke University and Maya Alliance Institutional Review Boards.

Consent for publication

Not applicable

Availability of data and materials

Data extracted from publicly available tool (http://www.sesan.gob.gt/wordpress/informacion/mapeo-deactores/). A replication data set will also be made available upon publication at: https://doi.org/10.7910/DVN/E8I4CX

Competing interests

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Authors' contributions

Study design: GA AC EP AF GP EYJ. Design of web tools: GA AC EP AF XZ. Data analysis: GA AC PR. Manuscript draft: GA AC EYJ PR. Critical revision of manuscript: EP AF XZ GP.

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Figures

Figure 1. Distribution of nutrition stakeholder institutions and activities at the departmental level, compared to stunting prevalence in children under 5 years. (A) Departmental prevalence of stunting per the 2014-2015 Demographic Household Survey. (B) Number of stakeholder institutions participating in mapping project in each department. (C) Number of nutrition activities reported by responding stakeholder institutions in each department. The six departments prioritized by the National Strategy for their high prevalence of stunting are indicated with asterisks. To highlight some areas of mismatch, a solid arrow indicates the department of Totonicapán; dashed arrow, the department of Chimaltenango; arrowhead, the department of Escuintla.



Figure 1

See image above for figure legend

Figure 2. Linear regression of the relationship between number of nutrition stakeholder institutions per department and the departmental stunting prevalence in children under 5 years. Each department is plotted as a dot, and priority department names are bolded. Dotted lines represent the 95% confidence intervals around the regression.



Figure 2

See image above for figure legend

Figure 3. **Comparison of the Distribution of Nutrition-Sensitive and Nutrition-Specific Activities per Department**. (A) Number of nutrition-sensitive program activities per department. (B) Number of nutrition-specific program activities per department. Asterisks in indicate the six departments prioritized by the National Strategies. To highlight some areas of balance and imbalance, dashed arrow indicates the department of Huehuetenango; solid arrow, the department of Sololá.



Figure 3

See image above for figure legend

Figure 4. Distribution of nutrition program activities at the departmental level, categorized by priority areas of the National Strategy for the Prevention of Chronic Malnutrition. (A) Provision of primary care services; (B) Education and behavior change; (C) Water sanitation and hygiene; and (D) Household income generation. Asterisks indicate the six departments prioritized by the National Strategy.



Figure 4

See image above for figure legend

Supplementary Files

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