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

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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 gram. 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)	
Academic	3
National Religious	5
International Religious	7
Bilateral Aid Organization	13
International Nongovernmental Organization	13
National Nongovernmental Organization	27
Community Based Organization	15
Private Sector	17
Geographic distribution of institutions (n=99)	
Alta Verapaz	8
Huehuetenango	8
Quiché	6
San Marcos	7
Sololá	8
Totonicapán	5
Other 16 departments not prioritized by the National Strategy	57
Yearly Institutional Budget (n=45)	
US $1,000-$50,000	38
US $50,000-$100,000	11
More than US $100,000	51
Nutrition-specific vs. nutrition-sensitive activities (n=99)	
Only nutrition-specific activities	22
Only nutrition-sensitive activities	33
Both nutrition-specific and nutrition-sensitive activities	45
Has monitoring and evaluation strategy for program activities (n=74)	81
Ethnicity of program beneficiaries (n=76)	
Maya	67
Ladino/Mestizo	12
Not Tracked	21

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 de partment. 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 have more responding nutrition stakeholder institutions compared to most non-priority depa ments. 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-speci fic interventions by department. Variability in optimal implementation was observed. Some high-priority departments (Huehue- tenango, 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).

También es posible que exista algún tipo de sesgo de información entre las organizaciones que respondieron a la encuesta y aquellas que no lo hicieron en términos de ubicación o área(s) de enfoque. Sin embargo, nuestros hallazgos sobre el desajuste de recursos son similares a los de otros países donde se ha utilizado el mapeo para comprender el panorama de las intervenciones nutricionales. Por ejemplo, en la última década, la Actividad REACH (Esfuerzos Renovados contra el Hambre y la Desnutrición Infantil) ha trabajado con 22 países, incluidos Egipto, Burkina Faso, Etiopía, Tanzania, Mozambique y Uganda, y utilizó el mapeo para apoyar los procesos de planificación y asignación de recursos.(4, 7) En este sentido, los esfuerzos descritos en el presente documento sentaron las bases para que la SESAN adoptara un enfoque similar. Es importante destacar que la SESAN mantiene las herramientas de encuestas y representación, con planes de llevar a cabo la actualización de las visualizaciones en el futuro. Esperamos que todo lo anterior conlleve a una comunicación más efectiva y continua entre los distintos sectores relacionados con las actividades de nutrición en Guatemala, y sobre todo, desemboque en una asignación más efectiva de los recursos fomentando la colaboración y apoyo a la Estrategia Nacional para la Prevención de la Desnutrición Crónica.(8)

ABBREVIATIONS

FUNDEGUA: Fundación Desarrolla Guatemala para la Educación y Salud

REACH: Renewed Efforts Against Child Hunger and Undernutrition (Esfuerzos Renovados contra el Hambre y la Desnutrición Infantil)

SESAN: Guatemalan Secretariat of Food and Nutrition Security (Secretaría de Seguridad Alimentaria y Nutricional de Guatemala)

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-de-actores/). 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.

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.

FIGURE LEGENDS

Figure1. Distribution of nutrition stakeholder institutions and activities at the departmental level, compared to stunting prevalence in children under 5 years. Heat maps all created with Datawrapper (https://www.datawrapper.de/). (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.
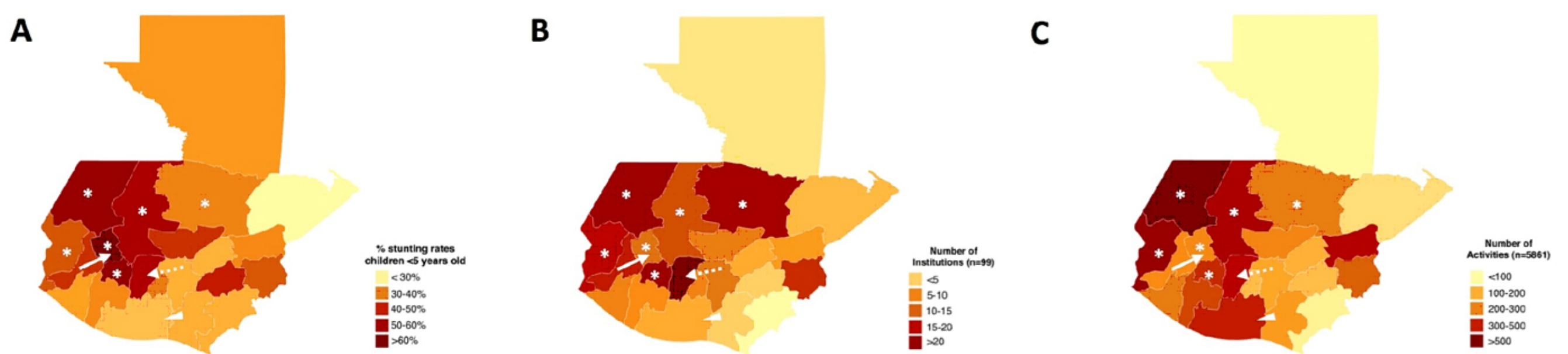

Figure 2. Linear regression of the relationship between number of nutrition stakeholder institutions per department and the departmental stunting prevalence in children under 5 years. Each department is plotted as a dot, and priority department names are bolded. Dotted lines represent the 95% confidence intervals around the regression.
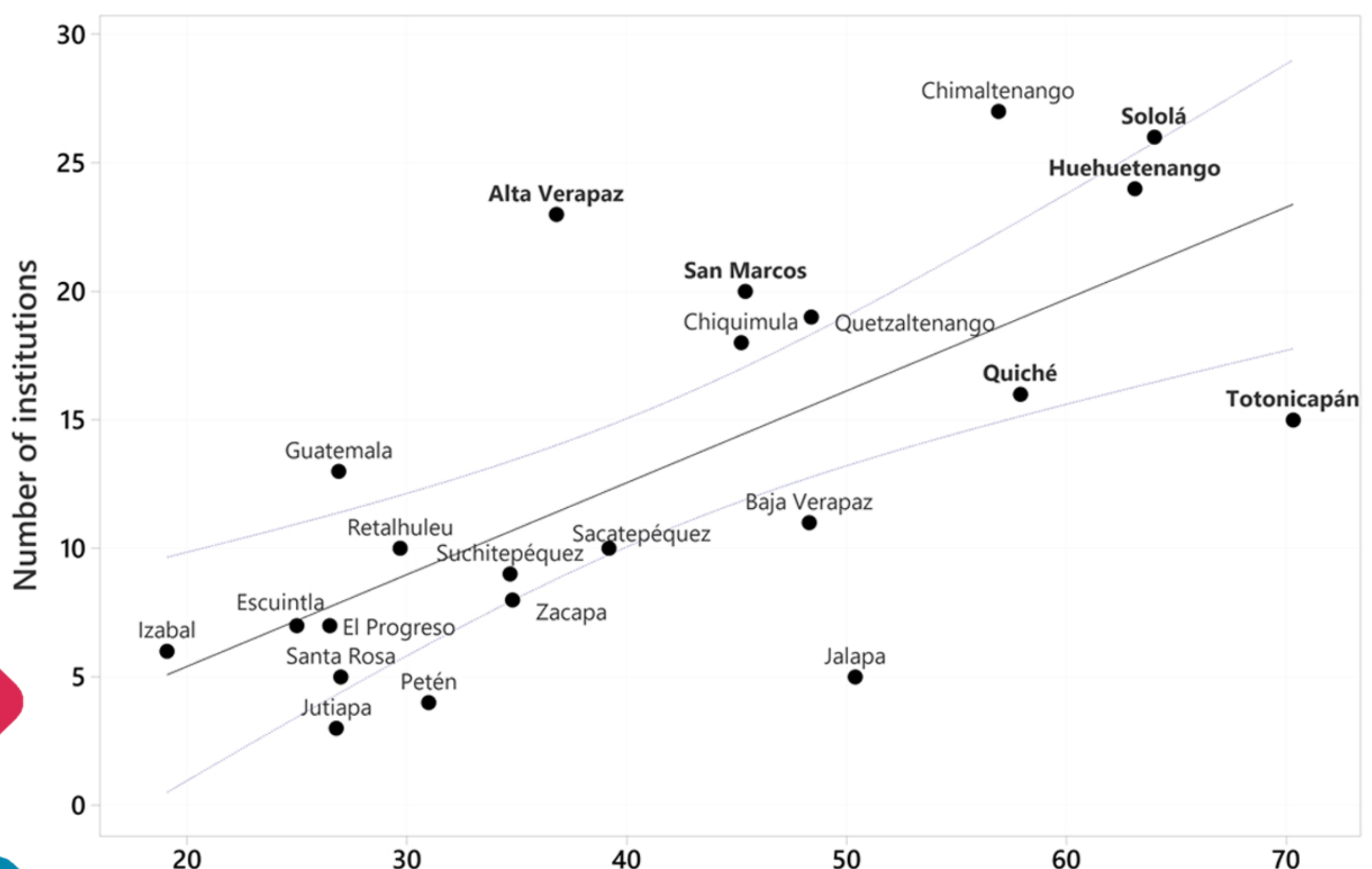
Figure 3. Comparison of the Distribution of Nutrition-Sensitive and Nutrition-Specific Activities per Department. Heat maps all created with Datawrapper (https://www.datawrapper.de/). (A) Number of nutrition-sensitive program activities per department. (B) Number of nutrition-specific program activities per department. Asterisks 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.
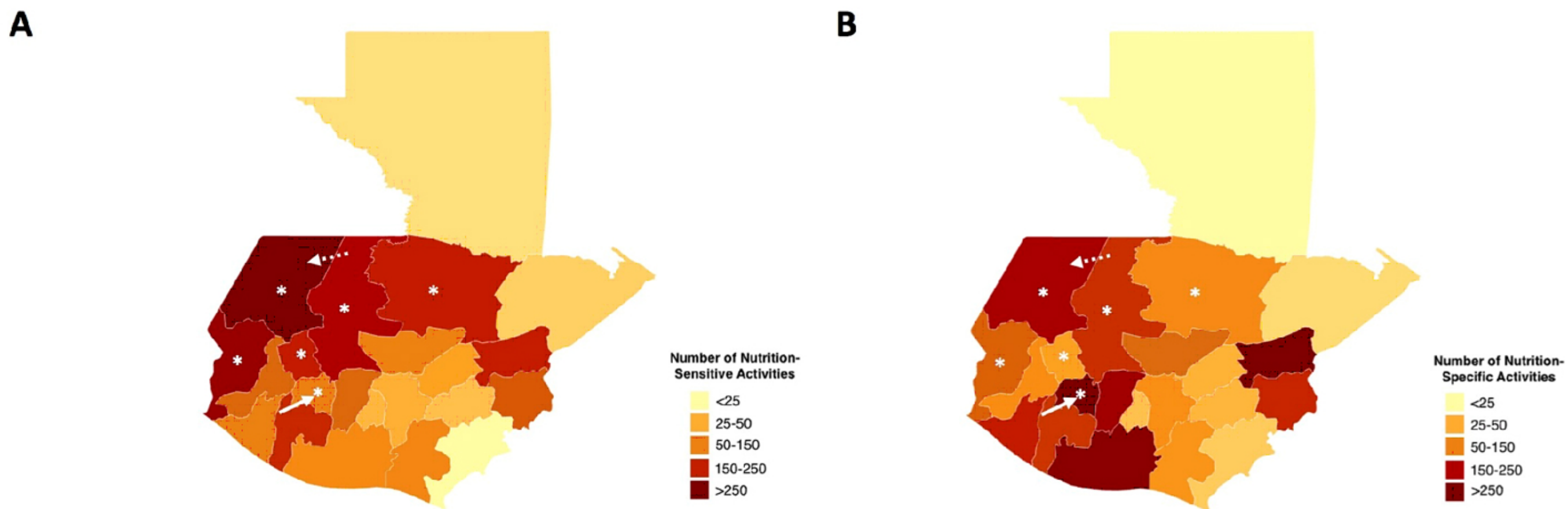

Figure 4. Distribution of nutrition program activities at the departmental level, categorized by priority areas of the National Strategy for the Prevention of Chronic Malnutrition. Heat maps all created with Datawrapper (https://www.datawrapper.de/). (A) Provision of primary care services; (B) Education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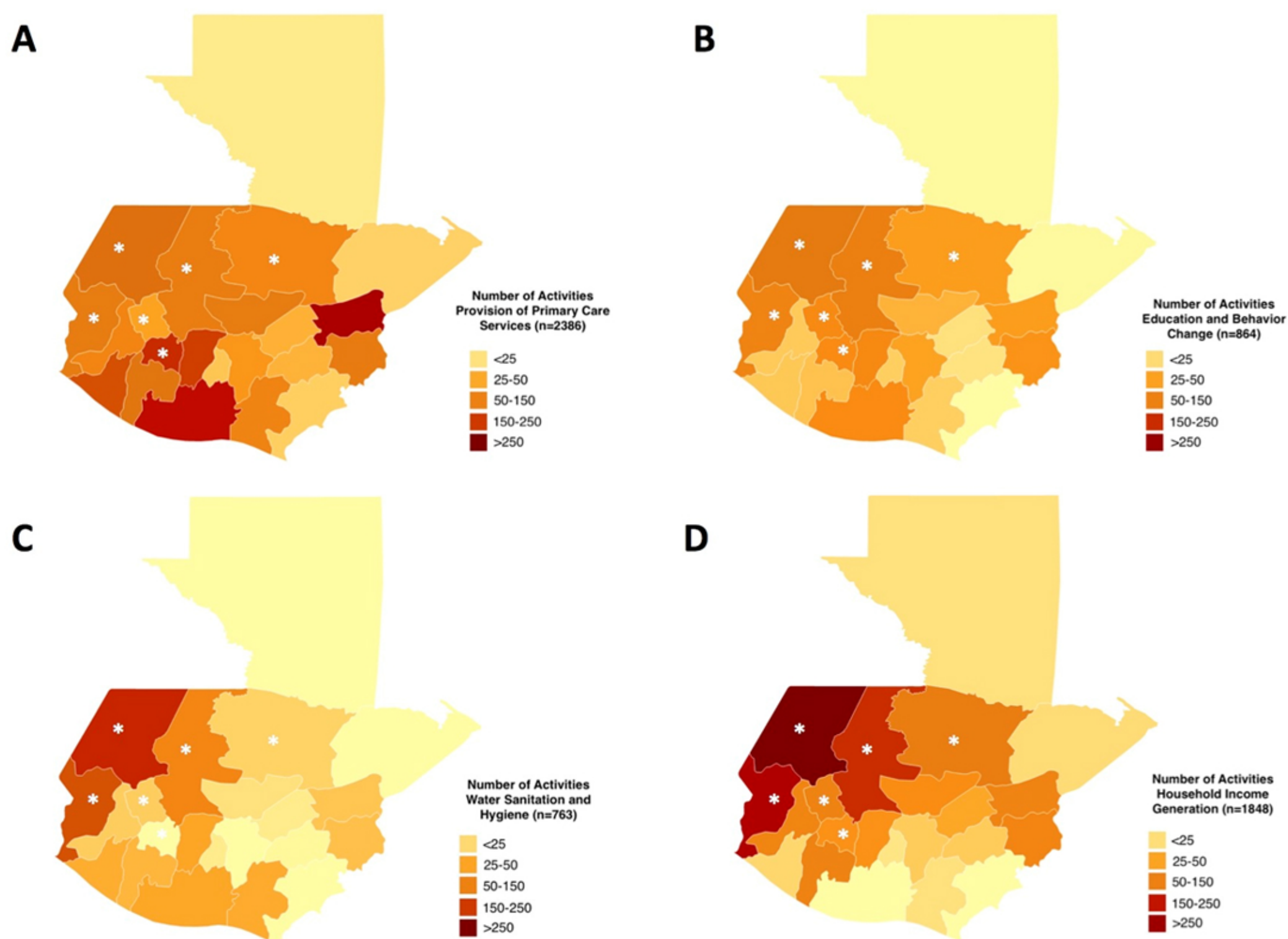
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