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Developing a health information system for a chronic malnutrition program
in San Juan and San Pablo La Laguna, Guatemala: A Special Studies Project

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Abstract

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By Neha Kamat

Chronic or recurrent undernutrition results in lower linear growth achieved for age, also known as stunting. Globally, there are about 155 million stunted children. Within Latin America and the Caribbean, the highest national prevalence of stunting is found in Guatemala where about half of all children nationally, and up to 90% of children in certain municipalities are stunted. ODIM is a small NGO that aims to prevent and treat chronic malnutrition in two rural towns of Guatemala, through its program “Mamá y Yo Saludable” (“Healthy Mommy and Me” or MYS). Currently, MYS employs evidence-based approaches in its health education and community outreach, but its data collection and management systems prohibit rigorous analysis. Effective data use will inform future decision making, MYS programmatic efforts, and evaluate its past efforts and positive impact created. Thus, there is a need for accessible and effective knowledge management systems that allow for efficient data entry, review, and analysis. The purpose of this project is to provide ODIM with an accessible database system that allows for the longitudinal monitoring of its participants, and an accompanying data management protocol that delineates all steps related to data collection, entry, management, quality control, and initial steps for analysis. With successful implementation of the database and protocol, ODIM will be able to effectively evaluate the MYS program and quantify its impact on the reduction of chronic malnutrition.

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1. Chapter 1: Introduction

The problem of chronic malnutrition

Chronic or recurrent undernutrition results in lower linear growth achieved for age, also known as stunting. Globally, there are about 155 million stunted children ([WHO, 2018](#)). Within Latin America and the Caribbean, the highest national prevalence of stunting is found in Guatemala where about 46.5% of children nationally, and up to 90% of children in certain municipalities are stunted ([WFP, 2018](#)).



Figure 1: Map of Guatemala: *The area of interest is the department of Sololá, west of the capital, Guatemala City. Photo Source: Welt Atlas*



Figure 2: Map of Lake Atitlan, in the department of Sololá: *The specific towns of interest are San Juan La Laguna and San Pablo La Laguna, both are on the northeastern shore of Lake Atitlán. Photo Source: La Ruta Maya*

ODIM's "Mamá y Yo Saludable" program

The Organization for the Development of the Indigenous Maya (ODIM) is a 501(c)(3) organization registered in the United States that was founded in 2005 as a response to Hurricane Stan. Since then, ODIM has grown to include two community clinics, four health and education programs, and more ([ODIM, n.d.](#)). ODIM prioritizes its commitment to the two towns it serves, San Juan and San Pablo La Laguna, in the department of Sololá.

One of ODIM's community health and education programs, "Healthy Mommy and Me" or "Mamá y Yo Saludable" (MYS) focuses on preventing chronic malnutrition in both San Juan and San Pablo. Women are enrolled into MYS during pregnancy through community campaigns and snowball recruitment and proceed through the program through the child's first two years of life. MYS employs a health promoter model where local individuals are recruited and trained to facilitate sessions. ODIM addresses the multifactorial causes of malnutrition by offering education sessions, support groups, and cooking classes that are specific to one of four stages of development. As illustrated in Figure 3, women are enrolled during pregnancy, and proceed through the four program stages based on the age of the child. By structuring MYS this way, ODIM can guarantee that women receive the necessary support and education specific to that stage of growth and development.

Within one month, each group of MYS holds an educational session, a health check, and a cooking class or a support group session. During the educational sessions, the health promoters facilitate interactive activities on stage-specific topics such as danger signs during pregnancy, birth plans, exclusive breastfeeding, family planning options, complementary feeding, hygiene, water purification, maternal nutrition, and more. A health check for pregnant women includes reminders and support to receive prenatal care at either one of ODIM's clinics, at the local

government health center, or with a trained midwife. A health check for a participating child includes measuring height and weight and one-on-one nutritional counseling based on the child’s growth. The session often includes supplementation, if indicated as needed. If children are found to be two standard deviations below the height average for their age and sex, then the mother is instructed on how to administer “Máni+,” a Ready to Use Supplementary Food (RUSF) that was specifically designed for use in Guatemala ([Maniplus, n.d.](#)). During each cooking class, the demonstrated recipe is one that incorporates local foods in novel ways to optimize nutritional content. For example, recipes often include “chipilin,” a locally grown legume, in traditional stews and dishes. Lastly, to incentivize participation and attendance, women are provided with a tray of eggs if they attend two of the three monthly activities each month. This serves as not only an incentive for participation, but also as a protein supplement for breastfeeding mothers.

Group 1: Pregnancy	Educational sessions (9)	Prenatal checks (9)	Cooking classes (4)	Support group sessions (4)
Group 2: 0-6 months	Educational sessions (6)	Height/weight checks (6)	Cooking classes (3)	Support group sessions (3)
Group 3: 7-12 months	Educational sessions (6)	Height/weight checks (6)	Cooking classes (3)	Support group sessions (3)
Group 4: 13-24 months	Educational sessions (12)	Height/weight checks (12)	Cooking classes (6)	Support group sessions (6)

Figure 3: “Mamá y Yo Saludable” (MYS) Program Participation Schematic:

Each stage of MYS includes educational sessions, cooking classes, and support group meetings. The number of offerings, by activity, is in parentheses.

Data demand, use, and quality

ODIM highly values evidence-based interventions and has consistently applied current research and findings into its programming, but has yet to create its own evidence base from its own data collection to inform future work. After all, local data would best represent the towns of San Juan and San Pablo in a way that national and departmental data cannot.

The field of operations research conceptualizes how organizations should apply and use collected data, with the process including data, information, knowledge, and wisdom ([Bernstein, 2009](#)). Data demand and use is often overlooked when developing information systems. For analysis and learnings, it is integral to have quality data that are well and systematically organized. The need for investment in strengthening health information systems (HISs) has been documented ([MEASURE, 2017](#); [MEASURE, 2016a](#); [MEASURE, 2016b](#); [WHO, 2008](#)). A systematic review that aimed to identify standardized methods in evaluating HISs concluded that they are extremely sensitive to contextual factors ([Eslami Andargoli et al., 2017](#)). Various authors have identified key components or qualities of a successful HIS. One such study categorized the use and function of a HIS into three different levels: “the micro-level of the individual patient, meso-level of operational management, and the macro-level of policy that guides programming,” ([Stucki and Bickenbach, 2017](#)). Another group named three key components: (1) quality data collection and data, (2) easy-to-use technology, and (3) organizational stakeholder engagement in the data review process ([Sligo et al., 2017](#)). The common thread, among these investigations, is that they all underscore the ease of use and an easily understood purpose as being integral to use.

Formal HIS endeavors on a national scale typically employ robust data collection and complex information processes. For example, since 2012, USAID has been involved in a group

of programs called “Western Highlands Integrated Program” (WHIP). WHIP aims to reduce chronic malnutrition and poverty and increase health service utilization. In 2014, WHIP published a report of baseline survey results which specified that data entry was performed using Census and SurveyProcess (CSPro) and that a local area network (LAN) was established to consolidate and store longitudinal survey information ([MEASURE, 2014](#)). Such systems are not feasible for ODIM due to lack of funding, capacity, and infrastructure. Although these specific tools are out of reach, solutions that employ accessible programs, including Microsoft Office, are worthy of consideration. To be considered a high-performing HIS, MEASURE has identified six essential functions that can all be achieved with the proposed data management system:

1. Monitor trends in health outcomes and services,
2. Ensure that data are trustworthy,
3. Make decisions quickly and efficiently,
4. Identify what works,
5. Ensure the coordination and equity of health services, and
6. Manage resources for the greatest benefit, ([MEASURE, 2016c](#)).

This project is founded upon proposing a new HIS for ODIM that satisfies the aforementioned characteristics. Such a HIS would allow for review of an individual child’s growth over time, and review of growth patterns across participating children. Additionally, staff could stratify by town, by time of enrollment, by any of the collected demographic information. Thus, when ODIM implements the proposed data management system, MYS staff will be able to collect data more efficiently and more importantly, review the collected longitudinal growth data in a more timely and organized fashion to identify learnings and inform future programmatic efforts.

ODIM's data management challenges

The breadth of MYS activities is evident. While the multi-faceted approach allows for consideration of the many factors related to behavior change, it also results in a strong need for a structured, yet nuanced, data management plan and database. Currently, ODIM collects attendance information, height/weight data, facilitation information, and supplementation information - for upwards of 300 participants at any given moment in time. This abundance of information is presently entered into a Microsoft Excel file by a data assistant. The Excel file has information divided into twelve sheets tabs, six for each town. ODIM's data management challenges encompass three main areas:

- a. Adequate and accurate entry all collected data,
- b. Longitudinal structure of storage to allow for child growth analyses, and
- c. Efficient retrieval of information when necessary.

Motivations and purpose

This project aims to provide ODIM, specifically MYS staff, with the resources and tools necessary to collect, enter, store, manage, and use their data. Effective data use will inform future decision making, MYS programmatic efforts, and evaluate its past efforts and positive impact created.

ODIM's current approach to data collection continues to be paper-based and its data storage structure prohibits longitudinal analysis. The individual health promoters document children's monthly height and weight and a data assistant is tasked with entering the information into the previously described Excel spreadsheet. Since measurements are recorded chronologically, and not in a traditional "long" or "wide" format, any formal analysis efforts are impossible. In other words, instead of documenting height and weight by months of age for each

participating child, the database is organized in a manner that has the height and weight information by month of measure. For example, ODIM staff could easily extract the measurements taken in March 2017, and describe the height statuses of participating children in that month, but there is no efficient way to follow those children over time without extending serious efforts in reorganizing the database. As it stands, ODIM's efforts are evidence-based, but not evidence-generating. Anecdotally, staff can reflect on lessons learned and improve future efforts, but there is no systematic manner in which to review the growth data that have been collected to identify what level of impact ODIM has achieved.

ODIM is not an outlier; there are numerous non-profit organizations that attempt to prevent chronic malnutrition. While such efforts are well-intentioned and can be successful, they are poorly monitored and are not conducive to impact evaluations or the dissemination of program learnings. There is a need for accessible and effective knowledge management systems that allow for efficient data entry, review, and analysis. The purpose of this project is to provide ODIM with an accessible database system that allows for the longitudinal monitoring of its participants, and an accompanying data management protocol that delineates all steps related to data collection, entry, management, quality control, and initial steps for analysis. With successful implementation of the database and protocol, ODIM will be able to effectively evaluate the MYS program and quantify its impact on the reduction of chronic malnutrition.

Definition of terms

Chronic malnutrition: Undernutrition over an extended period of time, identified when a child's linear growth value is more than two standard deviations below the mean based on that child's age and sex

Complementary feeding (CF): The process by which a child's nutrition goes from solely comprising of breastmilk to breastmilk, supplemented by other foods

Health Information Systems (HISs): Coordinated and structured processes and procedures to process health information in an efficient manner that optimizes data-driven decision making

Height-for-Age Z-scores (HAZ): The z-score that examines the height gained by a child based on sex and age in comparison to an accepted international reference

“Mamá y Yo Saludable” (MYS): A community health education program administered and executed by ODIM that aims to prevent and treat chronic malnutrition

Plan Estratégico de Seguridad Alimentaria y Nutricional (PESAN): The national strategic plan of Guatemala to address food security and nutrition

Organization for the Development of the Indigenous Maya (ODIM): A small NGO founded on principles of community-driven healthcare and education that operates in rural Guatemala

Weight-for-Age Z-scores (WAZ): The z-score that examines the weight gained by a child based on sex and age in comparison to an accepted international reference

2. Chapter 2: Comprehensive Review of the Literature

Background of chronic malnutrition in Guatemala

Malnutrition encompasses a variety of nutritional conditions and can generally be categorized into two types: (1) protein-energy malnutrition and (2) micronutrient deficiency conditions. Among the former category, there are further subdivisions, one of which is chronic malnutrition. This project specifically looks at chronic malnutrition which results from inadequate nutrition or undernutrition over an extended period of time, and thus is measured by failure of linear growth, also known as stunting ([LSHTM, 2009](#)). Chronic malnutrition contributes to numerous adverse health effects over time and has extensive consequences for the national economy ([USAID, 2018](#)).

The prevalence of chronic malnutrition in Guatemala has been identified as the highest among Latin American countries ([URC, 2010](#); [World Bank, 2003](#)). Recent publications estimate that 47% of children under age five suffer from chronic malnutrition ([USAID, 2018](#); [WFP, 2018](#), [FAO, 2015](#)). Although, it should be noted that these are national estimates and that the populations most affected by malnutrition are primarily indigenous Mayan communities who exhibit stunting rates double that of Ladino populations ([Loewenberg, 2009](#)). The 2014-2015 “Encuesta Nacional de Salud Materno-Infantil” or the “National Maternal and Child Health Survey” estimated 28,306 children under the age of five are stunted in the department of Sololá, which is about 66% ([FANTA, 2017](#)).

Malnutrition in Guatemala has been well documented and studied, starting in 1969 with the longitudinal study led by the Institute of Nutrition in Central America and Panama (INCAP). The study aimed to describe the nutritional situation in each country to inform solutions ([INCAP, n.d.](#)). Initial results from clinical and biochemical analyses demonstrated vitamin A and

riboflavin deficiencies across the region, but did not adequately consider variations with the population, such as socioeconomic and geographic differences ([Arroyave, 2010](#)). When such variations were considered, it became clear that families of lower socioeconomic status exhibited greater levels of vitamin A, riboflavin, and protein deficiencies ([Arroyave, 2010](#)). The INCAP studies represent the “one of the most extensive and in-depth assessments of the nutritional status and related health problems in any country or region in the developing world” at the time ([Arroyave, 2010](#)). INCAP also developed the protein supplement, “INCAP Vegetable Mixture No. 8” or “Incaparina” that is still well known today ([INCAP, n.d.](#)). The INCAP study investigated the effect of a high-protein, high-energy supplement drink, by comparing villages where the drink was and was not distributed. In the distribution villages, the drink was made available at central community facilities, such as medical clinics. The towns were followed for decades, allowing researchers to infer conclusions about supplementation during pregnancy, lactation, and early childhood ([Ramirez-Zea et al., 2010](#)).

More generally, malnutrition was identified as a national priority in Guatemala. In 2012, the “Food and Nutrition Security Strategic Plan” or “Plan Estratégico de Seguridad Alimentaria y Nutrición” (PESAN) was enacted. The plan outlined the immediate and structural causes of malnutrition ([PESAN, 2019](#)) and resulted in the implementation of various nutrition efforts. The national program, “La Ventana de los 1,000 Días” (“The Window of 1,000 Days”) was launched in 2013 and included a variety of activities, from vitamin A supplementation and prophylactic distribution of anti-parasitics to health education and flour fortification that targeted pregnant women, mothers, and children under age two ([PESAN, 2019](#)). Another program subsidized the cost of healthy foods in urban areas and focused on vulnerable peoples in crisis, extreme poverty, and/or suffering from malnutrition ([PESAN, 2019](#)).

Causes of malnutrition

There are diverse causes of chronic malnutrition, from historical civil conflict, persistent discrimination, climate change, insufficient infrastructure, and more. Chronic malnutrition is typically “associated with poor socioeconomic conditions, poor maternal health and nutrition, frequent illness, and/or inappropriate infant and young child feeding and care in early life,” ([WHO, 2018](#)). A national nutrition project undertaken by USAID and FHI360 described the cause of malnutrition in Guatemala to be “manifold” and that persistent “infections (including acute respiratory infections, diarrhea, and malaria) and suboptimal breastfeeding and IYCF practices that result in inadequate dietary intake are immediate causes of malnutrition, but underlying causes include maternal malnutrition and short stature, lack of safe water, hygiene, and sanitation; food insecurity; high fertility; gender inequality; and poverty,” ([FANTA, 2017](#)).

The social and societal causes of chronic malnutrition have also been documented. Past studies found greater prevalence of chronic malnutrition among children with illiterate primary caregivers, and among children living in households with four or more children ([Sereebutra, 2006](#)). Additionally, indigenous populations experience disparities in relation to services and health outcomes. Compared to 68% of non-indigenous households, only 15% of indigenous households have access to sewage systems ([Minority Rights Group International, 2013](#)). Also, indigenous families also have less access to potable water ([Lawton, 2015](#)). Many indigenous landowners often had their lands confiscated by agricultural corporations which continues to not only have economic effects, but also hinder the consumption of fresh produce ([Lawton, 2015](#)). These results demonstrate that future efforts to prevent chronic malnutrition must focus on vulnerable populations.

On a deeper, individual level, the causes of chronic malnutrition can be divided into two

categories: persistent illness and disease, and inadequate dietary intake over time. The causes related to persistent illness involve the aforementioned societal and community factors such as sanitation and hygiene. Inadequate dietary intake is equally complex and involves food insecurity and feeding practices. UNICEF visualized the causes of child malnutrition and successfully demonstrated the complexity and depth of the problem in Figures 3 and 4 ([UNICEF, 1998](#)).

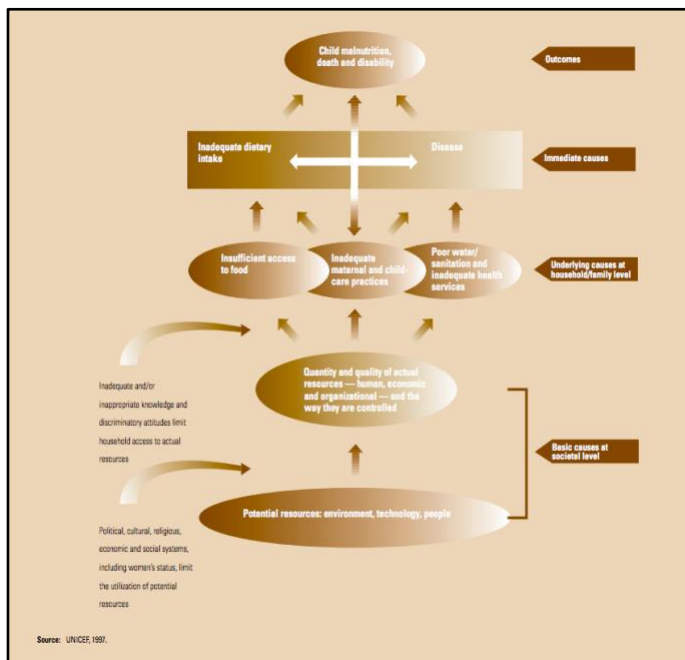


Figure 4: Causes of Child Malnutrition
 (UNICEF, 1997): *The causes of child malnutrition, death, and disability are categorized into immediate causes, underlying causes at the household/community level, and basic causes at the societal level.*

The window of 1,000 days

Numerous studies have identified that the time period from conception through the first two years of life, the 1,000 days, is the best window of intervention because of maximized potential impact. It was first formally recognized in the 2008 Lancet series that focused on maternal and child undernutrition ([Victora et al., 2008](#)), but was formally coined by Hillary Clinton in 2010 ([1,000 Days Organization, n.d.](#)). This period starts at conception and ends at the child’s second birthday; it includes consideration of the maternal nutritional, which critically

affects embryonic development and then goes on to include the most integral developmental milestones ([Biesalski, 2016](#)). Based on a study that looked at growth in the first 6 weeks of life, the effect of short maternal stature can carry over to the infant ([Solomons et al., 2014](#)). Overall, the vulnerability of the first 1,000 days can be explained by “rapid growth and development, high nutritional requirements, greater susceptibility to infections, high sensitivity to programming effects and full dependence on others for care, nutrition, and social interaction,” ([Martorell, 2017](#)). Moreover, the window of 1,000 days is not specific to a certain population, but is rather generalizable across populations.



Figure 5: Context and causes of stunted growth and development

The larger contexts involving the nation, politics, economy, and more influence the stunted growth and development of children.

Source: [WHO, 2017](#)

The evidence base that supports MYS’ approach

The MYS program’s approach to preventing chronic malnutrition is rooted in evidence-based practices. The use of trained local health promoters is a logistical consideration due to the population primarily speaking the indigenous Mayan language, Tz’utujil, but it has been shown that such individuals, when trained, can provide quality, individualized nutrition education and counseling, resulting in “significant improvements in child dietary quality over standard

approaches,” ([Martinez et al., 2018](#)). The focus MYS places on nutrition education, starting during pregnancy and throughout the child’s first two years of life reflect the recommendations of numerous studies. A systematic review on complementary feeding (CF) interventions in developing settings examined 16 studies and found that “education on CF alone significantly improved HAZ, WAZ, and significantly reduced the rates of stunting,” ([Lassi et al., 2013](#)). The authors recommended that nutrition education be combined with the provision of affordable, complementary foods.

The notion of a more holistic approach to combat chronic malnutrition has been well established. Another systematic review focusing on complementary feeding interventions found that more comprehensive approaches are more effective and sustainable ([Dewey and Adu-Afarwuah, 2008](#)). These interventions included health education covering the same topics that MYS covers: exclusive and then sustained breastfeeding, avoiding thinner soups or porridges, incorporating animal-source foods, dietary diversity, responsive feeding, and personal hygiene ([Dewey and Adu-Afarwuah, 2008](#)).

Existing nutrition interventions have demonstrated improvement, some have reduced stunting at 36 months by 36%, but long-term elimination would require efforts aimed at the systemic causes of malnutrition and strive to reduce poverty, prevent disease, and empower women ([Bhutta et al., 2008](#)).

The impact of social support in improving nutrition has also been an area of research. Another non-profit organization in rural Guatemala has documented the success of its nutrition efforts, specifically on how it maximized the effect of RUSF introducing the supplement as medicine, providing nutritional education, and incorporating positive peer support ([Davis et al., 2014](#)). The MYS approach does incorporate the provision of social support, through support

group sessions every other month. While there are pre-identified topics of conversations, participating women are encouraged to use that time and space to discuss any and all relevant matters.

The importance of social support as it relates to behavior change and nutrition has been well documented. An anthropological study demonstrated how social influences can impact child malnutrition and based on the results, the partner NGO implemented three key changes, from addressing social isolation among female caregivers through one-on-one care provided by social work staff, utilizing peer support groups to “denormalize” child illness and malnutrition, and incorporating medical accompaniment practices for referrals to hospitals and treatment facilities ([Chary et al., 2013](#)). Overall, different categories of maternal stressors, such as nutritional, infectious, and psychosocial, are rarely considered together. One mixed methods study performed participatory action research, administered food security surveys, and collected quantitative health information to identify patterns among demographic characteristics, maternal perspectives, and nutritional outcomes and the underlying recommendation is to employ a socioecological framework to understand maternal and child nutrition ([Chomat et al., 2015](#)).

Past and current interventions

There are numerous non-profit efforts toward the prevention and reduction of chronic malnutrition within Guatemala. Few efforts are well documented and published. There is immense variety in approaches, from establishing community and school gardens, to health education on hygiene and nutrition. Figure 5 illustrates USAID’s multi-sectoral nutrition conceptual framework that describes the various areas of intervention that can be applied in prevention efforts.

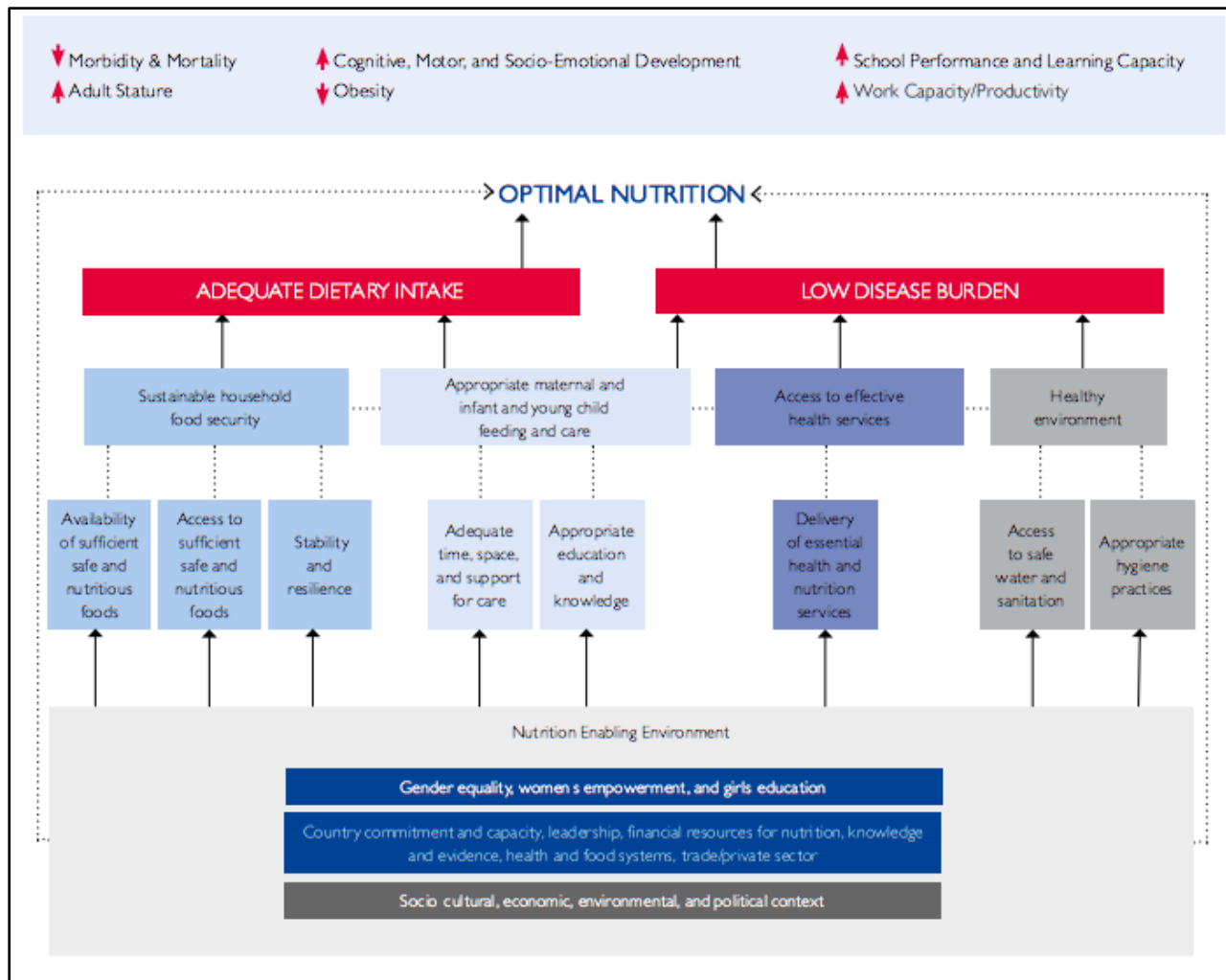


Figure 6: Multi-sectoral nutrition conceptual framework: *The various areas of intervention that can be applied in chronic malnutrition prevention efforts. Source: [USAID, 2014](#)*

Table 1: Select chronic malnutrition programs in Guatemala

Organization	Activities that focus on chronic malnutrition	Location within Guatemala
International Relief Teams	<ul style="list-style-type: none"> - Provision of nutritional food supplement, Nutributter - Daily sachet for period of ten months 	Eastern Guatemala and flood-prone Polochic River basin in Alta Verapaz
Feed the Children	<ul style="list-style-type: none"> - Health education on hygiene and nutrition 	Not specified
MDG Achievement Fund	<ul style="list-style-type: none"> - School gardens - Training of health and nutrition workers - Health education on nutrition 	Totonicapán department
Mayan Families	<ul style="list-style-type: none"> - Provision of supplements and antiparasitics - Health education - Home visits 	Panajachel, Sololá
Wuqu Kawoq (Mayan Health Alliance)	<ul style="list-style-type: none"> - Health education - Provision of nutrition supplement, Chispitas 	Tecpán, Chimaltenango
Maternal Child Survival Program	<ul style="list-style-type: none"> - Technical assistance to Ministry of Health - Infant and young child feeding (IYCF) programming - Supplementation during pregnancy 	San Marcos, Quiché, Huehuetenango, Totonicapán, and Quetzaltenango departments
Feed the Future	<ul style="list-style-type: none"> - Strengthen municipal governments - Focus on supporting farmers and agricultural laborers 	Not specified
Seed Programs International	<ul style="list-style-type: none"> - Provision of seeds - Promotion of gardens 	Not specified
Seeds for a Future	<ul style="list-style-type: none"> - Provision of seeds - Provision of livestock animals 	Not specified
Pueblo a Pueblo	<ul style="list-style-type: none"> - Provision of medical care, from pregnancy to age five - Health education on nutrition, hygiene 	Not specified
Save the Children	<ul style="list-style-type: none"> - Early childhood development education for parents - Promote school health and nutrition strategies 	Huehuetenango, Quiché, and Sololá departments
Plan International Canada	<ul style="list-style-type: none"> - Not specified 	Carchá and Polochic, Alta Verapaz; Rabinal, Baja Verapaz; Jalapa, Jalapa
World Food Programme	<ul style="list-style-type: none"> - Provision of specialized nutritious foods to U2 children - Behavior change promotion 	Alta Verapaz, Baja Verapaz, Sololá, and Chimaltenango departments

Stunting and its measurement

In order to determine the nutritional status of a single child, that child's growth is compared to that of a healthy reference population. This reference population, statistically developed by the Centers for Disease Control and Prevention and the National Center for Health Statistics, is internationally accepted and has been shown to be applicable to all races and ethnicities, regardless of socioeconomic status and type of feeding ([de Onis, 2007](#)). Height or length-for-age (HAZ) and weight-for-age (WAZ) Z-scores, or the number of standard deviations from the standard, are used to determine the extent to which a child differs from what is considered healthy.

The high prevalence of stunting among Guatemalan children is often attributed to genetic factors, there is a stronger environmental influence. Bogin et al. compared indigenous Mayan children born in Guatemala to children of indigenous Mayan heritage born in the United States and found the U.S.-born children to be 11.54 cm taller on average ([Bogin et al., 2002](#)). This indicates that although there are genetic causes to variation in stature, there is a stronger effect from social and environmental influences, including nutrition, frequency of gastrointestinal illness, and more.

Current recommendations on data systems

The Association of Research and Social Studies (Asociación de Investigación y Estudios Sociales, ASIES) published a strategic planning report in 2017 that outlines future goals related to national chronic malnutrition prevention. Two of the objectives listed is to determine the progress achieved by various policies and programs, and to identify gaps in the national response. The corresponding activity is the “compilation, systematization, and analysis of statistical information linked to food security and nutrition themes,” ([ASIES, 2017](#)).

3. Chapter 3: Project Content/Methods

Original dataflow

Prior to this project, MYS health promoters employed numerous forms to document registration (Figure 6). Beginning with registration, women are asked about their demographic information, past medical history, address, expected due date, and about their commitment to participate. Throughout pregnancy, women attend the monthly educational sessions, and bi-monthly cooking classes and support group meetings. Attendance at these events is documented on a group level. After giving birth, the mothers and children continue to participate in the educational sessions, cooking classes, and support group meetings, and also begin monthly height and weight check-ins. During these sessions, the health promoters measure the children's height and weight, document the measurements in individual forms with the WHO graphs that delineate 1, 2, and 3 standard deviations above and below the average.

A data assistant was tasked with entering the data into a single Excel file, but with numerous sheets contained within it. Each town has six individual Excel sheets, totaling 12 sheets for the entire MYS program. The first sheet contains registration information, such as the woman's name, date of birth, age, number of previous children, gestational age, anticipated due date, address, phone number, child's date of birth, child's sex, location of birth (health center, clinic, hospital, home, etc.), and number of prenatal visits made. This information is collected during at least two health promoter-participant encounters. The second sheet contains data on prenatal care visits, specifically those made by ODIM clinic staff. The third sheet includes data on who attended which educational sessions and support group meetings. The fourth sheet contains information on verbal pre- and post-tests that are administered before and after each educational session to measure any changes in knowledge. The fifth sheet details which women

received prenatal supplements and which children received nutritional supplements. The sixth sheet details the child's date of birth, and then height and weight organized by month of measurement; within this sheet, the first set of columns dates to May 2015 (when MYS began) and the last set of columns being the most recent month of measurement.

Attendance data from the educational sessions, cooking classes, and support group meetings are collected on a group level, meaning that the health promoters compose a list of present participants, but that information is never disaggregated to the individual level and matched to the child's growth data; they are contained on different Excel sheets. Additionally, the growth data is organized chronologically or structured by the month of measurement (i.e. August 2016) and not by the age of the child (i.e. 8 months). These two flaws in organization result in ODIM's inability to accurately quantify any association or impact between program activities and health outcomes. Clearly, the Excel file, with its 12 component sheets, is cumbersome and inefficient for data review or use.

Proposed dataflow

The proposed dataflow involves documenting individual-level data from the outset in one form (Figure 6). The first section would include registration information, followed by the woman's medical information, then attendance (Group 1), then birth, followed by a combination of attendance and growth data (Groups 2-4). A singular form with all of this information would not only minimize the physical amount of paper and documentation, but also allow for each health promoter to see the full picture of the mother-infant dyad's health and participation.

For data collection in regards to attendance, the health promoters would ideally document attendance on an individual level, thus allowing for more efficient data entry because all information regarding a single participant would be contained within one form. The barrier in

employing this approach is that the health promoters are compensated on an hourly basis and ODIM aims for those work hours to be optimized for programmatic activities. Thus, the approach selected is to have health promoters document and collect data on a group-level; they would mark a typical attendance sheet with whether or not a woman attended and whether or not she received any supplements or incentives during that session. Then the data assistant would only enter in session information (type, topic, date, year, promoter responsible, and group) and the participant identification numbers of all women who attended said session. With the unique participant identification numbers, attendance information would link to the registration and maternal health information entered earlier and be subsequently linked to the birth, vaccination, and growth information

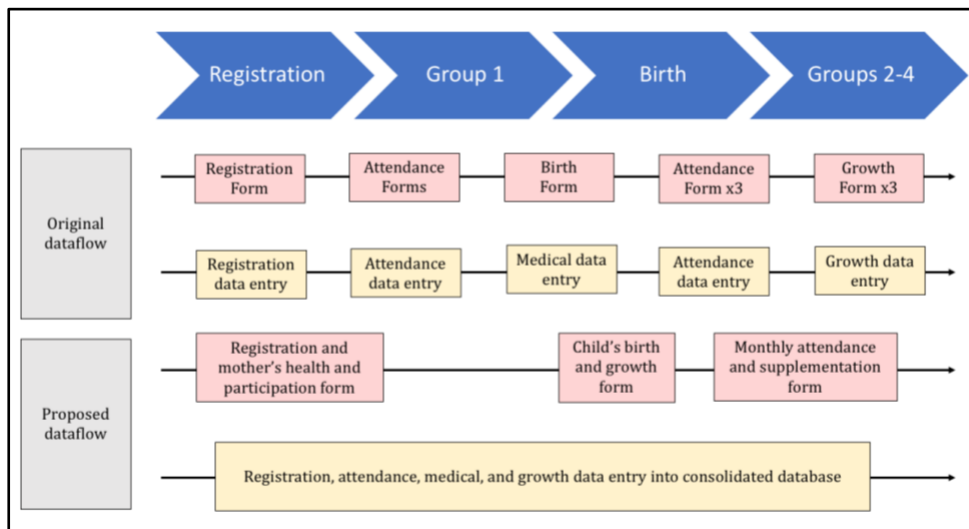


Figure 7: Original and proposed dataflows:

Blue arrows represent stage of participation, pink boxes represent data collection forms, and yellow boxes represent separate databases.

Development of data collection tools

At the outset of this project, a singular form to document all health and programmatic information for each mother-infant dyad. A barrier to implementing this would be that ODIM also offers clinical services and the mother and child are separate patients, thereby needing separate forms of documentation. To accommodate ODIM's clinical information system and

dataflow, two data collection forms were developed: one for the mother, and one for each child. These forms were adapted from the existing set of seven forms.

The proposed data system entails using two primary data collection forms, one that follows the mother and the other follows the child. The mother's form (Appendix A) includes registration/contact information, prenatal health information (such as receipt of the tetanus vaccine), and participation during pregnancy (i.e. during Group 1). The child's form (Appendix B) starts with information on the birth (date, location, attendant, birthweight, etc.) and then height, weight, and supplementation information for the first two years of life.

Cleaning of existing data

Prior to developing the Access database and data entry system, the existing MYS data required reorganization and restructuring. The six individual Excel sheets were combined into one by developing a traditional "wide" format with the columns or fields detailing registration, prenatal health, participation, and child growth over time, and with each mother-infant dyad as an individual row. In the case of twins, the mother's information would be duplicated and each child would have its own row. It was specifically because of this potential situation, that mother and child participant identification numbers were created separately. Both identification numbers are alphanumeric and offer information about the town of residence, mother, and birth order. The mother's participant identification number is structured as X###, where the X is either "J" or "P" (identifying the town of residence as either San Juan or San Pablo, respectively), the three-digit number indicates the number assigned at registration. The child's participant identification number is structured as X###X, where the first four characters are identical to the mother's, and the last letter, either "A," "B," or "C" to delineate birth order in the case of twins or triplets. For example, participant identification J121 clearly refers to the 121st woman enrolled in MYS in the

town of San Juan, while participant identification P212B indicates the case of the second child to the 212th woman enrolled in San Pablo. During this process, the data was manually re-entered into a new Excel file that was stored using Box cloud storage platform to adequately store personal health information during data re-entry.

Access database development

When determining the organization of the Access database, it was necessary to identify how MYS staff collect data, and what the optimal form of data entry would be. First, since data are collected on both individual- and group-levels, there would be two forms of data entry. Consolidating data to all be individual-level would require more effort than the health promoters have time to exert. Additionally, since all MYS participants, both women and children, can be referred to a member of ODIM's clinical staff, mother's health and participation information could not be combined with that of the child's, but they had to be easily linked and identified when looking at mother-infant dyads.

Data management protocol development

The data management protocol delineates the steps and resources involved in data collection, entry, storage, security, and archiving. First, it describes the current monitoring situation and identifies key areas of improvement. Then, it illustrates the workflow in terms of staff members involved, their roles and responsibilities, and frequency of data-related activities. The protocol also includes all the newly developed data collection forms and specifies an approach for data validation by randomly selecting participants by their MYS identification numbers and confirming accurate data entry. The protocol also explains data storage steps that ODIM already employs to ensure adequate cloud versions. Finally, the protocol provides a

monthly data management checklist to facilitate adequate use in terms of entry and also functional use in terms of programmatic and clinical decision making.

As ODIM grows and technology advances, there will be new areas of improvement along the spectrum of data related tasks. For example, if ODIM were to acquire tablets for mobile data collection, it would be possible to enter data immediately and forgo the paper forms completely. It is important to recognize that the data management protocol adequately addresses the current situation and limitations of time, finances, and efforts and should be recognized as such; it is a living, transitional document and should be updated accordingly.

4. Chapter 4: Discussion, Implications, and Limitations

Discussion

To analyze its impact over time and describe the growth patterns of participating children, MYS staff should (1) employ the newly developed data collection forms (Appendices A and B), and (2) enter data into the new Access database, following the steps delineated in the data management protocol (Appendix C). There are numerous organizational benefits to the new data system, and they align well with MEASURE's six essential functions of a HIS ([MEASURE, 2016c](#)):

1. *Monitor trends in health outcomes and services*: the new data system will allow for MYS staff to identify patterns in attendance and growth over time on a monthly basis.

Previously, examining either over time was impossible due to the inappropriate structure of the data.
2. *Ensure that data are trustworthy*: the proposed form of data entry, using Access, includes built-in quality checks that ensure accurate entry. If the data assistant were to enter an invalid height or weight measure, Access would provide a message detailing that.
3. *Make decisions quickly and efficiently*: MYS staff can review collected data more efficiently and on a monthly basis, allowing for data-driven decision making and for timely action in case of clinical intervention.
4. *Identify what works*: Specifically, in regards to attendance of the various sessions MYS offers, the new data system could be used to identify trends in absences and examine if and when change is needed.
5. *Ensure the coordination and equity of health services*: the proposed data system allows for more efficient review, preliminary analyses, and information sharing across ODIM's

programmatic and clinical staff, thus allowing for coordinated medical care and program attention. Additionally, the proposed data system uses a widely available program, Microsoft Access, at a reasonable cost, in lieu of a more expensive, customized data solution.

6. *Manage resources for the greatest benefit:* As mentioned, the data entry data entry system is cost-effective and optimizes the data entry process.

Implications for chronic malnutrition in Guatemala

As efforts to prevent and reduce chronic malnutrition continue, it becomes even more necessary to invest efforts where the area of impact is greatest. By collecting data in a standardized and efficient manner, ODIM will have the capability to perform quality data review and identify key learnings moving forward. Currently, it is known that nutrition education and awareness is lacking, but that educational efforts must be combined with other approaches that address systemic issues of health such as agricultural practices and funding, and food purchasing as it relates to women's empowerment ([Brown et al., 2016](#)).

Limitations

The proposed data system was designed considering the existing version of programmatic offers and considers the current time, financial, and situational constraints. A limitation of the proposed data system is that a mother's information is specific to each mother-infant dyad of which she is part. A woman can be enrolled, be assigned a participant identification (e.g. P191), and her child would also be assigned one (e.g. P191A). If she had twins, each child would receive a participant identification (e.g. P191A and P191B). After completing the program, the woman and her child (or children) would graduate. If she were to become pregnant and wish to enroll in MYS again, it would be challenging to link her previous participation and health

information (from the original mother-infant dyad) to that of the current pregnancy. She would be assigned a new participant ID, thus prohibiting the linking of previous and current programmatic experiences.

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Appendices:

Appendix A: Proposed data collection form for the mother's participation and health

Registration form

FORMULARIO DE PARTICIPACION - MAMA Y YO SALUDABLE	
Registración de la mujer	
Fecha de registraci3n: ___/___/___	Pueblo: _____
Número de Identificaci3n (MYS): _____	Número de paciente (ODIM): _____
Número de tel3fono: _____ - _____	Cant3n: _____
<i>Informaci3n sobre la mujer</i>	
Nombre completo de la mujer: _____	
Fecha de nacimiento (dd/mm/aa): ___/___/___	Edad: _____ ańos
#de nińos previos: _____	# de embarazos previos: _____
Fecha de 3ltima menstruaci3n (dd/mm/aa): ___/___/___	
Fecha probable de parto (dd/mm/aa): ___/___/___	
Vacuna contra el t3tanos	Dosis 1 -- Fecha: ___/___/___
	Dosis 2 -- Fecha: ___/___/___
	Dosis 3 -- Fecha: ___/___/___
	Dosis 4 -- Fecha: ___/___/___
	Dosis 5 -- Fecha: ___/___/___
S3 no tiene su carta de vacunaci3n, 3cuántas vacunas dice que tiene?	

Birth and Vaccination Form

FORMULARIO DE PARTICIPACION - MAMA Y YO SALUDABLE			
Registraci3n del nińo/de la nińa			
Transferencia a Grupo 2			
<i>Llene los datos del nacimiento del beb3.</i>			
Nombre completo de la madre: _____			
Nombre completo del beb3: _____			
Fecha de nacimiento (dd/mm/aa): ___/___/___	Sexo: M / F		
Meses de embarazo cumplido: _____	Lugar del parto: _____		
3Qui3n asisti3 el parto? _____	Peso al nacer: _____ libras _____ onzas		
Complicaciones para la mujer o del beb3 durante el parto: _____			
<i>Llene las fechas de vacunaci3n segun el carnet (dd/mm/aa)</i> <i>*S3 no tiene el carnet, deja en blanco para llenar la pr3xima vez*</i>	BCG Al nacer ___/___/___	OPV	A los 4 meses ___/___/___
	Hepatitis B Al nacer ___/___/___		A los 6 meses ___/___/___
	DTP		A los 18 meses ___/___/___
		A los 2 meses ___/___/___	Neumococo
	A los 4 meses ___/___/___	A los 12 meses ___/___/___	
	A los 6 meses ___/___/___	Pentavalente	A los 2 meses ___/___/___
	IPV A los 2 meses ___/___/___		A los 4 meses ___/___/___
	SPR		A los 6 meses ___/___/___
			A los 12 meses ___/___/___
	Rotavirus	A los 18 meses ___/___/___	
A los 2 meses ___/___/___			
	A los 4 meses ___/___/___		

Growth Form – Groups 2 and 3

Para la sección de cada grupo, primero llene el nombre del mes según la fecha de nacimiento del niño/de la niña. Después, escriba el nombre del mes apropiado. Cada mes cuando la madre y el niño/la niña vengan a peso/talla, escriba la fecha de la medida, el peso y talla medido en las columnas apropiadas. Marque con "X" si la madre recibió vitaminas prenatales. Si la madre recibió Nutributter o otro suplemento, hay que documentarlo en la siguiente columna. Por favor, no marque nada en la última columna, es para documentar si los datos ya fueron ingresados en el sistema o no.

Salud en Grupo 2

Firma del promotor(a) cuando el/la participante se cambia a Grupo 2:

Mes #	Mes	Fecha	Peso (kilos)	Talla (cm)	Vitaminas?	Suplementación	Ingreso de datos
1							
2							
3							
4							
5							
6							

Salud en Grupo 3

Firma del promotor(a) cuando el/la participante se cambia a Grupo 3:

Mes #	Mes	Fecha	Peso (kilos)	Talla (cm)	Vitaminas?	Suplementación	Ingreso de datos
7							
8							
9							
10							
11							
12							

Growth Form – Group 4

Para la sección de Grupo 4, primero llene el nombre del mes según la fecha de nacimiento del niño/de la niña. Después, escriba el nombre del mes apropiado. Cada mes cuando la madre y el niño/la niña vengan a peso/talla, escriba la fecha de la medida, el peso y talla medido en las columnas apropiadas. Marque con "X" si la madre recibió vitaminas prenatales. Si la madre recibió Nutributter o otro suplemento, hay que documentarlo en la siguiente columna. Por favor, no marque nada en la última columna, es para documentar si los datos ya fueron ingresados en el sistema o no.

Salud en Grupo 4							
<i>Firma del promotor(a) cuando el/la participante se cambia a Grupo 4:</i>							
Mes #	Mes	Fecha	Peso (kilos)	Talla (cm)	Vitaminas?	Suplementación	Ingreso de datos
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

Monthly Attendance Form

ASISTENCIA DEL GRUPO - MAMA Y YO SALUDABLE

Asistencia de las mujeres en las varias sesiones del mes

Esta hoja es para documentar quien asiste cada sesión de MYS, y quien recibe viveres durante la sesión. Primero, llene los datos de la sesión, incluyendo el pueblo, el tipo (si es una charla, una clase de cocina, o un grupo de apoyo), el mes y año, el tema o la comida (si es una clase de cocina), y el promotor o la promotora responsable.

Pueblo:	Tipo de sesión:	Mes/Año:
Tema:	Promotor/a responsable:	Grupo:

Ahora, marque si cada participante en el listado del grupo asistió la sesión. Si una participante no está incluida, puede agregar su nombre al final. Por favor, no marque nada en la última columna, es para documentar si los datos ya fueron ingresados en el sistema o no.

	Nombre	Número de MYS	Recibió viveres? (si/no)	Ingreso de datos
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
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24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				

Appendix B: Data management protocol

**PLAN DE GESTIÓN DE DATOS
PARA EL PROGRAMA
MAMÁ Y YO SAUDABLE**



Jar inin wachib'iil nuutee' utz qaawach

Índice:

1. Plan de gestión de datos

a. Abreviaturas y definiciones

b. Introducción

i. Propósito

ii. Procesos de trabajo

iii. Trabajos y personas responsables

2. Formularios para la recolección de datos

3. Ingreso de datos

a. Proceso

b. Validación de datos

c. Control de calidad de datos

d. Almacenamiento de información y seguridad de datos

4. Listado de chequeo mensual para manejar datos

1. Plan de gestión de datos

Abreviaturas y definiciones

- Datos longitudinales: Información que describe un individuo o algo por tiempo, en este caso, información de peso y talla de un niño, medida cada mes por dos años
- Desnutrición crónica: Desnutrición por un periodo prolongado de tiempo, identificado cuando su crecimiento lineal (su talla para edad) es más que 2 desviaciones estándar debajo del promedio según la edad y el sexo de un niño o niña
- Desviaciones estándar (DE) o Puntuaciones Z: Describen el crecimiento del niño o niña comparado al promedio mundial; para cada desviación
- Tendencias individuales: El crecimiento logrado por un niño o niña por un cierto tiempo, descrito por medidas mensuales
- Tendencias grupales: El crecimiento logrado por un grupo de niños por un cierto tiempo, descrito por promedios; en este caso, también se refiere a los estados de los niños participantes

Introducción

Propósito

El propósito de este documento es para asistir en la recolección de datos y asegurar la calidad de datos para el programa de “Mamá y Yo Saludable” (MYS) que aspira a prevenir y tratar la desnutrición crónica en dos pueblos, San Juan y San Pablo La Laguna, Sololá, Guatemala. Este documento se puede ser modificado en cualquier momento para reflejar cambios en el programa.

Procesos de trabajo

Este plan de gestión de datos intenta a realizar tres objetivos con el base de datos:

- (1) Facilitar el ingreso de datos para que sea más fácil y preciso,
- (2) Organizar la información de crecimiento por mes de edad para hacer un análisis de datos longitudinales posible, y
- (3) Conectar la información de la madre y del niño, en vez de tener todo extendido por varias hojas en Excel.

El archivo de Access permite el ingreso de datos según el tipo de información y guarda todo en un archivo de Excel. El archivo de Excel se puede usar para generar listas de participantes según características de asistencia, información médica, u tipo de dato.

Trabajos y personas responsables

Este plan requiere los esfuerzos de varias personas, incluyendo los promotores, la coordinadora de MYS, la asistente de datos, la gerente y subgerente de programas. La siguiente tabla describe sus roles y responsabilidades:

Persona/Cargo	Actividad	Recursos	Frecuencia
Promotor(a)	<ul style="list-style-type: none"> - Recolección de datos - Manejo de los formularios 	Formularios para el registro, nacimiento, crecimiento y asistencia mensual	<ul style="list-style-type: none"> - Cada periodo de registraci3n - Cada actividad del programa - Cada cita de peso/talla
Asistente de datos	<ul style="list-style-type: none"> - Ingreso de datos - Generaci3n de listados de ni1os en alto riesgo - Control de calidad (con la coordinadora) 	Archivo de Access	<ul style="list-style-type: none"> - Mensual (al fin de cada mes)
Coordinadora de MYS	<ul style="list-style-type: none"> - Manejo de los formularios de asistencia (guardarlos) - Generaci3n de listados de ni1os en alto riesgo - Control de calidad (con la asistente de datos) 	Archivo de Access	<ul style="list-style-type: none"> - Mensual
Gerente y subgerente de programas	<ul style="list-style-type: none"> - Plan de acci3n para ni1o en alto riesgo - Comunicaci3n con servicios de salud 	Listados generados por la coordinadora y la asistente de datos	<ul style="list-style-type: none"> - Mensual

2. Formularios para la recolección de datos

Registro

FORMULARIO DE PARTICIPACION - MAMA Y YO SALUDABLE	
Registración de la mujer	
Fecha de registraci3n: ___/___/___	Pueblo: _____
Número de Identificaci3n (MYS): _____	Número de paciente (ODIM): _____
Número de tel3fono: _____ - _____	Cant3n: _____
Informaci3n sobre la mujer	
Nombre completo de la mujer: _____	
Fecha de nacimiento (dd/mm/aa): ___/___/___	Edad: ___ ańos
#de nińos previos: _____	# de embarazos previos: _____
Fecha de 3ltima menstruaci3n (dd/mm/aa): ___/___/___	
Fecha probable de parto (dd/mm/aa): ___/___/___	
Vacuna contra el t3tanos	Dosis 1 -- Fecha: ___/___/___
	Dosis 2 -- Fecha: ___/___/___
	Dosis 3 -- Fecha: ___/___/___
	Dosis 4 -- Fecha: ___/___/___
	Dosis 5 -- Fecha: ___/___/___
S3 no tiene su carta de vacunaci3n, 3cuántas vacunas dice que tiene?	

Nacimiento y vacunaci3n

FORMULARIO DE PARTICIPACION - MAMA Y YO SALUDABLE		
Registraci3n del nińo/de la nińa		
Transferencia a Grupo 2		
Llene los datos del nacimiento del beb3.		
Nombre completo de la madre: _____		
Nombre completo del beb3: _____		
Fecha de nacimiento (dd/mm/aa): ___/___/___	Sexo: M / F	
Meses de embarazo cumplido: _____	Lugar del parto: _____	
3Qu3n asisti3 el parto? _____	Peso al nacer: ___ libras ___ onzas	
Complicaciones para la mujer o del beb3 durante el parto: _____		
Llene las fechas de vacunaci3n segun el carnet (dd/mm/aa)	BCG Al nacer ___/___/___	
	Hepatitis B Al nacer ___/___/___	
	DTP	A los 2 meses ___/___/___
		A los 4 meses ___/___/___
	IPV	A los 6 meses ___/___/___
		A los 2 meses ___/___/___
	SPR	A los 12 meses ___/___/___
		A los 18 meses ___/___/___
	Rotavirus	A los 2 meses ___/___/___
		A los 4 meses ___/___/___
S3 no tiene el carnet, deja en blanco para llenar la pr3xima vez	OPV	
	A los 4 meses ___/___/___	
	A los 6 meses ___/___/___	
	A los 18 meses ___/___/___	
	Neumococo	
	A los 2 meses ___/___/___	
A los 4 meses ___/___/___		
Pentavalente	A los 12 meses ___/___/___	
	A los 2 meses ___/___/___	
	A los 4 meses ___/___/___	
A los 6 meses ___/___/___		

Crecimiento - Grupo 2 y 3

Para la sección de cada grupo, primero llene el nombre del mes según la fecha de nacimiento del niño/de la niña. Después, escriba el nombre del mes apropiado. Cada mes cuando la madre y el niño/la niña vengan a peso/talla, escriba la fecha de la medida, el peso y talla medido en las columnas apropiadas. Marque con "X" si la madre recibió vitaminas prenatales. Si la madre recibió Nutributter o otro suplemento, hay que documentarlo en la siguiente columna. Por favor, no marque nada en la última columna, es para documentar si los datos ya fueron ingresados en el sistema o no.

Salud en Grupo 2

Firma del promotor(a) cuando el/la participante se cambia a Grupo 2:

Mes #	Mes	Fecha	Peso (kilos)	Talla (cm)	Vitaminas?	Suplementación	Ingreso de datos
1							
2							
3							
4							
5							
6							

Salud en Grupo 3

Firma del promotor(a) cuando el/la participante se cambia a Grupo 3:

Mes #	Mes	Fecha	Peso (kilos)	Talla (cm)	Vitaminas?	Suplementación	Ingreso de datos
7							
8							
9							
10							
11							
12							

Crecimiento - Grupo 4

Para la sección de Grupo 4, primero llene el nombre del mes según la fecha de nacimiento del niño/de la niña. Después, escriba el nombre del mes apropiado. Cada mes cuando la madre y el niño/la niña vengan a peso/talla, escriba la fecha de la medida, el peso y talla medido en las columnas apropiadas. Marque con "X" si la madre recibió vitaminas prenatales. Si la madre recibió Nutributter o otro suplemento, hay que documentarlo en la siguiente columna. Por favor, no marque nada en la última columna, es para documentar si los datos ya fueron ingresados en el sistema o no.

Salud en Grupo 4							
<i>Firma del promotor(a) cuando el/la participante se cambia a Grupo 4:</i>							
Mes #	Mes	Fecha	Peso (kilos)	Talla (cm)	Vitaminas?	Suplementación	<i>Ingreso de datos</i>
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

Asistencia mensual

ASISTENCIA DEL GRUPO - MAMA Y YO SALUDABLE

Asistencia de las mujeres en las varias sesiones del mes

Esta hoja es para documentar quién asiste cada sesión de MYS, y quien recibe viveres durante la sesión. Primero, llene los datos de la sesión, incluyendo el pueblo, el tipo (si es una charla, una clase de cocina, o un grupo de apoyo), el mes y año, el tema o la comida (si es una clase de cocina), y el promotor o la promotora responsable.

Pueblo:	Tipo de sesión:	Mes/Año:
Tema:	Promotor/a responsable:	Grupo:

Ahora, marque si cada participante en el listado del grupo asistió la sesión. Si una participante no está incluida, puede agregar su nombre al final. Por favor, no marque nada en la última columna, es para documentar si los datos ya fueron ingresados en el sistema o no.

	Nombre	Número de MYS	Recibió viveres? (si/no)	Ingreso de datos
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				

3. Ingreso de datos

Proceso

Información de registro

Cuando está ingresando datos del registro, hay que usar el formulario de registro y ingresar lo siguiente, creando un número de identificación de MYS para la nueva participante.

- Número de identificación de MYS
- Fecha de registro
- Pueblo
- Número de paciente (Sí es paciente de ODIM)
- Número de teléfono
- Cantón
- Nombre completo
- Fecha de nacimiento
- Edad (en años)
- Número de niños vivos
- Número de embarazos previos
- Fecha de última regla
- Fecha probable de parto
- Fecha(s) de administración de la vacuna contra el tétano*

*Significa que es un campo o variable que será actualizado sí sea necesario

Información de nacimiento del niño

Cuando está ingresando datos del nacimiento del niño, hay que usar el formulario de nacimiento e ingresar lo siguiente, creando un número de identificación de MYS para el/la participante nuevo/a.

- Nombre completo de la madre
- Nombre completo del bebé
- Fecha de nacimiento del bebé
- Sexo del bebé
- Edad gestacional de la madre cuando dio a luz
- Ubicación del parto (clínica, hospital, centro de salud, en hogar, etc.)
- Quien asistió el parto (médico, enfermera, comadrona, etc.)
- Fecha(s) de administración de las siguientes vacunas*
 - BCG
 - Hepatitis B
 - DTP
 - IPV
 - Rotavirus

- OPV
- Neumococo
- Pentavalente

*Significa que es un campo o variable que será actualizado sí sea necesario

Crecimiento mensual del niño/de la niña

- Mes del año
- Fecha de medida
- Peso
- Talla/longitud
- Si recibió vitaminas (Si/No)
- Suplementación (¿cuántas recibió?)

Asistencia mensual de las varias actividades del programa

- Pueblo
- Tipo de actividad (charla, clase de cocina, grupo de apoyo)
- Mes del año
- Año
- Promotor(a) responsable
- Grupo (1, 2, 3 o 4)
- Números de identificación de MYS de las participantes quienes asistieron a esa actividad

Control de calidad de datos

Para mantener la calidad de datos, sin gastar demasiado esfuerzo y tiempo, es recomendado que la coordinadora y la asistente de datos, juntas, elijan unas participantes por un método aleatorio (por ejemplo, usando este sitio web: <http://www.generarnumerosaleatorios.com/>). Así, se pueden verificar los datos de tres participantes de cada pueblo como muestra para ver si los datos fueron bien ingresados o no.

Almacenamiento de información y seguridad de datos

La información será guardado en el archivo de Excel que está respaldado por la cuenta de Dropbox. Cuando la computadora está conectada al Internet, el archivo se guarda en Dropbox automáticamente.

- 4. Listado de chequeo mensual para manejar datos**
5. Asegurar que los datos del último mes ya fueron ingresados
6. Agregación de cantidades mensuales: Crear un listado de todos los niños participantes por su desviación estándar (DE)
 - a. Número de niños en +3 DE y arriba
 - b. Número de niños en +1 a +3 DE
 - c. Número de niños en -1 a +1 DE
 - d. Número de niños en -2 a -1 DE
 - e. Número de niños en -3 a -2 DE
 - f. Número de niños en -3 DE y abajo
7. Identificación y agregación de errores
 - a. Número de niños sin medidas en este mes
 - i. Categorizar este listado según el grupo de participación y notificar los promotores apropiados para motivar que estas mujeres y sus hijos vengan el próximo mes
 - b. Número de niños con medidas errores en este mes
8. Calidad de datos
 - a. Identificar 6 participantes por un método aleatorio
 - i. Por ejemplo, usando este sitio web:
<http://www.generarnumerosaleatorios.com/>
 - ii. Hay que identificar el primer y el último número de MYS para cada pueblo
 - iii. Con los formularios a la mano, asegurar los datos de estos 3 participantes para cada pueblo