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Strengthening and Evaluating the Preventing Malnutrition in Children under 2 Years of Age Approach

Guatemala Follow-up Report

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Abbreviations and Acronyms

BCC	behavior change communication
BCG	bacillus Calmette–Guérin
BMI	body mass index
cm	centimeter(s)
CSB	corn-soy blend
DHS	Demographic and Health Survey(s)
dL	deciliter(s)
DPT	diphtheria/pertussis/tetanus
EBS	*Equipo Básico de Salud* (Basic Health Team)
ENSMI	*Encuesta Nacional de Salud Materno Infantil* (National Maternal and Child Health Survey)
FANTA	Food and Nutrition Technical Assistance III Project
FFP	Office of Food for Peace
FFR	full family ration
g	gram(s)
GDP	gross domestic product
GPS	global positioning system
GTQ	Guatemal quetzal(es)
HAD	height-for-age difference
Hb	hemoglobin
HCC	health convergence center
HHS	Household Hunger Scale
IFPRI	International Food Policy Research Institute
IMCI	Integrated Management of Childhood Illness
IU	international unit(s)
IV	intravenous
IYCF	infant and young child feeding
kcal	kilocalorie(s)
kg	kilogram(s)
km	kilometer(s)
LAZ	length-for-age z-score
LNS	lipid-based nutrient supplement
m	meter(s)
µg	microgram(s)
mg	milligram(s)
mm	millimeter(s)
MMR	measles/mumps/rubella
MN	miconutrient
MNP	micronutrient powder

MSPAS	*Ministerio de Salud Pública y Asistencia Social* (Ministry of Public Health and Social Assistance
MUAC	mid–upper arm circumference
NFR	no family ration
NGO	nongovernmental organization
ORS	oral rehydration salts
PM2A	Preventing Malnutrition in Children under 2 Approach
pp	percentage points
PROCOMIDA	*Programa Comunitario Materno Infantil de Diversificación Alimentaria* (Community Maternal and Child Food Diversification Program)
PSS	health services provider (*prestadora de servicios de salud)*
SD	standard deviation(s)
SE	standard error(s)
SRQ-20	Self-Report Questionnaire [WHO]
US$	U.S. dollar(s)
USAID	U.S. Agency for International Development
WHO	World Health Organization
WLZ	weight-for-length z-score

Executive Summary

Programa Comunitario Materno Infantil de Diversificación Alimentaria (*PROCOMIDA*) (Community Maternal and Child Food Diversification Program), a U.S. Agency for International Development (USAID) multiyear development assistance program, was implemented in parts of the Alta Verpaz region of Guatemala from 2011 to 2015. The primary objective of the program was to improve the health and nutritional status of pregnant and lactating women and children under 2 years of age through three core program components: the distribution of food rations; behavior change communication (BCC) focused on health, hygiene, and nutrition; and strengthening and promoting the use of health care services.

The International Food Policy Research Institute (IFPRI) in collaboration with Mercy Corps (which implemented *PROCOMIDA*) and with funding from the Office of Food for Peace at USAID (through the Food and Nutrition Technical Assistance III Project [FANTA]) designed and conducted a comprehensive research program to evaluate *PROCOMIDA*. The program's impact was assessed via a cluster-randomized controlled trial with five different treatment arms and was designed to test both the optimal size of the family ration and composition of the individual ration. Three treatment arms, each receiving corn-soy blend (CSB) as the individual ration, had varying family ration sizes: a full family ration (FFR), a reduced family ration (RFR), or no family ration (NFR). Two additional treatment arms, both receiving the FFR, received either lipid-based nutrient supplement (LNS) or micronutrient powder (MNP) as the individual ration. The individual ration was targeted to the mother during pregnancy and after the birth of the child until the child was 6 months old. Then, when the child was 6–24 months old, the individual ration was targeted to the child. The *PROCOMIDA* food component was expected to increase the availability of micronutrient-rich foods for mothers and children via the individual ration and increase food availability and limit sharing within the household in treatment arms receiving a family ration.

Additionally, all treatment arms received the same BCC and health program components. The BCC component was delivered by trained program staff and aimed to improve knowledge and adoption of optimal health, hygiene, and nutrition practices. The program's health component aimed to strengthen the delivery of preventive and curative health services at local health convergence centers as well as encourage the use of these services in conjunction with the BCC strategy.

PROCOMIDA's impact was evaluated with an eight-wave longitudinal survey. Pregnant women were enrolled in the study on a rolling basis early in pregnancy, and follow-up surveys were conducted when children reached key ages: 1 month, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months. The results of the enrollment survey were documented in an earlier report (Richter et al. 2013). The current report summarizes the impact of *PROCOMIDA* with evidence from the seven follow-up surveys. It includes the impact on intermediary outcomes along the three program pathways (food, health, and care) and on maternal and child nutrition and well-being.

Program enrollment and participation in food distributions were high among treatment arms receiving the full or reduced family ration. Both enrollment and participation were lower in the arm that did not receive a family ration. Additionally, there was evidence of more intrahousehold sharing of CSB when households received the reduced or no family ration. Together, these findings suggest that the family ration helped motivate program enrollment and participation, and helped protect the individual ration for its intended beneficiary. The program's impacts on maternal and child dietary outcomes were small and inconsistent and appeared largely due to the inclusion of CSB in the food ration. These impacts were more consistent in treatment arms receiving a full or reduced family ration and were strongest in the FFR+CSB and FFR+MNP arms. The program also reduced household hunger 4–6 percentage points among treatment arms that received the full family ration.

The program had positive impacts on maternal knowledge related to pregnancy danger signs, early breastfeeding practices, the consequences of iron deficiency, the use of a cup in place of a bottle, the optimal age to introduce liquids other than breast milk, and key handwashing times. *PROCOMIDA*'s impacts on increasing exclusive breastfeeding and reducing the use of bottles echoed the program impact on knowledge related to early breastfeeding practices. Additionally, the program had impacts on improving some hygiene practices, such as cleanliness of the index children and the houses in which they lived. However, improvements in the use of soap to wash hands at critical times are still needed.

Most health convergence centers were found to fulfill guidelines for personnel requirements and provision of health services. However, the lack and temporary shortages of essential medications, supplements, supplies, and equipment were common[1] and often limited the quality of health services that could be provided. *PROCOMIDA* had an impact on whether mothers could present a vaccination card and whether children were weighed at monthly growth monitoring visits. Additionally, during the second year of life, the program had an impact on whether children's length was measured at growth monitoring visits, which was likely attributable to the improved capacity of the community-based health workers who conducted growth monitoring.

PROCOMIDA reduced maternal stress[2] in the treatment arms receiving FFR+CSB and FFR+MNP. Levels of anemia were low in the study population, and the program did not improve maternal anemia or hemoglobin concentration; in fact, there was an increase in maternal anemia in the treatment arms receiving FFR+CSB and RFR+CSB. In all treatment arms receiving CSB, mothers had higher post-pregnancy body weight relative to the control arm, a possible unintentional negative effect of the program.

Ultimately, the program decreased the prevalence of stunting and increased length-for-age z-scores in the FFR+CSB and FFR+MNP treatment arms. There was, however, no impact on child development, anemia, or hemoglobin concentration, and the FFR+CSB treatment arm had the unanticipated negative impact of increasing child anemia.

We conclude that the full family ration worked as intended: it motivated beneficiaries to participate in the program throughout the first 1,000 days; it seemed to protect the individual micronutrient-fortified food or supplement from intrahousehold sharing; it reduced household hunger; and it contributed to reducing the prevalence of stunting when provided with CSB or MNP. The positive impacts among beneficiaries who received the reduced family ration were not as consistent or large as those found for the full family ration. Even though the FFR coupled with CSB produced the largest impact on reducing the prevalence of stunting, some unintentional negative impacts were found in this treatment arm. The full family ration coupled with MNP, on the other hand, produced significant positive impacts on reducing the prevalence of stunting, as well as on a number of other outcomes, but did not have any detectable unintended negative impacts. Thus, whereas CSB and MNP both worked to reduce stunting, the trade-off between larger impacts and fewer unintended negative impacts needs to be considered when deciding what type of individual ration to provide in a Preventing Malnutrition in Children under Two Years of Age (PM2A) program in this type of context.

[1] Under USAID, Office of Food for Peace guidelines, *PROCOMIDA* was not able to purchase immunizations or medications.
[2] Maternal stress was measured using the Self-Report Questionnaire (WHO 1994).

1. Introduction

This report presents the findings from the impact evaluation of *Programa Comunitario Materno Infantil de Diversificación Alimentaria (PROCOMIDA)* (Community Maternal and Child Food Diversification Program), a Preventing Malnutrition in Children under Two Years of Age (PM2A) program that was implemented in Alta Verapaz region, Guatemala, from 2011 to 2015.[3] The report assesses the impact of *PROCOMIDA* on mothers and their children at key time points from early gestation until the child reached 24 months old.

PROCOMIDA was a multiyear development food assistance project funded by the USAID Office of Food for Peace (FFP). The objectives were to improve the health and nutritional status of pregnant and lactating women and children under 2 years of age and to strengthen the quality and delivery of health care services. The program had three core components: distribution of family and individual food rations; required participation of beneficiaries in behavior change communication (BCC) sessions focused on improving health and nutrition–related behaviors; and required use of preventive health services for pregnant and lactating women and children under 2 years of age. Mercy Corps, a nongovernmental organization (NGO), implemented this program.

A strong comprehensive research program[4] conducted by the International Food Policy Research Institute (IFPRI) was integrated into *PROCOMIDA* and implemented in close collaboration with Mercy Corps. The research was funded by USAID's FFP through the Food and Nutrition Technical Assistance III Project (FANTA). The overall objectives of the research were to assess the impact of *PROCOMIDA* on child nutritional status, to evaluate the differential and absolute impact of varying the composition of the individual food supplement and size of the family rations, and to estimate the program's cost-effectiveness. In addition, the study evaluated the impact of the program on a number of other household, maternal, and child outcomes, such as household hunger, infant and young child feeding (IYCF) practices, health-seeking practices, maternal hemoglobin (Hb) and anemia, children's morbidity symptoms, children's Hb and anemia, and children's language and motor development. In addition to impact and cost-effectiveness studies, process evaluation research[5] was conducted to better understand program delivery and utilization.

PROCOMIDA was evaluated using a longitudinal design. Beginning in August 2011, pregnant women were recruited to participate in the enrollment survey of the longitudinal study. Recruitment for the enrollment survey continued until November 2012. The results of the enrollment survey are available in a previous report (Richter et al. 2013). Follow-up surveys were conducted when index children reached key

[3] Mercy Corps implemented PROCOMIDA from 2010 to 2015. The impact evaluation was conducted in a subset of the implementation area from 2011 to 2015.
[4] A study conducted in Haiti and funded by FFP through FANTA was the first rigorous evaluation conducted under real programmatic conditions that showed that the blanket targeting of a food-assisted maternal and child health and nutrition program to all children 6–24 months of age (preventive approach) was more effective at reducing the community prevalence of stunting, wasting, and underweight than the traditional approach based on targeting underweight children (weight-for-age z-score < -2) (recuperative approach) (Ruel et al. 2008). Based on the evidence from Haiti, FFP invited proposals to replicate the preventive approach (PM2A) in two countries: Guatemala and Burundi. The two countries were selected because of their excessively high levels of child stunting. FFP and FANTA considered that it would be important to incorporate a strong, action-oriented research and development program linked to the implementation of PM2A in the two countries, to allow learning and refinement of the approach and generate lessons learned for future PM2A programming.
[5] Based on the process evaluation research, recommendations were made to improve program delivery. A second round of process evaluation was planned to assess how well these recommendations were implemented, but was canceled due to funding cuts.

ages: 1 month, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months. This report presents the results from these seven follow-up surveys.

The remainder of this report is structured as follows: Section 2 presents the study methods. Community and health convergence center (HCC) characteristics are presented in Section 3. The household, maternal, and child characteristics are presented in Sections 4, 5, and 6, respectively. Section 7 presents information on *PROCOMIDA* participation. Sections 8 follows with results on programmatic impact at the household level. Sections 9–13 report results on maternal knowledge, health care utilization, diet, stress, and anthropometry. Sections 14–18 include results on child feeding, health care utilization, morbidity, development, and anthropometry. Section 19 concludes the report with a discussion of the results.

2. Methods

2.1 Study Setting

Guatemala is the most populous country in Central America, with more than 16 million inhabitants (World Bank 2016). The population includes more than 20 different indigenous groups; those of Mayan descent account for more than 50 percent of the population (MRG International 2008). In 1996, the Peace Accords were signed, ending 36 years of civil war in Guatemala. Hopes that subsequent changes would improve the livelihoods of the indigenous population were not met; the country suffers from high unemployment rates, and inequality between nonindigenous and indigenous peoples remains a significant problem, especially in relation to income, land ownership, and health outcomes.

The gross domestic product (GDP) per capita is US$7,250, classifying Guatemala as a lower–middle income country. However, the Gini index is 52.4, suggesting a high level of income inequality, which is largely determined by indigenous heritage status (World Bank 2016). The majority of the indigenous population is poor, at 73 percent, as opposed to 35 percent of nonindigenous persons. Current life expectancy at birth is 71.5 years, 68.0 years for males and 75.1 years for females (World Bank 2016), and it is estimated that the gap between indigenous and nonindigenous ethnic groups in life expectancy is 13 years (IWGIA 2015). Nationally, among adults 15 and older, the literacy rate is 77.0 percent and higher among men (82.7 percent) than women (72.1 percent) (World Bank 2016). The agricultural sector accounts for 11.5 percent of GDP, and 32.7 percent of the labor force is employed in agriculture (World Bank 2016).

The largest Mayan populations in Guatemala live in regions to the north and west of Guatemala City, specifically Alta Verapaz, Quiché, Sololá, and Totonicapán. *PROCOMIDA* was implemented in the department of Alta Verapaz, and the impact evaluation occurred specifically in the municipalities of Cahabón, Cobán, Lanquín, and San Pedro Carchá. The majority ethnic group in this area is Q'eqchi', and the region suffered some of the worst violence during the country's 36-year civil war. Alta Verapaz is one of the most food-insecure areas of Guatemala and has some of the country's highest rates of stunting and infant and maternal mortality. According to the *Encuesta Nacional de Salud Materno Infantil* (*ENSMI*) (National Maternal and Child Health Survey), only 56.8 percent of births in Alta Verapaz were medically assisted, compared with a national average of 65.5 percent. The prevalence of child stunting is higher in this region: 50.0 percent of children ages 3–59 months are stunted and 17.5 percent are severely stunted, compared with a national average of 46.5 percent stunted and 16.6 percent severely stunted (*MSPAS* 2015).

2.2 PROCOMIDA

To address the many underlying causes of undernutrition (e.g., illness, limited access to nutrient-rich foods, and suboptimal IYCF and care practices), *PROCOMIDA* delivered a package of health and nutrition interventions aimed at preventing child undernutrition. *PROCOMIDA* included three main components: distribution of food rations, strengthening of preventive health services, and delivery of a BCC strategy. These three core components were expected to positively affect maternal and child health and nutrition outcomes. A detailed description of each component can be found in the process evaluation report (Olney et al. 2013). A summary is provided in the following paragraphs.

Food Component. The food component of *PROCOMIDA* was expected to increase household availability of micronutrient-rich foods and, in turn, increase the consumption of such foods and improve dietary diversity. To achieve these goals, *PROCOMIDA* beneficiaries received a monthly household food ration[6] composed of beans (4 kg), rice (6 kg), and vegetable oil (1.85 kg) (details in Section 2). This ration was distributed to the beneficiary, but intended for household consumption. In addition to the household ration, an individual ration was distributed for the beneficiaries: pregnant women, women with a child 0–6 months of age, and children 6–23 months of age received 4 kg of corn-soy blend (CSB).[7] From the time of enrollment, a beneficiary mother received the monthly individual ration until her child was 6 months of age. At 6 months, when complementary foods should be introduced to the infant, the mother's individual ration was discontinued and the child received the monthly individual ration until 24 months of age.

Health Component. The health component was designed to improve the provision of preventive health services by health staff, increase their utilization by the beneficiary population, and ultimately contribute to improvements in maternal and child health outcomes. *PROCOMIDA* provided training to health service providers from the *Ministerio de Salud Pública y Asistencia Social (MSPAS)* (Ministry of Public Health and Social Assistance) assigned to the HCCs[8] served by the program. In addition, to ensure use of these preventive health services, *PROCOMIDA* required all beneficiaries to attend prenatal visits and take their children under 24 months of age for growth monitoring and promotion services. It also encouraged beneficiaries to utilize other available preventive health services (e.g., vaccinations, micronutrient supplements, deworming). Furthermore, in conjunction with the BCC component, *PROCOMIDA* educated the beneficiary population on the use of health services for curative care by teaching about the treatment of diarrhea and anemia, the danger signs during pregnancy and childhood illness requiring immediate medical care, and how to care for sick and malnourished children.

BCC Component. *PROCOMIDA*'s BCC strategy was designed to educate beneficiaries about best practices in health and nutrition and to encourage them to adopt these practices. *PROCOMIDA*'s BCC strategy included the required participation by beneficiary mothers at BCC sessions prior to receiving their monthly food rations, recipe demonstrations provided by model mothers (who were themselves beneficiaries), and ad hoc BCC sessions provided to men who attended food distribution events with the beneficiary mother.

The BCC curriculum contained five modules, each with between 9 and 16 key messages. The lessons were developed by an educational specialist and considered educational philosophy and teaching strategies appropriate for the beneficiary population. Trained field technicians led each session, which could cover multiple lessons, using high-quality flip charts designed by the program that included validated graphics and prompts to promote dialogue and questions from the beneficiaries.

- Module 1, "*PROCOMIDA* Food Commodities": 15 lessons on the type of food commodities and supplements distributed by the program and their proper preparation and utilization in the home.
- Module 2, "Exclusive Breastfeeding": 8 lessons on the importance of exclusive breastfeeding, immediate breastfeeding, the use of colostrum, proper hygiene for breastfeeding mothers, and the benefits of breastfeeding for the nursing mother and child.

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[6] The quantities provided here reflect the standard *PROCOMIDA* package. Quantities were 3 kg, 3 kg, and 0.925 kg for beans, rice, and vegetable oil in the reduced family ration arm. The no-family ration arm received no beans, rice, or vegetable oil. Study arms are explained in a subsequent section of the report.
[7] CSB was provided as the individual ration in the standard *PROCOMIDA* intervention. In two of the study arms, CSB was replaced by a lipid-based nutrient supplement or micronutrient powder. Details on all study arms are explained in a subsequent section of the report.
[8] Health convergence centers (HCCs) are the smallest unit of service delivery in the national health system. Health centers are the second level of care (after HCCs) in the national health system. They typically staff both physicians and nurses.

- Module 3, "Pregnancy and Breastfeeding Mothers": 16 lessons on the importance of antenatal care services, developing a birthing plan, ensuring proper maternal nutrition, taking micronutrients, and danger signs during pregnancy and birth.
- Module 4, "Feeding and Care of Children 6–24 months of age": 16 lessons focusing on nutrition, including complementary feeding for children between 6 and 8 months of age, 9 and 11 months of age, and 12 and 23 months of age.
- Module 5, "Feeding and Care of a Sick and/or Malnourished Child": 12 lessons related to the signs and dangers of child dehydration, dehydration prevention using oral rehydration solution (ORS), proper feeding of sick children, response to dysentery and persistent diarrhea, and pneumonia prevention.

2.3 PROCOMIDA Evaluation Design

PROCOMIDA incorporated a comprehensive research program undertaken by IFPRI in collaboration with Mercy Corps, with funding from the USAID's FFP through FANTA. The research objectives were to assess the impact and cost-effectiveness of *PROCOMIDA* on child nutritional status as well as the differential and absolute impact of varying the food ration composition and size in a PM2A program such as *PROCOMIDA*. To assess the program's impact, a longitudinal study was conducted. Women were enrolled in the study when they were 3–7 months' pregnant; follow-up interviews were conducted when the children turned 1 month, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months.

All pregnant women and women with children under 24 months of age in communities where *PROCOMIDA* was implemented were eligible to participate. Enrollment in the study was done in selected *PROCOMIDA* communities when women were identified as being pregnant. Study enrollment was independent from the women's enrollment in *PROCOMIDA* because the study aimed at evaluating the population-level impact of the program (i.e., intent-to-treat effect of the intervention packages) rather than the impact on the beneficiaries only (i.e., effect of the treatment on the treated). Thus, some women and children who never participated in *PROCOMIDA* despite being eligible to participate, are included in the study sample and in the impact analyses along with those who did participate.

To answer questions related to the optimal size of the family food ration and the composition of the individual food ration, the study compared households in the areas served by health convergence centers that were randomly assigned to one of six study arms, which varied by the size of the household ration and the composition of the individual food ration (**Tables 2.1, 2.2,** and **2.3**):

- Arm A: Full family ration (FFR) (rice, pinto beans, and vegetable oil), individual ration (CSB), BCC, and required health visits
- Arm B: Reduced family ration (RFR) (rice, pinto beans, and vegetable oil), individual ration (CSB), BCC, and required health visits
- Arm C: No family ration, individual ration (CSB), BCC, and required health visits
- Arm D: Full family ration (rice, pinto beans, and vegetable oil), individual ration (lipid-based nutrient supplement [LNS]), BCC, and required health visits
- Arm E: Full family ration (rice, pinto beans, and vegetable oil), individual ration (micronutrient powder [MNP]), BCC, and required health visits
- Arm F: Control arm: No *PROCOMIDA* participation (i.e., did not receive family or individual rations or BCC messages) and no requirement to attend health visits; however, families in the control arm did have access to standard *MSPAS* services

Table 2.1 The Six Study Arms of the *PROCOMIDA* Evaluation

Program Component	Study Arm A	B	C	D	E	F
Food ration						—
Family ration (rice, beans, oil)	Yes	Reduced	—	Yes	Yes	—
Individual ration	Yes	Yes	Yes	Yes	Yes	—
CSB	Yes	Yes	Yes	—	—	—
LNS	—	—	—	Yes	—	—
MNP	—	—	—	—	Yes	—
BCC	Yes	Yes	Yes	Yes	Yes	—
Required health visits	Yes	Yes	Yes	Yes	Yes	—[a]

[a] Households in the control arm have access to the standard health services.

The full family ration of rice, pinto beans, and vegetable oil provided a total of 269 kcal per household member per day and was given to all beneficiary families in study arms A, D, and E. Arm B's reduced family ration provided approximately 152 kcal per day per family member. Arm C did not receive a family ration.

Table 2.2 *PROCOMIDA* Monthly Family Ration Sizes[a]

Foods	Full Family Food Ration (Arms A, D, and E)		Reduced Family Food Ration (Arm B)	
	Weight (kg)	Energy (kcal)	Weight (kg)	Energy (kcal)
Rice	6.000	21,600	3.000	10,800
Pinto beans	4.000	13,600	3.000	10,200
Vegetable oil	1.850	16,354	0.925	8,177
Total	**11.850**	**51,554**	**6.925**	**29,177**
Total kcal/capita/day[b]		269[c]		152[c]

[a] These rations were distributed starting in July 2011; from June 2010 to June 2011 a larger family ration size was distributed (see Appendix B, Table B.2).
[b] Total kcal/capita/day was calculated using an average household size of 6.3 members (average household size in the enrollment survey) and 30.42 days/month.
[c] The individual ration was not meant to be shared, so it is not included in the computation of the total kcal/capita/day. If the individual CSB ration were shared, it would provide an additional 78 kcal/capita/day.

The individual ration was intended to be consumed strictly by the targeted individual; in study arms A, B, and C it consisted of CSB. The ration of CSB provided 494 kcal per day. In two of the study arms (D and E), micronutrient supplements were provided instead of CSB: LNS in arm D and MNP in arm E. In these study arms, Mercy Corps worked with the NGOs providing services at the HCCs to ensure that mothers and children who were receiving LNS or MNP were not also receiving other micronutrient supplements—iron–folic acid in the case of pregnant and lactating women or locally available micronutrient powders in the case of children 6–24 months of age. The composition of the LNS and MNP supplements provided by *PROCOMIDA* to pregnant and lactating women and children 6–23 months of age were designed to be identical aside from the kilocalories, protein, fat, and fatty acids included in the LNS. The nutrient composition of the LNS and MNP supplements for pregnant and lactating women and children 6–23 months of age and the number of sachets provided can be found in Appendix B, Table B.1.

Table 2.3 *PROCOMIDA* Monthly Individual Ration Sizes

Target group	CSB (Arms A, B, and C)		LNS[a] (Arm D)			MNP[a] (Arm E)		
	kg/month	kcal/day	Sachets/ month	g/day	kcal/day	Sachets/ month	g/day	kcal/day
Pregnant women/women within the first 6 months postpartum	4.0	494	30	20	118	60	4	—
Children aged 6–23 months	4.0	494	60	20	118	60	4	—

[a] The nutrient composition of the LNS and MNP supplements for pregnant and lactating women and for children 6–23 months of age and the number of sachets provided can be found in Appendix B, Table B.1.

The comparison groups and how they relate to the specific research questions are shown in **Table 2.4**.

Table 2.4 Study Arm Comparisons and Research Questions

Study Arm	Compared To	Research Question
PROCOMIDA (A)	Control (F)	What is the impact of *PROCOMIDA* on child nutritional status?
PROCOMIDA (A)	Control (F)	What is the cost-effectiveness of *PROCOMIDA*?
PROCOMIDA with a reduced family ration (B)	Control (F)	Does *PROCOMIDA* with a reduced family ration improve child nutritional status?
PROCOMIDA with a reduced family ration (B)	*PROCOMIDA* (A)	Does *PROCOMIDA* with a reduced family ration have the same impact on child nutritional status as *PROCOMIDA?*
PROCOMIDA without a family ration (C)	Control (F)	Does *PROCOMIDA* without a family ration improve child nutritional status?
PROCOMIDA without a family ration (C)	*PROCOMIDA* (A)	Does *PROCOMIDA* without a family ration have the same impact on child nutritional status as *PROCOMIDA?*
PROCOMIDA with LNS (instead of CSB for individual ration) (D)	Control (F)	What is the impact of the *PROCOMIDA* program with LNS instead of CSB as individual ration on child nutritional status?
PROCOMIDA with LNS (instead of CSB for individual ration) (D)	*PROCOMIDA* (A)	What is the differential effect of LNS instead of CSB as individual ration on child nutritional status?
PROCOMIDA with MN powder (instead of CSB for individual ration) (E)	Control (F)	What is the impact of the *PROCOMIDA* program with micronutrient (MN) powder instead of CSB as individual ration on child nutritional status?
PROCOMIDA with MN powder (instead of CSB for individual ration) (E)	*PROCOMIDA* (A)	What is the differential effect of MN powder instead of CSB as individual ration on child nutritional status?
PROCOMIDA with MN powder (instead of CSB for individual ration) (E)	*PROCOMIDA* with LNS (instead of CSB for individual ration) (D)	What is the differential effect of PROCOMIDA with LNS compared to PROCOMIDA with MN powder, as individual rations on child nutritional status?

2.4 Study Methods

Data for this study were collected at the household, community, and health convergence center levels. Household surveys included eight waves, spanning from pregnancy until the child reached 24 months old. Pregnant women were recruited into the study on a rolling basis beginning in August 2011; the final survey (in a household with a child 24 months old) was conducted in June 2015. The community and health convergence center surveys took place from July to September 2012, after program implementation was underway, and again two years later, from July to September 2014. Sample size estimates are based on the ability to detect impact in the household sample. Community and HCC data were primarily used to provide descriptive information about the *PROCOMIDA* implementation area.

2.4.1 Sample Size

The sample size calculations for the longitudinal cohort study used the following parameters[9]: a type 1 error of 0.05, power of 0.90, and an intracluster correlation of 0.007 for length-for-age Z-score (LAZ).

The sample sizes for the PM2A evaluation were calculated to detect meaningful changes measured at the individual (i.e., child or household) level. The study was not powered to detect meaningful changes at the HCC or community level.

To establish the required study sample size, we calculated the number of subjects necessary to estimate the impact of *PROCOMIDA* (arm A vs. control, i.e. research question 1) on LAZ, child anemia, child feeding practices, child development, food security, household expenditure; the number of subjects necessary to estimate the impact of study arms B, C, D, and E on LAZ (research questions 2, 4, 6, and 8) and of arms D and E on child anemia (questions 6 and 8); the number of subjects necessary to estimate the differential impact of the different study arms: A versus B (question 3), C (question 5), D (question 7), and E (question 9), and arm D versus E (question 10). The required sample size in each study arm is shown in **Table 2.5**. The estimated required sample size was (nearly) 600 pregnant women in each study arm, or a total of 3,600 pregnant women.[10]

Table 2.5 Required Sample Size by Study Arm

	Study Arm					
	A	B	C	D	E	F
Minimum sample size required	598	600	600	600	600	600

2.4.2 Sampling

A cluster, randomized controlled evaluation design with longitudinal follow-up on study participants was used for the impact evaluation. For this study, a cluster was defined as a group of communities served by one health convergence center. One HCC serves an average of 900–1,000 people living in two to three communities. A total of 120 health convergence centers was selected of the pool of 215 *PROCOMIDA*-eligible health convergence centers in the municipalities of Cahabón, Cobán, Lanquín, and San Pedro

[9] The sampsi command (followed by sampclus to correct for intracluster correlation) in Stata was used for the sample size calculation. Sampsi's change option for repeated measures was used, setting the correlation between measurements at a conservative 0.45. This provides a more conservative estimate of the sample size required for a simple (ex-post) difference estimate than without taking the autocorrelation into account.
[10] Due to expected loss to follow-up, the number of pregnant women to be enrolled needed to be higher. Using information on loss-to-follow-up among women enrolled in the first months of the study, the required number of pregnant women was estimated to be approximately 4,600.

Carchá in Alta Verapaz.[11] The HCCs were randomly assigned to one of the six study arms (20 health convergence centers per arm). The complete list of selected HCCs and the study arm to which each one was assigned is shown in Appendix C, Table C.1.

2.4.3 Selection of the Index Mother and Child

All women 3–7 months pregnant residing in communities served by the 120 selected HCCs were invited to enroll in the study. A master list of eligible women was compiled using information obtained from the NGOs that managed the health convergence centers' health services and from a list of *PROCOMIDA*'s beneficiaries. Each month, the list of eligible pregnant women was updated.

If a household had more than one eligible pregnant woman, one woman was randomly selected as the index mother by ranking the women's first names alphabetically. If another woman became pregnant in the same household at a later date, she was not eligible to enroll in the study cohort but could receive the same program benefits as study participants who resided in her cluster.

If an enrolled woman had twins, one child was randomly selected as the index child by ranking the children's first names alphabetically. The second child was not eligible to enroll in the study.[12]

2.4.4 Timing of Data Collection

Pregnant women and their households were recruited for the study on a rolling basis from August 2011 to November 2012 (**Table 2.6**). The panel survey consisted of eight waves in total, and after enrollment households were interviewed when the index child was 1, 4, 6, 9, 12, 18, and 24 months old. The 24-month survey took place from September 2013 to June 2015.

Table 2.6 Timing of the Household Surveys

Survey	Start	End
Enrollment	August 2011	November 2012
1 month	October 2011	July 2013
4 months	January 2012	October 2013
6 months	March 2012	December 2013
9 months	June 2012	March 2014
12 months	September 2012	June 2014
18 months	March 2013	February 2015[a]
24 months	September 2013	June 2015

[a] Surveys in one community were delayed a few months because of civil unrest.

The first wave of the community and health convergence center surveys took place from July to September 2012. At this point, program implementation and many aspects of institutional strengthening for the HCCs had already begun. Thus, the community and health convergence center data should not be interpreted as a pre-implementation baseline. Two years later, from July to September 2014, a second wave of community and HCC data were collected.

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[11] HCCs serving a large number of communities (more than six) or a large population (over 2,300 people) were dropped, because they were rare. HCCs in the Lanquín municipality were also dropped, since there were few of them. The 190 remaining HCCs were then stratified by the number of communities served (first stratum: one community; second stratum: two communities; third stratum: three to five communities). Within each stratum, sampling proportional to population size was used to randomly select HCCs.
[12] Both twins still received program benefits, but only one family ration was provided.

2.4.5 Questionnaire Descriptions

Data were collected at the HCC, community, and household levels, using pretested questionnaires. The list of modules included in each of the questionnaires is presented in **Tables 2.7–2.10**.

Health Convergence Center Questionnaire

The HCC questionnaire gathered information on the health convergence centers' schedule, personnel, services provided, and availability of equipment and supplies.

Table 2.7 Modules Included in Health Services Assessment Questionnaire

Module	Topic	Description	Respondents
1	Schedule	Hours of operation for preventive services for children, pregnant women, and women postpartum	HCC personnel
2	Personnel	Number of health care personnel and the number of hours worked at the HCC per month	HCC personnel
3	Services for children	Provision of growth monitoring services, services for sick children, and treatment for severely malnourished children	HCC personnel
4	Services for women	Prenatal care, delivery assistance, and postnatal care	HCC personnel
5	Vaccinations	Vaccination and vitamin A supplementation	HCC personnel
6	Equipment	Availability of medical equipment required for the provision of preventive and curative care for children and pregnant women	HCC personnel
7	Medications	Supply of medication	HCC personnel
8	Infrastructure	Construction materials used for floor, walls, and roof; availability of water, electricity, toilets/latrine, and stove, etc.	HCC personnel

Community Questionnaire

The community questionnaire collected information on the local schools and health services, food crops, fruit trees, the presence of associations or cooperatives, forms of transportation, infrastructure, recent immigration/emigration patterns, weather conditions, development projects, and positive and negative events that affected the community residents in recent years. Data were collected in each of the 264 communities served by the 120 health convergence centers.

Table 2.8 Modules Included in Community Questionnaire

Module	Topic	Description	Respondent
1	Schools	Information on schools attended by children living in the community, including location, type, fees, and perceived quality	Group of community members
2	Health services	Health services used by families living in the community, including location and travel time, vaccination campaigns, and epidemics; health personnel living in the community also identified	Group of community members
3	Food crops	Main crops in the community and timing of harvest	Group of community members
4	Fruit trees and permanent crops	Main fruit trees and permanent crops in the community and timing of harvest	Group of community members
5	Community organizations	Existing community organizations, their objectives, and membership	Group of community members
6	Transportation	Availability and cost of public transportation to a number of locations and ease of access to the community	Group of community members
7	Infrastructure	The availability of electricity, water, and telephone	Group of community members
8	History	Community, migration, climate, etc.	Group of community members
9	Development programs	Development programs implemented over the past 5 years (recall period changed to 2 years in the second community survey)	Group of community members
10	Events	Events that affected the community (positively or negatively) over the past 5 years (recall period changed to 2 years in the second community survey)	Group of community members

Household Questionnaire

The household questionnaire was used to gather information on household demographic characteristics and socioeconomic indicators, food security, participation in social assistance programs, shocks, and the characteristics of the pregnant woman and their children under 2 years of age. The household questionnaire was based on instruments from a variety of sources, such as the FANTA Household Hunger Scale (HHS) (Ballard et al. 2011), and the 20-question Self-Report Questionnaire (SRQ-20) (WHO 1994) to evaluate maternal health and stress. The World Health Organization (WHO) IYCF instrument was used to construct breastfeeding and complementary feeding indicators for children 0–23 months of age (WHO 2008; 2010). All modules were adapted to the specific needs of this study. **Table 2.7** presents the modules included in the questionnaire, the questionnaire or instrument the module was based on, and a short description of each module.

Table 2.9 Modules Included in the Household Questionnaire

Module	Topic	Waves Collected	Source	Description	Respondent
1	Household roster and education	Complete: enrollment, 12 months, and 24 months Updated for migrant households[13] at all other waves	IFPRI	Information on the composition of the household, including designation of the head of household, a list of all household members, their age and sex, and their relationship to the head of household; highest educational level attained and activity/employment in the past month	Head of household, spouse, household member over 18 years of age, or index mother
2	Housing	Complete: enrollment, 12 months, and 24 months Updated for migrant households at all other waves	IFPRI	Construction materials used for floor, walls, and roof; availability of water and electricity; fuel/energy used for cooking, lighting, etc.	Household member over 18 years of age or index mother

[13] Migrant households are households that moved (either long distances or nearby to form new households) between surveys. As explained in Section 2.4.6, Vox Latina was required to notify the IFPRI-Cobán office if households had moved. The IFPRI-Cobán office then determined if the household would be interviewed in its new location. Interviews were conducted in the new location for the 1-month, 4-month, 6-month, 9-month, and 18-month surveys if the household moved to a community within the same HCC, moved to a community covered by an HCC in the sample, or moved to an HCC that could be accessed by one of the six Vox Latina survey teams. Interviews were conducted in the new location for the 12-month and 24-month surveys for all households that could be found. Of the original sample, 30 households migrated and were completely lost to follow-up at some point during the sample; another 345 households migrated and were able to complete a later survey. Consistent with the intent-to-treat approach used in this study, data were analyzed according to the initial study group to which the household was assigned.

Module	Topic	Waves Collected	Source	Description	Respondent
3	Assets	Complete: enrollment, 12 months, and 24 months Updated for migrant households at all other waves	IFPRI	Durable household goods (in working condition), including tools for agricultural production and animals	Household member over 18 years of age or index mother
4	Nonfood expenditure	Enrollment and 24 months	IFPRI	Household expenses over the past week, month, and year in specific nonfood items	Household head, spouse, household member over 18 years of age, or index mother
5	Food consumption and expenditure	Enrollment and 24 months	IFPRI	Expenses and consumption of food by the household in the past week	Individual in charge of food preparation or household member over 18 years of age or index mother
6	Participation in social programs	Enrollment, 12 months, and 24 months	IFPRI	All social programs' household members participate in and the benefits received from these programs	Household head, spouse, household member over 18 years of age, or index mother
7	Shocks	Enrollment and 24 months	IFPRI	All shocks (economical, agricultural, and familial) faced by the household in the past 12 months	Household head, spouse, household member over 18 years of age, or index mother
8	Food security	Enrollment, 12 months, and 24 months	FANTA Household Hunger Scale (HHS) (Ballard et al. 2011)	The prevalence of household hunger using the FANTA HHS	Individual in charge of food preparation or household member over 18 years of age
9	Health and nutrition knowledge	All waves	IFPRI	Knowledge of child health, health care–seeking, feeding, and danger signs	Index mother
10	Index mother's status	Enrollment, 12 months, and 24 months	Demographic and Health Surveys (DHS), IFPRI	Women's decision-making power	Index mother
11	Index mother's occupation and activity	Enrollment, 12 months, and 24 months	IFPRI	Women's literacy, occupation, and activities	Index mother

Module	Topic	Waves Collected	Source	Description	Respondent
12	Index mother's prenatal care	Enrollment, 1 month, 4 months, and 6 months	DHS	Pre-, peri-, and postnatal care received	Index mother
13	Index mother's health	All waves	IFPRI, WHO SRQ-20 (1994)	Index mother's health and stress	Index mother
14	Child development	4 months, 6 months, 9 months, 12 months, 18 months, and 24 months	IFPRI	Achievement of motor and language milestones (see Appendix D)	Index mother and interviewer observation
16	IYCF	1 month, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months	WHO 2008; 2010	Breastfeeding and child feeding practices	Index mother
17	Child health and morbidity	1 month, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months	WHO Integrated Management of Childhood Illness (IMCI), DHS	Illness, treatment for illness, growth monitoring attendance, vaccination receipt, supplementation (vitamin A, iron–folic acid), and deworming	Index mother
19	Participation in *PROCOMIDA*	Enrollment, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months	IFPRI	Participation of the index mother in *PROCOMIDA*	Index mother
21	Hygiene spot-check, latitude, longitude, and altitude	Enrollment, 1 month, 12 months, and 24 months	IFPRI	Cleanliness of the index mother and child and the interior and exterior of the house	Interviewer observation and handheld global positioning system (GPS) devise

Note: Missing module numbers indicate that no module with this number was included in the survey.

Anthropometry and Hemoglobin Concentration Data Collection

At enrollment, interviewers recorded the height and weight of the index mother. In subsequent surveys, index mothers' height and weight were again measured, as was the length and weight of the index child. Blood Hb concentration was also collected from index mothers and children in some of the subsequent surveys.

Table 2.10 Modules Included in Anthropometry and Hemoglobin Concentration Questionnaire

Module	Topic	Waves collected	Description
18	Index mother anthropometry	All waves	Index mother's height and weight were measured; height was measured twice and a third measurement was taken if the difference between the first two measurements exceeded 10 mm. The absolute differences between measurements were calculated, and the average of the two measurements with the smallest difference was used to calculated mother's height.
	Index mother Hb	6 months, 12 months, and 24 months	Index mother's blood Hb concentration
	Index child anthropometry	1 month, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months	Child weight and length were measured; length was measured twice and a third length measurement was taken if the difference between the first two measurements exceeded 6 mm. The absolute differences between measurements were calculated, and the average of the two measurements with the smallest difference was used to calculated child's length.
	Index child Hb	6 months, 12 months, 18 months, and 24 months	Index child's blood Hb concentration

2.4.6 Fieldwork for Household Surveys

Survey Firm. Vox Latina, a Guatemala City–based survey firm, was contracted in 2011 to conduct the longitudinal survey. A special field office was opened in Cobán in August 2011 to manage the Vox Latina field operations. This office ensured that enumerators and supervisors were equipped with the necessary supplies and the updated list of eligible pregnant women. They also reported enrollment numbers to IFPRI weekly and uploaded electronic questionnaires into Dropbox[14] daily. The Vox Latina team in Cobán was also in charge of managing equipment, monitoring fieldwork, preparing trainings, and communicating all field issues with IFPRI. In addition, staff wrote a weekly report that updated IFPRI on Vox Latina field and office activities.

Computer-Assisted Personal Interviewing with Surveybe. Data were collected using portable computers. Economic Development Initiatives (EDI), a London-based company, was contracted in January 2011 to program the enrollment and 1-month questionnaires into Surveybe, their computer-assisted personal interview (CAPI) software. Surveybe is an advanced CAPI software package allowing for real-time (i.e., in the field, while the questionnaire is being completed) data quality checks, which enables enumerators to correct the issues identified by Surveybe as the interview is being conducted. Questionnaires for subsequent surveys were programmed by IFPRI staff.

[14] A file-sharing service.

Training for the Enrollment Survey

- **Training of supervisors.** The survey supervisors participated in a 1-week training before enumerator training began. The training covered basic computer skills, introduction to Surveybe, and an overview of the enrollment questionnaire. Supervisors were also trained to manage a large team of enumerators, conduct basic computer tasks (e.g., management of computer folders and use of USB flash drives), upload files into Dropbox, archive completed electronic questionnaires on both the supervisor's and enumerators' computers, and correctly report progress and problems to the Vox Latina–Cobán office. The supervisors also attended all trainings for enumerators.
- **Training of enumerators.** A variety of methods was used to train the enumerators[15] in the use of the paper questionnaire over the course of 3 weeks. These included lectures, role-play, discussions of all potential answers to a question, and discussions related to the coding of different types of responses. The enumerators were continuously evaluated during the training. Each week, a short written test was used to evaluate their understanding of the paper questionnaire.
- **The use of Q'eqchi'.** In the absence of a standard Q'eqchi' spelling and since many Q'eqchi' speakers have difficulty reading written Q'eqchi', the Spanish questionnaire was not translated. Rather, field-workers were trained to apply the questionnaire in Q'eqchi'. To standardize the translation, interviewers first decided on a suitable translation in small groups and then the entire team discussed it until a final translation was approved. The translation was then evaluated by two staff members of the Mayan Academy of Languages who had extensive knowledge of the Alta Verapaz region. After they gave their final approval, the translation was read one more time to the group. Each enumerator was instructed to write down the translation on the paper version of the questionnaire.
- **Training of enumerators in Surveybe.** Once enumerators were familiar with the paper questionnaire and knew how to conduct the survey in Q'eqchi', they were trained in the use of the Surveybe questionnaire over the course of 1 week. A variety of activities was used in the Surveybe training, including lectures, individual and group computer exercises, and answering each question in the Surveybe questionnaire. Enumerators were also trained to understand how to troubleshoot problems with the computer (e.g., frozen screen) and what safety practices to use in the field (e.g., use of a surge protector when charging the battery).
- **Training and standardization in anthropometry.** The team of field-workers was carefully trained in conducting the anthropometric measurements for 1 week. Their training included lectures and equipment demonstrations and was followed by practical exercises in the measurement of height and weight of infants, children, and women. The field-workers were then standardized (Cogill 2003) in the measurement of height and weight. First, the height and weight of five children 0–24 months of age and their mothers were measured by all field-workers and the trainer; each field-worker measured each individual twice. A spreadsheet was created to compute the precision and accuracy of all trainees. A second round of standardization was organized for those needing more practice. Based on the results of the standardization, a final selection of anthropometrists was made.
- **Pilot test and feedback.** After completing the training, each enumerator conducted three pilot interviews. Each completed electronic questionnaire was reviewed by the IFPRI coordinator, the Vox Latina field manager, and a randomly selected enumerator pair. Observations, comments, and problems were discussed among the entire group for 2 days.

[15] Enumerators were both male and female.

Training for the Subsequent Surveys. Field-workers were trained extensively for each subsequent survey round. The field teams were trained in batches in order to keep staff in the field at all times and thus minimize disruptions to the field operations.

Identifying and Enrolling Pregnant Women. To identify and enroll pregnant women in a timely fashion, a surveillance system was set up. This system is described below.

- **Master list of pregnant women and control sheets.** At the beginning of the enrollment process (and every month thereafter), a list of eligible pregnant women (women who were between 3 and 7 months' pregnant) was compiled by IFPRI using information obtained from the NGO that managed the health convergence centers' health services and from a list of newly enrolled beneficiaries in *PROCOMIDA* (Steps 1 and 2, **Figure 2.1**). Every month, newly identified pregnant women were added to the list, thus generating an updated master list of eligible pregnant women (Step 3a, **Figure 2.1**). For each woman, a control sheet (Step 3b, **Figure 2.1**) was generated that included basic information on the woman and the last date the interview could be conducted, based on her expected due date. The control sheets were used to track enrollment progress in the field, ensure that women were enrolled in a timely manner, and cross-check the number of electronic questionnaires received by Vox Latina.
- **Enrolling women in the study.** The control sheets for each eligible woman were given to the supervisors of each field team, and they were instructed to first interview women who were further along in their pregnancy (Step 1, **Figure 2.2**). After conducting the enrollment interview, the enumerators recorded the interview date, the Surveybe enrollment questionnaire identification number, and any pertinent information about the interview on the control sheet (Steps 2 and 3, **Figure 2.2**).
- **Identifying newly pregnant women in the field.** Field teams met with community health volunteers to identify women eligible for enrollment who were not included in the master list. If a pregnant woman was detected in the field, the field team was instructed to fill out a control sheet for the newly identified woman and conduct the enrollment interview if possible (Steps 2 and 3, **Figure 2.2**).
- **Enrollment monitoring.** At the end of each week, the field team turned in the control sheets of enrollment interviews conducted and newly identified pregnant women to IFPRI staff (Step 4, **Figure 2.2**). The IFPRI-Cobán office then entered the information into an MS Access database to track enrollment progress by HCC and study arm and to monitor reasons for not conducting the interview (e.g., not eligible for enrollment, could not be located, or did not accept interview). Each week, the master list was updated and a report sent to Vox Latina detailing the remaining number of identified eligible pregnant women (Step 5, **Figure 2.2**).

Figure 2.1 Monthly update of master list of pregnant women

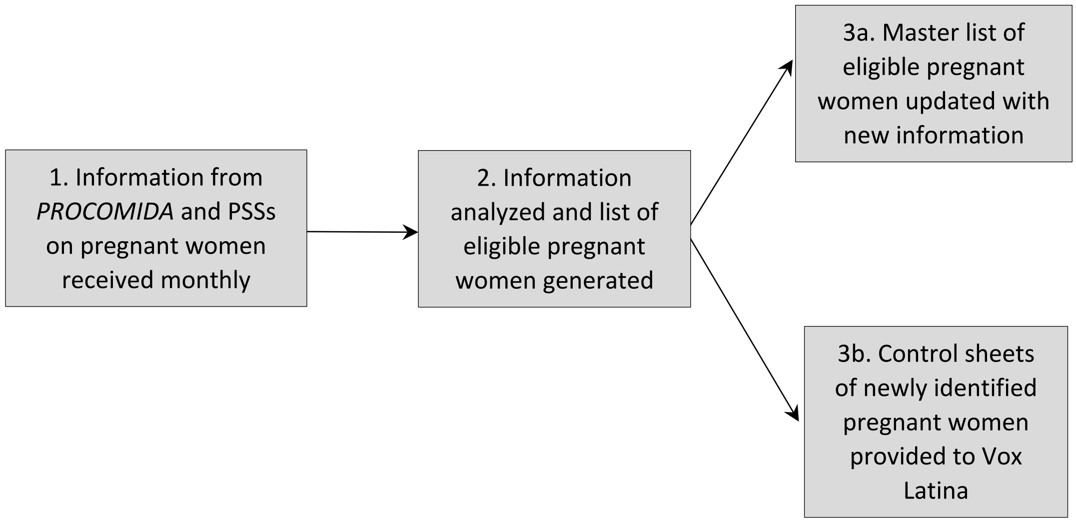
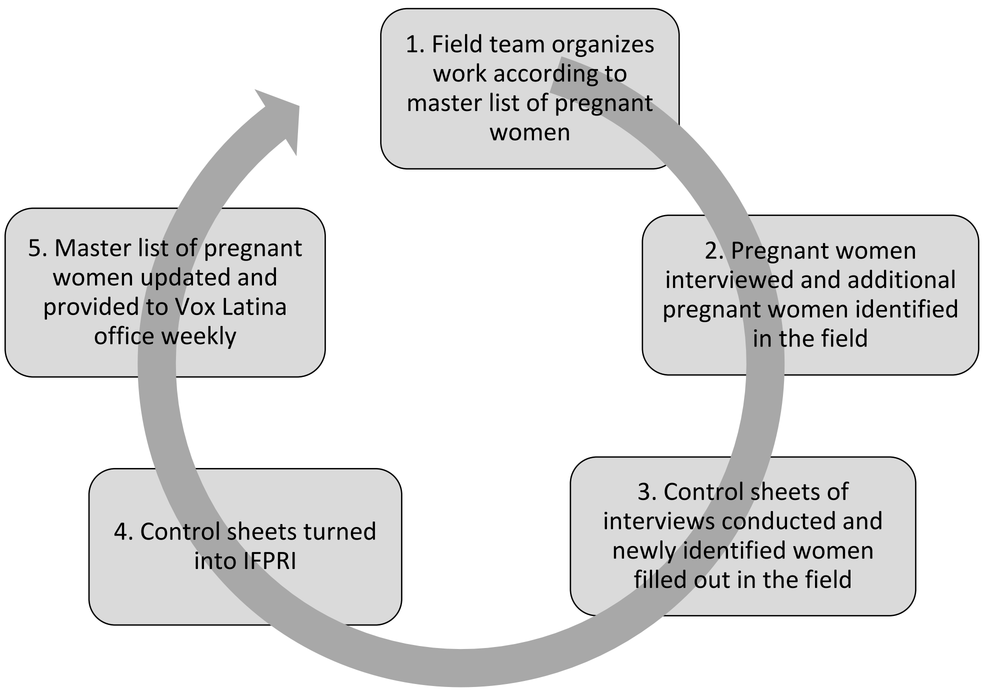


Figure 2.2 Weekly update of master list of pregnant women

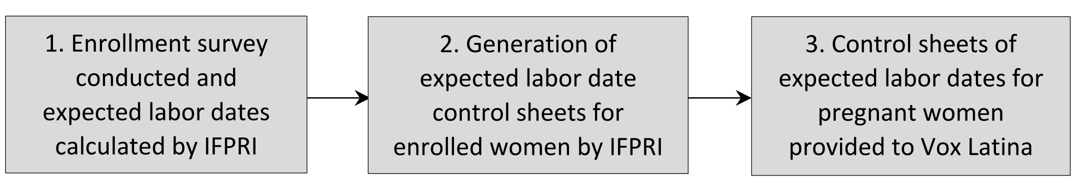


Identifying Dates of Birth and Conducting the 1-Month Survey. To identify birth dates and conduct the 1-month survey in a timely fashion, the following surveillance system was set up.

- **Master list of expected labor dates and control sheets.** Once an enrollment interview was conducted, IFPRI calculated the potential labor date for each pregnant woman based on the first day of the woman's last period, which was self-reported in the enrollment interview (Steps 1 and 2, **Figure 2.3).** For each woman, a control sheet was generated that included basic information on the woman, her potential due date, and the estimated dates for the 1-month survey.

- **Identifying births in the field.** The expected-labor-date control sheet for each woman was given to the field supervisor of the HCC serving the area in which the woman resided (Step 3, **Figure 2.3**). Supervisors were instructed to locate women close to their estimated expected labor dates to determine if the woman had given birth (Step 1, **Figure 2.4**). The enrolled pregnant women and their family members were also provided with Vox Latina's office number in Cobán in order to report a birth.
- **1-month control sheets.** Vox Latina sent IFPRI the updated control sheets (i.e., those that contained the actual birth date of the index child, (Step 1 and 2, **Figure 2.5**) on a weekly basis. IFPRI registered these births in an MS Access database and generated a 1-month survey control sheet, which contained general information on the woman, the birth date of the child, and the acceptable time window in which to conduct the 1-month interview (i.e., within three days of the child turning 1 month of age).[16]
- **Conducting interviews.** The 1-month control sheet for each woman-child pair was given to the supervisor of the health convergence center serving the area where the woman-child pair resided (Step 3, **Figure 2.5**). Supervisors were instructed to schedule interviews within the acceptable time window (Step 1, **Figure 2.5**). After conducting the 1-month interview, the enumerators recorded the interview date, the Surveybe questionnaire identification number, and any relevant information about the interview on the control sheet (Steps 2 and 3, **Figure 2.5**). If the interview was outside the acceptable time window, the enumerator was required to provide a written explanation of why it was conducted late.
- **Identifying new births in the field.** If a non–previously identified child around 1 month of age was found in the field and the 1-month interview could be conducted, the field team was instructed to conduct the interview and fill out both the expected labor date and 1-month control sheets at the same time (Steps 2 and 3, **Figure 2.5**).
- **1-month interview monitoring.** At the end of each week, the field team submitted the control sheets of expected labor dates and 1-month interviews conducted (Step 4, **Figure 2.5**) to IFPRI. The IFPRI-Cobán office then entered the information into the MS Access database in order to track progress by HCC and by study arm, and to monitor late 1-month interviews and expected labor dates that were past due. Each week, the master list of expected births and 1-month interviews was updated and a report was sent to Vox Latina that detailing the remaining number of births and 1-month surveys to be conducted per supervisor and per health convergence center (Step 5, **Figure 2.5**).

Figure 2.3 Weekly update of expected labor dates of pregnant women



[16] The actual time window was larger than the ± 3 days.

Figure 2.4 Generation of 1-month survey control sheets

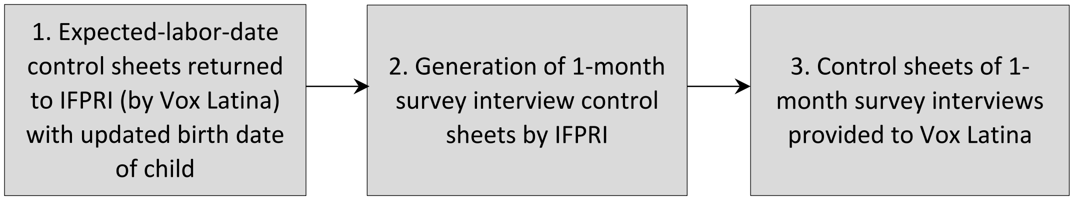
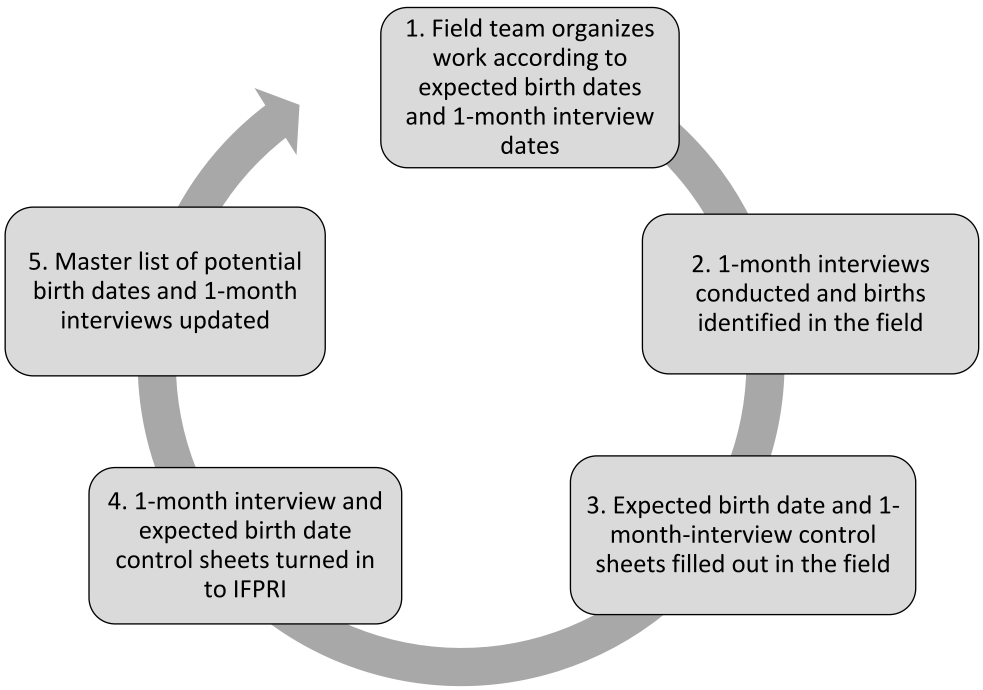


Figure 2.5 Weekly update of potential birth dates and 1-month interviews



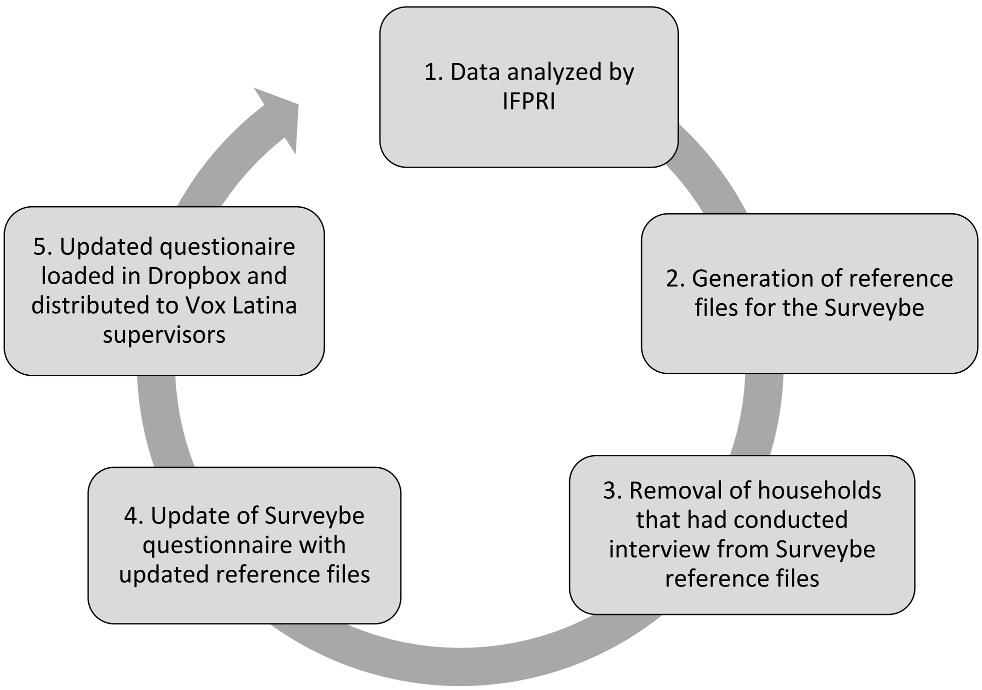
Conducting the Subsequent Surveys. For each follow-up survey after the 1-month survey, control sheets were prepared by IFPRI by analyzing children's birth dates from the 1-month survey. Interviews were conducted and monitored following the system described above. In addition, each month IFPRI provided to Vox Latina six calendars for the following month, one per supervisor. The calendar detailed which interviews could be conducted on which day, according to the distribution of households by supervisor. The calendar was meant to aid Vox Latina supervisors in the field management of follow-up surveys. If the 1-month interview was conducted late because a birth was difficult to verify, Vox Latina notified IFPRI immediately, and updated control sheets and questionnaires were prepared for follow-up surveys. If the household moved between surveys, Vox Latina was required to notify the IFPRI-Cobán office. The IFPRI-Cobán office then determined if the household would be interviewed in its new location. Interviews were conducted in the new location if the household moved to a community within the same HCC, moved to a community covered by an HCC in the sample, or moved to an HCC that could be accessed by one of the six Vox Latina survey teams.

Updating Follow-Up Questionnaires

- **Surveybe reference files.** Each follow-up survey built on data collected during the previous survey, such as the list of household members and the personal identification numbers of the household head, the index child, and the mother of the index child. The data were stored in a reference file and preloaded into the Surveybe questionnaire. When the enumerator opened the Surveybe program on his or her computer, he/she would first select which household to interview on the Surveybe dashboard. Once the correct household identification number was selected, the questionnaire would contain the pre-programmed information for that particular household and survey round.

- **Updating reference files.** Each month, data were analyzed and the respective reference files were updated (Steps 1 and 2, **Figure 2.6**). In order to reduce the number of households on the Surveybe dashboard, IFPRI removed data for households for which the respective follow-up interview had been conducted. (Steps 3 and 4, **Figure 2.6).**
- **Updating questionnaires in the field.** Each month, IFPRI updated the respective questionnaire and uploaded it in the Dropbox folder shared with Vox Latina (Step 5, **Figure 2.6**). Vox Latina then shared the questionnaire with supervisors of each field team. The questionnaire contained the date of its most recent update to ensure that the correct version was used in the field.

Figure 2.6 Monthly update of 1-month questionnaire



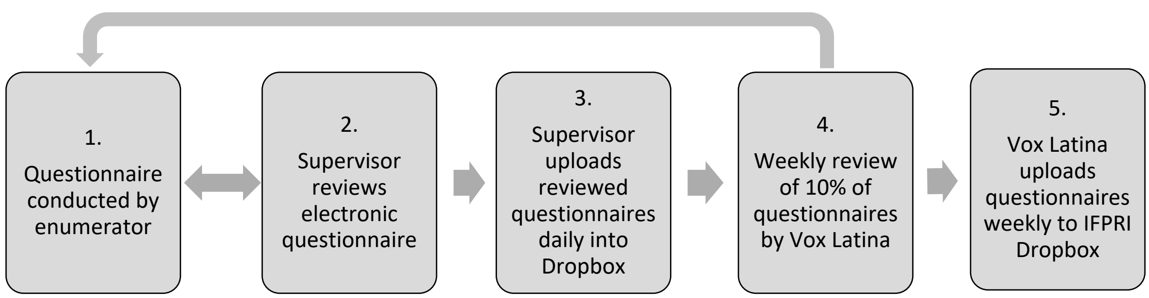
Field Operations

- **Information sessions.** Information sessions were organized at each HCC before the fieldwork for the enrollment survey started to inform the community about the purpose of the survey and to request their cooperation. Additional information sessions were held when community leaders changed or when questions arose.
- **Field teams.** Six teams (composed of one supervisor and four to six enumerators) administered the enrollment questionnaire. The enumerators conducted the enrollment questionnaire in pairs and collected and recorded the anthropometric data. In subsequent surveys, dedicated anthropometrists were used. Field teams were assigned to specific health convergence centers but were rotated on a regular basis to ensure uniformity in how the survey work was conducted. As the number of households to be followed decreased over time, the number of field teams was reduced. Field staff

were monitored closely and continuously by the survey firm and IFPRI staff. Continuous monitoring ensured that a high level of data quality was maintained and that challenges encountered during fieldwork were addressed in an efficient and timely manner.

- **Administration of the enrollment and anthropometry questionnaires.** Enumerators were instructed to briefly explain the use of the computer to the interviewees before conducting the interview. Enumerators always carried an extra charged computer battery and hard copies of the questionnaires to be used in case the computer was lost or broken. Before leaving a household where a questionnaire had been administered, enumerators reviewed each electronic questionnaire to make sure that no questions were overlooked (Step 1, **Figure 2.7**).
- **Reviewing the questionnaire in the field.** The supervisor for each team was responsible for daily quality checks of the completed questionnaires. This included reviewing the responses to difficult questions and checking for internal consistency (Step 2, **Figure 2.7**). If problems were encountered, enumerators returned to the household and corrected the mistakes. Each night, the supervisor uploaded the reviewed questionnaires to his or her Dropbox folder (accessible to Vox Latina) and then archived the questionnaires on his or her own and the enumerator's computer (Step 3, **Figure 2.7**).
- **Review of the questionnaire in Cobán.** Each week, the field coordinator randomly selected 10 percent of the questionnaires for quality control (Step 4, **Figure 2.7**). Quality control checks included reviewing responses to difficult questions and checking for internal consistency. If problems were encountered, the field coordinator communicated with the supervisor and, if necessary, the enumerators returned to the household and corrected the mistakes. Once the batch of electronic questionnaires collected that week passed the quality test, the field coordinator uploaded the questionnaires into the Dropbox folder shared between Vox Latina and IFPRI (Step 5, **Figure 2.7**).

Figure 2.7 Process to review and upload electronic questionnaires



2.4.7 Health Convergence Center and Community Survey Fieldwork

Vox Latina was also contracted to complete the HCC and community surveys. A separate field team not involved in the household survey conducted these surveys.

The Use of Surveybe. The first wave of community and HCCs, conducted in 2012, were administered using paper questionnaires because few computers were then available for fieldwork. Responses were then entered into Surveybe. During the second wave, in 2014, the interviews were conducted with Surveybe.

Training for the First Health Convergence Center and Community Surveys

- **Training of enumerators and supervisors.** All enumerators had prior experience administering questionnaires with Surveybe. They received training on the HCC and community surveys during 4 days of classroom training, and an addition 4–5 days of practice in the field. A variety of methods, including lectures, role-play, discussions of all potential answers to a question, and discussions related to the coding of different types of responses.

- **The use of Q'eqchi'.** Interviews were conducted in both Spanish and Q'eqchi'. The majority of health convergence center staff spoke Spanish, whereas most of the community leaders preferred Q'eqchi'. The questionnaire was kept in Spanish and enumerators translated questions into Q'eqchi' when necessary.
- **Pilot test and feedback.** After training was completed, each enumerator conducted two HCC and two community interviews. Each completed questionnaire was reviewed by the IFPRI coordinator, the Vox Latina field manager, and a randomly selected enumerator pair. Observations, comments, and problems were discussed among the entire group for 1 day.

Training for Subsequent (2014) Health Convergence Center and Community Surveys. Because of the 2-year lag between the first and second health convergence center and community surveys, a new team of enumerators and supervisors was completely retrained following the same protocol described above.

Field Operations

- **Field teams.** Two teams (composed of one supervisor and four enumerators) administered the HCC and community questionnaires.
- **Administration of the health convergence center questionnaire.** The HCC questionnaire was administered to at least one health professional per health convergence center facility.
- **Administration of the community questionnaire.** The community questionnaire was conducted with key informants who were brought together as a group in each community. The group interview was conducted by inviting community leaders, such as health and education professionals, religious leaders, and others. The questionnaire was filled out by at least two enumerators, who ensured that a consensus was reached on all the issues discussed.
- **Reviewing the questionnaires in the field.** The supervisor for each team was responsible for daily quality checks of the completed questionnaires. If necessary, the enumerators returned to the community or HCC and corrected the mistakes.
- **Review of the questionnaires in Cobán.** Each week, the field coordinator randomly selected 10 percent of the questionnaires for quality control. If problems were encountered, the field coordinator communicated with the supervisor and, if necessary, the enumerators returned to the community or health convergence center and corrected the mistakes.

2.4.8 Data Management, Cleaning, and Analyses

Data Management

Once the electronic enrollment household questionnaires were received by the IFPRI-Cobán office, they were exported to Stata (StataCorp) and four data management tasks were conducted.

- First, a unique household ID was generated to identify each household for follow-up interviews.
- Second, data checks were conducted by running a number of Stata do-files specifically written to identify missing information and internal consistency errors. After running these do-files, IFPRI communicated any problems detected with Vox Latina.
- Third, a cross-check was conducted between the number of questionnaires in Stata with that recorded in the MS Access database. In the case of any differences, IFPRI first tried to locate the electronic questionnaire in the Dropbox folder. If the electronic questionnaire was not found, IFPRI

communicated the problem to Vox Latina, who located the file on the enumerator's or the supervisor's computer.

- Finally, a list of all pregnant women enrolled per HCC was generated and provided to Vox Latina. For each enrolled woman, the list showed the number of months' pregnant, the expected birth date, and the name of the pregnant woman's husband or partner. The list was used to prevent enrolling a woman twice and to avoid enrolling two pregnant women in the same household.

At the 1-month survey, in addition to Steps 2 and 3 above, the following data management tasks were conducted.

- A cross-check was conducted between the labor dates entered in the questionnaires and the labor dates noted on the control sheets. Any differences were reported to Vox Latina for verification.
- A cross-check was conducted between the electronic survey results (e.g., miscarriage, migration) and what was reported on the control sheets. Any differences were reported to Vox Latina for verification.
- For each health convergence center, a report of all the children's birth dates and dates for the follow-up surveys for each woman-child pair was generated and provided to Vox Latina monthly. For each enrolled woman, the list showed the potential labor date, the actual labor date, the name of the pregnant woman's husband or partner, and the dates for all follow-up surveys. The report also included information on the result of the 1-month survey. These lists were meant to help Vox Latina understand which births and 1-month interviews were pending.

Data Cleaning

For each survey, standard data cleaning checks were performed. Impossible and unlikely values were either corrected or dropped. Open-ended responses were entered by the enumerators and responses that did not match a pre-programmed response category in Surveybe (e.g., reasons for not participating in *PROCOMIDA*) were classified and incorporated into the data files.

Additionally, for the longitudinal household survey, data were checked for consistency across waves. For example, data were compared to confirm that key household members (e.g., mother) were correctly identified across waves.

Variable Creation

From the data collected, new variables were also created to summarize HCC, household, and individual characteristics more concisely. These variables were based on norms and standards provided by international organizations and *MSPAS*. The variables created in this study are summarized below.

Health Convergence Center Variables. We compared the information obtained from the HCC questionnaires to the national guidelines for health convergence centers (*MSPAS* 2010). These guidelines describe the qualifications of essential personnel; the recommended characteristics of the facilities; and the essential equipment, medications, and supplies that each HCC should stock.

- **Personnel.** A complete Basic Health Team (*Equipo Básico de Salud* [*EBS*]) included two members of the ambulatory institutional team; a doctor or nurse and an institutional facilitator; and three community-level members, a community facilitator, a trained birth attendant, and a community health monitor. The local NGOs running the HCCs had determined that community health monitors were not considered essential, and a second indicator for the complete EBS relaxes this requirement.
- **Total number of diagnostic services for sick children.** This value sums the availability of six essential services for the diagnosis of sick children: measure body temperature, measure and record weight, measure and record height or length, evaluate immunization status, evaluate vitamin A status, and evaluate micronutrient supplementation status (range of the created variable 0–6, with 0 indicating that none of the six services were available, and 6 that all services were available).

- **Total number of prenatal care components.** This value sums the availability of nine essential service components offered during prenatal visits: measure weight, measure height, measure fundal height, measure pulse, measure blood pressure, measure temperature, check fetal heartbeat, check fetal movement, offer tetanus vaccine (range 0–9).
- **Total number of prenatal laboratory tests.** This value sums the availability of three essential prenatal laboratory tests: blood Hb test for anemia, blood sugar test, and urine sample (range 0–3).
- **Total number of prenatal nutrition and health counseling services.** This value sums the availability of four prenatal counseling topics: nutrition and hygiene during pregnancy, pregnancy danger signs, danger signs during birth, and preparing a family emergency plan (range 0–4).
- **Total number of postnatal nutrition and health counseling services.** This value sums the availability of five postnatal counseling topics: breastfeeding, postnatal nutrition and hygiene, family planning, danger signs in newborns, and danger signs in new mothers (range 0–5).
- **Anthropometric equipment availability.** This value sums the availability of seven pieces of essential anthropometric equipment: a newborn scale, a hanging (Salter) scale, a tie or bracket for the hanging scale, a child height/length board, an adult scale, an adult height board, and a mid-upper arm circumference (MUAC) band (range 0–7).
- **Diagnostic equipment availability.** This value sums the availability of five pieces of essential diagnostic equipment: thermometer, child blood pressure cuff, adult blood pressure cuff, stethoscope, laryngoscope (range 0–5).
- **Vaccination equipment availability.** This value sums the availability of five essential pieces of equipment for providing vaccinations: ice packs, a vaccine carrier, syringes and needles, a biohazard box, and new vaccination cards (range 0–5).
- **Maternal health equipment availability.** This value sums the availability of six types of maternal health equipment essential for running a health convergence center: disposable specula, Pap smear test kits, Ayre spatulas, delivery kits, pregnancy kits, and a measuring tape (range 0–6).
- **Disposable material availability.** This value sums the availability of 12 disposable materials essential for running a HCC: nonsterile gloves, sterile gloves, surgical knives, scalpels, cotton swabs, gauze squares, tongue depressors, rolls of gauze, elastic rolls, medical tape, IVs, and IV catheters (range 0–12).
- **Rupture in the supply chain.** A HCC experienced a rupture in the availability of essential vaccines or medications if personnel reported that they experienced a shortage of any duration during the past 6 months.

Household Characteristics. The following household variables were created.

- **Dependency ratio.** The ratio of economically dependent household members (aged under 15 or over 60 years) to economically active ones (between 15 and 60 years of age).
- **Cleanliness of mothers, children, and interior and exterior of dwellings.** These variables were constructed from spot-check observations conducted during the interviews. Field-workers[17] noted the cleanliness of hands, face, hair, and clothes of mothers and children, which were scored as "clean," "dirty," or "dusty." Inside the home, they noted whether it needed to be swept, dirty clothes were around, animal feces were present, and water was covered. Outside the home, they noted whether the

[17] Field-workers were extensively trained on this instrument to provide objective ratings of cleanliness but no formal standardization was conducted.

yard needed cleaning, human or animal feces were present, and garbage was present. The variables describe the proportion of mothers, children, or homes scoring "clean" on all counts.

- **Wealth index.** Principal component analysis was used to construct a wealth index, which included ownership of household durables, housing quality characteristics, and land ownership (Filmer and Pritchett 2001). The index was divided into quintiles ranging from poorest to wealthiest.
- **Household hunger.** This was assessed according to the percentage of households experiencing moderate or severe hunger according to the Household Hunger Scale, constructed using FANTA guidelines (Ballard et al. 2011), with scores assigned to a set of three questions about meals and hunger ("no food to eat of any kind in your household"; "go to sleep at night hungry"; "go a whole day and night without eating"), based on the frequency of occurrence (never = 0; rarely or sometimes = 1; often = 2) over the past 4 weeks. A total score (range of 0–6) was calculated and the following classifications made: 0–1, "little or no hunger"; 2–3, "moderate hunger"; 4–6, "severe hunger."

Maternal Characteristics. The following variables were created to describe maternal characteristics.

- **Maternal literacy.** Literacy was evaluated in both Spanish and Q'eqchi'. For each language, mothers were asked to read one of two sentences. The women were classified as literate if they could read the entire sentence, partially literate if they could read a little, and nonliterate if they could not read the sentence at all.
- **Maternal knowledge.** Mothers were asked a series of questions to assess their knowledge of danger signs during pregnancy and for childhood illnesses, how to care for a sick child or a child recovering from an illness, appropriate IYCF practices regarding breastfeeding and complementary feeding, and optimal hygiene practices for the prevention of diarrhea. Variables were created to describe the proportion of mothers responding correctly to each knowledge question within these four categories.
- **Maternal dietary diversity.** Maternal dietary diversity was calculated based on international standards and using an eight-food-group dietary diversity score, adapted from the nine-food-group dietary diversity score, which was the standard at the start of the study (Kennedy et al. 2011). Based on the mother's 24-hour dietary recall, all foods and liquids consumed were classified into one of eight food groups (starchy staples, dark green leafy vegetables, vitamin A-rich fruits and vegetables, other fruits and vegetables, flesh foods,[18] eggs, legumes/nuts/seeds, and milk and milk products). Dietary diversity included CSB consumption (which contributed to the starchy staples and legumes/nuts/seeds groups).[19]
- **Maternal stress:** Maternal stress was assessed by use of the Self-Reporting Questionnaire (SRQ-20) (WHO 1994), a 20-item questionnaire used to detect common mental disorders in primary health care settings. The SRQ-20 has been validated in Brazil (Iacoponi and Mari 1989; Mari and Williams 1985), Nicaragua (Penayo et al. 1990), and Chile (Araya et al. 1992). Cutoff points for categorizing severe mental distress vary according to context and the underlying mental health burden. No research has been conducted to determine a Guatemala-specific cutoff; therefore the mean score for the SRQ-20 was used for analysis.
- **Depression:** Postnatal depression was assessed with the Edinburgh Postnatal Depression Scale (EPDS), a 10-item questionnaire developed to identify women who potentially have postnatal depression. Scores greater than 10 indicate that the woman may be under distress or discomfort;

[18] Mothers reported on their consumption of flesh foods and organ meat together, and the two cannot be disaggregated in the two food groups recommended.
[19] Current guidelines recommend that CSB only be classified as a starchy staple and not part of the legumes/nuts/seed group (FAO/FHI 360 2016). This guidance was not available at the start of the study. For consistency with the report on the Burundi study, CSB is classified in both the starchy staple and legumes/nuts/seeds groups.

scores greater than 13 indicate a likelihood of depression (Cox et al. 1987; Murray and Cox,1990). The scale has been validated in Mexico (Alvarado-Esquivel et al. 2006), Peru (Vega-Dienstmaier et al. 2002) and Chile (Castañón and Pinto 2008).

Preventive Health Care Practices. Preventive health care practices for mothers and children were reported by mothers and evaluated in relation to national recommendations (*MSPAS* 2010), as detailed below.

- **Prenatal care.** It was evaluated whether women attended at least the recommended four visits, whether they attended a visit during the first 4 months and final month of pregnancy, and whether these visits were with trained professionals. Mothers reported receipt of specific prenatal care services and prenatal micronutrient supplementation.
- **Perinatal care.** Mothers reported whether the birth was attended by a trained professional and whether the infant was wiped, wrapped, and weighed following delivery.
- **Postnatal care.** Mothers reported whether they had seen a medical professional with their newborn by the time of the 1-month survey.
- **Preventive child health care practices.** The standards for growth monitoring, vitamin and mineral supplement use, and vaccination coverage[20] were based on national standards. Information about growth monitoring, supplementation, and vaccinations were recorded in the child's vaccination card. At each survey, the date of each event was recorded directly from the vaccination card if it was available. Beginning with the 12-month survey, dates of previous events were updated or corrected. The following variables were created using the complete record available from the final survey:
    - **Growth monitoring visits (weight).** Children aged 0–23 months should attend monthly growth monitoring visits and should be weighed at each visit. We create variables indicating the number of months that a child's weight was measured and recorded on their health card for four different 6-month intervals: 0–5 months, 6–11 months, 12–17 months, and 18–23 months.
    - **Growth monitoring visits (length).** Children aged 0–23 months should have length measured every four months. We created binary variables for whether a child's length was measured and recorded on their health card at least once for six different 4-month intervals: 0–3 months, 4–7 months, 8–11 months, 12–15 months, 16–19 months, and 20–23 months.
    - **Vitamin A supplementation.** Children should receive vitamin A supplements every 6 months from 6–59 months of age. We created a binary indicator for three separate 6-month intervals. In practice, children often received their first supplement when they were almost 6 months old. Therefore, we allowed a supplement received when children were 5 months old to be included in the first interval. Thus, we created binary indicators for the following three intervals: 5–11 months old, 12–17 months old, and 18–23 months old.

IYCF Practices. The WHO IYCF practices instrument (WHO 2010) was used to construct the WHO-recommended indicators for breastfeeding and complementary feeding of children 0–24 months of age. The WHO instrument was designed for use in cross-sectional surveys. Given the longitudinal nature of this study, some adjustments needed to be made, which are detailed below.

[20] A common practice among health workers administering vaccinations is to write recommended upcoming vaccination dates in pencil in the vaccination cards as reminders. This meant that it was impossible to confirm whether the dates listed in children's vaccination cards were actual vaccination events. Therefore, these data are not analyzed.

- **Early initiation of breastfeeding (within 1 hour of birth).** Proportion of children who were put to the breast within 1 hour of birth (recall of the primary caregiver at the 1-month survey).[21]
- **Exclusive breastfeeding of children among children under 6 months of age.** Proportion of children who were given nothing but breast milk (no other liquids or solids) in the past 24 hours reported at the 1-month, 4-month, and 6-month surveys.[22] Note that the indicator does not report the percentage of children who were exclusively breastfed; it only defines the percentage of children who were exclusively breastfed in the last 24 hours. The indicator likely overestimates the children who were exclusively breastfed.
- **Predominant breastfeeding among children under 6 months of age.** Proportion of children given breast milk and specific other liquids,[23] but no solids, in the past 24 hours reported at the 1-month, 4-month, and 6-month surveys.[24] Those children classified as exclusively breastfed by the previous indicator are also classified as predominantly breastfed.
- **Introduction of solid, semisolid, or soft foods (6–8 months).** Proportion of children 6–8 months of age given solid, semisolid, or soft foods in the past 24 hours (collected at the 6-month and 9-month surveys).
- **Minimum meal frequency.** Proportion of children, both breastfed and non-breastfed, given a minimum number of meals in the past 24 hours at the 6-month, 9-month, 12-month, 18-month, and 24-month surveys. For breastfed children aged 6–8 months, the minimum number of meals was set at two, for breastfed children aged 9–23 months, the minimum number of meals was set at three, and for non-breastfed children 6–23 months the number of meals was set at four.
- **Dietary diversity in the past 24 hours.** Based on the mother's recall of the index child's diet in the past 24-hour period, all foods and liquids consumed by the index child were classified into one of seven food groups[25] (collected at 6 months, 9 months, 12 months, 18 months, and 24 months). Dietary diversity included CSB consumption (contributed to the grains, roots, and tubers as well as the legumes, nuts, and pulses groups).
- **Minimum dietary diversity (≥ 4 food groups).** Proportion of children who consumed food from at least four food groups (of the seven nutrient-rich food groups used to calculate dietary diversity) in the past 24 hours at the 6-month, 9 month, 12-month, 18-month, and 24-month surveys. Dietary diversity included CSB consumption (contributed to the grains, roots, and tubers as well as the legumes, nuts, and pulses groups).
- **Consumption of iron-rich or iron-fortified foods.** Proportion of children who were fed iron-rich food (or food that was fortified with iron and made especially for children) in the previous 24 hours at the 6-month, 9-month, 12-month, 18-month, and 24-month surveys. Consumption of iron-rich or iron-fortified foods included *PROCOMIDA* supplements, namely CSB, LNS, and MNP. Consumption of iron-rich or iron-fortified foods did not included iron-fortified sugar.

[21] The actual WHO indicator is the proportion of mothers who have given birth in the last 2 years who put their children to the breast within 1 hour of birth.
[22] At the 6-month survey, the question about exclusive breastfeeding was limited to those children who were under 183 days old.
[23] This includes certain liquids, such as water or water-based drinks, fruit juice, ritual fluids and ORS, drops, or syrups (vitamins, minerals, medicines), but excludes non-human milk and food-based fluids.
[24] At the 6-month survey, the question about predominant breastfeeding was limited to those children who were under 183 days old.
[25] The seven food groups were grains, roots, and tubers; legumes, nuts, and pulses; milk and dairy products; eggs; flesh foods; vitamin A-rich foods; and other fruits and vegetables.

- **Minimum acceptable diet.** Proportion of children who received the minimum acceptable diet at the 6-month, 9-month, 12-month, 18-month, and 24-month surveys. This indicator was calculated for both breastfed and non-breastfed children. For breastfed children, it was defined as meeting both the minimum dietary diversity and the minimum meal frequency requirements; for non-breastfed children, it was defined as having received at least two milk feedings, having consumed food from at least four food groups (of six nutrient-rich food groups[26]), and the minimum meal frequency in the past 24 hours.

In addition to the WHO IYCF indicators, the following IYCF indicators were also created.

- **Child breastfed in the past 24 hours.** Proportion of children who were given breast milk in the past 24 hours (recall of the primary caregiver at each survey).
- **Consumption of CSB in the past 24 hours.** Based on mother's recall of the index child's diet in the past 24-hour period, the proportion of children who consumed CSB in the past 24 hours (collected at 6 months, 9 months, 12 months, 18 months, and 24 months). Additionally, CSB consumption was also calculated for those enrolled in *PROCOMIDA*.
- **Consumption of *PROCOMIDA* supplements (LNS and MNP) in the past 24 hours.** Based on mother's 24-hour dietary recall, the proportion of enrolled beneficiary children who consumed LNS or MNP in the past 24 hours (collected at 6 months, 9 months, 12 months, 18 months, and 24 months).

Anthropometric and Hemoglobin Concentration Measures. Mothers' anthropometric data were used to construct the following indicators.

- **Child LAZ and stunting.** Age- and sex-specific LAZ were calculated according to the 2006 WHO growth standards (WHO Multicentre Growth Reference Study Group 2006a). Children <- 2 standard deviations (SD) below the median for LAZ were considered stunted.
- **Child weight-for-length Z-score (WLZ) and wasting.** Age- and sex-specific WLZ were calculated according to the 2006 WHO growth standards (WHO Multicentre Growth Reference Study Group 2006a). Children <- 2 SD below the median for WLZ were considered wasted.
- **Child height-for-age difference (HAD).** Age- and sex-specific HAD, expressed in centimeters, were calculated (Leroy et al. 2015), using the 2006 WHO growth standards (WHO Multicentre Growth Reference Study Group 2006a).
- **Maternal and child Hb and anemia.** Hb concentrations vary with altitude. The Hb concentration values were thus adjusted according to international guidelines (INACG 2002; Stevens et al. 2013; WHO 2011) and using the following formula-[27]:

$$measured\ Hb\ + \frac{(0.32*(\text{altitude}*0.0033)) - (0.22*(\text{altitude}*0.0033)^2)}{10}\ \text{if altitude} > 1{,}000\ \text{m}$$

  Anemia was defined for non-pregnant women as having an Hb concentration less than 12 g/dL, and for pregnant women and children as having an Hb concentration less than 11 g/dL. Severe anemia was defined for non-pregnant women as having an Hb concentration less than 8 g/dL, and for pregnant women and children as having an Hb concentration less than 7 g/dL (WHO 2011).

[26] The six food groups were grains, roots, and tubers; legumes, nuts, and pulses; eggs; flesh foods; vitamin A-rich foods; and other fruits and vegetables.
[27] Community altitude, collected with a handheld GPS device, was used.

Child Development Indicators. Children's motor and language development were assessed by parental report[28] using a predefined list of motor and language milestones, derived from the Griffiths (1970) and McCarthy (1972) scales. The motor milestone scale consists of 30 motor milestones ranging from the first milestone of a child being able to hold his or her head straight to the 30th milestone of skipping using alternate legs. The language milestone scale consists of 21 milestones and ranges from the first—making sounds while playing alone—to the 21st—talking about things that took place in the past. The scales are adapted from ones previously used in Tanzania (Olney et al. 2009; Stoltzfus et al. 2001). Items are ordered to reflect a generally accepted sequence of motor and language development, with each motor development milestone placed on an interval scale ranging from 1 to 30 and each language development milestone placed on an interval scale ranging from 1 to 21.

Parents were asked if their child had achieved each of the motor and language milestones. Once three milestones were recorded as not being achieved, the interviewer stopped asking about the remaining milestones. In addition, children were asked to demonstrate six of the key motor milestones included in the larger parental report scale: sitting without support, standing with assistance, crawling, standing alone, and walking with and without assistance (WHO Multicentre Growth Reference Study Group 2006b). The highest milestone attained, based on parental report, was used to indicate the child's motor and language development at each time point.

2.4.9 Data Analysis and Impact Estimation

Descriptive analyses were conducted for the community, HCC, and household data. In the case of the community and HCC data, the analyses serve to provide information on the context of the study area. Single difference estimates were used to determine the impact of *PROCOMIDA* on key outcomes at the household level for each time point. *PROCOMIDA* did not specifically aim to improve community characteristics and only targeted some HCC characteristics. Additionally, the first community and health convergence center surveys were conducted in 2012, after program implementation was underway. Therefore, no impact of the program on these characteristics is assessed. All data were analyzed using Stata Release 14.1.

Community and Health Convergence Center: Descriptive Analyses

Community and HCC level results are presented as percentages or means and SD as appropriate. Results are presented by study group, and final sample sizes are reported in the results tables in Section 3. *PROCOMIDA* did not specifically aim to improve community characteristics and only targeted key HCC characteristics. Additionally, the study was not powered to detect impact at the community or HCC level. Therefore, only descriptive analyses of community and HCC characteristics are reported.

Household: Descriptive Analyses and Impact Estimation

Descriptive Analyses. Similar to the community- and HCC-level analyses, the variables or indicators of interest are presented as percentages or means and SDs as appropriate in the household, maternal, and child results sections. The results are presented in figures by study group, and corresponding tables with the final sample sizes are available in the appendix.

To compare characteristics among the six study arms at enrollment, we used the following linear model for continuous and dichotomous variables:

$$y_i = \beta_0 + \beta_1 S_{i1} + \beta_2 S_{i2} + \beta_3 S_{i3} + \beta_4 S_{i4} + \beta_5 S_{i5} + \varepsilon_i$$

where y_i is the variable or indicator of interest for observation *i*. We included five dummy variables ($S_{i.}$) for the study arms. For data collected at the household level, the standard errors of the parameters were

[28] The child's primary caregiver reported on these indicators. The primary caregiver was most often the mother; however, in the case of maternal death or absence, the designated caregiver provided this information.

adjusted for the (potential) lack of independence between observations in the same health convergence center by using a clustered sandwich estimator. A joint F-test was used to determine whether there were statistically significant differences among the study arms.

For categorical variables, the Pearson chi-square statistic was adjusted for the lack of independence between clusters with the second-order correction of Rao and Scott (Rao and Scott 1984) and converted into an F statistic.

Results were considered significantly different among the study arms if $p < 0.05$. Variables with significant differences among the study arms are marked with an asterisk (*) in the results tables. For categorical variables, the asterisk is placed in the row of the last category. Findings from the enrollment report revealed that there was balance[29] across study arms. Therefore, balance is not further discussed in the text of this report.

Impact Estimation. Program impact was estimated using the following single difference HCC fixed-effect model. This model compares the outcomes among study arms at each survey (1 month, 4 months, 6 months, 9 months, 12 months, 18 months, and 24 months).

$$y_{i,t=1} = \beta_0 + \sum_{i=1}^{5} \beta_i S_i + C\beta + \sum_{j} \beta_j X_{j,t=0} + \varepsilon$$

where *t* is the time of data collection (i.e., 1-month, 4-month, 6-month, 9-month, 12-month, 18-month, or 24-month survey, depending on indicator of interest), S_i is the assigned study arm, and *C* is a vector representing HCC-level fixed effect. The coefficients β_1 through β_5 represent the estimated treatment effect of the program. By using HCC-level fixed effects, the model controls for unobserved HCC characteristics that did not change between surveys. To reduce residual noise and maximize power, individual baseline covariates ($X_{j,t=0}$) were added to the model. The same model was used for both continuous and binary outcomes; categorical outcomes with multiple response possibilities were analyzed as individual binary outcomes. When no differences were hypothesized across treatment arms, an additional test, which pooled the five treatment arms, was conducted using the same approach.

A test of the pooled treatment arms was also conducted using the same approach described above, except where the differences between treatment arms made such comparisons meaningless (e.g., the consumption of iron-rich foods, which was driven largely by the consumption of MNP and LNS). The difference in impact between arms was tested only where specified in the study research questions **(Table 2.4**).

Point estimates and confidence intervals of the impact estimates are presented in figures by study arm, and, when appropriate, results are also presented for the pooled treatment arms. The covariates included in the model are indicated in the footnotes of each figure.

The standard errors (SE) of all estimated parameters were adjusted for the (potential) lack of independence among observations in the same health convergence center by using a clustered sandwich estimator. We conducted intent-to-treat analyses. One-sided tests were used when there was a clear a priori hypothesis of the direction of the effect; the use of one- or two-sided tests is indicated in the footnotes of each figure.

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[29] The design of the study, which recruited women at pregnancy, did not allow for a “true” baseline. The comparability of study arms at enrollment can thus only be assessed on variables that the program could not have changed (e.g., maternal education).

3. Results: Community and Health Convergence Center Characteristics

3.1 Community Characteristics

3.1.1 Community Infrastructure

The *PROCOMIDA* study area, in general, had limited access to utilities, community services, and transportation infrastructure. In 2012, approximately one-fourth of the communities were served by an electric company, and by 2014 community access to an electric grid had improved to approximately one-third of communities (**Table 3.1**). Access to a fixed telephone landline from within the community was extremely rare, and in the majority of communities residents had to walk more than 10 km to reach a landline telephone. Almost 90 percent of the communities had access to a mobile phone network from within the community. However, in 2012, residents in just over half the communities could charge their mobile phones and purchase credit to make outgoing calls from within the community. By 2014, these indicators improved, and it was possible to charge mobile phones and buy credit in almost two-thirds of the communities. During the dry season, the primary source for drinking water in more than half of communities was a spring. River and rainwater were also common. During the rainy season, rainwater was the most common source of drinking water, and spring water was still a common source. Drinking river water during the rainy season was much less common than in the dry season. In 2012, less than 5 percent of communities said that tap water to individual houses was their primary source of drinking water during either the dry or rainy season. Having tap water available was only somewhat more common in 2014 than in 2012.

Approximately one-fourth of communities held a market more often than once a week, and the plurality of communities were located between 11 and 20 km from a daily market (**Table 3.2**). Fewer communities held weekly markets, but it was rare that a community was located more than 20 km from a weekly market. Almost all communities had at least one church, and approximately two-thirds had immediate access to a bus stop. Those without churches and bus stops could generally reach them in fewer than 5 km. Approximately one-third of communities had an administrative center, and for those without administrative centers, traveling over 10 km to reach one was very common. Indicators describing the distance to markets and community services did not differ substantially between 2012 and 2014.

Members of the study communities could regularly reach nearby communities by truck (a little less than half), bus (one-third), motorcycle (one-fourth), bicycle (one-fourth), private car (less than 20 percent), and taxi (less than 5 percent) (**Table 3.3**). To reach nearby cities, regularly available transportation included trucks (approximately 80 percent), buses (three-quarters), motorcycles (a little more than one-third), bicycles (approximately 10 percent), private cars (approximately 20 percent), and taxis (less than 5 percent). A road reached approximately three-quarters of communities, and very few communities were more than 5 km from a road. Most of these roads were paved with stones, and very few communities had immediate access to an asphalt road. Non–4x4 cars and buses could typically only travel on these roads three-quarters of the year. Cars with 4x4 traction and trucks were, on average, able to pass all but a few weeks out of every year. The transportation services available to communities did not differ significantly between 2012 and 2014.

Table 3.1 Utilities Available within Communities[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**41**	**45**	**45**	**45**	**44**	**44**	**41**	**45**	**45**	**45**	**44**	**44**
Community served by electric company (at least part)												
	14.6	31.1	24.4	24.4	27.3	20.5	17.5	31.1	34.2	35.6	28.6	33.3
Distance (km) to closest fixed landline phone												
0 km (in community)	0.0	4.5	0.0	4.4	2.3	4.7	2.5	9.1	5.3	11.1	7.3	9.5
1–5 km	7.3	6.8	0.0	11.1	7.0	7.0	10.0	4.5	10.5	4.4	2.4	7.1
6–10 km	12.2	11.4	24.4	13.3	7.0	16.3	12.5	9.1	0.0	15.6	4.9	11.9
11–20 km	39.0	22.7	20.0	22.2	20.9	16.3	45.0	31.8	28.9	35.6	12.2	28.6
21–30 km	9.8	27.3	13.3	4.4	9.3	18.6	7.5	15.9	15.8	8.9	17.1	14.3
> 30 km	31.7	27.3	42.2	44.4	53.5	37.2	22.5	29.5	39.5	24.4	56.1	28.6
Distance (km) to closest mobile phone network												
0 km (in community)	90.2	93.3	86.7	81.8	79.1	90.9	97.5	93.3	94.7	97.8	85.7	92.9
1–5 km	7.3	6.7	8.9	4.5	9.3	6.8	2.5	2.2	5.3	2.2	11.9	7.1
6–10 km	2.4	0.0	4.4	13.6	2.3	2.3	0.0	2.2	0.0	0.0	0.0	0.0
11–20 km	0.0	0.0	0.0	0.0	7.0	0.0	0.0	2.2	0.0	0.0	2.4	0.0
21–30 km	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Possible to charge mobile phone in the community												
	46.3	55.6	60.0	57.8	72.7	52.3	67.5	66.7	73.7	84.4	73.8	64.3
Possible to buy credit for mobile phone in the community												
	48.8	46.7	55.6	55.6	54.5	47.7	65.0	62.2	60.5	62.2	57.1	54.8
Primary drinking water source during dry season												
Spring	68.3	55.6	46.7	64.4	56.8	45.5	70.7	55.6	55.6	51.1	54.5	54.5
River	9.8	17.8	28.9	8.9	20.5	36.4	9.8	17.8	8.9	2.2	22.7	25.0
Rain	4.9	6.7	8.9	4.4	9.1	11.4	4.9	6.7	8.9	22.2	9.1	2.3
Tap in house	2.4	2.2	4.4	11.1	0.0	2.3	2.4	11.1	8.9	11.1	0.0	2.3
Other	14.6	17.8	11.1	11.1	13.6	4.5	12.2	8.9	17.8	13.3	13.6	15.9
Primary drinking water source during rainy season												
Spring	26.8	28.9	11.1	22.2	13.6	13.6	22.0	20.0	6.7	8.9	6.8	6.8
River	2.4	2.2	8.9	0.0	9.1	6.8	0.0	0.0	0.0	0.0	2.3	0.0
Rain	53.7	55.6	66.7	57.8	70.5	75.0	58.5	62.2	60.0	71.1	70.5	79.5
Tap in house	4.9	2.2	6.7	11.1	0.0	2.3	2.4	11.1	15.6	11.1	4.5	2.3
Other	12.2	11.1	6.7	8.9	6.8	2.3	17.1	6.7	17.8	8.9	15.9	11.4

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 261 to 264 in the full sample; N = 44 to 45 in the B arm; N = 44 to 45 in the C arm; N = 44 to 45 in the D arm; N = 43 to 44 in the E arm; and N = 43 to 44 in the F arm.
[C] Sample size in the 2014 survey ranged from N = 247 to 264 in the full sample; N = 38 to 41 in the A arm; N = 44 to 45 in the B arm; N = 36 to 45 in the C arm; N = 41 to 44 in the E arm; and N = 41 to 44 in the F arm.

Table 3.2 Access to Markets and Community Services [a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**41**	**45**	**45**	**45**	**44**	**44**	**40**	**45**	**38**	**45**	**42**	**42**
Distance (km) to closest regular market (more than once a week)												
0 km (in community)	32.5	15.6	32.6	31.8	36.4	19.0	17.5	22.7	21.6	18.6	31.0	19.5
1–5 km	7.5	20.0	14.0	15.9	13.6	31.0	15.0	22.7	18.9	18.6	16.7	34.1
6–10 km	17.5	15.6	23.3	22.7	13.6	19.0	22.5	9.1	24.3	16.3	11.9	19.5
11–20 km	35.0	26.7	14.0	22.7	18.2	19.0	35.0	34.1	24.3	37.2	16.7	14.6
21–30 km	7.5	22.2	16.3	6.8	18.2	11.9	10.0	11.4	10.8	9.3	23.8	12.2
Distance (km) to closest weekly market												
0 km (in community)	17.1	20.0	11.1	11.4	18.2	20.5	10.3	18.6	7.9	11.6	26.2	14.3
1–5 km	14.6	13.3	31.1	34.1	29.5	25.0	17.9	18.6	28.9	25.6	26.2	28.6
6–10 km	17.1	26.7	20.0	27.3	25.0	18.2	17.9	18.6	18.4	25.6	14.3	21.4
11–20 km	43.9	17.8	26.7	22.7	11.4	22.7	41.0	25.6	34.2	30.2	14.3	26.2
21–30 km	7.3	22.2	11.1	4.5	15.9	13.6	12.8	18.6	10.5	7.0	19.0	9.5
Distance (km) to closest church												
0 km (in community)	97.6	100.0	93.2	93.3	97.7	100.0	100.0	100.0	94.7	97.8	97.6	97.6
1–5 km	2.4	0.0	6.8	6.7	2.3	0.0	0.0	0.0	5.3	2.2	2.4	2.4
Distance (km) to closest bus stop (to go to closest village)												
0 km (in community)	68.3	75.6	77.3	68.9	61.4	68.2	70.0	77.8	68.4	60.0	64.3	59.5
1–5 km	26.8	22.2	15.9	26.7	34.1	31.8	20.0	22.2	28.9	28.9	33.3	40.5
6–10 km	4.9	0.0	6.8	2.2	4.5	0.0	10.0	0.0	0.0	6.7	2.4	0.0
11–20 km	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	2.6	4.4	0.0	0.0
21–30 km	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance (km) to closest administrative center												
0 km (in community)	30.0	24.4	40.9	37.2	44.2	26.2	25.0	25.6	27.8	24.4	42.9	34.1
1–5 km	5.0	4.4	0.0	11.6	9.3	9.5	10.0	16.3	19.4	17.1	16.7	24.4
6–10 km	15.0	15.6	15.9	18.6	4.7	16.7	17.5	20.9	8.3	22.0	11.9	14.6
11–20 km	42.5	26.7	29.5	20.9	18.6	28.6	32.5	27.9	27.8	26.8	16.7	19.5
21–30 km	7.5	28.9	13.6	11.6	23.3	19.0	15.0	9.3	16.7	9.8	11.9	7.3

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 257 to 263 in the full sample; N = 40 to 41 in the A arm; N = 43 to 45 in the C arm; N = 43 to 45 in the D arm; N = 43 to 44 in the E arm; and N = 42 to 44 in the F arm.
[c] Sample size in the 2014 survey ranged from N = 243 to 252 in the full sample; N = 39 to 40 in the A arm; N = 43 to 45 in the B arm; N = 36 to 38 in the C arm; N = 41 to 45 in the D arm; and N = 41 to 42 in the F arm.

Table 3.3 Transportation Services and Infrastructure[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	41	45	45	45	44	44	41	45	45	45	44	44
Regularly available transportation to neighboring communities												
Truck	53.7	44.4	51.1	37.8	38.6	50.0	46.3	51.1	20.0	17.8	34.1	34.1
Bus/microbus	39.0	37.8	42.2	31.1	31.8	34.1	26.8	33.3	24.4	17.8	34.1	25.0
Motorcycle	22.0	33.3	22.2	22.2	25.0	43.2	17.1	40.0	22.2	15.6	22.7	31.8
Bicycle	29.3	22.2	20.0	22.2	29.5	29.5	17.1	13.3	15.6	13.3	18.2	15.9
Private car	12.2	15.6	11.1	11.1	15.9	22.7	19.5	24.4	20.0	11.1	15.9	25.0
Taxi	0.0	0.0	2.2	4.4	0.0	2.3	4.9	6.7	2.2	0.0	4.5	2.3
Regularly available transportation to nearby large city												
Truck	87.8	84.4	73.3	75.6	86.4	81.8	80.5	77.8	60.0	80.0	81.8	72.7
Bus/microbus	61.0	75.6	77.8	75.6	77.3	81.8	73.2	62.2	64.4	80.0	72.7	75.0
Motorcycle	29.3	53.3	35.6	37.8	29.5	54.5	41.5	37.8	42.2	35.6	22.7	36.4
Bicycle	9.8	15.6	11.1	8.9	6.8	11.4	9.8	6.7	8.9	8.9	2.3	18.2
Private car	14.6	24.4	20.0	22.2	18.2	29.5	41.5	35.6	33.3	24.4	22.7	34.1
Taxi	0.0	4.4	4.4	8.9	0.0	2.3	7.3	6.7	2.2	4.4	0.0	4.5
Distance to closest road from center of community												
0 km (in community)	70.7	86.7	82.2	82.2	70.5	79.5	77.5	77.8	78.9	84.1	73.8	69.0
1–5 km	26.8	13.3	17.8	15.6	27.3	20.5	20.0	22.2	21.1	11.4	23.8	28.6
6–10 km	2.4	0.0	0.0	2.2	2.3	0.0	2.5	0.0	0.0	2.3	0.0	2.4
> 10 km	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.4	0.0
Material of closest road												
Asphalt or pavement	2.4	4.4	4.4	6.7	0.0	4.5	2.5	6.6	2.6	10.1	0.0	7.2
Dirt	0.0	2.2	0.0	4.4	2.3	4.5	2.5	0.0	2.6	2.2	4.8	0.0
Paved with stones	97.6	93.3	95.6	88.9	97.7	90.9	95.0	93.3	94.7	86.7	95.2	92.9
During last 12 months, number of months the road could be used by												
Simple car	7.6±5.9	9.2±5.0	7.0±5.9	6.3±6.0	5.8±5.9	8.2±5.5	8.6±5.2	7.1±5.5	7.5±5.5	8.1±5.2	3.9±5.4	7.3±5.3
4x4 car	11.7±1.9	12.0±0.0	11.5±2.5	11.9±0.6	11.6±1.9	12.0±0.0	11.8±1.4	11.0±3.0	11.7±1.6	11.5±1.8	11.9±0.5	11.5±1.9
Transport truck	11.4±2.6	11.5±2.4	10.9±3.5	11.1±3.1	10.8±3.5	10.9±3.5	11.7±1.9	10.6±3.6	11.4±2.7	11.1±2.8	10.0±4.2	9.8±4.2
Bus/minibus	8.2±5.7	10.2±4.3	10.0±4.5	7.8±5.6	8.4±5.4	9.6±4.7	8.8±5.3	6.2±5.9	7.7±5.7	7.8±5.6	8.2±5.6	7.7±5.6
Heavy truck	10.2±4.3	9.9±4.6	8.8±5.4	9.5±4.8	10.0±4.4	9.4±4.9	9.5±4.8	8.3±5.4	8.1±5.5	7.9±5.5	8.0±5.5	5.5±5.5
Distance to closest asphalt road from center of community												
0 km (in community)	2.4	6.7	2.2	8.9	0.0	2.3	5.0	8.9	7.9	11.1	0.0	2.4
1–10 km	31.7	33.3	60.0	28.9	31.8	65.9	32.5	33.3	39.5	26.7	28.6	71.4
11–20 km	31.7	8.9	4.4	35.6	38.6	11.4	42.5	13.3	15.8	33.3	40.5	7.1
21–30 km	19.5	13.3	13.3	13.3	13.6	2.3	5.0	11.1	2.6	8.9	11.9	2.4
> 30 km	14.6	37.8	20.0	13.3	15.9	18.2	15.0	33.3	34.2	20.0	19.0	16.7

[a] Values are mean ± SD or percentages.
[b] Sample size in the 2012 survey ranged from N = 263 to 264 in the full sample; and N = 44 to 45 in the C arm.
[c] Sample size in the 2014 survey ranged from N = 252 to 264 in the full sample; N = 40 to 41 in the A arm; N = 38 to 45 in the C arm; N = 42 to 44 in the E arm; and N = 42 to 44 in the F arm.

3.1.2 Availability of Education and Health Services

Almost all communities had at least one primary school, and the cost to attend primary school was approximately 1,000 quetzales (GTQ) (US$130) annually (**Table 3.4**). Access to both lower and upper secondary school within the community was much less common. Less than one-fourth of communities had a lower secondary school, and very few had an upper secondary school. Communities without immediate access to these schools were located approximately 10 km away from lower secondary schools, and more than 20 km away for upper secondary schools. The cost to attend lower and upper secondary school was approximately GTQ3,500 (US$450) and GTQ8,500 (US$1,100) respectively. These indicators did not change notably from 2012 to 2014.

A little more than one-half of communities had a HCC; those that did not could usually reach one by traveling less than 5 km. Less than 5 percent of communities were farther than 5 km from an HCC (**Table 3.5**). Accessing more advanced care was more difficult. Only around 20 percent of communities were less than 10 km away from the closest health center[30], and nearly all communities were more than 10 km away from the closest hospital. In 2012, only around one-fourth of communities had a pharmacy and more than one-third were farther than 10 km from a pharmacy; by 2014, more than one-half of communities had a pharmacy.

The strengthening or establishment of local health commissions[31] was implemented early on by *PROCOMIDA*; by 2012 only around 10 percent of communities did not have an established health commission, and around 80 percent had health commissions with more than five members, which was the minimum suggested size (**Table 3.6**). More than 90 percent of communities had at least one trained birth attendant, and 20–30 percent had at least two or more. In 2012, community health monitors were present in more than 80 percent of communities, and more than 40 percent had multiple community health monitors. Fewer communities had community health monitors in 2014, likely because they were no longer considered a mandatory part of the *EBS*, and former community health monitors may have transitioned into other community-based health worker positions. Around one-half of communities had at least one community facilitator; this proportion increased to almost two-thirds of communities by 2014. (**Appendix A** explains the structure of the *EBS* and roles of the members.)

[30] Health centers are the second level of care (after HCCs) in the government-funded health system. They typically staff both physicians and nurses.

[31] The health commissions were volunteer community groups that worked alongside the local HCC and helped with the delivery of health services, especially with the needs of high risk patients that need to be transported to a hospital. Within *PROCOMIDA* they also managed the voluntary fund and helped with the food distributions.

Table 3.4 Characteristics of Local Schools[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	41	45	45	45	44	44	41	45	45	45	44	44
Number of primary schools in community (grades 1–6)												
0	2.4	8.9	11.1	11.1	6.8	6.8	4.9	4.4	20.0	4.4	6.8	6.8
1	95.1	91.1	86.7	86.7	93.2	90.9	95.1	93.3	75.6	95.6	90.9	90.9
2+	2.4	0.0	2.2	2.2	0.0	2.3	0.0	2.2	4.4	0.0	2.3	2.3
Average cost (GTQ) of primary school	1,132.5 ±839.0	1,195.2 ±1,226.5	1,267.7 ±1,245.8	1,095.2 ±821.4	978.6 ±487.8	1,319.0 ±973.6	959.3 ±599.6	952.3 ±708.5	1288.8 ±1,092.5	1,051.7 ±828.0	1,225.0 ±707.6	761.0 ±525.1
Number of lower secondary schools in community (grades 7–9)												
0	82.9	84.4	71.1	75.6	75.0	72.7	82.9	80.0	73.3	75.6	79.5	75.0
1	17.1	15.6	26.7	22.2	25.0	27.3	17.1	20.0	26.7	22.2	20.5	25.0
2+	0.0	0.0	2.2	2.2	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0
Distance (km) to closest lower secondary school if none in the community	8.1±14.7	13.1±40.9	11.0±21.0	4.4±2.8	9.8±19.2	15.4±31.1	9.0±17.9	23.1±71.6	20.0±32.0	4.9±3.8	11.6±25.7	8.1±14.0
Average cost (GTQ) of lower secondary school	3,345.3 ±1,914.4	4,692.3 ±2,862.4	3,393.0 ±2,130.3	3,134.2 ±1,629.4	3,382.4 ±2,151.2	5,038.2 ±5,438.3	3,170.4 ±4,684.6	3,178.2 ±2,414.4	2751.6 ±1,922.9	3,640.5 ±4,662.1	2,835.6 ±1,482.8	2,948.8 ±2,130.3
Number of upper secondary schools in community (grades 10–11)												
0	100.0	100.0	100.0	97.8	97.7	100.0	100.0	100.0	100.0	97.8	100.0	100.0
1	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	2.2	0.0	0.0
2+	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance (km) to closest upper secondary schools if none in the community	32.0±28.7	23.5±18.9	34.9±25.6	24.9±22.7	34.2±32.1	26.7±18.8	30.5±22.6	29.2±36.7	40.2±33.1	24.3±26.4	53.8±39.0	22.8±21.9
Average cost (GTQ) of upper secondary school	7,166.7 ±2,447.1	1,0313.5 ±5,346.9	8,312.5 ±4,251.7	9,538.7 ±4,102.6	8,051.3 ±2,631.2	8,277.1 ±3,554.9	8,083.3 ±3,936.0	5,624.4 ±2,836.2	1,0583.3 ±7,188.5	7,037.3 ±3,841.8	5,963.5 ±5,220.8	8,344.5 ±8,509.6

[a] Values are mean ± SD or percentages.

[b] Sample size in the 2012 survey ranged from N = 103 to 264 in the full sample; N = 13 to 41 in the A arm; N = 21 to 45 in the B arm; N = 14 to 45 in the C arm; N = 22 to 45 in the D arm; N = 12 to 44 in the E arm; and N = 21 to 44 in the F arm.

[c] Sample size in the 2014 survey ranged from N = 78 to 264 in the full sample; N = 12 to 41 in the A arm; N = 14 to 45 in the B arm; N = 12 to 45 in the C arm; N = 16 to 45 in the D arm; N = 10 to 44 in the E arm; and N = 14 to 44 in the F arm.

Table 3.5 Access to Health Care Services[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	41	45	45	45	44	44	41	45	45	45	44	44
Distance (km) to closest health convergence center												
0 km (in community)	55.3	54.8	63.6	52.4	47.7	55.8	52.8	61.5	63.9	62.8	50.0	59.0
1–5 km	44.7	40.5	34.1	42.9	45.5	37.2	47.2	33.3	36.1	32.6	47.6	41.0
6–10 km	0.0	4.8	0.0	2.4	6.8	7.0	0.0	5.1	0.0	2.3	0.0	0.0
> 10 km	0.0	0.0	2.3	2.4	0.0	0.0	0.0	0.0	0.0	2.3	2.4	0.0
Distance (km) to closest health center												
0 km (in community)	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	3.1	0.0	3.7
1–5 km	0.0	2.6	0.0	12.9	21.1	13.0	7.4	0.0	10.5	9.4	15.8	14.8
6–10 km	20.7	10.3	24.0	19.4	10.5	26.1	22.2	5.9	5.3	12.5	10.5	22.2
> 10 km	79.3	87.2	76.0	64.5	68.4	60.9	70.4	94.1	84.2	75.0	73.7	59.3
Distance (km) to closest hospital												
0 km (in community)	0.0	0.0	0.0	2.8	0.0	0.0	3.8	3.6	3.6	0.0	0.0	2.9
1–5 km	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.0
6–10 km	0.0	0.0	5.4	8.3	0.0	2.8	7.7	3.6	3.6	11.1	0.0	2.9
> 10 km	100.0	100.0	94.6	86.1	100.0	97.2	88.5	92.9	92.9	81.5	100.0	94.1
Distance (km) to closest pharmacy												
0 km (in community)	33.3	20.0	30.0	33.3	25.0	0.0	25.0	75.0	40.0	80.0	100.0	0.0
1–5 km	33.3	0.0	10.0	33.3	0.0	50.0	0.0	0.0	20.0	0.0	0.0	25.0
6–10 km	0.0	0.0	20.0	0.0	0.0	12.5	0.0	0.0	20.0	20.0	0.0	0.0
> 10 km	33.3	80.0	40.0	33.3	75.0	37.5	75.0	25.0	20.0	0.0	0.0	75.0

[a] Values are percentages.

[b] Sample size in the 2012 survey ranged from N = 39 to 253 in the full sample; N = 6 to 38 in the A arm; N = 5 to 42 in the B arm; N = 10 to 44 in the C arm; N = 6 to 42 in the D arm; N = 4 to 44 in the E arm; and N = 8 to 43 in the F arm.

[c] Sample size in the 2014 survey ranged from N = 25 to 235 in the full sample; N = 4 to 36 in the A arm; N = 4 to 39 in the B arm; N = 5 to 36 in the C arm; N = 5 to 43 in the D arm; N = 3 to 42 in the E arm; and N = 4 to 39 in the F arm.

Table 3.6 Presence of Community-Level Health Workers[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	41	45	45	45	44	44	41	45	45	45	44	44
Number of health commission members in the community												
No health commission	10.0	4.4	15.6	15.6	9.1	4.5	5.0	11.1	7.9	8.9	4.8	2.4
1–4	7.5	4.4	8.9	4.4	13.6	9.1	10.0	6.7	7.9	6.7	9.5	2.4
5+	82.5	91.1	75.6	80.0	77.3	86.4	85.0	82.2	84.2	84.4	85.7	95.2
Number of trained birth attendants in the community												
0	7.5	11.1	8.9	8.9	6.8	6.8	5.0	11.1	15.8	8.9	2.4	2.4
1	75.0	71.1	60.0	71.1	63.6	72.7	75.0	73.3	47.4	73.3	71.4	69.0
2	10.0	13.3	20.0	13.3	29.5	13.6	12.5	11.1	18.4	13.3	21.4	14.3
3+	7.5	4.4	11.1	6.7	0.0	6.8	7.5	4.4	18.4	4.4	4.8	14.3
Number of community health monitors in the community												
0	15.0	17.8	11.1	22.2	9.1	6.8	75.0	72.7	81.6	71.1	73.8	66.7
1	35.0	40.0	35.6	26.7	38.6	31.8	12.5	18.2	13.2	24.4	23.8	21.4
2	22.5	17.8	22.2	15.6	20.5	34.1	5.0	6.8	5.3	2.2	0.0	7.1
3–4	10.0	13.3	13.3	20.0	20.5	13.6	7.5	2.3	0.0	0.0	2.4	0.0
5+	17.5	11.1	17.8	15.6	11.4	13.6	0.0	0.0	0.0	2.2	0.0	4.8
Number of community facilitators in the community												
0	55.0	52.3	51.1	55.6	50.0	54.5	38.5	37.8	27.8	34.1	42.9	35.7
1	40.0	45.5	46.7	42.2	47.7	40.9	56.4	60.0	66.7	61.4	54.8	57.1
2+	5.0	2.3	2.2	2.2	2.3	4.5	5.1	2.2	5.6	4.5	2.4	7.1

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 262 to 263 in the full sample; and N = 44 to 45 in the B arm.
[c] Sample size in the 2014 survey ranged from N = 248 to 252 in the full sample; N = 39 to 40 in the A arm; N = 44 to 45 in the B arm; N = 36 to 38 in the C arm; and N = 44 to 45 in the D arm.

3.1.3 Community Agricultural Production

Corn and beans were cultivated in nearly all communities, and taro (a tuber also known as cocoyam or *Xanthosoma*), chilies, and yucca were also cultivated in more than one-half of communities in 2012 and 2014 (**Table 3.7**). Somewhat less commonly cultivated were sweet potatoes, piloy beans, cilantro, tomatoes, and cabbage, and the number of communities that cultivated these five crops decreased from 2012 to 2014.

The majority of communities also grew bananas, cardamom, coffee, oranges, and mandarins in 2012 and 2014 (**Table 3.8**). Avocados, sugar cane, allspice cocoa, and achiote were also commonly produced, but in less than one-half of communities.

Table 3.7 Ten Most-Common Cultivated Crops[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**41**	**45**	**45**	**45**	**44**	**44**	**40**	**45**	**38**	**45**	**42**	**42**
Corn	100.0	100.0	100.0	100.0	97.7	100.0	100.0	100.0	100.0	97.8	100.0	100.0
Black beans	100.0	97.8	95.6	100.0	100.0	93.2	92.5	93.3	89.5	86.7	95.2	92.9
Taro[d]	80.5	88.9	68.9	77.8	90.9	77.3	75.0	55.6	76.3	73.3	71.4	78.6
Chilies	73.2	71.1	62.2	75.6	63.6	63.6	60.0	46.7	31.6	42.2	57.1	59.5
Yucca	70.7	64.4	60.0	60.0	72.7	65.9	62.5	42.2	52.6	55.6	57.1	52.4
Sweet potatoes	31.7	31.1	28.9	28.9	36.4	34.1	25.0	8.9	5.3	8.9	9.5	4.8
Piloy beans	19.5	11.1	28.9	37.8	18.2	15.9	10.0	0.0	13.2	8.9	14.3	4.8
Cilantro	12.2	20.0	20.0	13.3	27.3	11.4	2.5	13.3	10.5	33.3	11.9	4.8
Tomatoes	14.6	13.3	20.0	13.3	18.2	13.6	7.5	8.9	5.3	13.3	7.1	4.8
Cabbage	9.8	13.3	22.2	24.4	9.1	4.5	10.0	11.1	18.4	11.1	7.1	2.4

[a] Values are percentages.
[b] Sample size in the 2012 survey did not vary by indicator.
[c] Sample size in the 2014 survey did not vary by indicator.
[d] Tuber also known as cocoyam (*Xanthosoma*).

Table 3.8 Ten Most-Common Trees or Permanent Crops[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**41**	**45**	**45**	**45**	**44**	**44**	**40**	**45**	**38**	**45**	**42**	**42**
Bananas	90.2	73.3	84.4	91.1	86.4	86.4	62.5	62.2	60.5	79.5	76.2	69.0
Cardamom	82.9	86.7	80.0	68.9	86.4	81.8	80.0	75.6	73.7	52.3	88.1	83.3
Coffee	80.5	73.3	77.8	84.4	81.8	88.6	67.5	57.8	60.5	50.0	66.7	78.6
Oranges	70.7	73.3	91.1	71.1	81.8	70.5	55.0	75.6	73.7	65.9	59.5	66.7
Mandarins	61.0	42.2	40.0	44.4	70.5	56.8	57.5	40.0	31.6	47.7	52.4	40.5
Avocadoes	36.6	37.8	57.8	44.4	38.6	38.6	17.5	28.9	34.2	43.2	14.3	19.0
Sugar cane	22.0	22.2	31.1	42.2	38.6	36.4	15.0	4.4	0.0	9.1	11.9	11.9
Allspice	29.3	15.6	20.0	26.7	40.9	25.0	22.5	13.3	13.2	11.4	19.0	23.8
Cacao	22.0	28.9	17.8	6.7	18.2	20.5	20.0	26.7	5.3	2.3	7.1	11.9
Achiote	19.5	24.4	8.9	8.9	18.2	20.5	17.5	13.3	0.0	4.5	7.1	2.4

[a] Values are percentages.
[b] Sample size in the 2012 survey did not vary by indicator.
[c] Sample size in the 2014 survey did not vary by indicator.

3.1.4 Community Groups and Community Change

Communities had on average six associations, cooperatives, or other types of community groups; only around 40 percent of these groups had women among their members (**Table 3.9**). The most common community group activities were related to health, education, and local governance. Communities also had groups that engaged in activities related to culture and leisure, water and sanitation, conflict resolution, security, religion, emergency response, and agriculture. *PROCOMIDA* institutional strengthening activities included the capacity building of local health commissions and the establishment of emergency funds managed by the health commissions. In all study arms, including the control arm, there was a notable increase in the percentage of communities that had community groups engaged in emergency response activities from approximately one-fourth in 2012 to nearly all in 2014.

In 2012, approximately two-thirds of communities perceived there to be much more or more rain than usual during the past 12 months, and this was similar in 2014 (**Table 3.10**). Additionally, around 80 percent of communities in 2012 and 2014 perceived the temperature to be hotter or much hotter than normal during the past 12 months. In 2012, a little less than two-thirds of communities thought that living conditions had improved during the past 5 years, and around one-half of communities perceived that they had experienced more in-migration than out-migration during this same time period. By 2014, these perceptions had changed, and approximately one-third of communities described living conditions as having improved during the past 5 years, whereas another one-third thought living conditions had deteriorated. Only around one-fourth reported more in-migrants, and nearly one-half of communities claimed that neither in-migration nor out-migration were common during the previous 5 years.

Table 3.9 Presence and Activities of Community Groups

	2012[a]						2014[b]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**41**	**45**	**45**	**45**	**44**	**44**	**40**	**45**	**38**	**45**	**42**	**42**
Number of groups in community												
	5.6±1.8	5.9±2.2	6.2±2.0	6.5±2.4	6.3±2.2	5.9±2.2	4.7±1.6	4.8±2.0	5.7±2.5	5.2±2.0	5.9±2.0	5.4±2.6
Percentage of groups with female members												
	39.3±23.0	42.6±25.3	43.0±26.1	46.6±25.0	40.8±24.7	41.6±25.4	44.2±27.4	50.8±26.9	51.2±24.8	62.0±28.2	49.9±26.5	49.0±26.2
Percentage of communities with groups activities related to:												
Health	97.6	100.0	95.6	93.2	95.3	97.7	92.5	84.4	81.6	84.1	95.2	92.9
Education	53.7	60.0	66.7	59.1	65.1	50.0	42.5	51.1	57.9	54.5	47.6	47.6
Local governance	56.1	51.1	46.7	63.6	58.1	36.4	87.5	91.1	81.6	88.6	95.2	95.2
Culture and leisure	48.8	55.6	55.6	56.8	55.8	56.8	10.0	8.9	31.6	22.7	33.3	26.2
Water and sanitation	43.9	44.4	37.8	54.5	46.5	56.8	30.0	28.9	36.8	40.9	38.1	40.5
Conflict resolution	46.3	37.8	46.7	54.5	48.8	29.5	27.5	33.3	42.1	47.7	40.5	42.9
Security	41.5	40.0	37.8	27.3	34.9	38.6	7.5	8.9	15.8	18.2	11.9	14.3
Religion	41.5	28.9	37.8	40.9	20.9	38.6	17.5	28.9	21.1	36.4	28.6	26.2
Emergency response	24.4	31.1	28.9	25.0	41.9	25.0	97.5	95.6	97.4	100.0	100.0	95.2
Agriculture	17.1	28.9	17.8	20.5	30.2	22.7	2.5	11.1	10.5	4.5	14.3	11.9

[a] Sample size in the 2012 survey did not vary by indicator.
[b] Sample size in the 2014 survey did not vary by indicator.

Table 3.10 Perceptions of Climate, Living Conditions, and Migration[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**41**	**45**	**45**	**45**	**44**	**44**	**40**	**45**	**38**	**45**	**42**	**42**
Perception of rainfall over last 12 months												
Much more than usual	39.0	28.9	44.4	17.8	27.3	22.7	30.0	55.6	44.7	44.4	50.0	45.2
More than usual	29.3	22.2	31.1	26.7	29.5	40.9	20.0	20.0	31.6	17.8	19.0	21.4
Same as usual	17.1	24.4	13.3	33.3	25.0	27.3	30.0	17.8	23.7	22.2	21.4	23.8
Less than usual	14.6	24.4	8.9	22.2	18.2	9.1	20.0	4.4	0.0	15.6	9.5	9.5
Much less than usual	0.0	0.0	2.2	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0
Perception of temperature over last 12 months												
Much higher than usual	43.9	37.8	57.8	40.0	45.5	38.6	42.5	57.8	39.5	24.4	50.0	33.3
Higher than usual	29.3	35.6	40.0	48.9	43.2	45.5	30.0	22.2	26.3	46.7	26.2	42.9
Same as usual	22.0	24.4	0.0	11.1	11.4	15.9	20.0	13.3	31.6	20.0	16.7	23.8
Lower than usual	4.9	2.2	2.2	0.0	0.0	0.0	7.5	6.7	2.6	8.9	7.1	0.0
Perception of living conditions over the last 5 years												
Improved	61.0	57.8	51.1	62.2	56.8	70.5	25.0	24.4	31.6	33.3	66.7	31.0
Deteriorated	2.4	6.7	8.9	13.3	2.3	4.5	32.5	17.8	31.6	40.0	9.5	26.2
No change	36.6	35.6	40.0	24.4	40.9	25.0	42.5	57.8	36.8	26.7	23.8	42.9
Perception of relative migration in last 5 years												
More arrivals	41.5	44.4	40.0	37.8	36.4	54.5	20.0	26.7	18.4	22.2	19.0	33.3
More departures	9.8	4.4	11.1	6.7	6.8	15.9	10.0	2.2	10.5	8.9	9.5	11.9
Similar amounts of both	7.3	13.3	4.4	8.9	4.5	6.8	22.5	22.2	26.3	31.1	26.2	21.4
Neither occurred	41.5	37.8	44.4	46.7	52.3	22.7	47.5	48.9	44.7	37.8	45.2	33.3

[a] Values are percentages.
[b] Sample size in the 2012 survey did not vary by indicator.
[c] Sample size in the 2014 survey did not vary by indicator.

3.2 Health Convergence Center Characteristics

3.2.1 Health Convergence Center Infrastructure and Personnel

Approximately 80 percent of the health convergence centers in the *PROCOMIDA* study area were housed in their own building in 2012 (**Table 3.11**). Nearly all the facilities had protected waiting areas and private consultation rooms, and three-quarters had a storage place for medications. The buildings primarily had cement floors; three-quarters had brick or cement walls; and all had corrugated metal or tile roofs. Approximately three-quarters had a functioning toilet or latrine, and a little over one-half had sinks. Approximately one-quarter had a source of electricity, and the primary source of water for more than one-half the HCCs was rainwater. The basic infrastructure of these facilities was similar in 2012 and 2014.

HCCs were well staffed by both institutional ambulatory members of the *EBS* and community-level *EBS* personnel according to *MSPAS* norms[32] (**Table 3.12**). In 2012 and 2014, nearly all health convergence centers had a complete *EBS* team. This included near-universal presences of a doctor or nurse and an institutional facilitator on days that the ambulatory institutional team worked, and a community facilitator and trained birth attendant based in the community. By 2014, the availability of doctors had increased from only three centers to more than one-fourth of all centers. In 2012, approximately three-quarters of HCCs also had at least one community health monitor, but this position was largely phased out by 2014. (**Appendix A** explains the structure of the *EBS* and roles of the members.)

Non-*PROCOMIDA* health educators were not common in 2012, but approximately 90 percent of health convergence centers in the five treatment arms and 10 percent in the control arm reported having *PROCOMIDA*-affiliated health educators. By 2014, non-*PROCOMIDA* health educators were also present at more than 80 percent of centers, along with *PROCOMIDA* health educators.

[32] A more detailed description of the roles and responsibilities of each EBS member and the Health Commission can be found in the process evaluation report (Olney et al. 2013).

Table 3.11 Infrastructure of Health Convergence Centers[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	20	20	20	20	20	20	20	20	19	20	20	19
Own building	75.0	85.0	80.0	90.0	75.0	90.0	90.0	85.0	84.2	80.0	90.0	84.2
Facilities												
Waiting room protected from rain and sun	95.0	95.0	100.0	90.0	100.0	90.0	85.0	90.0	89.5	80.0	95.0	94.7
Consultation room	95.0	95.0	100.0	95.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	100.0
Storage place for medications	60.0	80.0	85.0	89.5	75.0	75.0	84.2	100.0	73.7	75.0	80.0	88.9
Building characteristics												
Cement or tile floor	80.0	85.0	90.0	100.0	100.0	90.0	95.0	85.0	89.5	95.0	95.0	89.5
Brick or cement wall	70.0	55.0	80.0	90.0	70.0	70.0	65.0	65.0	84.2	85.0	80.0	73.7
Wood wall	25.0	45.0	20.0	5.0	30.0	30.0	35.0	35.0	15.8	10.0	20.0	21.1
Corrugated metal roof	100.0	100.0	100.0	95.0	100.0	100.0	100.0	100.0	100.0	95.0	100.0	100.0
Tile roof	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0
Functioning toilet or latrine	80.0	55.0	70.0	75.0	90.0	50.0	75.0	70.0	68.4	95.0	85.0	84.2
Sink	52.6	60.0	50.0	55.0	20.0	45.0	36.8	55.0	57.9	65.0	60.0	31.6
Utilities												
Electricity	20.0	30.0	15.0	30.0	35.0	30.0	35.0	30.0	26.3	25.0	35.0	42.1
Source of water												
Tap water	25.0	15.0	20.0	30.0	5.0	5.0	25.0	10.0	26.3	20.0	5.0	5.3
Open well	0.0	0.0	5.0	0.0	10.0	5.0	0.0	5.0	5.3	5.0	0.0	0.0
Surface water	20.0	25.0	15.0	10.0	0.0	25.0	10.0	10.0	5.3	10.0	0.0	15.8
Rainwater	55.0	50.0	50.0	45.0	70.0	50.0	60.0	70.0	47.4	60.0	80.0	73.7
Other	0.0	10.0	10.0	15.0	15.0	15.0	5.0	5.0	15.8	5.0	15.0	5.3

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 119 to 120 in the full sample; N = 19 to 20 in the A arm; and N = 19 to 20 in the D arm.
[C] Sample size in the 2014 survey ranged from N = 114 to 118 in the full sample; N = 19 to 20 in the A arm; N = 18 to 20 in the B arm; and N = 18 to 19 in the F arm.

Table 3.12 Health Convergence Center Personnel[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	20	20	20	20	20	20	20	20	20	20	20	20
Institutional ambulatory *EBS* personnel, percentage with at least one												
Doctor	5.0	0.0	0.0	10.0	0.0	0.0	25.0	20.0	20.0	40.0	30.0	30.0
Nurse	100.0	100.0	100.0	95.0	100.0	100.0	95.0	80.0	95.0	80.0	100.0	85.0
Institutional facilitator	100.0	95.0	100.0	100.0	100.0	100.0	95.0	85.0	90.0	85.0	95.0	90.0
Community *EBS* personnel, percentage with at least one												
Community facilitator	100.0	100.0	100.0	100.0	100.0	100.0	95.0	95.0	95.0	100.0	100.0	95.0
Trained birth attendant	100.0	95.0	100.0	100.0	100.0	100.0	100.0	95.0	95.0	95.0	100.0	95.0
HCC has complete *EBS*	100.0	90.0	100.0	100.0	100.0	100.0	90.0	80.0	90.0	80.0	95.0	90.0
Community health monitor	75.0	70.0	75.0	80.0	85.0	80.0	5.0	5.0	15.0	5.0	10.0	0.0
Community *EBS* personnel, percentage with at least one												
Health educator	20.0	20.0	40.0	15.0	30.0	25.0	90.0	75.0	90.0	85.0	95.0	90.0
PROCOMIDA health educator	85.0	90.0	95.0	85.0	85.0	0.0	85.0	90.0	90.0	95.0	90.0	10.0

[a] Values are percentages.
[b] Sample size in the 2012 survey did not vary by indicator.
[c] Sample size in the 2014 survey did not vary by indicator.

3.2.2 Consultation Activities Conducted by the *EBS*

There was a clear division of labor between the institutional- and community-level *EBS* staff. In 2012, institutional *EBS* staff were present at HCCs approximately 1 day per month, and by 2014, their presence had increased to approximately 7 days per month (**Table 3.13**). While they were present, institutional-level *EBS* staff held consultations and conducted home visits for sick children and pregnant and postpartum mothers, and in 2014 they also conducted some growth monitoring activities.

The community-based teams conducted the majority of growth monitoring activities in both 2012 and 2014 (**Table 3.14**). They also occasionally conducted or assisted with consultations, but with considerably less frequency than the institutional teams. The community-based teams commonly conducted home visits, approximately 4 days per month in 2012 and 6 days per month in 2014.

Table 3.13 Institutional *EBS* Health Consultations and Home Visits[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**19**	**19**	**20**	**20**	**19**
Days per month health convergence center is attended by institutional *EBS*												
	1.1±0.3	1.1±0.4	1.3±0.4	1.3±0.6	1.3±0.4	1.1±0.3	7.5±7.9	5.9±5.7	7.3±8.1	7.0±8.3	6.0±7.1	6.6±6.4
Days per month of institutional *EBS* consultations for:												
Children under 5 years	1.1±0.2	1.0±0.0	1.1±0.4	1.1±0.5	1.1±0.4	1.1±0.2	5.5±7.4	3.3±5.2	3.3±3.5	2.9±4.5	3.4±4.7	3.7±5.2
Prenatal care	1.1±0.3	1.0±0.0	1.2±0.4	1.2±0.4	1.1±0.4	1.1±0.3	4.8±6.5	2.8±2.6	2.5±2.7	1.5±0.6	4.0±6.0	3.6±5.0
Home visits	1.6±2.4	1.1±0.7	1.4±1.1	1.5±1.6	1.1±0.8	1.1±1.3	4.2±5.0	3.1±2.7	4.4±5.7	7.3±18.7	3.7±3.5	4.4±4.5
Number of consultations in the past 3 months conducted by institutional *EBS* team for:												
Weight monitoring	0.0±0.0	3.8±16.8	3.4±11.2	2.5±10.1	0.2±0.9	2.3±9.2	37.2±45.6	71.7±79.9	64.3±56.0	140.3±210.7	52.2±53.9	107.8±148.5
Height/ length monitoring	0.0±0.0	1.6±6.9	2.6±8.2	9.8±24.9	3.5±14.5	2.6±10.3	37.2±45.6	71.7±79.9	64.3±56.0	137.3±211.1	52.2±53.9	107.7±148.4
Sick children	24.6±19.7	35.2±31.7	24.3±28.2	34.5±64.0	16.8±12.3	21.4±13.7	37.2±48.5	46.8±48.5	42.4±59.7	47.3±112.3	35.1±33.8	37.6±54.5
Prenatal visits	16.7±9.1	18.4±21.0	13.1±6.2	16.5±11.7	13.4±7.1	15.5±8.4	18.5±19.8	17.5±14.4	14.7±7.0	17.1±15.4	17.0±13.4	18.7±12.8
Postnatal visits	4.9±4.8	8.6±9.8	3.0±2.4	4.3±3.0	4.8±4.5	4.3±4.1	7.7±7.3	5.2±4.2	5.7±3.8	5.1±4.4	5.0±4.7	7.1±4.9

[a] Values are means ± SD.

[b] Sample size in the 2012 survey ranged from N = 115 to 120 in the full sample; N = 17 to 20 in the A arm; N = 19 to 20 in the B arm; N = 19 to 20 in the D arm; and N = 18 to 20 in the F arm.

[C] Sample size in the 2014 survey ranged from N = 112 to 117 in the full sample; N = 18 to 20 in the A arm; N = 17 to 19 in the B arm; N = 19 to 20 in the D arm; and N = 19 to 20 in the E arm.

Table 3.14 Community *EBS* Health Consultations and Home Visits[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**19**	**20**	**20**	**19**
Days per month of community *EBS* consultations for:												
Children under 5 years	0.6±1.0	1.1±2.7	0.9±1.3	0.7±1.0	0.9±2.2	1.6±2.5	2.5±5.1	4.2±7.2	2.9±4.5	3.1±7.1	3.0±4.3	3.6±5.0
Prenatal care	0.3±0.7	0.4±0.9	0.6±1.0	0.6±1.1	0.3±0.4	0.3±0.7	2.1±5.0	1.7±3.6	1.5±2.8	2.4±6.8	2.2±4.1	2.1±4.1
Home visits	4.3±3.6	4.3±4.1	4.5±3.7	3.3±3.2	5.3±5.6	2.8±1.3	6.8±11.4	5.9±6.4	8.1±8.4	3.6±3.4	6.0±5.5	6.2±4.2
Number of consultations in the past 3 months conducted by community *EBS* team for:												
Weight monitoring	90.3±56.6	103.0±76.8	91.8±77.0	108.5±106.6	84.3±47.7	96.7±65.0	96.7±67.0	102.9±88.1	76.6±61.3	140.3±195.5	111.8±59.8	137.3±144.4
Height/ length monitoring	42.4±53.5	27.4±40.0	41.0±68.2	15.6±30.5	38.6±47.0	33.4±50.2	96.7±67.0	107.3±85.0	76.6±61.3	136.1±195.1	111.8±59.8	139.0±142.9
Sick children	11.8±34.5	8.5±7.0	14.1±21.4	8.4±10.4	7.5±10.7	9.3±11.5	11.1±14.0	27.4±39.2	9.7±6.4	18.1±58.1	31.4±51.0	15.8±25.2
Prenatal visits	3.1±7.8	2.6±5.3	2.1±4.9	2.0±5.9	1.4±3.4	0.9±1.7	6.0±7.9	4.1±11.4	6.1±5.8	9.2±23.2	10.2±16.5	12.6±22.8
Postnatal visits	4.9±4.8	8.6±9.8	3.0±2.4	4.3±3.0	4.8±4.5	4.3±4.1	7.7±7.3	5.2±4.2	5.7±3.8	5.1±4.4	5.0±4.7	7.1±4.9

[a] Values are means ± SD.
[b] Sample size in the 2012 survey ranged from N = 119 to 120 in the full sample; and N = 19 to 20 in the D arm.
[C] Sample size in the 2014 survey ranged from N = 113 to 118 in the full sample; N = 18 to 20 in the B arm; N = 18 to 20 in the D arm; and N = 17 to 19 in the F arm.

3.2.3 Components of Care Offered

In 2012, HCC staff reported that they offered, on average, 5.2 (of six) key services for the diagnosis of sick children (**Table 3.15**). By 2014, this had improved slightly so that 5.6 key services were reported as offered. Children with diarrhea could receive ORS at almost all centers, and the availability of zinc for administration increased from approximately 70 percent of centers in 2012 to approximately 80 percent in 2014. The treatment of acutely malnourished children and moderately malnourished children with complications was most often done through referrals to health centers, hospitals, or other specialized centers. In 2012, on-site availability of food supplements, therapeutic treatments or vitamin supplementation was very rare. In 2014, food supplementation was available at approximately one-third of centers, but therapeutic treatments and vitamin supplementation were still extremely uncommon.

In 2012, HCCs reported that pregnant women seeking prenatal services received approximately eight (of nine) key services; the most commonly left out services were height and temperature measurement (**Table 3.16**). The availability of these services improved, and in 2014 all nine services were almost universally available. Approximately 85 percent measured women's height, and more than 95 percent took their temperature. In 2012 and 2014, mothers almost never received blood sugar and anemia tests, and fewer than one-half of centers analyzed pregnant women's urine samples. Almost all centers reported providing prenatal supplements of both iron and folic acid or a prenatal multivitamin, though this likely depended on their availability. Prenatal nutrition and health counseling on four key topics was offered almost universally.

According to HCC staff, new mothers seeking postnatal care could commonly experience checkups from community-based *EBS* members within 15 days of birth and institution-based *EBS* members within 40 days (**Table 3.17**). Almost all health convergence centers reported providing either both iron and folic acid or a multivitamin as part of postnatal services. These were likely subject to availability. Postnatal counseling was conducted on five health and nutrition topics at nearly all centers. Postnatal services were similar in 2012 and 2014.

Table 3.15 Reported Components of Care for Sick Children at Health Convergence Centers[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Protocol during the diagnosis of sick children												
Temperature	85.0	94.7	80.0	85.0	75.0	80.0	100.0	89.5	94.7	95.0	100.0	100.0
Weight	80.0	84.2	75.0	75.0	90.0	60.0	85.0	94.7	100.0	100.0	90.0	94.7
Height	60.0	63.2	60.0	70.0	70.0	45.0	95.0	94.7	100.0	100.0	90.0	100.0
Immunization status	100.0	100.0	100.0	95.0	100.0	100.0	95.0	100.0	94.7	100.0	95.0	94.7
Vitamin A status	100.0	100.0	100.0	100.0	100.0	100.0	95.0	94.4	94.7	100.0	90.0	100.0
Micronutrient status	100.0	100.0	100.0	100.0	100.0	100.0	95.0	100.0	94.7	100.0	95.0	94.7
Diagnostic services sum (0-6)	5.3±0.9	5.2±1.4	5.2±0.9	5.3±1.0	5.3±0.8	4.8±1.0	5.7±0.8	5.3±1.6	5.5±1.5	6.0±0.2	5.6±1.2	5.5±1.4
Treatment of children with diarrhea												
Administer ORS	100.0	100.0	100.0	90.0	100.0	95.0	100.0	100.0	94.7	95.0	100.0	100.0
Administer zinc	60.0	68.4	65.0	75.0	65.0	85.0	70.0	72.2	94.7	90.0	80.0	89.5
Referred to health center	95.0	89.5	90.0	80.0	85.0	90.0	80.0	89.5	84.2	90.0	80.0	84.2
Referred to hospital	70.0	89.5	90.0	75.0	90.0	90.0	55.0	63.2	73.7	75.0	80.0	94.7
Availability of or referral for treatment of malnourished children under 5 years												
Food supplements	0.0	5.0	5.0	25.0	0.0	5.0	40.0	30.0	30.0	15.0	10.0	30.0
Therapeutic treatments	10.0	5.0	0.0	15.0	5.0	5.0	5.0	10.0	10.0	10.0	0.0	5.0
Vitamin supplements	5.0	15.0	10.0	10.0	5.0	5.0	10.0	25.0	15.0	10.0	15.0	25.0
Referral to specialized center	15.0	5.0	25.0	20.0	10.0	15.0	15.0	30.0	20.0	20.0	10.0	5.0
Referral to health center	45.0	60.0	20.0	35.0	60.0	45.0	65.0	45.0	25.0	55.0	50.0	50.0
Referral to hospital	40.0	70.0	70.0	45.0	65.0	70.0	20.0	45.0	45.0	45.0	50.0	60.0

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 119 to 120 in the full sample; and N = 19 to 20 in the B arm.
[c] Sample size in the 2014 survey ranged from N = 116 to 120 in the full sample; N = 18 to 20 in the B arm; N = 19 to 20 in the C arm; and N = 19 to 20 in the F arm.

Table 3.16 Components of Prenatal Care[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Prenatal visit services												
Weight	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	94.7	95.0	95.0	94.7
Height	35.0	35.0	20.0	20.0	10.0	35.0	85.0	84.2	84.2	85.0	90.0	94.7
Fundal height	100.0	95.0	100.0	95.0	95.0	95.0	100.0	100.0	94.7	95.0	100.0	100.0
Pulse	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	94.7	95.0	100.0	100.0
Blood pressure	100.0	95.0	100.0	100.0	95.0	100.0	100.0	100.0	100.0	95.0	95.0	94.7
Temperature	85.0	75.0	80.0	85.0	55.0	65.0	95.0	94.7	100.0	95.0	100.0	100.0
Fetal heartbeat	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	100.0	100.0
Fetal movement	100.0	100.0	100.0	100.0	100.0	95.0	100.0	100.0	100.0	95.0	100.0	100.0
Tetanus vaccine	95.0	100.0	95.0	90.0	90.0	95.0	95.0	94.4	94.4	95.0	90.0	100.0
Prenatal services sum (0–9)	8.2±0.7	8.0±0.7	8.0±0.6	7.9±0.4	7.5±0.8	7.8±0.9	8.7±0.6	8.3±2.0	8.2±2.0	8.4±1.8	8.7±0.6	8.4±2.0
Prenatal lab tests												
Anemia test	0.0	5.0	5.0	0.0	0.0	0.0	5.0	5.3	10.5	10.0	15.0	10.5
Blood sugar	0.0	5.0	0.0	0.0	0.0	5.0	5.0	5.3	0.0	5.0	10.5	0.0
Urine sample	65.0	45.0	25.0	20.0	55.0	35.0	35.0	26.3	42.1	40.0	35.0	31.6
Prenatal lab tests sum (0–3)	0.7±0.5	0.6±0.8	0.3±0.5	0.2±0.4	0.6±0.5	0.4±0.6	0.5±0.8	0.3±0.5	0.5±0.7	0.6±0.8	0.6±0.9	0.4±0.7
Prenatal supplementation												
Iron supplements	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	90.0	94.7
Folic acid supplements	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	95.0	100.0
Prenatal vitamins	20.0	25.0	30.0	20.0	25.0	30.0	55.0	47.4	52.6	35.0	45.0	52.6
Either iron and folic acid or prenatal vitamins	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	90.0	94.7
Prenatal nutrition and health counseling												
Nutrition and hygiene during pregnancy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	95.0	100.0
Pregnancy danger signs	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0	100.0	100.0
Danger signs during birth	100.0	100.0	100.0	100.0	100.0	95.0	100.0	100.0	100.0	100.0	100.0	94.7
Preparing a family emergency plan	95.0	100.0	95.0	100.0	95.0	95.0	100.0	100.0	100.0	90.0	100.0	100.0
Counseling sum (0–4)	4.0±0.2	4.0±0.0	4.0±0.2	4.0±0.0	4.0±0.2	3.9±0.3	4.0±0.0	3.9±0.7	3.8±0.9	3.8±0.7	4.0±0.2	3.8±0.9

[a] Values are means ± SD or percentages.
[b] Sample size in the 2012 survey did not vary by indicator.
[c] Sample size in the 2014 survey ranged from N = 115 to 120 in the full sample; N = 19 to 20 in the A arm; N = 18 to 20 in the B arm; N = 18 to 20 in the C arm; N = 19 to 20 in the E arm; and N = 19 to 20 in the F arm.

Table 3.17 Components of Postnatal Care[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Postnatal visit by community *EBS* within 15 days after birth	95.0	95.0	100.0	95.0	100.0	85.0	100.0	85.0	100.0	100.0	100.0	100.0
Postnatal visit by institutional *EBS* within 40 days after birth	80.0	95.0	85.0	95.0	90.0	75.0	95.0	85.0	100.0	85.0	95.0	73.7
Postnatal supplementation												
Iron	90.0	100.0	85.0	95.0	85.0	90.0	95.0	89.5	100.0	95.0	90.0	94.7
Folic acid	90.0	100.0	85.0	100.0	85.0	90.0	95.0	89.5	100.0	95.0	90.0	94.7
Multivitamin	5.0	10.0	25.0	10.0	10.0	15.0	45.0	42.1	31.6	35.0	30.0	42.1
Either iron and folic acid or multivitamin	90.0	100.0	85.0	95.0	85.0	90.0	95.0	84.2	100.0	95.0	90.0	89.5
Postnatal counseling offered on:												
Breastfeeding	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nutrition and hygiene	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Family planning	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Danger signs for newborns	100.0	85.0	90.0	100.0	100.0	100.0	90.0	100.0	94.7	100.0	95.0	94.7
Danger signs for mothers	100.0	100.0	95.0	95.0	100.0	95.0	95.0	100.0	94.7	100.0	95.0	94.7
Counseling sum (0–5)	5.0±0.0	4.8±0.4	4.8±0.5	5.0±0.2	5.0±0.0	5.0±0.2	4.8±0.5	5.0±0.0	4.7±1.2	5.0±0.0	4.9±0.4	4.7±1.2

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 119 to 120 in the full sample; and N = 19 to 20 in the A arm.
[c] Sample size in the 2014 survey ranged from N = 114 to 120 in the full sample; N = 19 to 20 in the A arm; N = 19 to 20 in the B arm; N = 18 to 20 in the C arm; N = 19 to 20 in the D arm; and N = 19 to 20 in the F arm.

3.2.4 Availability of Equipment, Medications, and Vaccinations

HCCs were generally well equipped with essential furniture in 2012 and 2014 (**Table 3.18**). Anthropometric equipment related to child growth monitoring, which had been distributed by *PROCOMIDA* when HCCs did not have it, was also widely available. However, anthropometric equipment for newborns and mothers was often not available. Additionally, basic diagnostic equipment, particularly thermometers, child-sized blood pressure cuffs, and laryngoscopes were often missing. Equipment necessary to maintain the cold supply and integrity of vaccinations were widely available in 2012, and there was only a small decline in equipment availability by 2014. Basic gynecological equipment for maternal care in pregnancy and delivery was often lacking in 2012; its availability increased from three (of six) pieces of essential equipment to 3.5 in 2014. Disposable and sterile materials necessary to provide care under a variety of circumstances were not widely available at either survey. In 2012, health convergence centers had an average of 5.5 (of 12) of these materials, and in 2014 they only had around 3.5.

The availability of essential medications was generally inadequate in 2012 and in many cases decreased in 2014 (**Table 3.19**). Approximately 90 percent had acetaminophen and 55 percent had ibuprofen in 2012, but in 2014 these were only available at approximately 65 percent and 20 percent of centers, respectively. Similar patterns occurred for antibiotic availability. Five key oral antibiotics were each available in approximately two-thirds of centers in 2012; their availability in 2014 declined considerably and each were, on average, available in only one-fourth of centers. Ophthalmic chloramphenicol was not available at all in 2014. Albendazole for deworming decreased in availability from approximately 80 percent to 40 percent, and albuterol, a bronchial dilator, declined in availability from 50 percent to 15 percent.

In 2012, iron sulfate was available in more than three-quarters of centers, and folic acid was only available in 60 percent. Chispitas or Macrovital[33] multivitamin combinations were available in only approximately one-third of HCCs, and prenatal supplements were very rarely available. There were small improvements in the availability of these supplements from 2012 to 2014. For children needing treatment for diarrhea or acute malnutrition, ORS was generally available at the 2012 survey, and slightly less commonly available in 2014. Zinc availability improved from rarely being available in 2012 to being available at approximately one-half of centers in 2014. Intravenous rehydration therapy was available at approximately one-fourth of centers in 2012, but at only around 10 percent in 2014, and ready-to-use therapeutic food were rarely available at either survey.

Vaccinations were not commonly available at HCCs in either 2012 or 2014 (**Table 3.20**). Instead, they were brought by members of the *EBS*. Vaccinations for tuberculosis (bacillus Calmette–Guérin [BCG]), polio (and booster), pentavalent, rotavirus, measles/mumps/rubella (MMR), tetanus, and diphtheria/pertussis/tetanus (DPT) (booster) were commonly brought by members of the *EBS* in 2012 and 2014. Hepatitis B vaccines were brought by only approximately one-half of the *EBS* teams. Supply ruptures for these critical vaccinations were extremely common in 2012, and were even more common in 2014, when nearly all HCCs had experienced supply ruptures for every vaccine in the past 6 months. The availability of vitamin A capsules in 100,000 and 200,000 international unit (IU) doses followed a similar pattern: they were almost always brought by the *EBS* staff, and supply ruptures were common in 2012 and even more so in 2014.

[33] Chispitas and Macrovital are locally available multiple micronutrient powders.

Table 3.18 Availability of Equipment[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Furniture												
Hospital bed	95.0	100.0	100.0	100.0	90.0	95.0	95.0	100.0	90.0	95.0	85.0	90.0
Chairs	95.0	100.0	85.0	95.0	90.0	90.0	90.0	100.0	90.0	100.0	95.0	95.0
Table	95.0	95.0	90.0	95.0	95.0	85.0	95.0	95.0	95.0	95.0	100.0	95.0
Bench	95.0	75.0	90.0	85.0	80.0	80.0	85.0	80.0	85.0	90.0	90.0	85.0
Anthropometric equipment												
Newborn scale	35.0	60.0	60.0	60.0	50.0	35.0	40.0	45.0	40.0	55.0	50.0	45.0
Salter scale	100.0	100.0	100.0	100.0	100.0	90.0	100.0	100.0	95.0	100.0	90.0	85.0
Tie for Salter scale	90.0	100.0	90.0	95.0	95.0	85.0	90.0	95.0	90.0	90.0	95.0	80.0
Child height/length board	100.0	100.0	95.0	95.0	95.0	95.0	95.0	95.0	90.0	100.0	90.0	90.0
Adult scale	95.0	100.0	100.0	100.0	100.0	80.0	100.0	95.0	90.0	100.0	95.0	65.0
Adult height board	35.0	30.0	40.0	30.0	40.0	40.0	65.0	60.0	55.0	55.0	65.0	45.0
MUAC band	40.0	65.0	50.0	45.0	45.0	55.0	65.0	65.0	45.0	45.0	50.0	30.0
Anthropometric sum (0–7)	5.0±1.2	5.5±0.9	5.3±0.8	5.3±1.2	5.3±1.1	4.8±1.5	5.5±1.1	5.5±1.0	5.0±1.4	5.5±1.0	5.3±1.0	4.4±1.5
Diagnostic equipment												
Thermometer	70.0	100.0	80.0	80.0	75.0	70.0	75.0	80.0	60.0	70.0	80.0	90.0
Child blood pressure cuff	35.0	65.0	50.0	30.0	60.0	45.0	50.0	55.0	35.0	55.0	65.0	70.0
Adult blood pressure cuff	100.0	95.0	95.0	100.0	95.0	100.0	85.0	70.0	70.0	65.0	80.0	90.0
Stethoscope	100.0	95.0	95.0	100.0	95.0	95.0	90.0	90.0	80.0	85.0	95.0	95.0
Laryngoscope	15.0	40.0	35.0	30.0	35.0	35.0	35.0	30.0	40.0	30.0	25.0	25.0
Diagnostic sum (0–5)	3.2±0.7	4.0±0.8	3.5±1.1	3.4±0.8	3.6±0.9	3.5±0.9	3.4±1.3	3.3±1.5	2.9±1.3	3.0±1.2	3.5±1.3	3.7±1.1
Vaccination equipment												
Ice packs	90.0	85.0	100.0	85.0	90.0	100.0	65.0	65.0	75.0	65.0	85.0	75.0
Vaccine carrier	95.0	85.0	100.0	90.0	90.0	95.0	80.0	85.0	90.0	90.0	90.0	95.0
Syringes and needles	90.0	90.0	95.0	95.0	85.0	100.0	85.0	75.0	85.0	80.0	85.0	75.0
Biohazard box	95.0	95.0	100.0	85.0	95.0	95.0	85.0	95.0	95.0	100.0	95.0	90.0
New vaccination cards	70.0	80.0	85.0	90.0	90.0	85.0	75.0	75.0	85.0	70.0	95.0	75.0
Vaccination sum (0–5)	4.4±0.8	4.3±0.9	4.8±0.4	4.5±0.9	4.5±0.9	4.8±0.4	3.9±1.4	4.0±1.2	4.3±1.2	4.0±1.1	4.5±1.1	4.1±1.4
Maternal health equipment												
Disposable speculum	15.0	45.0	45.0	0.0	25.0	30.0	75.0	60.0	50.0	65.0	35.0	60.0
Pap smear test kit	5.0	40.0	35.0	0.0	25.0	30.0	65.0	65.0	55.0	60.0	40.0	60.0
Ayre spatula	25.0	40.0	35.0	35.0	35.0	25.0	30.0	45.0	35.0	30.0	40.0	35.0
Delivery kit	45.0	65.0	55.0	70.0	60.0	25.0	55.0	50.0	55.0	50.0	40.0	35.0

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Pregnancy kit	40.0	65.0	50.0	35.0	45.0	60.0	50.0	40.0	50.0	60.0	70.0	65.0
Measuring tape	100.0	95.0	95.0	95.0	90.0	95.0	95.0	80.0	90.0	95.0	85.0	85.0
Maternal health sum (0–6)	2.3±1.1	3.5±1.7	3.1±1.6	2.4±0.9	2.8±1.6	2.6±1.3	3.7±1.5	3.4±1.8	3.4±1.9	3.6±1.3	3.1±1.2	3.4±1.6
Disposable materials												
Nonsterile gloves	75.0	75.0	60.0	75.0	70.0	70.0	45.0	40.0	50.0	55.0	60.0	55.0
Sterile gloves	10.0	30.0	20.0	5.0	20.0	0.0	40.0	25.0	30.0	35.0	15.0	20.0
Surgical knifes	25.0	40.0	35.0	50.0	25.0	25.0	25.0	10.0	20.0	10.0	10.0	5.0
Scalpels	25.0	35.0	25.0	35.0	20.0	20.0	20.0	5.0	20.0	15.0	10.0	10.0
Cotton swabs	80.0	95.0	100.0	100.0	95.0	90.0	50.0	75.0	60.0	70.0	60.0	50.0
Gauze squares	65.0	70.0	70.0	70.0	70.0	70.0	45.0	50.0	45.0	40.0	55.0	35.0
Tongue depressors	85.0	75.0	95.0	85.0	95.0	85.0	55.0	45.0	60.0	50.0	60.0	60.0
Rolls of gauze	20.0	30.0	50.0	25.0	35.0	30.0	10.0	15.0	0.0	5.0	5.0	5.0
Elastic rolls	15.0	15.0	35.0	20.0	35.0	20.0	10.0	10.0	5.0	5.0	5.0	0.0
Medical tape	40.0	35.0	50.0	15.0	30.0	15.0	20.0	30.0	20.0	20.0	30.0	15.0
IVs	35.0	30.0	35.0	25.0	35.0	45.0	25.0	15.0	10.0	5.0	10.0	5.0
IV catheters	30.0	25.0	30.0	25.0	35.0	45.0	15.0	15.0	20.0	15.0	20.0	10.0
Disposables sum (0–12)	5.0±2.7	5.5±2.5	6.0±2.9	5.3±2.1	5.7±2.2	5.2±2.2	3.6±2.3	3.4±2.5	3.4±1.7	3.3±2.2	3.4±2.1	2.7±2.1

[a] Values are percentages.
[b] Sample size in the 2012 survey did not vary by indicator.
[C] Sample size in the 2014 survey did not vary by indicator.

Table 3.19 Availability of Essential Medications and Supplements[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Analgesic												
Acetaminophen	85.0	90.0	90.0	100.0	90.0	80.0	70.0	60.0	73.7	55.0	70.0	57.9
Ibuprofen	60.0	55.0	50.0	50.0	55.0	50.0	15.0	35.0	15.8	15.0	25.0	15.8
Antibiotics												
Erythromycin	80.0	80.0	75.0	65.0	70.0	60.0	40.0	35.0	21.1	10.0	20.0	21.1
Metronidazole	75.0	80.0	55.0	60.0	85.0	40.0	25.0	25.0	5.3	20.0	30.0	15.8
Trimetoprim-sulfamethoxazole	70.0	75.0	60.0	60.0	80.0	60.0	25.0	30.0	10.5	35.0	35.0	21.1
Penicillin	65.0	55.0	50.0	40.0	65.0	60.0	10.0	15.0	5.3	5.0	0.0	0.0
Amoxicillin	60.0	70.0	60.0	60.0	95.0	65.0	40.0	35.0	52.6	50.0	60.0	47.4
Chloramphenicol ophthalmic	55.0	70.0	80.0	65.0	70.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0
Anthelminthic												
Albendazole	80.0	85.0	80.0	80.0	85.0	50.0	35.0	40.0	36.8	40.0	70.0	36.8
Bronchial dilator												
Albuterol	50.0	75.0	60.0	35.0	60.0	40.0	15.0	20.0	0.0	20.0	20.0	15.8
Micronutrient supplements												
Iron sulfate	80.0	65.0	90.0	80.0	95.0	75.0	70.0	75.0	57.9	60.0	90.0	78.9
Folic acid	75.0	45.0	70.0	75.0	60.0	50.0	70.0	45.0	78.9	65.0	75.0	68.4
Chispitas or macrovital[d]	30.0	30.0	20.0	35.0	45.0	20.0	65.0	55.0	68.4	55.0	65.0	63.2
Prenatal supplements	0.0	0.0	10.0	5.0	0.0	0.0	0.0	25.0	10.5	5.0	5.0	10.5
Treatment for diarrhea and malnutrition												
ORS	75.0	90.0	85.0	80.0	90.0	65.0	65.0	65.0	63.2	65.0	80.0	68.4
Hartmann's solution (IV)	25.0	20.0	30.0	15.0	25.0	35.0	25.0	10.0	10.5	10.0	5.0	0.0
Zinc supplements	5.0	5.0	15.0	10.0	15.0	20.0	45.0	55.0	52.6	40.0	55.0	47.4
Ready-to-use therapeutic food	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	5.3

[a] Values are means ± SD or percentages.
[b] Sample size in the 2012 survey did not vary by indicator.
[c] Sample size in the 2014 survey did not vary by indicator.
[d] Chispitas and Macrovital are locally available multiple micronutrient powders.

Table 3.20 Availability and Supply Rupture of Vaccinations[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**19**	**20**	**20**	**19**
Hepatitis B												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
Brought in by *EBS*	45.0	50.0	55.0	50.0	65.0	55.0	45.0	50.0	63.2	45.0	50.0	57.9
Rupture past 6 months	20.0	60.0	54.5	18.2	42.9	36.4	90.0	100.0	100.0	100.0	100.0	90.9
BCG												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	10.0	10.0	10.5	15.0	15.0	5.3
Brought in by *EBS*	95.0	100.0	90.0	95.0	100.0	100.0	100.0	90.0	100.0	90.0	95.0	94.7
Rupture past 6 months	47.4	50.0	40.0	35.0	25.0	40.0	95.0	94.7	78.9	94.4	85.0	100.0
Polio												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	10.0	0.0	10.5	5.0	15.0	5.3
Brought in by *EBS*	100.0	100.0	100.0	100.0	100.0	100.0	95.0	90.0	100.0	90.0	95.0	89.5
Rupture past 6 months	40.0	50.0	25.0	40.0	20.0	40.0	89.5	100.0	94.7	94.4	84.2	94.1
Pentavalent												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	10.0	5.0	15.8	0.0	10.0	10.5
Brought in by *EBS*	100.0	100.0	100.0	100.0	100.0	100.0	90.0	95.0	100.0	95.0	90.0	89.5
Rupture past 6 months	35.0	40.0	35.0	40.0	20.0	50.0	88.9	94.7	89.5	94.7	100.0	94.1
Rotavirus												
Available at HCC	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.0	15.8	0.0	10.0	10.5
Brought in by *EBS*	85.0	90.0	95.0	90.0	100.0	100.0	90.0	95.0	100.0	95.0	85.0	84.2
Rupture past 6 months	27.8	33.3	15.8	21.1	25.0	15.0	94.4	100.0	89.5	94.7	94.1	100.0
MMR												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	10.0	0.0	10.5	5.0	5.0	5.3
Brought in by *EBS*	95.0	95.0	100.0	95.0	95.0	100.0	90.0	95.0	100.0	95.0	90.0	89.5
Rupture past 6 months	25.0	26.3	10.0	21.1	0.0	20.0	83.3	84.2	94.7	94.7	77.8	88.2
Polio R (booster)												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	10.5	10.0	15.0	0.0
Brought in by *EBS*	95.0	95.0	100.0	95.0	100.0	100.0	85.0	90.0	100.0	85.0	90.0	78.9
Rupture past 6 months	21.1	45.0	10.0	20.0	10.0	20.0	88.2	100.0	84.2	94.4	94.4	93.8
DPT R (booster)												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	10.5	10.0	10.0	0.0
Brought in by *EBS*	95.0	100.0	100.0	100.0	100.0	100.0	80.0	90.0	89.5	85.0	80.0	84.2
Rupture past 6 months	15.8	40.0	15.0	25.0	5.0	10.0	87.5	100.0	94.1	100.0	94.1	93.8
Tetanus (for pregnant women)												
Available at HCC	0.0	0.0	0.0	5.0	0.0	0.0	10.0	0.0	10.5	10.0	15.0	10.5
Brought in by *EBS*	100.0	95.0	95.0	100.0	95.0	100.0	80.0	95.0	94.7	85.0	85.0	100.0

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**19**	**20**	**20**	**19**
Rupture past 6 months	5.0	20.0	20.0	30.0	26.3	20.0	68.8	89.5	83.3	82.4	83.3	84.2
Vitamin A 100,000 IU												
Available at HCC	0.0	5.0	0.0	5.0	0.0	0.0	20.0	10.0	5.3	20.0	20.0	26.3
Brought in by *EBS*	95.0	90.0	100.0	100.0	100.0	95.0	70.0	80.0	78.9	65.0	80.0	68.4
Rupture past 6 months	35.0	47.4	25.0	10.0	10.0	21.1	56.3	76.5	93.8	71.4	68.8	80.0
Vitamin A 200,000 IU												
Available at HCC	0.0	5.0	0.0	0.0	0.0	5.0	10.0	0.0	15.8	5.0	25.0	26.3
Brought in by *EBS*	95.0	90.0	95.0	95.0	95.0	100.0	55.0	75.0	94.7	75.0	85.0	57.9
Rupture past 6 months	15.8	36.8	10.0	15.8	21.1	10.0	66.7	66.7	94.4	75.0	64.7	69.2

[a] Values are percentages.

[b] Sample size in the 2012 survey ranged from N = 67 to 120 in the full sample; N = 10 to 20 in the A arm; N = 10 to 20 in the B arm; N = 11 to 20 in the C arm; N = 11 to 20 in the D arm; N = 14 to 20 in the E arm; and N = 11 to 20 in the F arm.

[C] Sample size in the 2014 survey ranged from N = 63 to 118 in the full sample; N = 10 to 20 in the A arm; N = 10 to 20 in the B arm; N = 12 to 19 in the C arm; N = 9 to 20 in the D arm; N = 11 to 20 in the E arm; and N = 11 to 19 in the F arm.

3.2.4 *PROCOMIDA* Education Materials and Health Commission Activities

Health convergence centers had a wide range of educational posters available on topics related to *PROCOMIDA* (**Table 3.21**). In 2012, *PROCOMIDA* had produced the majority of posters available in HCCs related to 10 of 11 themes: exclusive breastfeeding; danger signs for pregnancy, newborns, and children; vaccinations; prevention and treatment of diarrhea; prevention and treatment of pneumonia; prevention and treatment of malnutrition; and adequate nutrition for 6–12- and 12–24-month olds. It did not provide the majority of the posters describing emergency plans for pregnant women. In 2014, educational posters were present in fewer HCCs, and the posters available were less commonly *PROCOMIDA* posters. *PROCOMIDA* posters were very rarely present in the control arm health convergence centers in 2012, but were present in a few control arm centers in 2014.

Almost all HCCs had an active health commission in 2012 and 2014 (**Table 3.22**). Around 80 percent had a designated local meeting place, but only one had a vehicle designated for emergency transportation. Nearly all health commissions supported the transfer of sick people and pregnant women; two-thirds raised funds to support the affiliated centers and supported family and emergency birth plans. Slightly less than one-half of commissions in *PROCOMIDA* treatment arms supported the construction or improvement of food storage areas, where *PROCOMIDA* rations were stored prior to distribution. The percentage engaging in each activity did not change substantially from 2012 to 2014.

3.2.5 Summary of Community and Health Convergence Center Characteristics

The *PROCOMIDA* study communities were generally isolated with limited access to basic services, including electricity, water, telephone landlines, health care, and secondary education. The communities depended largely on agricultural activities and benefited from the activities of a wide range of community groups. Communities were mostly in close proximity to HCCs and benefited from the availability of community-level health workers. They, however, were generally far from more advanced health care services.

HCCs generally met the *MSPS* personnel requirements. The buildings were of acceptable quality; however, many lacked functioning sinks and access to electricity and water. In providing care for sick children, pregnant women, and new mothers, a basic level of care was afforded, along with health education services. However, the availability of essential equipment, supplies, medications, supplements, and vaccines was inconsistent, and in many cases decreased from 2012 to 2014. Availability of these materials was not directly addressed by the program, but it presented a major obstacle in the provision of quality health services.

Table 3.21 Educational Posters on *PROCOMIDA* Topics[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**19**	**20**	**20**	**19**
Health convergence center has a poster visible on												
Exclusive breastfeeding (any)	55.0	65.0	70.0	90.0	85.0	5.0	60.0	20.0	47.4	45.0	45.0	63.2
From *PROCOMIDA* [d]	81.8	84.6	78.6	77.8	82.4	0.0	50.0	25.0	22.2	55.6	44.4	8.3
Pregnancy danger signs (any)	85.0	90.0	90.0	95.0	100.0	80.0	75.0	45.0	68.4	50.0	75.0	78.9
From *PROCOMIDA* [d]	47.1	38.9	66.7	52.6	60.0	0.0	26.7	33.3	23.1	40.0	26.7	6.7
Danger signs for newborns (any)	75.0	65.0	80.0	75.0	75.0	55.0	80.0	35.0	31.6	45.0	55.0	57.9
From *PROCOMIDA* [d]	60.0	38.5	75.0	46.7	66.7	0.0	25.0	28.6	33.3	44.4	27.3	9.1
Danger signs for children < 5 years (any)	60.0	60.0	50.0	75.0	65.0	40.0	55.0	31.6	47.4	20.0	45.0	42.1
From *PROCOMIDA* [d]	66.7	41.7	80.0	40.0	76.9	0.0	27.3	16.7	55.6	25.0	33.3	12.5
Vaccinating children < 5 years (any)	75.0	68.4	60.0	65.0	50.0	30.0	25.0	25.0	31.6	20.0	30.0	36.8
From *PROCOMIDA* [d]	53.3	38.5	58.3	69.2	70.0	0.0	40.0	0.0	16.7	0.0	33.3	14.3
Emergency plan for pregnant women (any)	85.0	90.0	80.0	85.0	100.0	75.0	70.0	70.0	78.9	65.0	90.0	89.5
From *PROCOMIDA* [d]	29.4	38.9	37.5	23.5	45.0	6.7	28.6	42.9	46.7	46.2	22.2	5.9
Prevention and treatment of diarrhea in children < 5 years (any)	42.1	36.8	50.0	50.0	55.0	20.0	45.0	15.0	31.6	25.0	15.0	36.8
From *PROCOMIDA* [d]	62.5	42.9	60.0	50.0	63.6	0.0	44.4	33.3	50.0	40.0	66.7	14.3
Prevention and treatment of pneumonia in children < 5 years (any)	42.1	26.3	50.0	31.6	25.0	25.0	21.1	10.0	15.8	10.0	20.0	42.1
From *PROCOMIDA* [d]	50.0	40.0	50.0	33.3	100.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0
Prevention and treatment of malnutrition of children < 5 years (any)	50.0	47.4	50.0	50.0	55.0	25.0	45.0	20.0	36.8	40.0	40.0	26.3
From *PROCOMIDA* [d]	50.0	66.7	80.0	80.0	72.7	0.0	55.6	50.0	28.6	50.0	25.0	0.0
Adequate nutrition for children 6–12 months (any)	60.0	60.0	60.0	65.0	80.0	20.0	50.0	25.0	42.1	35.0	40.0	31.6
From *PROCOMIDA* [d]	66.7	83.3	83.3	100.0	93.8	0.0	50.0	60.0	62.5	57.1	25.0	0.0
Adequate nutrition for children 12–24 months (any)	60.0	50.0	50.0	75.0	70.0	15.0	40.0	20.0	26.3	30.0	30.0	36.8
From *PROCOMIDA* [d]	75.0	100.0	80.0	86.7	92.9	0.0	50.0	50.0	60.0	50.0	33.3	14.3

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 39 to 120 in the full sample; N = 8 to 20 in the A arm; N = 5 to 20 in the B arm; N = 10 to 20 in the C arm; N = 6 to 20 in the D arm; N = 5 to 20 in the E arm; and N = 1 to 20 in the F arm.

[c] Sample size in the 2014 survey ranged from N = 23 to 118 in the full sample; N = 4 to 20 in the A arm; N = 2 to 20 in the B arm; N = 3 to 19 in the C arm; N = 2 to 20 in the D arm; N = 3 to 20 in the E arm; and N = 5 to 19 in the F arm.
[d] Sample is out of centers that had a poster available on that topic.

Table 3.22 Health Commission Characteristics[a]

	2012[b]						2014[c]					
	A (FFR+CSB)	**B (RFR+CSB)**	**C (NFR+CSB)**	**D (FFR+LNS)**	**E (FFR+MNP)**	**F (Control)**	**A (FFR+CSB)**	**B (RFR+CSB)**	**C (NFR+CSB)**	**D (FFR+LNS)**	**E (FFR+MNP)**	**F (Control)**
N	**19**	**20**	**19**	**20**	**20**	**19**	**20**	**20**	**19**	**20**	**20**	**19**
Is active	100.0	95.0	94.7	90.0	100.0	94.4	100.0	95.0	94.7	90.0	100.0	94.4
Has a designated local meeting place	84.2	73.7	88.9	94.4	90.0	68.8	85.0	73.7	88.9	94.4	90.0	68.8
Has vehicle for emergencies	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	5.3
Health commission activities												
Transfer of sick people, pregnant women, etc.	94.7	84.2	78.9	100.0	90.0	94.4	95.0	84.2	78.9	100.0	90.0	94.4
Raised funds for HCC	57.9	78.9	57.9	66.7	65.0	72.2	55.0	78.9	57.9	66.7	65.0	72.2
Construction/improvement of food storage	36.8	47.4	47.4	50.0	40.0	5.6	35.0	47.4	47.4	50.0	40.0	5.6
Family/emergency birth plan	73.7	78.9	63.2	38.9	65.0	61.1	70.0	78.9	63.2	38.9	65.0	61.1

[a] Values are percentages.
[b] Sample size in the 2012 survey ranged from N = 110 to 117 in the full sample; N = 19 to 20 in the B arm; N = 18 to 19 in the C arm; N = 18 to 20 in the D arm; and N = 16 to 19 in the F arm.
[c] Sample size in the 2014 survey ranged from N = 111 to 118 in the full sample; N = 19 to 20 in the B arm; N = 18 to 19 in the C arm; N = 18 to 20 in the D arm; and N = 16 to 19 in the F arm.

4. Results: Household Characteristics

Mean household size was 6.3 members at enrollment, with an average of 3.2 adults and 3.0 children under 18 years of age per household (**Table 4.1**). At enrollment, heads of household were on average 39.6 years, and nearly all were male and considered themselves indigenous. The vast majority of these household heads had very low levels of education. Nearly one-half had no schooling, and only 22.2 percent had completed primary or higher school. Less than one-half spoke Spanish as their first or second language. Farming was the primary occupation of the household heads enrolled in the surveys. At enrollment, 56.9 percent farmed their own land or land owned by their family, and 22.6 percent reported working as agricultural laborers. There were no significant differences in household composition or demographic characteristics across treatment groups at the 12-month or 24-month survey.

At enrollment the vast majority of households lived in houses they owned that had an average of two rooms each, and nearly all households owned a plot of land (**Table 4.2**). In general, housing conditions were poor: 82.5 percent of dwellings had a dirt floor and 69.7 percent had walls made of wood. The quality of roofing materials was better, and nearly all houses had a roof of corrugated metal. Housing conditions remained similar at the 12-month and 24-month surveys.

Only 16.7 percent of households had access to tap water at enrollment. The majority of households had access to surface water (22.0 percent) or rainwater (59.0 percent). Households' primary water sources did not change at the 12-month and 24-month surveys. The average time to reach the water source was 23.7 minutes (**Table 4.3**). Less than a one-quarter of households had electricity. Almost all households (99.2 percent) used firewood for cooking. Household light came from three different sources: 26.0 percent households used electricity, 29.0 percent used kerosene or oil, and 41.5 percent used candles. There were no significant changes in households' sources of electricity or cooking fuel at 12 and 24 months.

Table 4.1. Household Composition and Characteristics of Household Heads at Enrollment[a]

	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**748**	**755**	**756**	**739**	**794**	**753**
Household composition						
Total members	6.4±3.0	6.2±3.0	6.3±3.0	6.5±3.0	6.1±3.0	6.2±2.9
Members under 18 years	3.1±2.1	3.1±2.1	3.0±2.1	3.1±2.1	2.9±2.1	3.0±2.1
Members over 18 years	3.3±1.8	3.2±1.8	3.3±1.9	3.4±1.8	3.1±1.7	3.1±1.7
Members under 59 months	0.9±0.8	0.9±0.8	0.9±0.8	0.9±0.8	0.9±0.8	0.9±0.8
Members under 24 months	0.3±0.5	0.3±0.5	0.3±0.5	0.2±0.5	0.3±0.5	0.3±0.5
Dependency ratio	0.9±0.7	0.9±0.7	0.9±0.7	0.9±0.7	0.9±0.7	0.9±0.7
Household head characteristics						
Age (in years)	39.9±14.3	39.1±13.3	40.7±14.6	40.1±13.7	38.7±13.2	39.3±14.0
Male	94.1	95.2	95.2	92.8	91.9	94.4
Indigenous	99.6	99.5	99.2	99.6	99.7	99.7
Speaks Spanish as first or second language	42.5	41.5	46.0	52.0	45.0	42.9
Household head education						
None/preschool	51.6*	47.7	44.3	39.4	49.1	45.6
Some primary	28.6*	34.2	31.9	35.5	27.3	32.0
Primary and higher	19.8	18.1	23.8	25.2	23.6	22.4
Household head occupation						
Agriculture own or family land	56.0	60.4	57.3	52.6	61.2	53.5
Agricultural laborer	23.9	19.3	22.4	22.2	19.5	28.7
Other	14.0	15.5	14.7	17.9	12.0	12.1
Unemployed/student/retired	6.0	4.8	5.7	7.3	7.3	5.7

[a] Values are mean ± SD or percentages. All estimates account for clustering.

* Study arms differ, $p < 0.05$.

Table 4.2. Housing Characteristics at Enrollment[a]

	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)[b]
N	**748**	**755**	**756**	**739**	**794**	**753**
Owns home	97.9	96.7	98.1	96.2	98.2	97.3
Owns a plot of land	94.5	92.6	93.6	93.8	96.5	92.2
Dwelling type and characteristics						
Shared dwelling	1.2	1.3	2.0	1.4	1.4	1.2
Number of rooms	2.1±0.9	2.2±0.9	2.2±1.0	2.2±0.9	2.1±0.9	2.1±0.9
Housing quality						
Type of floor						
Dirt	89.4*	82.1	78.2	78.9	80.9	85.4
Type of walls						
Wood	68.9	68.3	63.2	67.7	74.9	74.7
Brick/cement/other blocks	11.5	15.5	20.4	19.9	16.0	12.2
Palm/bamboo	14.8	14.3	12.0	6.8	2.8	8.6
Other	4.8	1.9	4.4	5.7	6.3	4.4
Type of roof						
Corrugated metal sheet	97.9	98.1	96.7	99.5	97.5	99.1
Thatch/straw	2.1	1.7	2.9	0.5	1.9	0.7
Tile	0.0	0.0	0.3	0.0	0.3	0.0
Other	0.0	0.1	0.1	0.0	0.4	0.3

[a] Values are mean ± SD or percentages. All estimates account for clustering.
[b] Sample size ranged from N = 752 to 753 in the F arm.
* Study arms differ, $p < 0.05$.

Table 4.3. Water and Energy Access at Enrollment[a]

	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)[b]
N	**748**	**755**	**756**	**739**	**794**	**753**
Drinking water source						
Tap water	19.5	22.5	22.2	24.1	3.9	9.0
Open well	2.1	0.8	2.5	2.4	2.8	0.9
Covered well	0.8	0.1	0.3	0.0	0.3	0.3
Surface water	28.6	20.9	22.2	20.6	18.5	21.4
Rainwater	48.9	55.6	52.8	52.8	74.6	68.4
Other	0.0	0.0	0.0	0.1	0.0	0.0
Time (in minutes) to get drinking water	20.3±23.0	20.9±23.6	29.8±30.6	23.5±29.6	23.5±26.7	24.5±26.0
Household has electricity	22.1	26.0	28.4	29.6	26.6	15.4
Energy for cooking						
Firewood	98.8	98.8	99.6	99.2	99.7	99.2
Other	1.2	1.2	0.4	0.8	0.3	0.8
Energy for light						
Electricity	23.7	28.9	30.2	30.0	27.5	15.7
Kerosene/oil	33.3	29.4	30.0	27.1	23.6	31.2
Candle	38.9	37.7	38.2	41.3	43.5	49.4
Other	4.1	4.0	1.6	1.6	5.5	3.7

[a] Values are mean ± SD or percentages. All estimates account for clustering.
[b] Sample size ranged from N = 259 to 748 in the A arm; N = 182 to 755 in the B arm; N = 209 to 756 in the C arm; N = 187 to 739 in the D arm; N = 179 to 794 in the E arm; and N = 173 to 753 in the F arm.
* Study arms differ, $p < 0.05$.

5. Results: Maternal Characteristics

Mothers were on average 24.8 years old at enrollment (**Table 5.1**). Nearly all mothers were married or in a relationship and living with their husband or partner. Very few mothers self-identified as head of the household; 62.3 percent reported being the spouse or partner of the household head, 22.2 percent the daughter-in-law, and 12.8 percent the daughter. Overall, maternal education was very low: 34.3 percent had never attended school or had attended only preschool, and only 23.7 percent had primary or higher education. Nearly all mothers identified themselves as indigenous, and Q'eqchi' was almost universally spoken as a first or second language. Only about one-third of mothers reported Spanish as their first or second language. Just over one-half of mothers were able to read a simple sentence in Spanish or Q'eqchi', and 36.5 percent were unable to read a sentence in either language. Nearly all mothers, 97 percent, were unemployed at enrollment, which did not change at the 12- and 24-month surveys.

Table 5.1. Maternal Characteristics and Activities at Enrollment[a]

	A (FFR+CSB)	B (RFR+CSB)	C (NFR+CSB)	D (FFR+LNS)	E (FFR+MNP)	F (Control)
N	**748**	**755**	**756**	**739**	**794**	**753**
Age	24.8±6.7	24.6±6.5	24.5±6.5	24.9±6.4	24.9±6.7	25.1±6.7
Married	96.1	97.2	95.1	94.3	97.0	96.0
Relationship to household head						
Household head	1.1	0.9	0.7	0.9	1.4	1.1
Spouse or partner	62.7	62.6	59.0	59.5	65.4	64.1
Daughter	13.2	13.2	14.3	12.6	11.5	12.0
Daughter-in-law	22.2	21.2	25.1	24.6	20.3	21.5
Other	0.8	2.0	0.9	2.3	1.5	1.3
Education						
None/preschool	37.4*	36.8	33.2	28.4	36.1	33.5
Some primary	41.4	38.8	43.3	45.6	39.7	43.4
Primary and higher	21.1	24.4	23.5	26.0	24.2	23.1
Indigenous	99.5	99.1	99.3	98.6	99.9	99.5
Speaks Q'eqchi' as first or second language	99.5	97.9	94.7	98.5	99.2	98.1
Speaks Spanish as first or second language	28.1	33.0	32.3	40.7	29.2	28.3
Literacy in Spanish						
Literate	50.4	52.7	55.3	60.4	54.5	56.6
Partially literate	9.8	7.7	6.5	8.8	8.9	7.6
Nonliterate	39.8	39.6	38.2	30.9	36.5	35.9
Literacy in Q'eqchi'						
Literate	47.3	46.1	49.5	55.1	49.1	51.7
Partially literate	10.3	10.1	9.0	10.6	10.1	8.9
Nonliterate	42.4	43.8	41.5	34.4	40.8	39.4
Literacy in either Spanish or Q'eqchi'						
Literate	53.2	53.9	57.3	62.5	55.8	58.6
Partially literate	7.5	6.6	4.9	6.9	8.4	5.7
Nonliterate	39.3	39.5	37.8	30.6	35.8	35.7
Occupation						
Unemployed	97.1	98.4	97.1	95.4	97.2	95.5
Other	2.9	1.6	2.9	4.6	2.8	4.5

[a] Values are mean ± SD or percentages. All estimates account for clustering.
* Study arms differ, $p < 0.05$.

6. Results: Child Characteristics

About one-half of the children enrolled in the survey were male but this varied by treatment arm, with arm B (RFR+CSB) having the highest percentage of boys (54.1 percent) and arm E (FFR+MNP) having the lowest (45.5 percent) **(Table 6.1)**. At the 1-month survey, children were on average 1.2 months (**Table 6.1**), and at all subsequent surveys, their actual ages were close to the age prescribed by the study design.

Table 6.1. Child Characteristics[a]

N	A (FFR+CSB) 693	B (RFR+CSB) 695	C (NFR+CSB) 705	D (FFR+LNS) 685	E (FFR+MNP) 718	F (Control)[b] 698
Child sex	52.8*	54.1	48.7	49.1	45.5	48.3
Child age at each survey						
1 month	1.2±0.4	1.2±0.5	1.2±0.4	1.3±0.5	1.2±0.5	1.2±0.4
4 month	4.1±0.3	4.1±0.2	4.1±0.3	4.1±0.3	4.1±0.2	4.1±0.3
6 month	6.1±0.2	6.1±0.2	6.1±0.3	6.1±0.2	6.1±0.3	6.1±0.3
9 month	9.1±0.2	9.1±0.2	9.1±0.2	9.1±0.3	9.1±0.2	9.1±0.2
12 month	12.0±0.2	12.0±0.2	12.1±0.3	12.1±0.3	12.0±0.2	12.0±0.2
18 month	18.0±0.2	18.0±0.2	18.0±0.1	18.0±0.1	18.0±0.1	18.0±0.1
24 month	24.0±0.2	24.0±0.2	24.0±0.2	24.0±0.2	24.0±0.2	24.0±0.2

[a] Values are mean ± SD or percentages. All estimates account for clustering.
[b] Sample size ranged from N = 657 to 693 in the A arm; N = 659 to 695 in the B arm; N = 640 to 705 in the C arm; N = 637 to 685 in the D arm; N = 678 to 718 in the E arm; and N = 655 to 698 in the F arm.
* Study arms differ, $p < 0.05$.

7. Results: *PROCOMIDA* Participation

7.1 Enrollment and Participation in *PROCOMIDA*

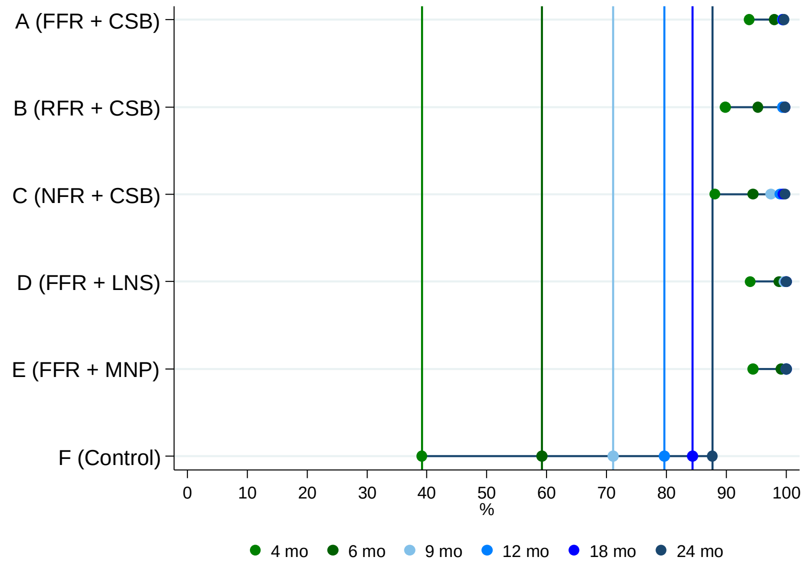
By the 4-month survey, approximately 90 percent of respondents in the treatment arms were aware of *PROCOMIDA*, and by the 24-month survey, more than 99 percent of respondents in the treatment arms knew of the program (**Figure 7.1**). Approximately 40 percent of respondents in the control arm had heard of *PROCOMIDA* at the 4-month survey, and almost 90 percent had heard of it by 24 months. At the enrollment survey, only 30 percent of mothers assigned to a treatment arm were already beneficiaries, but participation increased rapidly from pregnancy through the first few months of children's lives. By the 4-month survey, almost 80 percent of those in the study arms that received either the full or reduced family rations (A, B, D, and E) were participating in *PROCOMIDA*, and participation for these study arms remained between 80 percent and 85 percent up to the 24-month survey (**Figure 7.2)**. Participation in the C arm (NFR+CSB) was notably lower; 59.8 percent were participating at the 4-month survey, and it never exceeded 65 percent. Reported participation in the control arm was negligible. Among beneficiaries in study arms that received either the full or a reduced family ration most could produce their beneficiary cards and this increased over time (80 percent at 4 months and 95 percent at 24 months). Fewer beneficiaries in the C arm (NFR+CSB) were able to produce their beneficiary card at any survey time point compared to the other treatment arms, but this also increased over time within the C arm (62.4 percent at 4 months and 80.5 percent at 24 months) (**Figure 7.3**).

At 4 months, 93.8 percent of beneficiaries reported that receiving food rations, such as CSB, rice, beans, and oil, was a benefit of participating in *PROCOMIDA* (**Figure 7.4**). The percentage who identified food rations as a benefit increased to 97.6 percent at 24 months. Somewhat less commonly mentioned benefits were the BCC program (approximately 60 percent) and the cooking demonstrations (50 percent). Among arms that received supplements (D and E), approximately 60 percent mentioned receiving the supplement as a program benefit. Very few mothers (less than 1 percent) mentioned other benefits, such as health or agricultural assistance, and the percentage of those who mentioned each benefit did not vary much as the child got older (data not shown).

Among non-beneficiaries enrolled in the study who lived in eligible treatment areas, their reported reasons for not participating in *PROCOMIDA* were most commonly that they did not think that there were enough benefits to the program (80 percent), thought they were not eligible (30 percent), were too busy (25 percent), were not able to pay the voluntary contribution[34] (15 percent), or were inhibited by community conflict (15 percent) (**Figure 7.5**). Approximately 5 percent mentioned that they had registered to participate in *PROCOMIDA*, but had not yet been able to participate. Reasons for not participating remained similar as children got older (data not shown).

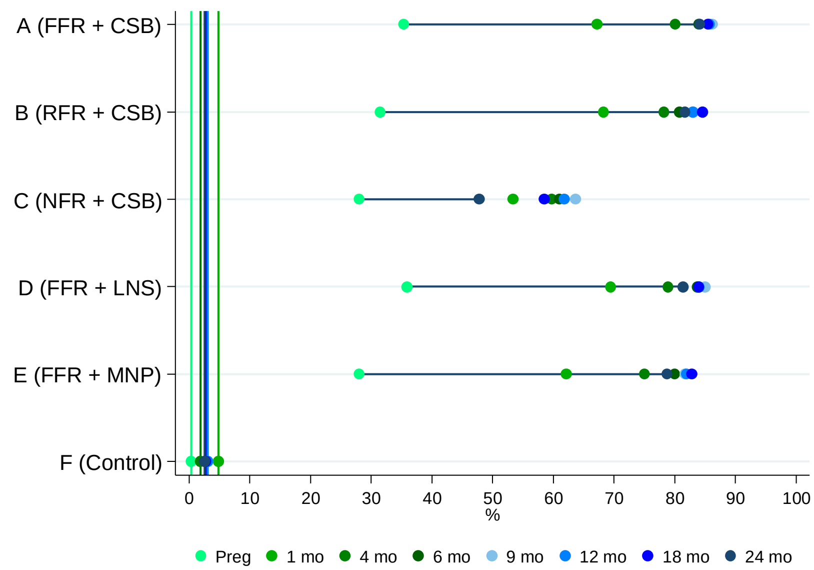
[34] The amount of the voluntary contribution was decided by the beneficiaries and differed for each health convergence center. Process evaluation data collected in 2012 found that voluntary contributions were on average GTQ14.1 in the A (FFR+CSB) arm, 10.2 in the B (RFR+CSB) arm, 6.4 in the C (NFR+CSB) arm, 13.8 in the D (FFR+LNS) arm, and 16.1 in the E (FFR+MNP) arm (Olney et al. 2013).

Figure 7.1 *PROCOMIDA* program awareness



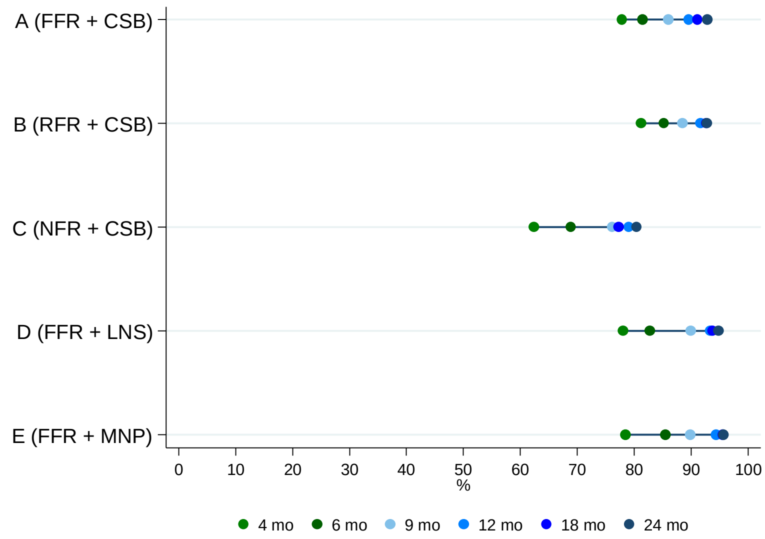
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 7.2 Current participation in *PROCOMIDA*



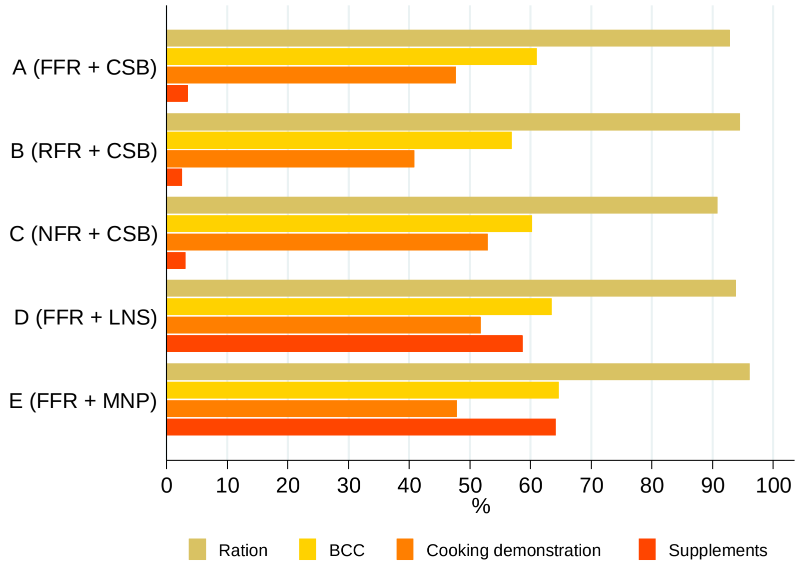
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 7.3 *PROCOMIDA* beneficiary card (current beneficiaries)



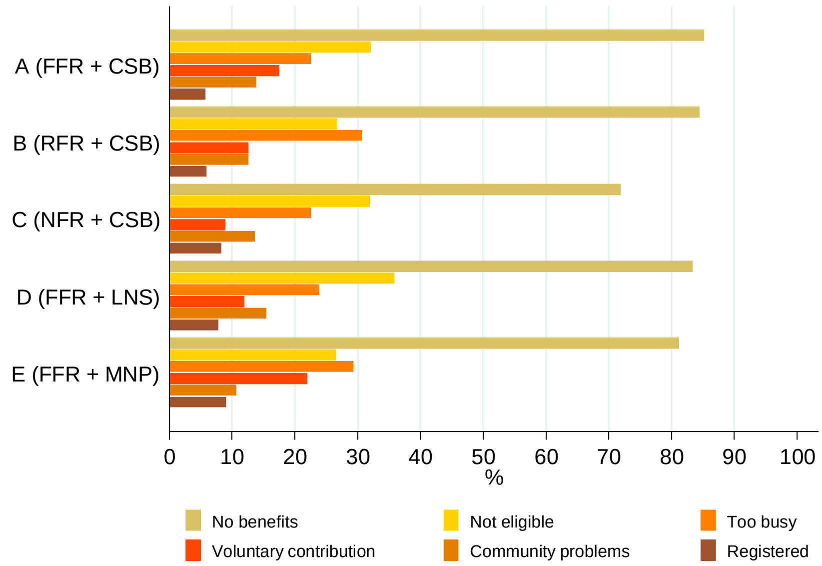
Note: Unadjusted values are shown.

Figure 7.4 Reported benefits of *PROCOMIDA* participation at 4 months (current beneficiaries)



Note: Unadjusted values are shown. Data are from the 4-month survey. Questions were open-ended, and the number of responses was not limited.

Figure 7.5 Reasons for non-participation in *PROCOMIDA* at 4 months (current non-beneficiaries)



Note: Unadjusted values are shown. Data are from the 4-month survey. Questions were open-ended, and the number of responses was not limited.

7.2 Participation in *PROCOMIDA* Program Activities

Among current beneficiaries, nearly 90 percent had attended a food distribution in the month prior to the 4-month survey, although attendance was lowest in the C (NFR+CSB) arm (81.2 percent) (**Figure 7.6**). Attendance at food distributions remained high for every arm except C (NFR+CSB), for which attendance during the past month dropped below 75 percent at the 9-month survey and remained at this level throughout the rest of the survey waves. Approximately three-quarters of beneficiaries had help in carrying home their rations in the early waves, and the availability of help tapered off in later waves to around 50 percent (**Figure 7.7**). Only one-quarter of the beneficiaries in the C (NFR+CSB) arm, who did not have family rations to carry, received help. Nearly all participants traveled to the distribution site on foot, and it took on average 20 minutes to reach the distribution sites from the beneficiaries' houses (**Figure 7.8)**.

At the most recent food distribution, nearly all beneficiaries in treatment arms with a family ration reported receiving rice and beans (**Figure 7.9)**. At the 4-month survey, oil was received at the last distribution by less than 70 percent of beneficiaries in the A (FFR+CSB), D (FFR+LNS), and E (FFR+MNP) arms, but nearly 100 percent of beneficiaries had received oil at the 24-month survey. In the B (RFR+CSB) arm, oil was received by approximately 40 percent of beneficiaries in the B arm, since oil was received every other month as part of the reduced family ration.[35] Nearly all enrolled beneficiaries in the A (FFR+CSB), B (RFR+CSB), and C (NFR+CSB) arms received their individual CSB ration (**Figure 7.10)**. Only around 80 percent of beneficiaries in the D (FFR+LNS) arm reported having received their LNS supplements at the 4- and 6-month surveys, but these were received by approximately 95 percent of beneficiaries in later waves.[36] At each wave, approximately 90 percent of beneficiaries in the E (FFR+MNP) arm reported receiving MNP at the last distribution. Approximately 95 percent of beneficiaries in the A (FFR+CSB), B (RFR+CSB), D (FFR+LNS), and E (FFR+MNP) arms reported receiving the quantity they expected, but in the C (NFR+CSB) arm only 89.7 percent of beneficiaries reported that they received the expected ration size (**Figure 7.11**). By 24 months, almost all beneficiaries in all arms stated that they had received the expected amount of rations. Among the few beneficiaries (<10 percent) who reported that they did not receive the full ration, more than one-half reported that there was no food to distribute, while others reported that food items were not distributed every month, they came late to the food distribution, or they did not attend the food distribution.

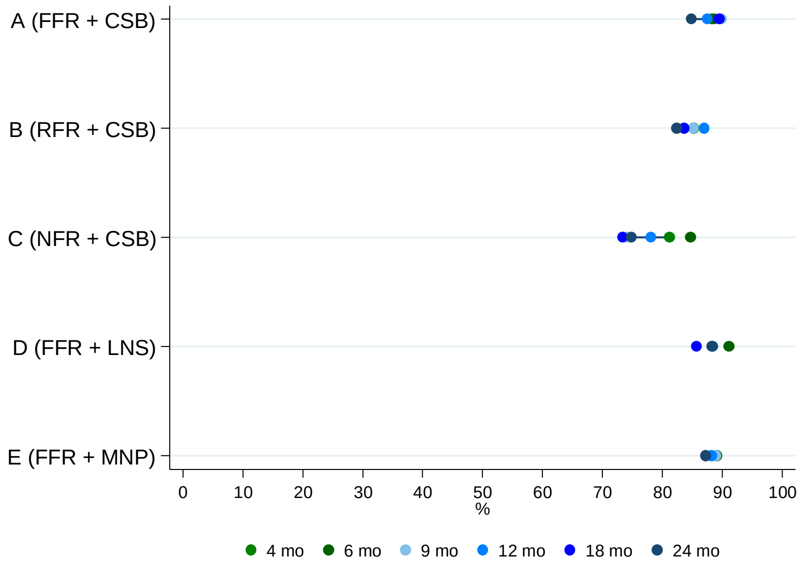
At the 4-month survey, approximately 15 percent of beneficiaries in the A (FFR+CSB), B (RFR+CSB), D (FFR+LNS), and E (FFR+MNP) arms stated that they missed a distribution since the previous survey (i.e., the 1-month survey), whereas 31.9 percent of beneficiaries in the C (NFR+CSB) arm reported having missed a distribution (**Figure 7.12**). This pattern was similar at later waves; an episode of truancy between waves among beneficiaries in the C (NFR+CSB) arm varied between one-quarter to one-third of respondents across survey waves. Missing food distributions occurred most often because beneficiaries did not have time to participate (75 percent); the voluntary contribution was too high (10 percent); they did not see benefits of the program (5 percent); or they believed that no distribution occurred (1–2 percent). (**Figure 7.13**).

Among current beneficiaries, nearly all reported that they had participated in the education session at the last distribution (**Figure 7.14).** Most common reasons for missing an education session were being late, illnesses (either the mother or the child), the inability to pay the voluntary contribution, or there was no education session held. Attendance at the cooking demonstrations, which were held by leader mothers separately from the primary education sessions, was also high—between 90 percent and 95 percent, and it

[35] Initially, for arms receiving the full family ration, a quantity of oil that was intended to last 2 months was distributed every other month, and families receiving the reduced family ration received 4 months' worth of oil every 4 months. The oil distribution strategy eventually changed, and families received smaller quantities more frequently.
[36] This is consistent with the delay in receiving LNS for distribution that was reported by program staff.

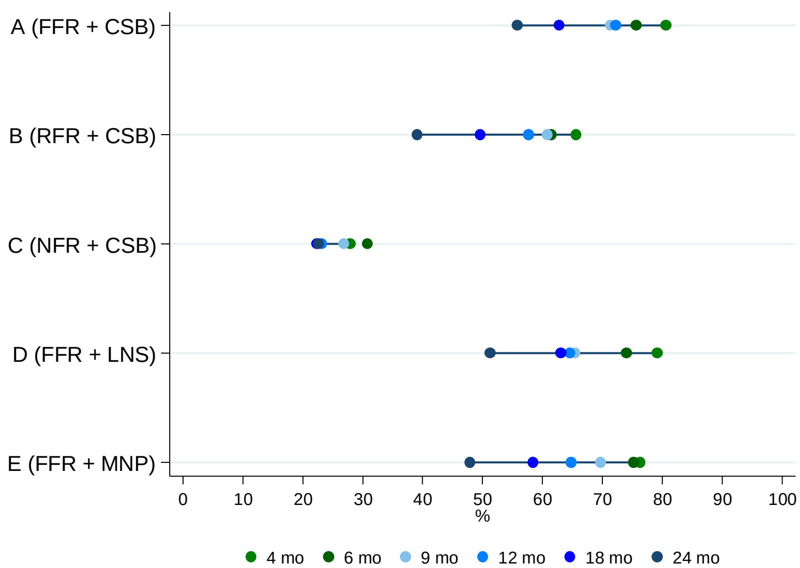
was somewhat lower among those in the C (NFR+CSB) arm (80–90 percent) (**Figure 7.15)**. Reasons stated for not attending the cooking demonstrations included having other obligations (e.g., work or care for child) (85 percent), that there was no demonstration to attend (25 percent), having just registered for the program and not knowing the time and location (15 percent), and having forgotten the date (15 percent) (**Figure 7.16**).

Figure 7.6 Attended most recent *PROCOMIDA* food distribution (current beneficiaries)



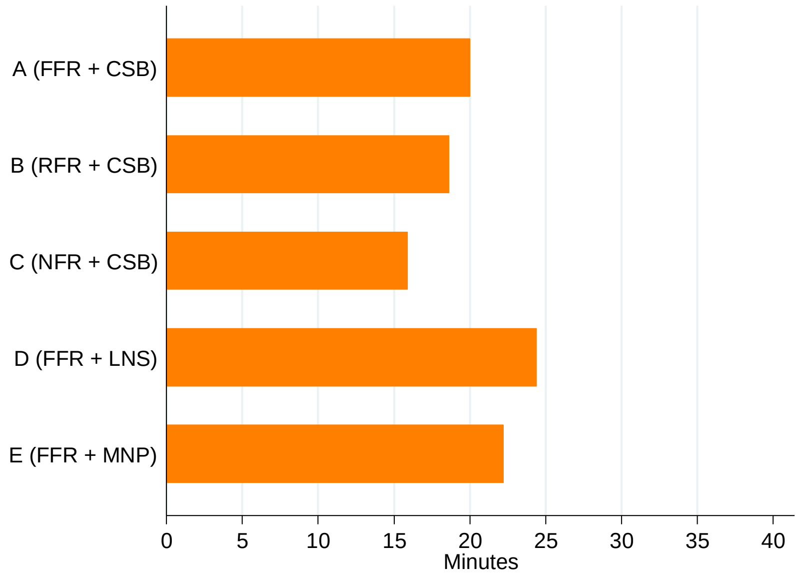
Note: Unadjusted values are shown.

Figure 7.7 Received help to carry food commodities (attended most recent distribution)



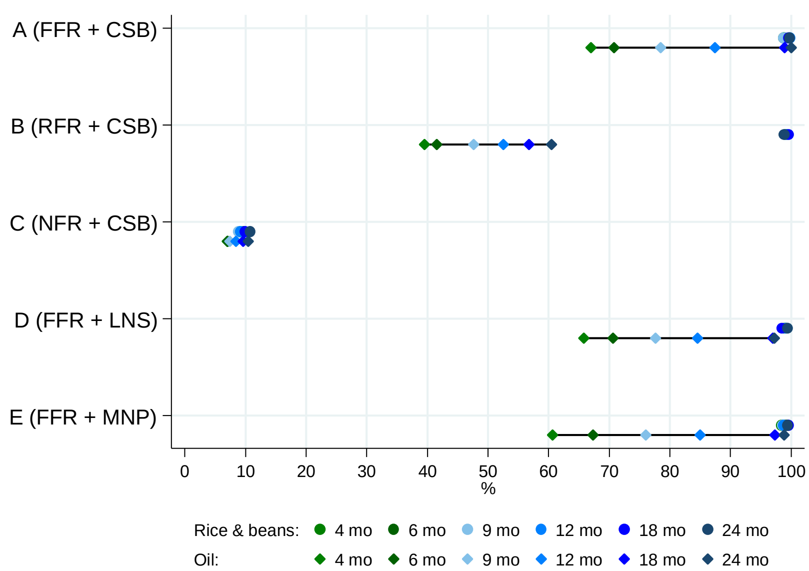
Note: Unadjusted values are shown.

Figure 7.8 Time traveled to distribution site (current beneficiaries)



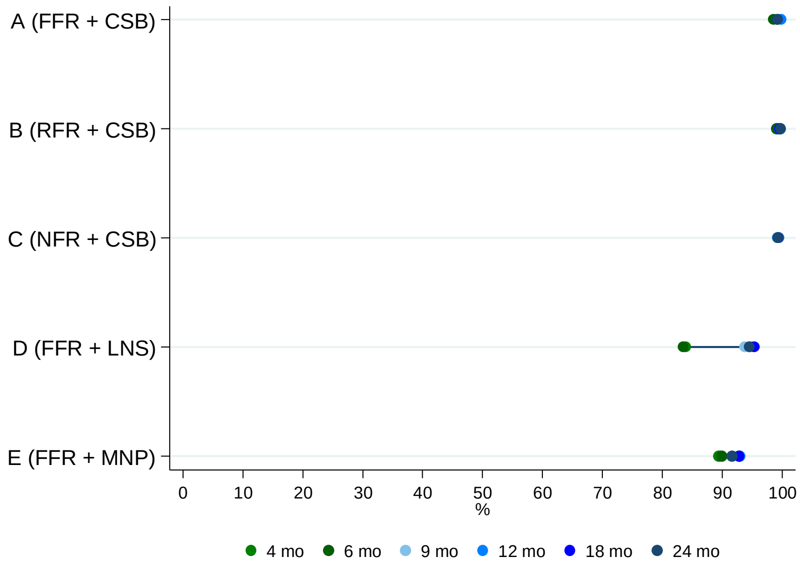
Note: Unadjusted values are shown. Data are from the 4-month survey.

Figure 7.9 Components of family ration received at most recent food distribution (current beneficiaries)



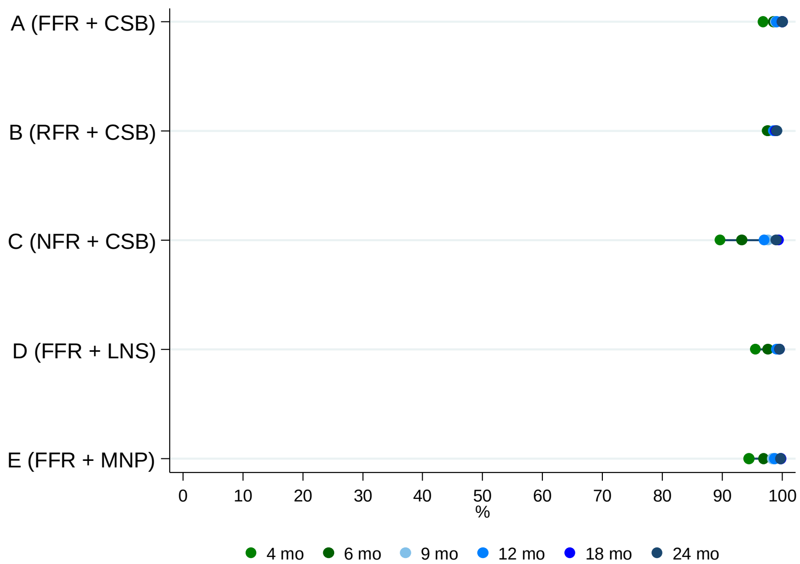
Note: Unadjusted values are shown.

Figure 7.10 Received correct individual ration at most recent food distribution (current beneficiaries)



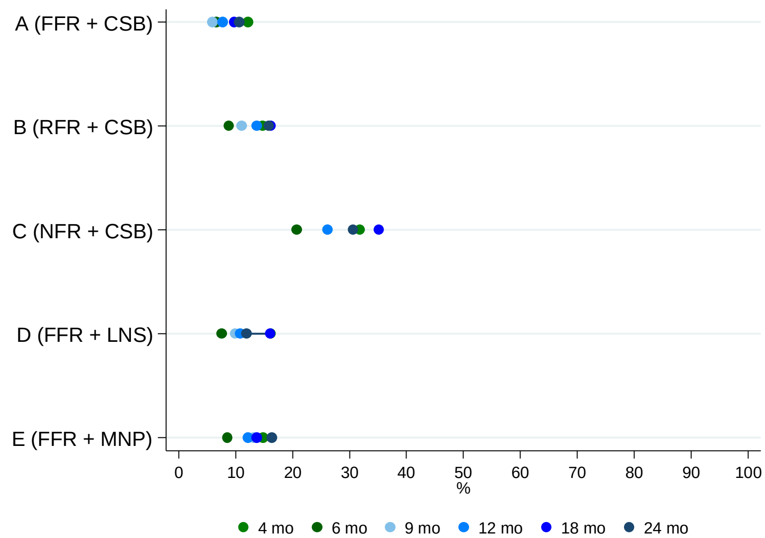
Note: Unadjusted values are shown.

Figure 7.11 Total amount of ration received as expected at most recent food distributions (current beneficiaries)



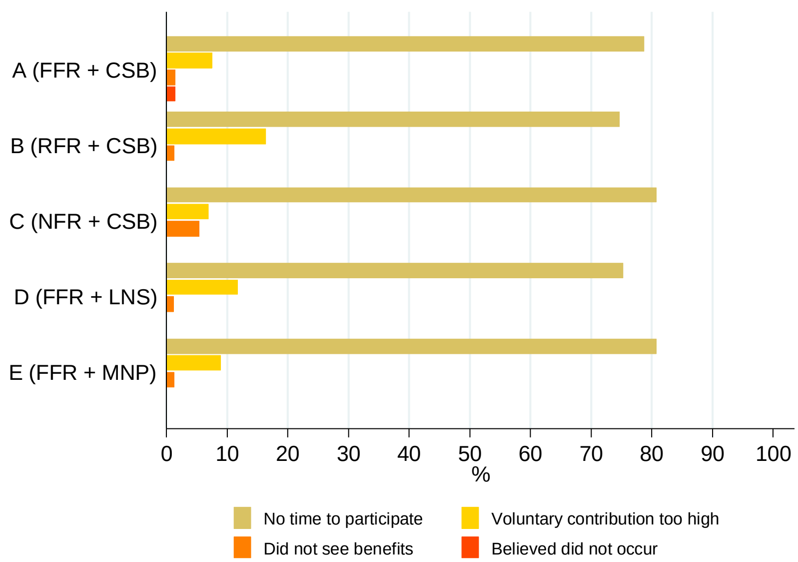
Note: Unadjusted values are shown.

Figure 7.12 Missed a food distribution since previous survey (current beneficiaries)



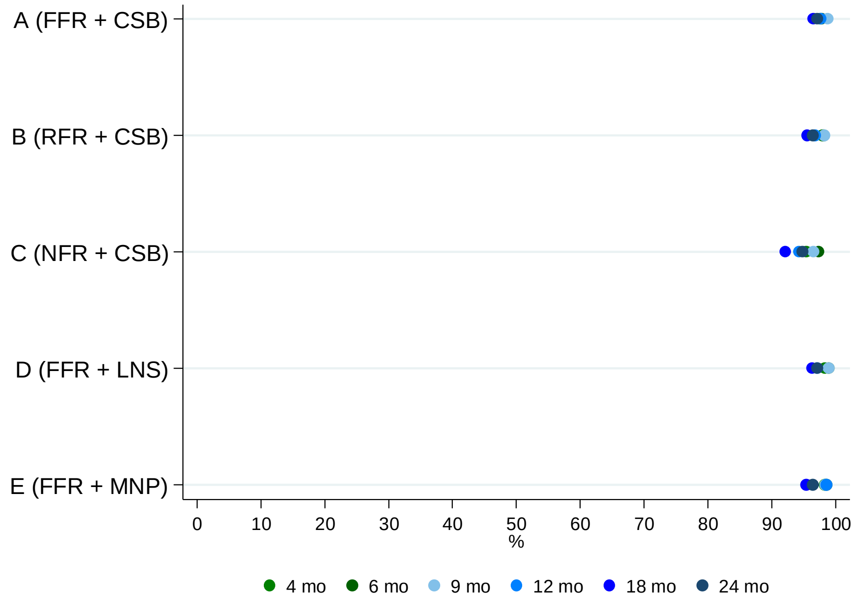
Note: Unadjusted values are shown.

Figure 7.13 Reason for missing a food distribution (beneficiaries who missed a food distribution)



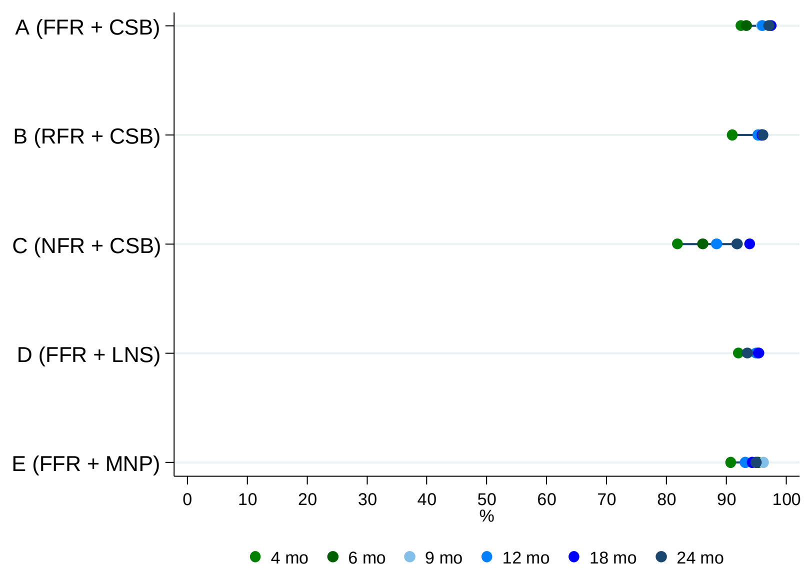
Note: Unadjusted values are shown. Data are from the 4-month survey.

Figure 7.14 Attended most recent *PROCOMIDA* education session (current beneficiaries)



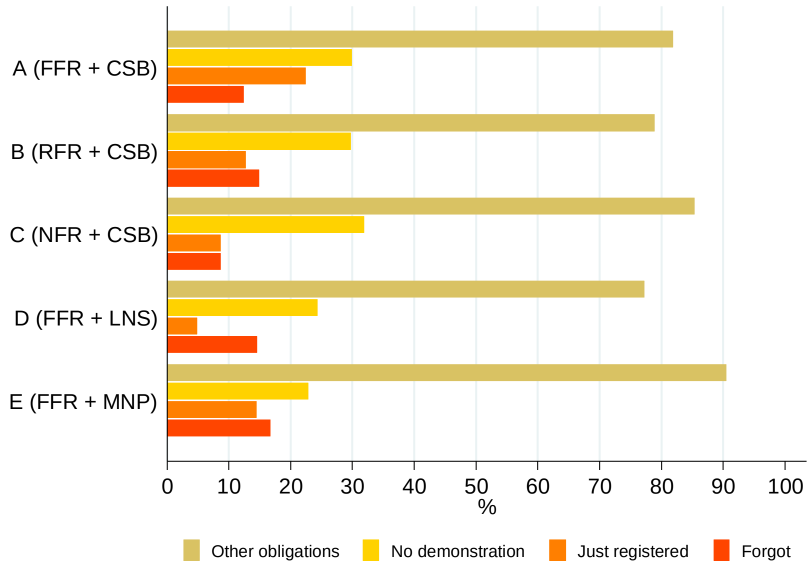
Note: Unadjusted values are shown.

Figure 7.15 Attended most recent *PROCOMIDA* cooking demonstration (current beneficiaries)



Note: Unadjusted values are shown. Cooking demonstrations were held by leader mothers separately from primary BCC sessions.

Figure 7.16 Reason for not attending *PROCOMIDA* cooking demonstration (current beneficiaries)



Note: Unadjusted values are shown. Data are from the 4-month survey.

8. Results: Household Impact

8.1 Household Hygiene and Sanitation

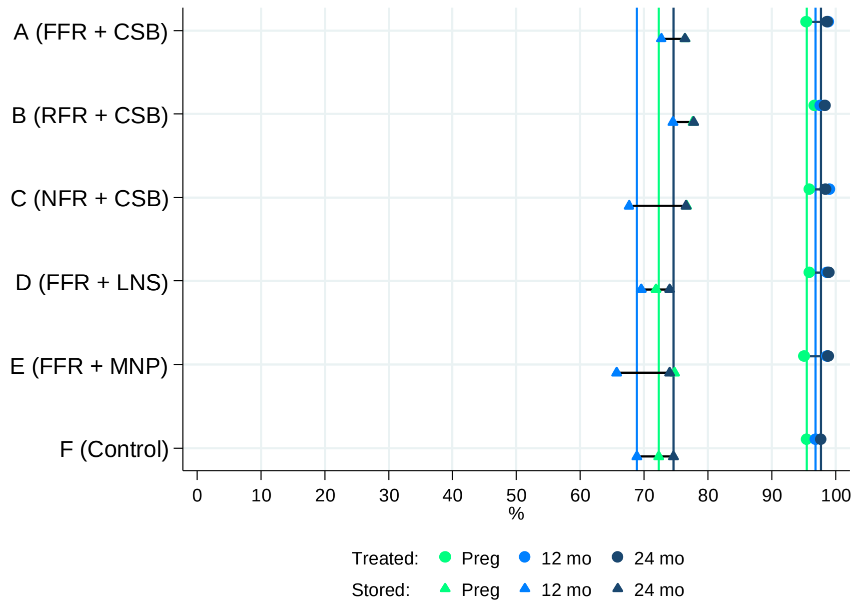
Nearly all households (95.8 percent) used an approved method to treat their drinking water at enrollment in the study, and 75.0 percent of households covered their stored water (**Figure 8.1a**). There was a small positive impact of the program on whether households treated their water in the pooled treatment arms at 12 months (1.7 percentage points [pp]); at 24 months, the impact was only significant in the D (FFR+LNS) and E (FFR+MNP) arms (both 1.3 pp) (**Figure 8.1b**). There was no impact on how water was stored. Households disposed of their garbage[37] often through multiple modes; at enrollment burning was most common (69.0 percent), followed by dumping (50.4 percent), composting (22.0 percent), and burying (20.7 percent) (**Figure 8.2a**). No meaningful program impact was found (**Figure 8.2b**).

At enrollment, 95.8 percent of households had soap available, and 97.9 percent of mothers reported having used it the previous day (**Figure 8.3a**). Notwithstanding the very high levels at enrollment, *PROCOMIDA* generally led to small increases in soap availability and use (not all of the effects reached statistical significance, however) in the combined treatment arms (**Figure 8.3b**) Despite nearly universal soap availability, it was not frequently used at key handwashing times. At enrollment, 28.9 percent of mothers reported using soap to wash their hands prior to eating, 14.7 percent prior to preparing food, 9.4 percent after using the bathroom, and 3.6 percent prior to feeding children (**Figure 8.4a**). At none of the surveys did the percentage of mothers who reported using soap to wash their hands prior to feeding their child exceed 10 percent. The impact of the program on reported handwashing with soap was minimal; in the pooled treatment arms positive impacts were limited to handwashing after using the bathroom (3.5 pp) at 12 months, 3.3 pp at 24 months) (**Figure 8.4b**). No pooled effects were found for any of the other handwashing behaviors.

At enrollment, 90.8 percent of mothers were considered “clean” in a spot-check of hands, hair, clothes, and face (**Figure 8.5a**). The percentage of mothers who were “clean” increased in all study arms across the subsequent waves to around 97 percent at 24 months; these increases were similar among study arms, and there was no significant impact of the treatment (**Figure 8.5b**). Similarly, most children (94.9 percent) were observed as “clean” at 1 month; this dropped by around 3 pp at subsequent waves (**Figure 8.6a**). There was a trend toward a positive program impact on child cleanliness, and there was a significant effect of the program at 24 months only in the A (FFR+CSB) (3.6 pp) and E (FFR+MNP) arms (4.7 pp) (**Figure 8.6b**). Turning to household cleanliness, around 70 percent of exteriors and one-half of interiors were considered clean at baseline; in subsequent waves, the exteriors were observed as cleaner and the interiors as less commonly clean (**Figure 8.7a**). In general, there were some positive consequences of the program on household cleanliness, although they were not universally significant (**Figure 8.7b**).

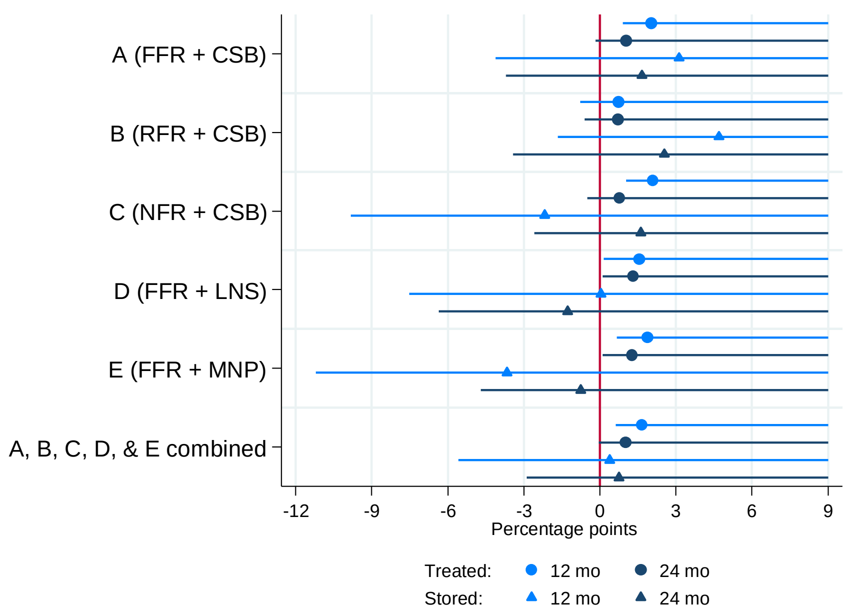
[37] Proper garbage disposal was promoted through the homestead improvement plan, which was the part of the BCC strategy that promoted hygienic homestead environments and use of homestead gardens.

Figure 8.1a Drinking water treatment and storage



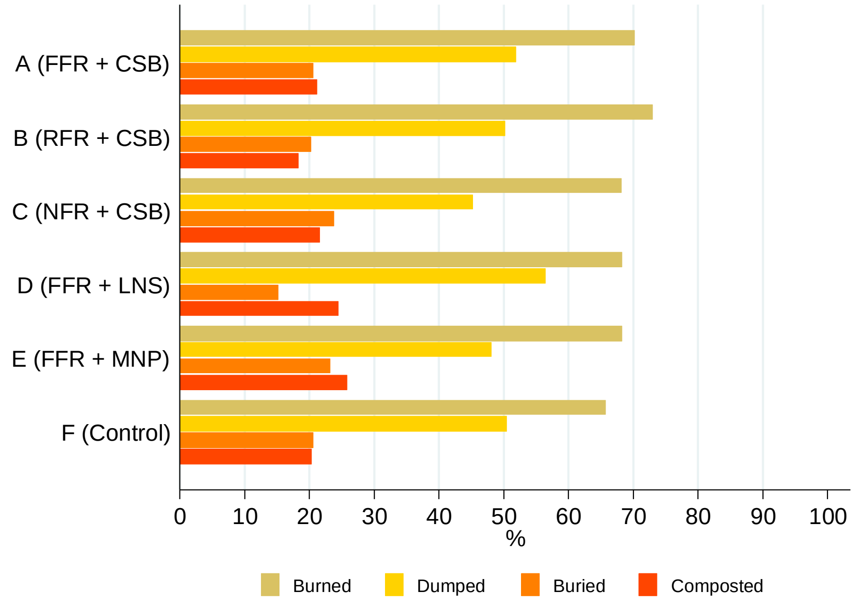
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 8.1b Drinking water treatment and storage: impact



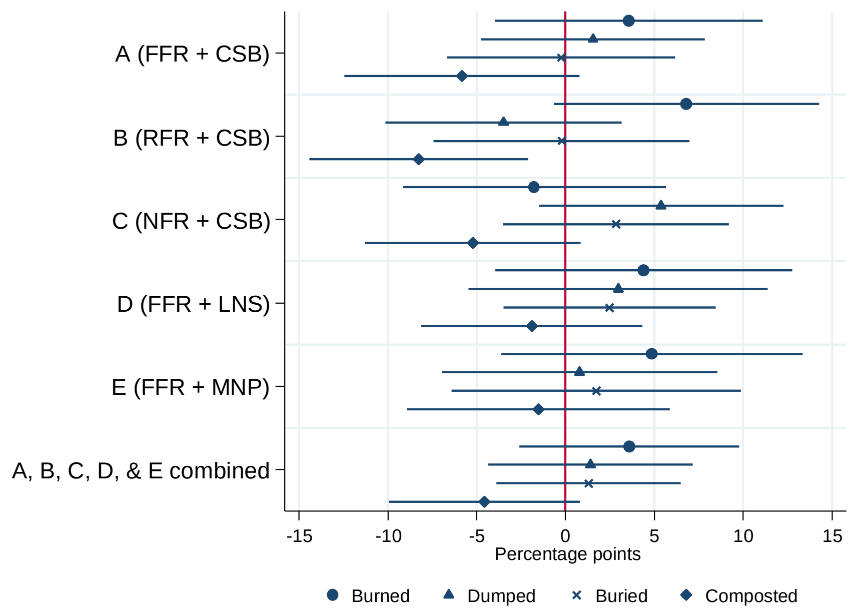
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 8.2a Methods of garbage disposal at enrollment



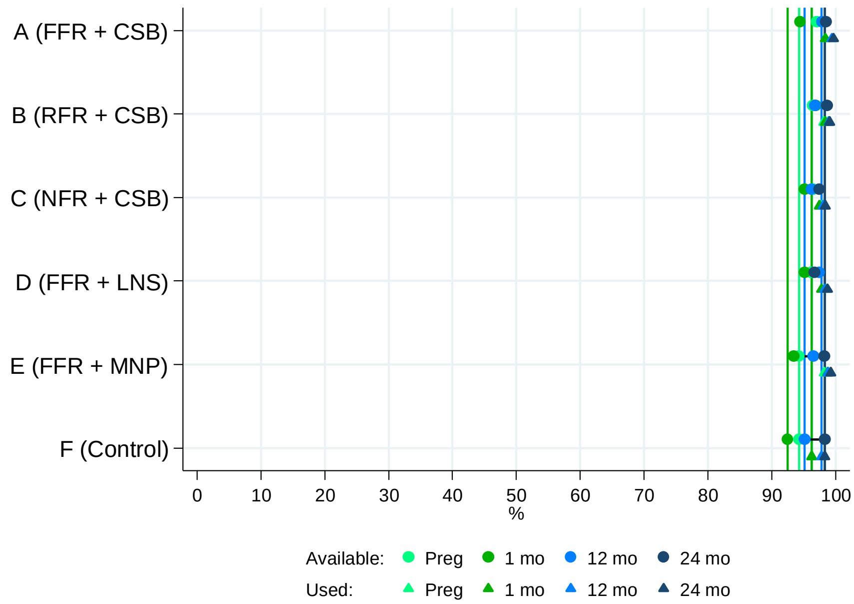
Note: Unadjusted values at enrollment are shown.

Figure 8.2b Garbage disposal at 24 months: impact



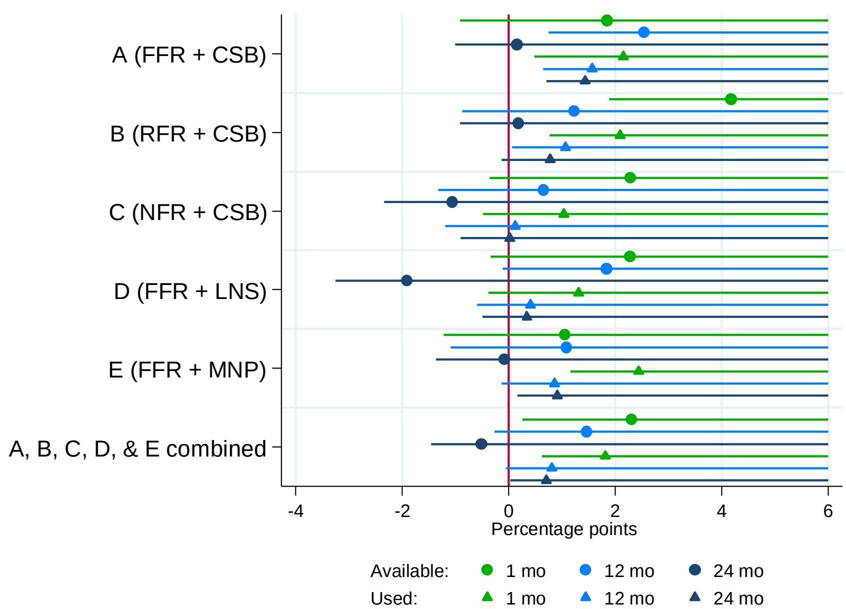
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; two-sided test was used.

Figure 8.3a Soap availability and use



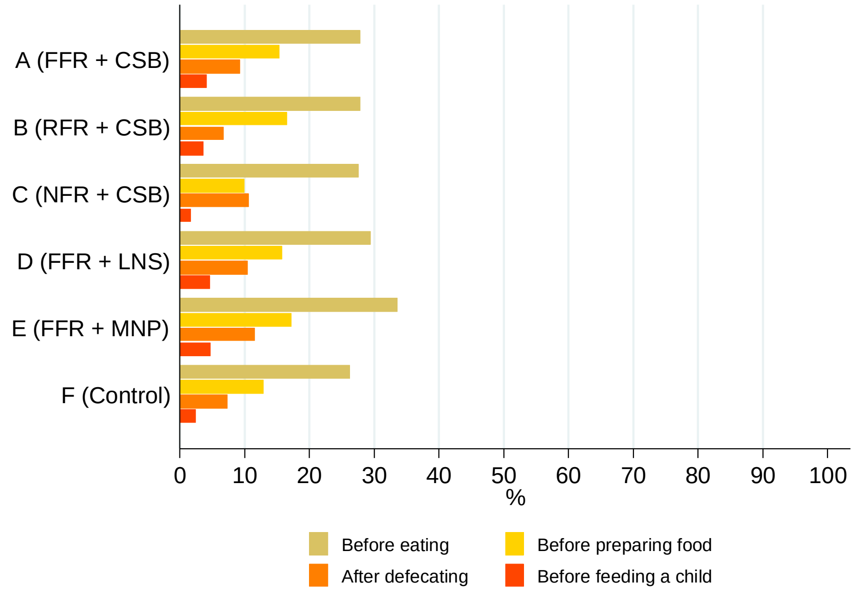
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 8.3b Soap availability and use: impact



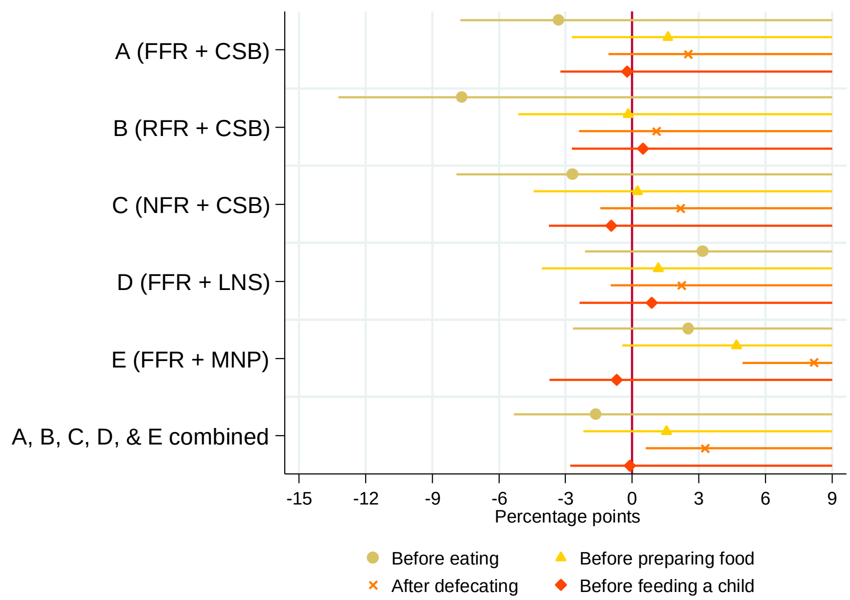
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 8.4a Soap use, previous day at enrollment



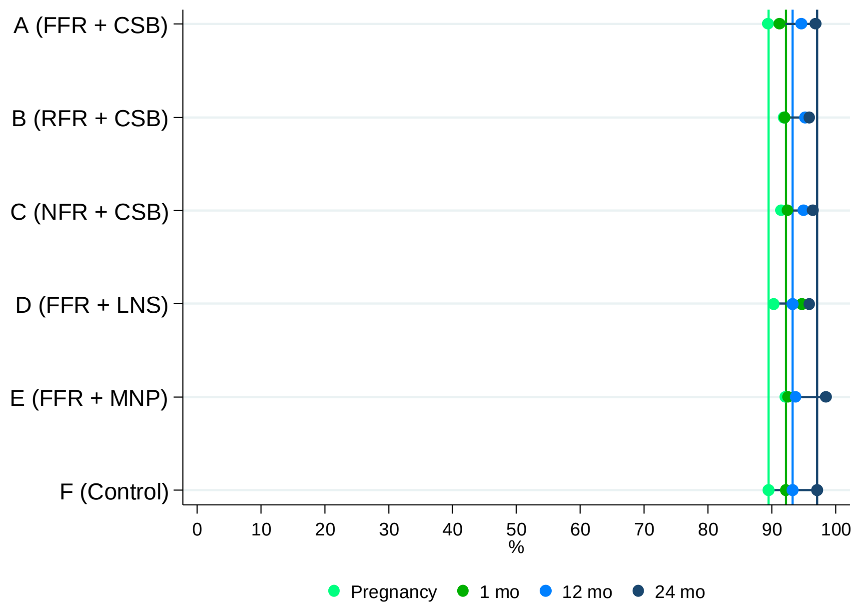
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 8.4b Soap use, previous day: impact at 24 months



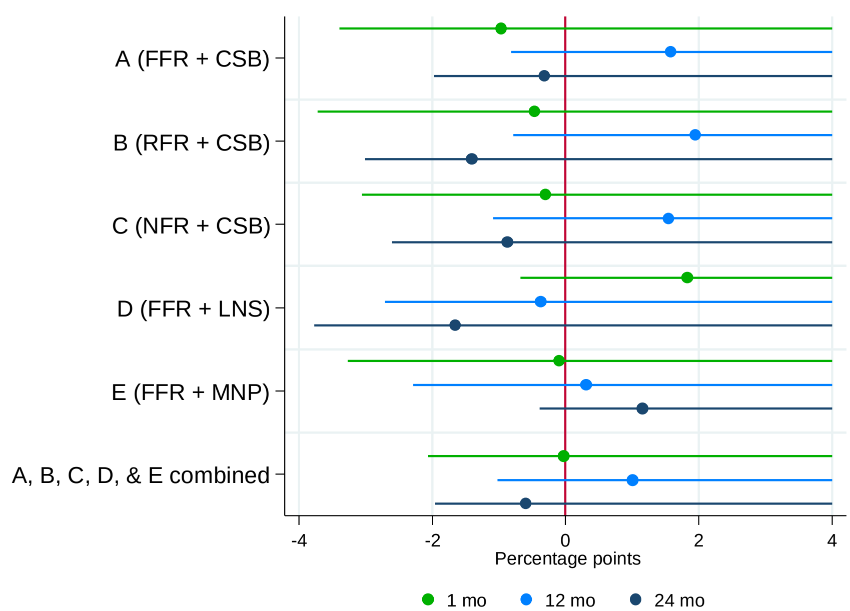
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 8.5a Mother spot-check observations, all clean



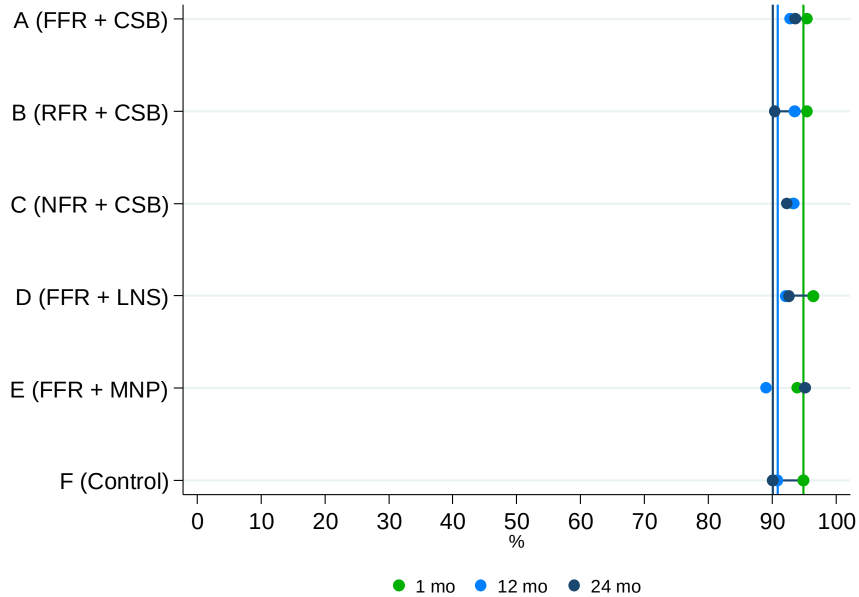
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 8.5b Mother spot-check observations, all clean: impact



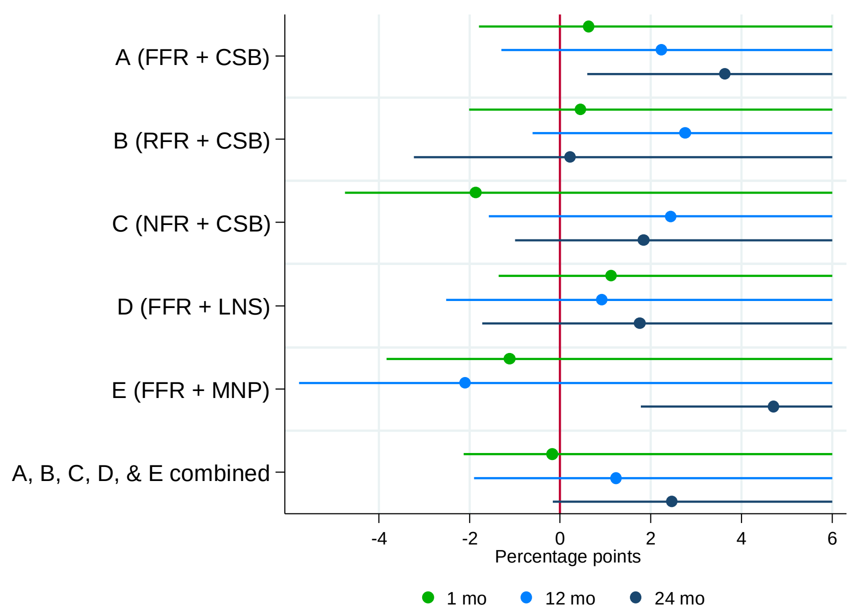
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 8.6a Child spot-check observations, all clean



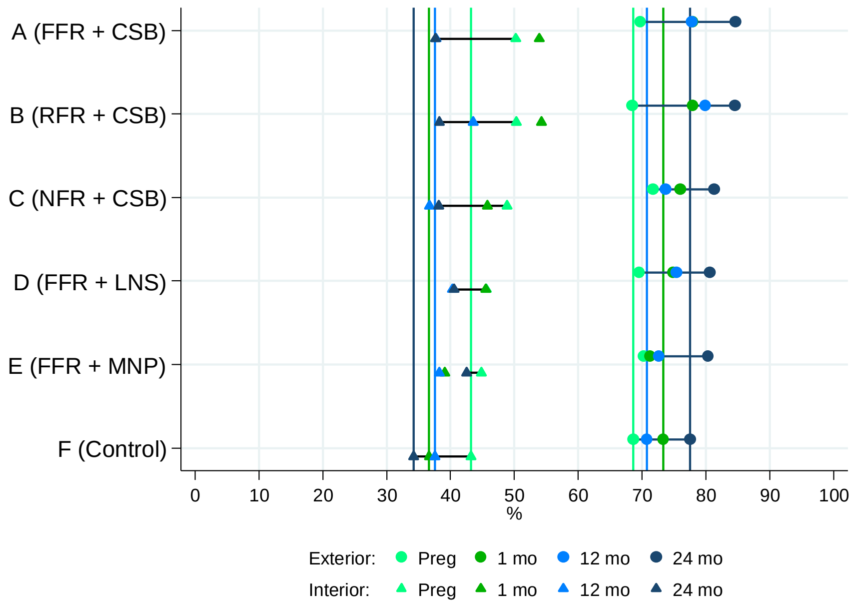
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 8.6b Child spot-check observations, all clean: impact



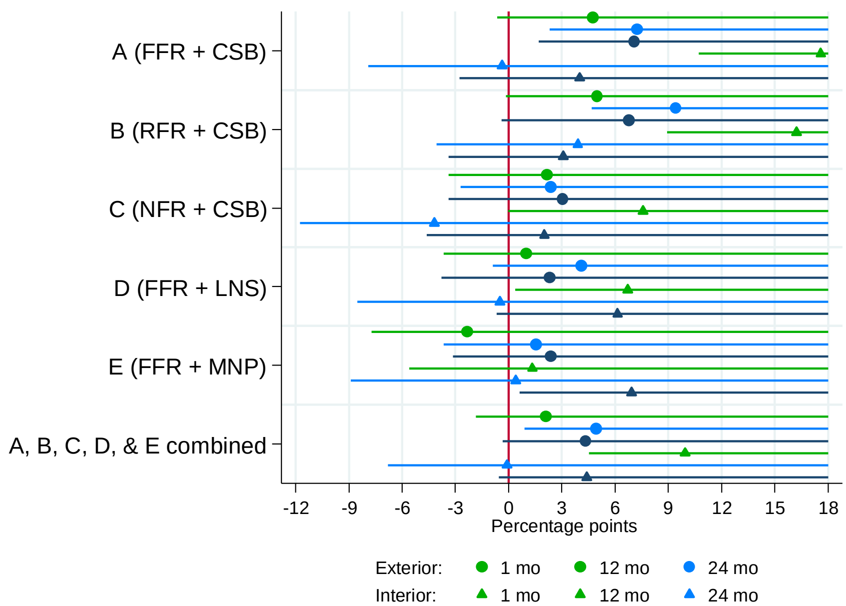
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for for mother and household head's education; mother and household head speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 8.7a Household spot-check observations, all clean



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 8.7b Household spot-check observations, all clean: impact

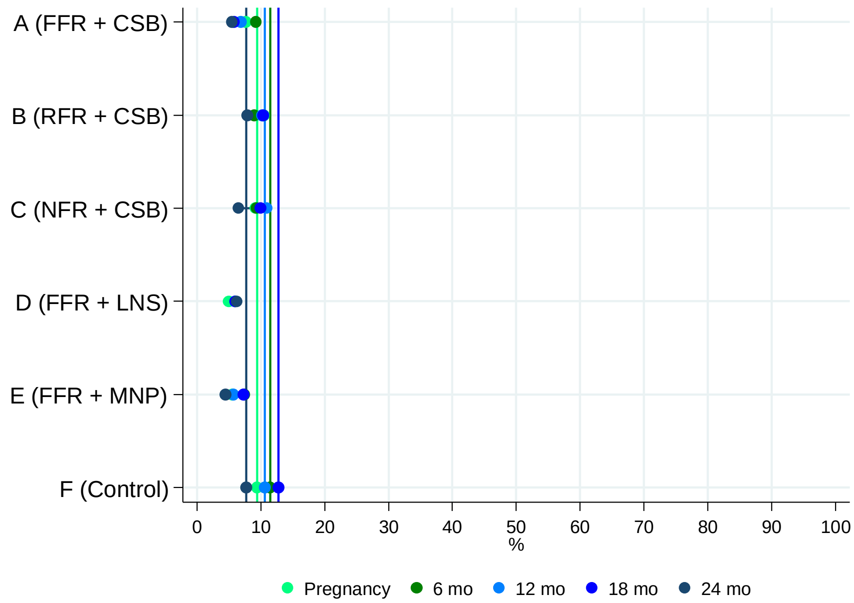


Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment, mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided was test used.

8.2 Household Hunger

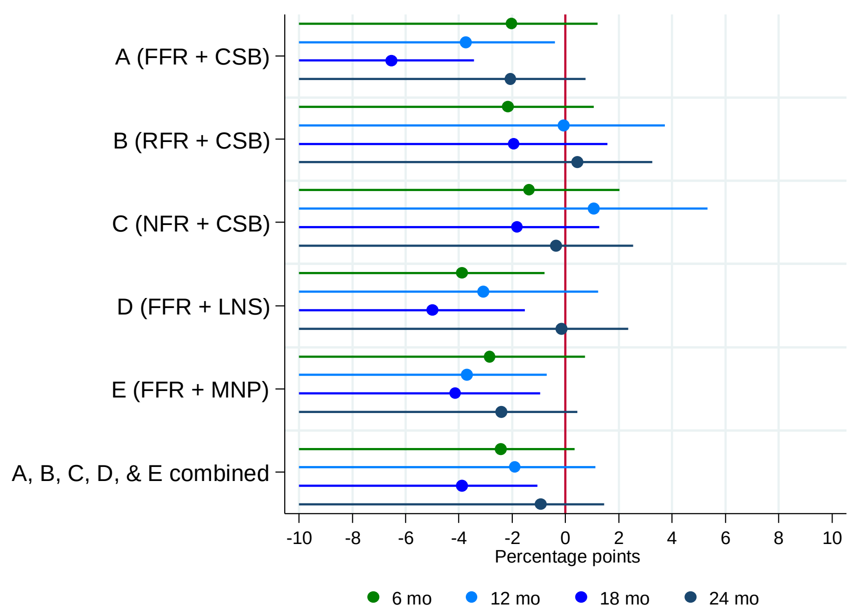
The prevalence of household hunger (as measured by the HHS) was low at enrollment, when only 7.9 percent of households reported experiencing hunger (**Figure 8.8a**). *PROCOMIDA* had a substantial impact on reducing household hunger, particularly in the treatment arms receiving the full family ration: the program reduced hunger in these arms by approximately 4 pp at 6 months and by 4.2 to 6.6 pp at 18 months (**Figure 8.8b**). Interestingly, there were no significant program effects at 24 months, likely because households had already received their last program ration by the 24-month interview. We found no program impact on household hunger in the treatment arms receiving the reduced or no family ration.

Figure 8.8a Household hunger



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 8.8b Household hunger: impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided was test used.

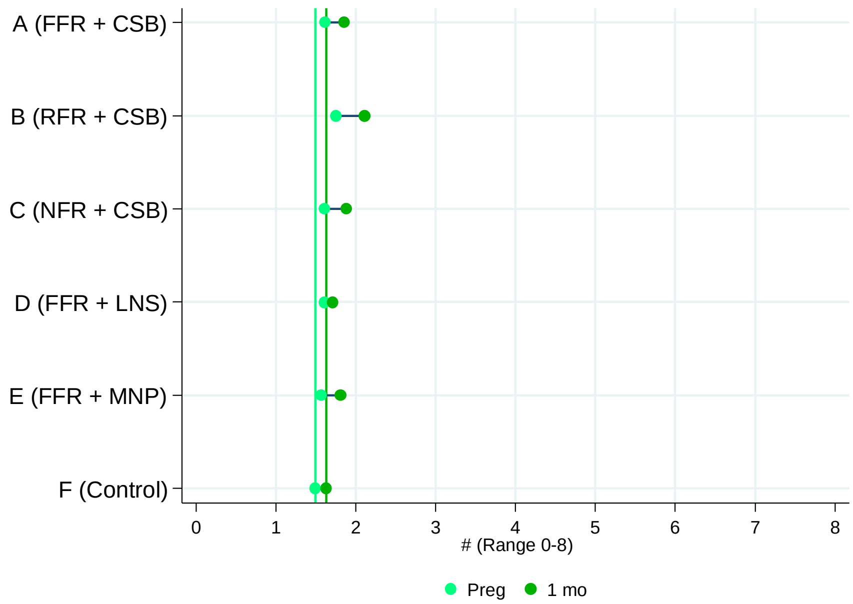
9. Results: Maternal Knowledge

9.1 Mothers' Knowledge of Danger Signs

At enrollment, mothers could name, on average, 1.6 (of 8 possible) danger signs to look for during pregnancy (**Figure 9.1a**). Mothers in the pooled treatment arms identified an average of 0.2 more danger signs at the 1-month survey than those in the control arm (**Figure 9.1b**). This positive impact was driven largely by a positive impact in the percentage of mothers who specifically identified that vaginal bleeding (6.9 pp) and swollen hands or face (4.6 pp) are danger signs during pregnancy (data not shown).

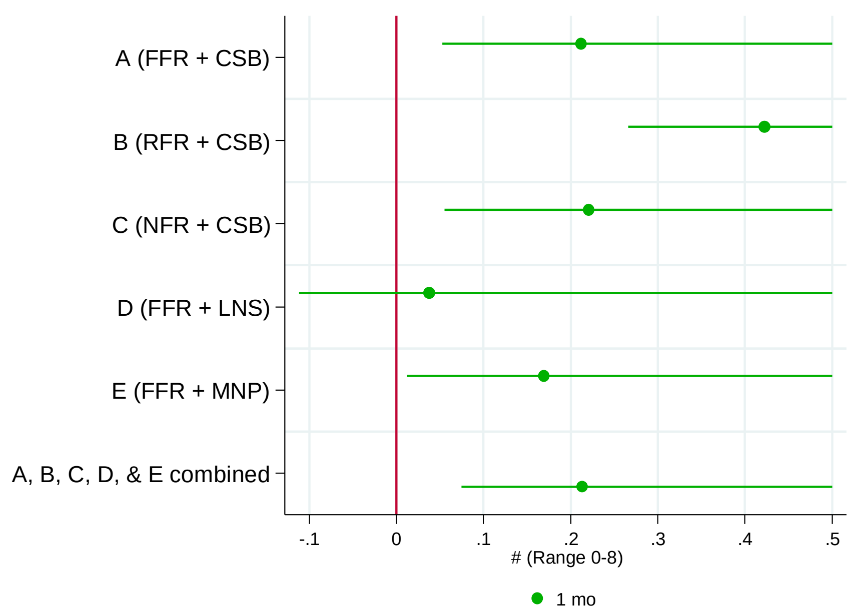
As with danger signs during pregnancy, maternal knowledge of danger signs of childhood illness was also low at enrollment. Mothers could name on average 1.5 (of 7 possible) danger signs (**Figure 9.2a**). More than 90 percent of mothers could specifically identify fever as a danger sign, but not more than 20 percent were ever able to identify any other symptom (data not shown). There was no impact on the number of danger signs that mothers could identify at any time point (**Figure 9.2b**), nor was there a consistent pattern of impacts on mothers' ability to name any specific danger signs of childhood illness (data not shown).

Figure 9.1a Knowledge of pregnancy danger signs among mothers



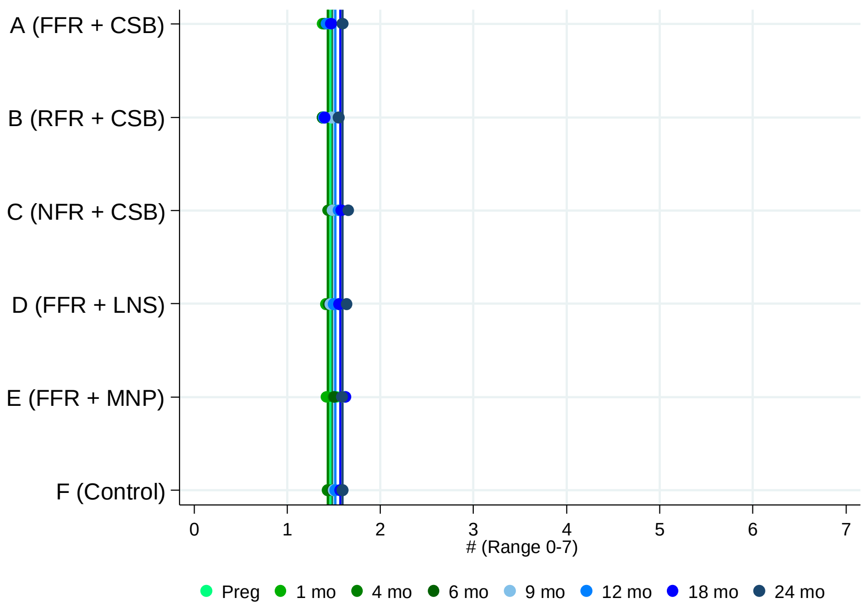
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.1b Knowledge of pregnancy danger signs among mothers: impact



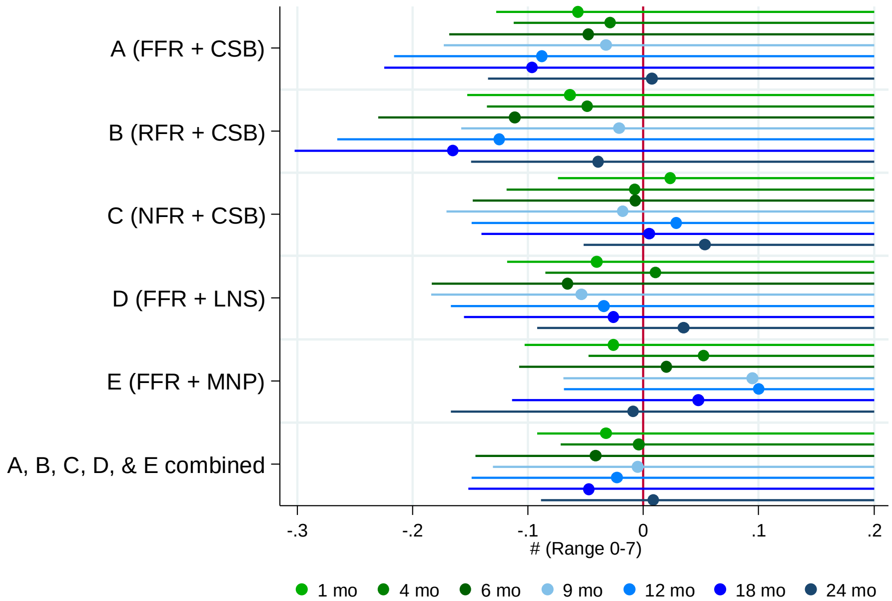
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided was test used.

Figure 9.2a Knowledge of childhood illness danger signs among mothers



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.2b Knowledge of childhood illness danger signs among mothers: impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided was test used.

9.2 Mothers' Knowledge of Breastfeeding, Care for Sick and Convalescent Children, Micronutrients, and Complementary Feeding Practices

Approximately 80 percent of mothers knew that newborns should be breastfed immediately following birth (**Figure 9.3a**) and given colostrum (**Figure 9.4a**). Notwithstanding the high percentage of women who already knew these positive practices, the program had a positive impact on knowledge of these optimal early breastfeeding practices. Among mothers in the pooled treatment arms, the impact on knowing to breastfeed immediately after birth was 4.7 pp and 8.1 pp, at 1 month and 4 months, respectively. This positive impact was sustained in the subsequent surveys (between 2.4 pp and 2.7 pp, not significant at 9 months) (**Figure 9.3b**). Similarly, among the pooled treatment arms, the impact on knowing to give newborns colostrum was 3.1 pp at the 1-month survey, and had a significant impact of between 2.2 pp and 3.1 pp at later waves (except at 12 months) (**Figure 9.4b**).

When asked to explain the benefits of exclusive breastfeeding, at enrollment, most mothers knew that it benefited child health and nutrition (84.1 percent), but far fewer mentioned lactational amenorrhea (7.7 percent) and cost (2.8 percent) as benefits (**Figure 9.5a**). There was no impact on the already-high percentage of mothers who mentioned child health and nutrition benefits (**Figure 9.5b**). The program significantly impacted the percentage of mothers who mentioned lactational amenorrhea as a benefit of exclusive breastfeeding; this peaked at 4 months (6.0 pp).

At enrollment mothers' knowledge of optimal practices for feeding sick children was limited. Fewer than one-third of mothers knew that a sick child should be breastfed more than normal (**Figure 9.6a**). There were not any consistent program impacts on this indicator (**Figure 9.6b**). The vast majority of mothers also did not know that sick children older than 6 months of age should be given more food and liquids than usual (**Figures 9.7a** and **9.8a**). The program had no impacts on these indicators (**Figures 9.7b** and **9.8b**).

Maternal knowledge regarding optimal practices for feeding children recovering from illness was better than that for feeding children during illness, but was still low. Less than one-half of the mothers interviewed knew that children recovering from illness should have more breast milk (49.7 percent at enrollment), food (42.4 percent at 6 months), and liquid (46.4 percent at 6 months) (**Figures 9.9a, 9.10a,** and **9.11a**). There were no consistent program impacts on knowledge of optimal practices for feeding children recovering from illness (**Figures 9.9b, 9.10b,** and **9.11b**).

Most mothers (85.1 percent) knew that ORS should be given to children older than 6 months in the case of diarrhea or dehydration, and the percentage who knew was balanced among study arms (**Figure 9.12a**). In some cases there were positive trends suggesting potential program impact; however, they were not significant (**Figure 9.12b**).

At enrollment the majority of mothers were able to name at least one vitamin A–rich food (91.8 percent) and at least one consequence of vitamin A deficiency (93.3 percent) (**Figures 9.13a** and **9.14a**). A positive impact of the program on identifying at least one vitamin A–rich food was observed in the pooled treatment arms at 6 months (2.1 pp) and 12 months (1.4 pp) (**Figure 9.13b**). Focusing on the specific food groups, there were positive impacts on the percent of mothers who could identify orange and yellow fruits and vegetables as rich in vitamin A at 1, 4, 6, and 24 months that ranged between 3.5 and 5.8 pp (data not shown). A positive impact on mothers' ability to identify a consequence of vitamin A deficiency occurred only at 1 month (3.1 pp) (**Figure 9.14b**), and it resulted from improvements in identifying both vision problems and poor immunity as consequences (data not shown).

Mothers were also able to name at least one iron-rich food at enrollment (89.2 percent), but only about one-half could name a consequence of iron deficiency (50.2 percent) (**Figures 9.15a** and **9.16a**). The program did not impact mothers' ability to name at least one iron-rich food (**Figure 9.15b**); however, the program did increase the percentage of mothers that named CSB (2–4 pp) and *PROCOMIDA* supplements (< 2 pp) as iron-rich (data not shown). By the end of mothers' exposure to the program, the program had a positive impact on whether mothers could correctly name a consequence of iron deficiency (3.7 pp at 18 months and 7.5 pp at 24 months) (**Figure 9.16b**).

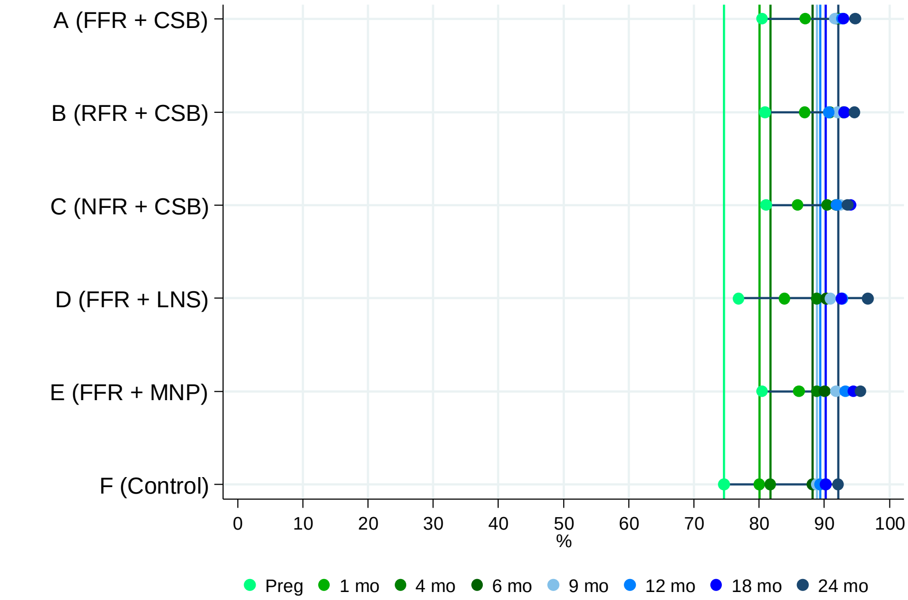
At enrollment, a little more than one-half of mothers knew that children should be introduced to foods and liquids other than breast milk at 6 months of age (56.3 percent and 53.2 percent, respectively) (**Figures 9.17a** and **9.18a**). Those who did not know that foods and liquids other than breast milk should be introduced at 6 months most often thought that they should be introduced when children were older than 6 months (data not shown). The program increased the percentage of mothers who knew the optimal time to introduce liquids other than breast milk by 4–5 pp; the size of the impact was similar across the survey waves, but only reached significance at the 4-, 12-, and 24-month surveys (**Figure 9.18b)**. There were no consistent impacts on whether mothers knew when to introduce foods, but there were impacts at 4 and 18 months (7.2 and 5.3 pp, respectively) in the D(FFR+LNS) arm and at 12 and 24 months (6.8 and 4.9 pp, respectively) in the E(FFR+MNP) arm (**Figure 9.17b)**.

At enrollment, mothers did not commonly know that children should drink from a cup, not a bottle (**Figure 9.19a**). This knowledge was not equally distributed among study arms; less than 20 percent of mothers in the control arm knew this, whereas between 30 percent and 40 percent of mothers in the various treatment arms knew this information. This imbalance may have existed because mothers in treatment areas who enrolled during later parts of the program may have already been exposed to the public service campaigns emphasizing this message. Furthermore, the program had substantial impacts, ranging from 13.8 pp at 1 month to around 30 pp at 6 months and beyond, on knowing that a child should drink from a cup and not a bottle (**Figure 9.19b**).

Only about one-half of mothers correctly knew that 6–8-month-old children should receive semisolid foods, but more than 90 percent knew that children older than 9 months should receive either solid or semisolid foods (**Figure 9.20a**). There were no consistent program impacts on this indicator; the only exceptions were small impacts (approximately 4 pp) at 18 months in the B(RFR+CSB) and C(FFR+CSB) arms (**Figure 9.20b**).

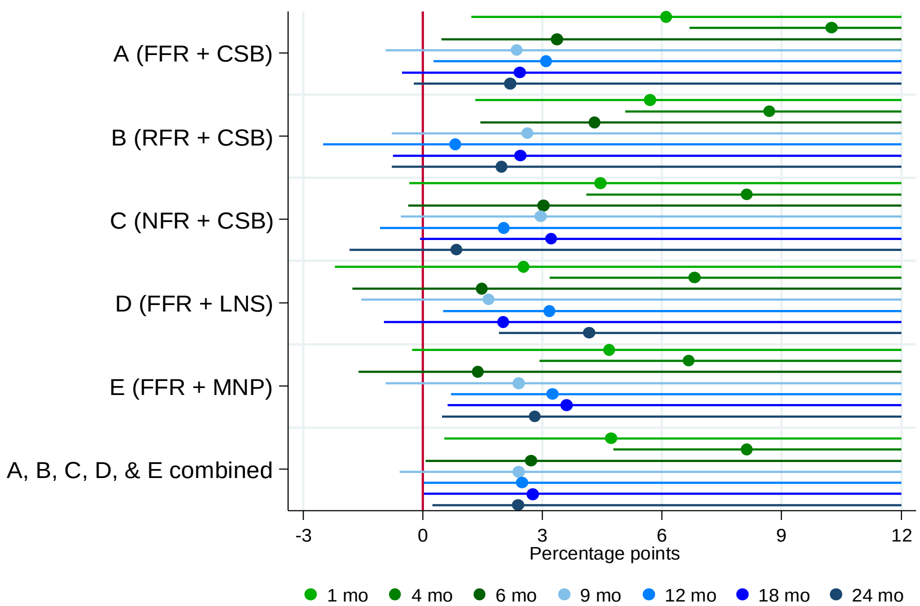
The majority of mothers already knew that children between 6 and 8 months old should be fed foods other than breast milk at least twice a day and that children older than 9 months should receive such foods at least thrice a day (**Figure 9.21a**). Given the already-high knowledge of minimum feeding frequencies, there were no program impacts (**Figure 9.21b**).

Figure 9.3a Breastfeeding knowledge, immediately after birth



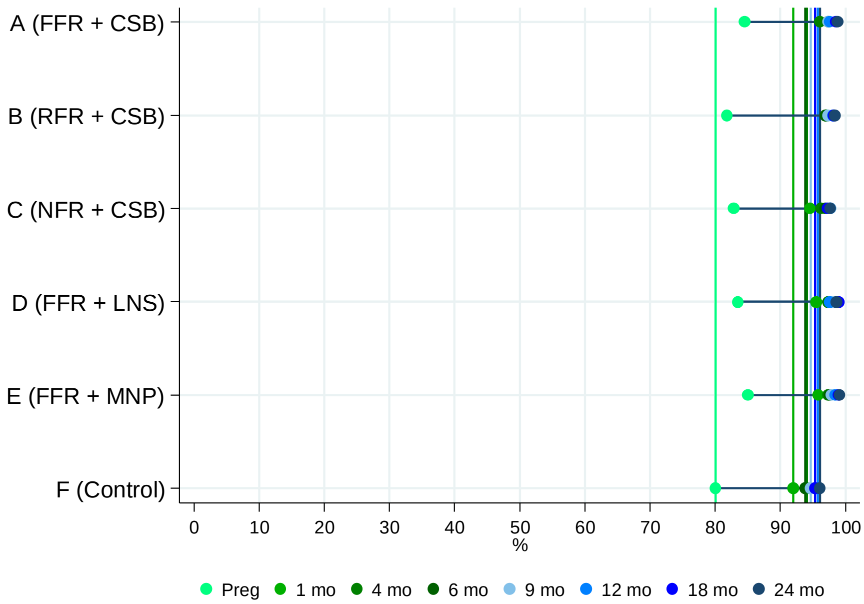
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.3b Breastfeeding knowledge, immediately after birth: impact



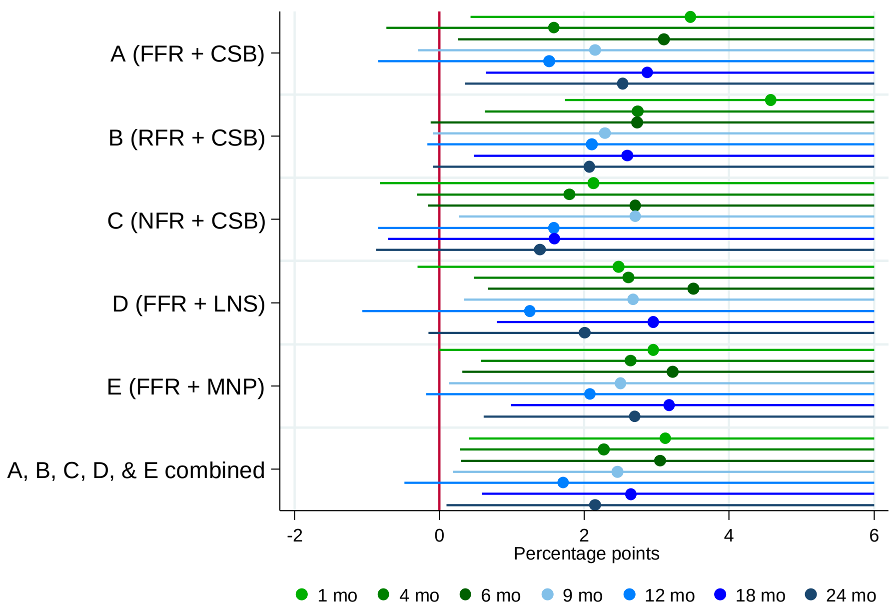
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.4a Breastfeeding knowledge, give colostrum



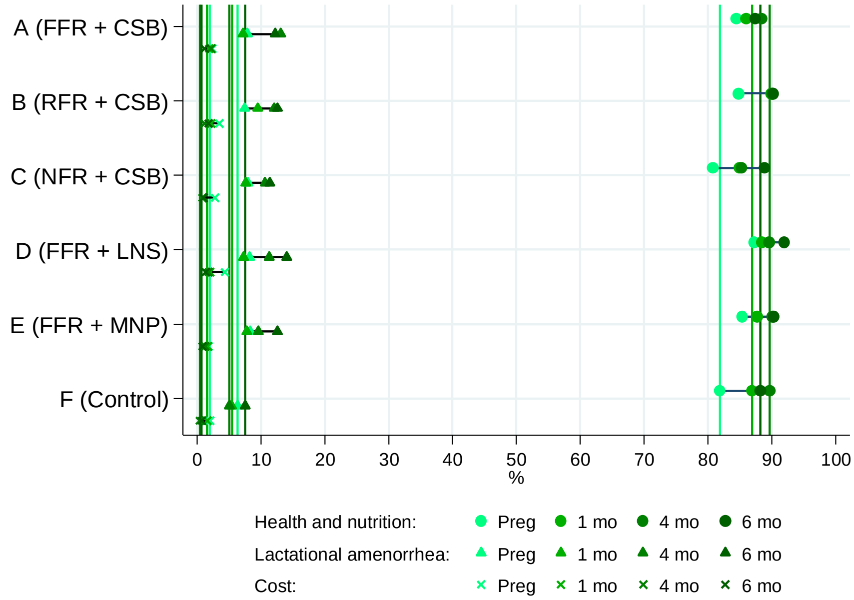
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.4b Breastfeeding knowledge, give colostrum: impact



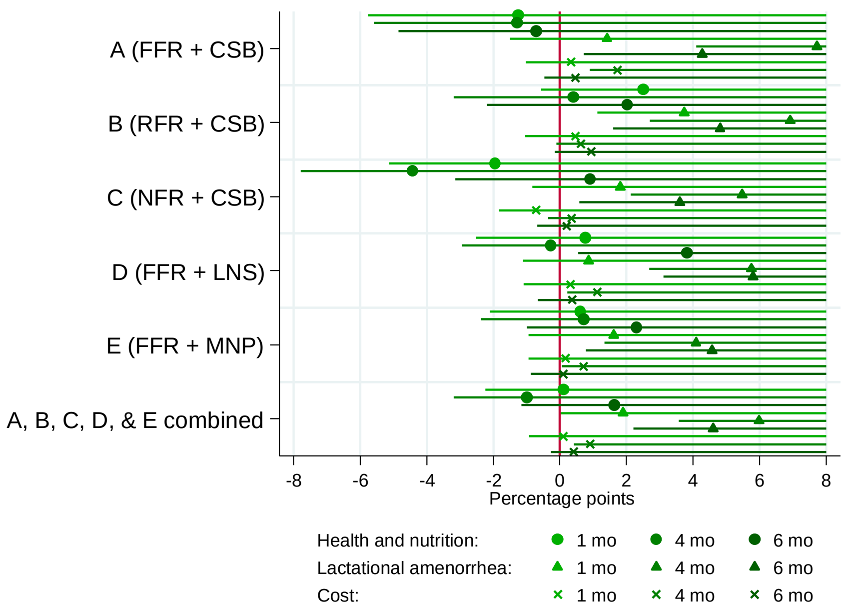
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.5a Breastfeeding knowledge, benefits of exclusive breastfeeding: impact



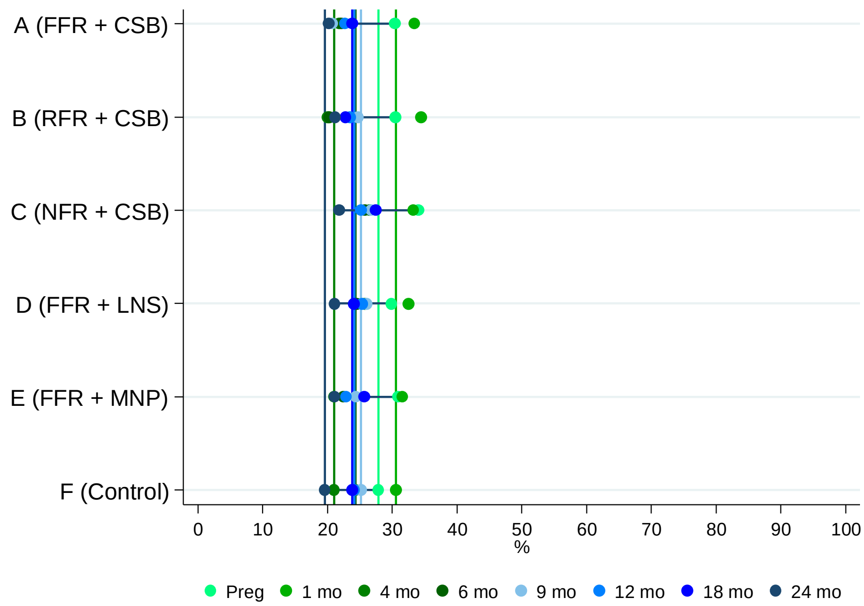
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.5b Breastfeeding knowledge, benefits of exclusive breastfeeding: impact



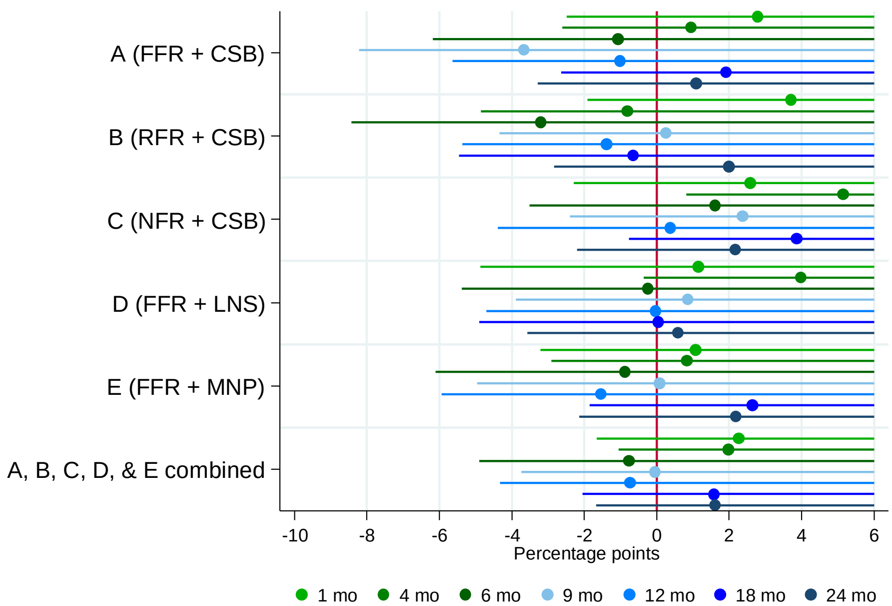
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.6a Mother knows to breastfeed a sick child more



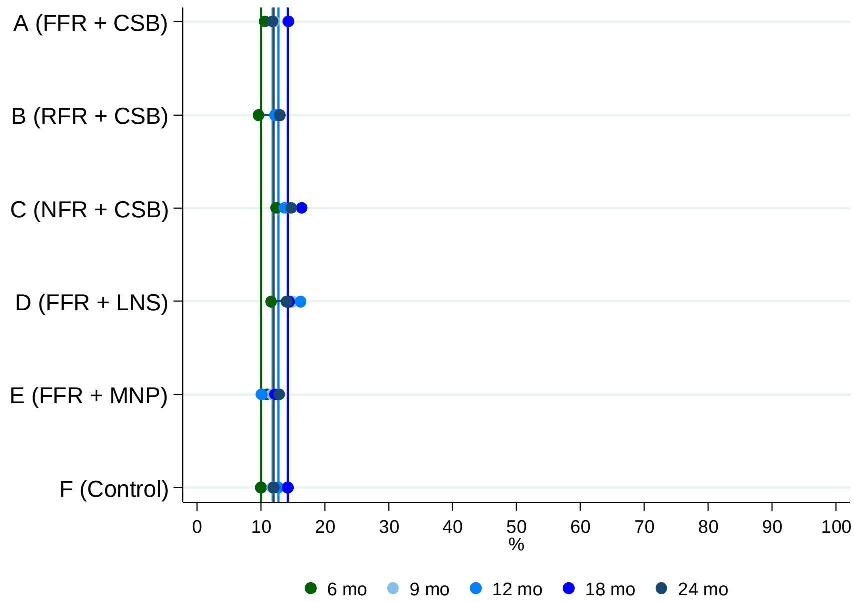
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.6b Mother knows to breastfeed a sick child more: impact



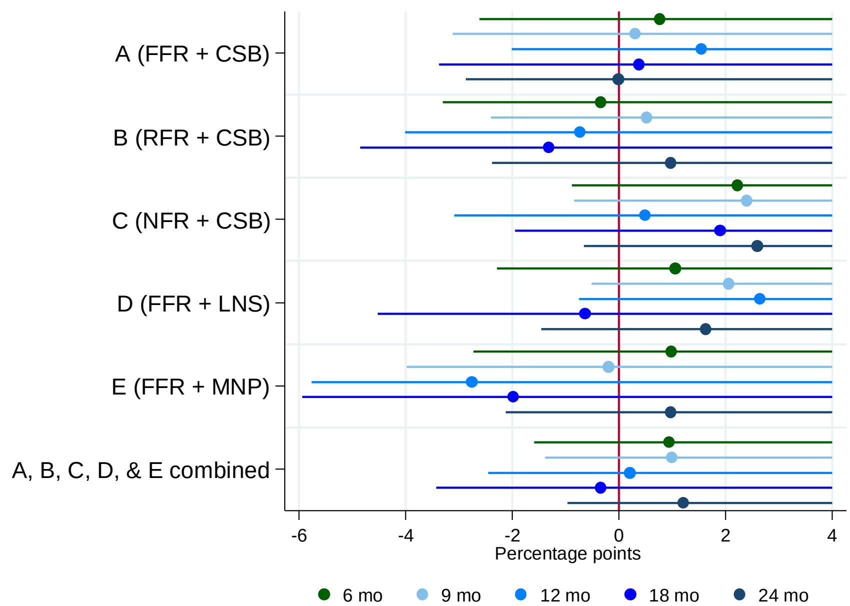
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.7a Mother knows to feed a sick child more food



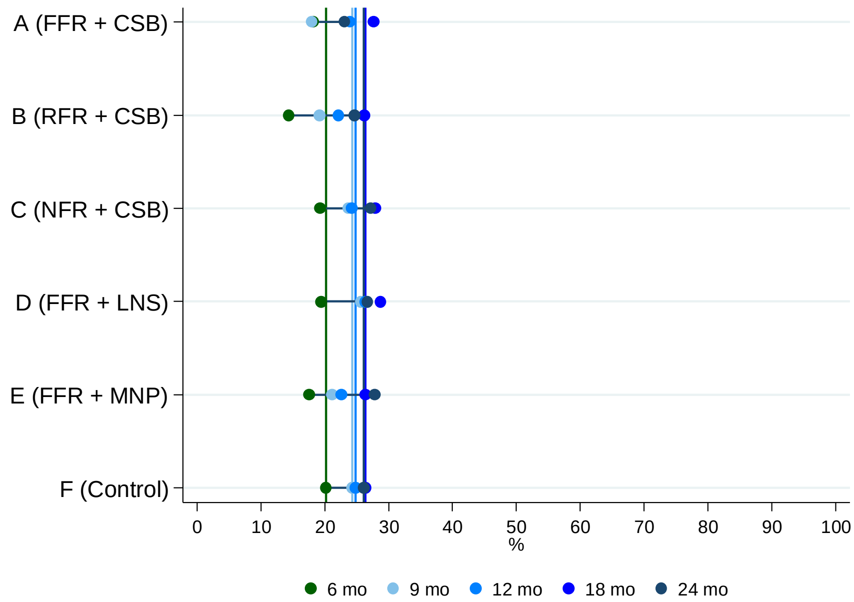
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.7b Mother knows to feed a sick child more food: impact



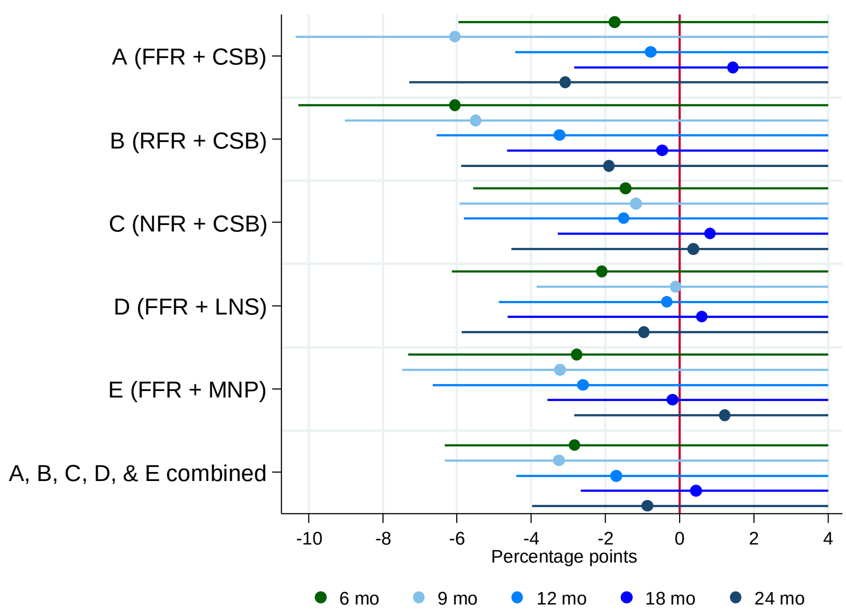
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.8a Mother knows to give a sick child more liquids



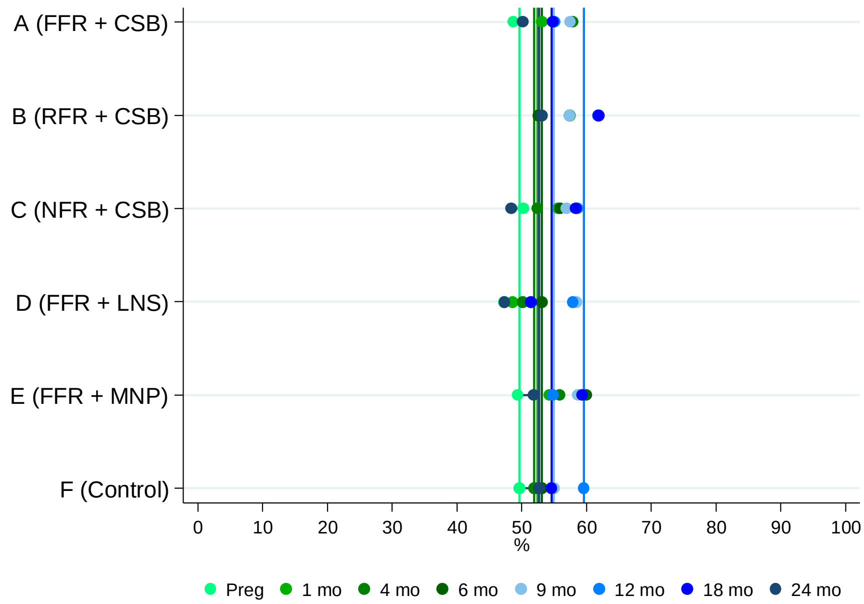
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.8b Mother knows to give a sick child more liquids: impact



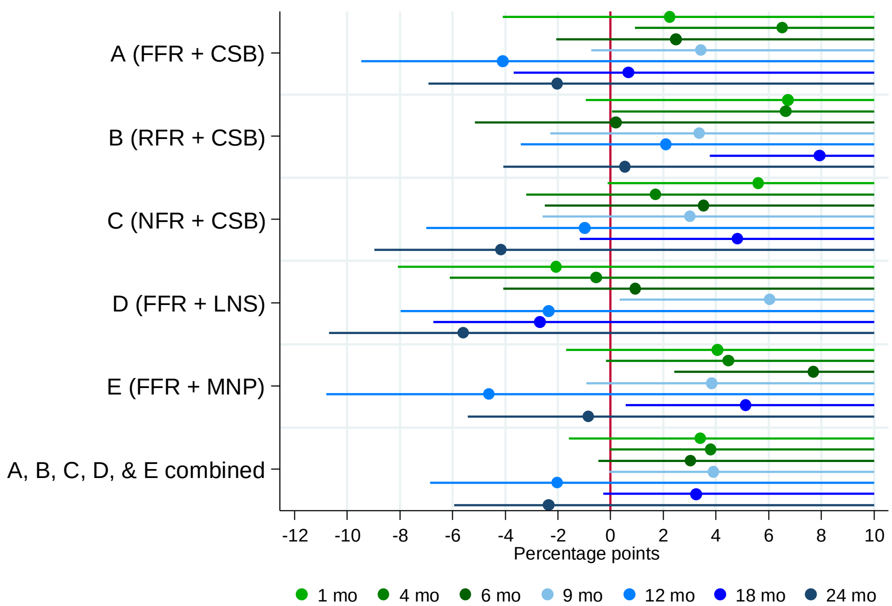
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.9a Mother knows to breastfeed a convalescent child more



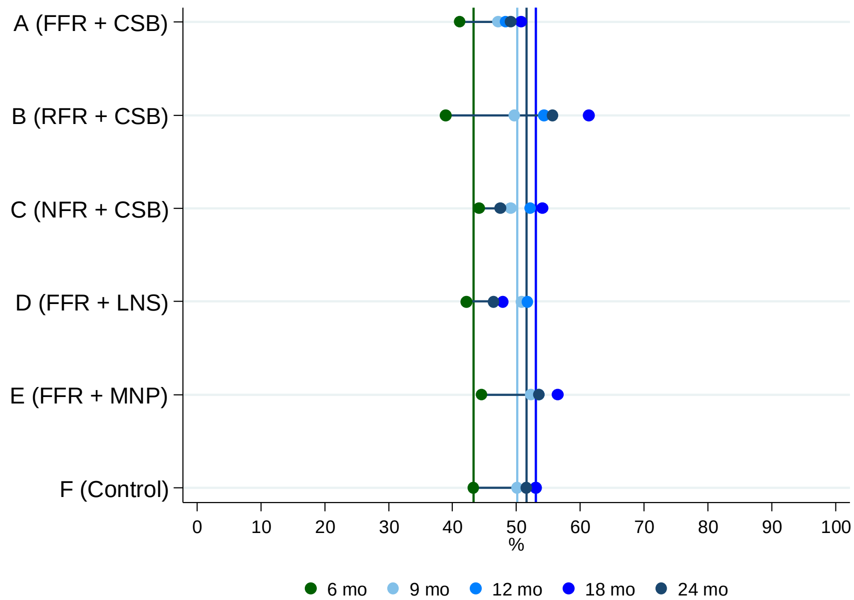
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.9b Mother knows to breastfeed a convalescent child more: impact



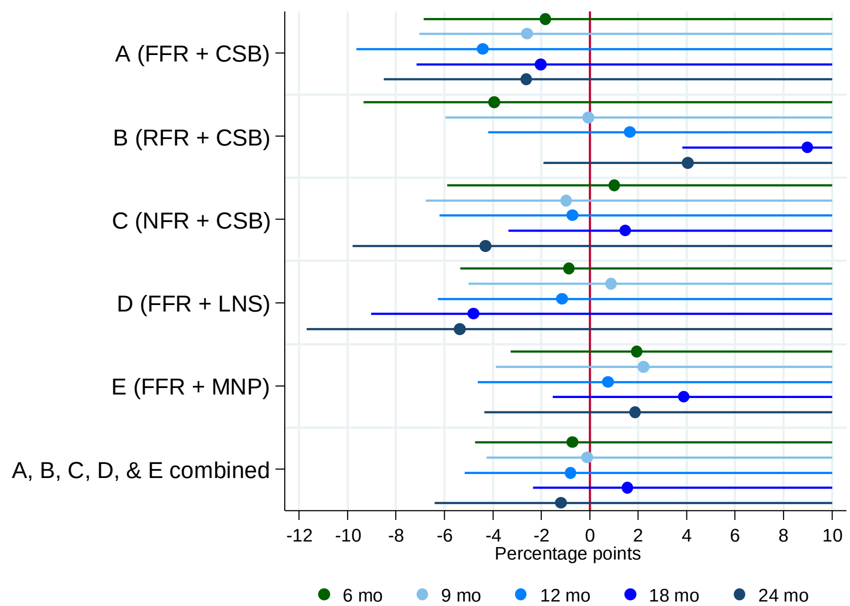
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.10a Mother knows to give a convalescent child more food



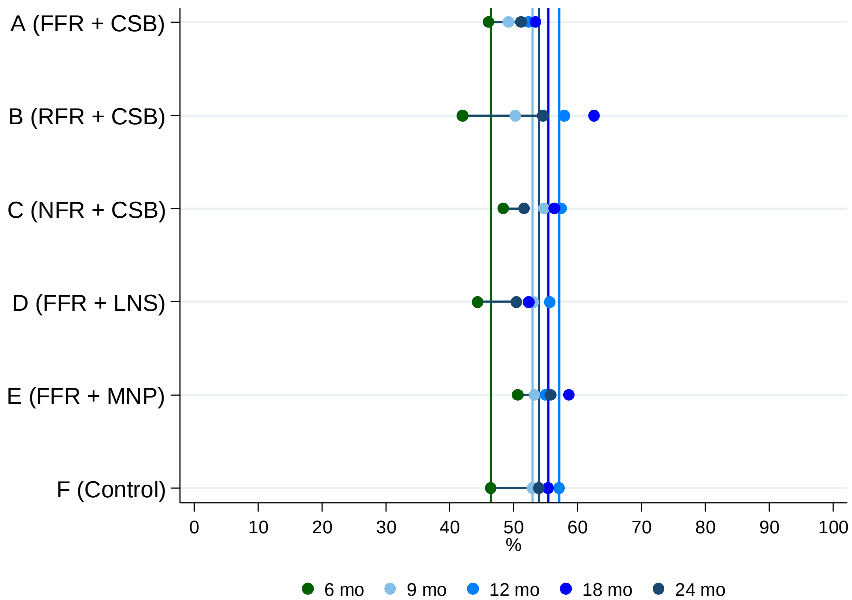
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.10b Mother knows to give a convalescent child more food: impact



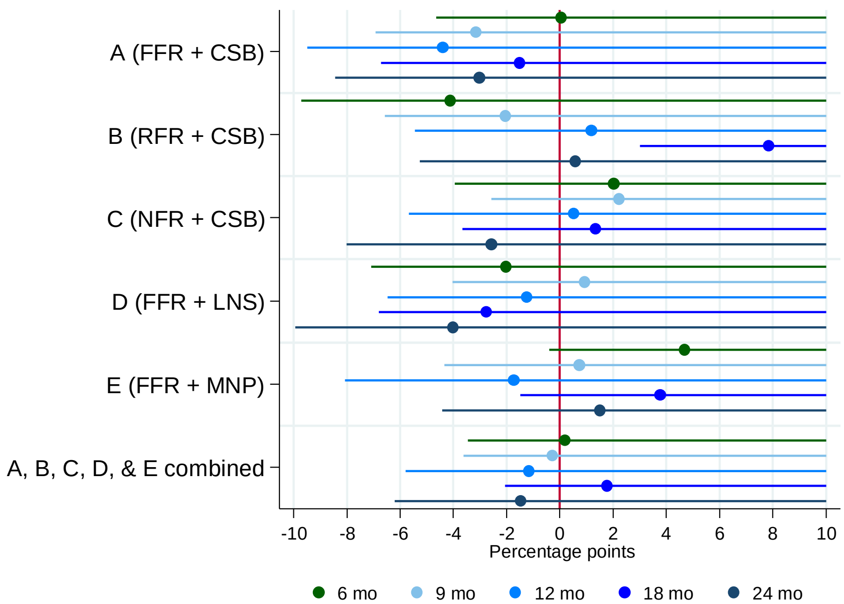
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.11a Mother knows to give a convalescent child more liquids



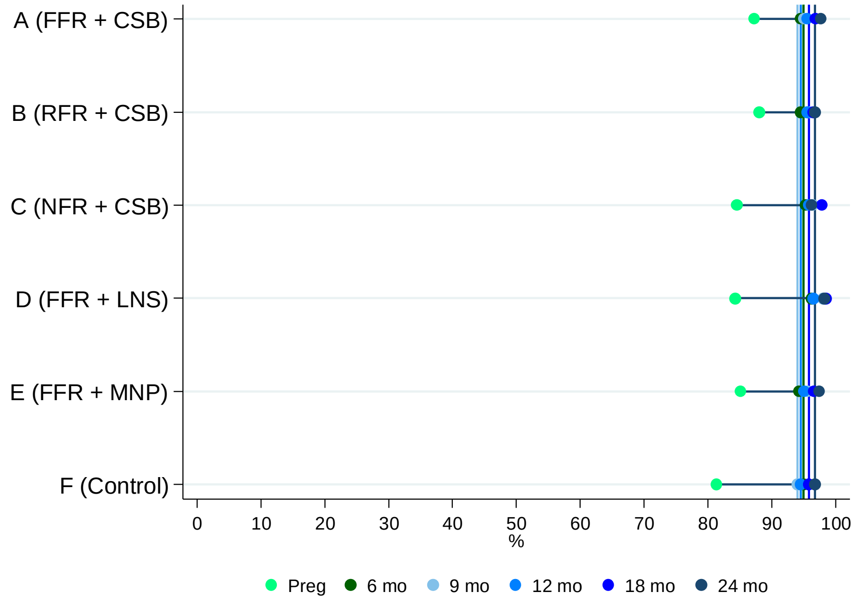
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.11b Mother knows to give a convalescent child more liquids: impact



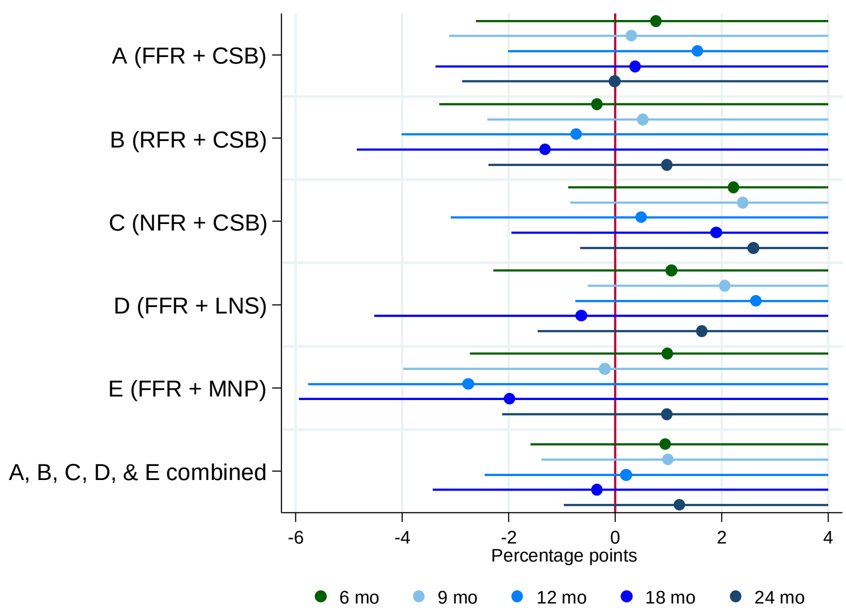
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.12a Mother knows to give ORS for rehydration



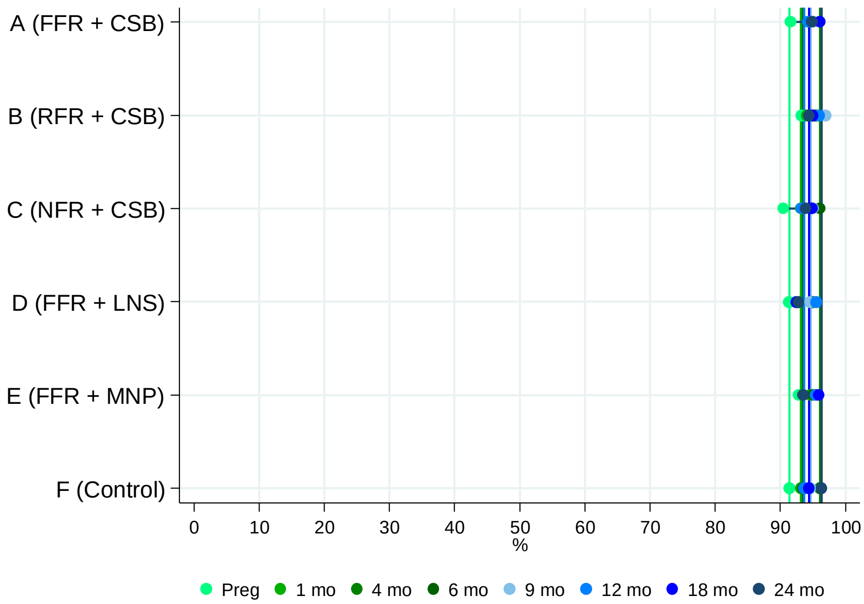
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.12b Mother knows to give ORS for rehydration: impact



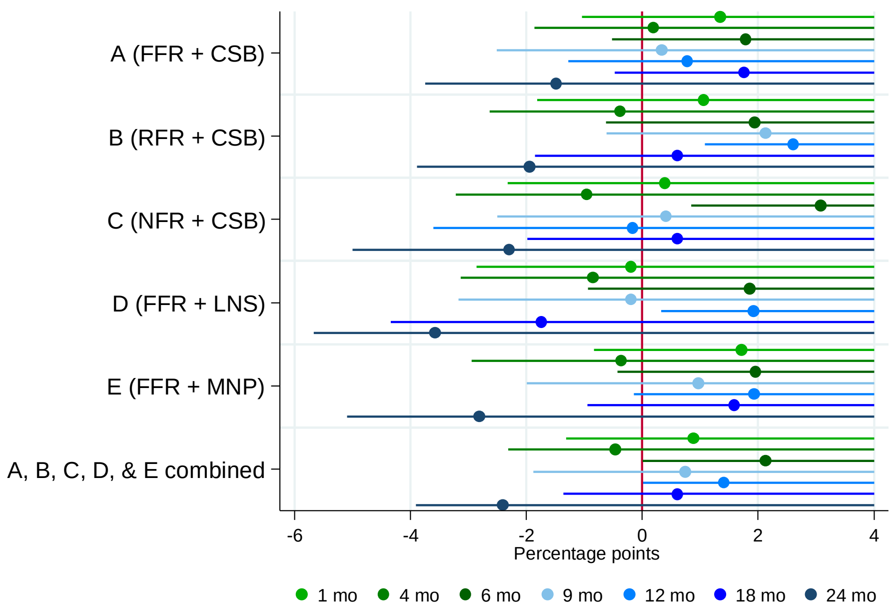
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.13a Mother knows at least one vitamin A-rich food



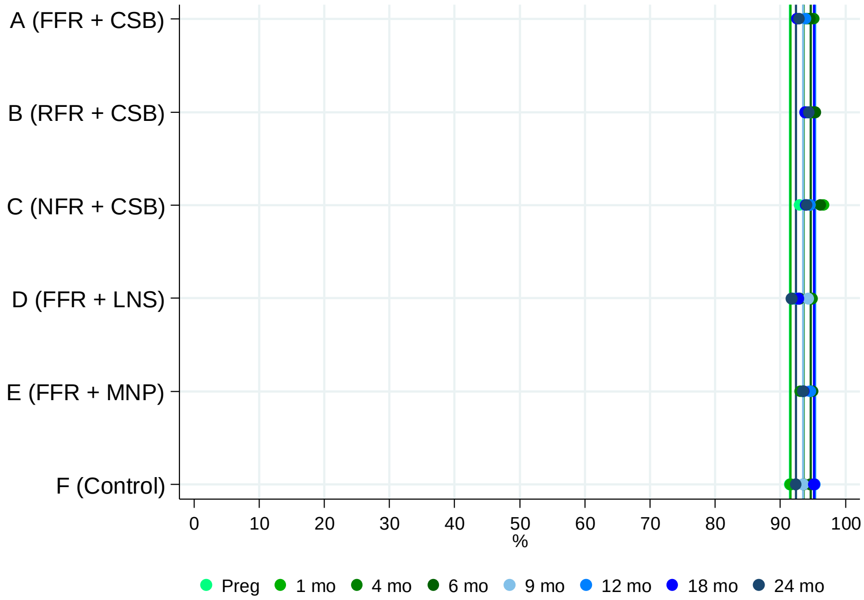
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.13b Mother knows at least one vitamin A-rich food: impact



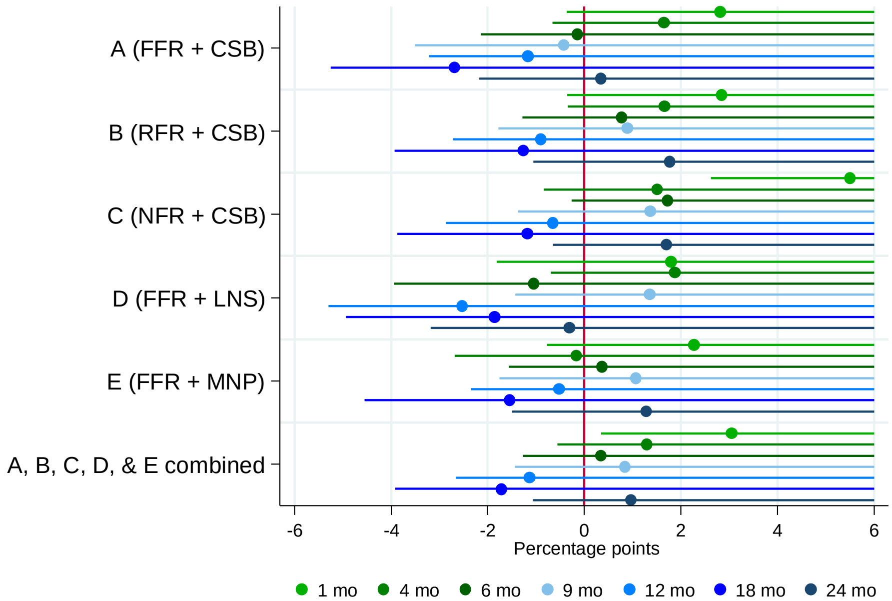
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.14a Mother knows at least one consequence of vitamin A deficiency



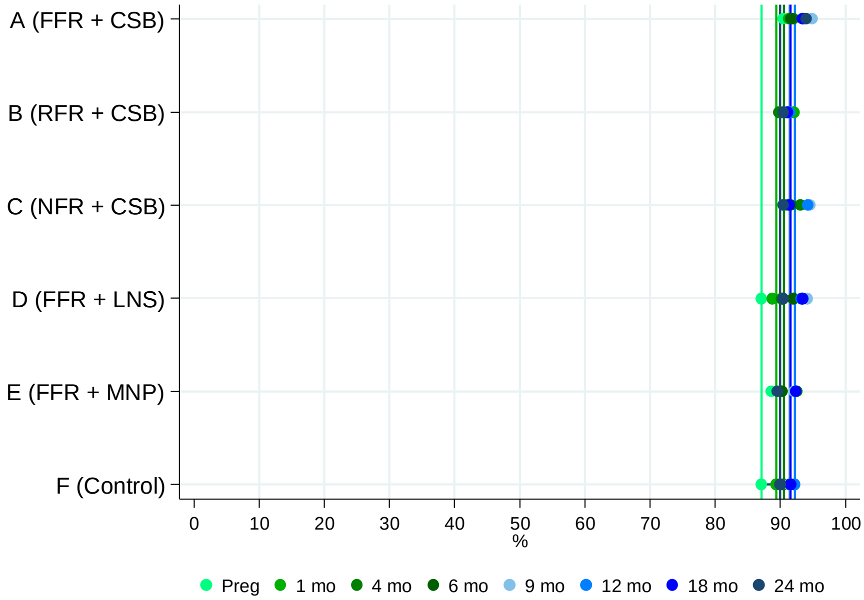
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.14b Mother knows at least one consequence of vitamin A deficiency: impact



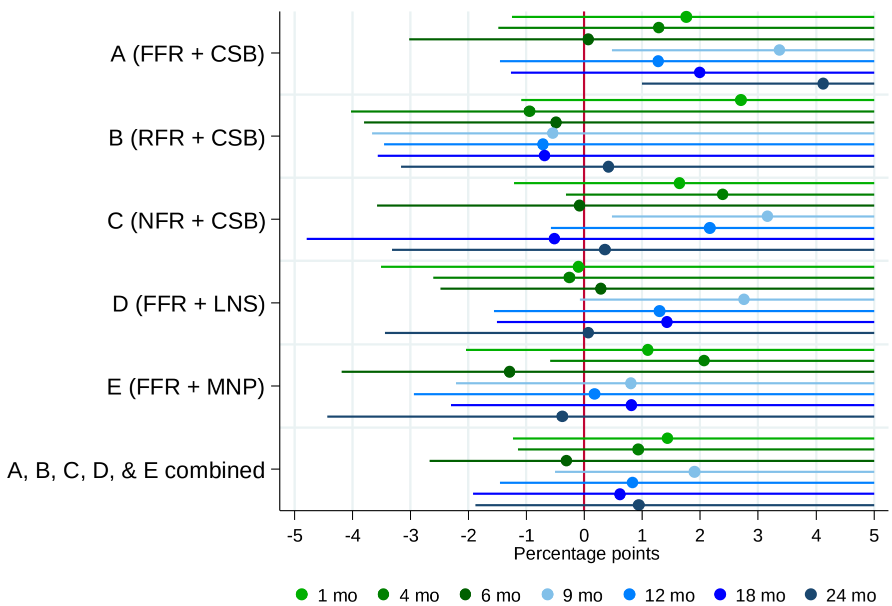
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.15a Mother knows at least one iron-rich food



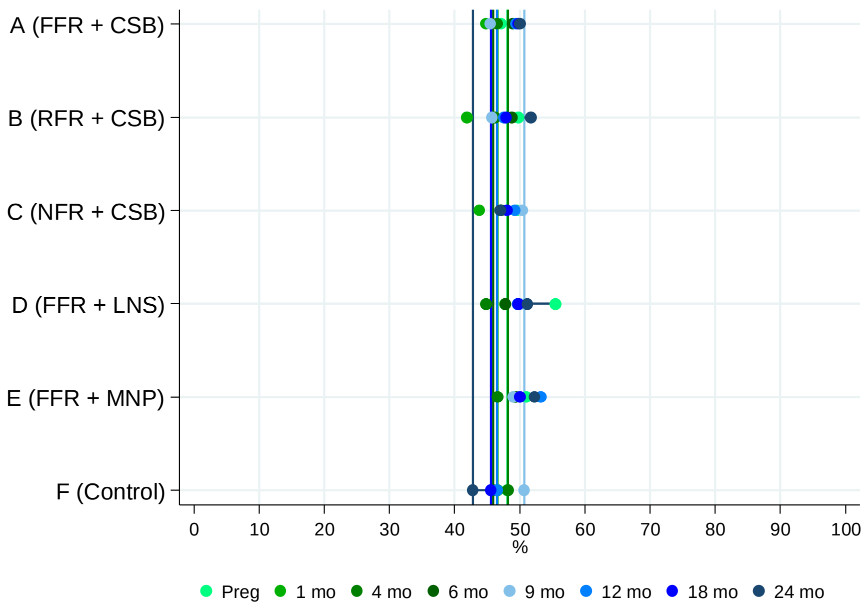
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.15b Mother knows at least one iron-rich food: impact



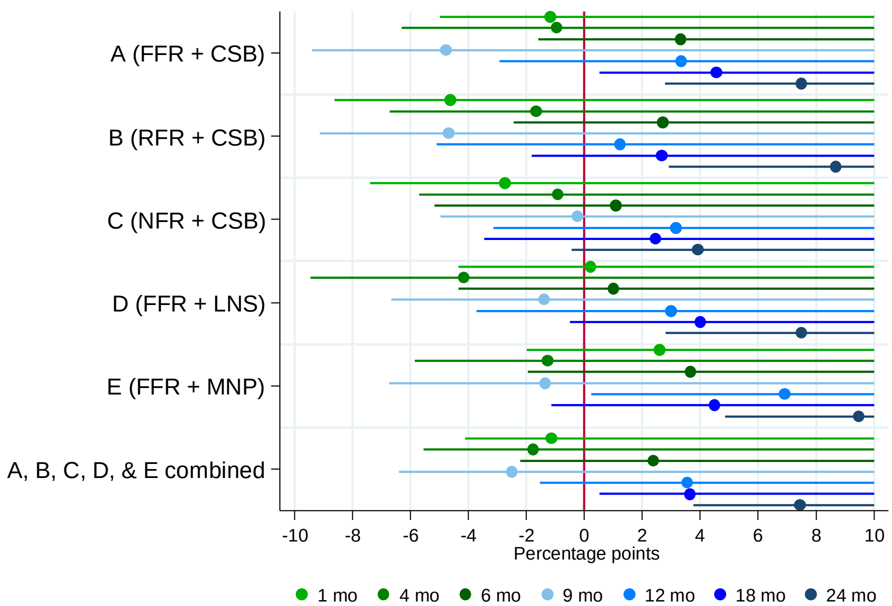
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.16a Mother knows at least one consequence of iron deficiency



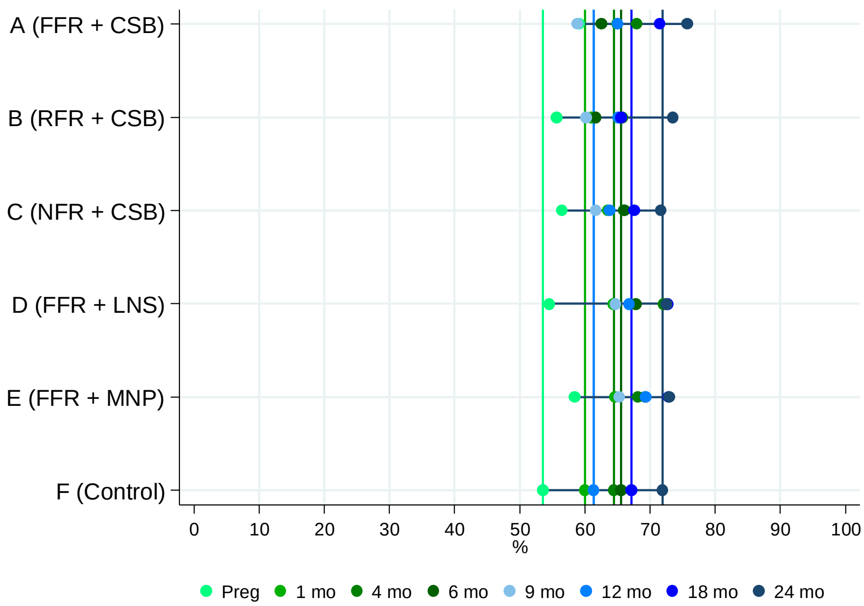
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.16b Mother knows at least one consequence of iron deficiency: impact



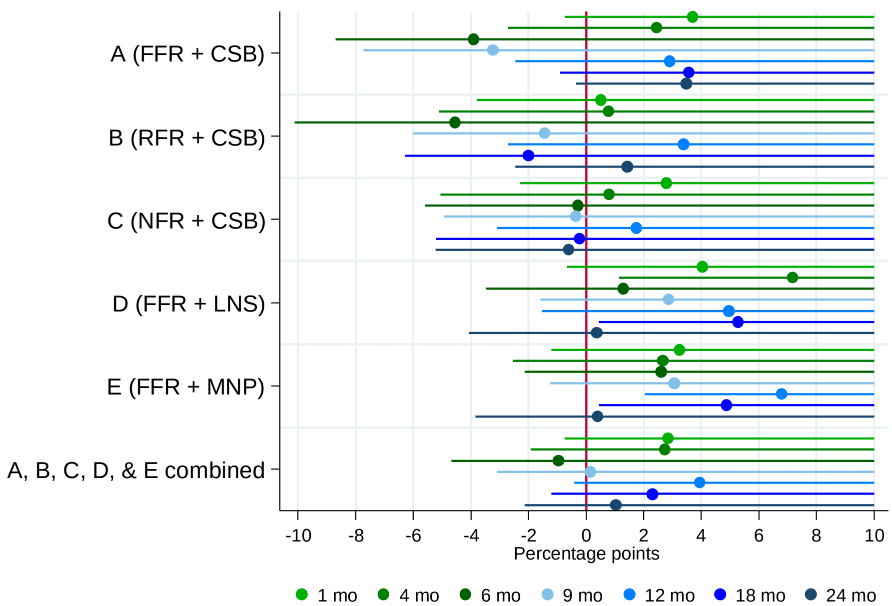
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.17a Mother knows to introduce foods at 6 months



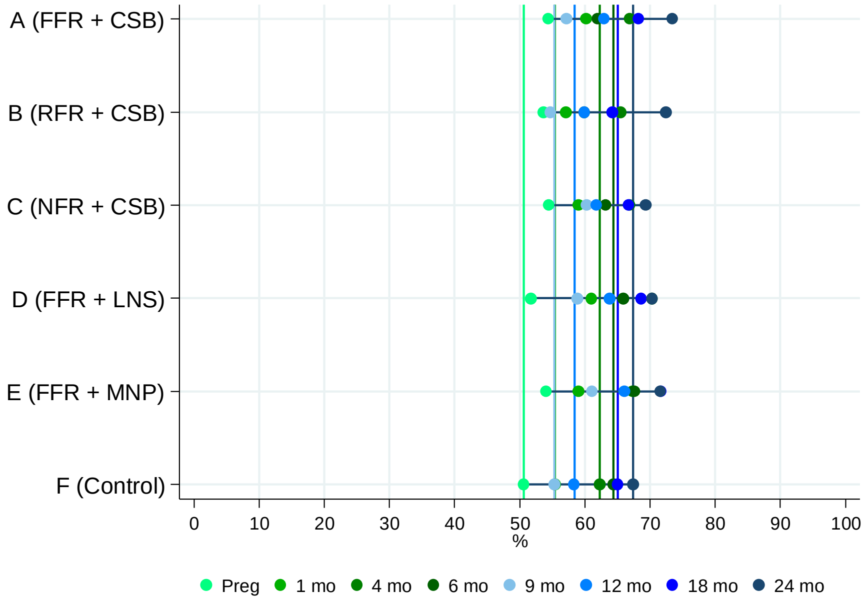
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.17b Mother knows to introduce foods at 6 months: impact



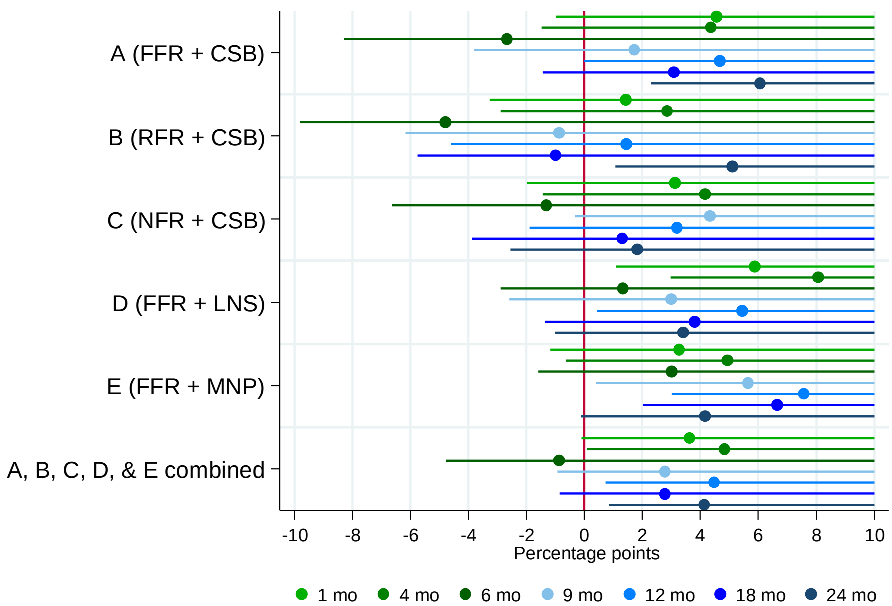
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.18a Mother knows to introduce liquids (other than breast milk) at 6 months



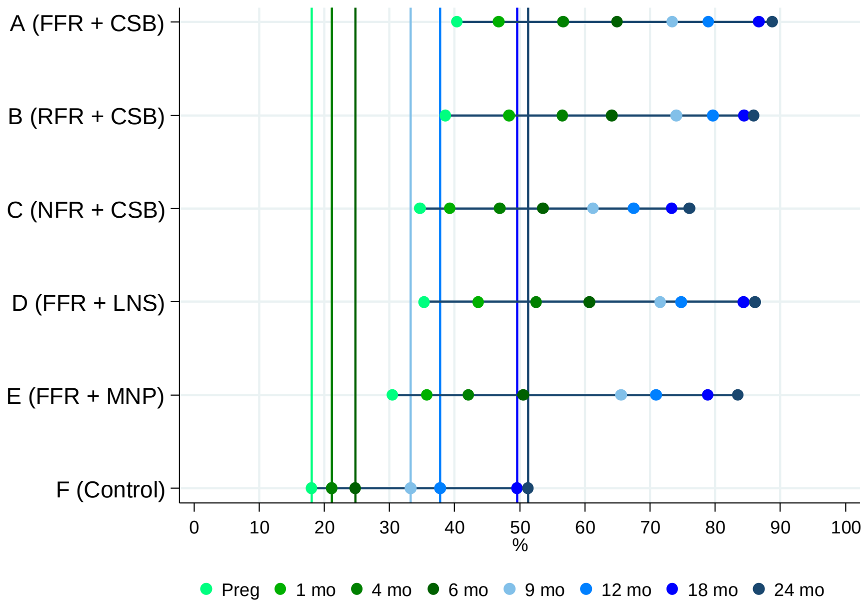
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.18b Mother knows to introduce liquids (other than breast milk) at 6 months: impact



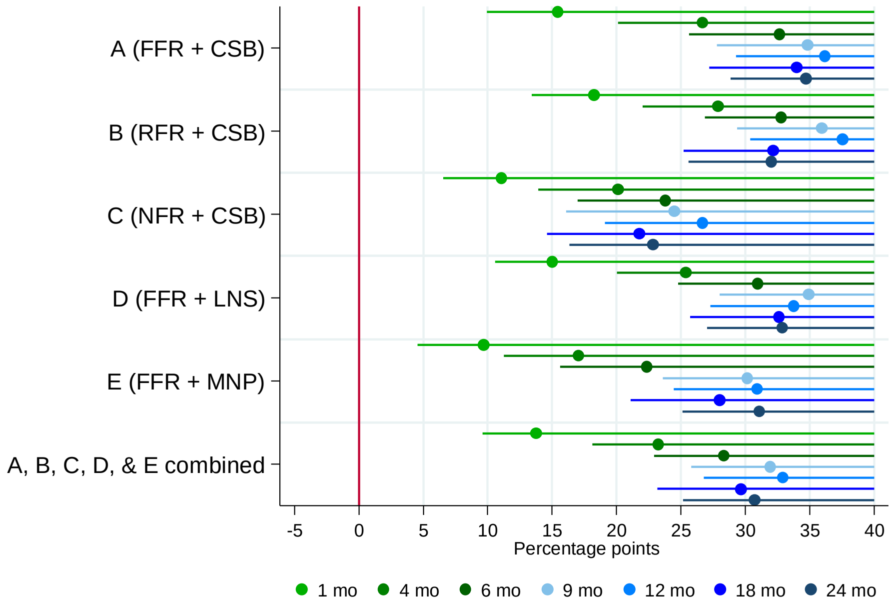
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.19a Mother knows to use a cup, not a bottle



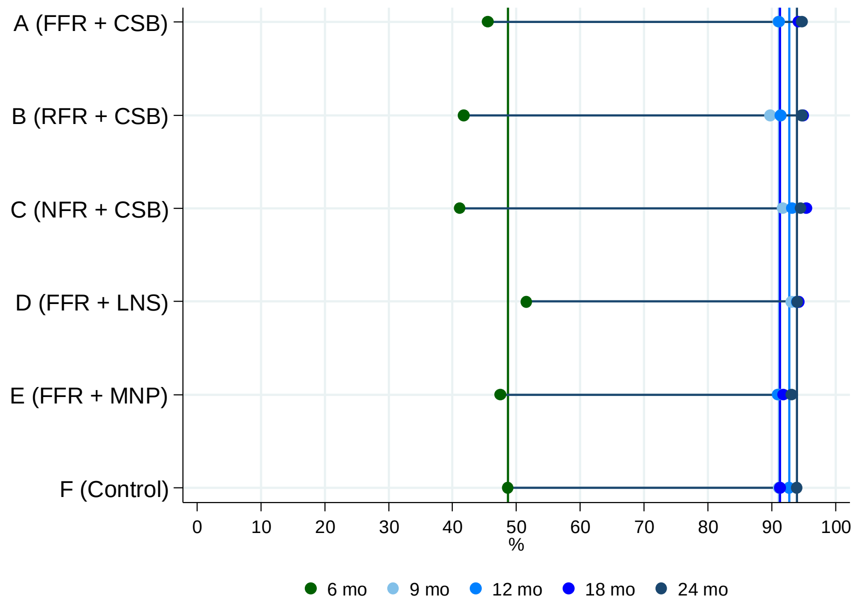
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.19b Mother knows to use a cup, not a bottle: impact



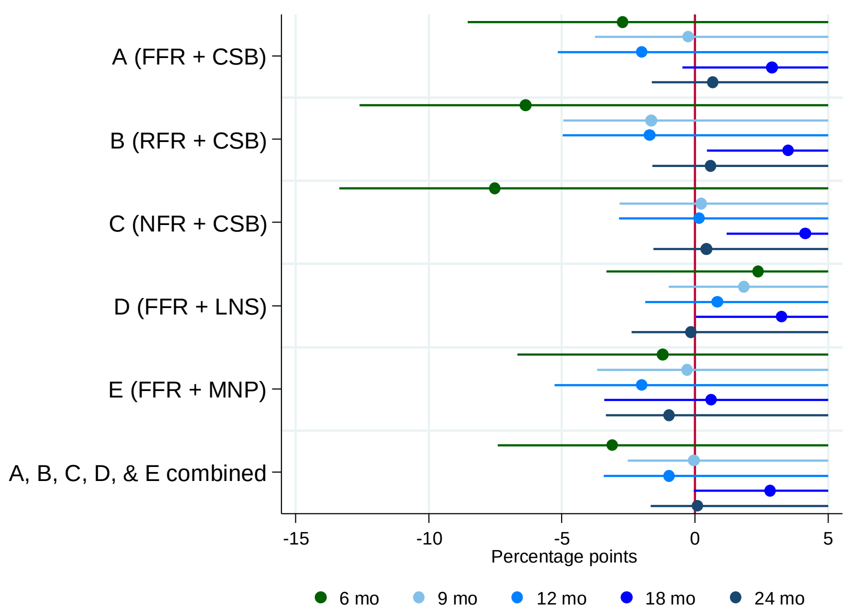
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.20a Mother knows correct feeding consistency for age



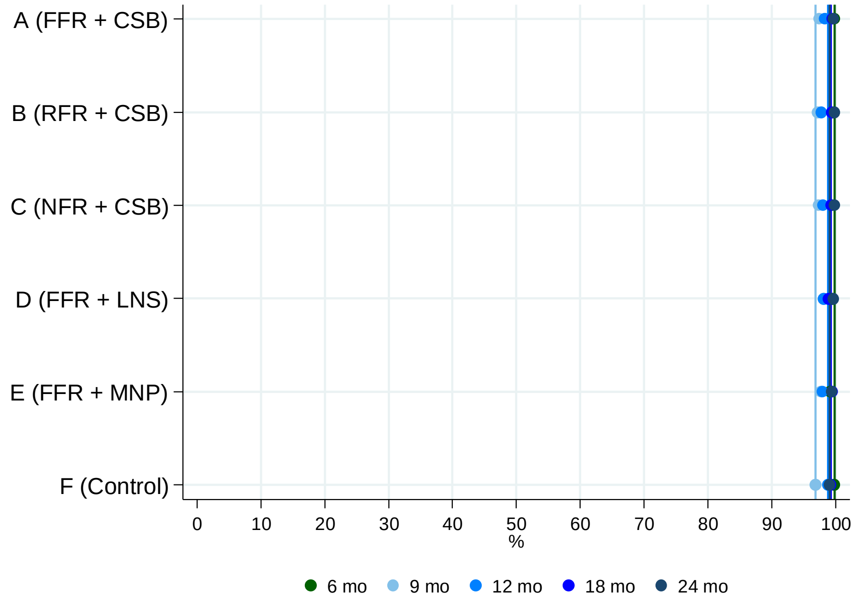
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.20b Mother knows correct feeding consistency for age: impact



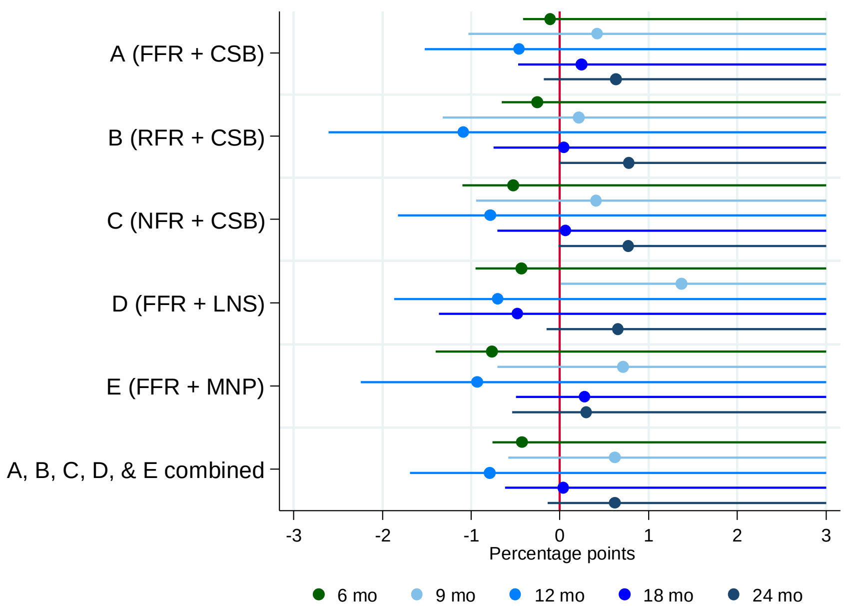
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.21a Mother knows correct feeding frequency for age



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.21b Mother knows correct feeding frequency for age: impact



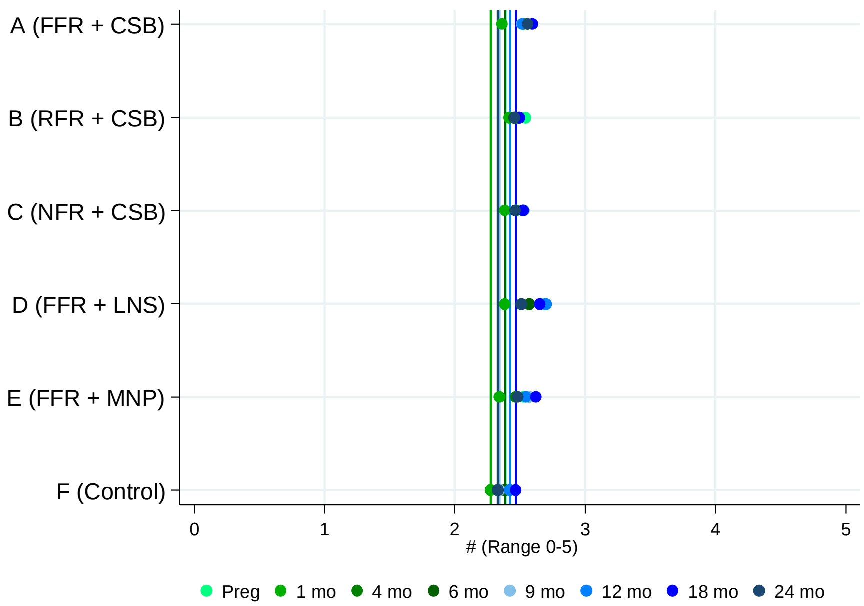
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

9.3 Mothers' Hygiene Knowledge

At enrollment, mothers correctly identified 2.5 (of 5) key handwashing times (**Figure 9.22a**). The program had a small but statistically significant impact on increasing the number of key handwashing times that mothers were able to identify (**Figure 9.22b**). These impacts were driven by changes in the percentage of mothers naming 4 out of the 5 specific handwashing times: after changing a child's diapers (between 4 and 11 pp), before feeding a child (between 4 and 10 pp), before preparing and touching food (between 4 and 6 pp), and after using the bathroom (between 3 and 4 pp) (data not shown). Before eating was the only handwashing time for which there were no program impacts.

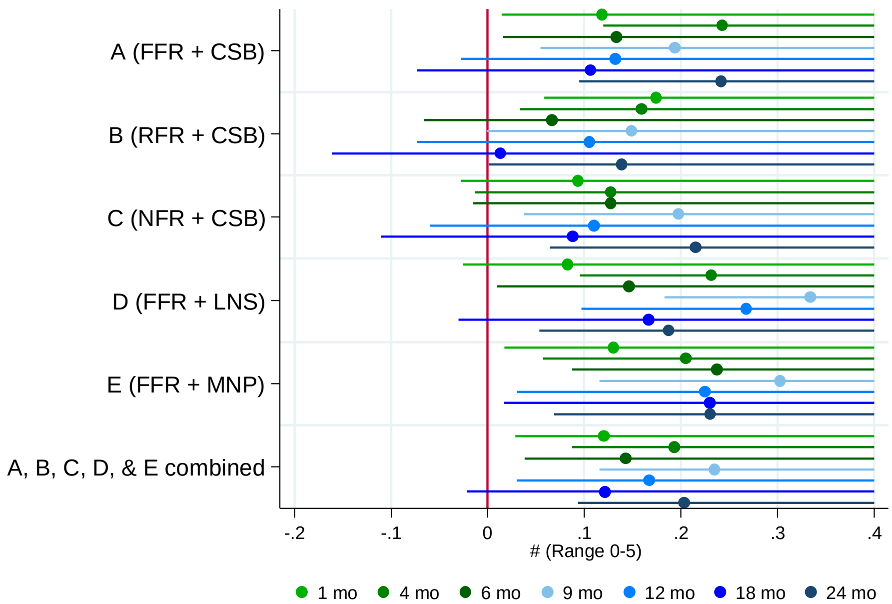
At enrollment, almost all mothers could correctly name at least one handwashing product and one method for purifying water (**Figures 9.23a** and **9.24a**). This high level of knowledge left no room for program impact, and no impacts were observed (**Figures 9.23b** and **9.24b**).

Figure 9.22a Number of key handwashing times mother knows



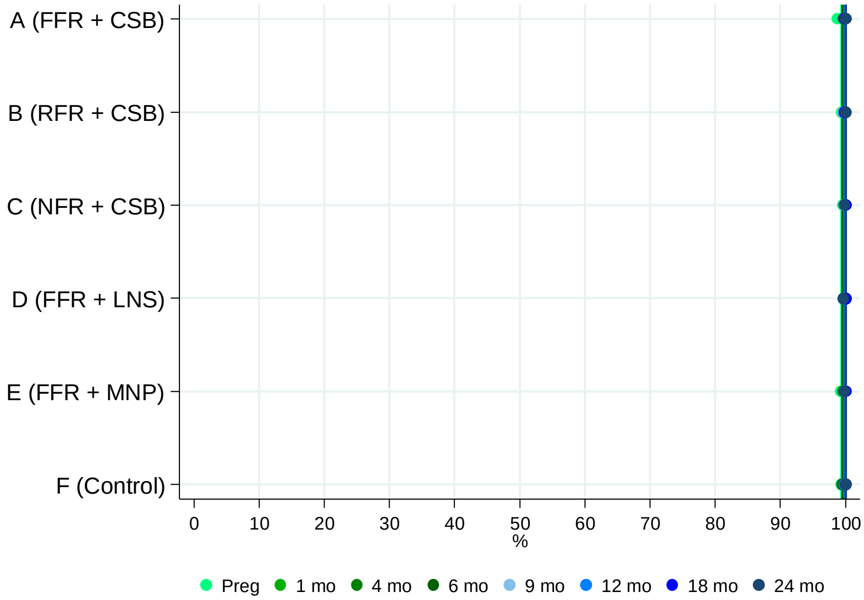
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.22b Number of key handwashing times mother knows: impact



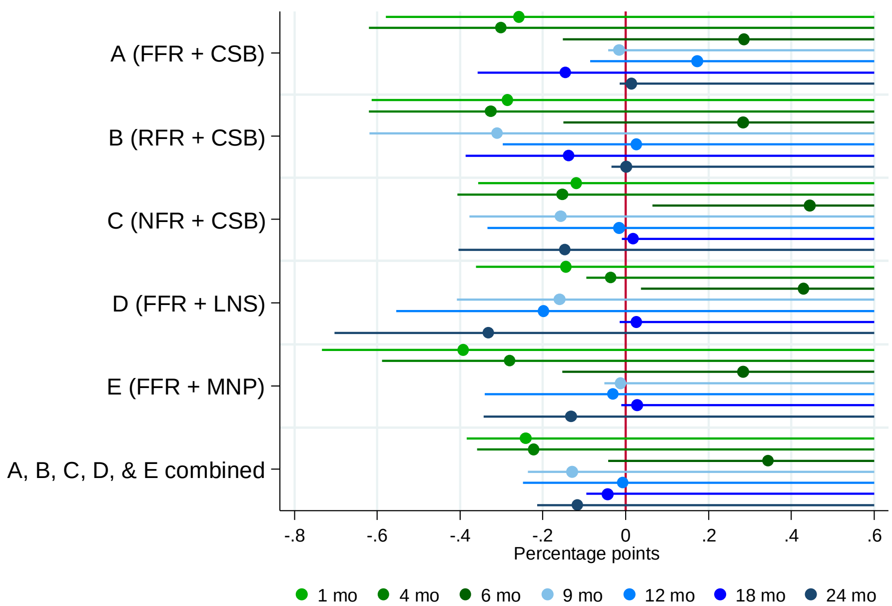
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.23a Mother knows a handwashing product



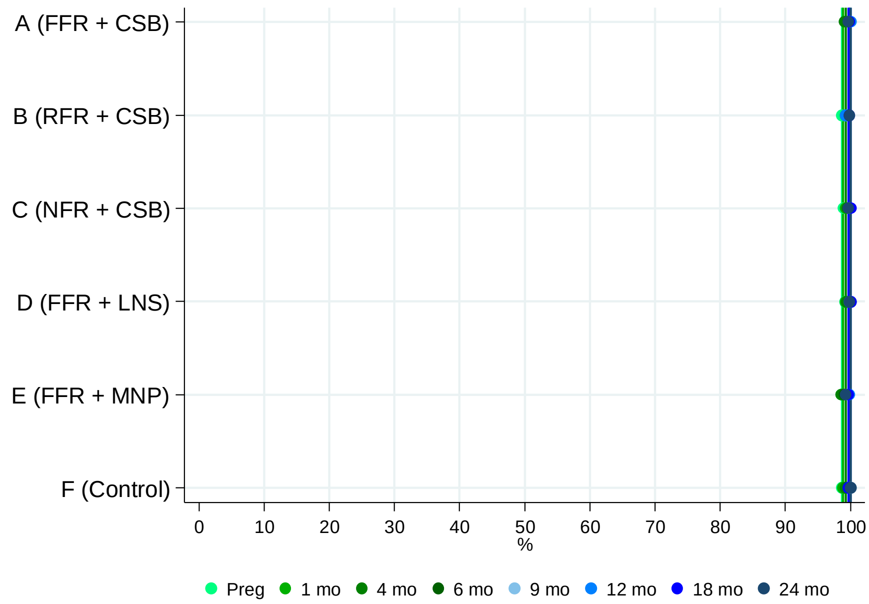
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.23b Mother knows a handwashing product: impact



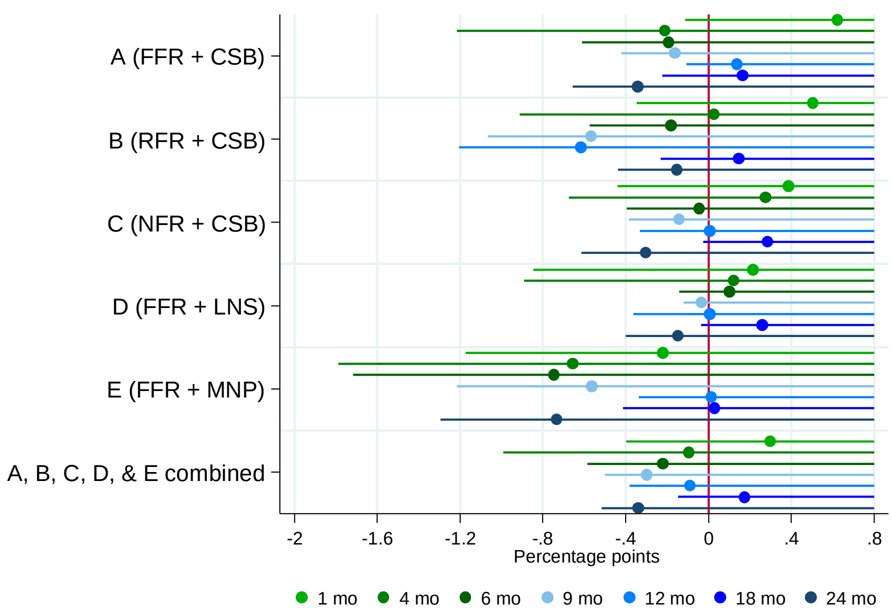
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 9.24a Mother knows a water purification method



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 9.24b Mother knows a water purification method: impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for value of the outcome at enrollment; mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

10. Results: Pre-, Peri-, and Postnatal Health Care

Nearly all mothers (99.5 percent) attended at least one prenatal visit, and about three-quarters attended the recommended minimum of four visits and attended their first visit before 4 months' gestation. However, only about one-half sought care during the final month of pregnancy (**Figure 10.1a**). Mothers primarily reported receiving care from formally trained providers, including trained birth attendants (67.8 percent), traveling nurses (62.6 percent), and physicians (47.4 percent) (**Figure 10.2a**). In general, the program did not have an impact on attendance at prenatal visits or the training of the individual providing care, with the exception of an impact on attending a prenatal visit during the last month of pregnancy in the B (RFR+CSB) arm (5.9 pp) (**Figures 10.1b** and **10.2b**).

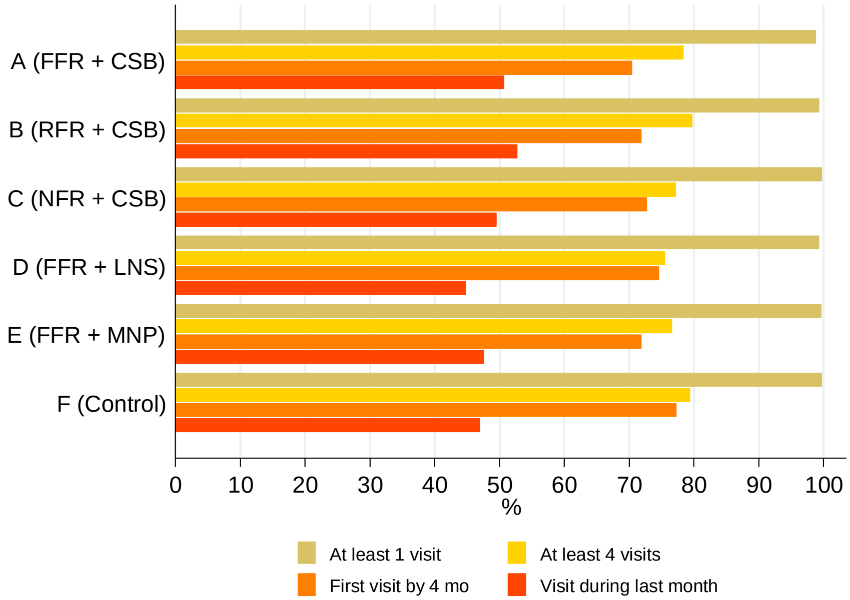
During prenatal visits, measurement of weight (94.7 percent), blood pressure (93.5 percent), and fundal height (90.8 percent) were common; less commonly provided services were height measurement (54.7 percent), provision of a tetanus vaccine (39.9 percent), and taking urine and blood samples (28.5 percent and 20.8 percent, respectively) (**Figure 10.3a**). In general, the program did not have an impact on the clinical services received at prenatal visits; there was, however, a positive impact on the percentage of mothers who reported measurement of fundal height (3.8 pp) and receiving a tetanus vaccine (8.2 pp) in arm B (RFR+CSB) (**Figure 10.3b)**. Mothers commonly reported being told about danger signs during pregnancy (78.4 percent), and nearly all mothers who were informed of danger signs during pregnancy were subsequently informed where to seek care in case such an emergency were to arrive (**Figure 10.4a**). The program increased the percentage of mothers who were informed about danger signs during pregnancy at prenatal visits (6.5 pp in the pooled treatment arms) (**Figure 10.4b**).

At delivery, most mothers (92.7 percent) received care from a trained provider, including trained birth attendants (49.1 percent), physicians (37.2 percent) or medical or nursing assistants (9.3 percent) (**Figure 10.5a**). Delivering with a traditional birth attendant was uncommon. [38] In the C (NFR+CSB) arm, there was a significant increase in the percentage of mothers who had a physician present during delivery compared to the F (control) arm (10.2 pp), and an equal decrease in the percentage that had a trained birth attendant present for delivery (-10.2 pp) (**Figure 10.5b**). This pattern was similar in the other treatment arms, though not statistically significant. Immediately following birth, infants were commonly cleaned (96.9 percent), wrapped (97.0 percent), and weighed (92.9 percent) (**Figure 10.6a**). Among infants who were weighed, however, their weight was rarely recorded (8.6 percent). There was a tendency for children in intervention arms to more often be weighed at birth, but this impact was only statistically significant in the A (FFR+CSB) arm (6.0 pp) (**Figure 10.6a**).

Following delivery, less than one-third of mothers (30.3 percent) sought postnatal care, but among those who did seek care 91.3 percent did so from a trained provider (**Figure 10.7a**). Only 18.1 percent of mothers reported receiving breastfeeding assistance following the birth. The program did not have a significant impact on these postnatal care indicators; however, mothers in every treatment arm except E (FFR+MNP) were somewhat more likely to attend a postnatal visit compared to mothers in the control arm (nonsignificant trend of approximately 4 pp) (**Figure 10.7b**).

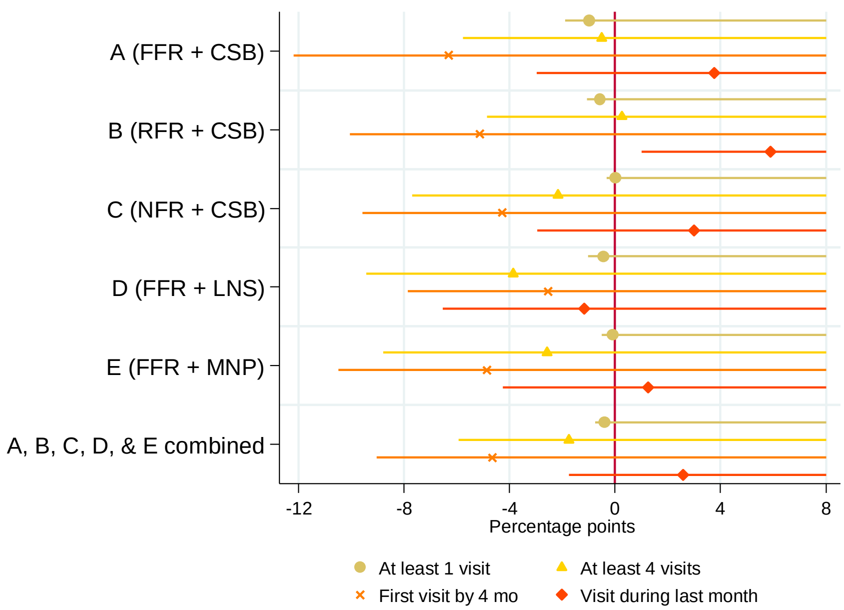
[38] Traditional birth attendants are those who do not have any formal training in health care provision.

Figure 10.1a Prenatal care received, timing, and visits



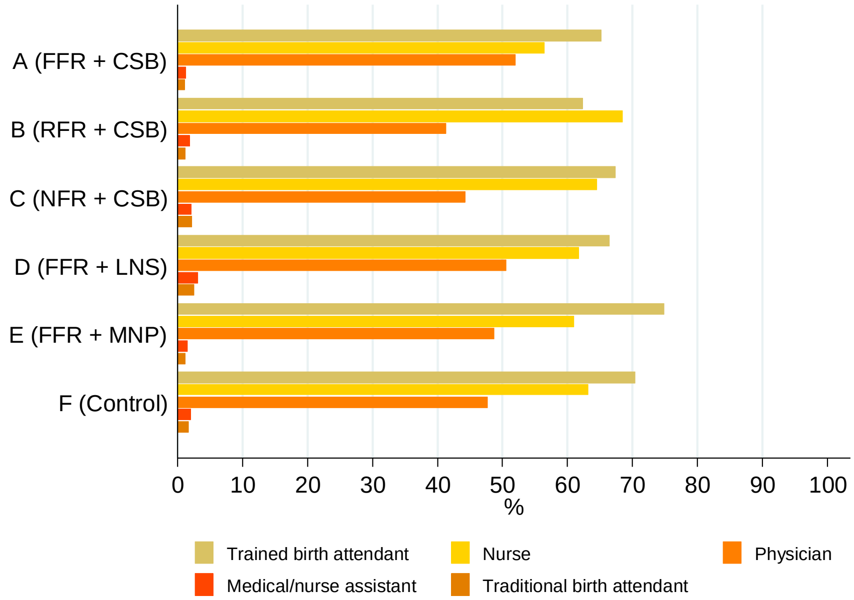
Note: Unadjusted values are shown. Data shown were collected at the 1-month survey.

Figure 10.1b Prenatal care received, timing, and visits: impact



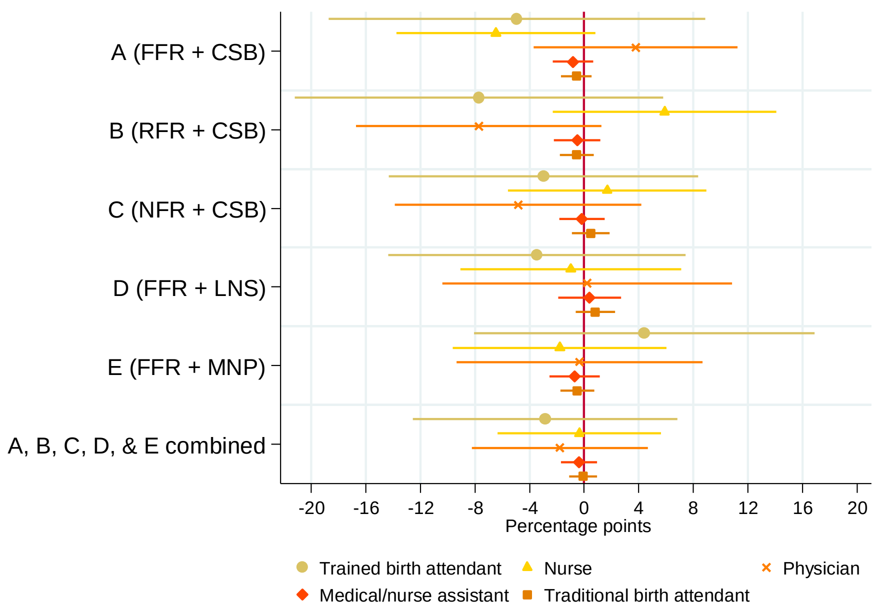
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided was test used. Data shown were collected at the 1-month survey.

Figure 10.2a Prenatal care, type of provider



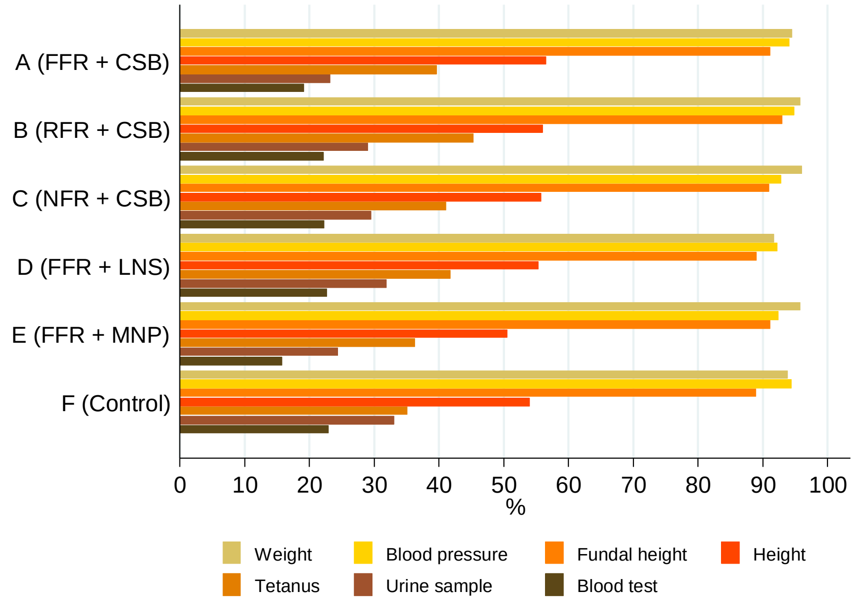
Note: Unadjusted values are shown. Data shown were collected at the 1-month survey.

Figure 10.2b Prenatal care, type of provider: impact



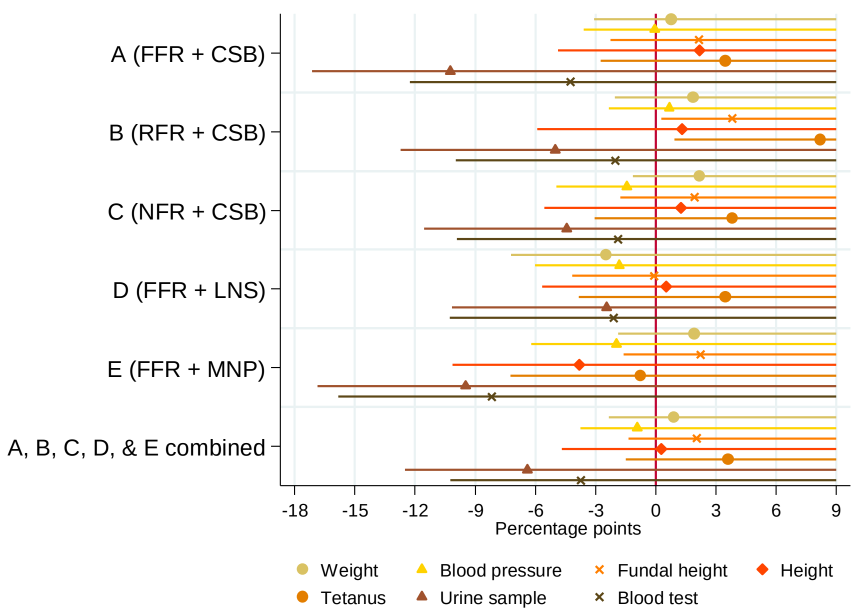
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; two-sided test was used. Data shown were collected at the 1-month survey.

Figure 10.3a Prenatal care services received



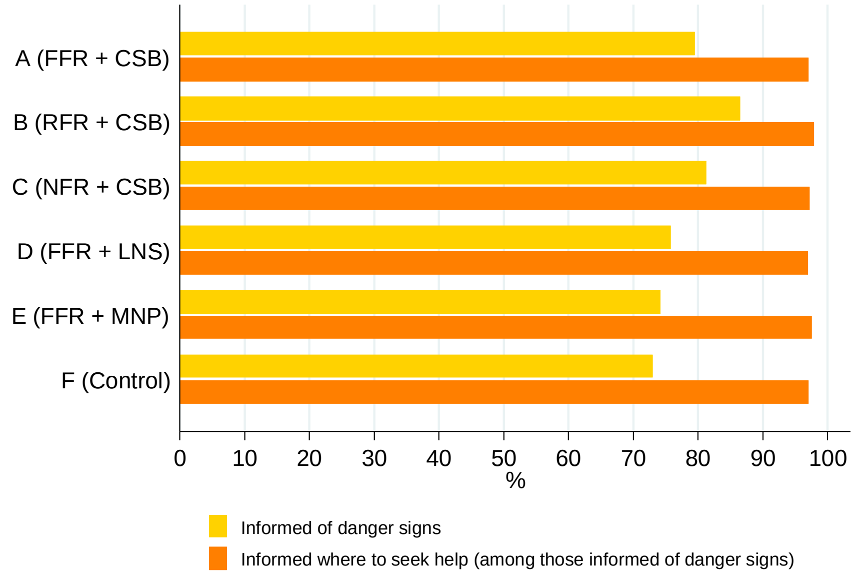
Note: : Unadjusted values are shown. Data shown were collected at the 1-month survey.

Figure 10.3b Prenatal care services received: impact



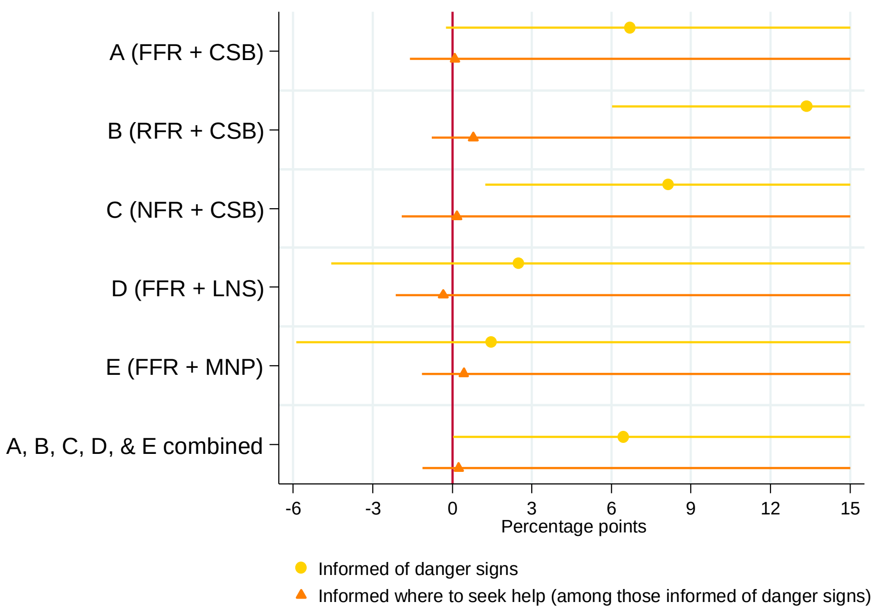
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used. Data shown were collected at the 1-month survey.

Figure 10.4a Prenatal care, informed of danger signs, and where to seek help



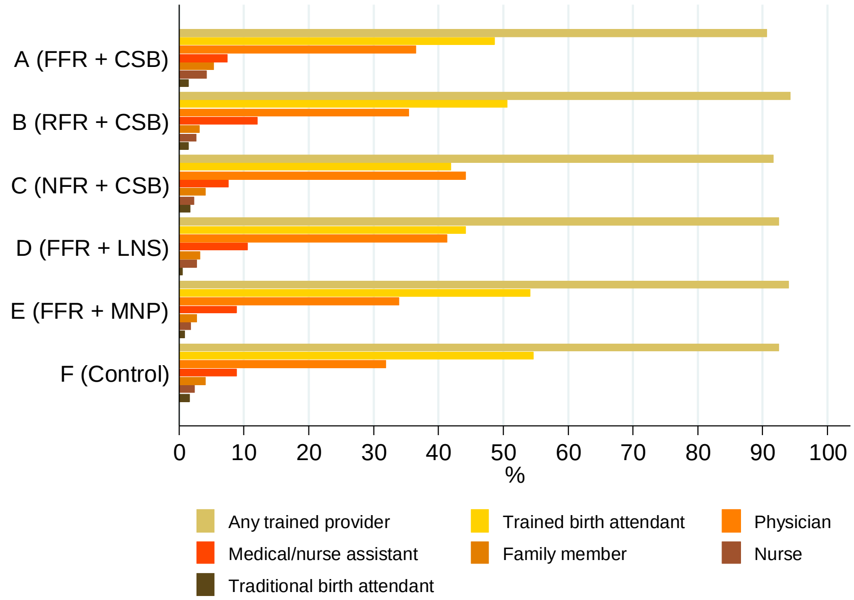
Note: Unadjusted values are shown. Data shown were collected at the 1-month survey.

Figure 10.4b Prenatal care, informed of danger signs, and where to seek help: impact



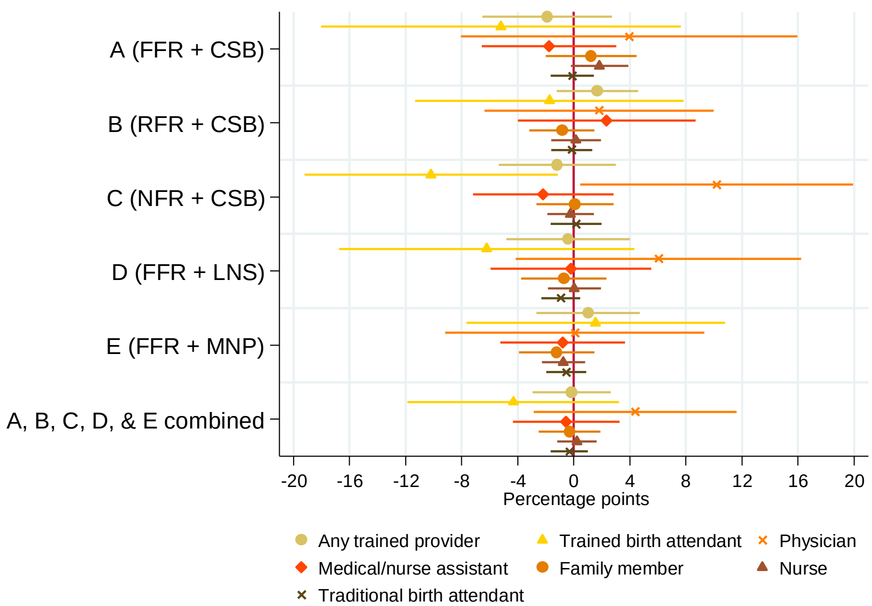
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used. Data shown were collected at the 1-month survey.

Figure 10.5a Delivery care location and service provider



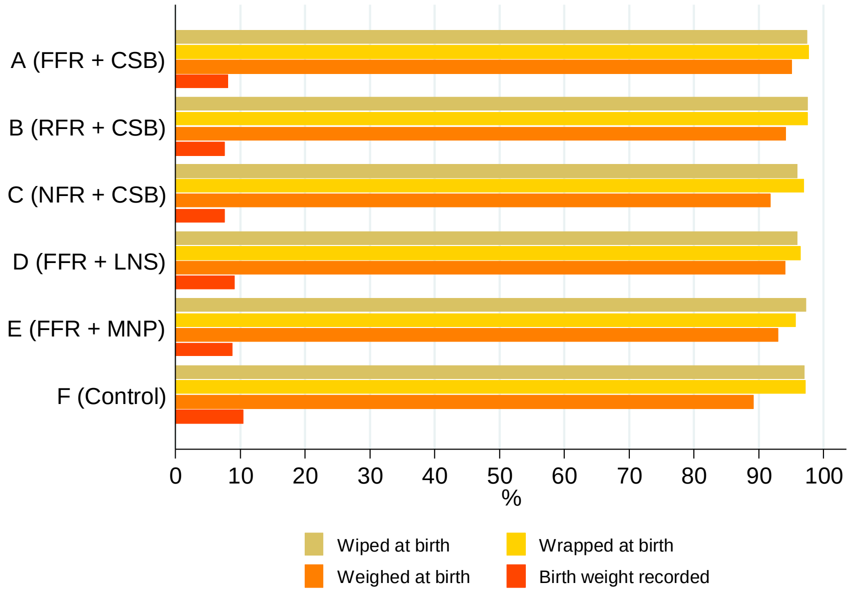
Note: Unadjusted values are shown. Data shown were collected at the 1-month survey.

Figure 10.5b Delivery care location and service provider: impact



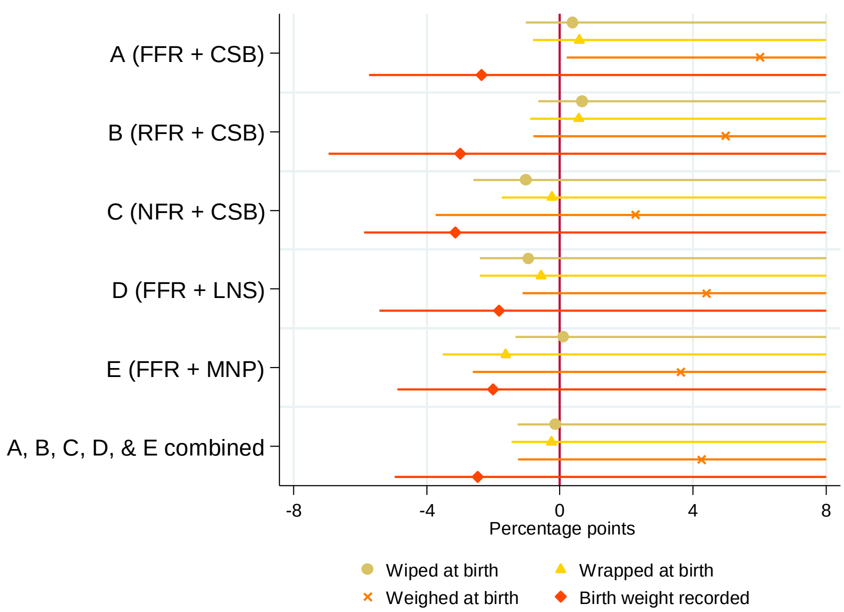
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; two-sided test was used. Data shown were collected at the 1-month survey.

Figure 10.6a Delivery care child wiped, wrapped, and weighed



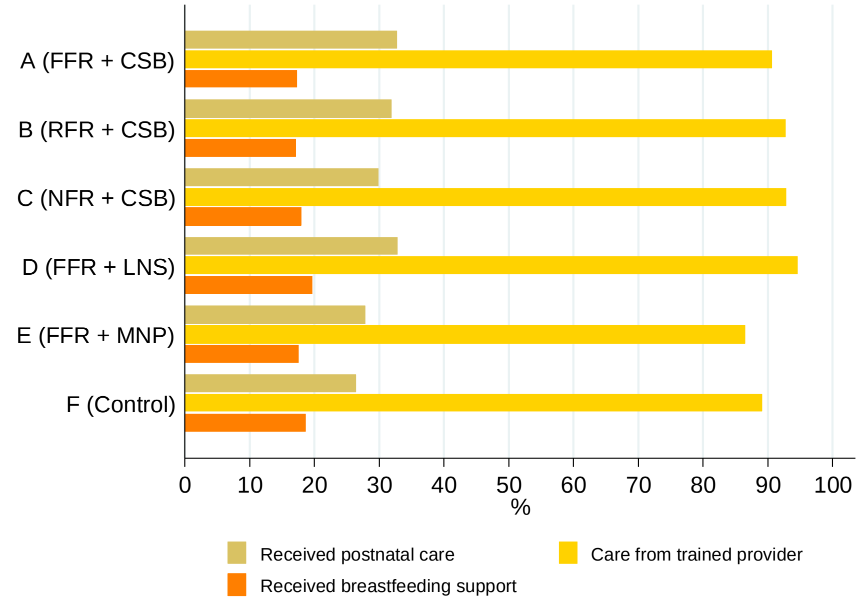
Note: Unadjusted values are shown. Data shown were collected at the 1-month survey.

Figure 10.6b Delivery care child wiped, wrapped, and weighed: impact



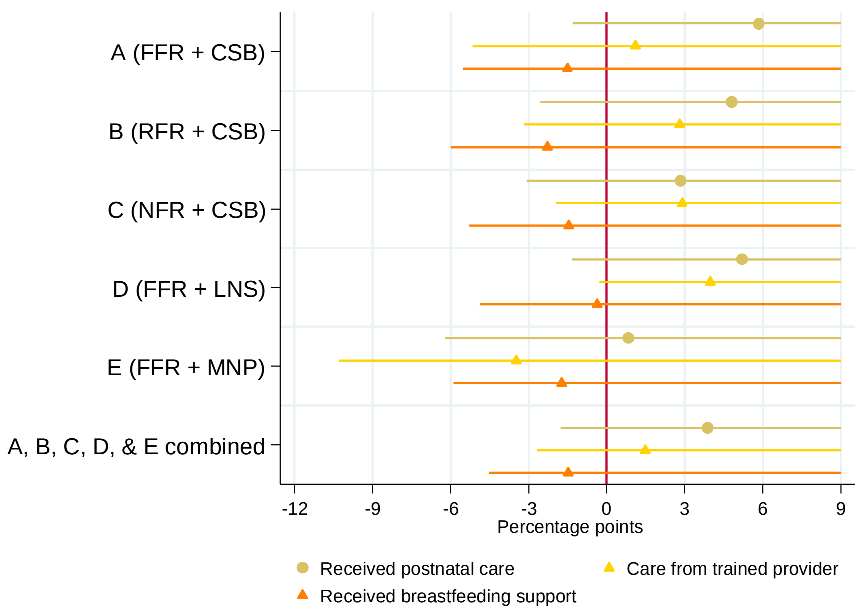
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used. Data shown were collected at the 1-month survey.

Figure 10.7a Postnatal care received



Note: Unadjusted values are shown. Data shown were collected at the 1-month survey. Data shown were collected at the 1-month survey.

Figure 10.7b Postnatal care received: impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintil. SEs were adjusted for clustering; one-sided was test used. Data shown were collected at the 1-month survey.

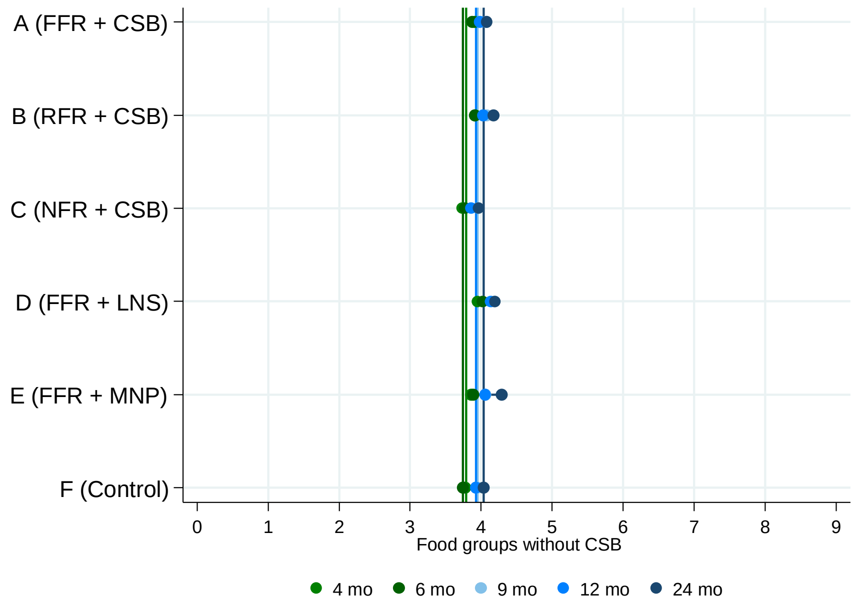
11. Results: Maternal Diet and Consumption of Fortified Foods and Supplements

Mothers' dietary diversity was limited. When excluding CSB, mothers consumed only around four food groups (of 8) and this did not change meaningfully over time (**Figure 11.1a**). A small program impact of around 0.2 food groups was found in arms A (FFR+CSB) and B (RFR+CSB) at 4 months, 6 months, and 9 months (not shown), but this impact disappeared when CSB consumption was excluded from the calculation of women's dietary diversity (**Figure 11.1b**). *PROCOMIDA* had a similar-sized effect on mothers' dietary diversity in arm E (FFR+MNP) at 24 months (around 0.2 food groups), but the effect in group E (FFR+MNP) did not disappear when CSB was excluded.

At 1 month, intake of CSB in the previous 24 hours was similar in arms A (FFR+CSB) and B (RFR+CSB), 31.6 percent and 27.2 percent, respectively, but lower in arm C (NFR+CSB) at 15.5 percent (**Figure 11.2a**). The percentage of mothers reporting CSB consumption in the past 24 hours increased steadily over time, even after 6 months when the CSB ration was meant to be consumed by the child. CSB consumption dropped at 24 months in arms B and C, likely because households had already received their last ration before the 24-month interview. Even when limiting the analyses to enrolled program beneficiaries, CSB consumption was similarly lower in arm B (RFR+CSB) and lowest in arm C (NFR+CSB) (**Figure 11.2b**). These results provide indirect evidence that more of the CSB was shared when the family ration became smaller.

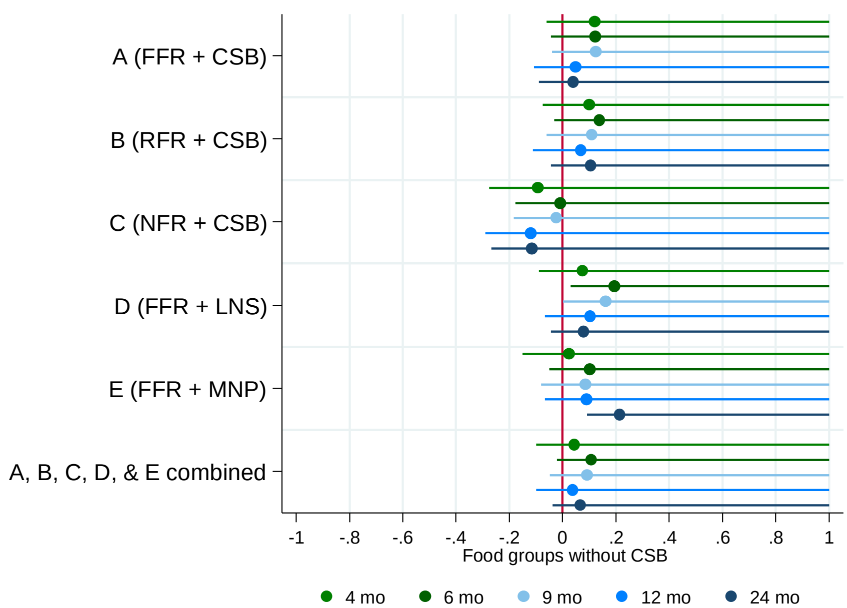
The consumption of the *PROCOMIDA* LNS and MNP supplements in arms D (FFR+LNS) and E (FFR+MNP) was higher than that of CSB at every survey. At enrollment in the study (i.e., during pregnancy), around 19 percent and 10 percent of mothers in these arms reported having consumed LNS and MNP, respectively. When asked to recall consumption during pregnancy at the 1-month survey, this percentage had gone up to around 42 percent (**Figure 11.3**). In terms of postnatal supplement consumption, the percentage of mothers reporting LNS or MNP consumption postpartum was similar at about 37 percent at 1 month. This percentage increased to around 65 percent at the 4-month and 6-month surveys in both arms D (FFR+LNS) and E (FFR+MNP).

Figure 11.1a Maternal diet, dietary diversity



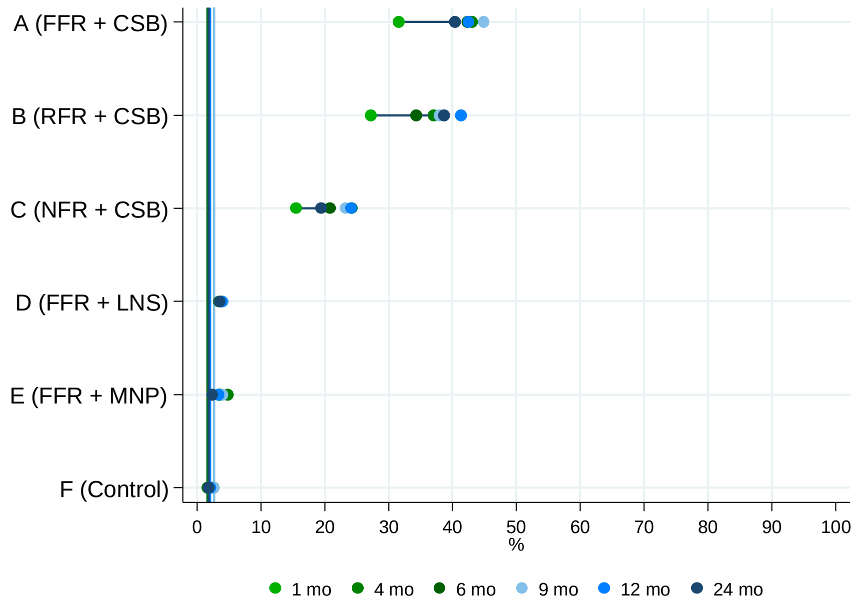
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 11.1b Maternal diet, dietary diversity: impact



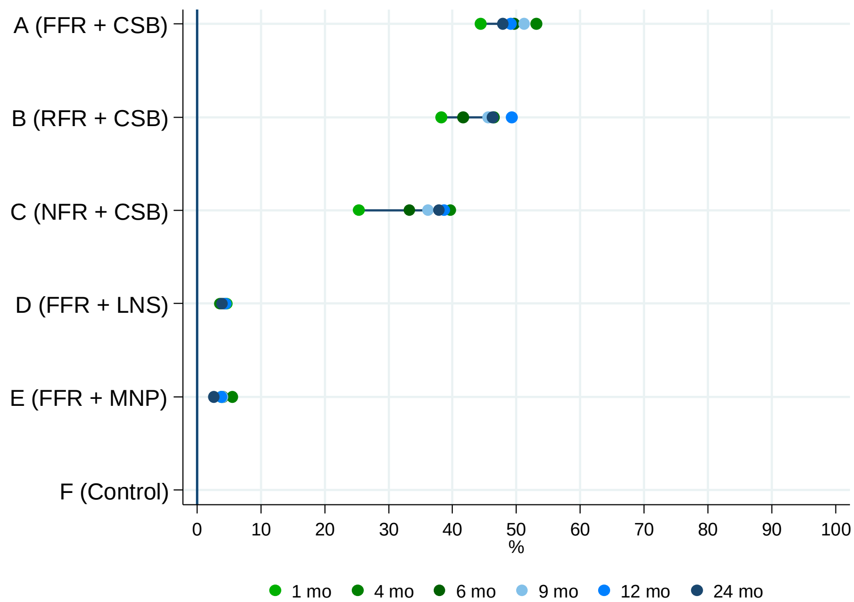
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 11.2a Maternal diet, CSB consumption in the past 24 hours



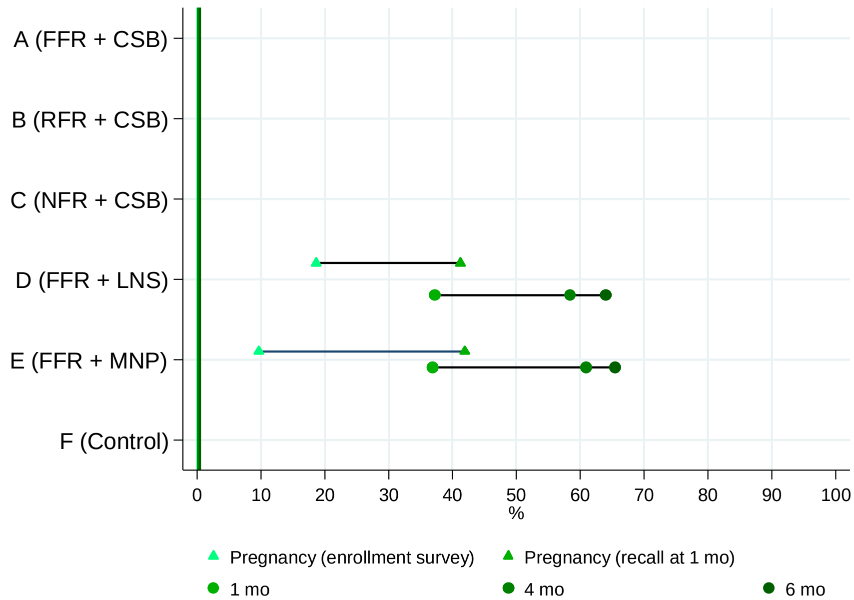
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 11.2b Maternal diet, CSB consumption in the past 24 hours for enrolled *PROCOMIDA* beneficiaries



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 11.3 Maternal diet, *PROCOMIDA* supplement consumption



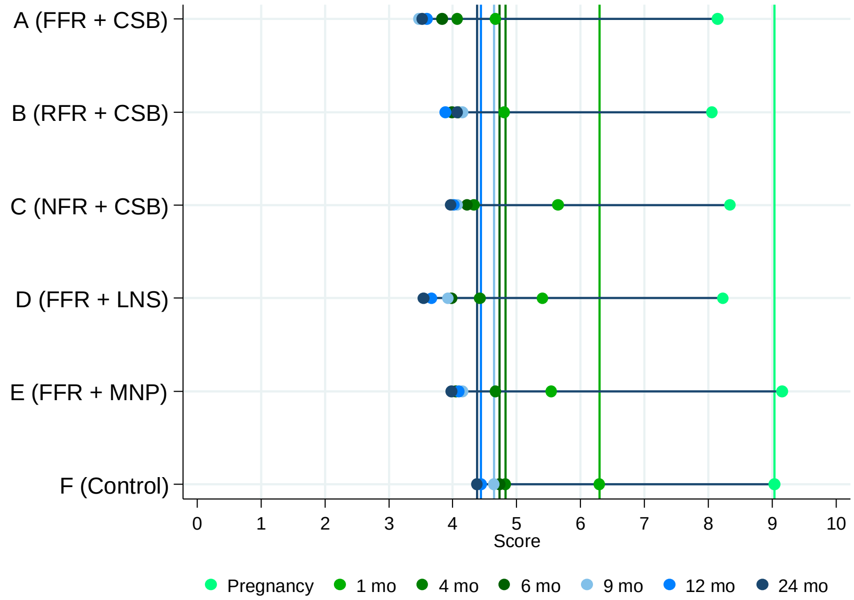
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm. Intake of *PROCOMIDA* supplements (ever) during pregnancy shown through recall at enrollment and 1-month surveys. Intake of *PROCOMIDA* supplements (in the past 24 hours) after pregnancy shown through recall at 1-, 4-, and 6-month surveys.

12. Results: Maternal Stress and Depression

At enrollment, the mean maternal stress score was 8.5 (of 20) in the full sample (**Figure 12.1a**). Over time, maternal stress score decreased in all study arms, but there was a significantly larger decrease in arms A (FFR+CSB) and E (FFR+MNP) compared to F (control). *PROCOMIDA* had a significant impact of -1.3 points at 1 month, -0.6 points at 6 months, -0.9 points at 9 months, and -0.6 points at 12 months in arm A (FFR+CSB) (**Figure 12.1b**). Arm E (FFR+MNP) saw a significant decrease in maternal stress score up to 9 months: -0.7 at 1 month, -0.6 at 6 months, and -0.4 at 9 months.

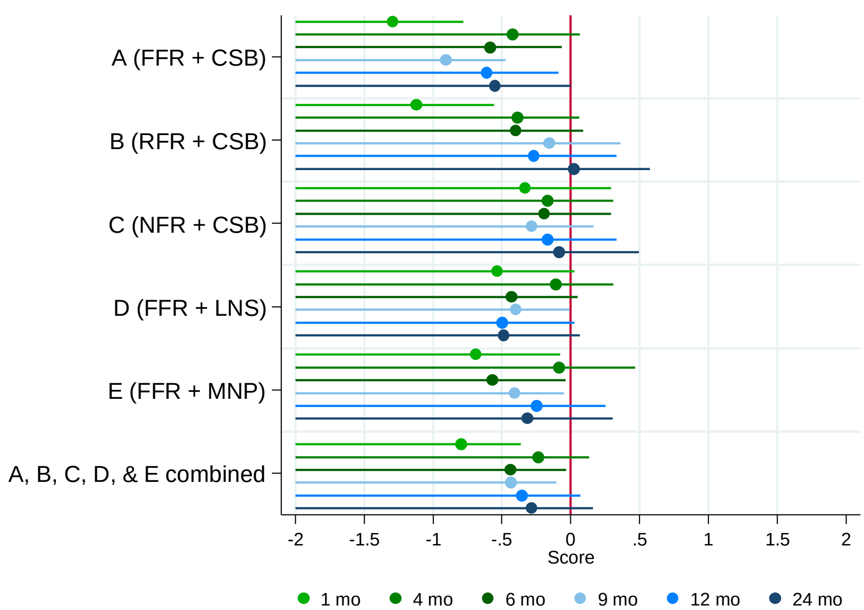
The prevalence of postnatal depression among mothers was low at 1 month, relative to established cutoffs (10 to indicate distress or discomfort, and 13 to indicate the likelihood of depression) on the EPDS (Murray and Cox 1990). The mean Edinburgh score was 3.4 (of 30) for the full sample, ranging from 3.1 in arm A (FFR+CSB) to 3.6 in arm F (control) (**Figure 12.2a**). Over time, there were similar-sized decreases in the average Edinburgh score in all study arms, and there were no program impacts on postnatal depression (**Figure 12.2b**).

Figure 12.1a Maternal stress score (0–20)



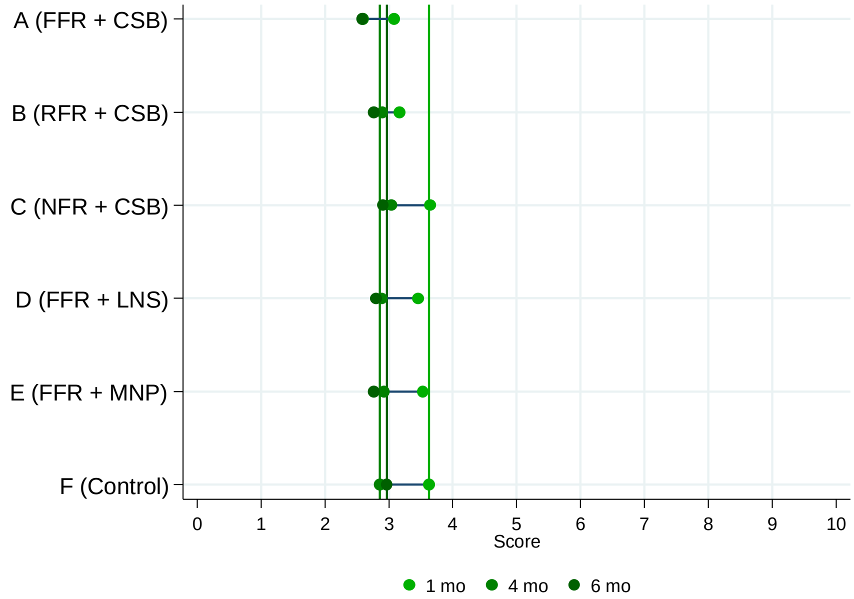
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 12.1b Maternal stress score (0–20): impact



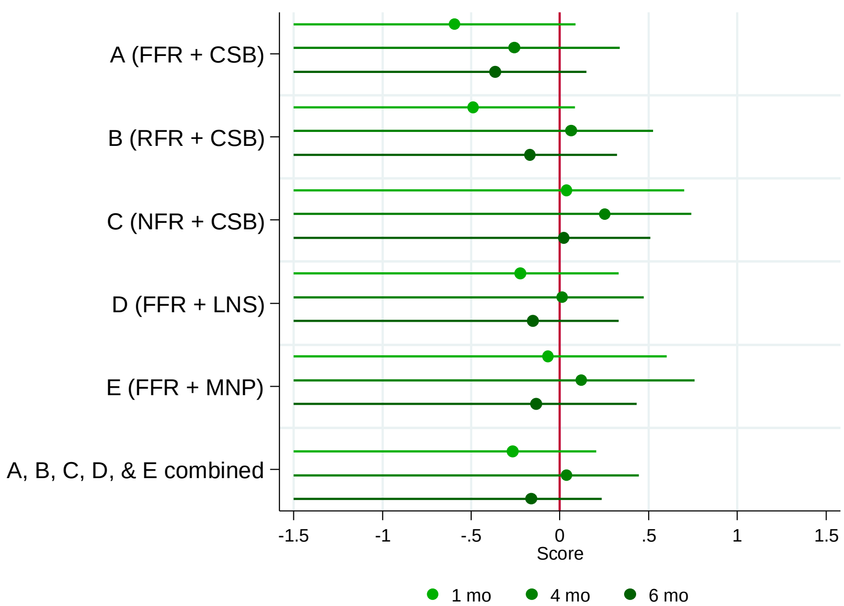
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for baseline value; child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs adjusted were for clustering; one-sided test was used.

Figure 12.2a Maternal postpartum depression score (0–30)



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 12.2b Maternal postpartum depression score (0–30): impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

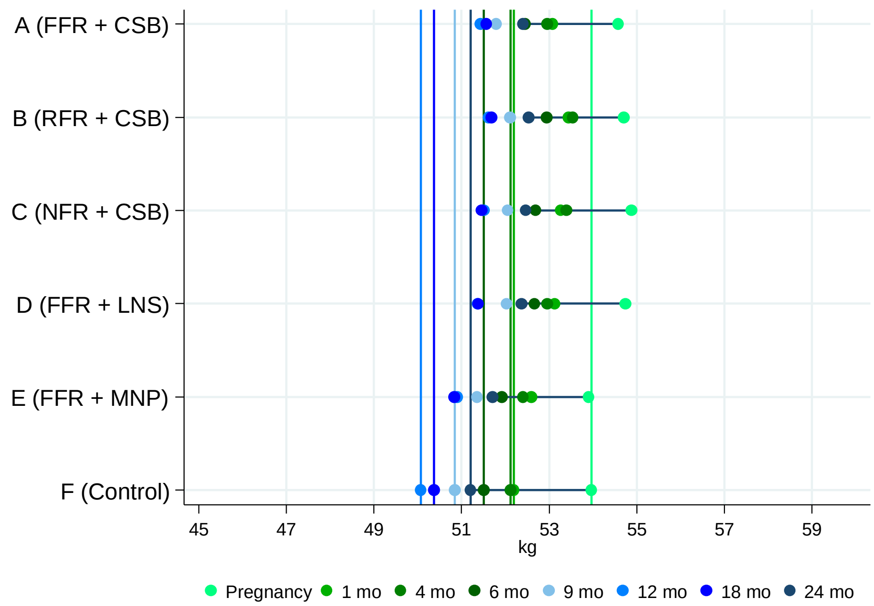
13. Results: Maternal Body Weight, Hemoglobin Concentration and Anemia

At enrollment, pregnant mothers had an average weight of 54.5 kg in the full sample (**Figure 13.1a**). After birth, maternal body weight decreased in all treatment arms, but there were smaller decreases among women in the arms receiving CSB as the individual ration. *PROCOMIDA* led to a relative increase in maternal body weight ranging from 0.9 to 1.2 kg from 4 to 24 months in arm A (FFR+CSB), from 1.2 to 1.5 kg from 1 to 24 months in arm B (RFR+CSB), and from 1.1 to 1.3 kg from 4 to 24 months in arm C (NFR+CSB) (**Figure 13.1b**). No significant program impacts were observed on maternal body weight in arms D (FFR+LNS) and E (FFR+MNP). The impacts in the arms receiving CSB, together with the relatively stable CSB consumption (**Figure 11.2a**), indicate that the smaller postpartum decrease in maternal body weight could be due to the consumption of CSB. Surprisingly, despite less frequent CSB consumption reported in arms B (RFR+CSB) and C (NFR+CSB) compared to arm A (FFR+CSB), the impact on body weight was similar across these arms.

Mean Hb concentration among mothers at 6 months was 13.0 g/dL, increased by 0.2 g/dL at 12 months, and decreased back to 13.1 g/dL at 24 months (**Figure 13.2a**). Prevalence of anemia at 6 months was 16.6 percent in the full sample (**Figure 13.3a**), a level considered by WHO as being of mild public health significance (WHO 2011). The low prevalence of anemia among mothers may be related to the high reported consumption of iron-fortified sugar (86 percent of households at 6 months). Consistent with our a priori hypothesis that the program would have a positive effect on Hb (and thus reduce anemia), one-sided tests were used to assess impact. When using one-sided tests, we found no significant program impacts on maternal Hb concentration (**Figure 13.2b**) or maternal anemia at 6 months, 12 months, and 24 months (**Figure 13.3b**). Mothers in arms C (NFR+CSB), D (FFR+LNS) and E (FFR+MNP) were slightly less likely to be anemic all time points, but those differences were not significant.

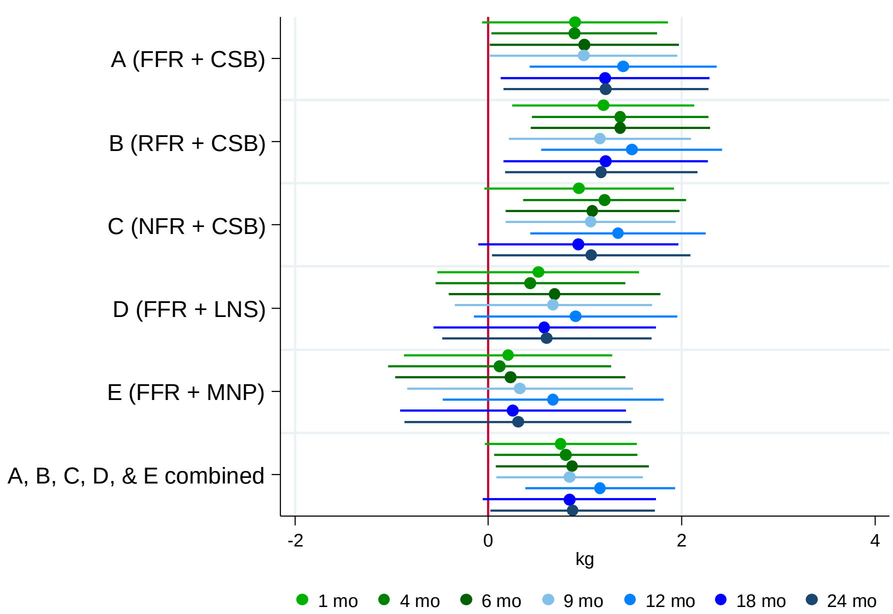
However, against our expectations, the impact estimates in arms A (FFR+CSB) and B (RFR+CSB) suggested a negative program impact, particularly at the 12-month and 24-month surveys. Therefore, we used a two-tailed test to assess program impacts. When using two-tailed tests, we found a statistically significant increase in maternal anemia of 8.2 pp in arm A (FFR+CSB) and 3.9 pp in arm B (RFR+CSB) at 24 months. This negative effect might be due to the increase in phytate consumption from the individual (CSB) and family (beans) ration.

Figure 13.1a Maternal body weight



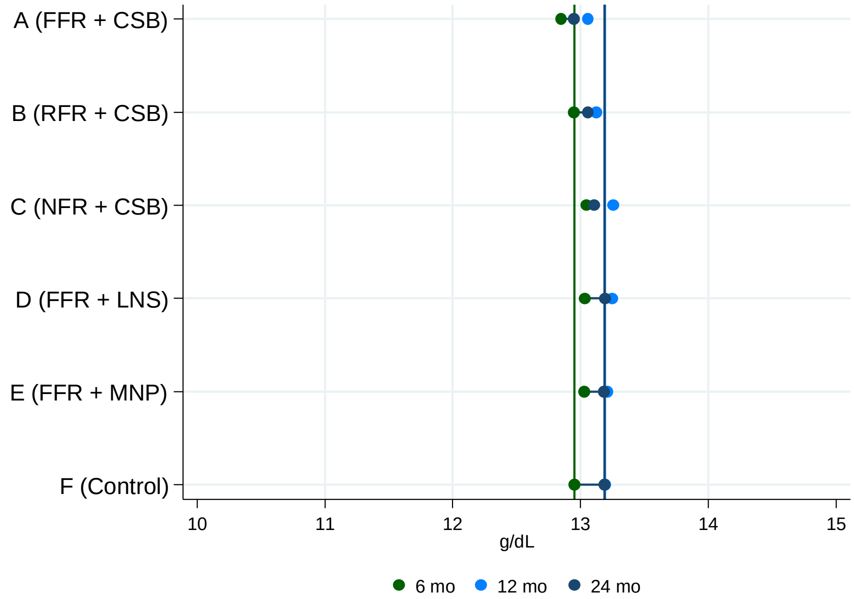
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 13.1b Maternal body weight: impact



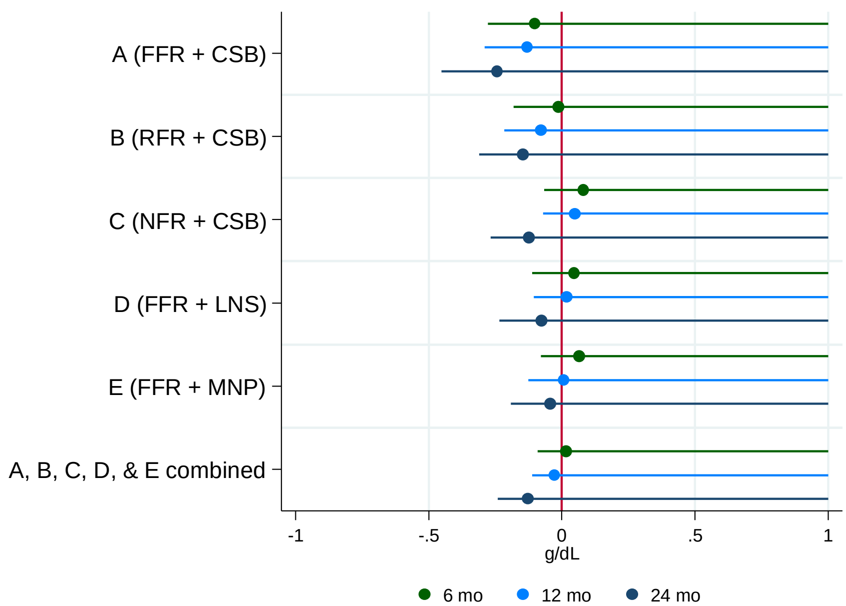
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother's age and height; mother and household head's education;, mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; two-sided test was used.

Figure 13.2a Maternal hemoglobin concentration



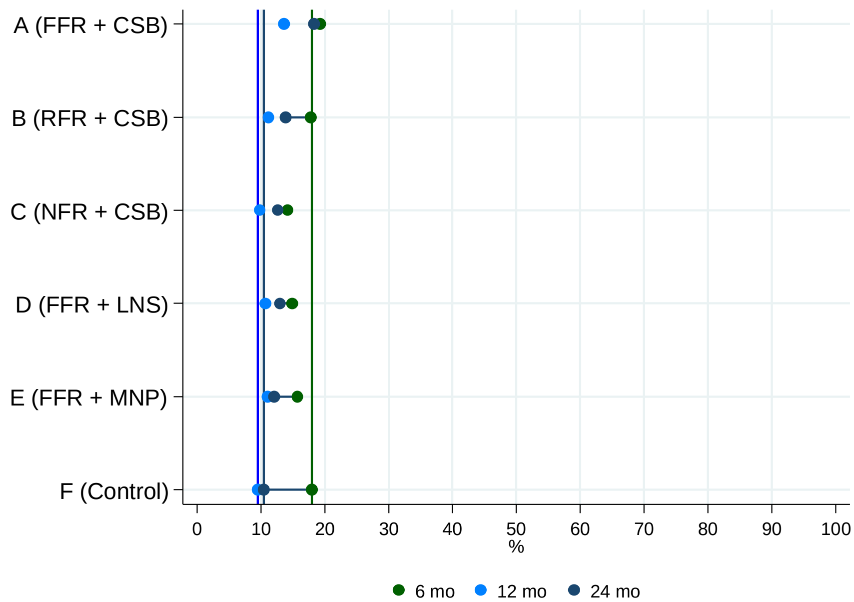
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 13.2b Maternal hemoglobin concentration: impact



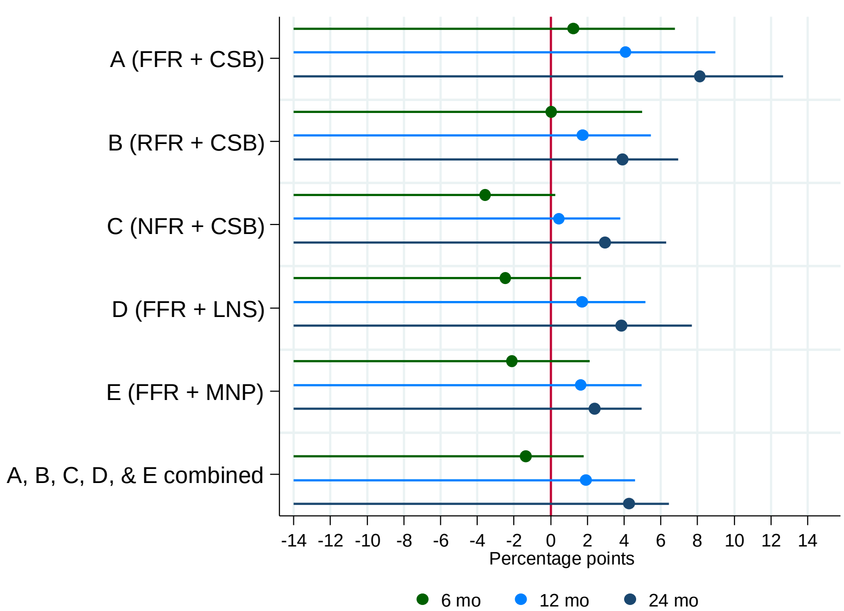
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 13.3a Maternal anemia



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 13.3b Maternal anemia: impact



Note: Impact estimates and 95 pecent confidence bounds are shown. The models controlled for mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

14. Results: IYCF Practices

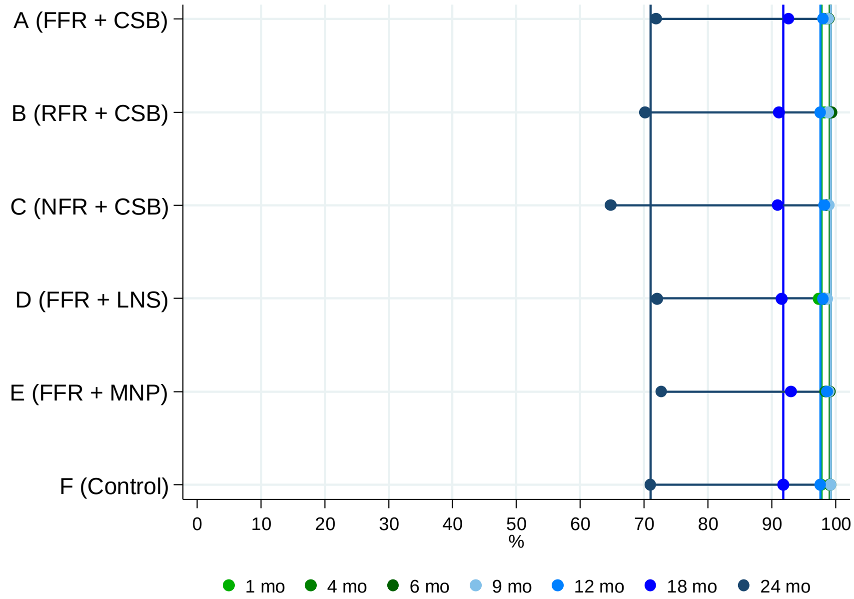
14.1 Breastfeeding Practices

Breastfeeding practices[39] were optimal in many aspects at 1 month: nearly all children were breastfed in the last 24 hours (**Figure 14.1a**) and exclusive and predominant breastfeeding were nearly universal (**Figure 14.3a** and **Figure 14.4a**). However, less than three-quarters of children in the full sample were breastfed within 1 hour of birth (assessed at 1 month, **Figure 14.2a**). Exclusive breastfeeding decreased over time to suboptimal levels at 4 and 6 months of age. At the 6-month survey, only 40.7 percent of children in the full sample were exclusively breastfed. Although exclusive breastfeeding was suboptimal, the vast majority of children did receive breast milk and continued to be breastfed up to 18 months of age (**Figure 14.1a**). At the 24-month survey, 70.5 percent of children were still being breastfed.

PROCOMIDA had a large significant impact on all but one of the breastfeeding outcomes. The program increased the percentage of mothers complying with early initiation of breastfeeding by about 5 pp, and this effect reached significance in the A (FFR+CSB), B (RFR+CSB), and E (FFR+MNP) arms (**Figure 14.2b**). Interestingly, no effect was found in the D (FFR+LNS) arm. We found no significant program impact on breastfeeding in the last 24 hours, except for in arm E (FFR+MNP) at 12 months (**Figure 14.1b**), but the program was effective at increasing exclusive and predominant breastfeeding. The percentage of children exclusively breastfed decreased in all study arms from 1 to 6 months, but decreased at a slower pace in the treatment arms compared to the control arm, and there was a program impact on the maintenance of exclusive breastfeeding at the 4 and 6-month surveys (**Figure 14.3b**). A significant program impact was found in all treatment arms at 4 months (8.0–10.2 pp); the effect was generally larger at 6 months (10.6–16.0 pp). Similarly, predominant breastfeeding decreased over time at a slower pace in the treatment compared to the control arm, with effect sizes somewhat smaller than for exclusive breastfeeding (**Figure 14.4b**).

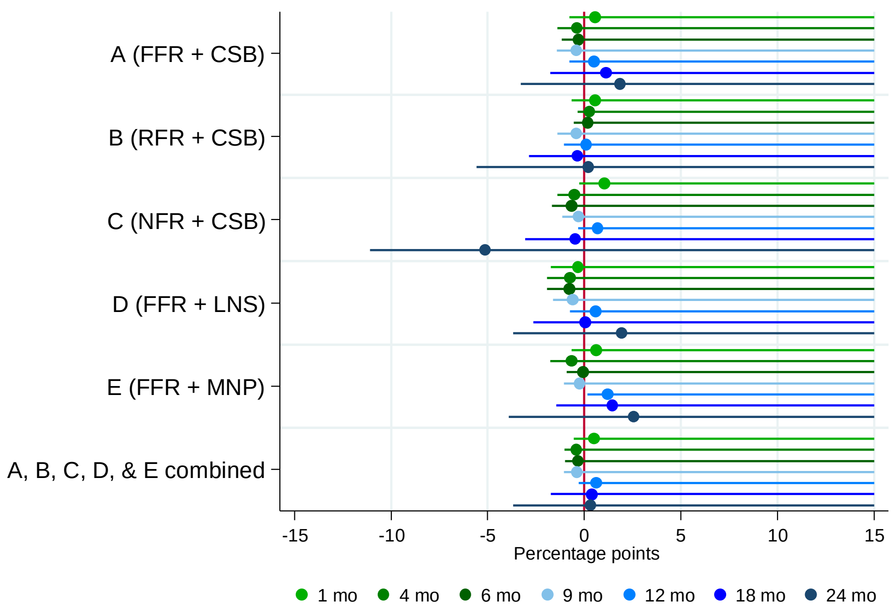
[39] IYCF practices are assessed using the WHO IYCF indicator cutoffs, which sometimes differ from the WHO guidance for complementary feeding.

Figure 14.1a Breastfed in the last 24 hours



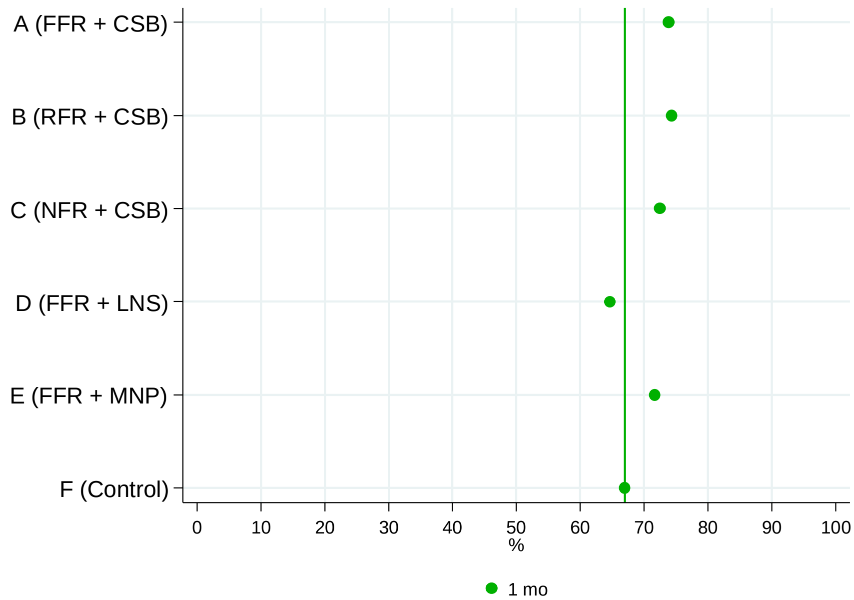
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.1b Breastfed in the last 24 hours: impact



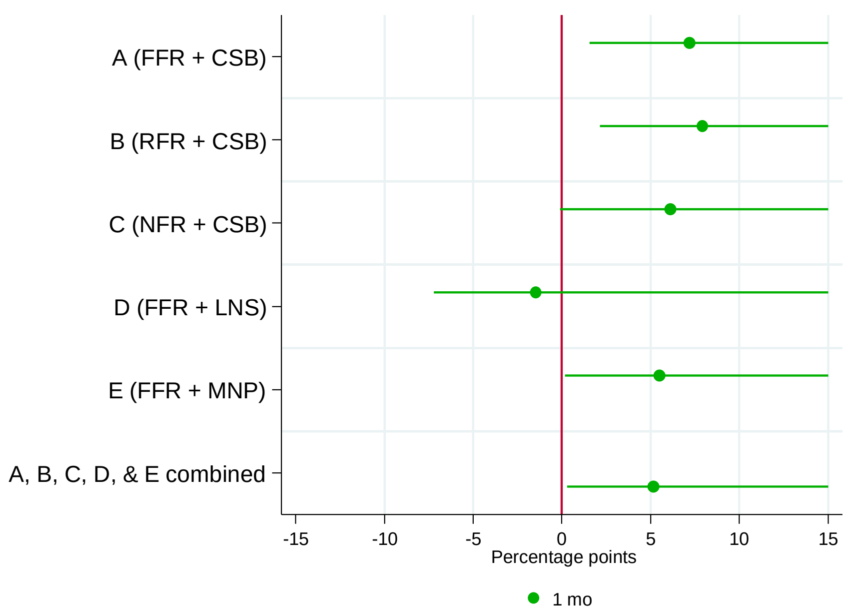
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.2a Early initiation of breastfeeding



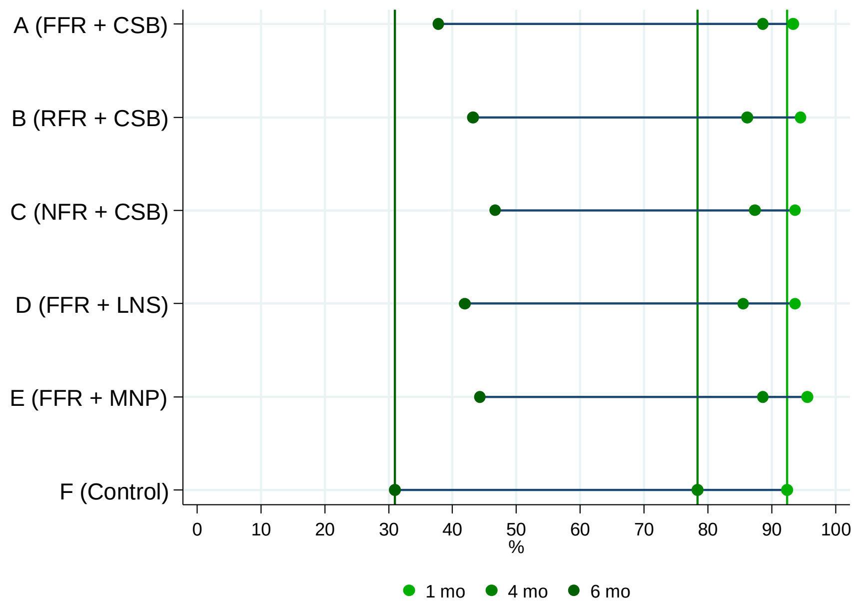
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.2b Early initiation of breastfeeding: impact



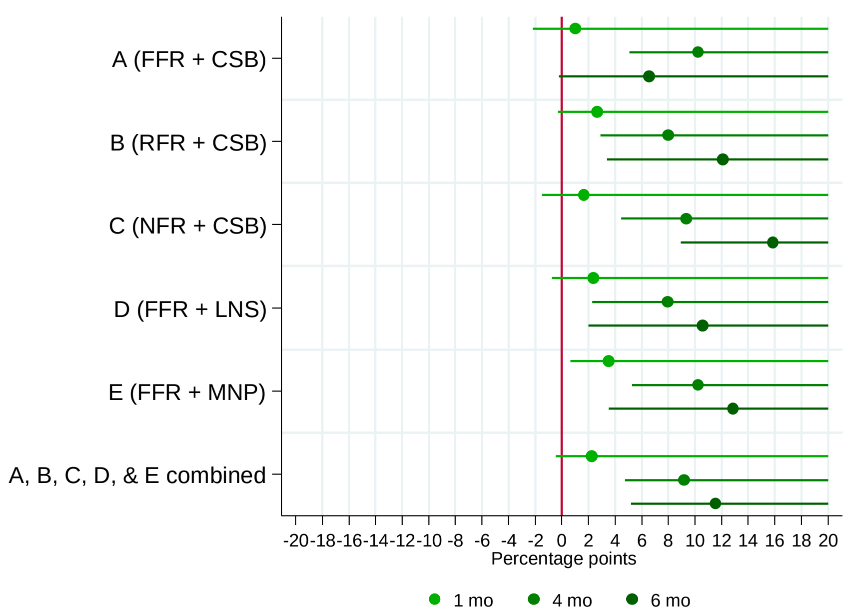
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.3a Exclusive breastfeeding



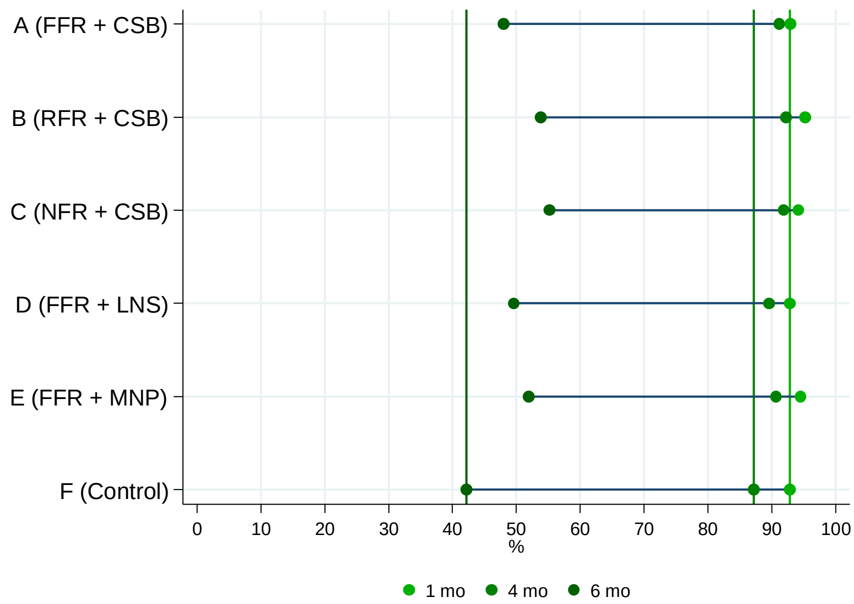
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.3b Exclusive breastfeeding: impact



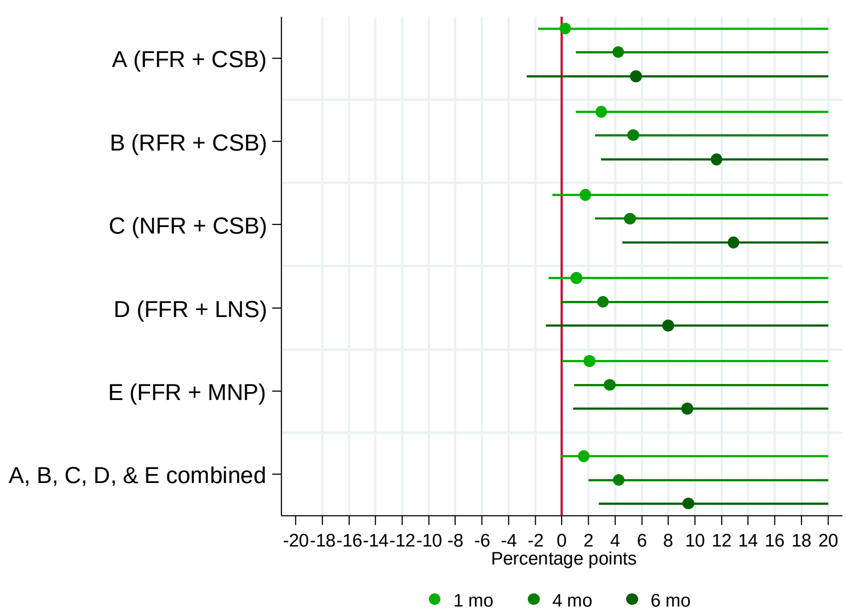
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child’s age and sex; mother’s age, mother and household head’s education; mother and household head’s speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.4a Predominant breastfeeding



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.4b Predominant breastfeeding: impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

14.2 Complementary Feeding Practices

At 6 months, only 55.0 percent of children had been introduced to solid or semisolid foods (**Figure 14.5a**). However, by 9 months, nearly all children were eating complementary foods. These results are in line with the suboptimal knowledge of the appropriate age to introduce solid and semisolid foods described in Section 9: at 6 months about 67 percent of mothers knew they should start introducing solid and semisolid foods and 30 percent of mothers thought they should start introducing foods after 6 months. Changes in complementary feeding practices were similar across the study arms, and there was no program impact[40] (**Figure 14.5b**).

Only 47.5 percent of children in the full sample met the recommended minimum meal frequency at 6 months (**Figure 14.6a**). The percentage increased to 90.8 percent at 18 months, and decreased to 82.6 percent at 24 months. At 24 months, the percentage of children who met the minimum meal frequency was significantly higher in all *PROCOMIDA* arms compared to arm F (control), except for arm C (NFR+CSB) (**Figure 14.6b**). Together with the results showing that nearly all mothers knew the appropriate minimum meal frequency for their child's age (see Section 9), the lack of an impact in arm C (NFR+CSB) might indicate the importance of receiving the family rations.

Children's dietary diversity was low throughout the program. Children's dietary diversity excluding CSB as a food was 1.4 (of seven food groups) at 6 months in the full sample (**Figure 14.7a**), and increased gradually to 4 at 24 months. (The minimum recommended dietary diversity from 6 to 24 months is four food groups.) *PROCOMIDA* had a small positive impact on the total number of food groups consumed by children (**Figure 14.7b**). A small effect of around 0.2 food groups at 9 months in arm A (FFR+CSB), and at 18 months and 24 months in arms A (FFR+CSB) and B (RFR+CSB), disappeared when CSB was not considered in the food group calculation. Similar effect sizes were also found at 18 months in arm D (FFR+LNS) and at 18 months and 24 months in arm E (FFR+MNP).

The percentage of children who met the minimum dietary diversity (four of seven food groups) at 6 months was 13.3 percent when excluding CSB consumption and 14.6 percent when including CSB consumption (**Figure 14.8a**). These percentages increased over time, but remained suboptimal: at 24 months, around 70 percent of children consumed at least four food groups (including CSB). Similar to total dietary diversity, the impact of *PROCOMIDA* on the percentage of children who met the minimum dietary diversity was small and largely due to CSB (in the arms receiving this food) (**Figure 14.8b)**. We observed a positive impact of 7.5 pp on the minimum dietary diversity from 12 to 24 months in arm A (FFR+CSB), but this effect disappeared when CSB consumption was excluded. No effects were observed in arm B (RFR+CSB) or C (NFR+CSB). A positive impact (ranging from 5.2 to 7.5 pp) was found in children 12–24 months in arm E (FFR+MNP); the impact in arm D (FFR+LNS) was limited to children 18 months of age. Program effects were thus limited to the arms receiving a full family ration, indicating that the family ration may have been important in improving children's dietary diversity. The limited impact in arm D (FFR+LNS) compared to E (FFR+MNP) is remarkable. A possible explanation is that the instruction to sprinkle the MNP on foods twice per day might have triggered mothers to provide food more often to children. In addition, these meals may have been more diverse due to the recipe demonstrations that were provided and taught mothers how to prepare foods for their children that included diverse nutrient-rich ingredients.

Reported consumption of CSB in the past 24 hours among children was low at 6 months, ranging from 14.5 percent in arm C (NFR+CSB) to 21.0 percent in arm A (FFR+CSB) (**Figure 14.9a**). CSB

[40] The results in **Figure 14.5b** suggest that there might have been a negative effect of the program (the point estimates at 6 months are consistently below 0). Interviews were conducted around 6 months of age, and only children above 6 months of age at the 6-month survey were included when calculating this indicator. Mothers might have made sure—following BCC guidance—not to introduce foods before 6 months. The impact might thus have looked very differently if it had been assessed at 7 months, when mothers knew their child was older than 6 months of age.

consumption increased until 18 months in all three treatment arms receiving CSB (ranging from 26.1 percent to 43.1 percent), and decreased slightly at 24 months. Intake of CSB in the study arms not receiving CSB rations was nearly nonexistent. Similar to maternal CSB consumption, when limiting the analyses to enrolled program beneficiaries, CSB consumption was lower among children in the arm receiving a reduced or no family ration (**Figure 14.9b**), indicating that the individual CSB ration may have been shared more in those arms with other household members compared to the full family ration arm.

In terms of other *PROCOMIDA* supplements, consumption of LNS was low at 6 months: only 3.9 percent of children in arm D (FFR+LNS) had consumed LNS in the past 24 hours (**Figure 14.10a**). By 9 months, about two-thirds of children in arm D (FFR+LNS) were consuming LNS. LNS consumption remained at this level up to 18 months, and decreased to 59.8 percent at 24 months. The low use of LNS among children 6 months of age is likely related to the timing of the survey and the timing of the program changing from having the mother being the beneficiary to the child being the beneficiary of the individual ration, which happened at 6 months of age, as indicated by the high percentage of mothers still reporting consuming LNS at 6 months (about 65 percent). For example, the survey may have taken place before the monthly food distribution at which the child would qualify as the beneficiary of the individual ration.

Similarly, MNP consumption in the past 24 hours was low in arm E (FFR+MNP) at 6 months (1.2 percent) (**Figure 14.10a**). MNP consumption among mothers was about 65 percent at 6 months and could thus be related to the low percentage of children consuming MNP. MNP consumption in the past 24 hours increased to 49.9 percent at 9 months and 60.9 percent at 18 months; it decreased to 54.6 percent at 24 months.

Children's consumption of iron-rich foods in the past 24 hours was low at 6 months. Excluding *PROCOMIDA* foods or supplements (CSB, LNS, and MNP), only 15.2 percent of children in the full sample consumed iron-rich foods in the past 24 hours. Including *PROCOMIDA* foods and supplements, the percentage was higher at 23.1 percent (**Figure 14.11a**). Given that almost all mothers knew at least one iron-rich food at all survey time points, these results are likely explained by the late introduction of solid and semisolid foods, and the low dietary diversity at 6 months. Consumption of iron-rich foods increased gradually until 24 months for both indicators: 43.3 percent excluding *PROCOMIDA* foods and supplements and 64.6 percent including these products. Excluding *PROCOMIDA* foods and supplements, the program had no impact on consumption of iron-rich foods among children[41] (**Figure 14.11b**). Including *PROCOMIDA* foods, the program had a positive impact on consumption of iron-rich foods in arm A (FFR+CSB) from 6 to 24 months, in arms B (RFR+CSB), D (FFR+LNS) and E (FFR+MNP) from 9 to 24 months, and in arm C (NFR+CSB) at 9 and 18 months. The lack of program impact in arm C (NFR+CSB) at 12 and 24 months attests to the importance of the family ration in increasing the percentage of children who consumed iron-rich foods (in this case CSB) in the past 24 hours.

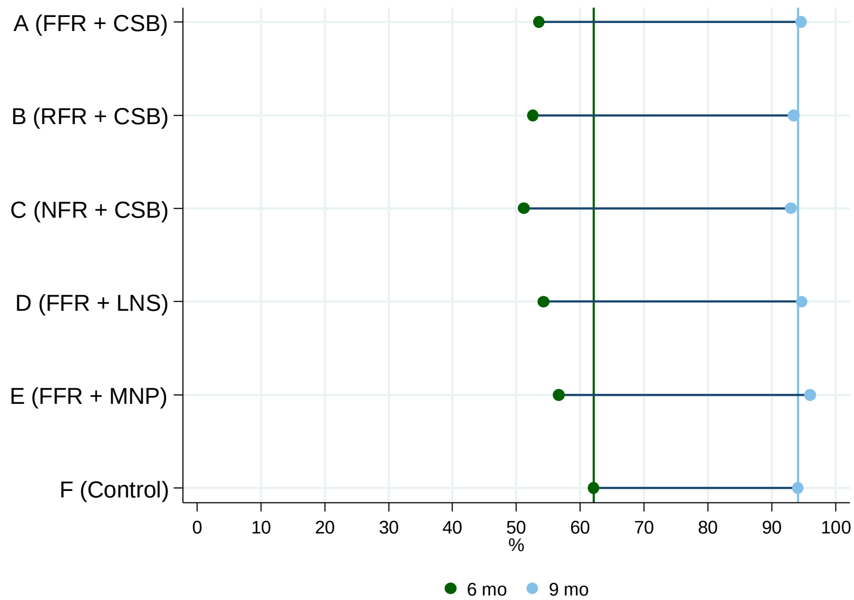
At 6 months, only 12.9 percent of children were classified as having received a minimum acceptable diet in the past 24 hours when including CSB (11.8 percent excluding CSB) (**Figure 14.12a**). This percentage increased to an average of 58.9 percent at 18 months (57.1 percent excluding CSB), and decreased to an average of 50.2 percent at 24 months (49.2 percent excluding CSB). *PROCOMIDA* had a positive impact on the percentage of children classified as receiving a minimum acceptable diet in arm A (FFR+CSB) from 9 to 24 months, but only when including CSB consumption (**Figure 14.12b**). The program had a positive impact on the percentage of children classified as receiving a minimum acceptable diet in arm D (FFR+LNS) at 18 months, and in arm E (FFR+MNP) at 12 months, 18 months, and 24 months. These results suggest that CSB and MNP could be more effective in improving children's diets compared to

[41] Excluding the *PROCOMIDA* foods and supplements, the point estimates are largely to the left of the 0-impact line. This is suggestive of substitution—that is, reducing the intake of iron-rich foods because the child received CSB, LNS, or MNP.

LNS, in addition to indicating the importance of the full family ration as compared to a reduced or no family ration. Similar to the finding for minimum dietary diversity, program effects were limited to the arms receiving a full family ration (suggesting the role of the family ration in improving children's dietary diversity) and larger in arm E (FFR+MNP) compared to arm D (FFR+LNS). This was possibly because the need to sprinkle MNP onto foods triggered mothers to provide more food to children compared to LNS, which could be given as is or mixed with food.

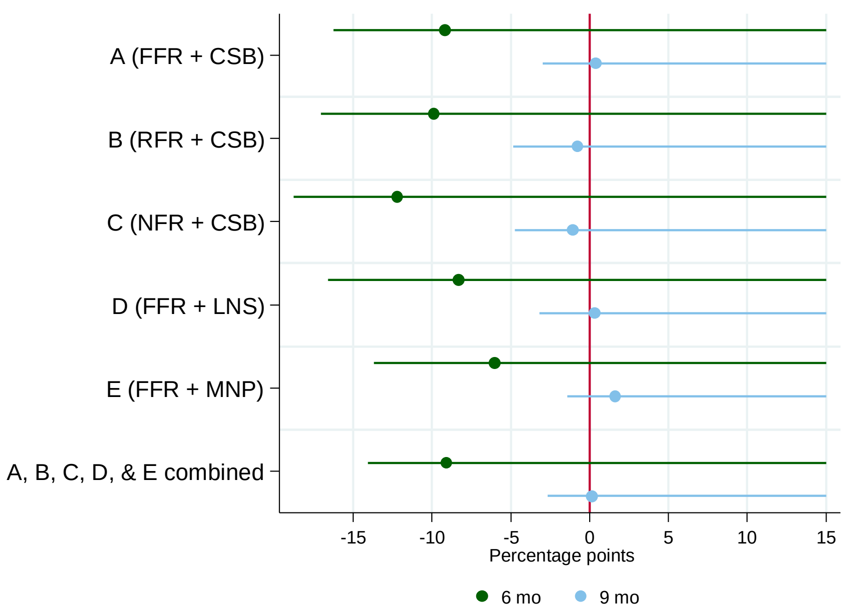
It was not common to bottle-feed young infants, and the prevalence of bottle-feeding at 1-month old was 5.5 percent in the pooled treatment arms (**Figure 14.13a**). However, the prevalence of bottle-feeding increased as children got older, and the increases were largest in the F (control) arm, and by 6 months, 40 percent of children in the control arm had been bottle-fed in the past 24 hours There were consistent impacts on the reduction of bottle-feeding for the pooled treatment group at every wave (**Figure 14.13b**). The impact at 1 month was initially small (-2.2 pp) in the pooled treatment arms, but by 9 months, the program had reduced the prevalence of bottle-feeding in the past 24 hours by 27.5 pp.

Figure 14.5a Received semisolid foods in past 24 hours



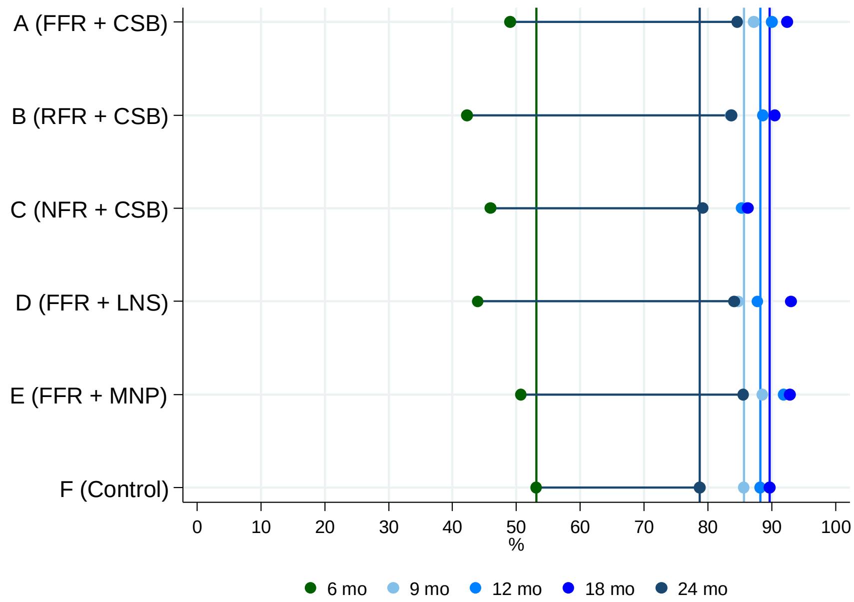
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.5b Received semisolid foods in past 24 hours: impact



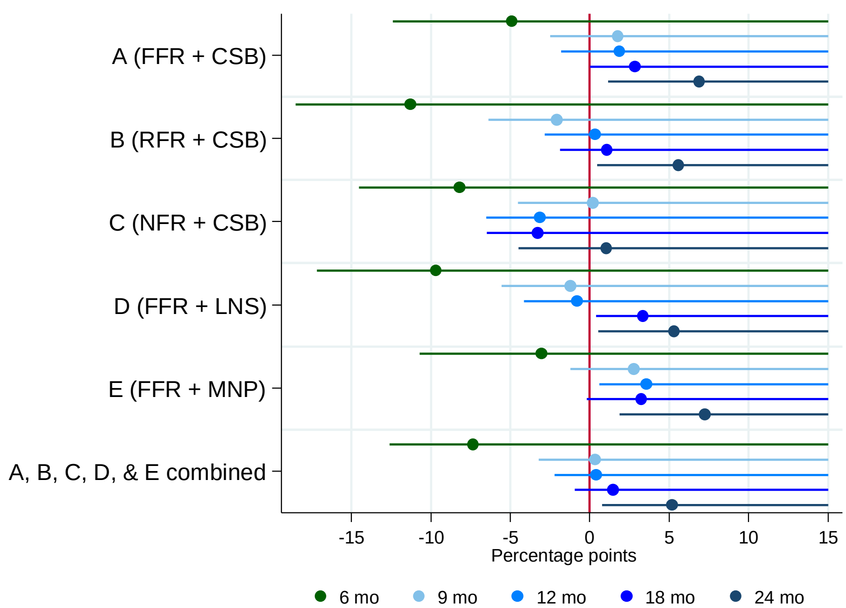
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.6a Minimum meal frequency in the past 24 hours



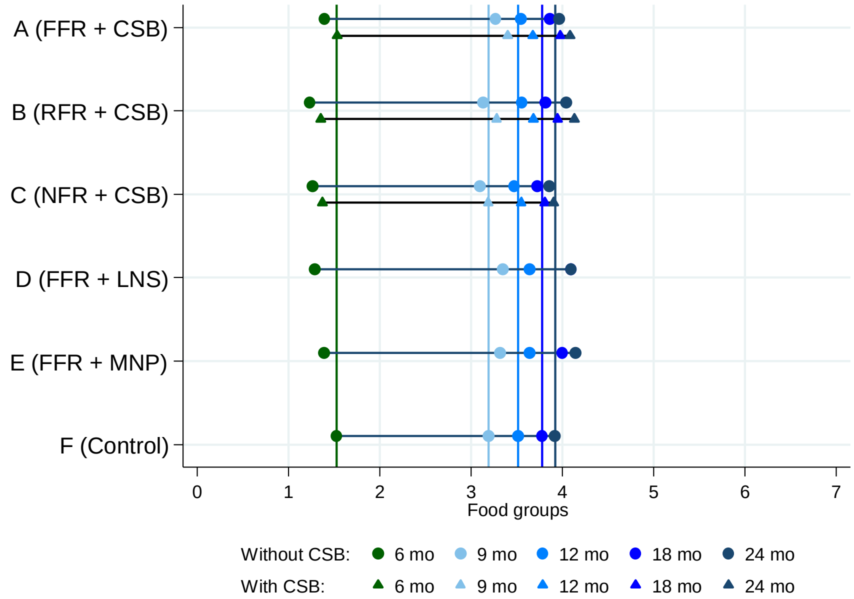
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.6b Minimum meal frequency in the past 24 hours: impact



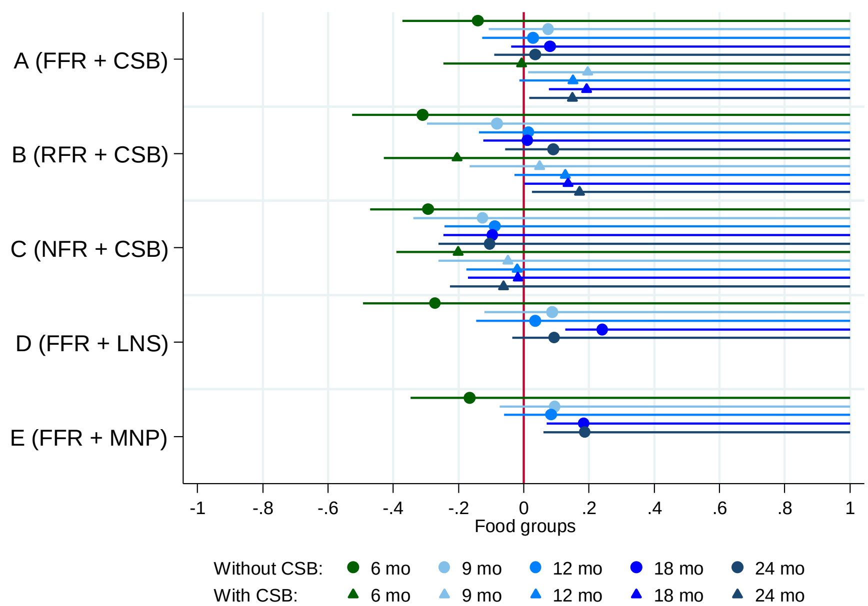
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.7a Child diet, dietary diversity in the past 24 hours



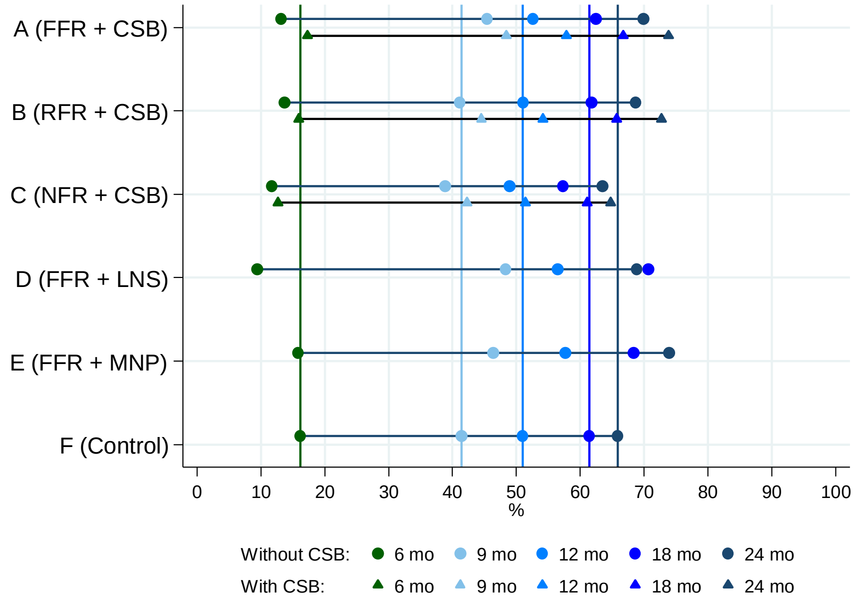
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.7b Child diet, dietary diversity in the past 24 hours: impact



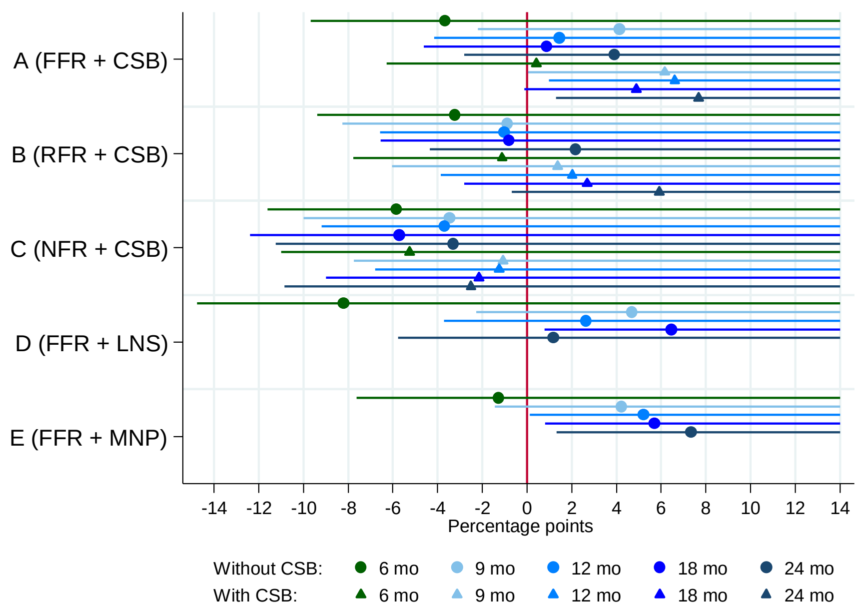
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.8a Child diet, minimum dietary diversity in the past 24 hours



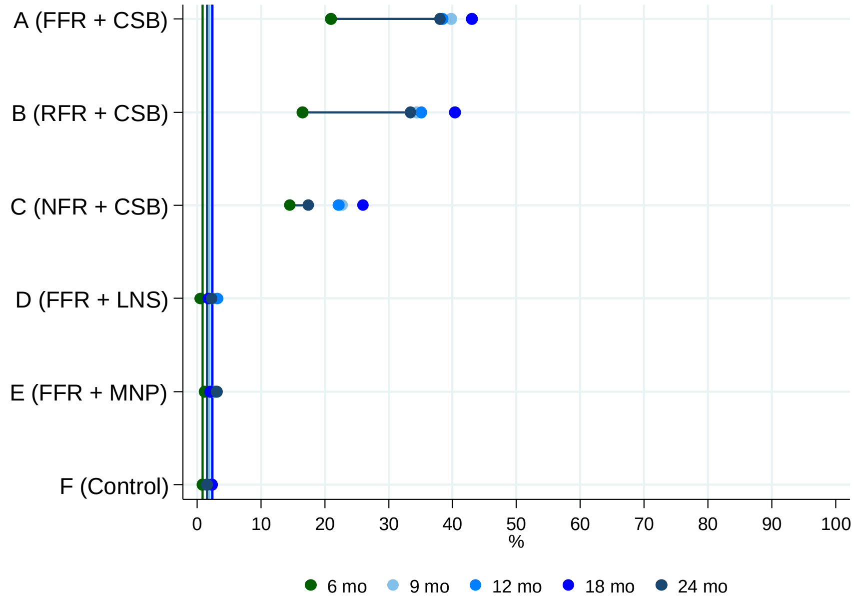
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.8b Child diet, minimum dietary diversity in the past 24 hours: impact



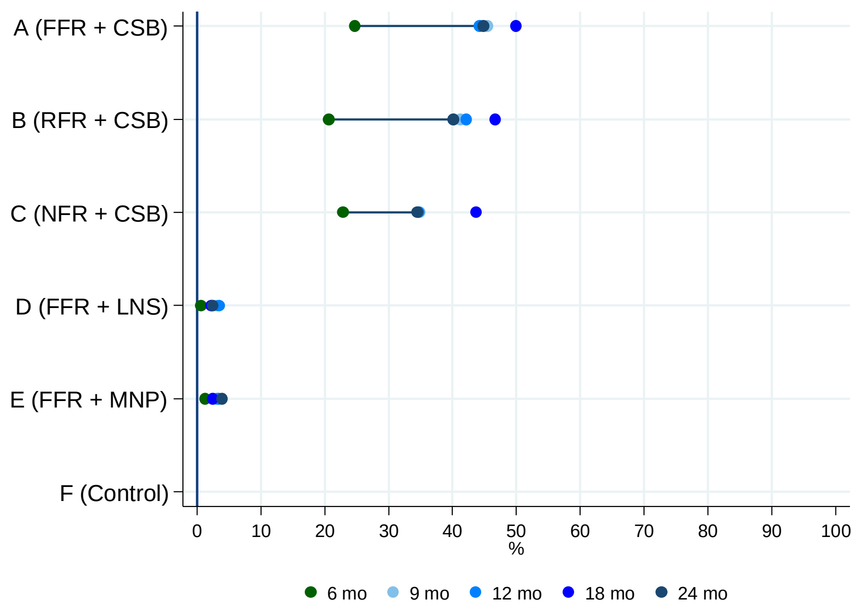
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.9a Child diet, CSB consumption in the past 24 hours



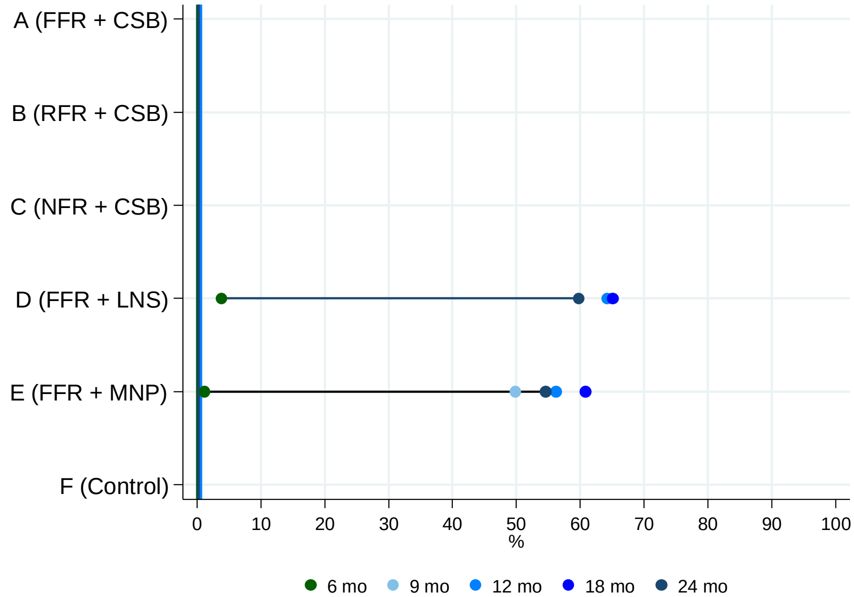
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.9b Child diet, CSB consumption in the past 24 hours for enrolled beneficiaries



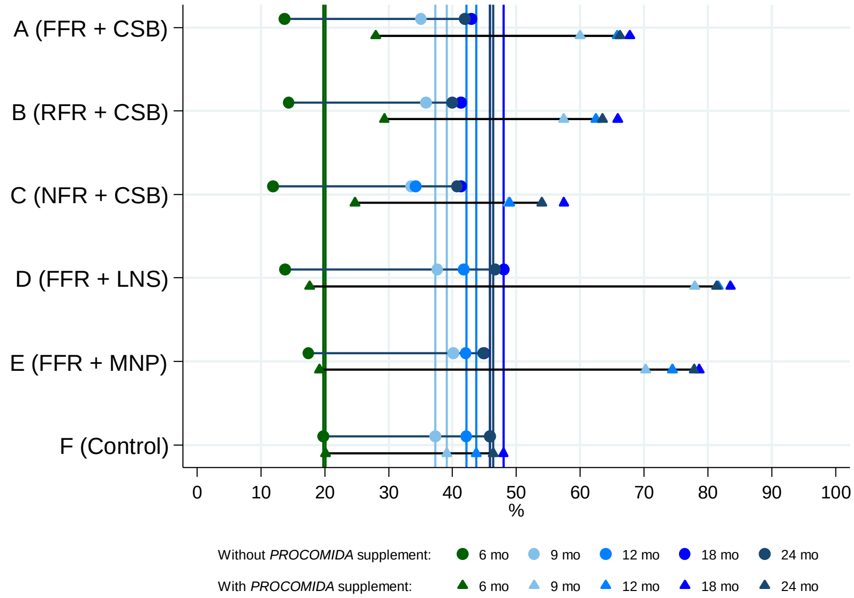
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.10 Child diet, PROCOMIDA supplement (LNS and MNP) consumption in the past 24 hours



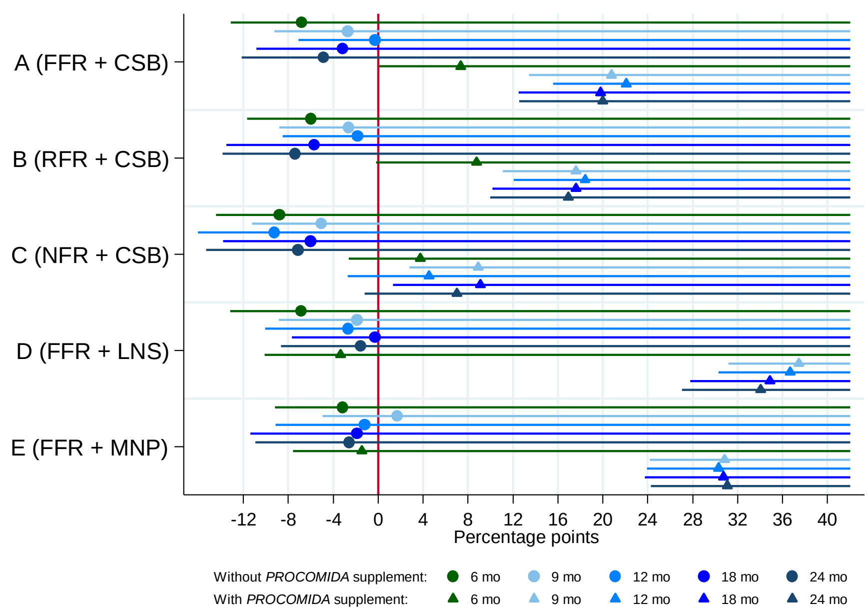
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.11a Child's diet, consumption of iron-rich foods in the past 24 hours



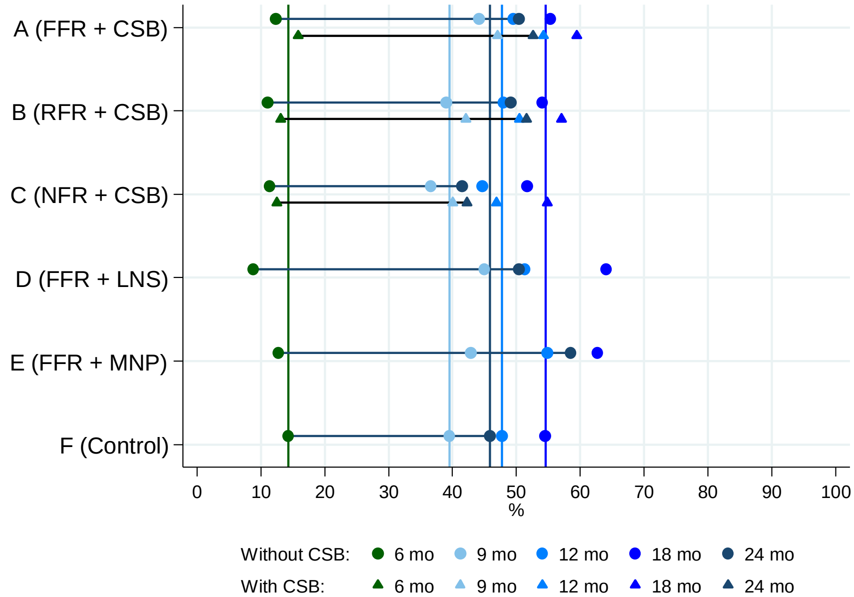
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.11b Child's diet, consumption of iron-rich foods in the past 24 hours: impact



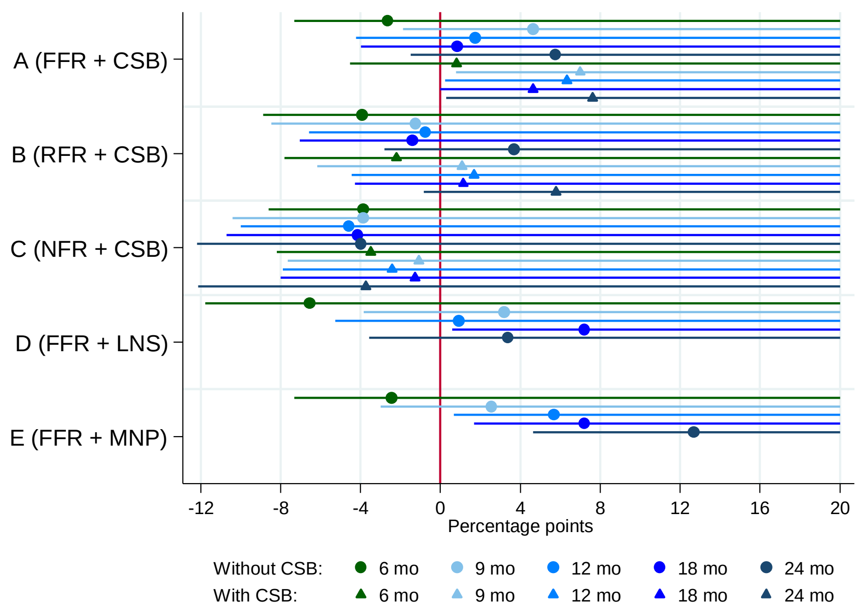
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.12a Minimum acceptable diet in the past 24 hours



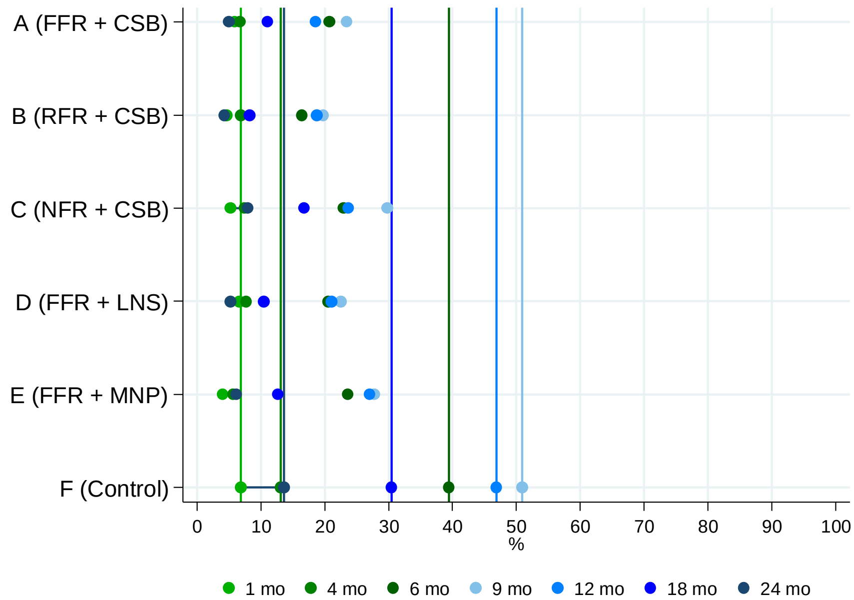
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.12b Minimum acceptable diet in the past 24 hours: impact



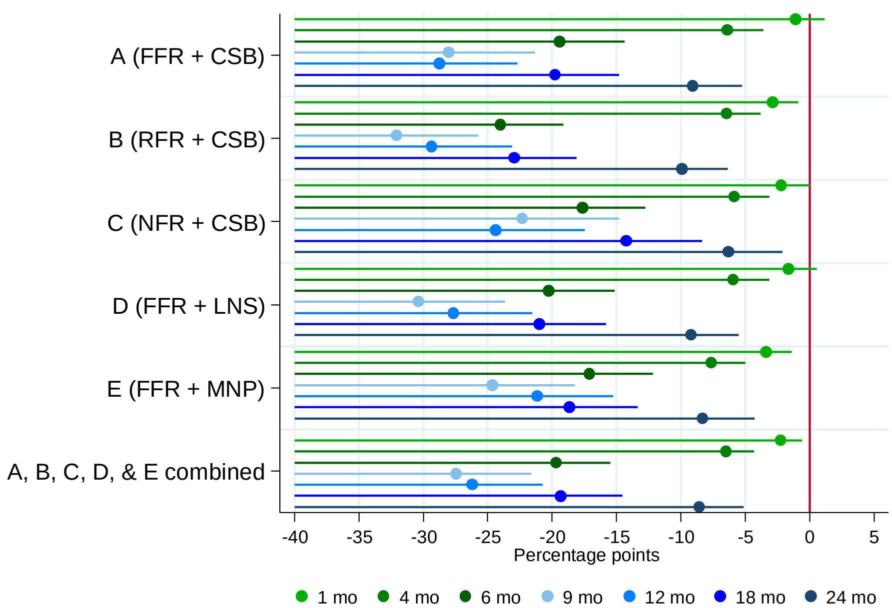
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 14.13a Bottle-fed in the past 24 hours



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 14.13b Bottle-fed in the past 24 hours: impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

15. Results: Preventive Care Practices

The majority (62.4 percent) of caregivers were able to show a vaccination card at the time of the 1-month survey, and at later surveys approximately 90 percent were able to present it (**Figure 15.1a**). With the exception of the 1-month survey (for which there was no program impact), at every survey there were positive impacts of the program on all treatment arms that ranged from between 8.0 to 12.5 pp in the pooled treatment arms (**Figure 15.1b**).

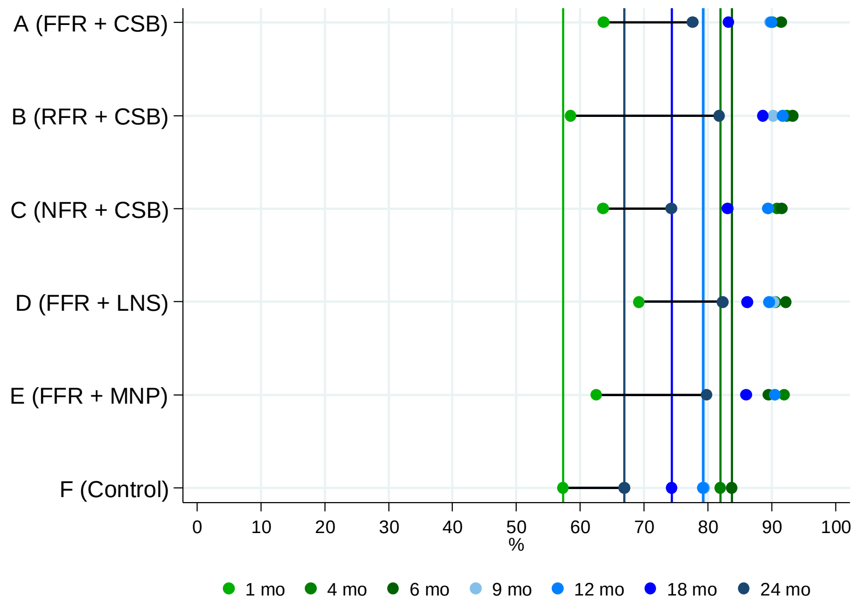
Growth monitoring participation indicators also improved as a consequence of the program. According to MSPAS guidelines, children should be weighed monthly, and this information should be recorded on children's vaccination card. From birth to 5 months, children in the study experienced, on average, 4.3 (of 6) monthly visits in which they were weighed, according to their vaccination cards (**Figure 15.2a**). The program had a positive impact on how frequently children were weighed, and children in the pooled treatment arms were weighed at growth monitoring 0.3 and 0.6 times more frequently in the first and second 6 months of life (**Figure 15.2b**). The frequency of weight monitoring declined sharply during the second year of children's lives, and from 18 to 23 months they were weighed on average 2.9 times. However, the impact of the program continued to increase, and children in the pooled treatment arms were weighed 0.9 and 1.0 times more often than the control arm when they were 12–17 and 18–23 months old, respectively.

During their first 4 months of life, only 60 percent of children met the *MSPAS* requirement that length be measured once every 4 months (**Figure 15.3a**). This indicator improved as children got older, and around 80 percent of children were measured regularly at later waves. During the second year of life, the program had an impact on whether children were regularly measured of 7.1 pp at 12–15 months, and approximately 14 pp at both 16–19 and 20–23 months (**Figure 15.3b**).

According to *MSPAS* guidelines, vitamin A supplements should be received once every 6 months beginning when a child is 6 months old. Among 5–11-month-olds,[42] 87.2 percent had received vitamin A supplementation (**Figures 15.4a**). Receiving later doses of vitamin A was less common, and from 18 to 23 months, only one-third of children had received them. Moreover, there were no consistent positive impacts of the program on whether children received vitamin A supplements; the only exception was an impact of 11.7 pp between 12 and 17 months in the B (RFR+CSB) arm (**Figures 15.4b**).

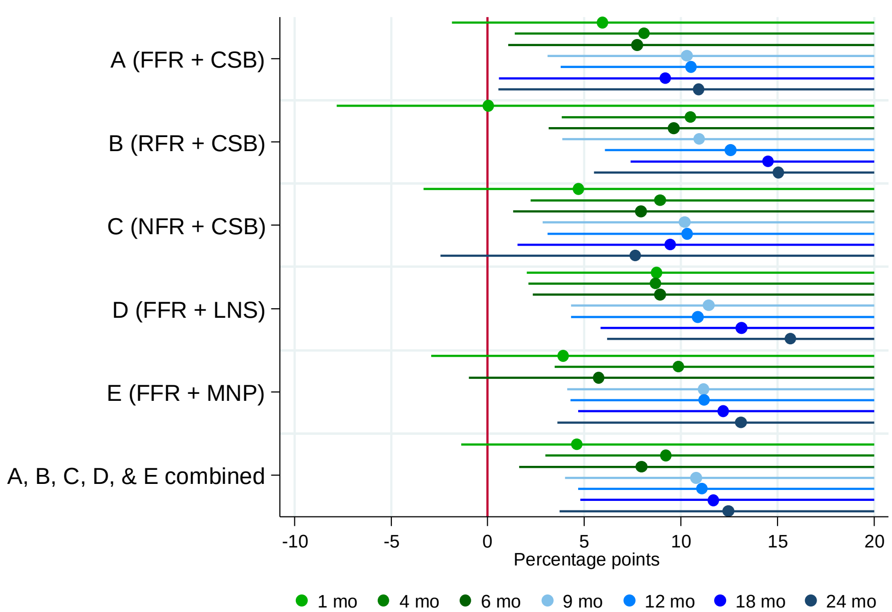
[42] Analyses allow for the fact that many health care providers administered vitamin A supplementation shortly before the child turned 6 months old.

Figure 15.1a Vaccination card seen



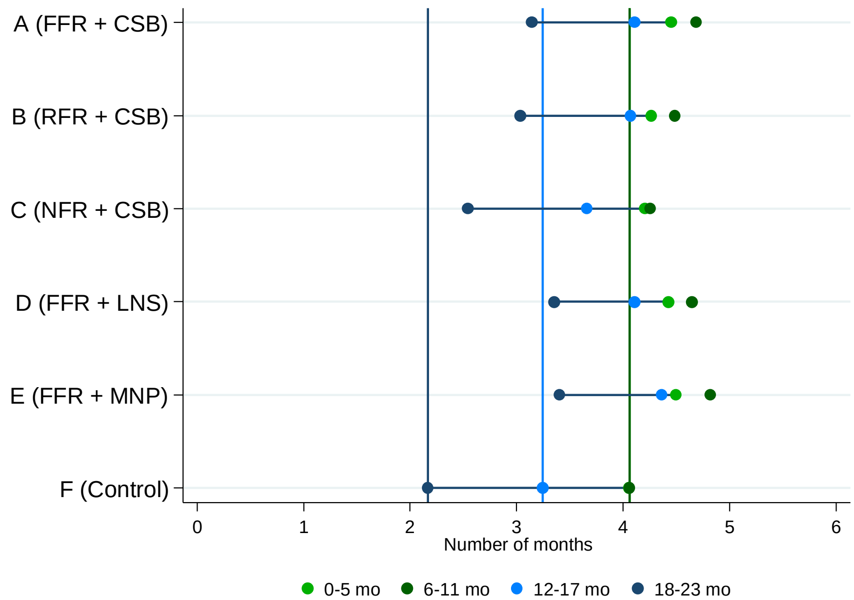
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 15.1b Vaccination card seen: impact



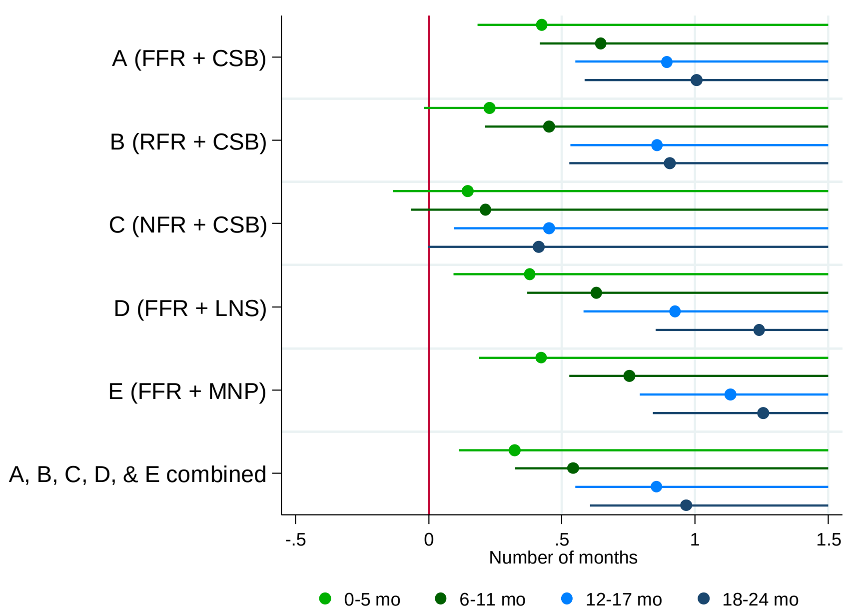
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex, household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 15.2a Weight recorded on health card each month



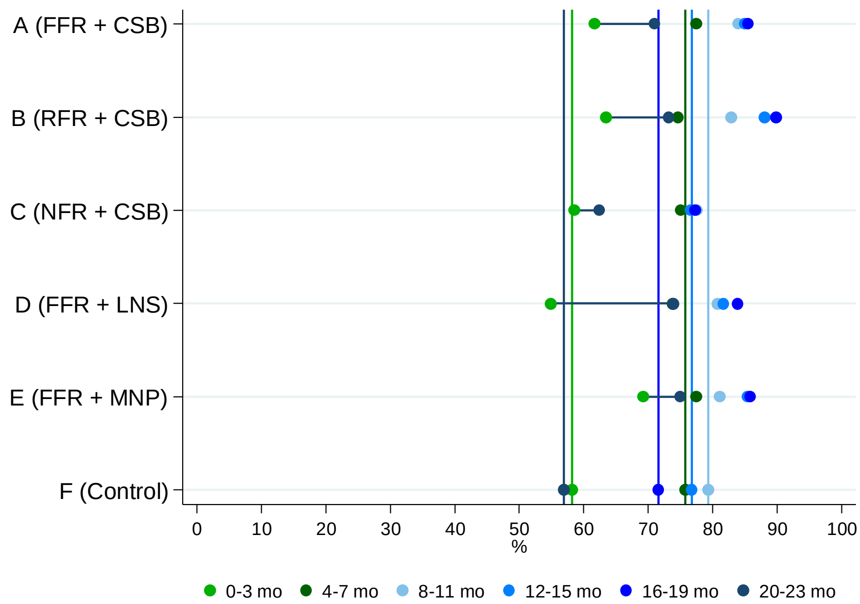
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm. The values of the control arm at 0–5 months and 6–11 months are identical.

Figure 15.2b Weight recorded on health card each month: impact



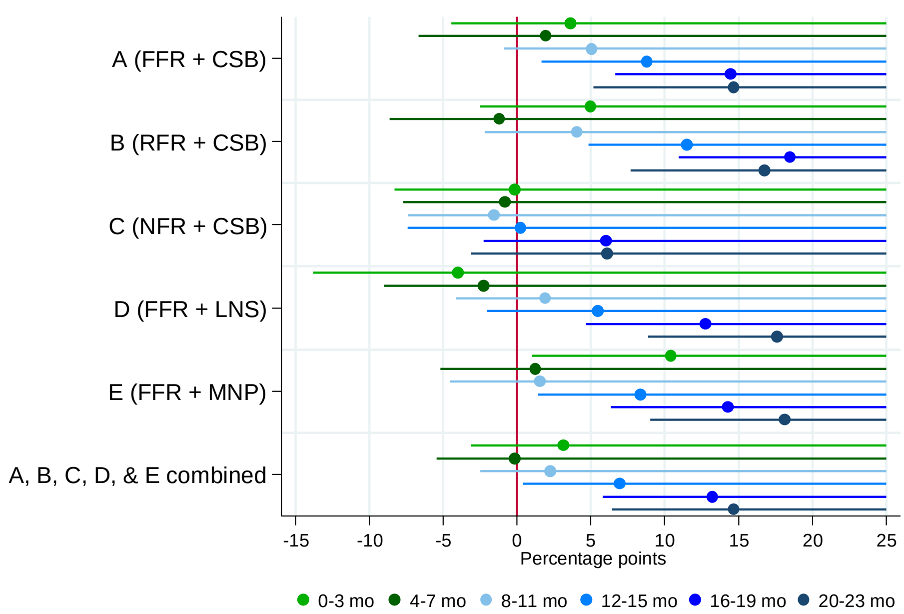
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 15.3a Length recorded on health card once every 4 months



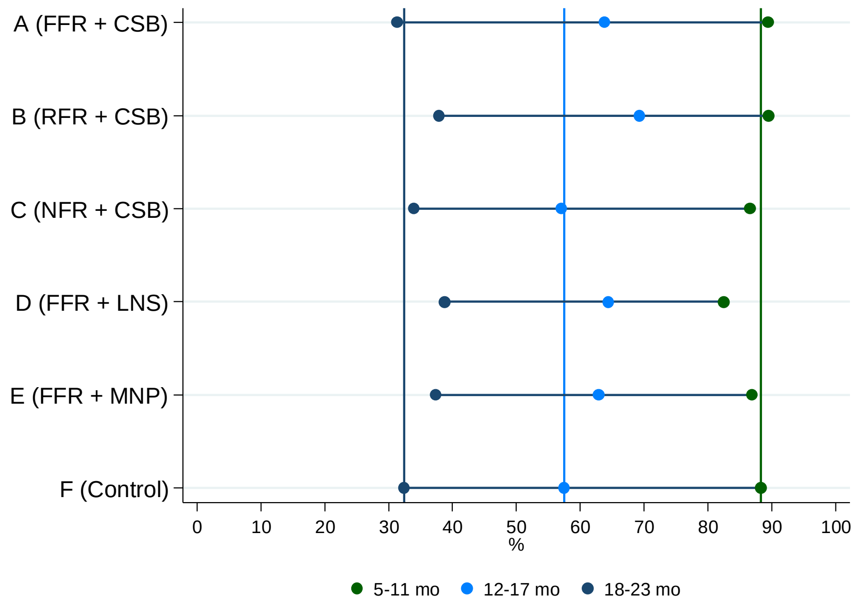
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm

Figure 15.3b Length recorded on health card once every 4 months: impact



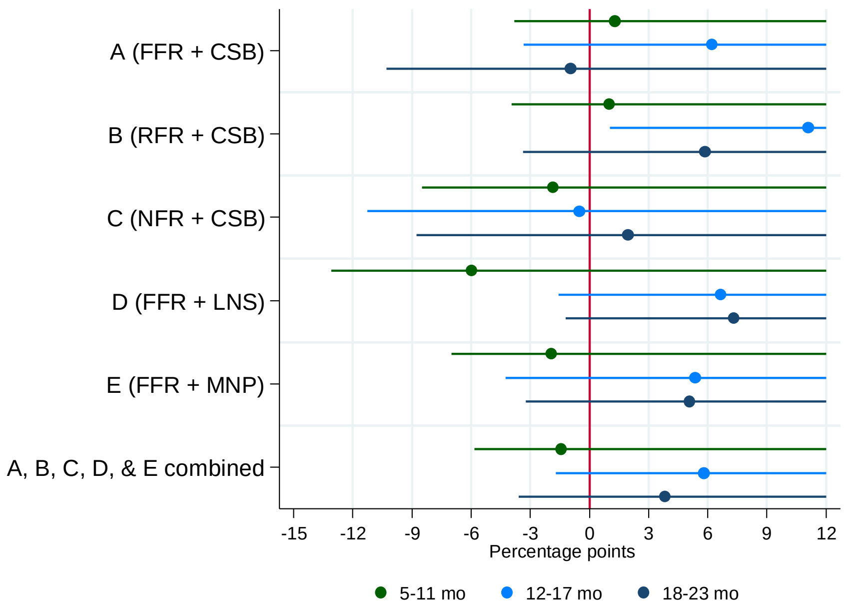
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 15.4a Received vitamin A supplementation once every 6 months



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 15.4b Received vitamin A supplementation once every 6 months: impact



Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

16. Results: Child Morbidity

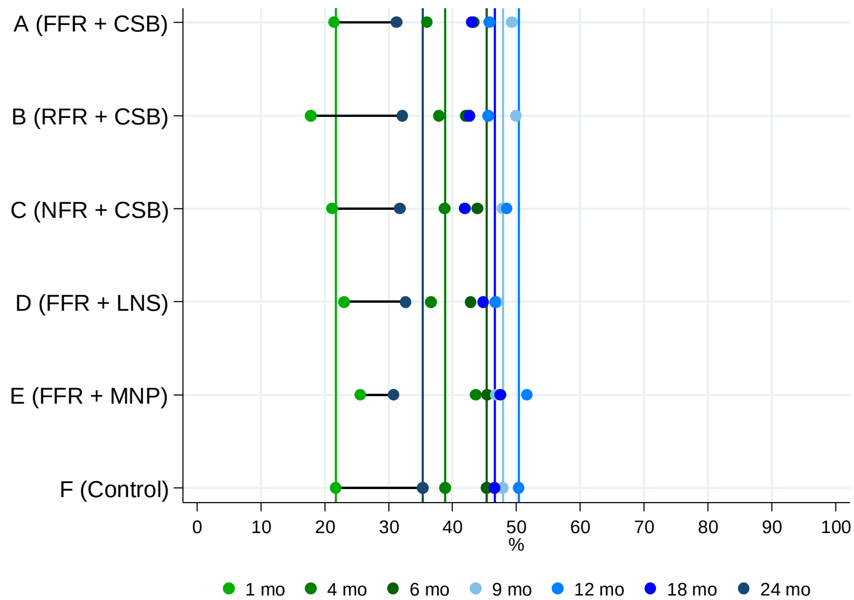
The prevalence of any symptoms of illness during the past two weeks was just over 20 percent at the 1-month survey, increased through the first year of life (to just below 50 percent) and tapered off during the second year of life (**Figure 16.1a**). The most commonly reported symptoms were fever (33.8 percent), cough (32.9 percent), and difficulty breathing (21.3 percent) (**Figure 16.1b**). There were no significant impacts of the program, though there was a nonsignificant trend toward a reduction in experiencing symptoms of illness during the past 2 weeks in every treatment arm, except E (FFR+MNP) (**Figure 16.1c**).

Considering specific symptom clusters that suggest a potentially severe illness, the prevalence of severe diarrhea was 4.2 percent at 1 month and peaked at 21.9 percent at 12 months (**Figure 16.2a**). Potential pneumonia was 2.0 percent at 1 month and peaked at 10.2 percent at 9 months. As with general symptoms of illness, there were not significant impacts on the prevalence of potentially severe illnesses (**Figure 16.2b**).

It was not common to seek care from a trained medical professional when symptoms of a potentially dangerous disease were present (**Figure 16.3a**). In fact, only 13.1 percent of 1-month-old children who experienced these symptoms were treated by a medical professional, and the percentage who were treated by a medical professional never exceeded 30 percent. Moreover, there were no impacts of the program on seeking care for a potentially dangerous disease (**Figure 16.3b**).

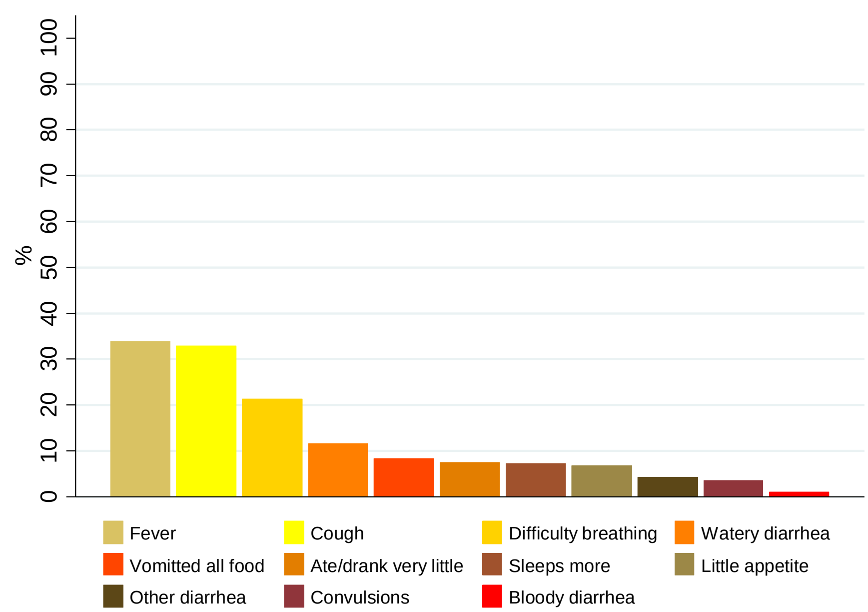
Among children 4 months and older who experienced fever, approximately three-quarters of them were treated with medication (**Figure 16.4a**). The program had an impact on treatment with fever-reducing medications at 18 months (7.1 pp); the effect size was similar, though not significant at 24 months (**Figure 16.4b**). Among children 9 months and older who experienced diarrhea, only around 40 percent received ORS, and between 20 percent and 40 percent received more liquids than normal (**Figure 16.5a**). In the combined treatment arms, the only positive impact was on receiving ORS at 24 months (9.0 pp) (**Figure 16.5b**).

Figure 16.1a Morbidity, past 2 weeks (any symptoms)



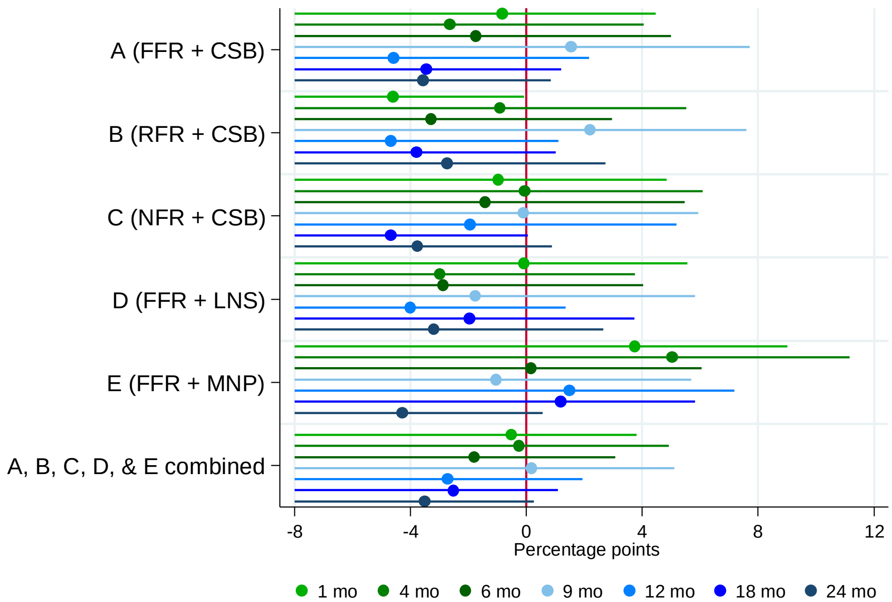
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 16.1b Specific symptoms during past 2 weeks



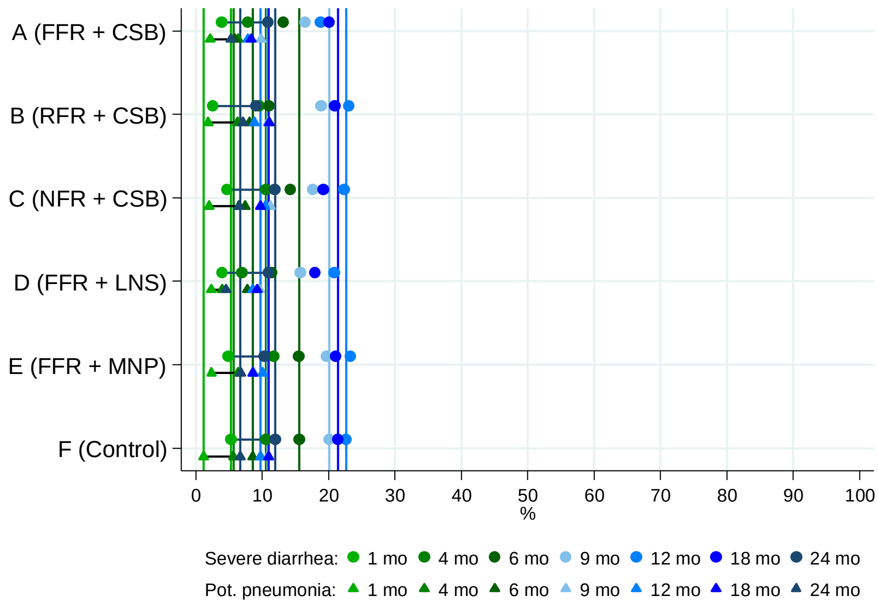
Note: Unadjusted values are shown. Data shown are from the 6-month survey.

Figure 16.1c Morbidity, past 2 weeks (any symptoms): impact



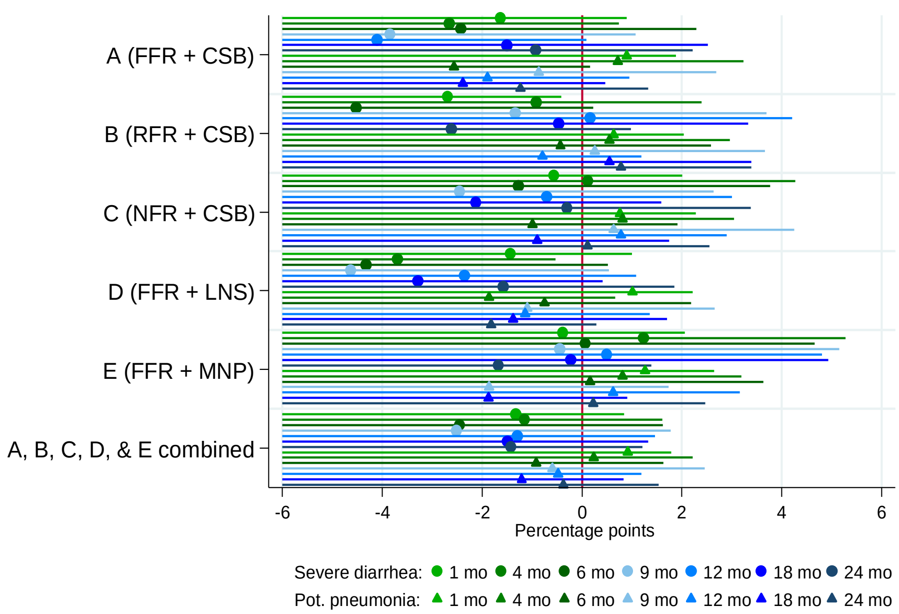
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 16.2a Potentially severe morbidity, past 2 weeks



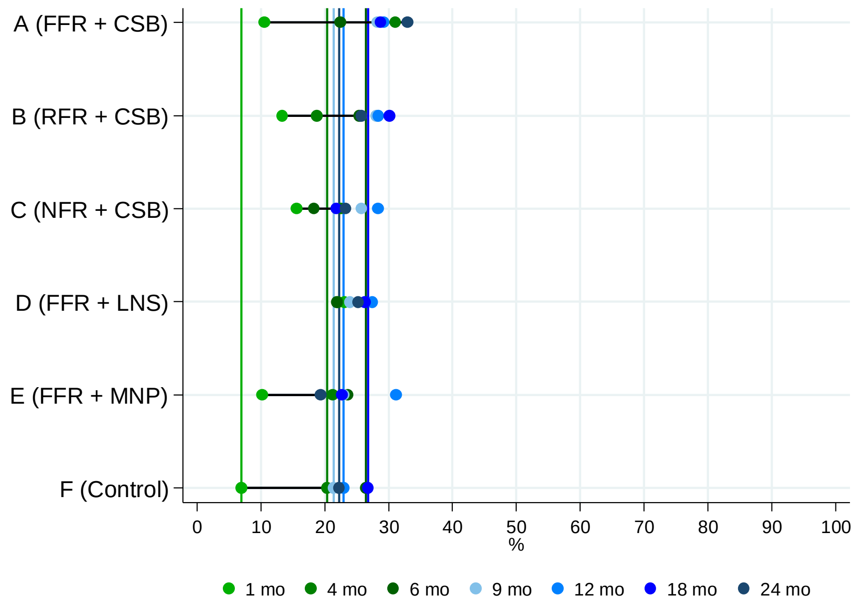
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 16.2b Potentially severe morbidity, past 2 weeks: impact



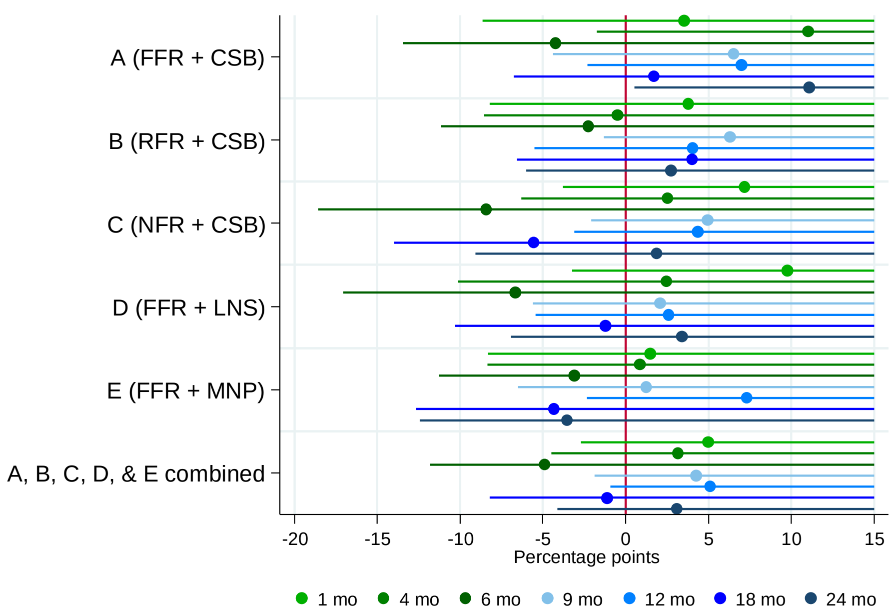
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 16.3a Sought trained care for potentially dangerous disease



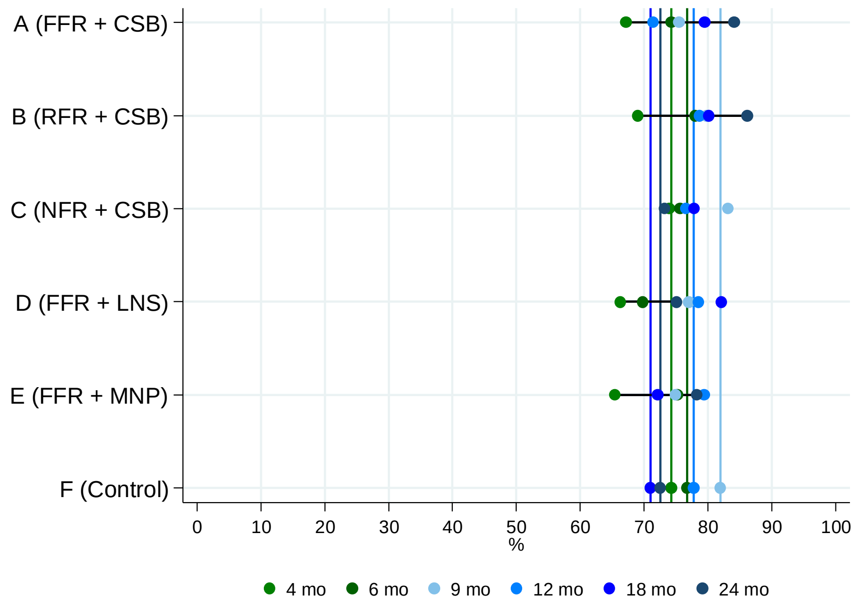
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 16.3b Sought trained care for potentially dangerous disease: impact



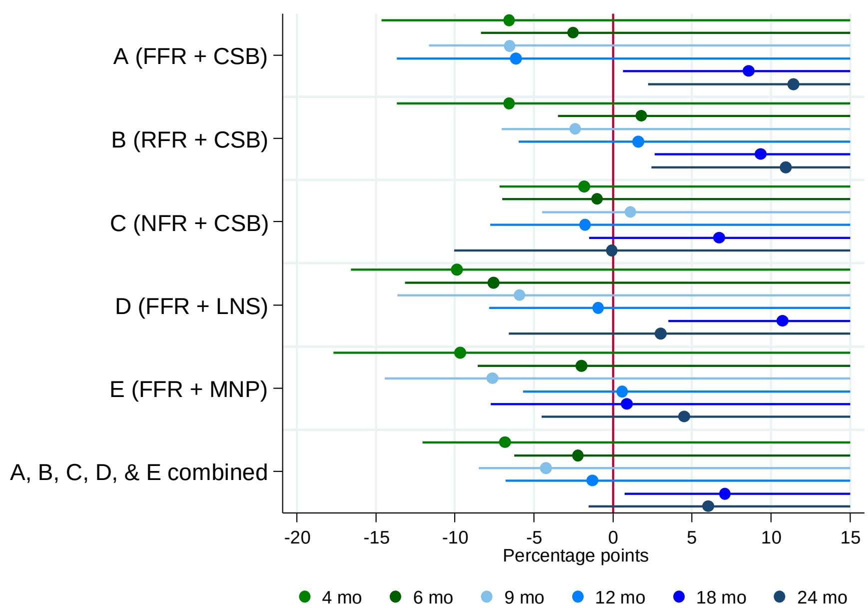
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 16.4a Received medication for fever



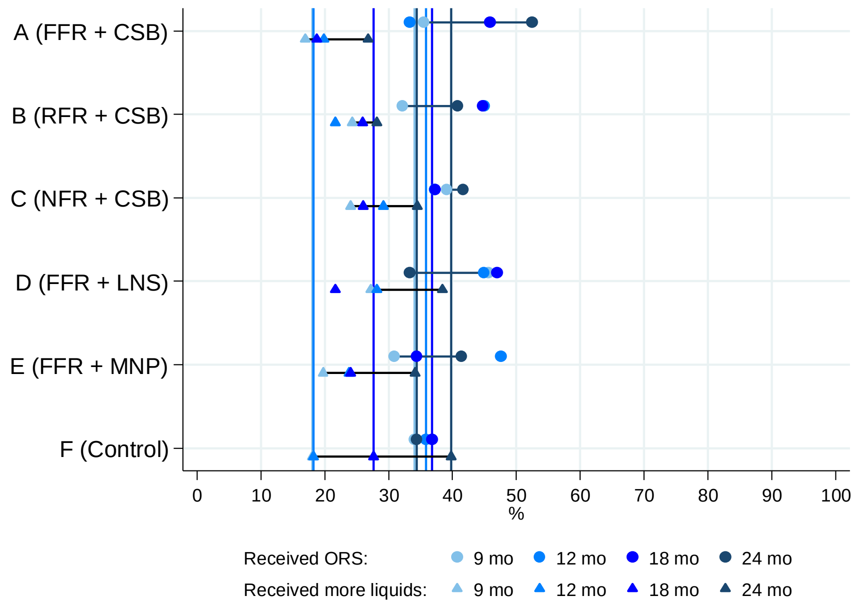
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm. Results for 1 month are excluded because administering medication for a fever outside direct medical observation is not advised.

Figure 16.4b Received medication for fever: impact



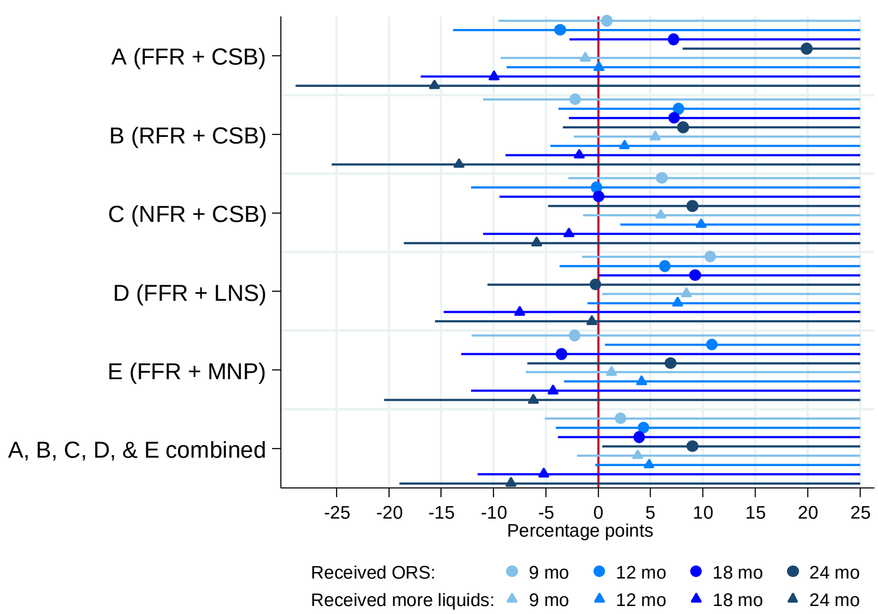
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 16.5a Received ORS and increased liquid intake for diarrhea



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 16.5b Received ORS and increased liquid intake for diarrhea: impact



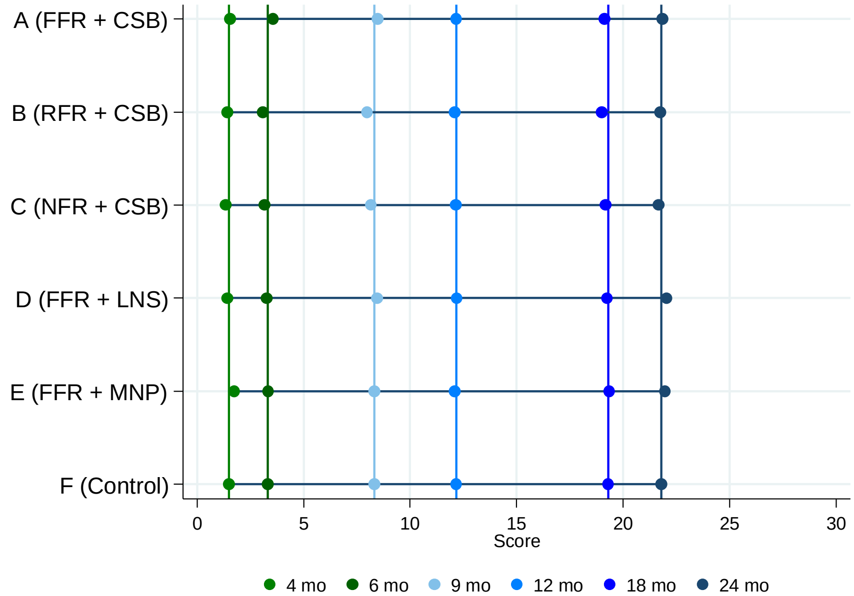
Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for mother and household head's education; mother and household head's speaking Spanish; mother's age; child's age and sex; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

17. Results: Child Development

At 4 months, children had attained an average of 1.5 motor milestones (i.e., range 0–9), and there were no statistically significant differences among study arms (**Figure 17.1a**). At 12 months, the average number of motor milestones attained in the full sample of children was 12.1, ranging from 2 to 22; at 24 months, it was 21.8, ranging from 12 to 30. At 12 months, about 31 percent of children could walk without assistance. By 18 months, about 94 percent of children could walk without assistance. At 24 months, nearly all children could walk without assistance; only 16 mothers reported that their children could not walk without assistance at the 24-month survey. Motor development score increased gradually with age up to 24 months, at a similar pace in all study arms. *PROCOMIDA* had no significant impact on child motor development scores or on the proportion of children who had achieved independent walking by 12, 18, or 24 months (**Figure 17.1b**).

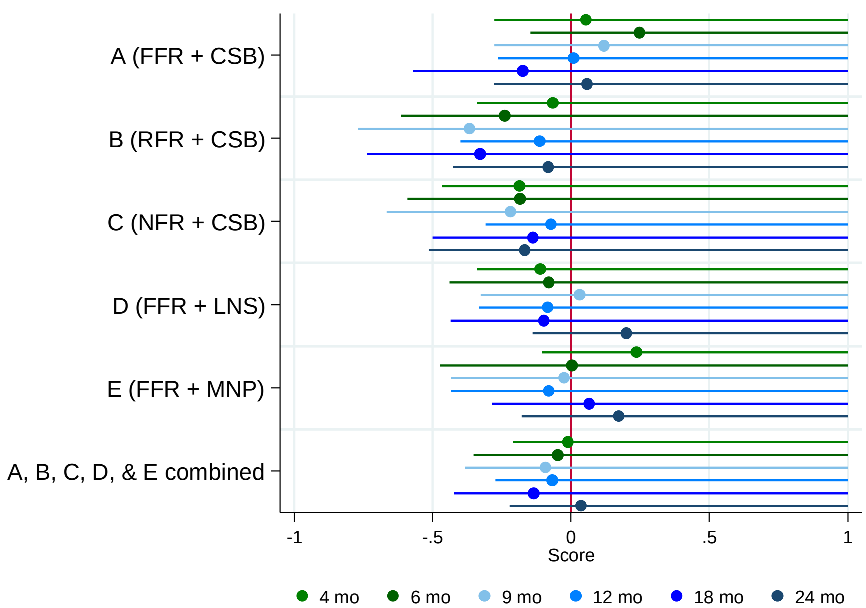
The mean number of language milestones children had attained increased from 2.1 at 4 months to 12.3 at 24 months in the full sample (**Figure 17.2a**). There were no significant differences among study arms at 4 months and there was no significant program impact on this outcome (**Figure 17.2b**).

Figure 17.1a Child motor development milestones (0–30)



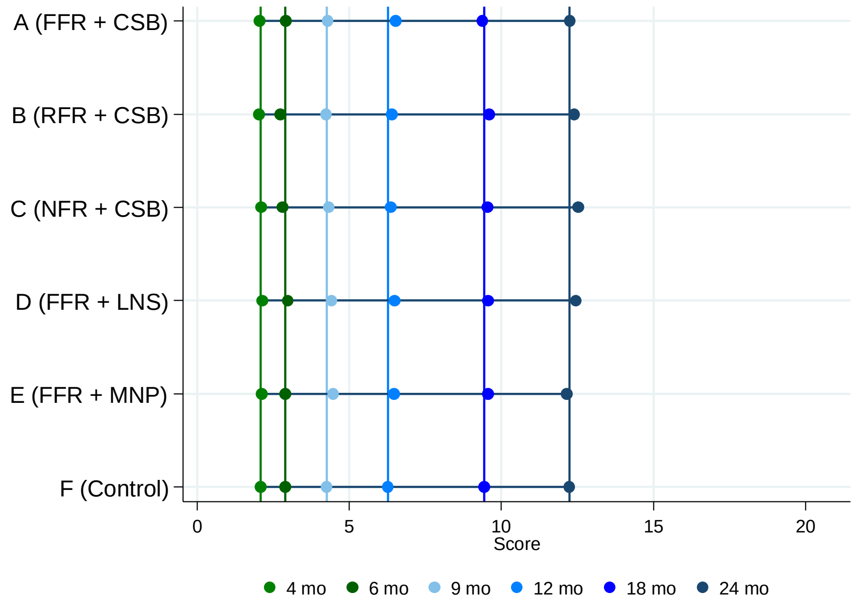
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 17.1b Child motor development milestones (0–30): impact



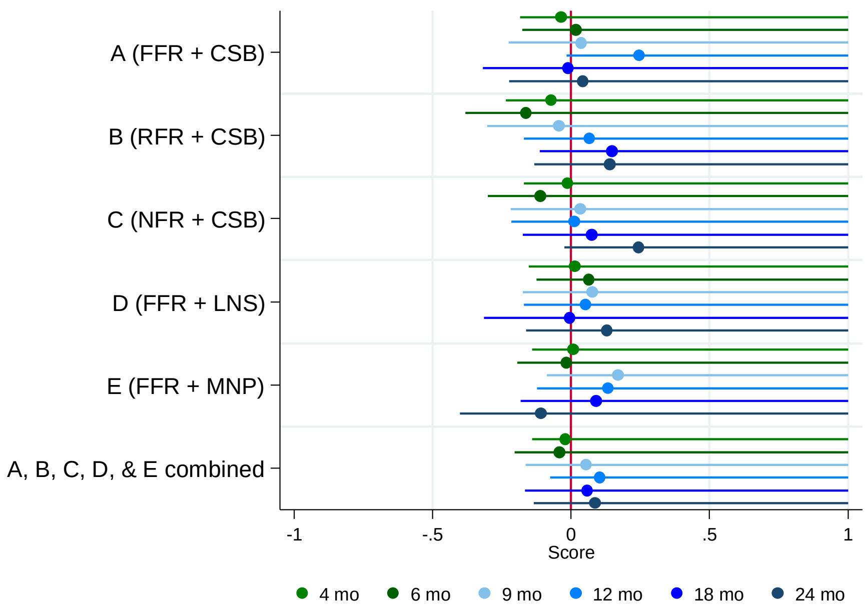
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 17.2a Child language development milestones (0–21)



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 17.2b Child language development milestones (0–21): impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

18 Results: Anthropometry and Hemoglobin Concentration

18.1 Child Anthropometry

At 1 month, child length was 52.7 cm on average in the full sample (**Figure 18.1a**). *PROCOMIDA* had a small positive impact on child length at 1 month of 0.4 cm in arm A (FFR+CSB), 0.3 cm in arm B (RFR+CSB) and 0.2 cm in arm E (FFR+MNP) (**Figure 18.1b**). No significant impact was found from 4 to 18 months. At 24 months, arm A (FFR+CSB) saw a significant program impact of 0.5 cm.

Child linear growth faltered from 1 to 24 months: children were on average 2.1 cm shorter than the WHO reference median length at 1 month; the length deficit increased to 6.9 cm at 24 months (**Figure 18.2a**). At 1 month, *PROCOMIDA* had a significant impact on child height-for-age difference (HAD) in the same study arms (A [FFR+CSB], B [RFR+CSB] and E [FFR+MNP]) as where the impact on child length was found (**Figure 18.2b**). At 24 months, a significant effect was found in arm A (FFR+CSB). When comparing program impact on child HAD across study arms, we found that from 12 to 24 months it was larger in arm A (FFR+CSB) than in arm B (RFR+CSB) or D (FFR+LNS). Mean LAZ at 1 month was -1.1 and dropped to -2.2 at 24 months (**Figure 18.3a)**. A significant program impact was found at 1 month in arms A (FFR+CSB), B (RFR+CSB), and E (FFR+MNP) and at 24 months in arm A (FFR+CSB) **(Figure 18.3b**). Program impact was larger in arm A (FFR+CSB) than in arms B (RFR+CSB) and C (NFR+CSB) at 12 and 24 months, and arm D (FFR+LNS) at 12, 18, and 24 months.

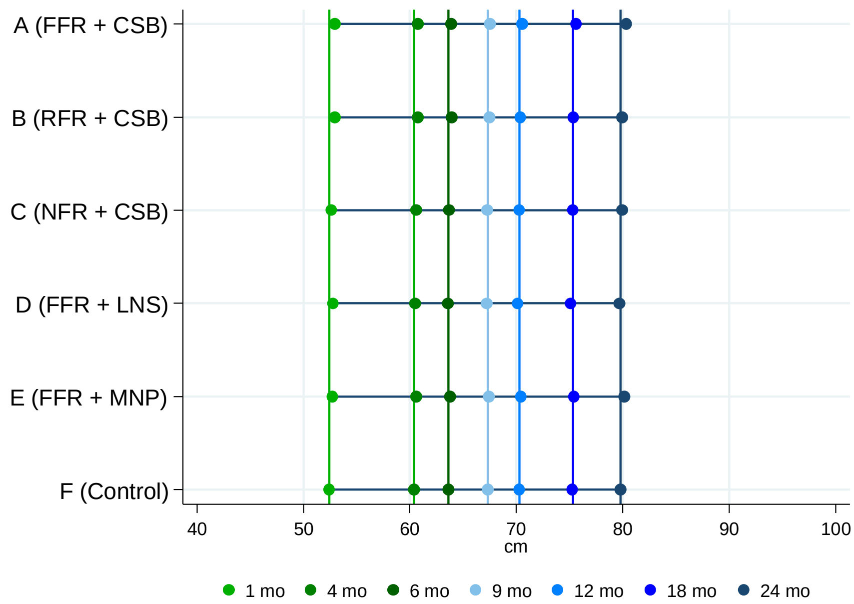
The overall prevalence of stunting at 1 month was high (17.1 percent in the full sample) and increased to around 60 percent at 24 months **(Figure 18.4a**). *PROCOMIDA* was found to have large effects on the prevalence of stunting in the A (FFR+CSB), B (RFR+CSB) and E (FFR+MNP) arms. The impact ranged from 5 to 10 pp in arm A (FFR+CSB) (significant at 1 month, 9 months, 12 months, and 24 months), 4–6 pp in arm B (RFR+CSB) (significant at 1 month and 4 months), and 4–5 pp in arm E (FFR+MNP) (significant at every wave until 18 months)[43] (**Figure 18.4b**). When comparing program impact on the prevalence of child stunting across treatment arms, we found that it was larger at 24 months in arm A (FFR+CSB) compared to arms B (RFR+CSB), C (NFR+CSB), and D (FFR+CSB).

Mean child weight was 4.3 kg at 1 month (**Figure 18.5a**). *PROCOMIDA* had significant impact on child weight of about 0.1 g at 1 month (all treatment arms, except for arm C [NFR+CSB]) and of around 0.1 g at 4 months (arms B [RFR+CSB], D [FFR+LNS] and E [FFR+MNP]) (**Figure 18.5b**). We found no other significant program impacts on child weight and no significant differences in impacts across treatment arms.

Average WLZ was 0.7 in the full sample at 1 month. While it steadily decreased from 1 to 24 months, average WLZ stayed above zero (**Figure 18.6a**). As would be expected, the prevalence of wasting among children was low at 2.2 percent at 1 month and gradually decreased over time up to 24 months (**Figure 18.7**). The only significant program effect on WLZ was found in arm D (FFR+LNS): at 1 month and 4 months the impact on child WLZ was 0.2 SD (**Figure 18.6b**). Given the low prevalence of wasting, impact on this outcome was not assessed.

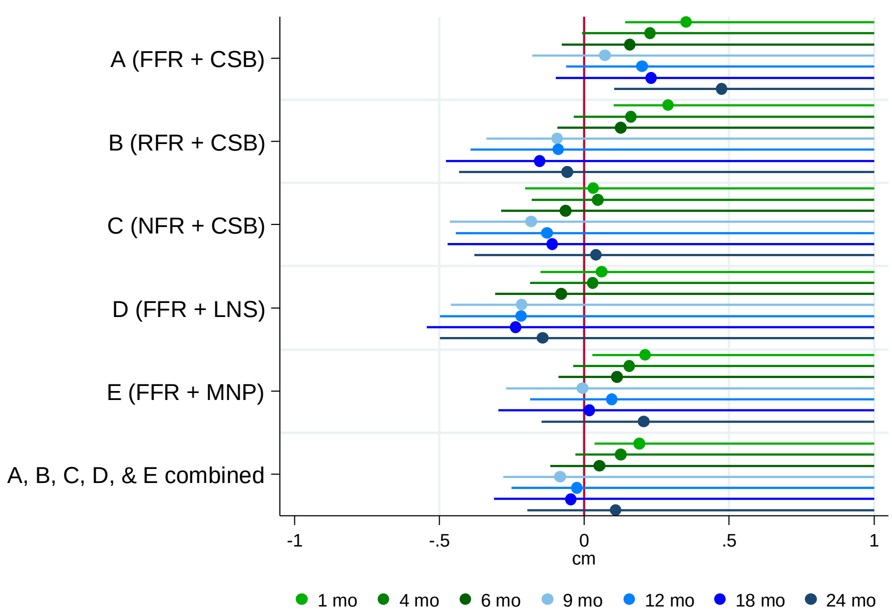
[43] When using a linear mixed model that takes into account all time points and the same control variables, the impact of the E (FFR+MNP) arm on reducing stunting (-6.7 pp) is also statistically significant ($p < .05$) at 24 months. This is different from the results presented in **Figure 18.4b,** which come from separate models that estimate program impact at each at each survey without accounting for growth at other time points.

Figure 18.1a Child length



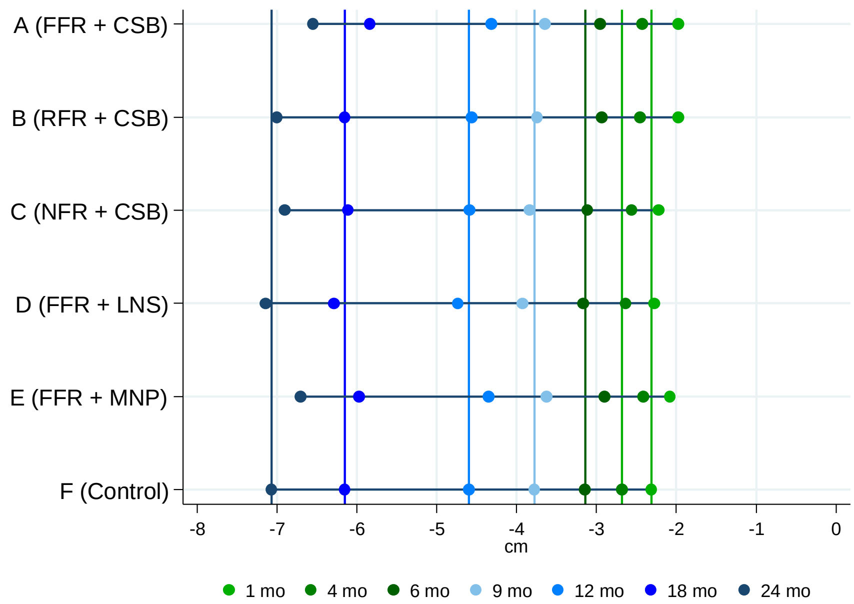
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.1b Child length: impact



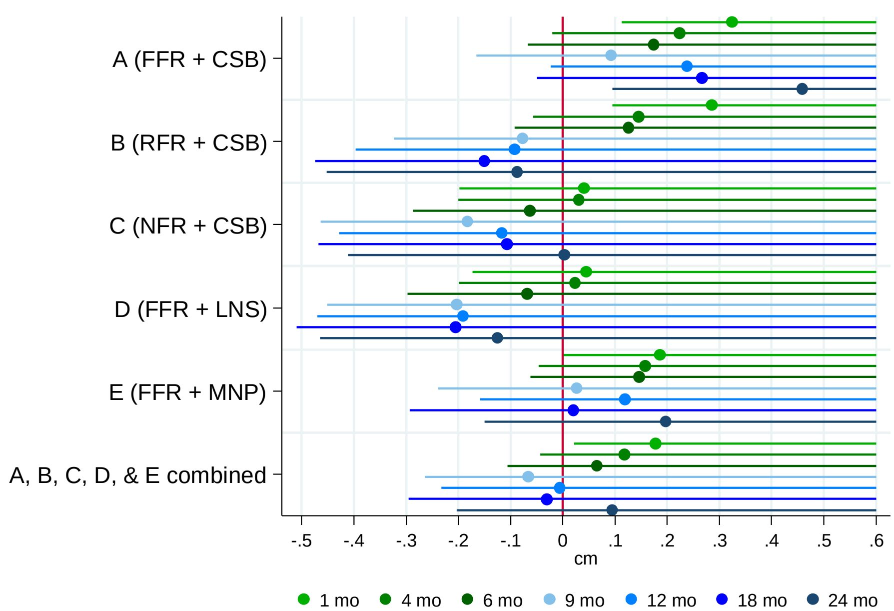
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 18.2a Child HAD



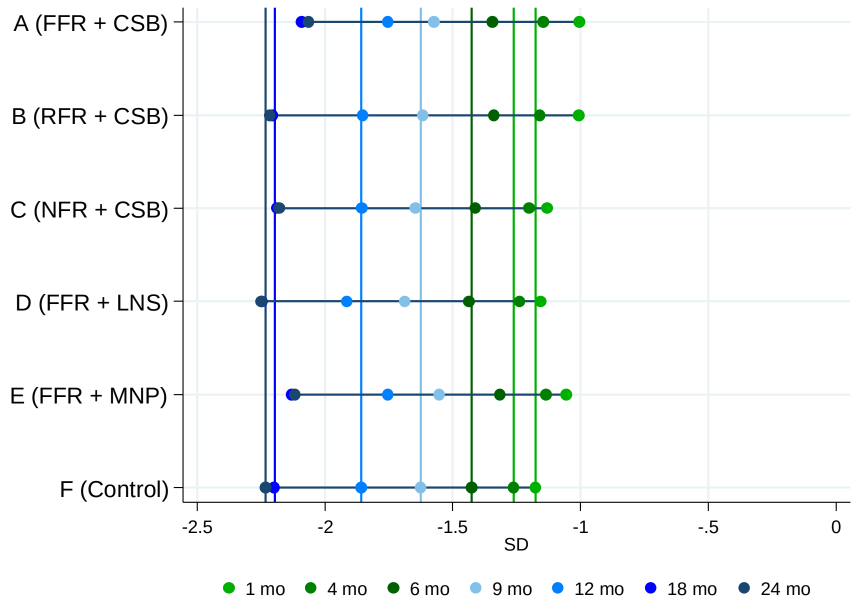
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.2b Child HAD: impact



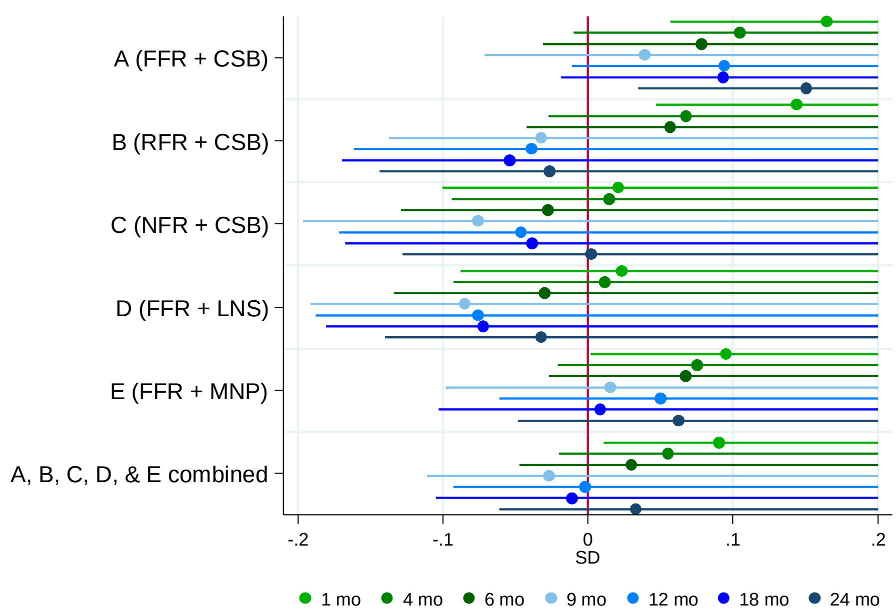
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 18.3a Child LAZ



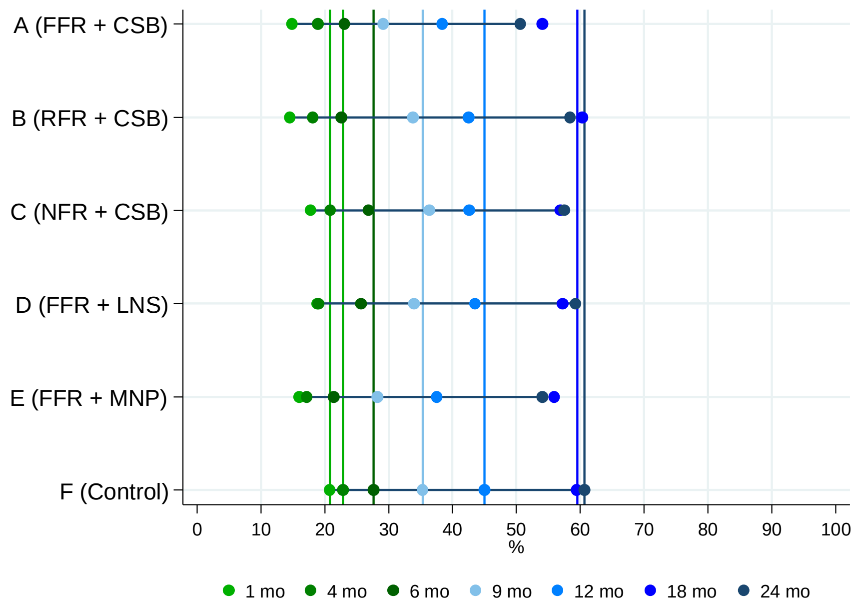
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.3b Child LAZ: impact



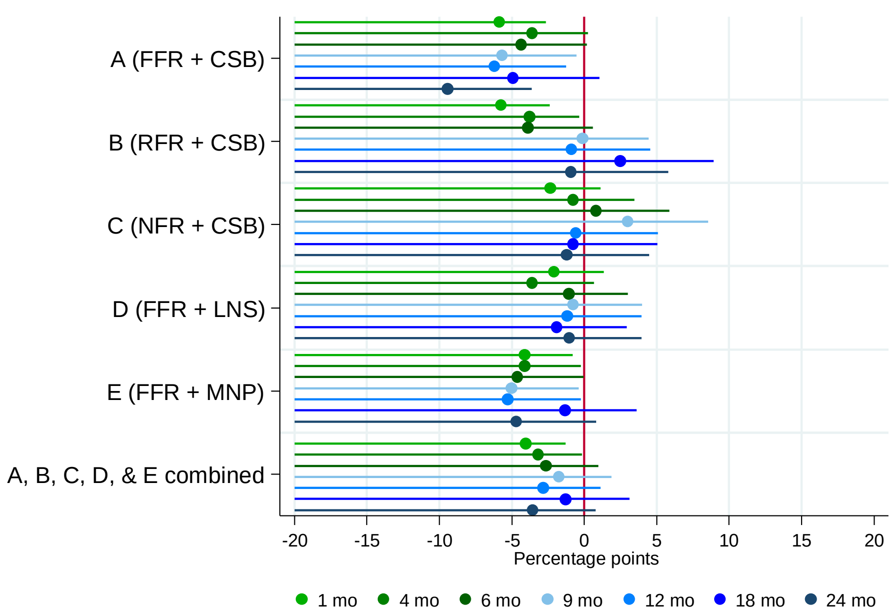
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 18.4a Child stunting



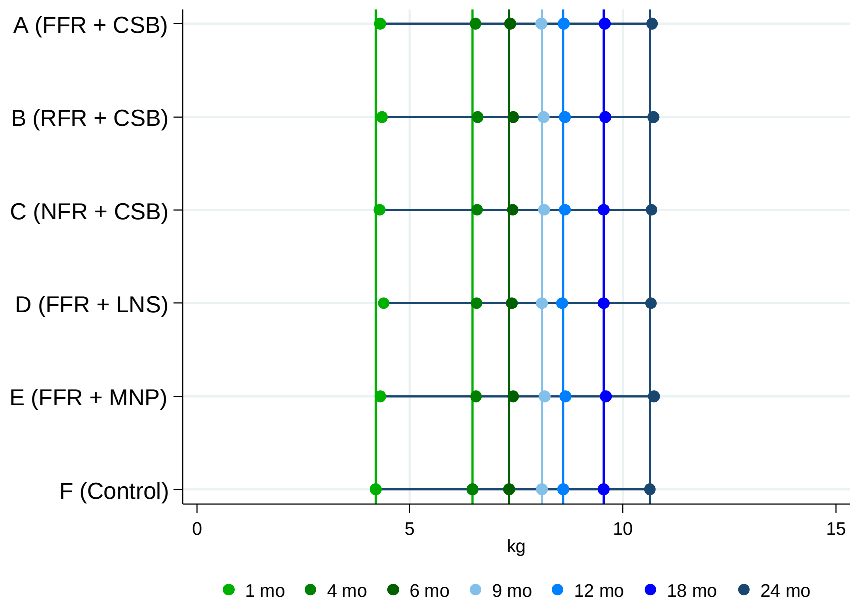
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.4b Child stunting: impact



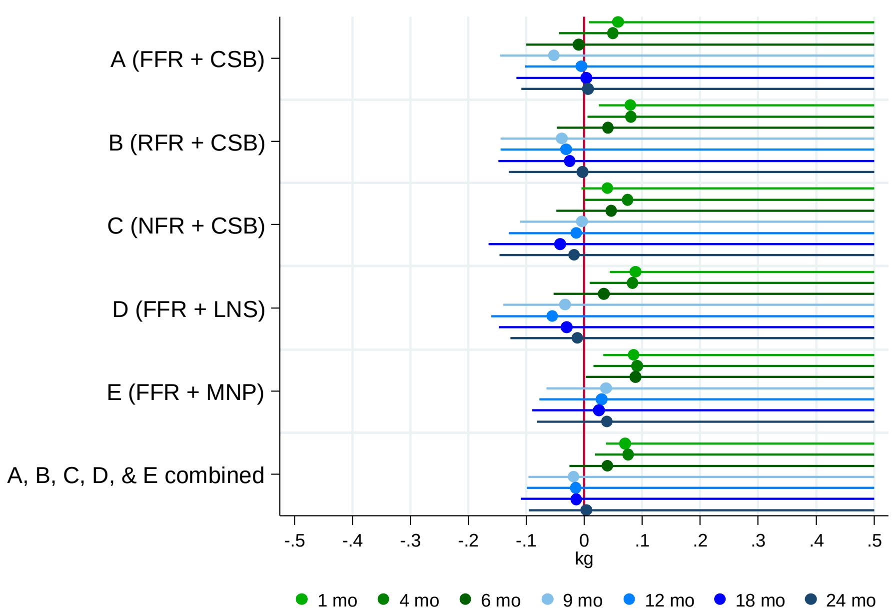
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 18.5a Child weight



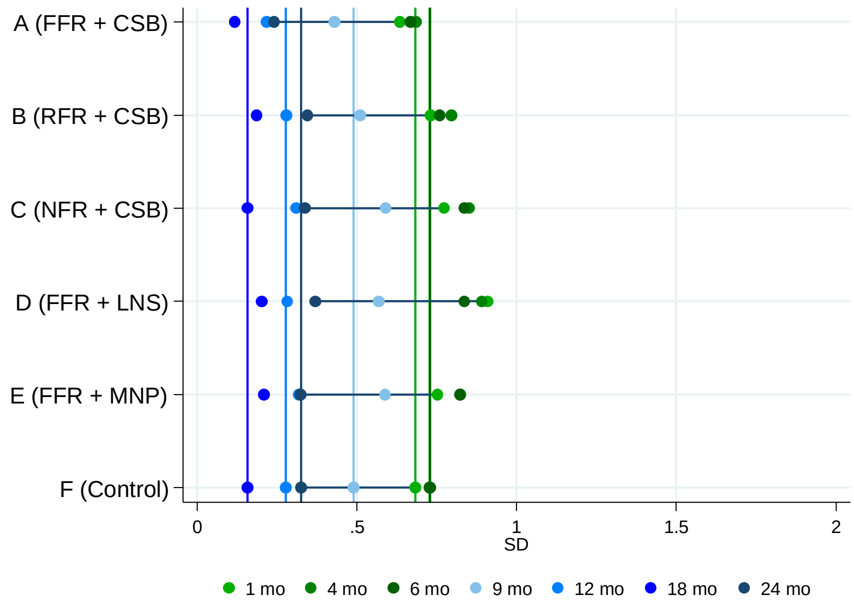
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.5b Child weight: impact



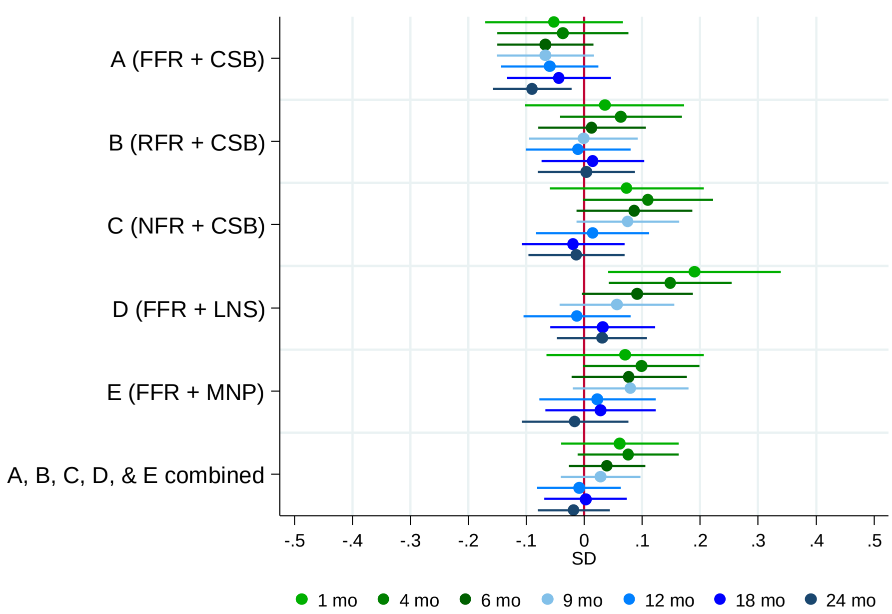
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintil. SEs were adjusted for clustering; one-sided test was used.

Figure 18.6a Child WLZ



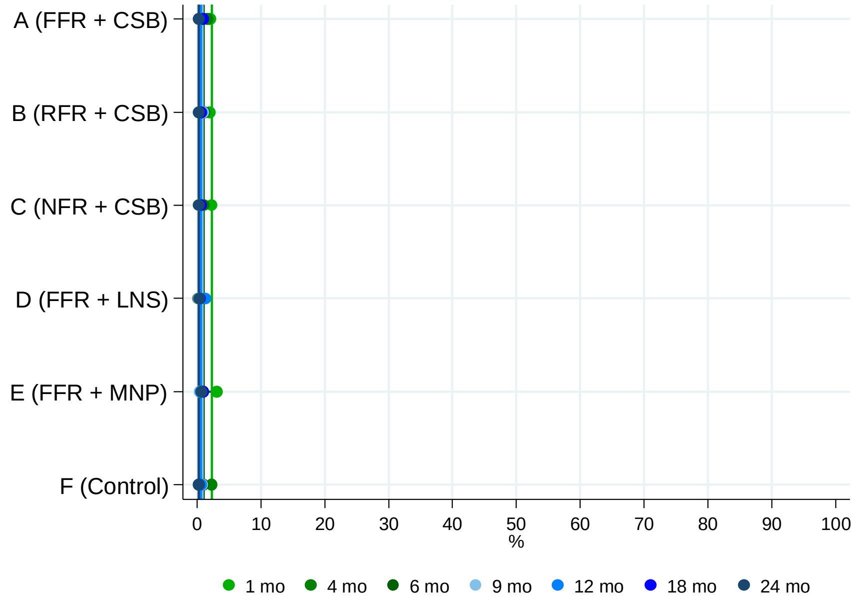
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.6b Child WLZ: impact



Note: Impact estimates and 95 percent confidence intervals are shown. The models controlled for child's age and sex; mother's age and height; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 18.7 Child wasted



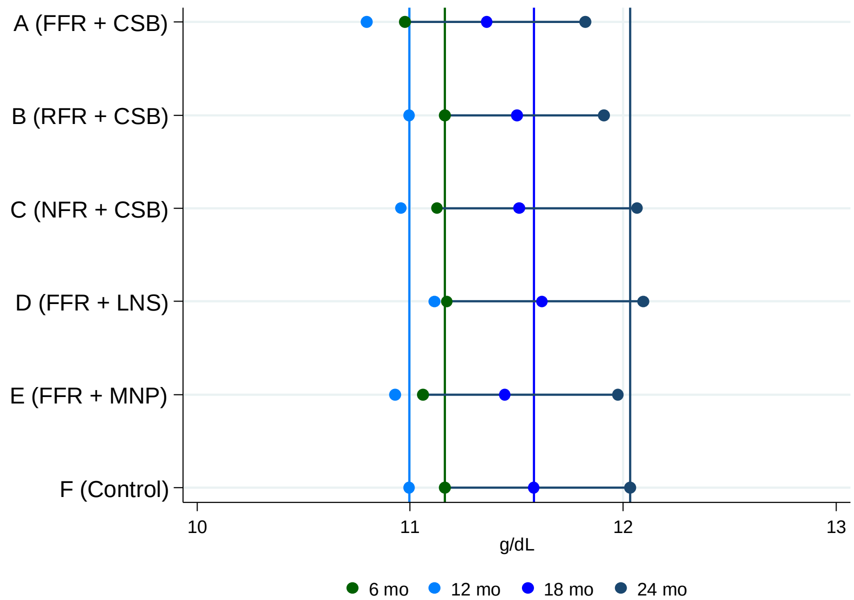
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

18.2 Child Hemoglobin Levels and Anemia Status

Mean Hb concentration at 6 months was 11.1 g/dL, decreased by 0.1 g/dL at 12 months and increased to 11.5g/dL at 18 months and 12.0 g/dL at 24 months (**Figure 18.8a**). Correspondingly, child anemia was 44.3 percent at 6 months, increased by 4.2 pp at 12 months, and decreased to 27.3 percent at 18 months and 12.5 percent at 24 months (**Figure 18.9a**). Severe anemia was nonexistent in this population. Consistent with our a priori hypothesis that the program would have a positive effect on Hb (and thus reduce anemia), one-sided tests were used to assess impact. When using one-sided tests, we found no significant program impacts on child hemoglobin concentration (**Figure 18.8b**). Consistent with the lack of change in hemoglobin concentration when using one-sided tests, we found no significant changes in the prevalence of anemia among children except for a 6.5 pp decrease in arm D (FFR+LNS) compared to arm F (control) at 12 months (**Figure 18.9b**).

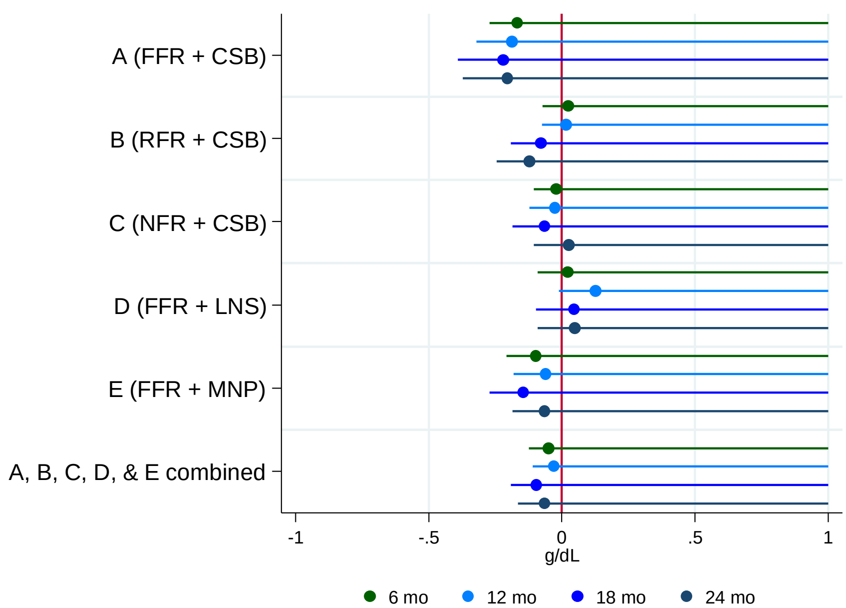
However, against our expectations, the impact estimates in arm A (FFR+CSB) suggested a negative program impact. Therefore, we used a two-tailed test to assess program impacts and found a statistically significant ($p < 0.05$) decrease in child hemoglobin concentration in arm A (FFR+CSB) at all time points, ranging from 0.17 to 0.22 g/dL. Similar to the findings on maternal anemia, the impact estimates in arm A (FFR+CSB) suggested a negative program impact on child anemia as well. When using a two-tailed test, we found a statistically significant increase in child anemia of 6.2 pp in arm A (FFR+CSB) at 24 months.

Figure 18.8a Child hemoglobin concentration



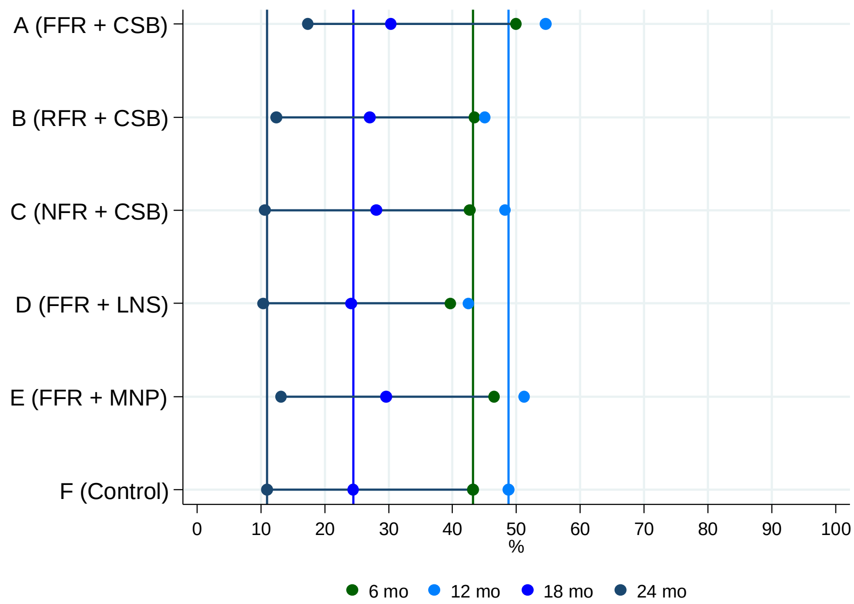
Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.8b Child hemoglobin concentration: impact



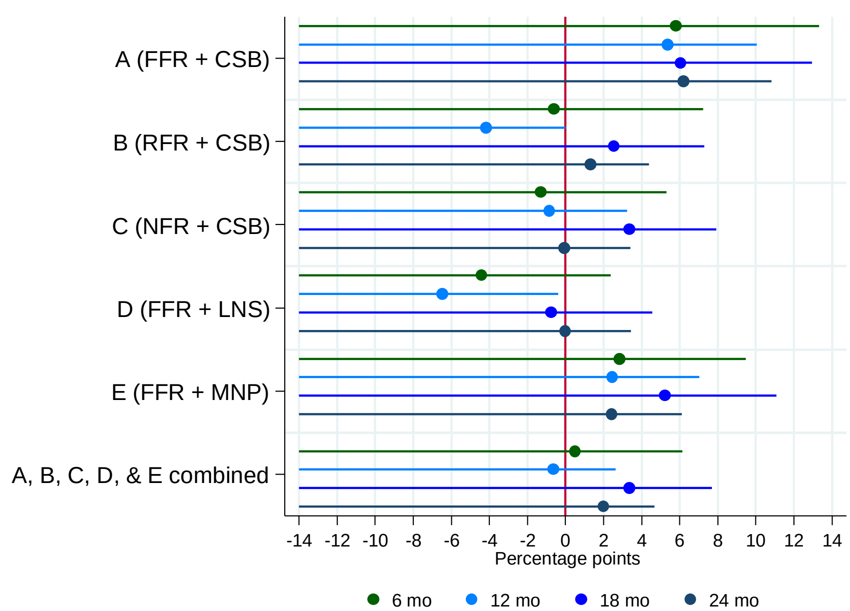
Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

Figure 18.9a Child anemia



Note: Unadjusted values are shown. Vertical lines indicate the value at each time point for the control arm.

Figure 18.9b Child anemia: impact



Note: Impact estimates and 95 percent confidence bounds are shown. The models controlled for child's age and sex; mother's age; mother and household head's education; mother and household head's speaking Spanish; household dependency ratio; and wealth quintile. SEs were adjusted for clustering; one-sided test was used.

19. Summary of Findings along the Program Impact Pathways

PROCOMIDA had three main program components: food distributions (food); a health, hygiene, and nutrition BCC strategy (care); and component focused on health care strengthening and promotion of the use of services (health). These three core components were expected to work together to positively affect maternal and child nutrition and well-being outcomes through three hypothesized program impact pathways. In this study, we sought to answer the questions of whether or not *PROCOMIDA* improved maternal and child nutrition and well-being, what the optimal size of the family ration was (full, reduced, or none) and what the optimal type of individual ration (CSB, LNS, or MNP) was. In this section, we summarize the impact of *PROCOMIDA* on intermediary outcomes along these three hypothesized program impact pathways and the impacts on maternal and child nutrition and well-being. We conclude with a section that specifically addresses the three primary research questions that this study sought to address.

19.1 The *PROCOMIDA* Food Component

The food component of *PROCOMIDA* was expected to increase the availability of staple foods (beans, rice, and oil) for all household members and micronutrient-rich foods or supplements (CSB, LNS, or MNP) for the target beneficiaries (pregnant women, women with children under 6 months of age, and children between the ages of 6 and 23 months). The increased availability of staple foods was intended to motivate eligible beneficiaries to participate in *PROCOMIDA*, limit sharing of the micronutrient-fortified foods or supplements for the target beneficiaries, and reduce household hunger. The micronutrient-fortified foods or supplements, together with the staple foods (and the BCC strategy), were expected to increase intake of iron-rich foods, increase dietary diversity, and increase diet quality. Improvements in maternal and child dietary diversity and quality in turn were expected to contribute to improving maternal and child health, nutrition, and well-being.

PROCOMIDA was nearly universally known by eligible households, and program participation increased rapidly from pregnancy through the first few months of children's lives. Across the pooled treatment arms, 31.7 percent of households reported participating in *PROCOMIDA* at the time of enrollment in the study (pregnancy), 64.0 percent at the 1-month postpartum time point, 74.4 percent at 4 months; at the 9-month time point, program participation reached 79.8 percent. The family ration had a positive effect on program participation. In the treatment arms in which beneficiaries received the full or reduced family ration (arms A [FFR+CSB], B [RFR+CSB], D [FFR+LNS], and E [FFR+MNP]), participation was 78.0 percent by the 4-month time point, whereas it was only 59.8 percent at 4 months in treatment arm C (NFR+CSB), in which beneficiaries did not receive a family ration. The difference in participation remained around 20 pp until 12 months, and then increased further to nearly 35 pp at 24 months.

Among program beneficiaries, the food provided by the program was commonly listed as a benefit of participating in *PROCOMIDA*. This was reflected in their attendance at the monthly food distributions, which was generally high among those receiving the full and reduced family rations (arms A [FFR+CSB], B [RFR+CSB], D [FFR+LNS] and E [FFR+MNP]) but was lower among those who did not receive a family ration (arm C [NFR+CSB]). Thus, the food component clearly played a role in motivating program beneficiaries to participate in *PROCOMIDA*.

In addition to the family ration, target beneficiaries received an individual micronutrient-fortified food or supplement, which was supposed to be consumed daily. Both the size of the family ration and the type of individual ration appeared to influence compliance with the recommended daily intake of these fortified products. For example, at most assessment time points, a little less than one-half of the beneficiaries (mothers and children) in the treatment arm that received the full family ration with CSB (arm A [FFR+CSB]) ate CSB in the past 24 hours; this percentage was consistently lower among those in the reduced family ration arm (arm B [RFR+CSB]) and even lower in the no family ration arm (arm C

[NFR+CSB]).[44] Additionally, when children were 6 months and older, mothers appeared to continue consuming the CSB even when they were no longer the intended recipients of CSB. These patterns suggest considerable intrahousehold sharing and illustrate the role that the size of the family ration played in helping to protect the micronutrient-fortified food ration, in this case CSB, for the target beneficiaries. In comparing daily use of the individual rations (among arms A [FFR+CSB], D [FFR+LNS], and E [FFR+MNP], which all received the full family ration), among mothers at all time points LNS was most commonly reported to be consumed in the previous 24 hours, followed by MNP, and lastly by CSB. Among children, however, MNP was most frequently consumed in the past 24 hours, followed closely by LNS, then CSB.

Although the prevalence of household hunger was only 7.9 percent at enrollment, *PROCOMIDA* had an impact on reducing household hunger by 4 to 6 pp from the 4-month survey until the 18-month survey. However, this positive impact of the program was limited to those arms that received the full family ration (A [FFR+CSB], D [FFR+LNS], and E [FFR+MNP]).

In addition to reducing household hunger among the treatment arms that received the full family ration, *PROCOMIDA* also had a small but inconsistent impact on increasing maternal dietary diversity and some positive impacts on child dietary diversity, intake of iron-rich foods, and diet quality. Among mothers, the impacts on dietary diversity varied by treatment arm and time point. Small significant program impacts (approximately 0.2 food groups) were seen at 6 months among mothers in arm D (FFR+LNS) and at 24 months among mothers in arm E (FFR+MNP). When CSB was included in the calculation of maternal dietary diversity, there was also a small program impact among mothers in arms A (FFR+CSB) and B (RFR+CSB) at 4, 6, and 9 months. Similar to mothers, there was a small positive program impact on child dietary diversity (approximately 0.2 food groups), which also varied by treatment arm and time point. Specifically, there was a positive program impact on increasing child dietary diversity in arm D (FFR+LNS) at 18 months and arm E (FFR+MNP) at 18 and 24 months. Among children in arms A (FFR+CSB) and B (RFR+CSB), program impacts were only significant at 18 and 24 months, when CSB was included in the calculation of dietary diversity. Intake of iron-rich foods or supplements was also positively affected by the program in all arms, with the most consistent impacts in arms A (FFR+CSB), B (RFR+CSB), D (FFR+LNS), and E (FFR+MNP); excluding the *PROCOMIDA* foods and supplements, however, the program had no impact on the consumption of iron-rich foods among children. Finally, the percentage of children who met the requirements for a minimum acceptable diet was also larger in the arms that received the full family ration with either CSB or MNP (arms A [FFR+CSB] and E [FFR+MNP], respectively) at multiple time points, and in the arm that received the full family ration with LNS (arm D [FFR+LNS]) at 18 months. Taken together the impacts on maternal dietary diversity and child dietary diversity, intake of iron-rich foods and diet quality point to significant benefits of the program in the arms that received the full family ration, with some indications that these benefits were most consistent in the arms that received the full family ration with either CSB or MNP.

19.2 The *PROCOMIDA* BCC Component

PROCOMIDA's BCC strategy was developed based on formative research conducted in Guatemala prior to the start of the program and promoted the adoption of optimal nutrition, health, and hygiene practices related to pregnancy, lactation, and the first two years of life. Improvements in these practices, in turn, were expected to improve maternal and child nutrition and well-being outcomes.

The BCC sessions were led by trained program staff prior to food distributions, and messages were reinforced by community- and institutional-level health workers, radio messages, and graphic images on *PROCOMIDA* materials (e.g., ration packaging). Additionally, leader mothers were trained to lead

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[44] This pattern remained when only including the program beneficiaries, indicating that it was not (only) a consequence of lower program participation in the arms receiving a reduced family ration or not receiving a family ration.

cooking demonstrations, where they taught other beneficiary mothers in their communities how to prepare healthy recipes using the food commodities provided as well as other nutrient-rich foods that were deemed to be accessible to the program beneficiaries (e.g., locally available vegetables).

Attending BCC sessions was required in order to receive food rations, and more than 90 percent of all currently enrolled beneficiaries reported that they attended the most recent BCC session. Missing cooking demonstrations was also rare. However, only about 60 percent of mothers specifically mentioned BCC as a program benefit.

Maternal knowledge of optimal breastfeeding practices was high at enrollment, as was recognition of vitamin A- and iron-rich foods and familiarity with the consequences of vitamin A deficiency. For example, about 80 percent of mothers knew that infants should be given breast milk immediately after birth and about 90 percent could name at least one vitamin A– and iron-rich food. However, knowledge levels of optimal practices for feeding children during illness and recovery were lower (e.g., less than 30 percent of mothers knew that children should be given more breast milk, liquids, and food during illness), as were those related to the consequences of iron deficiency, danger signs during pregnancy and childhood, important handwashing times, and optimal timing for the introduction of complementary foods.

Impacts of the program on improving knowledge in these areas was mixed. The largest program impacts were seen in increasing knowledge related to using a cup instead of a bottle for giving liquids to young children (13–30 pp), initiation of breastfeeding within 1 hour of birth (4–8 pp), giving colostrum (2–4 pp), optimal timing of the introduction of liquids other than breast milk (4–5 pp), and identification of the consequences of iron deficiency (4–8 pp). Additionally, there were small program impacts on increasing mothers' ability to name danger signs during pregnancy (average increase of 0.2 of 8 danger signs), iron-rich foods (2–4 pp), and key handwashing times (average increase of 0.2 of 5 key handwashing times). However, there were no consistent program impacts related to knowledge of danger signs of childhood illness, optimal feeding practices during illness and convalescence, the optimal age for the introduction of complementary foods, or the correct consistency of foods.

While *PROCOMIDA*'s impact on maternal hygiene, nutrition, and health practices was mixed, impacts were largest for those practices that were identified during the formative research as being high priorities for program improvement: increasing the prevalence of exclusive breastfeeding up to 6 months of age, reducing the use of bottle, and increasing diet quality among children. The program increased exclusive breastfeeding by between 9 and 11 pp at the 4-month and 6-month time points for the pooled treatment arms and reduced the use of bottles by 2 to 28 pp. As mentioned in the previous section, there were also significant (but modest) program impacts on improving child dietary diversity, intake of iron-rich foods, and diet quality, with the most consistent impacts in the arms that received the full family ration with either CSB or MNP (arms A [FFR+CSB] and E [FFR+MNP]).

Reflecting hygiene and sanitation knowledge, most households reported treating their drinking water, having soap available for handwashing, and using soap on the previous day. Notwithstanding the high prevalence of these behaviors, there were still small but detectable impacts on all of these indicators (1–2 pp). Despite the availability of soap, its use was not commonly reported at key handwashing times, and the program had a significant impact only on handwashing after using the bathroom (3 pp).

Mothers and children were both generally clean (> 90 percent) in spot-checks of hands, hair, clothes, and face. Despite this, *PROCOMIDA* still had small significant impacts on increasing the percentage of children who were observed to be clean at 24 months in arms A (FFR+CSB) and E (FFR+MNP). In addition, the program improved the percentage of houses with clean interiors and exteriors at some survey waves (5–10 pp). Taken together, these impacts indicate that the program had small impacts on improving hygiene practices even though for many there was not much room for improvement.

19.3 The *PROCOMIDA* Health Component

PROCOMIDA's health system strengthening and promotion of the use of the health services component aimed to improve the quality of preventive and curative care provided at HCCs and increase the use of these services. At a health systems level, it operated by training staff and promoting community involvement through local health commissions. The program also aimed to increase the demand for health services among the beneficiary population by teaching beneficiaries about the danger signs in pregnancy and childhood, promoting the use of the available health services, and requiring participants to attend preventive care appointments.

The 2012 HCC survey provided information on the types of health services being offered. Nearly all HCCs (including those in the F [control] arm) received the services of institutional and community-based members of the basic health team, which included a doctor or nurse, an institutional facilitator, a community facilitator, and a trained birth attendant. Additionally, a *PROCOMIDA* health educator was available at approximately 90 percent of facilities across treatment arms. The availability of these personnel mostly persisted through 2014 (when a second HCC survey was conducted). Institution-based members of the community health team were available at HCCs approximately 1 day per month in 2012; their presence increased to approximately 7 days per month in 2014 across arms (including the control arm). This would be expected since these services are provided under *MSPAS* and thus should be uniform across the study arms. HCCs had a variety of educational posters available in 2012, and many had been provided by *PROCOMIDA*. However, by 2014, many of these posters were no longer present. In addition, HCCs offered sick children on average a little more than five of six basic diagnostic services in 2012 and 2014. Almost all offered children with diarrhea ORS, but only about three-quarters offered them zinc. Overall, shortages of medications, immunizations, and other supplies were common and likely inhibited the adequate provision of preventive and curative care.[45]

For women seeking prenatal care, HCCs offered approximately eight of nine basic services. Urine testing was the only laboratory service regularly offered, and this was offered at only about one-half of HCCs. Iron and folic acid supplementation was offered at all HCCs in 2012; only a few were no longer offering this service in 2014. For postnatal visits, approximately 90 percent of HCCs provided iron and folic acid supplementation. Additionally, a comprehensive battery of nutrition and health counseling services were provided during prenatal and postnatal visits.

Among the study population, prenatal care was widely used. Almost all women had at least one visit, and approximately three-quarters had the minimum of four recommended visits and a first visit before four months' gestation. Fewer than one-half of women, however, sought prenatal care the final month of pregnancy. There were no program impacts on prenatal care–seeking. Additionally, at prenatal visits, the quality of care was less than optimal. Mothers reported having their weight, blood pressure, and fundal height measured (approximately 90 percent), but other essential care components, such as measuring height, providing a tetanus shot, and taking urine and blood samples were not optimal. There were no detectable program impacts on the quality of prenatal care provided in these areas. There was, however, a significant impact on the percentage of women who were informed of pregnancy-related danger signs during prenatal visits.

More than 90 percent of women delivered with a trained health care provider, but there was no significant program impact on this outcome. More than 90 percent of newborns were wiped, wrapped, and weighed, but fewer than 10 percent had their weight recorded; there were also no program impacts on the quality of delivery care received.

[45] Note that the provision of medications, immunizations, and supplies was beyond the scope of *PROCOMIDA*'s activities.

Less than 40 percent of mothers sought postnatal care. Those who did generally received care from a trained provider (90 percent), but few received breastfeeding support (20 percent). There were no impacts on any aspects of postnatal care use or quality.

PROCOMIDA did, however, have significant impacts on the use of preventive health services for children. Specifically, mothers of children in the treatment arms were more commonly able to present a vaccination card (8–12 pp) and to have had their children weighed monthly. While attendance at growth monitoring visits decreased dramatically during the second year of life, it declined more slowly among children in the treatment arms. Additionally, during the second year of children's lives, the program had an impact on whether children's length was measured at growth monitoring visits. Impacts on measuring children's length was likely a consequence of the improved capacity of the community-based health workers who conducted growth monitoring activities.

Despite better attendance at preventive health visits among children in treatment compared to control arms, there was no impact on whether children with potentially severe illnesses were seen by a trained medical provider, and impacts on home treatment strategies were modest: a 7 pp increase in the use of fever-reducing medications in the case of fever at 18 months, and a 9 pp increase in giving ORS for diarrhea at 24 months. No program impacts were found on child morbidity.

19.4 Impact on Maternal and Child Nutrition and Well-Being

The food, BCC, and health components of *PROCOMIDA* were designed to work together to positively impact maternal and child nutrition and well-being outcomes, and as noted above some significant program impacts were found on outcomes along all three primary program impact pathways.

The micronutrient supplements (LNS and MNP) distributed by *PROCOMIDA* were expected to contribute to reducing maternal anemia. However, the prevalence of maternal anemia was relatively low among the study population at enrollment and declined over time in all arms. Unexpectedly, there was an indication of a negative program impact on maternal anemia at the 24-month time point in the arms that received the full or reduced family ration with CSB (arms A [FFR+CSB] and B [RFR+CSB], respectively), as reflected by a slower decrease in the prevalence of anemia over time among mothers in these arms compared to the control arm. This negative effect might be due to the increase in phytate consumption from the individual (CSB) and family (beans) ration.

PROCOMIDA resulted in higher post-pregnancy weight for mothers in all of the treatment arms that received CSB as the individual ration (arms A [FFR+CSB], B [RFR+CSB] and C [NFR+CSB]). These significant differences at 1 month persisted through the postpartum study period and average weight among mothers in these arms remained similarly higher at 24-month postpartum, despite the varied size of the family ration among these arms. Given the high prevalence of overweight and obesity in this population, the higher average weight found in these arms compared to the control arm are of concern and may be considered an unintentional negative impact of the program.

Despite these unexpected negative program impacts on maternal anemia and maternal body weight, the program had positive impacts on maternal well-being. Specifically, maternal stress scores declined notably from pregnancy to 9 months, with larger decreases in arms A (FFR+CSB) and E (FFR+MNP) compared to the control arm. The program had no impact on the prevalence of postpartum depression, but there was little room for improvement on this outcome as the overall prevalence was low compared to established cutoffs.

Despite the mixed results on maternal nutrition and well-being, *PROCOMIDA* significantly improved child nutritional status as reflected by the significant reduction in the prevalence of stunting among children in households that received the full or reduced family ration with CSB or the full family ration with MNP. Program impact was apparent at 1 month (between 4 and 5 pp), indicating the importance for child linear growth of women's receiving program interventions during the prenatal period and up to 1-

month postpartum. The impact of *PROCOMIDA* on reducing stunting in arm A (FFR+CSB) was even greater at 24 months, resulting in a statistically significant program impact of about 10 pp. Positive program impacts of about 6.7 pp were also seen at 24 months in the arm that received the full family ration with MNP (arm E [FFR+MNP]) when a linear mixed model was used to estimate program impacts. Although *PROCOMIDA* reduced the prevalence of stunting in arms A (FFR+CSB) and E (FFR+MNP), there was also an indication that arm A (FFR+CSB) had a negative impact on anemia (6.3 pp) at 24 months when a two-sided test was used for analysis. As with mothers, this negative effect might be due to the increase in phytate consumption from the individual (CSB) and family (beans) ration. The program had no significant impacts on improving child development outcomes.

19.5 Conclusion

As intended, *PROCOMIDA* reduced the prevalence of stunting among young children. These impacts were most consistent and largest in the arm that received the full family ration with CSB (arm A [FFR+CSB]). This treatment arm was the primary *PROCOMIDA* program design and thus represents the program that was delivered to all program beneficiaries aside from those in the other treatment arms. In addition to reducing the prevalence of stunting, *PROCOMIDA* reduced household hunger and maternal stress, and improved maternal health, hygiene, and nutrition knowledge and practices in some important areas such as increasing exclusive breastfeeding up to 6 months of age, decreasing the use of bottles, improving dietary diversity, and slightly improving hygiene practices. *PROCOMIDA* also had unintended negative impacts on maternal and child anemia and on maternal weight. The negative impacts on anemia may have been due to higher intakes of phytates from both the individual (CSB) and family (beans) rations, although further analyses are necessary to better understand the cause of these negative program impacts. In regard to maternal weight, it is not surprising that the provision of food would result in higher weight during pregnancy and throughout the postpartum period. However, in this population, where overweight and obesity are common, the unintended impacts on weight need to be considered. One way to address this in future programs would be to understand the drivers of overweight and obesity in this population and to include BCC messages around balanced energy intake as well as other messages designed to address the drivers identified.

It is clear from the information presented in this report that the full family ration worked as intended in terms of motivating beneficiaries to participate in the program throughout the first 1,000 days; the FFR seemed to help protect the individual micronutrient-fortified food or supplement, reduce household hunger, and contribute to reducing the prevalence of stunting when provided with CSB or MNP. Although the program had some positive impacts among beneficiaries who received the reduced family ration (arm B [RFR+CSB]), these were not as consistent or large as those found for the full family ration (arm A [FFR+CSB]). For example, positive impacts in arm B (RFR+CSB) on stunting at 1 month and 4 months disappeared by 6 months.

Although the full family ration coupled with CSB (arm A [FFR+CSB]) produced the largest impact on reducing the prevalence of stunting, some unintentional negative impacts were found in this treatment arm compared to the control arm, including an increase in both maternal and child anemia and maternal bodyweight. The full family ration coupled with MNP, on the other hand, produced significant positive impacts in terms of reducing the prevalence of stunting as well as on a number of other outcomes, but did not have any detectable unintended negative impacts. Therefore, while CSB and MNP both worked to reduce stunting (when provided with the full family ration, BCC, and health components of the program), there may be trade-offs between larger impacts and unintended negative impacts to be considered when deciding what type of individual ration to provide in a PM2A program.

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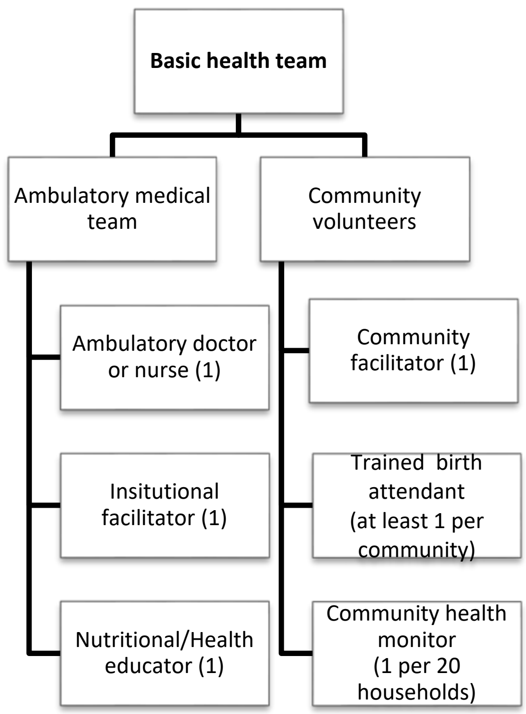
Appendix A. Description of the Basic Health Team

At each health convergence center, services were provided by members of the basic health team (*equipo básico de salud)* (EBS), which includes an ambulatory medical team that spent one day a month at each health convergence center and trained volunteer community members who were based in the communities served by the health convergence center (**Figure A.1**). The ambulatory medical team consisted of an ambulatory doctor or nurse and an institutional facilitator. In addition, some teams had a nutrition and health educator. The community volunteers consist of a community facilitator, community health monitors (1 per 20 families), and trained birth attendants.

Figure A.1 Organizational structure of the basic health team



The ambulatory doctor or nurse provided monthly consultations for pregnant women and children under 5 at the health convergence centers. During these consultations, necessary medication could have been prescribed and, if necessary, patients were referred to health services. Other duties include training and monitoring midwives, providing family planning counseling, conducting home visits for high-risk cases, and participating in quarterly meetings to analyze PSS-level health trends and achievements.

The institutional facilitator was responsible for the growth monitoring program and the monthly provision of immunizations and micronutrient supplements. Other duties included visiting the health convergence centers monthly to provide vaccinations; planning and implementing monthly training sessions for community facilitators and community health monitors; providing health consultations to children with diarrhea, respiratory infections, and malnutrition; and organizing quarterly meetings for the community volunteer members of the EBS at the health convergence centers.

The community facilitator was responsible for the community health monitors and trained birth attendants in their communities and reported to the institutional facilitator. Other duties of the community facilitator include monitoring health concerns in the community, participating in PSS-level activities, summarizing health convergence centers' health trends and progress for quarterly health convergence center meetings, helping the institutional facilitator with the growth monitoring and vaccination activities, and coordinating with the local health commission to transport high-risk patients to hospitals.

Community health monitors and trained birth attendants were the primary health workers available at the community level on a regular basis and were expected to make regular home visits in their communities. The community health monitors were tasked with reinforcing educational messages and reminding women to visit health convergence centers for antenatal care, perinatal care, postnatal care, child well visits, growth monitoring, and vaccinations and micronutrient supplements. Each community health monitor performs these duties in his or her assigned sector—approximately 20 households. Other obligations included participating in quarterly health convergence center meetings; visiting families in their assigned sectors every two months; keeping an up-to-date registry of pregnant women, children under 5, and high-risk cases; and providing preventive health care to families. Trained birth attendants focused on providing care for women during the pre-, peri-, and postnatal periods. They also provided support for mothers during pregnancy and lactation. Their duties include promoting tetanus vaccinations during pregnancy, vaccinating newborns, distributing micronutrient supplements to pregnant women, referring pregnant women with complications to health centers or hospitals, and registering birth information at the health convergence centers.

Appendix B. *PROCOMIDA* Ration Sizes

Table B.1 Nutrient Composition of LNS and MNP Supplements

		LNS		MNP	
	Unit	**Child**	**Mother**	**Child**	**Mother**
Daily dose	g	20 g (two 10-g sachets)	20 g (1 sachet)	4 g (two 2-g sachets)	4 g (two 2-g sachets)
Energy	kcal	118	118	—	—
Proteins	g	2.6	2.6	—	—
Fat	g	9.6	10	—	—
Linoleic acid	g	4.46	4.6	—	—
α-Linolenic acid	g	0.58	0.6	—	—
Calcium	mg	280	280	280	280
Copper	mg	0.34	4	0.34	4
Folic Acid	µg	150	400	150	400
Iodine	µg	90	250	90	250
Iron	mg	9	20	9	20
Magnesium	mg	40	65	40	65
Manganese	mg	1.2	2.6	1.2	2.6
Niacin	mg	6	36	6	36
Pantothenic acid (B5)	mg	2	7	2	7
Phosphorus	mg	190	190	190	190
Potassium	mg	200	200	200	200
Riboflavin (B2)	mg	0.5	2.8	0.5	2.8
Selenium	µg	20	130	20	130
Thiamine (B1)	mg	0.5	2.8	0.5	2.8
Vitamin A	µg	400	800	400	800
Vitamin B12	µg	0.9	5.2	0.9	5.2
Vitamin B6	mg	0.5	3.8	0.5	3.8
Vitamin C	mg	30	100	30	100
Vitamin D	mg	5	10	5	10
Vitamin E	mg	6	20	6	20
Vitamin K	mg	30	45	30	45
Zinc	mg	8	30	8	30

Table B.2 Monthly Ration Size for the PROCOMIDA Beneficiary Population, June 2010–July 2011

Foods	Full Family Food Ration (Arms A, C, D, and E)		Reduced Family Food Ration (Arm B)	
	Weight (kg)	**Energy (kcal)**	**Weight (kg)**	**Energy (kcal)**
Rice	12.000	43,200	7.000	25,200
Pinto beans	6.000	20,400	3.000	10,200
Vegetable oil	3.700	32,708	1.850	16,354
Total	**21.700**	**96,308**	**11.850**	**51,754**
Total kcal/capita/day[b]		460[c]		247[c]

[a] For the first year of distribution, these family food ration sizes were used. In year 2, they were reduced by roughly one-half (see Table 2.2).
[b] Total kcal/capita/day is derived using an average household size of 6.88 members and 30.42 days/month.
[c] Note that the individual ration is not meant to be shared, so we do not include it in the computation of the total energy/capita/day. If it were shared, it would provide an additional 71 kcal/capita/day, and the total full family food ration would therefore provide 531 kcal/capita/day and the reduced family food ration would provide 318 kcal/capita/day.

Appendix C. Health Convergence Centers, Municipalities, and Assigned Study Arms

Table C.1. List of Health Convergence Centers, Municipalities, and Assigned Study Arms

	Health Convergence Center	Municipality	Study Arm
1	Camcal	Cobán	A
2	Saquiha	Cahabon	A
3	Cerro Verde	Cobán	A
4	Corozal	Cobán	A
5	San Isidro	Cobán	A
6	San Pedro Canau	Cobán	A
7	Saacte	Cobán	A
8	San Vicente Chicatal	San Pedro Carchá	A
9	Santa Maria Julha	San Pedro Carchá	A
10	Sebob	San Pedro Carchá	A
11	Sejalal	San Pedro Carchá	A
12	Senimlaha	San Pedro Carchá	A
13	Jobchacob	Lanquin	A
14	Mawixul	Lanquin	A
15	Rubelraxtul	San Pedro Carchá	A
16	Chicanuz	Lanquin	A
17	Candelaria Yalicar	San Pedro Carchá	A
18	Chiyo	San Pedro Carchá	A
19	Taquinco la Esperanza	Cahabon	A
20	Santa Maria Rubeltzul	San Pedro Carchá	A
1	Agricola Samanzana	Cobán	B
2	Belen	Cahabon	B
3	San Lucas Tzulben	Cahabon	B
4	Sebas I	Cahabon	B
5	Sesaquiquib Chimox	Cahabon	B
6	Chelac	San Pedro Carchá	B
7	Chiacal	San Pedro Carchá	B
8	Chicuxab	Cobán	B
9	Chijotom	San Pedro Carchá	B
10	Chirrequiche	San Pedro Carchá	B
11	Chitzunun	San Pedro Carchá	B
12	Sacoyou	Cobán	B
13	Seconty	Cobán	B
14	Quiha Esperanza	San Pedro Carchá	B
15	Sejac	San Pedro Carchá	B
16	Sesaquiquib	San Pedro Carchá	B

	Health Convergence Center	Municipality	Study Arm
17	Sepajch I	Lanquin	B
18	Finca Guadalupe	Cobán	B
19	Sehache	San Pedro Carchá	B
20	Chiacte	Cahabon	B
1	Caquiton	San Pedro Carchá	C
2	Chiacam	San Pedro Carchá	C
3	Chijalal	San Pedro Carchá	C
4	Chiquixji	San Pedro Carchá	C
5	Chirreacte	San Pedro Carchá	C
6	Chirrequim	San Pedro Carchá	C
7	Monte Olivo	Cobán	C
8	Saraxoch	Cobán	C
9	Sesajab	Cobán	C
10	Ucula	Cobán	C
11	Nueva Concepcion Chitap	San Pedro Carchá	C
12	Rubel Cruz	San Pedro Carchá	C
13	San Lucas Secochoy	San Pedro Carchá	C
14	Seacte	San Pedro Carchá	C
15	Xalitzul	San Pedro Carchá	C
16	Xicacau	San Pedro Carchá	C
17	Chitzubil	Lanquin	C
18	Las Flores Chitoc	Cobán	C
19	Tzalamtun	Cahabon	C
20	Chajixim	San Pedro Carchá	C
1	Pinares	Cahabon	D
2	Chiguarrom	San Pedro Carchá	D
3	Chilatz	Cobán	D
4	Chinaichab	Cobán	D
5	Chipac	San Pedro Carchá	D
6	Chiquisis	San Pedro Carchá	D
7	Chirrepec	Cobán	D
8	Chitap Oficial	San Pedro Carchá	D
9	Ostua	Cobán	D
10	El Rosario	San Pedro Carchá	D
11	Seilob	Cobán	D
12	Tontem	Cobán	D
13	Raxnam	San Pedro Carchá	D
14	Sacchaj	San Pedro Carchá	D
15	San Antonio I	San Pedro Carchá	D
16	San Vicente	San Pedro Carchá	D

	Health Convergence Center	Municipality	Study Arm
17	Seconon	San Pedro Carchá	D
18	Sequixquib	San Pedro Carchá	D
19	Tuzam	Lanquin	D
20	Chizon	San Pedro Carchá	D
1	Chibax	San Pedro Carchá	E
2	Chinasayub	Cobán	E
3	Chitoc	San Pedro Carchá	E
4	Coperativa Samac	Cobán	E
5	Sactela	Cobán	E
6	Santa Valeria	Cobán	E
7	Sacristal	San Pedro Carchá	E
8	Salaute	San Pedro Carchá	E
9	San Antonio IV	San Pedro Carchá	E
10	Secuabon	San Pedro Carchá	E
11	Semox Setinta	San Pedro Carchá	E
12	Seraxquen	San Pedro Carchá	E
13	Setaña	San Pedro Carchá	E
14	Sexucti	San Pedro Carchá	E
15	Tierra Blanca	San Pedro Carchá	E
16	Tontem	San Pedro Carchá	E
17	Setaña	San Pedro Carchá	E
18	Rocja Satzac	Cobán	E
19	Nimlasayub	Cobán	E
20	Cipresales	San Pedro Carchá	E
1	Campamac	Cobán	F
2	Sacta	Cahabon	F
3	Tamax	Cahabon	F
4	Chimote	San Pedro Carchá	F
5	Chiguoyo	San Pedro Carchá	F
6	Xucaneb	Cobán	F
7	Yaxbatz	Cobán	F
8	Yiquiche Canau	Cobán	F
9	Pequixul	San Pedro Carchá	F
10	Quixal	San Pedro Carchá	F
11	Sacsi Chitaña	San Pedro Carchá	F
12	Secampamac	San Pedro Carchá	F
13	Sepocillo	San Pedro Carchá	F
14	Sesimaj	San Pedro Carchá	F
15	Tzapur	San Pedro Carchá	F
16	Ulpan I	San Pedro Carchá	F

	Health Convergence Center	Municipality	Study Arm
17	Nuevo Aquil	Cobán	F
18	Sactate	Cobán	F
19	Monte Blanco	Cobán	F
20	Chicanib	San Pedro Carchá	F

Appendix D. Developmental Milestones

Table D.1 Motor Milestones

Number	Milestone
1	Sit up and hold head straight
2	Lift head and chest when lying on the belly
3	Turn from the belly toward the back
4	Keep head straight, without wavering, when held sitting
5	Move with the belly on the floor (just like swimming)
6	Sit supported by someone or something
7	Sit on his/her own
8	Lift his/her belly when lying on the stomach, and hold on with hands, feet, or knees
9	While lying on the belly, head and chest up, can move using arms and legs
10	Crawl on all fours
11	Stand leaning on someone or something
12	Walk when both hands are held
13	Walk when one hand is held
14	Stand alone, without help, for a short time
15	Stand alone, without help, for a longer period of time
16	Bend at the waist and stand back up without falling (knees are straight or slightly bent)
17	Take a few steps alone, without help from anyone or anything
18	Run
19	Climb stairs walking on feet (not crawling)
20	Throw a ball (hand lifted to the ear)
21	Go up and down the stairs on feet (not crawling)
22	Kick a ball forward
23	Walk forward following a straight line (can take 10 steps)
24	Jump on both feet (both feet up at the same time)
25	Stand on one foot for several seconds
26	Walk backwards following a straight line (can take 10 steps)
27	Walk on tiptoe for 4 steps (heels are raised)
28	Jump 4 times without heels touching the ground
29	Jump on one leg 20 times in a row
30	Skip using alternate legs

Table D.2 Language Milestones

Number	Milestone
1	Make sounds while playing alone
2	Make sounds like da, ba, ga, ka, ma
3	Make sounds like ma-ma, da-da, ba-ba
4	Imitate simple sounds like da, ba ma, or repeat them
5	When holding something in his/her hand, will give the item when requested
6	Say one word
7	Say goodbye at the right time waving his/her hand
8	Point and make sounds when he/she wants something
9	Point to a cat or chicken when asked to do it
10	Say 3 words
11	Point to a person walking if asked to do it
12	Say 6 words
13	Use pronouns “I” and “you”
14	Constantly ask for names of objects
15	Start a lot of questions with “What,” “Where,” and “Who”
16	Say a lot of words (20 or more)
17	Use plurals when talking
18	Tell what a knife is used for
19	Say full name (last and first name)
20	Say opposite of word “big”
21	Talk about things that took place in the past (e.g., day before) using the correct conjugation