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Strengthening and Evaluating the Preventing Malnutrition in Children under 2 Approach (PM2A) in Burundi: Baseline Report

Megan Parker
Jef L Leroy
Deanna Olney
Jody Harris
Marie Ruel

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Abbreviations and Acronyms

BCC	behavior change communication
BCG	Bacille Calmette-Guérin (tuberculosis vaccine)
BIF	Burundian Franc
BMI	body mass index
CRS	Catholic Relief Services
CSB	corn-soy blend
DHS	Demographic and Health Survey
dl	deciliter(s)
DPT	diphtheria, pertussis, and tetanus (vaccine)
DRC	Democratic Republic of Congo
EICV	Enquête Intégral sur les Conditions de Vie des Ménages
FANTA-2	Food and Nutrition Technical Assistance II Project
FAO	Food and Agriculture Organization of the United Nations
FH	Food for the Hungry
g	gram(s)
HAZ	height-for-age z-score
Hb	hemoglobin
HDDS	Household Dietary Diversity Scale
HepB	hepatitis B virus (vaccine)
HHS	Household Hunger Scale
HiB	hemophilus influenza B (vaccine)
HIV	human immunodeficiency virus
IFPRI	International Food Policy Research Institute
IMC	International Medical Corps
IYCF	infant and young child feeding
ISTEEBU	Institut de Statistiques et d'Etudes Economiques du Burundi
kcal	kilocalorie(s)
kg	kilogram(s)
km	kilometer(s)
LAZ	length-for-age z-score
MICS	Multiple Indicator Cluster Surveys – Round 4
m	meter(s)
mm	millimeter(s)
MSP	Ministère de la Santé Publique
MUAC	mid-upper arm circumference
MYAP	Multi-Year Assistance Program
NGO	nongovernmental organization
ORS	oral rehydration salts
PM2A	Preventing Malnutrition in Children under 2 Approach
PRONIANUT	Programme National Intégré d'Alimentation et de la Nutrition
SD	standard deviation
SRQ-20	self-report questionnaire
T-18	<i>Tubaramure 18</i>
T-24	<i>Tubaramure 24</i>
T-NFP	<i>Tubaramure</i> no food during pregnancy
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WAZ	weight-for-age z-score
WHO	World Health Organization
WHZ	weight-for-height z-score
WLZ	weight-for-length z-score

1. Introduction

This report presents the findings from the baseline survey for the impact evaluation of the *Tubaramure* program, a Preventing Malnutrition in Children under 2 Approach (PM2A) program implemented in eastern Burundi. *Tubaramure* is a United States Agency for International Development (USAID) Title II food aid development program¹ funded out of the Public Law 480 Title II resources. The objectives of the *Tubaramure* program are 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.

Tubaramure has three core components: distribution of family and individual food rations; required participation of beneficiaries in a behavior change communication (BCC) strategy 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. The program is being implemented by a consortium of nongovernmental organizations (NGOs) led by Catholic Relief Services (CRS) and further consisting of International Medical Corps (IMC), Food for the Hungry (FH), and CARITAS Burundi.

Integrated into the *Tubaramure* program is a research program being conducted by the International Food Policy Research Institute (IFPRI) in collaboration with the consortium group, with funding from USAID through the Food and Nutrition Technical Assistance II Project (FANTA-2) and the FANTA-2 Bridge. FANTA-2 and the FANTA-2 Bridge also provided technical input and oversight for the implementation and evaluation of *Tubaramure*. The overall objectives of the research are to assess the impact and cost-effectiveness of *Tubaramure* on child nutritional status and to evaluate the differential and absolute impact of varying the duration of receiving food rations. In addition, the study will evaluate the impact of the intervention on a number of other household, maternal, and child outcomes, such as household hunger, infant and young child feeding (IYCF) and health-seeking practices, maternal hemoglobin (Hb) and anemia, children's morbidity symptoms, children's Hb and anemia, and children's cognitive and motor development. To assess the program's impact, three cross-sectional studies of the target population were scheduled. The first cross-sectional study, conducted from October to December 2010, provides a baseline reference. The second cross-sectional study, which will be carried out from October to December 2012, will evaluate the impact on children between the ages of 0 and 23 months, and the third cross-sectional study, which will be carried out in the same months in 2014, will evaluate the impact on children between the ages of 24 and 42 months.² This report summarizes the findings from the first cross-sectional (baseline) survey.

The report is structured as follows. Section 2 presents the study methods. The community- and household-level results are presented in Sections 3 and 4, respectively. Sections 5 and 6 follow with the results for mothers and children. Differences between study arms are discussed in Section 7. Section 8 concludes with a discussion of the results and recommendations for improving the health and nutrition situation in the study area.

¹ Title II food aid development programs were previously referred to as multi-year assistance programs (MYAPs).

² For ease of reference, we use "0–23 months" for children 0.0–23.9 months of age and "24–41 months" for children 24.0–41.9 months of age in the remainder of the text.

2. Methods

2.1. STUDY SETTING

Burundi is located in the Great Lakes region of East Africa bordered by the Democratic Republic of Congo (DRC), Rwanda, and Tanzania. The country is composed of 17 provinces and has approximately 8.1 million people living on 25,680 km² of land, making it one of the most densely populated African countries (United Nations Development Programme [UNDP], 2010).

The majority of the population depends on agriculture for a living, most of which is subsistence farming (Department for International Development [DFID] et al., 2009). A typical family farm in the study area is 0.5 hectares or less in size and is used to grow maize, beans, manioc, bananas, sweet potatoes, and sorghum (International Fund for Agricultural Development, 2012; Food and Agriculture Organization of the United Nations [FAO], 2010b; Central Intelligence Agency, 2012).

Burundi is one of the 10 poorest countries in the world (UNDP, 2010). Since 1993, agricultural production has declined by 24% (Ministère de la Santé Publique [MSP], 2011; World Food Programme, 2011). Approximately 81% of the population is estimated to live below the poverty line of \$1.25 per day (World Bank, 2011), and 63% of the population cannot afford enough food to meet their daily energy needs (FAO, 2010b). These estimates suggest that the average energy deficit is 380 kcal/person/day (FAO, 2010b) or about 20% of the mean daily caloric intake of adults in the United States (2,157 kcal/day) (United States Department of Agriculture, 2010).

The *Tubaramure* program is being implemented in the eastern provinces of Cankuzo and Ruyigi, located on the border with Tanzania. These provinces are among the poorest of Burundi's 17 provinces and are predominantly rural. According to the recent Demographic and Health Survey (DHS), the central-eastern provinces have the greatest prevalence of stunting and underweight at 62% and 33%, respectively (ICF Macro et al., 2011). Micronutrient deficiencies are common: Anemia prevalence in these provinces is approximately 44% among children 6–59 months of age and 18% among pregnant women, and vitamin A deficiency has remained widespread despite large-scale distributions by the Expanded Program of Vaccination (MSP, 2006; ICF Macro et al., 2011). Highlighting the severity of the situation is the fact that these two provinces (along with Rutana and Makamba) declared an acute food and livelihood crisis in 2010 (Food Security & Nutrition Working Group, 2010). The consortium group chose to work in Cankuzo and Ruyigi after evaluating several health and nutrition indicators (i.e., malnutrition, access to prenatal and postpartum services, IMC growth monitoring results, and food insecurity) that indicated that these two provinces were among those most in need of this type of program.

2.2. TUBARAMURE EVALUATION DESIGN

For the purposes of the IFPRI-led research on *Tubaramure*, and more specifically to answer questions related to the optimal timing and duration of exposure to PM2A programs, the study compares households that have been randomly assigned to one of four study groups:

- *Tubaramure* 24 (T-24): Households in this group receive the full *Tubaramure* program, including BCC, preventive health services, monthly individual food rations for the mother during pregnancy and the first 6 months postpartum and for the child from 6 to 24 months of age (plus a family ration for the rest of the household).
- *Tubaramure* 18 (T-18): Households in this group receive the full *Tubaramure* program, but only up to the time the child is 18 months of age.
- *Tubaramure* NFP (T-NFP): Households in this group receive BCC and preventive health services, but no food rations during the women's pregnancy. From the time the women give birth, households in this group receive the full *Tubaramure* program, including monthly food rations (individual + family), up to the time the child is 24 months of age.
- Control: The *Tubaramure* program is not provided to these households, but health services provided by the public system may still be accessed.

The *Tubaramure* household food ration is composed of 12 kg of corn-soy blend (CSB) and 1,200 g of oil (see Appendix **Table A.1**). Although this ration is distributed to the beneficiary, it is intended for household consumption. In addition to the household ration, the program distributes an individual ration for the beneficiary: A pregnant or lactating woman (0–6 months postpartum) receives 6 kg of CSB and 600 g of oil, while a child 6–24 months receives 3 kg of CSB and 300 g of oil. Beneficiary mothers and children are expected to attend and utilize recommended preventive health services at the local health center, including prenatal and postpartum checkups for women and growth monitoring and vaccinations for children. In addition, they are expected to attend two monthly care group meetings, where they receive BCC centered around key health- and nutrition-related practices.

Women in the T-24, T-18, and T-NFP households are invited to enroll in the *Tubaramure* program when they are pregnant (fourth month of gestation). From the time of enrollment, a beneficiary mother will receive the monthly individual ration until her child is 6 months of age. At this time, the mother's individual ration is discontinued and the child begins receiving a monthly individual ration until he or she graduates from the program (at either 18 months or 24 months of age). Also at 6 months, it is recommended that complementary foods be introduced to the infant.

The *Tubaramure* program is being implemented across all *collines*³ in the provinces of Cankuzo and Ruyigi, except for the 15 study control *collines*.

2.3. STUDY METHODS

2.3.1. Sample Size

The main outcome of the study, on which sample size calculations are based, is child nutritional status, namely linear growth. The largest program impact on child linear growth (the main measure of nutritional status) is expected to be observed in children that have been exposed beginning in early pregnancy and for the entire duration up to when they reach 24 months of age. The first group of children meeting this condition will be 24.0–41.9 months of age sometime between October and December 2014 (i.e., 4 years after the baseline survey). The impact on other outcomes (such as IYCF⁴) are purposively measured in children 0.0–23.9 months of age to reduce recall bias. The follow-up cross-sectional survey to measure the program's impact on these outcomes among children 0–23 months of age will be conducted in October–December 2012.

Sample size calculations were based on estimating program impact using the difference between study groups in the cross-sectional survey at follow-up. The required sample sizes for each study arm for the 2012 and 2014 follow-up studies are shown in Table 2.1. The parameters used for the sample size calculation were a type 1 error of 0.05, power of 0.90, and an intracluster correlation of 0.006 for stunting and 0.009 for height-for-age z-score (HAZ). Further details on the sample size calculation (including the minimal detectable difference in HAZ for all study group comparisons) can be found in the 5-year research proposal submitted to FANTA-2 (Leroy et al., 2009).

Note that the household, maternal, and child results (Sections 4, 5, and 6, respectively) are presented separately for both age groups.

³ Although “colline” literally translates into English as “hill,” in the Burundi context it is used to refer to a community, and that is how it is used throughout this document.

⁴ Note that specific IYCF guidelines are only available for children under 2 years of age.

Table 2.1. Sample size to measure impact on child and household outcomes

	Study group							
	T-24		T-18		T-NFP		Control	
Age (months)	0–23	24–41	0–23	24–41	0–23	24–41	0–23	24–41
Minimum sample size required (by age)	431	1,000	869	1,000	431	1,000	869	584
Minimum sample size required (per arm)	1,431		1,869		1,431		1,453	

2.3.2. Sampling

The *colline* selection procedure is described in detail in the Burundi baseline protocol (Armstrong et al., 2010). In brief, 210 *collines* meeting certain population and primary health care provision criteria were ranked according to population size and divided into 5 strata (based on population size) in Cankuzo (with 13 or 14 *collines* per stratum) and 10 strata in Ruyigi (14 or 15 *collines* per stratum). The 5/10 split was based on the relative population size of both provinces. Within each stratum, four *collines* were randomly selected using random numbers with a fixed random number seed in Stata version 11 (StataCorp, 2009). The four *collines* in each stratum were then each assigned randomly to one of the four arms of the study in a public event organized in the administrative center of Ruyigi on January 25, 2010. The list of selected *collines* and the assigned study arms is shown in Appendix **Table A.2**.

Once the 60 research *collines* were chosen, a household census was conducted in the selected *collines* to generate a complete list of households with children younger than 5 years of age. The census was conducted in October 2010. The enumerators visited each household in the selected 60 research *collines* to inquire if there was a child under the age of 5 years in the household. If the household was identified as having a child under 5 years of age, the following information was recorded on a pre-numbered census sheet: the *sous-colline*⁵ where the household lived, the first and last name of the head of the household, and the household size. The head of the household was given a pre-printed slip with the number corresponding to the number on the census sheet. After all households were identified and recorded, the data were entered and transferred to IFPRI in Washington, DC.

Using the household census data, the total number of households to be sampled with children 0–23 and 24–41 months of age was calculated for each *sous-colline*. First, the proportion of the sample that needed to be drawn from each *sous-colline* was calculated by dividing the total number of households with a child under the age of 5 years for each *sous-colline* by the total number of households with a child under the age of 5 years in the 15 *collines* of each study arm. Next, the total number of children 0–23 and 24–41 months of age to be sampled in each *sous-colline* was calculated by multiplying the *sous-colline*-specific proportion by the arm- and age group-specific sample size needed.

A separate survey list used by the field teams was generated for each of the 265 *sous-collines* (see example in Appendix **Table A.3**). The header of the list showed the *sous-colline* identifiers and the total number of households to be visited with a child 0–23 and 24–41 months of age. Each list further showed all (randomly ordered) households with a child 0–5 years of age living on the *sous-colline*. The supervisor of each field team was instructed to visit households according to the order of the list until the required number of surveys in each age group had been completed. Once the quota for one age group was reached, only children from the not-yet-complete age category were sampled.

⁵ Each *colline* is divided into a number of *sous-collines* (“sub-communities”). The 60 study *collines* consist of a total of 265 *sous-collines*.

2.3.3. Selection of Index Child

If there was only one child under 42 months of age in a household, that child was designated as the “index child.” If there was more than one child 0–41 months of age within a household, the household’s children’s names were alphabetized from “A” to “Z” by first name and then the first child on the list was selected to be the index child.⁶

2.3.4. Data Collection

Data were collected at the health center, community, and household level, using pre-tested questionnaires. The list of modules included within each of the questionnaires is presented in **Tables 2.2, 2.3, and 2.4**, along with a brief description of each module.

Health Center Questionnaire

The health center questionnaire focused on the services provided by each of the 13 health centers located within the 60 research *collines*. More specifically, the questionnaire gathered information on the health center’s schedule, personnel, services provided, vaccinations provided, services for children and mothers, equipment, and medical supplies (**Table 2.2**).

Table 2.2. List of modules included in health center questionnaire

Module	Topic	Description	Respondent
1	Schedule	Identifies the hours of operation for emergency services, external prevention services, prevention services for pregnant women, prevention services for postpartum women.	Health center personnel
2	Personnel	Identifies the number of personnel per establishment, personnel qualifications, and the services to which they attend.	Health center personnel
3	Services	Identifies the health services provided by each establishment for women and children.	Health center personnel
4	Vaccinations	Evaluates the availability of vaccines and vitamin A.	Health center personnel
5	Services for children	Investigates the provision of growth monitoring services, examinations for sick children, and treatment for severely malnourished children.	Health center personnel
6	Services for women	Investigates the provision of prenatal care, delivery assistance, and postpartum care.	Health center personnel
7	Equipment	Evaluates the presence of equipment and material available for preventive and curative care for children and pregnant women.	Health center personnel
8	Medications	Evaluates the presence of medications.	Health center personnel

Colline Questionnaire

The *colline* questionnaire required an interview with a group of adults from each the 60 research *collines*. This 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 *colline* residents (**Table 2.3**).

⁶ We decided that mothers with two children 0–41 months of age would be interviewed about only one child for two reasons. First, we wanted to reduce the respondent burden to the extent possible. Second, we believed data quality would be higher if the amount of time spent with each respondent was shorter.

Table 2.3. List of modules included in community questionnaire

Module	Topic	Description	Respondent
1	Schools	Identifies schools attended by children living in the <i>colline</i> , including location, type, costs, and perceived quality.	Group of community members
2	Health services	Identifies health services used by families living in the <i>colline</i> , including location, travel time, vaccination campaigns, and epidemics.	Group of community members
3	Food crops	Identifies the main crops in the <i>colline</i> and timing of harvest.	Group of community members
4	Fruit trees	Identifies the main crops in the <i>colline</i> and timing of harvest.	Group of community members
5	Community organizations	Identifies the existing organizations, objectives, and membership.	Group of community members
6	Transportation	Investigates the availability and cost of public transportation to a number of locations and ease of access to members of the <i>colline</i> .	Group of community members
7	Infrastructure	Investigates the availability of electricity, water, and telephone.	Group of community members
8	History	Investigates the history of the <i>colline</i> , concerning migrants, climate, and programs and activities over the past 5 years.	Group of community members
9	Development programs	Investigates local development programs over the past 5 years.	Group of community members
10	Events	Investigates local events (positive, negative) that affected the <i>colline</i> over the past 5 years.	Group of community members

Household Questionnaire

The household questionnaire gathered information on household demographics and socioeconomic indicators, food security, participation in social assistance programs, shocks, and maternal⁷ and child characteristics. The household questionnaire was based on the questionnaires used in the Rwanda DHS (<http://www.measuredhs.com>), the Rwanda Enquête intégrale sur les conditions de vie des ménages (EICV) (International Household Survey Network, 1998) and other instruments from a variety of sources, including the FANTA Household Hunger Scale (HHS) (Deitchler et al., 2010) and Household Dietary Diversity Scale (HDDS) (Swindale and Bilinsky, 2006) and the 20-question Self-Report Questionnaire (SRQ-20) (World Health Organization [WHO], 1994) to evaluate maternal health and stress. The WHO instrument to measure IYCF practices (WHO, 2010) was used to construct the WHO-recommended indicators of breastfeeding and complementary feeding of children 0–23 months of age (WHO, 2008b). All modules were adapted to the specific needs of this study. **Table 2.4** presents the modules included in the questionnaire, the questionnaire or instrument the module was based on, and a short description of each module.

⁷ Data were collected on the mother or caretaker of the index child. Where the index child did not live with his/her biological mother, data were collected from the caretaker of that index child.

Table 2.4. List of modules included in household questionnaire

Module	Topic	Source	Description	Respondent
1	Household roster and education	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, (biological) parents of the children under 5 years of age. Highest educational level attained, activity/employment in the past month of all household members 3 years of age and older.	Head of household, spouse, or household member over 18 years of age
2	Eligible child	IFPRI	Identifies all children from 0 to 23 months and 24 to 41 months of age and provides random selection of the index child.	Head of household, spouse, or household member over 18 years of age
3	Housing	EICV	Construction materials used for floor, walls, and roof; availability of water and electricity; fuel/energy used for cooking, lighting, etc.	Mother or household member over 18 years of age
4	Assets	EICV, IFPRI	Identifies the possession of durable household goods (in working condition), including tools for agricultural production, ownership, and control over each asset.	Mother or household member over 18 years of age
5	Household Dietary Diversity	HDDS	Evaluates the diversity of the household diet in the last 24 hours.	Individual in charge of food preparation, or household member over 18 years of age
6	Participation in social programs	IFPRI	Identifies all social programs household members participate in and the benefits received from these programs.	Head of household, spouse, or household member over 18 years of age
7	Shocks	IFPRI	Identifies all shocks (economical, agricultural, and familial) faced by the household in the past 12 months.	Head of household, spouse, or household member over 18 years of age
8	Food Security	HHS)	Investigates the prevalence of household hunger using the HHS.	Individual in charge of food preparation or household member over 18 years of age
9	Maternal knowledge	DHS, IFPRI	Evaluates knowledge on child health, health care seeking, feeding, and danger signs during pregnancy.	Mother of child between 0 and 41 months of age
10	Women's status	DHS, IFPRI	Evaluates women's autonomy and decision-making power.	Mother of child between 0 and 41 months of age
11	Women's occupation and activity	IFPRI	Evaluates maternal literacy, occupation, and activities.	Mother of child between 0 and 41 months of age

Module	Topic	Source	Description	Respondent
12	Prenatal- and postpartum care	DHS	Evaluates prenatal and postpartum care received.	Mother of children between 0 and 23 months of age
13	Maternal health	IFPRI, SRQ-20	Evaluates maternal health and stress	Mother of children between 0 and 41 months of age
14	IYCF practices	WHO, IFPRI	Investigates breastfeeding, IYCF practices.	Mother of children between 0 and 23 months of age
15	Child health	WHO	Evaluates preventive health care utilization and vaccination, morbidity, and curative health care seeking.	Mother of children between 0 and 41 months of age
16	Child development	Multiple Indicator Cluster Surveys – Round 4 (MICS) (Stoltzfus et al., 2001; (Griffiths, 1970; (Olney et al., 2009a; (McCarthy, 1972)	Evaluates the presence of books and toys for children, child care, and child development.	Mother and eligible child between 0 and 41 months of age
17	Hygiene spot-check	IFPRI	Evaluates the cleanliness of the child, mother, and the interior and exterior of the house using a spot-check observation method.	Enumerator (<i>direct observation</i>)

Anthropometry and Hemoglobin Questionnaire

The anthropometry questionnaire was used to record height (or length), weight, and Hb concentration of the index children and their mothers (**Table 2.5**).

Table 2.5. List of modules included in anthropometry questionnaire

Module	Topic	Description	Respondent
1	Child anthropometry	Child weight and length/height was measured. Length or height was measured twice, and a third time if the difference between the first two measurements exceeded 6 mm. Weight was measured once.	Eligible child between 0 and 41 months of age
2	Maternal anthropometry	Mother's height and weight were measured and pregnancy status recorded. Maternal height was measured twice, and a third time if the difference between the first two measurements exceeded 6 mm. Weight was measured once.	Mother and eligible child between 0 and 41 months of age
3	Mother and child Hb concentration	Hb concentration of the index child and his/her mother were measured.	Mother and eligible child between 0 and 41 months of age

2.3.5. Fieldwork

Census

- Institut de Statistiques et d'Etudes Economiques du Burundi (ISTEEBU) hired and trained 165 data collectors with previous experience conducting censuses. The training was held at Regina Mundi Cathedral in central Bujumbura. During this training, census workers were oriented to Cankuzo and Ruyigi provinces, organized into field teams, and instructed to visit each household within the 60 *collines* to identify all households with children under 5 years of age. IFPRI provided pre-printed census sheets for each *sous-colline* to record the name of the head of the household and the number of household members for each household with a child under 5 years of age.

Health Center, *Colline*, and Household Surveys

- **Survey firm.** ISTEEBU was selected to conduct the baseline survey, after interviews were conducted in February 2009.
- **Survey teams.** Twenty-two teams administered the household anthropometric survey. In each team, there were four enumerators, two anthropometrists, and one team controller. The enumerators conducted the household survey and anthropometrists collected and recorded the anthropometric and Hb data. The controllers were responsible for checking the quality of the data, as well as conducting the *colline* surveys. The controllers were overseen by the two supervisors in each province (total of four); supervisors were also responsible for conducting the health center survey. The four supervisors reported to the coordinating team based in Bujumbura. Survey teams were assigned to specific *collines* and were monitored closely and continuously by the survey firm and IFPRI staff and consultants throughout the fieldwork. 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.
- **Training of supervisors.** The four selected supervisors participated in the pre-testing of the French version of the questionnaire and verified and revised the Kirundi version as needed. They were therefore well oriented to the project before the training of controllers, enumerators, and anthropometrists began. The supervisors attended the 1-week training for controllers and the 4-week training for enumerators. They were trained to manage a large team of enumerators, organize the questionnaires, and monitor and report progress and problems to ISTEEBU.
- **Training of controllers.** Twenty-two controllers completed 1 week of training on the study materials using lectures, role-play, discussions of potential answers to a question, and discussions related to the coding of different types of responses. Following this training course, all controllers participated in the enumerator training. Controllers assisted the enumerator training process by leading small groups during role-play.
- **Training of enumerators.** A variety of methods were used to train the enumerators in the use of the survey questionnaire over the course of 4 weeks. These included lectures, role-play, discussions of potential answers to a question, and discussions related to the coding of different types of responses. The controllers and enumerators were continuously evaluated during the training. Each week, a short written test was used to evaluate their understanding of the questionnaire. The final selection of controllers and enumerators was based on a short field-based evaluation at the end of the training.
- **Standardization of the anthropometry team.** The fieldworkers that conducted the anthropometric measurements were carefully trained in the use of the equipment and the recording of anthropometric data for 2 weeks. Their training included lectures, videos, and equipment demonstrations, and was followed by practical exercises in the measurement of height and weight of infants, children, and mothers. The fieldworkers were then standardized (Cogill, 2003) in the measurement of height and weight. First, the height and weight of five children 0–41 months of age and their mothers were measured by all fieldworkers and the trainer; each fieldworker measured each child 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, anthropometrists were selected.
- **Training on the collection of capillary blood.** The members of the anthropometry team were trained to collect capillary blood using a sterile spring-loaded lancet. This method standardized the depth of the puncture and minimized the need to puncture more than once. Enumerators were trained on the proper procedure for taking the sample and measuring the Hb concentration using portable Hemocue machines. The training included the proper techniques for the sterile collection of samples, including the use of a sterile lancet and a new set of sterile gloves for each

sample. The enumerator used an alcohol swab to clean the area to be pricked before the procedure, cleaned it after the procedure, and applied a small band-aid. Each enumerator was supplied with a small plastic container to collect the waste from the procedure to be disposed of properly at health centers. The enumerators were also trained in the correct techniques to collect the blood sample in the microcuvette to minimize the need to repeat the procedure.

- **Administration of the health center questionnaire.** The health center questionnaire was administered by a controller to at least one health professional per health center facility. Only the 13 health centers located within the 60 research *collines* were surveyed.
- **Administration of the *colline* questionnaire.** The *colline* questionnaire was conducted using a group interview methodology for each *colline*. The group interview was conducted by inviting health and education professionals, religious leaders, and other leaders in each *colline* to come to a meeting to assist in filling out a *colline*-level questionnaire. The questionnaire was filled out by at least two controllers that ensured that a consensus was reached on all the issues discussed.
- **Administration of the household and anthropometry questionnaires.** Information sessions were organized in each *colline* before the survey work was started. The information sessions explained the purpose of the survey to the community members and reasons for measuring children's and mothers' height, weight, and Hb, and requested the cooperation of community members with the survey team. The enumerators reviewed each questionnaire before leaving the household where it was administered. At the end of each day of fieldwork, the controllers also reviewed each questionnaire for accuracy, logical patterns, and legible writing. Enumerators and anthropometrists were asked to return to survey households in cases where missing data or other problems were observed. On average, household surveys lasted between 3 and 4 hours; collecting the anthropometric and Hb data averaged less than 30 minutes.
- **Handling of questionnaires.** Upon completion of each household interview, the enumerator submitted the questionnaire to his/her respective controller. The controller recorded the number of questionnaires completed per age group and *sous-colline* to keep track of the total until the age quotas were filled. Once all the *sous-collines* in a *colline* were completed, the controller gave the completed package to his/her respective supervisor. The supervisors then checked the questionnaires that they received from controllers for quality. The supervisors recorded and reported the total number of questionnaires completed by *colline* and age group to the coordinators. Questionnaires were grouped according to *colline*, commune, and province, and then transported back to ISTEERU in Bujumbura. The questionnaires were then passed to the data entry team in Bujumbura.

2.3.6. Data Entry, Cleaning, and Analysis

Data Entry

A data entry program was developed by ISTEERU using CSpPro and provided the 10 data entry clerks with an interface resembling the paper questionnaire. Each of the health center, *colline*, household, and anthropometry questionnaires was entered into the CSpPro program twice by two different data entry clerks. At the end of the data entry period, lists of inconsistencies between the first and second entry of the same questionnaire were generated and mistakes corrected.

Data Cleaning

The data were transferred to Stata (StataCorp, 2009) and standard data cleaning checks were performed. All observations with problems were listed and verified using the paper questionnaires.

Variable Creation

From the data collected, new variables were also created to summarize some results in a more concise manner. Many of these variables were based on norms and standards provided by international organizations and the government of Burundi. The variables created in this study are summarized below.

Health Center Characteristics

We evaluated the information obtained from the health center questionnaires against the national requirement for health centers (MSP, 2008).

Household Characteristics

The following household variables were created.

- **Dependency ratio.** The ratio of persons that are economically dependent on those that provide for them, within the household. Calculated by dividing the number of people in the household aged under 15 or over 60 (deemed not economically active) by the number between 15 and 60 years of age (deemed potentially economically active).
- **Cleanliness of mothers, children, and interior and exterior of dwellings.** These variables were constructed from spot-check observations conducted at the time of the interviews. Fieldworkers⁸ noted the cleanliness of hands, face, hair, and clothes of mothers and children, and noted the presence of garbage, feces, dust, or dirty clothes around dwellings. The variables describe the proportion of people or premises scoring “clean” on all counts.⁹
- **Assets.** Household asset ownership was summarized in six different counts: total number of household goods, total number of agricultural tools and equipment, total number of small animals, total number of medium-sized animals, total number of large animals, and total number of motorbikes or bikes.
- **HHS.** Constructed according to FANTA-2 guidelines (Deitchler et al., 2010), 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 of 0 to 1 was classified as “little or no hunger,” 2 to 3 as “moderate hunger,” and 4 to 6 “severe hunger.”
- **HDDS.** Constructed according to FANTA guidelines (Swindale et al., 2006), the food preparer in each household was asked if the household had consumed food from 12 pre-defined food groups¹⁰ in the past 24 hours, providing a simple score out of 12. Once the HDDS was calculated, the types of food groups consumed between households with a HDDS less than four and those with a HDDS greater than or equal to four (four being the median dietary diversity in the sample) were compared.

⁸ Fieldworkers were extensively trained on this instrument, but no formal standardization was conducted.

⁹ For mothers, fieldworkers were asked to assess the cleanliness of hands, hair, clothes, and face. Possible answers were clean, dirty, and dusty. The same variables and answers were used for the children. Mothers and children were classified as “clean” if the fieldworker recorded “clean” for all items. The outside of the house was evaluated with respect to the need for cleaning, the presence of human feces and animal feces, and the presence of garbage. The inside of the house was evaluated with respect to need to be swept, the presence of animal feces, the water being covered, and the presence of dirty clothes. The outside of the house was classified as “clean” if the fieldworkers recorded “no” for all items. The same approach was followed for the inside of the house.

¹⁰ The 12 HDDS food groups are: cereals and grains; roots and tubers; legumes, nuts, and pulses; milk and dairy products; eggs; meat and poultry; fish and seafood; fruits; vegetables; oils and fats; sugar, honey, sweets, and snacks; and miscellaneous

Maternal Characteristics

The following variables were created to describe maternal characteristics.

- **Maternal literacy.** Literacy was evaluated by asking mothers 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 illiterate if they could not read the sentence at all.
- **Maternal knowledge.** Mothers were asked a series of questions to assess their knowledge about YCF practices (breastfeeding timing and duration, and appropriate complementary feeding practices), the prevention of diarrhea (hygiene practices), how to care for a sick child or a child recovering from an illness (including recognizing danger signs), and danger signs during pregnancy. Separate variables were created to describe the proportion of mothers responding correctly to each of the knowledge questions.
- **Maternal mental health.** Mental health was assessed by use of the SRQ-20 (WHO, 1994), a questionnaire used to detect common mental disorders in primary health care settings. Cutoff points for categorizing severe mental distress vary according to context and the underlying mental health burden. No research has been conducted to determine the appropriate cutoff for Burundi. We used a cutoff of 10, based on preliminary research in Rwanda, a neighboring country (Scholte et al., 2011; Scholte et al., in press).

Preventive Health Care Practices

Preventive health care practices as reported by the mother were evaluated in relation to several sets of national recommendations, detailed in the text below.

- **Prenatal care.** The total number of prenatal care visits was compared to the national recommendation of four visits per pregnancy (MSP, 2010). Receipt of specific prenatal care services were examined in relation to the national protocol to be followed by medical staff (MSP/WHO, 2007; MSP, 2010). Burundi's Ministry of Health recommends that all pregnant women take daily iron-folate prenatal vitamins with the dosage of 60 mg iron and 400 µg folic acid.
- **Postnatal/postpartum care.** Mothers and their newborns are informed that it is recommended to see a medical professional within 4 days of the birth of the child. In settings where the prevalence of anemia among pregnant women is greater than 40%, all women should continue receiving the same iron-folate dosage listed above for 3 months postpartum (MSP, 2010).
- **Preventive child care practices.** The standards for growth monitoring, vitamin and mineral supplement use, and vaccination coverage were based on the national (or if not available the international) standards. Information about child weight, vaccinations, and supplements were provided by child's vaccination card along with the date received. Information about these preventive care visits was recorded directly off the vaccination card for the primary caregivers that could present the card at the time of the interview. If the primary caregiver could not present the vaccination card, he or she was asked to recall the preventive care that the child had received. The following variables were analyzed:
 - **Growth monitoring visits.** According to UNICEF guidelines (UNICEF, 2002), children aged 0–23 months should be taken monthly and children aged 24–42 months every 3 months to a clinic for growth monitoring, where weight is taken and tracked on a chart.
 - **Vitamin and mineral supplements.** Children should begin receiving vitamin A supplements at 9 months and continue receiving vitamin A every 6 months until 5 years of age.

- **Vaccination.** The national vaccination schedule (**Table 2.6**) was used to calculate the percentage of children fully immunized according to their age. To construct this variable, a 1-month grace period was added to each recommended vaccination age. Children older than this calculated age (and younger than the next recommended age + 1-month grace period) with all recommended vaccinations were considered fully immunized. As we had little confidence in the accuracy of the vaccination information reported by mothers of children without a card, we used only information directly obtained from vaccination cards to construct these variables.

Table 2.6. National vaccination schedule for Burundi

Age	Vaccination
Birth (0 weeks)	BCG, ¹ Polio-0
6 weeks	DPT1-HiB1-HepB1, ² Polio-1
10 weeks	DPT2-HiB2-HepB2, Polio-2
14 weeks	DPT3-HiB3-HepB3, Polio-3
9 months	Measles

¹ Bacille Calmette-Guérin (vaccine against tuberculosis)

² Vaccine against diphtheria, pertussis and tetanus (DPT), hemophilus influenza B (HiB), and hepatitis B (HepB)

Infant and Young Child Feeding Practices

The recently published WHO instrument to measure IYCF practices (WHO, 2010) was used to construct the WHO-recommended indicators of breastfeeding and complementary feeding of children 0–23 months of age.

- **Child ever breastfed.** Proportion of children 0–23 months of age ever given breast milk (based on historical recall of the primary caregiver).
- **Early initiation of breastfeeding (within 1 hour of birth).** Proportion of children 0–23 months of age that were put to the breast within 1 hour of birth (based on the historical recall of the primary caregiver).
- **Exclusive breastfeeding of children among children under 6 months of age.** Proportion of children 0–5 months of age that were given nothing but breast milk (no other liquids or solids) in the past 24 hours. It must be noted that the indicator does not calculate the percentage of children under the age of 6 months that were exclusively breastfed; it only defines the percentage of children less than 6 months of age that were exclusively breastfed in the last 24 hours. The indicator likely overestimates the children that were exclusively breastfed.
- **Predominant breastfeeding among children under 6 months of age.** Proportion of children 0–5 months of age given breast milk and any other liquids (including water), but no solids, in the past 24 hours. Those children classified as exclusively breastfed by the previous indicator are also classified as predominantly breastfed.
- **Continued breastfeeding at 1 year of age (12–15 months).** Proportion of children 12–15 months of age that were breastfed in the past 24 hours.
- **Continued breastfeeding to 2 years of age (20–23 months):** Proportion of children 20–23 months of age that were breastfed in the past 24 hours.
- **Age-appropriate breastfeeding.** Proportion of children 0–23 months that are appropriately breastfed, which combines the proportion of children from birth to 6 months of age given only

breast milk in the past 24 hours and the proportion of children 6–23 months of age that received breast milk, as well as solid, semi-solid, or soft foods, during the previous day (see next section).

- **Bottle feeding.** Proportion of children 0–23 months of age fed using a bottle in the past 24 hours.
- **Milk feeding frequency for non-breastfed children (\geq two milk feedings/day).** Proportion of non-breastfed children 6–23 months of age given at least two milk feeds in the past 24 hours.
- **Introduction of solid, semi-solid, or soft foods (6–8 months).** Proportion of children 6–8 months of age given solid, semi-solid, or soft foods in the past 24 hours.
- **Consumption of iron-rich or iron-fortified foods.** Proportion of children 6–23 months of age that were fed iron-rich food (or food that was fortified with iron and made especially for children) in the previous 24 hours. In Burundi, food fortified with iron can include CSB and other cereal-based fortified food products.
- **Minimum dietary diversity (\geq four food groups).** Proportion of children 6–23 months of age that consumed at least four food groups (out of seven nutrient-rich food groups¹¹) in the past 24 hours.
- **Minimum meal frequency.** Proportion of children, both breastfed and non-breastfed, given a minimum number of meals in the past 24 hours. 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. For non-breastfed children, the number of meals was set at four.
- **Minimum acceptable diet.** Proportion of children 6–23 months of age that received the minimum acceptable diet. 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 at least four food groups (out of six nutrient-rich food groups¹²), and having the minimum meal frequency in the past 24 hours.

Anthropometric Measures

The primary caregivers' and children's anthropometric data were used to construct the following indicators.

- **Maternal body mass index (BMI).** Calculated as weight (kg)/height² (m²). Four BMI categories were created: underweight (BMI < 18.5), normal weight (BMI between 18.5 and 25), overweight (BMI between 25 and 30); and obese (BMI > 30) (WHO, 1995).
- **Child HAZ, weight-for-height z-score (WHZ), and weight-for-age z-score (WAZ).** Calculated using the 2006 WHO growth standards (WHO, 2006). Stunting was defined as HAZ < -2, wasting as WHZ < -2, and underweight as WAZ < -2.
- **Maternal and child Hb and anemia.** Hb concentrations vary with altitude and tend to be lower in people of African descent. The Hb concentration values were thus adjusted according to the international guidelines. Anemia was defined as having Hb concentrations < 12 g/dl in non-pregnant women and < 11 g/dl in pregnant women and children (International Nutritional Anemia

¹¹ Seven food groups: grains, roots, and tubers; legumes, nuts, and pulses; milk and dairy products; eggs; flesh foods; vitamin A-rich foods; and other fruits and vegetables

¹² Six food groups: grains, roots, and tubers; legumes, nuts, and pulses; eggs; flesh foods; vitamin A-rich foods; and other fruits and vegetables

Consultative Group, 2002). Severe anemia was defined as having Hb concentrations < 7 g/dl for both women (pregnant and non-pregnant) and children (WHO, 2001).

Child Development Indicators

The following indicators were created using the UNICEF MICS – Round 4 protocol.

- **Support for learning.** Percentage of children age 36–41 months with whom an adult engaged in four or more activities to promote learning and school readiness in the past 3 days.
- **Father’s support for learning.** Percentage of children age 36–41 months whose father has engaged in one or more activities to promote learning and school readiness in the past 3 days.
- **Learning materials, children’s books.** Percentage of all children that have three or more children’s books.
- **Learning materials, playthings.** Percentage of all children that have two or more playthings.
- **Inadequate care.** Percentage of children left alone or in the care of another child younger than 15 years of age¹³ for more than 1 hour at least once in the past week.

Children’s motor and language development were assessed using parental reports scales. These scales were adapted from scales that have been used in Tanzania (Stoltzfus et al., 2001; Olney et al., 2009a). The items from these scales were taken from other developmental measures, including the Griffiths and McCarthy scales (Griffiths, 1970; McCarthy, 1972). The items are ordered to reflect a generally accepted sequence of motor and language development.

Using these scales, motor and language development were examined in two ways. First, the mean and median age of the children that were reported to have a given milestone as the highest achieved milestone were calculated for each milestone in the two scales. Second, the median age of achievement of selected motor milestones was compared to children from Nepal and Tanzania (Siegel et al., 2005; Kariger et al., 2005), as well as to the standards established by WHO for achievement of these particular motor milestones (WHO, 2006).

Data Analysis

The data were analyzed using Stata version 11 (StataCorp, 2009). In the results section, the variables or indicators of interest are presented as percentages or means and standard deviations¹⁴ (SDs) as appropriate. In all results tables, the variables and indicators are presented by study group. For child nutritional status, the results are also presented by sex and age category. The final sample size for each variable and indicator is reported in the results tables.

The comparability of the four study arms on relevant variables is presented. To determine if the arms were comparable, we used the following linear model for continuous and dichotomous variables:

where y_i is the variable or indicator of interest for observation i . We included three dummy variables (S_i) for the study arms. The standard errors of the parameters were adjusted for the (potential) lack of independence between observations in the same *colline* by using a clustered sandwich estimator. A joint F-test was used to determine whether there were statistically significant differences in continuous variables between the study arms.

¹³ The MICS surveys use a 10 year cutoff. Due to an oversight, the questionnaire asked about care provided by a child younger than 15 years of age.

¹⁴ Non-normally distributed variables are presented as medians.

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

Results were considered significantly different between the strata if $p < 0.05$. Variables that have significant differences between the study arms are marked with an asterisk (*) in the tables.¹⁵ For categorical variables, the asterisk is placed in the row of the last category.

It must be noted that even in absence of true differences between study arms, it is to be expected that at $\alpha = 0.05$, 5% of the tests will result as significant; only a larger percentage of differences found would indicate that the study arms were not comparable. The statistically significant differences are discussed in Section 7.

¹⁵ A footnote explaining the asterisk is added to the tables with at least one statistically significant difference between groups. If no differences were detected, the footnote is omitted.

3. Results: Local Health Centers and Community Characteristics

The following section describes the 13 health centers located within the study *collines* and the characteristics of the 60 research *collines* themselves.

3.1. HEALTH CENTER CHARACTERISTICS AND HEALTH SERVICES

Thirteen health centers were located within the 60 research *collines*. The median¹⁶ reported number of people served by each health center was 12,350. Most health centers offered a waiting area for patients (12/13) and beds for observation and inpatient care (10/13), with a median¹⁶ of 10 beds per facility. Less than one-quarter (3/13) provided a consultation room specifically for children under 5 years. Although most facilities reported providing emergency care, on average they provided only about half a day of these services per week. On average, health centers offered about 3 days per week of preventive services for children, preventive services for pregnant women, and preventive services for postpartum women. Health centers were not typically staffed by doctors. Compared to the national norm for primary health care facilities, health centers were understaffed in terms of level A2 nurses, level A3 nurses with experience, health promoters, and lab workers.¹⁷

Table 3.1. Health center characteristics*

General characteristics	
Number of people served (median)**	12,350
Infrastructure	
Waiting room	12/13
Consultation room for children < 5 years of age	3/13
Beds for inpatient care and observation	10/13
Number of beds (median)**	10
Emergency services	11/13
Hours of service per week	
Emergency services*	4.6 (16.6)
Preventive services for children < 5 years of age	22.5 (15.8)
Preventive services for pregnant women	24.1 (15.8)
Preventive services for postpartum women	22.9 (22.0)
Staff***	
Nurse A2 level**** (≥ 1)	6/13
Nurse A2 level or A3 level ⁴ with experience (≥ 2)	6/13
Nurse A3 level (≥ 3)	13/13
Health promoter***** (≥ 1)	9/13
Lab worker (≥ 1)	1/13
Manager (≥ 1)	5/13

* Values are mean (SD) or counts, unless otherwise noted.

** Value is median due to skewed distribution.

*** The Ministry of Health norm is indicated between brackets.

**** Nursing levels: A1 level nurses complete high school and 2 years of nurse training at the university level. A2 level nurses complete 4 years of nurse training after completing the 10th grade. A3 level nurses complete 2 years of nurse training after completing the 10th grade;

***** The health promoter's role involves promoting health-, hygiene-, and sanitation-related messages and practices.

The estimated number of children under 5 years of age that lived in each facility's catchment area was reported by 6 facilities and averaged 3,365 children. The number of children that attended growth

¹⁶ The median, rather than mean, is presented due to skewed distribution.

¹⁷ Due to the small number of observations, we report absolute numbers rather than percentages.

monitoring during the previous month was reported by 8 facilities and averaged 159 children under 5 years of age (around 5% of eligible children). Nearly all health centers offered preventive child health services, such as growth monitoring, vaccinations, vitamin A supplements, and de-worming medications. The availability of curative services was more variable: The majority of health centers surveyed could evaluate the child's temperature, provide antibiotics, offer on-site oral rehydration in case of diarrhea, conduct blood tests, and treat fever using acetaminophen and/or a wet sponge. Less than half of the health centers, however, could provide such services as stool or urine tests and oral rehydration salts (ORS) or zinc in case of diarrhea.

Not all facilities provided services for severely malnourished children. About half could provide Plumpy'nut[®] or reported referrals to specialized centers. Only two offered hospitalization if necessary.

Table 3.2. Services available to children under 5 years of age at health centers*

Estimated number of children 0–5 years of age in area served (average of 6 facilities)	3,365 (2,136)
Number of children 0–5 years of age that attended growth monitoring during previous month (average of 8 facilities)	159 (100)
Preventive services	
Growth monitoring	12/13
Regular vaccinations	12/13
Regular supplementation	11/13
De-worming of children	11/13
Curative services	
Take the child's temperature	13/13
Antibiotics	11/13
On-site oral rehydration in case of diarrhea	10/13
Blood work	10/13
Acetaminophen and/or wet sponge to treat fever	9/13
Stool tests	6/13
ORS in case of diarrhea	3/13
Urine tests	3/13
Zinc pill or packet in case of diarrhea	2/13
Intravenous rehydration in case of severe diarrhea	2/13
Services offered to severely malnourished children	
Refer to a specialized center	6/13
Food supplements	5/13
Corn-soy blend	3/13
Plumpy'nut [®]	7/13
Hospitalization if needed	2/13

* Values are mean (SD) or counts unless otherwise noted.

Of the 13 health centers surveyed, most provided prenatal and delivery services, with an average of 128 deliveries at those facilities over the preceding 3 months. Most health centers provided postpartum services, with an average of 72 visits over the preceding 3 months. Where prenatal care was offered, the services typically included weighing mothers, measuring maternal height and blood pressure, and providing iron-folate prenatal supplements and tetanus vaccinations. Less common services included anemia tests, urine tests, HIV tests, de-worming medicines, iron-sulfate prenatal supplements, and folic acid prenatal supplements. Eight of the 13 health centers provided vitamin A supplements to postpartum women within the 6-week period following the delivery.

Table 3.3. Prenatal, delivery, and postpartum services*

Number of clinics offering services and number of women served	
Prenatal services	12/13
Delivery services	11/13
Average number of deliveries per clinic during past 3 months	128 (143)
Postpartum services	11/13
Number of postnatal visits per clinic during past 3 months	72 (50)
Prenatal services (including prenatal supplement distribution)	
Weighing	12/12
Measuring height	11/12
Blood pressure	11/12
Anemia test	2/12
Urine test	3/12
HIV test	5/12
De-worming	7/12
Tetanus vaccine	11/12
Iron-folate supplement distribution	10/12
Iron-sulfate supplement distribution	4/12
Folic acid supplement distribution	3/12
Postpartum services	
Provides vitamin A within 6 weeks of delivery	8/13

* Values are counts or mean (SD) unless otherwise noted.

All health centers provided malaria testing. All health facilities also distributed insecticide-treated bednets. Bednets were typically distributed to pregnant women, women at the time of delivery, and to mothers of infants less than 9 months of age. It was uncommon for health centers to distribute bednets for older children.

Table 3.4. Malaria-related services available to the community

Provide malaria test	13/13
Distribute insecticide-treated bednets	13/13
Patients that can receive insecticide-treated bednets	
Pregnant women	13/13
Women at time of delivery	9/13
Infants 0–9 months of age	13/13
Children	1/13

Almost all facilities had an examination table, a delivery table, a refrigerator for vaccines, a thermometer, a stethoscope, a pinard obstetrical stethoscope, an otoscope, sterile gloves, one-time use needles and syringes, and disinfectant.

Most health centers were equipped with child-specific equipment, including scales, height/length measuring boards, mid-upper arm circumference (MUAC) cuffs, graphs to chart weight, and immunization cards. Almost all health centers had a supply of BCG, polio, DPT-HiB-HepB, and measles vaccines. At the time of the survey, all health centers had either the 200,000 IU or 100,000 IU dose vitamin A capsules in stock. Iron-folate supplements were available in 9 of 13 health centers.

Table 3.5. Equipment and medications available for preventive and curative care of children and pregnant women

Equipment and consumables	
Examination table	12/13
Refrigerator (for vaccines)	11/13
Thermometer	13/13
Stethoscope	13/13
Otoscope	12/13
Sterile gloves	13/13
One-time use needles and syringes	13/13
Disinfectant	13/13
Women	
Gynecological lamp	3/13
Gynecological table	8/13
Delivery table	11/13
Pinard obstetrical stethoscope	13/13
Children	
Scale	11/13
Height/length measuring board	13/13
MUAC cuff	11/13
Graph to chart weight	10/13
Immunization card	13/13
Vaccines	
BCG vaccine	13/13
Polio vaccine	12/13
DPT-HiB-HepB vaccine	13/13
Measles vaccine	13/13
Micronutrients	
Iron-folate	9/13
Vitamin A (100,000 IU)	12/13
Vitamin A (200,000 IU)	13/13

3.2. COLLINE CHARACTERISTICS

3.2.1. Utilities, Infrastructure, and Access to Services

Households with access to electricity (either provided by the water company or generated through solar panels) were only found in two *collines*. None of the 60 *collines* had access to an electricity network. Access to a landline telephone was very limited, with only 10% of *collines* reporting a telephone within the *colline* and almost three out of four *collines* having to travel more than 10 km to the nearest landline. Most *collines* had access to a mobile phone network (88.3%), but only 23.3% reported being able to charge a mobile phone within the *colline*. The majority of the *collines* reported having access to clean drinking water (i.e., tap water and public water fountain) during both the dry season and the rainy season.

Table 3.6. Utilities and infrastructure within *collines*

N	Full sample	Study arm			
		T-24	T-18	T-NFP	Control
	60	15	15	15	15
Electricity					
Main source used by households in <i>colline</i>					
Water company	1.7	0.0	6.7	0.0	0.0
Solar panels	1.7	6.7	0.0	0.0	0.0
Electricity network					
Availability, % yes	0.0	0.0	0.0	0.0	0.0
Telephone					
Distance to nearest landline					
0 km (available in <i>colline</i>)	10.0	26.7	6.7	6.7	0.0
1–5 km	11.7	6.7	6.7	20.0	13.3
6–10 km	5.0	6.7	13.3	0.0	0.0
> 10 km	73.3	60.0	73.3	73.3	86.7
Distance to nearest mobile network					
0 km (available in <i>colline</i>)	88.3	93.3	93.3	86.7	80.0
1 to 5 km	6.7	6.7	0.0	13.3	6.7
6 to 10 km	3.3	0.0	6.7	0.0	6.7
> 10 km	1.7	0.0	0.0	0.0	6.7
Possible to charge mobile phone in <i>colline</i> , % yes	23.3	20.0	40.0	6.7	26.7
Water					
Primary source of drinking water during dry season					
Tap water	8.3	13.3	6.7	0.0	13.3
Public water fountain	68.3	73.3	60.0	86.7	53.3
Uncovered well water	3.3	6.7	0.0	0.0	6.7
Unimproved source/river/lake	20.0	6.7	33.3	13.3	26.7
Primary source of drinking water during rainy season					
Tap water	15.0	20.0	20.0	0.0	20.0
Public water fountain	66.7	66.7	66.7	86.7	46.7
Uncovered well water	3.3	6.7	0.0	0.0	6.7
Rainwater	6.7	0.0	6.7	0.0	20.0
Unimproved source/river/lake	8.3	6.7	6.7	13.3	6.7

Approximately two-thirds of the *collines* had access to a regular and to a weekly market within 5 km of their *collines*. Almost all (85%) had access to a church within their *colline*, with most of the others having to travel between 1 and 5 km to reach the nearest church. Access to long-distance transportation was poor: Only 22% of the *collines* had a bus stop available in the *colline*; one-third (33.9%) had to travel between 1 and 5 km to reach the closest bus stop, and nearly one-third (32.2%) had to travel more than 10 km. A government administrative office was available in 13.3% of the *collines*; 45% had to travel 1–5 km from the *colline* center to the closest administrative center; and more than one-fifth (21.7%) had to travel more than 10 km.

Table 3.7. Access to services

N*	Full sample	Study arm			
		T-24	T-18	T-NFP	Control
	60	15	15	15	15
Distance to closest . . .					
Regular market					
0 km (available in <i>colline</i>)	11.7	20.0	6.7	13.3	6.7
1–5 km	50.0	46.7	40.0	60.0	53.3
6–10 km	18.3	20.0	20.0	13.3	20.0
> 10 km	20.0	13.3	33.3	13.3	20.0
Weekly market					
0 km (available in <i>colline</i>)	34.5	23.1	40.0	13.3	60.0
1–5 km	36.2	38.5	40.0	40.0	26.7
6–10 km	15.5	15.4	13.3	20.0	13.3
> 10 km	13.8	23.1	6.7	26.7	0.0
Church					
0 km (available in <i>colline</i>)	85.0	93.3	93.3	66.7	86.7
1–5 km	11.7	6.7	6.7	20.0	13.3
6–10 km	1.7	0.0	0.0	6.7	0.0
> 10 km	1.7	0.0	0.0	6.7	0.0
Bus stop					
0 km (available in <i>colline</i>)	22.0	26.7	33.3	7.1	20.0
1–5 km	33.9	26.7	26.7	50.0	33.3
6–10 km	11.9	13.3	13.3	14.3	6.7
> 10 km	32.2	33.3	26.7	28.6	40.0
Administrative center					
0 km (available in <i>colline</i>)	13.3	26.7	20.0	6.7	0.0
1–5 km	45.0	26.7	46.7	60.0	46.7
6–10 km	20.0	46.7	6.7	13.3	13.3
> 10 km	21.7	0.0	26.7	20.0	40.0

* Maximum sample sizes presented. Sample sizes ranged from N = 58 to 60 in the full sample column; N = 13 to 15 in the T-24 arm; and N = 14 to 15 in the T-NFP arm; there were no missing values in the other arms.

3.2.2. Transportation

The large majority of people travelled within or between *collines* by foot (96.7%). The majority of trips to other cities or provinces are made on foot (46.7%) or by bicycle (21.7%). Most *collines* (70.0%) had a road leading to, or within 1 km of, the center of the *colline* and 28.3% had to travel between 1 and 5 km to reach the closest road. Only a fraction of these roads were made of asphalt (5%). The poor condition of

the roads is reflected in the limited number of months that they could be used. Even four-wheel drive vehicles were reported to not be able to use the road for an average of 2 months in the 12 months preceding the survey. In the majority of *collines* (69.0%), people had to travel more than 10 km to reach the closest asphalt road.

Table 3.8. Local forms of transportation

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
Primary form of transportation . . .					
Within the <i>colline</i>					
Bicycle	3.3	13.3	0.0	0.0	0.0
Walk	96.7	86.7	100.0	100.0	100.0
Between <i>collines</i>					
Bicycle	3.3	6.7	0.0	6.7	0.0
Walk	96.7	93.3	100.0	93.3	100
To go to other cities or provinces					
Bus/minibus	15.0	33.3	6.7	6.7	13.3
Taxi	1.7	0.0	0.0	0.0	6.7
Private car	10.0	0.0	13.3	6.7	20.0
Motorcycle	5.0	0.0	6.7	13.3	0.0
Bicycle	21.7	20.0	20.0	26.7	20.0
Walk	46.7	46.7	53.3	46.7	40.0
Distance from <i>colline</i> center to closest road					
0 km (available in <i>colline</i>)	70.0	73.3	73.3	60.0	73.3
1–5 km	28.3	26.7	26.7	33.3	26.7
6–10 km	0.0	0.0	0.0	0.0	0.0
> 10 km	1.7	0.0	0.0	6.7	0.0
Construction material of closest road					
Asphalt	5.0	0.0	13.3	6.7	0.0
Dirt	86.7	93.3	80.0	86.7	86.7
Laterite***	8.3	6.7	6.7	6.7	13.3
During the last 12 months, number of months the road could be used by . . .					
Simple car	8.3 (4.7)	9.7 (3.5)	9.5 (4.3)	7.0 (5.2)	7.1 (5.2)
4-wheel drive	9.9 (3.8)	10.9 (2.3)	10.7 (3.0)	8.7 (5.0)	9.2 (4.5)
Bus	6.8 (5.3)	6.8 (5.2)	8.5 (4.9)	6.4 (5.7)	5.5 (5.6)
Heavy truck	8.0 (4.7)	8.7 (4.8)	8.5 (4.3)	6.8 (5.1)	8.1 (4.8)
Distance from <i>colline</i> center to closest asphalt road					
0 km (available in <i>colline</i>)	6.9	6.7	13.3	0.0	6.7
1–5 km	20.7	26.7	20.0	7.7	26.7
6–10 km	3.5	0.0	0.0	15.4	0.0
> 10 km	69.0	66.7	66.7	76.9	66.7

* Values are % or mean (SD).

** Maximum sample sizes presented. Sample size was N = 58–60 in the full sample column and N = 13–15 in the T-NFP arm; there were no missing values in the other arms.

*** Laterite is rust-colored soil that can be used for road construction; these roads are considered to be better than a dirt road.

3.2.3. Access to Schools and Health Services

Three out of four *collines* had a primary school within the *colline*; of those without a primary school, the average distance to the nearest primary school was 2.5 km. The average annual cost to attend primary school was 35,918 Burundian Franc (BIF) (equivalent to US\$29.74¹⁸). Most primary schools had a latrine (88.5%) but under a quarter had clean water available (22.5%). Most *collines* had no secondary school (65%) with the nearest secondary school being at on average 4.8 km from the *collines*. The average annual cost to attend secondary school was BIF 137,659 (US\$113.96). Most secondary schools had a latrine (80.9%) and around half had clean water available (54.2%).

Table 3.9. School characteristics

	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
N**	60	15	15	15	15
Primary schools					
Number of primary schools in the <i>colline</i>					
% with 0	25.0	33.3	6.7	40.0	20.0
% with 1	50.0	60.0	40.0	33.3	66.7
% with > 1	25.0	6.7	53.3	26.7	13.3
Distance to primary school if not in <i>colline</i> (km)	2.5 (0.9)	2.8 (1.3)	2.0 (0.0)	2.8 (0.4)	1.7 (0.6)
Annual cost (BIF)	35,918 (17,635)	29,738 (12,745)	40,787 (19,779)	35,096 (19,680)	37,510 (15,647)***
% with latrine	88.5	95.2	89.8	81.8	87.2
% with clean water available	22.5	34.2	18.4	18.2	20.5
Secondary schools					
Number of secondary schools in the <i>colline</i>					
% with 0	65.0	53.3	60.0	66.7	80.0
% with 1	28.3	40.0	26.7	26.7	20.0
% with > 1	6.7	6.7	13.3	6.7	0.0
Distance to secondary school if not in <i>colline</i> (km)	4.8 (2.3)	3.9 (1.9)	5.4 (2.5)	5.4 (3.0)	4.4 (1.7)
Annual cost (BIF)	137,659 (87,155)	117,713 (74,276)	152,800 (87,934)	134,103 (66,708)	148,531 (114,483)
% with latrine	80.9	86.8	70.6	88.2	80.0
% with clean water available	54.2	61.2	52.0	54.6	48.9

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample size ranged from N = 53 to 60 in the full sample column; N = 14 to 15 in the T-24 arm; N = 13 to 15 in the T-18 arm; N = 12 to 15 in the T-NFP arm; and N = 14 to 15 in the control arm.

*** Study arms differ, p-value < 0.05.

¹⁸ The exchange rate from <http://www.oanda.com> on October 1, 2010 (US\$1 = 1,208 BIF) was used here and in the remainder of the document.

Very few *collines* had a public health center (10 of 60)¹⁹ or public hospital (2 of 60) located within the *colline* (Table 3.10). Almost two-thirds of *collines* (61.7%) had a public health center located within 5 km of the *colline* center; 10.0% had to travel more than 10 km to the nearest public health center. Only 20.0% of the population had a public hospital within 5 km of their *colline*, while half (50.0%) had to travel more than 10 km to the nearest public hospital. Typically, *colline* inhabitants walked or biked to all types of health institutions outside their *collines* for medical care. On average, it took inhabitants 1 hour and 42 minutes and 3 hours and 4 minutes to reach their nearest public health center and their nearest public hospital outside their *colline*, respectively. The average cost of an adult visit (i.e., visit fee) to a public health center was 311 BIF (US\$0.26), cheaper than a visit to the public hospital at 725 BIF (US\$0.60).

Table 3.10. Access to health services by the *colline* residents

	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
N**	60	15	15	15	15
Available health facilities in the <i>colline</i>					
Public health center	16.7	13.3	20.0	20.0	13.3
Public hospital	3.3	0.0	0.0	6.7	6.7
Distance to nearest public health center from <i>colline</i> center					
0 km (in the <i>colline</i>)	16.7	13.3	20.0	20.0	13.3
1–5 km	45.0	66.7	33.3	33.3	46.7
6–10 km	21.7	13.3	20.0	26.7	26.7
> 10 km	10.0	6.7	13.3	6.7	13.3
Distance to nearest public hospital from <i>colline</i> center					
0 km (in the <i>colline</i>)	3.3	0.0	0.0	6.7	6.7
1–5 km	16.7	26.7	6.7	20.0	13.3
6–10 km	11.7	6.7	13.3	6.7	20.0
> 10 km	50.0	46.7	80.0	46.7	26.7
Main methods of transportation used to visit health centers outside the <i>collines</i>					
Walk	96.8	91.3	100.0	100.0	97.5
Bicycle	3.2	8.7	0.0	0.0	2.5
Main methods of transportation used to visit hospitals outside the <i>collines</i>					
Walk	62.8	60.0	57.7	60.0	83.3
Bicycle	19.2	32.0	11.5	13.3	16.7
Private car	16.7	4.0	30.8	26.7	0.0*
Bus/minibus	1.3	4.0	0.0	0.0	0.0
Time to travel to the nearest . . . outside the <i>colline</i> (minutes)					
Public health center	101.7 (50.2)	85.0 (40.0)	114.5 (56.6)	89.2 (44.4)	118.0 (54.9)
Public hospital	183.8 (114.9)	165.0 (82.4)	228.0 (158.7)	128.2 (80.6)	201.0 (80.1)
Cost of adult visit by facility (BIF)					
Public health center	311 (802)	444 (997)	166 (329)	337 (998)	267 (670)
Public hospital	725 (1,121)	473 (186)	1,400 (1,882)	500 (204)	267 (238)***

* Values are mean (SD) or %.

** Sample size ranged from N = 49 to 60 in the full sample column; N = 12 to 15 in the T-24 arm; N = 11 to 15 in the T-18 arm; N = 11 to 15 in the T-NFP arm; and N = 10 to 15 in the control arm.

*** Study arms differ, p-value < 0.05.

¹⁹ Note that this number is different from the 13 health centers included in the health center survey (Section 3.1). It appears that 3 of the 13 health centers were considered to be inside the *colline* by the ISTEERU survey staff but outside of the *colline* by the respondents of the *colline* survey.

On average, *collines* had received 7.6 immunization campaigns from 2005 to 2010, lower than the 10 campaigns one would expect for an event that should be organized twice every year. During the same time period, *collines* on average suffered from less than one epidemic, the most common of which were chickenpox and dysentery.

Table 3.11. Immunization campaigns and epidemics between 2005 and 2010

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
	60	15	15	15	15
Number of immunization campaigns	7.6 (4.3)	8.8 (4.0)	7.7 (4.2)	7.3 (4.3)	6.7 (4.9)
Number of epidemics	0.6 (0.9)	0.7 (0.9)	0.9 (1.2)	0.3 (0.8)	0.4 (0.7)

* Values are mean (SD)

** Maximum sample sizes presented. Sample size ranged from N = 59 to 60 in the full sample column and from N = 14 to 15 in the control arm; there were no missing values in the other arms.

3.2.4. Agriculture

Manioc, maize, sweet potatoes, and beans were grown in nearly all *collines*. Groundnuts and sorghum were grown in around 80% of the *collines*, and rice, pigeon peas, finger millet, and potatoes in about 60% of the *collines*.

Table 3.12. The 10 most common crops cultivated within the *colline*

N	Full sample	Study arm			
		T-24	T-18	T-NFP	Control
	60	15	15	15	15
% of <i>collines</i> growing . . .					
Manioc	100.0	100.0	100.0	100.0	100.0
Maize	95.0	93.3	86.7	100.0	100.0
Sweet potato	91.7	86.7	86.7	93.3	93.3
Bean	90.0	86.7	93.3	86.7	93.3
Groundnuts	83.3	73.3	80.0	86.7	93.3
Sorghum	78.3	60.0	80.0	93.3	80.0
Rice	61.7	53.3	60.0	53.3	80.0
Pigeon pea	58.3	60.0	60.0	60.0	53.3
Finger millet	56.7	60.0	60.0	53.3	53.3
Potato	55.0	73.3	53.3	53.3	40.0

All but one *colline* grew avocados. Other common fruits included mango, banana, and pineapple. Oranges, guavas, Japanese plums, papayas, lemons, and coffee were less common.

Table 3.13. The 10 most common tree and fruit crops cultivated within the *collines*

N	Full sample	Study arm			
		T-24	T-18	T-NFP	Control
		60	15	15	15
% of <i>collines</i> growing . . .					
Avocado	98.3	100.0	93.3	100.0	100.0
Mango	85.0	80.0	80.0	86.7	93.3
Banana	80.0	86.7	73.3	73.3	86.7
Pineapple	75.0	80.0	73.3	73.3	73.3
Orange	33.3	40.0	40.0	26.7	26.7
Guava	28.3	33.3	33.3	26.7	20.0
Japanese plum	26.7	33.3	13.3	33.3	26.7
Papaya	25.0	26.7	20.0	20.0	33.3
Lemon	25.0	33.3	20.0	13.3	33.3
Coffee	23.3	26.7	6.7	33.3	26.7

3.2.5. Social Groups, Development Programs, and Recent Events

On average, each *colline* had a total of five associations, cooperatives, or other types of groups. Almost all (96.8%) groups had female members. The most common activities were agriculture (81.9%) and animal breeding (48.7%); other less common types of groups were related to such activities as credit, crafts, beekeeping, fish farming, health, trade, and leisure/culture.

Table 3.14. Presence of associations, cooperatives, or other groups in the *collines*

N	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
		58	15	14	14
Number of groups	5.2 (2.9)	5.4 (3.1)	4.9 (2.9)	4.7 (2.7)	5.6 (3.0)
% of groups with women	96.8	98.8	94.6	94.4	98.8
% of groups with activities related to . . .					
Agriculture	81.9	90.1	78.4	81.7	77.4
Breeding	48.7	44.4	43.2	60.6	47.6
Credit	6.5	7.4	5.4	2.8	9.5
Trade	5.8	7.4	4.1	7.0	4.8
Beekeeping	3.9	3.7	6.8	0.0	4.8
Crafts	3.5	1.2	2.7	4.2	6.0
Health	2.6	4.9	2.7	1.4	1.2
Leisure/culture	1.6	0.0	2.7	4.2	0.0
Fish farming	1.3	0.0	1.4	2.8	1.2
Religion	0.0	0.0	0.0	0.0	0.0

* Values are mean (SD) or %.

Development projects implemented during the past 5 years were related to a variety of sectors, including education, housing, agriculture, health, and infrastructure.

Table 3.15. Development project activities over the past 5 years within *collines*

N	Full sample	Study arm			
		T-24	T-18	T-NFP	Control
		59	15	15	14
Reported at least 1 project	100.0	100.0	100.0	100.0	100.0
% of <i>collines</i> with development projects related to . . .					
School construction and maintenance	61.0	53.3	60.0	57.1	73.3
Housing construction	45.8	53.3	60.0	42.9	26.7
Water supply infrastructure	42.4	60.0	40.0	21.4	46.7
Seed distribution	32.2	46.7	40.0	21.4	20.0
Cattle distribution	32.2	53.3	20.0	42.9	13.3
Health center construction and maintenance	20.3	13.3	26.7	14.3	26.7
Road construction and maintenance	20.3	20.0	26.7	14.3	20.0
Capacity building	10.2	13.3	13.3	7.1	6.7
Free health care services	10.2	26.7	0.0	7.1	6.7*
Erosion protection (agriculture)	6.8	0.0	6.7	14.3	6.7
Dam construction	5.1	6.7	0.0	7.1	6.7
Free schooling	3.4	13.3	0.0	0.0	0.0
Bednet distribution	3.4	6.7	6.7	0.0	0.0

* Study arms differ, p-value < 0.05.

The majority of *collines* (76.7%) reported that more new residents had arrived than current residents had left over the past 5 years. Over the last 12 months, almost half (48.3%) of the communities perceived a greater than usual amount of rain and 63.3% perceived the temperatures to be a lot higher than usual. An overwhelming majority of residents of the *collines* surveyed perceived their living conditions had gotten much worse over the past 6 years. Over the last 6 years, the majority of communities reported local activities organized by members of the *colline*, including adult literacy activities (55.0%), health activities (73.3%), family planning (90.0%), collective work to build/repair infrastructure (86.7%), and collective work to clean the environment (73.3%).

Table 3.16. Recent historical events that occurred within collines

N	Full sample	Study arm			
		T-24	T-18	T-NFP	Control
	60	15	15	15	15
In the last 5 years, the general movement of residents; % of collines reporting . . .					
More arrivals	76.7	73.3	73.3	80.0	80.0
More departures	11.7	13.3	13.3	6.7	13.3
About the same for both	3.3	6.7	6.7	0.0	0.0
No arrivals, no departures	8.3	6.7	6.7	13.3	6.7
Perception of rainfall over the last 12 months; % that said . . .					
More rain than usual	48.3	73.3	46.7	46.7	26.7
A little more rain than usual	3.3	0.0	6.7	0.0	6.7
Almost the same as usual	5.0	0.0	6.7	13.3	0.0
A little less rain than usual	15.0	13.3	0.0	13.3	33.3
A lot less rain than usual	28.3	13.3	40.0	26.7	33.3
Perception of temperature over the last 12 months; % that said . . .					
A lot higher than usual	63.3	53.3	73.3	46.7	80.0
A little higher than usual	11.7	13.3	13.3	6.7	13.3
About the same as usual	20.0	26.7	0.0	46.7	6.7*
A little lower than usual	3.3	6.7	6.7	0.0	0.0
A lot lower than usual	1.7	0.0	6.7	0.0	0.0
Perception of living conditions over the last 6 years; % that said . . .					
Improved	13.3	13.3	13.3	26.7	0.0
Got worse	83.3	80.0	86.7	73.3	93.3
Neither	3.3	6.7	0.0	0.0	6.7
During the past 6 years, proportion of collines with programs organized by colline members					
Adult literacy activities	55.0	66.7	60.0	40.0	53.3
Health activities organized	73.3	93.3	80.0	46.7	73.3*
Family planning activities	90.0	86.7	100.0	86.7	86.7
Collective work to build/repair infrastructure	86.7	100.0	100.0	73.3	73.3
Collective work to clean environment	73.3	93.3	60.0	60.0	80.0

* Study arms differ, p-value < 0.05.

Communities reported having experienced both positive and negative events over the last 5 years. The most frequently reported positive events included housing construction (50.0%), school construction and maintenance (35.0%), free health care services (25.0%), and free schooling and improved security (both around 20%). The most frequently reported negative events included drought (76.7%), famine (50.0%), flood (40.0%), hail (35.0%), and fire (33.3%).

Table 3.17. Positive and negative events that occurred over the last 5 years within *collines*

N*	Study arm				
	Full sample	T-24	T-18	T-NFP	Control
	60	15	15	15	14
% of <i>collines</i> that experienced the following positive events					
Housing construction	50.0	46.7	40.0	60.0	53.3
School construction and maintenance	35.0	33.3	46.7	20.0	40.0
Free health care services	26.7	60.0	13.3	26.7	6.7*
Free schooling	21.7	46.7	13.3	13.3	13.3
Improved security situation	20.0	26.7	20.0	13.3	20.0
Water supply infrastructure	18.3	33.3	13.3	6.7	20.0
Cattle distribution	15.0	20.0	20.0	13.3	6.7
Seed distribution	15.0	13.3	26.7	0.0	20.0
Road construction and maintenance	11.7	6.7	13.3	13.3	13.3
Health center construction and maintenance	8.3	0.0	13.3	6.7	13.3
Bednet distribution	5.0	6.7	13.3	0.0	0.0
Capacity building	3.3	0.0	6.7	6.7	0.0
% of <i>collines</i> that experienced the following negative events					
Drought	78.0	80.0	66.7	73.3	92.9
Famine	50.9	60.0	40.0	46.7	57.1
Flood	40.7	33.3	40.0	46.7	42.9
Hail	35.6	60.0	46.7	26.7	7.1**
Fire	33.9	53.3	26.7	20.0	35.7
Decimated livestock	13.6	6.7	13.3	13.3	21.4
War	5.1	6.7	6.7	0.0	7.1
School closing	5.1	13.3	0.0	6.7	0.0
Human catastrophe/accident	1.7	0.0	0.0	0.0	7.1
Closing of health centers	1.7	0.0	0.0	0.0	7.1
Theft of property during a conflict	1.7	0.0	0.0	0.0	7.1

* Maximum sample sizes presented. Sample size ranged from N = 59 to 60 in the full sample column and N = 14 to 15 in the control arm; there were no missing values in the other arms.

** Study arms differ, p-value < 0.05.

3.3. SUMMARY OF HEALTH CENTER AND COLLINE CHARACTERISTICS

The study *collines* were found to be isolated and to have limited access to basic services, including health care, electricity, and telephone landlines. Even though most *collines* had access to a mobile phone network, only a small proportion reported being able to charge their mobile phones. The majority of the *collines* reported having access to clean drinking water (i.e., tap water and public water fountain) during both the dry season and the rainy season. Most *collines* reported their living conditions had worsened over the last 6 years.

Even though most health centers provide basic preventive and curative services, the virtual absence of higher-level nurses indicates that the quality of the services might be inadequate.

4. Results: Household Characteristics

The following section presents results on household demographics; housing; access to utilities, water, and sanitation; hygiene; food security; economic assets and shocks; and participation in development programs.

As noted in the methods section, the results are presented separately for children 0–23 months of age and children 24–41 months of age. The purpose of presenting the results in different tables is not to compare the indicators between age groups, but to have the baseline values against which we will estimate the impact in 2012 (for the youngest children) and in 2014 (for the oldest children).

4.1. HOUSEHOLD DEMOGRAPHY AND HOUSING

In households with an index child aged 0–23 months, mean household size was 5.6 members, with an average of 2.1 adults and 3.4 children under 18 years of age per household. More than 90% of the household heads were male; they were on average 34.7 years of age. The vast majority of these household heads had very low levels of education: A fifth had no schooling (19.7%), another fifth had only received informal schooling (20.6%), and more than half attended, but did not complete, primary school (53.8%). Farming was the primary occupation of the household heads. The majority of these farmers were self-employed and worked on land owned by themselves or their family (76.2%), a few worked on land owned by someone else (3.0%), and 6.2% worked as agricultural laborers.

Table 4.1a. Characteristics of households with children 0–23 months of age

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
		2,621	432	868	433
Household					
Household size	5.6 (2.0)	5.5 (2.0)	5.7 (2.0)	5.7 (2.1)	5.5 (2.0)
Number of minors (< 18 years old)	3.4 (1.9)	3.3 (1.8)	3.5 (1.8)	3.5 (1.9)	3.4 (1.9)
Number of adults (≥ 18 years old)	2.1 (0.6)	2.2 (0.6)	2.2 (0.6)	2.2 (0.6)	2.1 (0.5)****
Number of children 0–59 months old	1.7 (0.6)	1.7 (0.6)	1.7 (0.6)	1.7 (0.6)	1.7 (0.6)
Percent adults (members ≥ 18 years/household size) x 100	42.6	43.6	42.1	42.8	42.4
Dependency ratio	1.5 (0.9)	1.4 (0.9)	1.5 (0.9)	1.5 (0.8)	1.5 (0.9)
Household head					
Age of household head (years)	34.7 (10.7)	35.4 (11.2)	35.3 (10.9)	34.3 (10.2)	34.1 (10.3)
Sex of household head (% male)	92.24	93.04	93.53	93.53	89.97
Education					
None	19.6	17.9	19.3	16.2	22.5
Preschool	0.2	0.2	0.2	0.2	0.1
Primary incomplete	53.8	55.9	53.0	54.3	53.5
Primary complete	2.0	2.3	2.3	1.2	1.8
Some secondary education	3.6	3.3	3.6	5.8	2.6
Higher education	0.2	0.0	0.5	0.5	0.0
Informal	20.6	20.4	21.2	21.9	19.5

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
		2,621	432	868	433
Occupation					
Unemployed	1.0	1.4	0.8	1.4	0.9
Farms own or family land	76.3	77.3	75.4	73.4	78.0
Farms someone else's land	3.0	1.6	2.9	1.9	4.4
Agriculture laborer	6.2	4.6	5.9	6.2	7.3
Retail***	0.5	0.0	0.1	1.4	0.8
Market/trade	2.2	1.6	2.6	1.9	2.4
Office/institution	3.8	4.6	4.2	5.1	2.3
Manual labor	5.5	6.7	7.3	6.2	2.8
Others	1.4	2.1	0.8	2.5	1.1

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,612 to 2,621 in the full sample column; N = 431 to 432 in the T-24 arm; N = 863 to 868 in the T-18 arm; N = 432 to 433 in the T-NFP arm; and N = 885 to 888 in the control arm.

*** Retail is a more formal form of trade, involving keeping a premise or shop that is owned or rented. Market/trade is informal or petty trade, such as a market stall or street vending.

**** Study arms differ, p-value < 0.05.

The characteristics of households with an index child aged 24–41 months were very similar. As would be expected, the households were somewhat larger (5.9 members), and the head of household slightly older on average (36.6 years of age).

Table 4.1b. Characteristics of households with children 24–41 months of age

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
		3,564	985	585	998
Household					
Household size	5.9 (2.0)	5.9 (2.0)	5.9 (2.0)	5.9 (1.9)	5.9 (2.0)
Number of minors (< 18 years old)	3.7 (1.7)	3.7 (1.7)	3.7 (1.7)	3.7 (1.7)	3.7 (1.8)
Number of adults (≥ 18 years old)	2.2 (0.6)	2.2 (0.7)	2.2 (0.6)	2.2 (0.6)	2.2 (0.6)
Number of children 0–59 months old	1.6 (0.6)	1.6 (0.6)	1.6 (0.6)	1.6 (0.6)	1.6 (0.6)
Percent adults: (members ≥ 18 years/household size) x 100	39.9	40.1	40.1	39.7	39.6
Dependency ratio	1.6 (0.8)	1.5 (0.8)	1.5 (0.8)	1.6 (0.8)	1.6 (0.9)
Household head					
Age of household head (years)	36.6 (10.5)	36.7 (10.7)	37 (10.3)	36.5 (10.6)	36.3 (10.3)
Sex of household head (% male)	92.07	92.39	90.39	92.66	92.16
Education					
None	21.3	16.9	22.9	21.1	24.9
Preschool	0.2	0.4	0.0	0.3	0.0
Primary incomplete	50.1	54.1	44.9	50.5	48.7
Primary complete	1.8	1.7	1.9	2.1	1.6
Some secondary education	3.9	4.1	4.5	4.5	2.7
Higher education	0.2	0.2	0.3	0.2	0.0
Informal	22.6	22.7	25.7	21.3	22.1

	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
N**	3,564	985	585	998	996
Occupation					
Unemployed	1.0	1.3	0.7	1.0	0.7
Farms own or family land	78.0	78.8	75.7	74.7	81.9
Farms someone else's land	2.9	1.9	2.9	2.9	3.6
Agriculture laborer	5.2	4.4	5.0	5.7	5.5
Retailer***	0.4	0.4	0.2	0.4	0.4
Market/trade	2.4	2.4	3.4	2.0	2.0
Office/institution	4.5	4.6	6.0	6.0	1.8
Manual labor	4.7	5.2	4.3	5.7	3.2
Others	1.2	1.0	1.7	1.4	0.8

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,549 to 3,564 in the full sample column; N = 984 to 985 in the T-24 arm; N = 581 to 585 in the T-18 arm; N = 992 to 998 in the T-NFP arm; and N = 991 to 996 in the control arm.

*** Retail is a more formal form of trade, involving keeping a premise or shop that is owned or rented. Market/trade is informal or petty trade, such as a market stall or street vending;

The housing situation was very similar in both samples (children 0–23 months of age and children 24–41 months of old). The majority of households lived in a single building (97.9%) that they owned, with an average of three rooms. Less than 1% of households shared the dwelling with another household. Housing conditions were poor: Almost all dwellings had dirt floors and walls made of rammed earth²⁰ or adobe bricks; about half of the households lived under a roof made out of thatch/straw.

Table 4.2a. Housing characteristics of households with children 0–23 months of age

	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
N**	2,621	432	868	433	888
Home ownership					
Own	97.4	97.5	96.8	97.7	97.8
Dwelling type					
Single building	97.9	99.1	98.1	97.7	97.2
Hut	2.1	0.9	1.9	2.3	2.8
Number of rooms	3.2 (1.2)	3.4 (1.3)	3.3 (1.2)	3.2 (1.3)	3.1 (1.2)
Shared dwelling; % that said yes	0.6	0.5	0.6	0.7	0.7
Housing quality					
Type of floor					
Dirt floor	96.1	96.3	96.2	93.1	97.4
Type of wall					
Rammed earth***	20.9	7.6	19.0	18.9	30.3
Adobe bricks	73.1	87.5	77.2	70.0	63.6
Clay bricks	3.7	2.6	2.0	8.8	3.6
Cement bricks/stone	0.8	1.9	0.2	0.7	0.8
Other	1.5	0.5	1.6	1.6	1.7****

²⁰ Rammed earth (*pisé* in French) is a technique for building walls using raw materials, such as earth, chalk, lime, and gravel. The damp material is poured and then compacted to construct the wall.

	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
N**	2,621	432	868	433	888
Type of roof					
Thatch/straw	50.4	44.7	49.6	48.7	54.7
Corrugated aluminum	36.8	38.9	37.2	36.7	35.4
Concrete/tile	12.8	16.4	13.1	14.6	9.9

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,606 to 2,621 in the full sample column; N = 430 to 432 in the T-24 arm; N = 861 to 868 in the T-18 arm; N = 429 to 433 in the T-NFP arm; and N = 886 to 888 in the control arm.

*** Rammed earth (*pisé* in French) is a technique for building walls using raw materials, such as earth, chalk, lime, and gravel. The damp material is poured and then compacted to construct the wall.

**** Study arms differ, p-value < 0.05.

Table 4.2b. Housing characteristics of households with children 24–41 months of age

	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
N**	3,561	985	585	995	996
Home ownership					
Own	98.2	99.0	96.8	98.3	98.2
Dwelling type					
Single building	98.0	99.4	97.4	97.1	97.8
Hut	2.0	0.6	2.6	2.9	2.2
Number of rooms	3.3 (1.2)	3.5 (1.2)	3.3 (1.2)	3.2 (1.2)	3.1 (1.2)****
Shared dwelling; % that said yes	0.5	0.4	0.5	0.5	0.6
Housing quality					
Type of floor					
Dirt floor	96.2	97.2	94.9	94.0	98.2
Type of wall					
Rammed earth***	17.5	7.1	17.5	16.8	28.4
Adobe bricks	76.2	89.2	76.7	72.5	66.7
Clay bricks	4.1	1.8	3.3	7.9	2.9
Cement bricks/stone	0.8	1.3	0.5	0.8	0.6
Other	1.4	0.5	2.1	2.0	1.3****
Type of roof					
Thatch/straw	47.1	45.6	45.3	45.0	51.8
Corrugated aluminum	39.3	40.0	42.1	38.9	37.6
Concrete/tile	13.5	14.4	12.7	16.1	10.6

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,540 to 3,561 in the full sample column; N = 978 to 985 in the T-24 arm; N = 582 to 585 in the T-18 arm; N = 989 to 995 in the T-NFP arm; and N = 991 to 996 in the control arm.

*** Rammed earth (*pisé* in French) is a technique for building walls using raw materials, such as earth, chalk, lime, and gravel. The damp material is poured and then compacted to construct the wall.

**** Study arms differ, p-value < 0.05.

The results show that households' access to water and sources of energy was very similar in both age groups. Consistent with what was found at the *colline* level, approximately 75% of households had access to clean water (tap), but getting the water took around 37 minutes on average. Only a very small proportion of households had electricity. Almost all households used firewood or straw for cooking. Household light sources included battery-operated equipment (around 46%), firewood or other natural combustible material (30%) and kerosene/oil (around 20%).

Table 4.3a. Water and energy access among households with children 0–23 months of age

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
	2,621	432	868	433	888
Drinking water source					
Tap water	72.4	82.8	68.4	75.3	69.8
Open well	2.4	0.5	3.1	2.8	2.4
Covered well	1.6	0.7	0.5	1.9	3.0
Surface water	23.6	16.0	28.0	20.1	24.8
Rainwater	0.0	0.0	0.0	0.0	0.0
Time to get drinking water (minutes)	37.2 (38.0)	30.7 (26.9)	39.7 (39.7)	37.5 (33.3)	37.9 (42.5)***
Electricity; % yes	0.5	0.0	0.7	0.2	0.6
Energy source for cooking					
Charcoal	1.5	0.7	1.6	3.5	0.8
Firewood/straw	98.2	99.3	98.0	96.1	99.0
Other	0.3	0.0	0.4	0.5	0.2
Energy source for light					
Electricity	0.5	0.0	0.7	0.2	0.7
Kerosene/oil	18.7	31.7	18.2	21.6	11.5
Candles	3.0	3.5	3.7	4.2	1.6
Battery-operated equipment	47.6	38.2	49.0	40.4	54.3
Firewood/straw/coal/dung	30.2	26.6	28.4	33.6	32.0***

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,612 to 2,621 in the full sample column; N = 431 to 432 in the T-24 arm; N = 865 to 868 in the T-18 arm; N = 431 to 433 in the T-NFP arm; and N = 884 to 888 in the control arm.

*** Study arms differ, p-value < 0.05.

Table 4.3b. Water and energy access among households with children 24 to 41 months of age

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
	3,564	985	585	998	996
Drinking water source					
Tap water	74.2	81.7	66.2	77.5	68.2
Open well	2.4	0.3	3.6	3.2	3.1
Covered well	1.7	1.3	0.5	1.9	2.7
Surface water	21.6	16.6	29.7	17.4	26.0
Rainwater	0.0	0.1	0.0	0.0	0.0
Time to get drinking water (minutes)	37.8 (37.1)	30.4 (24.0)	41.7 (42.3)	39.3 (35.2)	41.4 (44.4)***
Electricity; % yes	0.4	0.3	1.2	0.5	0.0
Energy source for cooking					
Charcoal	1.9	1.1	2.1	3.2	1.1
Firewood/straw	97.8	98.7	97.8	96.2	98.7
Other	0.3	0.2	0.2	0.6	0.2***
Energy source for light					
Electricity	0.6	0.2	1.4	0.8	0.2
Kerosene/oil	20.8	30.5	19.8	21.9	10.8
Candles	3.8	4.5	4.3	4.7	2.0
Battery-operated equipment	44.3	40.2	43.3	40.2	53.1
Firewood/straw/coal/dung	30.5	24.6	31.3	32.4	34.0***

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,551 to 3,564 in the full sample column; N = 981 to 985 in the T-24 arm; N = 582 to 585 in the T-18 arm; N = 994 to 998 in the T-NFP arm; and N = 994 to 996 in the control arm.

*** Study arms differ, p-value < 0.05.

4.2. HOUSEHOLD HYGIENE AND SANITATION

Even though one out of four households used unsafe drinking water (see previous section), only about 3% of all households treated their water, mostly by boiling. Most households stored their drinking water in covered containers (about 76%). More than 97% of households had access to a latrine, and less than 10% shared their toilet facilities with another household. When asked about garbage disposal, the most common techniques mentioned were discarding or composting (both around 50%), followed by burying (around 12%). Between 50% and 60% of households reported having a bednet; the mean number of bednets owned by these households was two. Not all households owning a bednet consistently used it: 43.4% and 41.0% of households with an index child 0–23 and 24–41 months, respectively, reported at least one household member having used a bednet the previous night, with an average of 35.0% of household members sleeping under a bednets.²¹

Table 4.4a. Hygiene and sanitation among households with children 0–23 months of age

	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
N**	2,621	432	868	433	888
Drinking water treatment methods					
Nothing	96.7	96.8	96.2	95.8	97.5
Boiling	2.3	2.1	2.8	2.8	1.8
Other	1.0	1.2	1.0	1.4	0.7
Drinking water storage					
Uncovered containers	24.1	24.3	25.4	25.6	21.9
Covered containers	75.8	75.7	74.5	74.1	78.0
No storage	0.1	0.0	0.1	0.2	0.1
Latrines					
Have latrine	97.3	98.4	97.5	98.4	96.0
Shared latrine	9.3	6.0	9.7	8.8	10.7
Garbage disposal***					
Discarded	48.7	40.1	47.8	48.7	53.7
Burned	1.3	1.4	0.8	1.4	1.6
Buried	12.1	13.2	11.9	10.9	12.4
Composted	46.2	51.6	47.2	47.6	41.8
Fed to pigs/animals	0.6	0.2	0.5	0.7	0.9
Bednets					
% of households with bednets	57.4	59.5	60.4	59.4	52.5
If yes, number of bednets	2.0 (1.0)	2.2 (0.9)	2.0 (1.0)	2.1 (1.0)	1.9 (1.0)****
% of households who used a bednet the night before****	43.4	47.7	44.9	44.3	39.2
% of household members who slept under bednet the night before****	36.3	39.9	37.2	38.4	32.6

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,617 to 2,621 in the full sample column; N = 867 to 868 in the T-18 arm; N = 432 to 433 in the T-NFP arm; and N = 885 to 888 in the control arm. There were no missing values in the T-24 arm.

*** Households reported all methods of garbage disposal used, hence totals sum up to more than 100%.

**** These percentages were calculated for all households, irrespective of whether or not it had a bednet.

***** Study arms differ, p-value < 0.05.

²¹ Note that the peak malaria season is from November to March. The bednet use reported in our survey (conducted from October to December) is thus most likely close to the highest use one would find throughout the year.

Table 4.4b. Hygiene and sanitation among households with children 24–41 months of age

N**	Full sample*	Study arm*			
		T-24	T-18	T-NFP	Control
	3,564	985	585	998	996
Drinking water treatment methods					
Nothing	97.3	97.1	98.1	97.2	97.1
Boiling	2.3	2.3	1.7	2.5	2.2
Other	0.5	0.6	0.2	0.3	0.7
Drinking water storage					
Uncovered containers	22.7	22.9	22.3	23.7	21.7
Covered containers	76.9	76.9	77.2	76.0	77.8
No storage	0.4	0.2	0.5	0.3	0.5
Latrines					
Have latrine	97.7	99.2	97.3	97.3	96.9*****
Shared latrine	7.9	5.6	9.3	7.8	9.5
Garbage disposal***					
Discarded	46.0	39.5	47.7	47.5	49.8
Burned	1.6	1.5	1.2	2.1	1.3
Buried	11.8	11.2	8.7	11.9	14.1
Composted	49.8	57.1	49.6	50.0	42.6*****
Fed to pigs/animals	0.5	0.2	0.9	0.6	0.5
Bednets					
% of households with bednets	54.7	60.0	56.1	57.2	46.2*****
If yes, number of bednets	2.2 (1.0)	2.2 (0.9)	2.2 (1.0)	2.2 (1.0)	2.0 (0.9)*****
% of households who used a bednet the night before****	41.2	48.9	42.3	40.7	33.5*****
% of household members who slept under bednet the night before****	34.4	41.4	35.5	34.3	27.1*****

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,552 to 3,564 in the full sample column; N = 584 to 585 in the T-18 arm; N = 993 to 998 in the T-NFP arm; and N = 990 to 996 in the control arm. There were no missing values in the T-24 arm.

*** Households reported all methods of garbage disposal used, hence totals sum up to more than 100%.

**** These percentages were calculated for all households, irrespective of whether or not it had a bednet.

***** Study arms differ, p-value < 0.05.

Approximately 75% of all households had soap in the household and used it the preceding day. The adequate use of soap, however, was very low and did not differ between age groups. When asked when they had used soap yesterday, only around 10% reported washing a child's hands with soap; 4%–5% washed their own hands after defecating or cleaning a child after defecating, 8%–9% before feeding the child, 6%–7% before preparing food, and 21% before eating their own food.

Table 4.5a. Soap use among households with children 0–23 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,615	432	867	432	884
% that . . .					
Have soap in household	72.6	76.9	73.2	71.8	70.3
Used soap today or yesterday	73.2	78.9	72.3	73.6	71.2
When used soap today or yesterday; % that . . .					
Washed child's hands	9.4	12.1	9.9	7.9	8.3
Washed own hands after defecation	4.4	5.4	3.8	5.4	4.1
Washed own hands after cleaning child's defecation	5.1	6.5	4.4	6.3	4.4
Washed own hands before feeding child	8.8	9.5	8.2	8.6	9.1
Washed own hands before preparing food	7.2	7.0	6.4	7.4	7.9
Washed own hands before eating	20.5	19.8	19.5	23.5	20.3

* Maximum sample sizes presented. Sample sizes ranged from N = 2,610 to 2,615 in the full sample column; N = 430 to 432 in the T-24 arm; N = 866 to 867 in the T-18 arm; N = 430 to 432 in the T-NFP arm. There were no missing values in the control arm.

Table 4.5b. Soap use among households with children 24–41 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N	3,562	985	585	997	995
% that . . .					
Have soap in household	74.6	80.4	70.3	75.4	70.6*
Used soap today or yesterday	74.5	81.9	71.8	73.4	69.8*
When used soap today or yesterday; % that . . .					
Washed child's hands	9.6	12.5	7.5	10.5	6.8
Washed own hands after defecation	4.6	3.8	5.1	5.8	3.8
Washed own hands after cleaning child's defecation	4.3	5.2	5.1	4.0	3.2
Washed own hands before feeding child	7.7	9.1	8.0	7.4	6.2
Washed own hands before preparing food	6.4	6.5	6.8	6.7	5.8
Washed own hands before eating	20.7	21.9	20.5	22.9	17.4

* Study arms differ, p-value < 0.05.

Less than a quarter of mothers were evaluated as “clean” in a spot-check of hands, hair, clothes, and face. Just under 30% of the children 0–23 months were evaluated as “clean” using the same criteria; this dropped to 11% in the older children, most likely because they were more engaged in active play. Of the homesteads, 32% of exteriors and only 4%–5% of interiors were evaluated as “clean.” Appendix **Tables B.1a** and **b** provide more details.

Table 4.6a. Spot-check observations in households with children 0–23 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,613	432	867	430	884
% of mothers all clean	23.9	20.1	24.0	22.8	26.2
% of children all clean	29.6	30.7	26.7	28.8	32.4
% of exteriors all clean	32.2	30.9	32.8	31.3	32.7
% of interiors all clean	4.7	6.8	4.1	2.9	5.5

* Maximum sample sizes presented. Sample sizes ranged from N = 1,196 to 2,613 in the full sample column; N = 147 to 432 in the T-24 arm; N = 437 to 867 in the T-18 arm; N = 210 to 430 in the T-NFP arm; and N = 402 to 884 in the control arm. The low number of observations for the “% of interiors all clean” (reflected in the lower value in each of the ranges of observations) was due to the inability to observe the interior of many houses.

Table 4.6b. Spot-check observations in households with children 24–41 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	3,559	983	585	996	995
% of mothers all clean	21.6	19.4	19.8	23.7	22.6
% of children all clean	11.2	10.7	11.8	11.1	11.5
% of exteriors all clean	31.9	31.1	35.4	31.6	31.1
% of interiors all clean	4.3	5.6	6.0	3.2	3.2

* Maximum sample sizes presented. Sample sizes ranged from N = 1,635 to 3,559 in the full sample column; N = 377 to 983 in the T-24 arm; N = 300 to 585 in the T-18 arm; N = 494 to 996 in the T-NFP arm; and N = 464 to 995 in the control arm. We could not observe the interior of many houses. The low number of observations for the “% of interiors all clean” is reflected in the lower value in each of the ranges of observations. Note that the % clean for all variables was calculated using the non-missing observations.

4.3. HOUSEHOLD ASSETS

More than 97% of all households owned a house and land. Households with older children owned slightly more assets than the households with younger children. As the household heads of the older children were slightly older on average, they most likely had had more time to accumulate additional assets than did those of the younger children. Households with a child 0–23 months owned 24.3 household goods (vs. 25.4 in the households with children 24–41 months), 4.3 pieces of agricultural equipment (vs. 4.6), 1.8 small animals (vs. 2.1), and 1.9 medium-sized animals (vs. 2.1). Very few households owned large animals, a motorbike, or a bicycle.

Table 4.7a. Asset ownership among households with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N	2,621	432	868	433	888
% of households that own . . .					
House	97.1	98.4	97.2	96.3	96.6
Land	97.1	97.5	97.7	97.5	96.1
Number of ... owned					
Household goods	24.3 (14.1)	27.3 (13.7)	24.2 (12.8)	25.4 (18.7)	22.4 (12.6)**
Agricultural equipment	4.3 (2.2)	4.8 (2.5)	4.3 (2.1)	4.4 (2.4)	4 (2.1)**
Small animals (poultry, rabbits, guinea pigs)	1.8 (2.2)	2 (2.5)	1.8 (2.1)	1.9 (2.1)	1.8 (2.2)
Medium-sized animals (goat, sheep, lamb)	1.9 (3.7)	1.7 (3)	1.8 (3)	1.8 (3.4)	2 (4.5)
Large animals (cows, pigs)	0.3 (0.9)	0.3 (0.9)	0.3 (0.8)	0.4 (1.2)	0.2 (0.9)
Motorbikes and bicycles	0.4 (0.5)	0.3 (0.5)	0.4 (0.5)	0.4 (0.5)	0.4 (0.5)

* Values are mean (SD) or %.

** Study arms differ, p-value < 0.05.

Table 4.7b. Asset ownership among households with children 24–41 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N	3,564	985	585	998	996
% of households that own					
House	97.5	98.1	97.3	97.4	97.0
Land	97.6	98.3	97.6	98.1	96.6
Number of ... owned					
Household goods	25.4 (13.6)	28.1 (13.2)	25.2 (14.1)	25.9 (15.3)	22.2 (11.3)**
Agricultural equipment	4.6 (2.4)	5 (2.8)	4.5 (2.4)	4.6 (2.4)	4.2 (2.1)**
Small animals (poultry, rabbits, guinea pigs)	2.1 (2.6)	2.2 (2.5)	2.2 (2.8)	2.2 (2.8)	1.9 (2.4)
Medium-sized animals (goat, sheep, lamb)	2.1 (3.6)	2 (3.6)	2.4 (4)	2.1 (3.8)	1.9 (3.3)
Large animals (cows, pigs)	0.3 (1)	0.3 (0.8)	0.4 (1.2)	0.4 (1.3)	0.2 (0.7)**
Motorbikes and bicycles	0.4 (0.6)	0.4 (0.8)	0.4 (0.5)	0.4 (0.5)	0.4 (0.5)

* Values are mean (SD) or %.

** Study arms differ, p-value < 0.05.

4.4. HOUSEHOLD FOOD SECURITY

On average, 10% of households with a child 0–23 months of age had experienced severe hunger and 37% had experienced moderate hunger in the past 4 weeks. The prevalence of hunger was very similar in the households with an older index child. Average dietary diversity was low. On average, households reportedly consumed four food groups out of 12 during the previous day and 65% of the surveyed households had consumed fewer than four food groups.

Table 4.8a. Household hunger and dietary diversity among households with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	2,621	432	868	433	888
Household hunger scale					
Little or no hunger	52.6	59.7	50.9	51.5	51.2
Moderate hunger	37.3	33.3	38.1	38.1	38.0
Severe hunger	10.1	6.9	11.0	10.4	10.7
Household dietary diversity					
HDDS	4.0 (1.6)	4.2 (1.6)	4.0 (1.6)	4.0 (1.9)	3.8 (1.5)
% with HDDS ≤ 4	65.6	63.7	63.6	62.1	70.1

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,615 to 2,621 in the full sample column; N = 866 to 868 in the T-18 arm; N = 431 to 433 in the T-NFP arm; and N = 886 to 888 in the control arm. There were no missing values in the T-24 arm.

Table 4.8b. Household hunger and dietary diversity among households with children 24–41 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	3,564	985	585	998	996
Household hunger scale					
Little or no hunger	54.1	59.8	54.4	53.6	48.6
Moderate hunger	37.2	32.6	37.4	37.5	41.4
Severe hunger	8.7	7.6	8.2	8.9	10.0
Household dietary diversity					
HDDS	4.0 (1.7)	4.1 (1.7)	4.1 (1.6)	4.1 (1.7)	3.8 (1.6)
% with HDDS ≤ 4	64.9	62.6	62.4	65.3	68.3

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,552 to 3,564 in the full sample column; N = 982 to 985 in the T-24 arm; N = 992 to 998 in the T-NFP arm; and N = 993 to 996 in the control arm. There were no missing values in the T-18 arm.

The food group consumption patterns were not different between age groups. The most commonly consumed food groups (consumed by more than 80% of all households) were vegetables²² and roots and tubers; followed by legumes, nuts, and pulses; and fruits, which were consumed by about 60% of all households. Cereals and grains and oils and fats were consumed by approximately 30% of households. The consumption of animal source foods was not common: Around 23% reported having consumed fish and seafood in the past 24 hours, and an even lower proportion of households consumed meat and poultry (5%–6%) or milk and dairy products or eggs (each 2%–3%).

²² The most commonly consumed vegetables are green leafy vegetables, such as amaranth, cassava, bean, and taro leaves.

Figure 4.1a. Consumption of food groups by all households during the past 24 hours among households with children 0–23 months of age

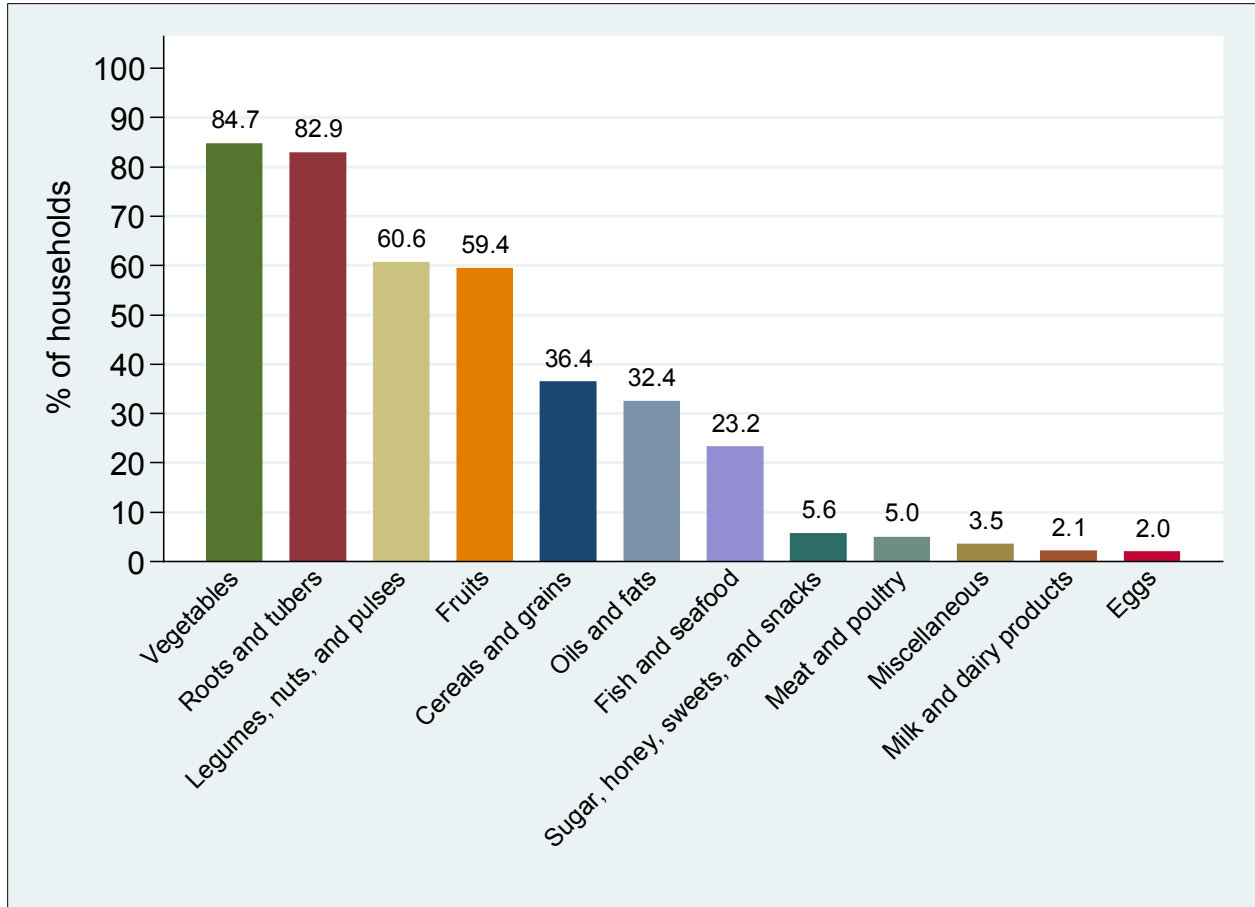
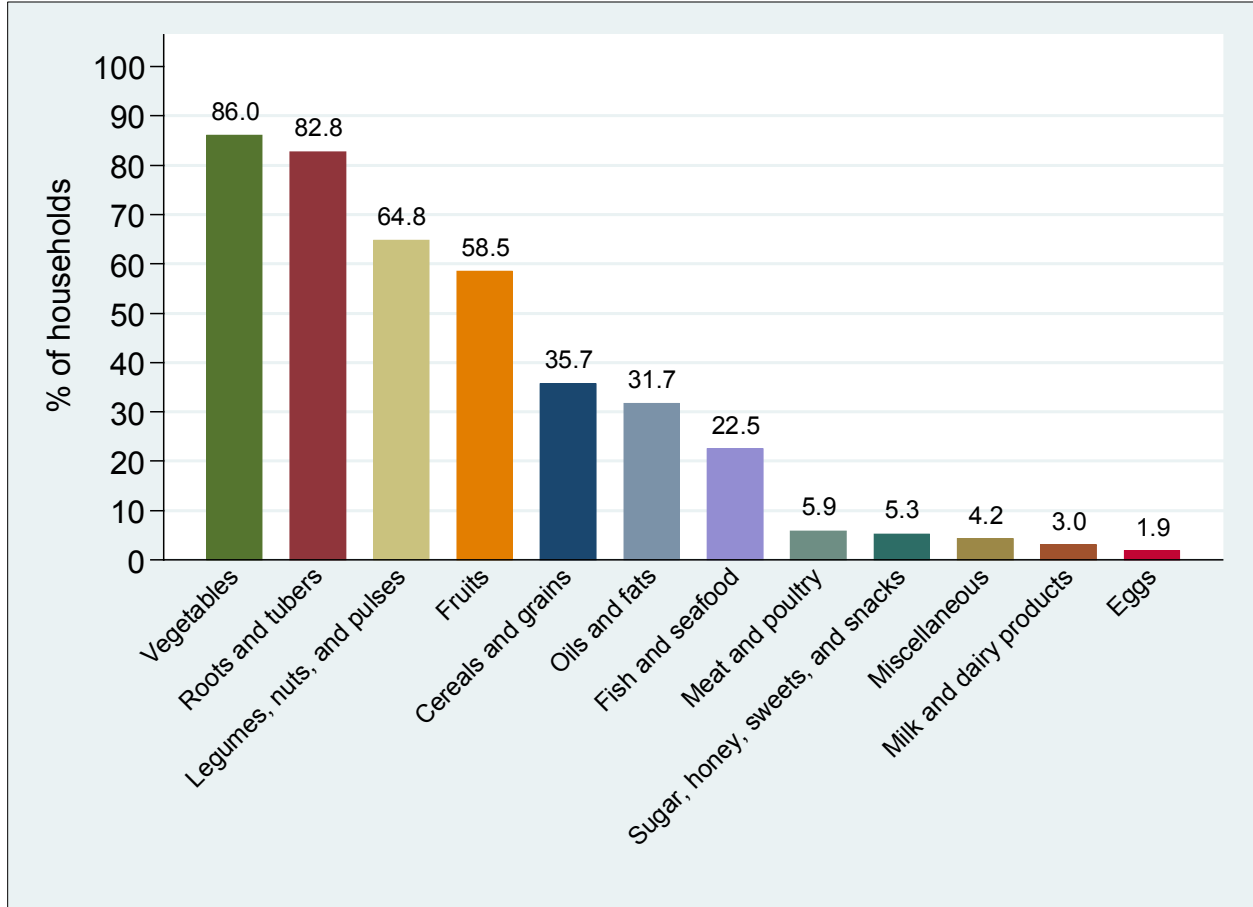


Figure 4.1b. Consumption of food groups by all households during the past 24 hours among households with children 24–41 months of age



Households that consumed fewer than four food groups were considerably less likely than those with higher dietary diversity to consume micronutrient-rich foods, such as legumes, nuts, and pulses; fruits; fish and seafood; meat and poultry; milk and dairy products; and eggs. They were also less likely to consume cereals and grains, oils and fats, and roots and tubers.

Figure 4.2a. Consumption of food groups by HHDS during the past 24 hours among households with children 0–23 months of age

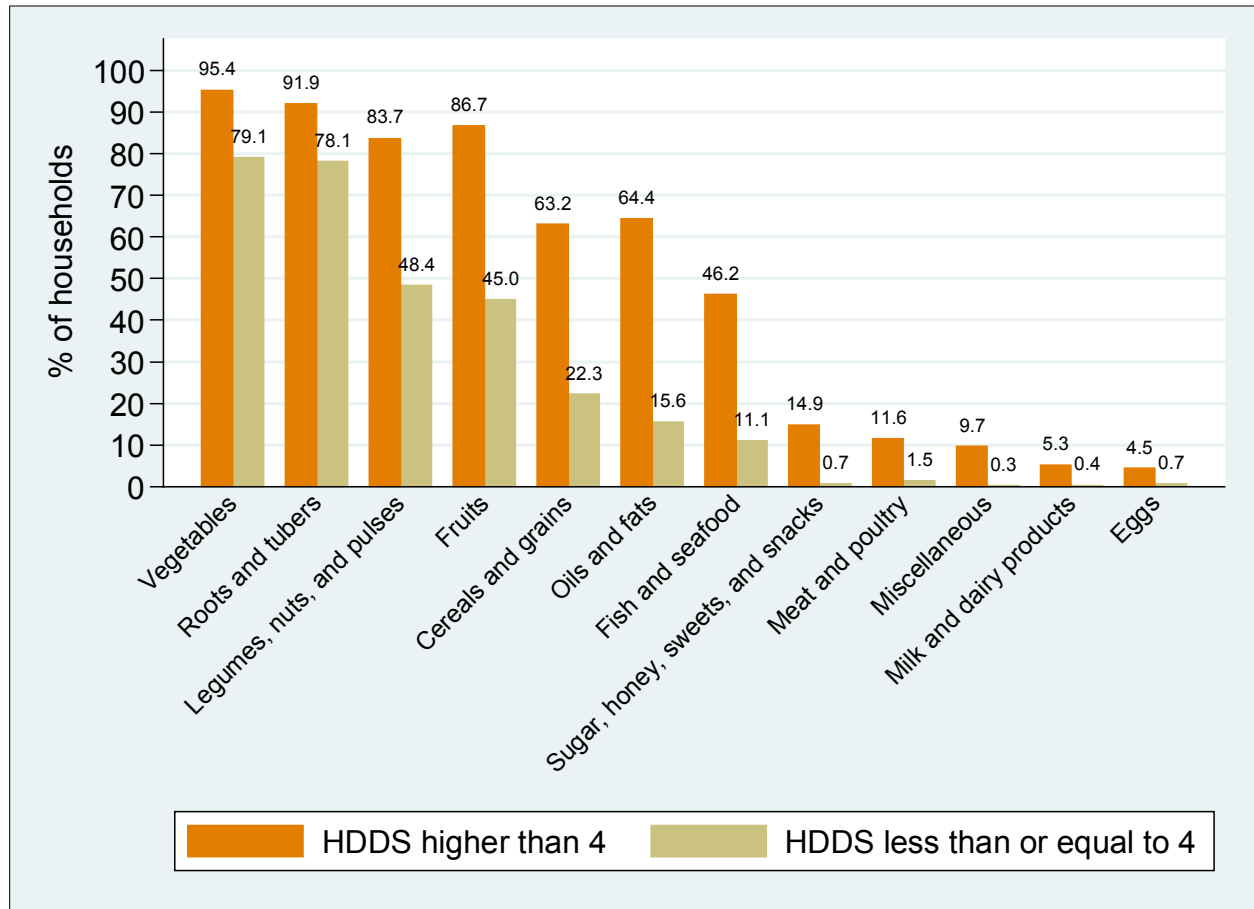
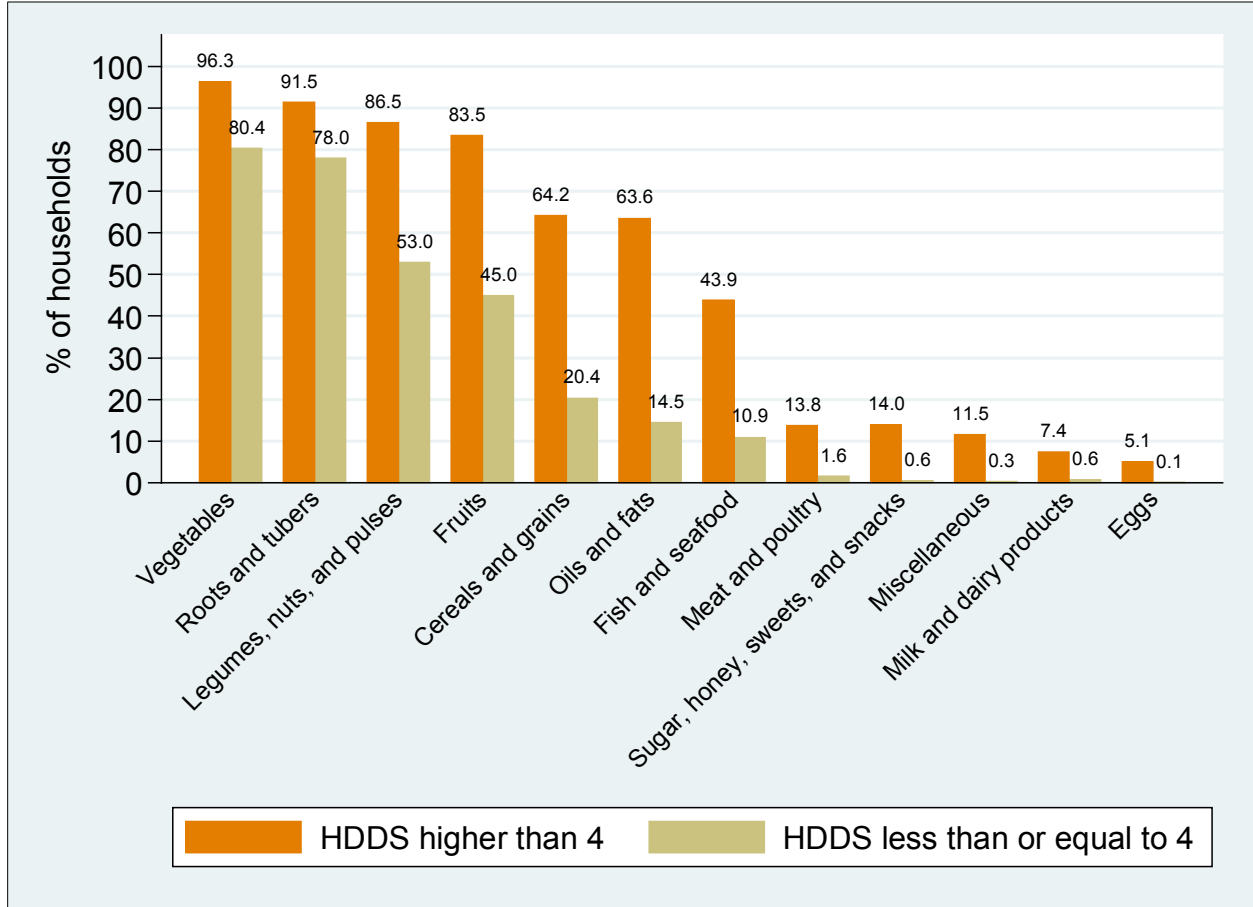


Figure 4.2b. Consumption of food groups by HHDS during the past 24 hours among households with children 24–41 months of age



4.5. HOUSEHOLD PARTICIPATION IN HEALTH, NUTRITION, AND SOCIAL PROGRAMS

Only about 11% of households reported participating in a social, health, or nutrition program. Given the presence of international and nongovernmental organizations in the area, we would have expected this percentage to be higher. The low percentage could indicate that respondents may not have understood the corresponding survey question correctly. The most common programs were related to agriculture and livestock.

Table 4.9a. Participation in health, nutrition, and social programs among households with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N	2,621	432	868	433	888
Households participating in a social, health or nutrition program; % yes	10.6	15.1	8.5	7.4	12.1
Households participating in programs**					
Number of programs in which household is participating	1.1 (0.3)	1.1 (0.2)	1.1 (0.3)	1.1 (0.3)	1.1 (0.3)
% of households participating in ... program**					
Health/medical treatment	5.8	6.2	2.7	12.5	5.6
Food	11.9	20.0	4.1	12.5	12.1***
Cash, vouchers	10.8	12.3	10.8	6.3	11.2
Health and nutrition education	5.0	3.1	1.4	9.4	7.5***
Agricultural inputs (seeds)	75.9	72.3	81.1	53.1	81.3***
Education	1.4	1.5	0.0	6.3	0.9
Training	6.5	4.6	6.8	6.3	7.5
Production equipment	6.5	7.7	9.5	12.5	1.9
Housing development	6.5	3.1	4.1	12.5	8.4
Livestock raising	37.4	38.5	29.7	62.5	34.6***
Commerce	0.0	0.0	0.0	0.0	0.0
Microfinance	0.4	1.5	0.0	0.0	0.0

* Values are mean (SD) or %.

** Responses are for those participating in social, health, or nutrition programs.

*** Study arms differ, p-value < 0.05.

Table 4.9b. Participation in health, nutrition, and social programs among households with children 24–41 months of age

N	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
		985	585	998	996
Households participating in health, nutrition, or social programs; % yes	11.6	14.1	10.9	9.3	11.8
Households participating in programs**					
Number of programs household participates in	1.1 (0.4)	1.1 (0.4)	1.1 (0.4)	1.2 (0.4)	1.1 (0.3)
% of households participating in ... program**					
Health/medical treatment	7.5	6.5	10.9	5.4	8.5
Food	9.2	7.9	7.8	10.8	10.3
Cash, vouchers	6.1	7.9	4.7	4.3	6.0
Health and nutrition education	5.8	2.2	9.4	9.7	5.1
Agricultural inputs (seeds)	78.9	79.9	76.6	78.5	79.5
Education	0.7	0.7	0	1.1	0.9
Training	4.1	6.5	4.7	3.2	1.7
Production equipment	6.5	13.7	6.3	3.2	0.9***
Housing development	5.1	0.7	0	9.7	9.4***
Livestock raising	40.9	45.3	23.4	51.6	36.8***
Commerce	0.5	0.7	0.0	0.0	0.9
Microfinance	0.0	0.0	0.0	0.0	0.0

* Values are mean (SD) or %.

** Responses are for those participating in social, health, or nutrition programs.

*** Study arms differ, p-value < 0.05.

4.6. ECONOMIC SHOCKS

The large majority of households (95% of those with an index child aged 0–23 months and 94% of those with an index child aged 24–41 months) reported having experienced a shock in the past 12 months. On average, households had experienced a total of three shocks. Predominant shocks included disease or injury of a household member, crop losses (due to drought, floods, pests, or hail), and disease or injury of cattle. For each shock, the survey asked about the impact of the shock on the household. When considering the biggest reported impact for each household, more than 80% of households reported a large negative effect. Complete information on the severity of impact that each of the shocks listed below had on households is provided in Appendix **Tables B.2a** and **b**.

Table 4.10a. Prevalence of shocks over the past 12 months among households with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N	2,621	432	868	433	888
% of households experiencing any shock	94.9	96.8	93.9	94.7	94.9
Number of shocks experienced	2.9 (1.7)	3.2 (1.7)	2.9 (1.6)	2.8 (1.7)	2.8 (1.6)
Types of shocks experienced					
Disease/injury of household member	65.3	63.7	66.5	62.4	66.3
Loss of employment	3.1	3.7	3.9	3.0	1.9
Disease/injury of cattle	20.5	24.1	18.6	18.5	21.5
Loss of crop due to flood	48.4	67.4	48.0	46.4	40.5**
Loss of crop due to drought	62.6	49.5	64.4	63.7	66.6**
Loss of crop due to hail	17.8	25.7	18.1	19.0	13.1**
Loss of crop due to pests	32.1	37.1	31.1	29.8	31.9
Victim of theft	12.6	14.4	11.6	13.2	12.3
Housing damage	3.1	4.2	2.9	3.5	2.6
Company bankruptcy	7.7	10.2	6.3	8.8	7.2
Conflicts, disputes, legal issues	8.1	10.7	8.5	6.5	7.3
Death of household member	6.9	7.2	8.5	4.9	6.1
Return of refugees	0.4	0.5	0.6	0.5	0.2
Largest reported effect of all of the experienced shocks					
No effect	7.9	6.2	7.6	5.4	10.2
Small negative effect	11.9	13.2	13.6	11.2	9.9
Large negative effect	80.2	80.6	78.8	83.4	80.0

* Values are mean (SD) or %.

** Study arms differ, p-value < 0.05.

Table 4.10b. Prevalence of shocks over the past 12 months among households with children 24–41 months of age

N	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
	3,564	985	585	998	996
Proportion of households experiencing any shock	94.3	96.6	94.4	93.0	93.4
Number of shocks experienced	3 (1.7)	3.2 (1.7)	2.9 (1.7)	2.9 (1.8)	2.9 (1.8)
Types of shocks experienced					
Disease/injury of household member	64.4	65.0	64.8	62.4	65.6
Loss of employment	2.5	2.4	2.6	2.9	2.0
Disease/injury of cattle	22.8	27.1	20.0	20.5	22.4
Loss of crop due to flood	52.3	63.7	45.5	54.9	42.3**
Loss of crop due to drought	60.4	51.5	65.6	61.0	65.5
Loss of crop due to hail	19.1	22.5	16.4	22.0	14.3
Loss of crop due to pests	32.9	39.4	31.6	26.9	33.3
Victim of theft	12.4	12.5	13.0	11.7	12.6
Housing damage	3.6	4.4	2.9	3.1	3.6
Company bankruptcy	8.2	7.9	6.7	7.3	10.2
Conflicts, disputes, legal issues	8.6	10.0	8.9	7.9	7.8
Death of household member	7.7	8.0	9.4	7.1	6.9
Return of refugees	0.6	0.5	0.7	0.7	0.6
Largest reported effect of all of the experienced shocks					
No effect	6.8	6.3	8.9	6.3	6.7
Small negative effect	12.0	13.5	13.2	10.5	11.3
Large negative effect	81.2	80.2	77.9	83.3	82.0

* Values are mean (SD) or %.

** Study arms differ, p-value < 0.05.

4.7. SUMMARY OF HOUSEHOLD FINDINGS

Housing conditions were poor and heads of household had low levels of education. Farming was found to be the primary occupation of the household heads. The majority of households had access to clean water (tap), but getting the water took almost 40 minutes on average. Even though one out of four households used unsafe drinking water, only a small fraction of households treated their water. The large majority of household had a latrine. Only a very small proportion of households had electricity. Even though many households had soap and reported using it the preceding day, the adequate use of soap was suboptimal. Bednet use was found to be low: Between 50% and 60% of all households owned a bednet and only around 40% of those reported having used it the previous night.

The prevalence of hunger was very high and dietary diversity of the household was limited. Nearly all households reported having experienced a shock in the past 12 months, mostly related to crop losses and disease or injury of a household member. Shocks were perceived by the respondents as having had large negative effects on the household.

5. Results: Mothers Characteristics

The following section details the characteristics and activities of mothers, child care arrangements, and women's status within the household.

5.1. MATERNAL CHARACTERISTICS AND STATUS

In households with an index child aged 0–23 months, the average age of the mother was 28.6 years and 99.5% were the biological mothers of the index child. Mothers of the children 24–41 months of age were somewhat older (30.9 years of age) and a slightly lower percentage (97.3%) were the biological mothers of the index child. The proportion with a spouse or partner was around 88% in both groups. The level of maternal education was very low, with less than 5% of mothers having completed primary education. Correspondingly, close to 40% were illiterate.

Most mothers (more than 90%) reported having worked in the past 12 months. Consistent with the heads of household, almost all reported occupational activities in the agricultural sector. Around 60% of the mothers were remunerated for their work. The mothers' perceived contribution to household expenses, however, was quite small.

Table 5.1a. Maternal characteristics and activities in households with children 0–23 months of age

N**	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
		432	868	433	888
Age (years)	28.6 (7.0)	28.3 (6.8)	29.0 (7.1)	28.6 (6.7)	28.3 (7.1)
Has a spouse or partner	87.9	88.7	89.9	91.2	83.9***
Biological mother	99.5	99.5	99.3	100.0	99.4***
Education					
None	21.5	18.8	19.5	21.5	24.7
Preschool	0.2	0.5	0.2	0.5	0.0
Primary incomplete	44.2	44.7	46.9	39.8	43.5
Primary complete	1.0	1.2	1.2	0.7	0.9
Some secondary education	2.8	3.2	2.5	5.1	1.6
Informal	30.4	31.7	29.7	32.4	29.3
Literacy					
Literate	52.0	56.0	52.7	50.4	50.2
Partially literate	9.2	9.7	9.8	11.1	7.4
Illiterate	38.8	34.3	37.5	38.6	42.4
Worked during the past 12 months					
None	8.3	5.1	7.1	10.1	10.1
Year long	70.6	71.8	69.2	67.3	73.0
Seasonal	9.4	10.4	12.8	12.4	4.2
Sometimes	11.7	12.7	10.9	10.3	12.6

N**	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
	2,621	432	868	433	888
Main occupation					
Unemployed	8.2	5.1	7.0	10.0	10.1
Farms own or family land	79.2	85.4	79.5	76.8	77.1
Farms someone else's land	4.6	3.9	5.0	3.0	5.2
Agricultural labor	6.2	3.2	6.7	7.2	6.8
Market/trade	0.5	0.7	0.2	0.7	0.5
Office/institution	1.0	0.9	1.4	1.9	0.2
Manual labor	0.2	0.5	0.2	0.5	0.0
Other	0.1	0.2	0.0	0.0	0.1
Earnings					
Cash	7.7	4.6	8.7	9.2	7.7
In-kind	31.0	34.9	31.1	36.4	26.1
Cash and in-kind	23.5	27.8	25.1	21.8	20.6
Nothing	37.8	32.7	35.1	32.6	45.7
Mother's perceived contribution to household expenses					
Nothing	23.6	27.3	22.4	21.7	23.8
Almost nothing	17.0	15.7	20.0	14.8	15.7
A little	46.7	42.6	44.6	54.7	46.8
All/Almost all	12.7	14.4	13.0	8.8	13.7

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,403 to 2,621 in the full sample column; N = 410 to 432 in the T-24 arm; N = 806 to 868 in the T-18 arm; N = 390 to 433 in the T-NFP arm; and N = 797 to 888 in the control arm.

*** Study arms differ, p-value < 0.05.

Table 5.1b. Maternal characteristics and activities in households with children 24–41 months of age

N**	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
	3,564	985	585	998	996
Age (years)	30.9 (7.8)	31.2 (7.8)	31.4 (8.3)	30.6 (7.3)	30.5 (7.9)***
Has a spouse or partner	88.6	90.6	87.3	89.0	87.1
Biological mother	97.3	97.2	96.9	98.0	97.1
Education					
None	21.6	16.6	20.1	21.8	27.2
Preschool	0.4	0.7	0.5	0.4	0.0***
Primary incomplete	42.1	47.2	38.4	39.2	42.2***
Primary complete	1.2	1.3	1.7	1.4	0.6
Some secondary education	2.7	2.8	4.0	3.3	1.4
Higher education	0.1	0.0	0.2	0.1	0.0
Informal	31.9	31.4	35.2	33.8	28.5

N**	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
	3,564	985	585	998	996
Literacy					
Literate	52.2	56.2	49.9	52.2	49.5
Partially literate	9.5	11.6	10.9	8.9	7.3
Illiterate	38.3	32.2	39.2	38.9	43.2
Work during the past 12 months					
None	9.0	6.8	7.8	8.7	12.3
Year long	69.8	72.2	68.3	67.4	70.6
Seasonal	8.8	9.8	12.6	10.7	3.8
Sometimes	12.4	11.2	11.4	13.2	13.3***
Main occupation					
Unemployed	9.0	6.7	7.7	8.6	12.2
Farms own or family land	79.7	84.1	80.3	79.4	75.4
Farms someone else's land	3.7	3.3	3.1	3.1	5.0
Agricultural labor	5.0	3.2	5.6	5.2	6.4
Retail	0.1	0.1	0.0	0.1	0.0
Market/trade	0.6	0.7	0.7	0.4	0.6
Office/institution	1.4	1.5	1.9	2.0	0.3
Manual labor	0.4	0.2	0.3	1.1	0.0
Other	0.1	0.2	0.3	0.0	0.1
Earnings					
Cash	7.2	5.0	8.0	9.3	6.6
In-kind	31.0	34.0	31.9	31.2	27.0
Cash and in-kind	25.8	28.4	25.0	26.9	22.4
Nothing	36.1	32.6	35.2	32.5	44.0
Mother's perceived contribution to household expenses					
Nothing	23.4	25.1	23.6	20.9	24.2
Almost nothing	15.1	17.9	13.4	14.0	14.6
A little	48.2	44.4	46.8	53.3	47.6
Almost all	13.3	12.7	16.3	11.8	13.6

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,243 to 3,564 in the full sample column; N = 918 to 985 in the T-24 arm; N = 540 to 585 in the T-18 arm; N = 910 to 998 in the T-NFP arm; and N = 875 to 996 in the control arm.

*** Study arms differ, p-value < 0.05.

Child care arrangements differed for children aged 0–23 months and those aged 24–41 months. Although where the mom worked did not differ between the groups, mothers of the younger children were more likely to report having her child with her when she was not at home compared to those of the older children (76.3% versus 15.3%). Correspondingly, the number of times per week the child was left with somebody else was much lower among the younger children than among the older children (0.7 compared to 3.1 times per week). Of the children that were left with someone other than their mother, two-thirds of the younger children and more than half of the older children were left with minors (younger than 15 years of age).

Table 5.2a. Child care arrangements for households with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	2,618	432	868	431	887
If left with somebody else, with whom:					
Adult (> 15 years)	36.8	48.3	38.4	34.7	30.7
Times per week that child is left with somebody else	0.7 (1.6)	0.6 (1.4)	0.7 (1.6)	0.9 (1.9)	0.7 (1.6)
Location of child if mother is away from home					
With mother	76.3	77.6	75.4	74.5	77.5
With someone else	6.0	5.8	5.2	7.2	6.2
Both	17.7	16.7	19.5	18.3	16.3
Work place location					
Home	26.8	28.2	25.8	28.3	26.3
Outside the home	35.9	37.7	37.9	38.8	31.7
Both	32.3	31.5	32.6	29.7	33.6
Does not work	5.0	2.6	3.7	3.3	8.5

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,615 to 2,618 in the full sample column; and N = 884 to 887 in the control arm. There were no missing values in the T-24, T-18, or T-NFP arms.

Table 5.2b. Child care arrangements for households with children 24–41 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	3,561	984	585	998	995
If left with somebody else, with whom:					
Adult (> 15 years)	45.0	50.8	45.6	45.5	37.9
Times per week that child is left with somebody else	3.1 (2.3)	3.1 (2.2)	3 (2.3)	3.3 (2.3)	3.1 (2.3)
Location of child if mother is away from home					
With mother	15.8	11.9	20.3	14.0	18.8
With someone else	47.5	47.8	40.5	50.8	48.1
Both	36.7	40.4	39.2	35.2	33.1***
Work place location					
Home	28.1	29.0	23.8	29.8	28.0
Outside the home	33.2	33.9	34.9	34.1	30.7
Both	33.1	33.1	36.6	32.5	31.7
Does not work	5.6	4.0	4.6	3.7	9.7

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,556 to 3,561 in the full sample column; N = 584 to 585 in the T-18 arm; N = 992 to 998 in the T-NFP arm. There were no missing values in the T-24 or control arms.

*** Study arms differ, p-value < 0.05.

Decision-making power within the household differed considerably across the different decision-making domains. For all of the domains, however, only a small percentage of mothers reported being solely responsible for the majority of decisions. Women were found to have the least power in issues related to working and control over earnings, where most of the decisions were made by her partner alone. Reproductive decisions (e.g., the mother’s use of birth control and deciding on having another child) and issues related to disciplining children were mostly jointly decided. Women were found to have the most power in decisions related to care for a sick child (just below 30% of mothers deciding by themselves). The age of the child did not change the decision-making patterns. Summary statistics are presented in Appendix **Tables C.1a** and **b**.

Figure 5.1a. Mother’s decision-making power among households with children 0–23 months of age

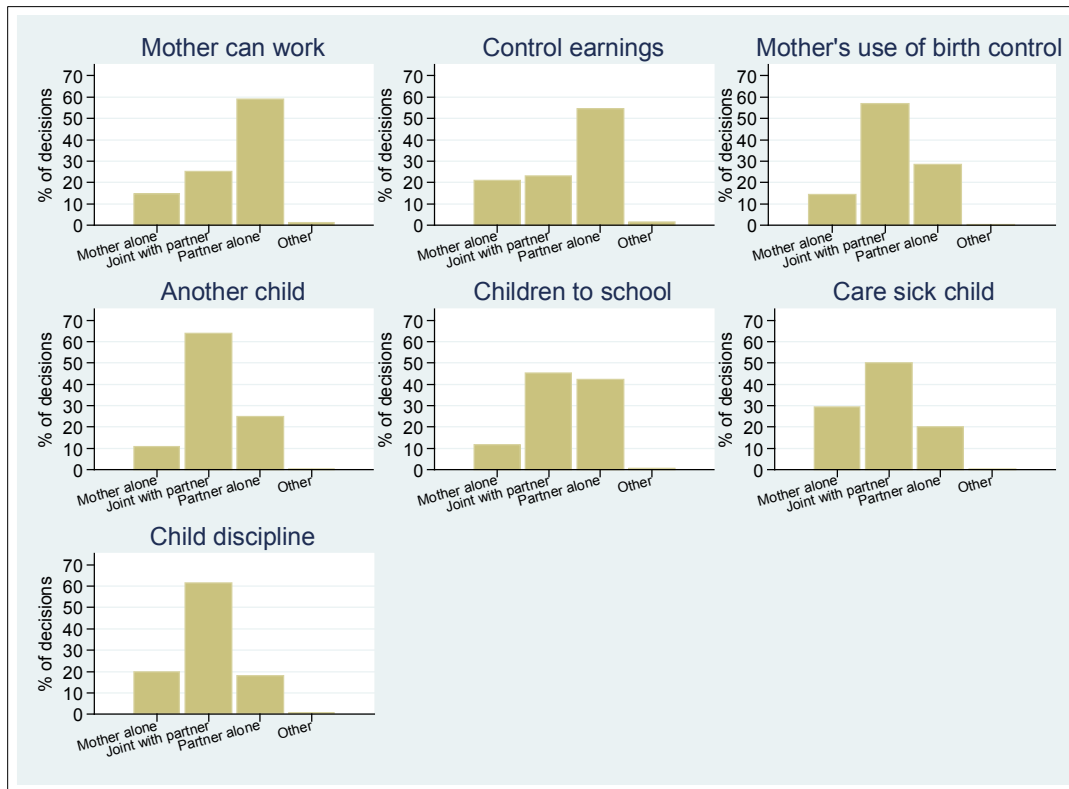
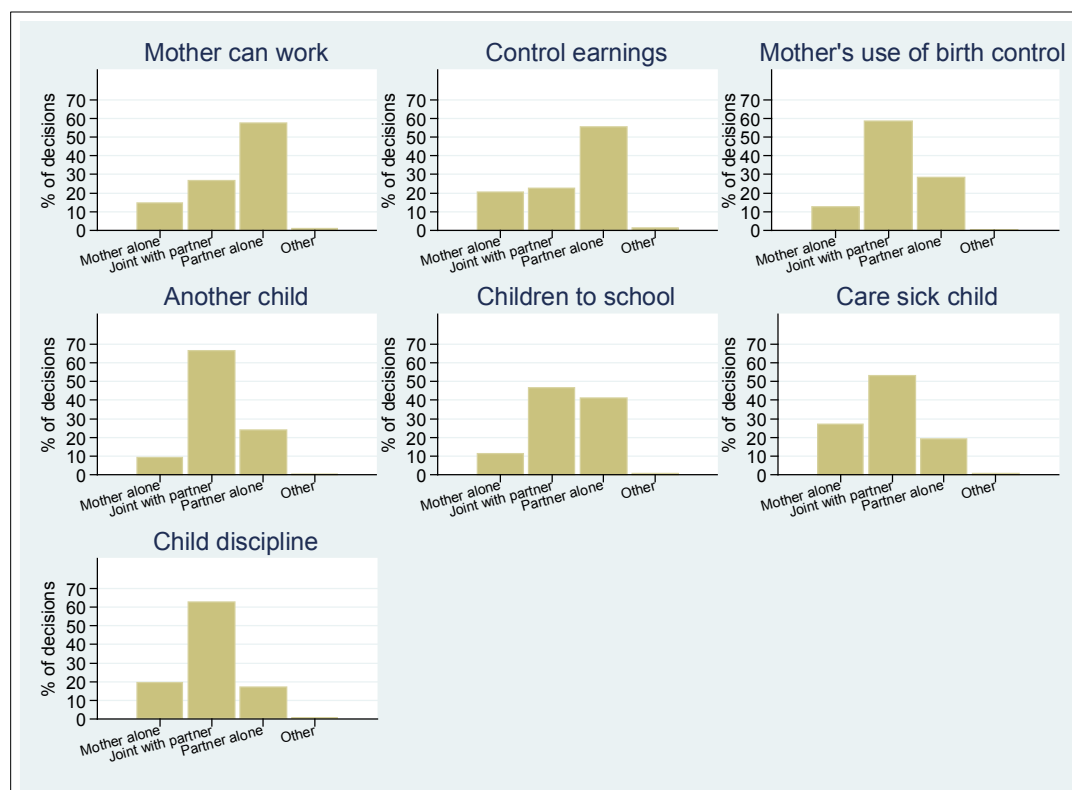


Figure 5.1b. Mother's decision-making power among households with children 24–41 months of age


In line with the results related to decision-making power, women in this sample were also unlikely to own assets that they could sell or to have money that they could spend autonomously. Less than 10% of these women owned and could sell their land, residence, livestock, or jewelry. Although a slightly larger proportion of women in the sample with the older children had money they could spend on their own compared to those in the sample of younger children (14.4% compared to 12.8%), less than 15% had autonomy in this domain.

Table 5.3a. Ownership and control of assets of women with children 0–23 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,620	432	868	433	887
Maternal assets; % that own and can sell					
Land/farm/fields	7.5	6.5	7.7	10.4	6.3
Primary residence	7.2	5.6	7.4	9.7	6.4
Secondary residence	0.9	1.2	0.6	1.2	0.9
Jewelry/stones	8.7	10.5	10.9	8.1	6.1
Livestock	9.0	7.5	9.5	10.9	8.2
Has own money to spend autonomously; % yes	12.8	10.4	13.4	13.2	13.3

* Maximum sample sizes presented. Sample sizes ranged from N = 2,611 to 2,620 in the full sample column; N = 429 to 432 in the T-24 arm; N = 862 to 868 in the T-18 arm; N = 431 to 433 in the T-NFP arm; and N = 886 to 887 in the control arm.

Table 5.3b. Ownership and control of assets of women with children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		985	585	998	996
Maternal assets; % that ho own and can sell					
Land/farm/fields	8.1	6.8	7.6	9.6	8.1
Primary residence	7.5	6.0	7.4	8.0	8.5
Secondary residence	0.7	0.9	1.0	0.2	0.6
Jewelry/stones	8.9	10.5	10.1	8.9	6.5
Livestock	9.0	8.7	9.3	10.1	8.1
Has own money to spend autonomously; % yes	14.4	14.6	15.7	13.8	14.0

* Maximum sample sizes presented. Sample sizes ranged from N = 3,554 to 3,564 in the full sample column; N = 982 to 985 in the T-24 arm; N = 583 to 585 in the T-18 arm; N = 995 to 998 in the T-NFP arm; and N = 991 to 996 in the control arm.

5.2. FEEDING, CARE, AND HEALTH KNOWLEDGE OF MOTHERS

The following section details maternal knowledge of appropriate practices for health care, breastfeeding, complementary feeding, and hygiene.

Only around half of the mothers interviewed knew that abdominal pain is a danger sign of complications in pregnancy.²³ Less than 30% mentioned vaginal bleeding. Other signs requiring immediate medical attention were mentioned by less than 15% of the respondents. The large majority knew that fever is a danger sign of childhood illness. The two other most commonly mentioned danger signs in regard to childhood illness were the intensification of symptoms and the inability to eat or drink, with about 41% and 24% mentioning the two, respectively. Other signs requiring immediate attention from a trained health professional (such as bloody stools and rapid and difficulty breathing) were mentioned by less than 15% of the mothers in either sample.

Knowledge with respect to the treatment of diarrhea was quite high: More than 90% of mothers knew about ORS and around 80% of mothers gave only correct answers regarding the correct treatment of diarrhea. Around 61% gave only correct answers regarding feeding a sick child, and 83% gave only correct answers regarding feeding a child during convalescence.²⁴ Overall, mother's knowledge about danger signs and the treatment of illness was similar in both age groups.

²³ This question was asked only to the mothers of the children aged 0–23 months.

²⁴ Mothers were asked about what to do when a child has diarrhea, and what to feed a sick child and a child recovering from illness. Answers included giving ORS, providing less, the same or more liquids, providing less, the same or larger quantities of food, etc. All answers were recorded. For each mother we then evaluated whether the answers given were all correct, all incorrect or a combination of correct and incorrect.

Table 5.4a. Health care knowledge of mothers among households with children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		432	868	433	887
Danger signs of pregnancy; % that said:					
Vaginal bleeding	27.2	25.8	28.1	24.9	28.2
Abdominal pain	48.2	45.7	49.5	52.1	46.3
Persistent back pain	13.6	16.1	15.3	14.6	10.3
Vaginal discharge	7.1	3.8	7.3	9.6	7.1**
Swollen hands/face	3.8	2.6	2.9	4.7	4.7
Severe headache/vision trouble	3.5	3.3	3.7	4.7	2.6
Regular contractions before 37 wks	4.3	3.6	3.6	5.2	4.9
No fetal movement	2.0	2.2	1.5	2.7	2
Danger signs of childhood illness; % that said:					
Cannot drink/breastfeed	25.6	29.6	25.0	27.9	23.1
Symptoms intensify	41.0	40.7	39.5	39.3	43.3
Fever	94.5	93.3	94.9	94.2	94.7
Rapid breathing	8.2	8.6	7.0	8.1	9.2
Difficulty breathing	9.5	10.9	9.2	11.8	8.1
Bloody stools	12.0	10.7	11.8	14.6	11.6
Difficulty swallowing	2.9	3.9	3.2	1.9	2.5
% that know about oral rehydration salts (ORS)	92.4	93.0	91.9	92.6	92.5
Treating diarrhea; % that gave:					
Only correct answers	80.0	75.0	82.4	79.0	80.6
Combination of correct and incorrect	15.1	19.2	13.6	15.2	14.4
Does not know	4.9	5.8	4.0	5.8	5.0
Feeding a sick child; % that gave:					
Only correct answers	60.7	61.5	60.3	63.2	59.6
Only incorrect answers	34.7	34.6	34.1	31.9	36.6
Does not know	4.6	4.0	5.6	4.9	3.9
Feeding a child immediately following recovery; % that gave:					
Only correct answers	82.5	87.7	82.6	82.1	80.1
Only incorrect answers	16.1	11.2	16.2	15.5	18.6
Does not know	1.4	1.2	1.2	2.4	1.3

* Maximum sample sizes presented. Sample sizes ranged from N = 2,579 to 2,620 in the full sample column; N = 422 to 432 in the T-24 arm; N = 861 to 868 in the T-18 arm; N = 426 to 433 in the T-NFP arm; and N = 870 to 887 in the control arm.

** Study arms differ, p-value < 0.05.

Table 5.4b. Health care knowledge of mothers among households with children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		985	585	998	996
Danger signs of childhood illness; % that said:					
Cannot drink/breastfeed	22.7	21.9	20.7	27.9	19.4**
Symptoms intensify	41.1	42.8	41.0	40.4	40.3
Fever	94.6	93.7	94.0	95.2	95.1
Rapid breathing	8.6	9.4	6.8	7.6	9.7
Difficulty breathing	9.5	12.0	8.7	8.7	8.4
Bloody stools	12.2	11.2	11.8	13.3	12.5
Difficulty swallowing	3.3	4.1	2.1	4.3	2.3**
% that know about ORS	93.7	92.9	93.7	93.8	94.3
Treating diarrhea; % that gave:					
Only correct answers	79.4	78.4	80.7	80.8	78.4
Combination of correct and incorrect	15.5	15.6	14.2	16.1	15.5
Does not know	5.1	6.0	5.1	3.1	6.1
Feeding a sick child; % that gave:					
Only correct answers	61.0	60.8	61.3	65.7	56.4
Only incorrect answers	35.0	35.9	34.1	30.8	39.0
Does not know	4.0	3.3	4.7	3.6	4.7
Feeding a child during convalescence; % that gave:					
Only correct answers	84.2	87.2	82.1	85.1	81.4
Only incorrect answers	15.2	12.4	17.4	14.1	17.7
Does not know	0.7	0.4	0.5	0.8	0.8

* Maximum sample sizes presented. Sample sizes ranged from N = 3,539 to 3,564 in the full sample column; N = 972 to 985 in the T-24 arm; N = 583 to 585 in the T-18 arm; N = 996 to 998 in the T-NFP arm; and N = 988 to 996 in the control arm.

** Study arms differ, p-value < 0.05.

Breastfeeding knowledge was not different between the two samples. More than 90% of the mothers knew that a baby should be breastfed immediately or very soon after birth and that a baby should be fed colostrum. Very few, however, knew that a malnourished mother is capable of producing enough milk to adequately feed her child. When asked about the benefits of exclusive breastfeeding, more than three-quarters of the mothers mentioned benefits related to child health and nutrition, but only around 2% mentioned lactational amenorrhea. The average age given as appropriate to stop breastfeeding was around 32 months of age, which meets the WHO recommendation for continued breastfeeding for the first 2 years of life or beyond.

Table 5.5a. Breastfeeding knowledge among mothers in households with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	2,618	432	867	433	886
% that knew that:					
Baby should be breastfed immediately or during first hours after birth	95.2	95.1	94.7	97.0	94.9
Baby should be fed colostrum	93.9	90.1	95.0	94.7	94.2
Malnourished mother can produce enough good milk	2.5	2.3	2.2	3.0	2.5
% that mentioned relation of EBF to:					
Child health and nutrition	77.2	79.9	75.1	80.1	76.6
Lactational amenorrhea	2.2	3.2	2.5	2.1	1.5
Appropriate age to stop breastfeeding (months)	32.1 (7.5)	31.0 (7.9)	32.4 (7.1)	31.7 (7.4)	32.5 (7.5)

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,570 to 2,618 in the full sample column; N = 425 to 432 in the T-24 arm; N = 847 to 867 in the T-18 arm; N = 428 to 433 in the T-NFP arm; and N = 870 to 886 in the control arm.

Table 5.5b. Breastfeeding knowledge among mothers in households with children 24–41 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	3,564	985	585	997	996
% that knew that:					
Baby should be breastfed immediately or during first hours after birth	94.4	94.9	94.2	94.7	93.7
Baby should be fed colostrum	93.7	92.3	93.7	94.3	94.5
Malnourished mother can produce enough good milk	2.0	2.2	1.4	1.9	2.3
% that mentioned relation of EBF to:					
Child health and nutrition	77.3	78.8	74.8	79.0	75.8
Lactational amenorrhea	1.8	1.7	1.7	2.0	1.6
Appropriate age to stop breastfeeding (months)	31.6 (7.3)	30.9 (7.6)	32.3 (6.9)	31.2 (7.4)	32.4 (7.1)***

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,508 to 3,564 in the full sample column; N = 968 to 985 in the T-24 arm; N = 573 to 585 in the T-18 arm; N = 984 to 997 in the T-NFP arm; and N = 983 to 996 in the control arm.

*** Study arms differ, p-value < 0.05.

The majority of the mothers were aware of the importance of a sufficient quantity of food to prevent malnutrition (about 75%), but less so with the importance of the quality of the food (less than 40%) or the contribution of illness (about 34%). On average, mothers stated that 6 months of age is the correct age to introduce foods and liquids other than breast milk, but less than 25% of mothers mentioned the importance of animal source foods (such as meat, dairy, and eggs) for children's growth. The most commonly mentioned foods essential for children's growth were vegetables (78% of all mothers), cereals and beans (both around 50%), and fruits (around 45%). Knowledge related to micronutrients was somewhat limited, with only about 57% and 39% of women identifying green leafy vegetables and yellow or orange colored fruits or vegetables as foods rich in vitamin A, respectively, and less than 15% mentioning animal source foods. Around 60% of the mothers thought that iron deficiency can cause poor immunity and a similar proportion knew that it can alter development. However, other key consequences of iron deficiency (such as weakness and fatigue) were mentioned by less than 30% of mothers. Knowledge related to practices indicative of responsive feeding of young children was limited. Only 61% stated that a child 12 months of age needs assistance to eat and around 30% of mothers mentioned force feeding as a strategy to encourage children to eat.

Table 5.6a. Maternal knowledge regarding complementary feeding practices among women in households with children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		2,620	432	868	433
Reasons for child malnutrition; % that said:					
Insufficient amount of food	75.2	75.5	76.7	77.4	72.5
Irregular meals	7.5	4.4	7.7	9.0	8.1*
Diseases	33.6	36.8	34.1	35.6	30.7
Early weaning	19.1	24.3	19.0	15.9	18.3*
Lack of affection during feeds	1.0	0.9	0.8	2.1	0.8
No food variety	39.4	32.6	39.9	37.9	43.1
Age of introduction of any food/liquids other than breast milk; % that said:					
Before 6 months	16.5	16.4	18.7	13.2	16.0
At 6 months	63.1	60.9	61.7	65.6	64.3
After 6 months	19.9	22.5	19.1	20.8	18.9
Does not know	0.5	0.2	0.5	0.5	0.8
Foods essential for child growth; % that said:					
Bread/rice/oatmeal	51.0	44.4	50.7	48.5	55.6
Meat, chicken	19.7	19.0	19.8	21.9	18.7
Fish	24.5	19.7	26.6	21.3	26.4
Eggs	9.6	13.2	8.9	9.7	8.4
Fruits	44.7	48.4	46.7	40.2	43.2
Vegetables	77.8	81.0	78.1	77.4	76.2
Milk	16.5	21.5	15.6	17.1	14.6*
Beans	49.3	48.8	49.4	45.7	51.2
Foods perceived as rich in vitamin; % that said:					
Fruits/vegetables (yellow/orange color)	39.4	34.3	36.8	39.0	44.5*
Green leafy vegetables	57.4	53.2	54.2	54.5	63.9*
Eggs	10.2	12.5	9.9	9.2	9.9
Liver	3.7	4.4	2.4	5.5	3.8
Breast milk	12.5	13.0	11.0	15.0	12.6
Cow milk	11.8	10.4	11.1	13.9	12.3

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,620	432	868	433	887
Consequences of iron deficiency among children; % that said:					
Altered studies	1.5	0.7	1.3	2.1	1.9
Altered development	57.6	63.9	51.7	62.4	57.9*
Slow growth	17.9	19.0	17.2	17.3	18.4
Poor immunity	58.9	62.3	58.7	54.0	59.7
Fatigue	11.7	9.0	11.3	12.9	12.6
Weakness	27.5	25.5	27.1	30.0	27.7
% that knows a child 12 months cannot eat without assistance	61.0	64.0	65.0	57.2	57.5
Methods to encourage eating among children; % that said:					
Feed slowly with patience	33.7	34.0	35.9	35.4	30.4
Talk to the child	15.1	15.5	15.0	18.1	13.5
Force feed	29.2	27.6	31.6	30.1	27.2
Reduce distractions	13.9	15.5	13.7	17.4	11.7
Give other food	23.2	24.1	21.0	20.6	26.3
Change the food's taste	19.7	18.1	19.2	23.6	18.9

* Maximum sample sizes presented. Sample sizes ranged from N = 2,586 to 2,620 in the full sample column; N = 428 to 432 in the T-24 arm; N = 859 to 868 in the T-18 arm; N = 421 to 433 in the T-NFP arm; and N = 878 to 887 in the control arm.

** Study arms differ, p-value < 0.05.

Table 5.6b. Maternal knowledge regarding complementary feeding practices among women in households with children 24–41 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	3,564	985	585	998	996
Reasons for child malnutrition; % that said:					
Insufficient amount of food	76.1	74.8	76.9	77.4	75.5
Irregular meals	7.9	6.4	7.2	7.4	10.2
Diseases	34.9	35.8	35.6	38.1	30.4*
Early weaning	18.9	19.4	20.2	17.7	18.9
Lack of affection during feeds	0.9	0.6	0.5	1.5	0.9
No food variety	39.4	37.3	39.0	41.2	40.0
Age of introduction of any food/liquids other than breast milk; % that said:					
Before 6 months	17.0	17.3	17.6	17.5	15.9
At 6 months	61.8	58.8	64.1	61.5	63.8
After 6 months	20.7	23.2	17.6	21.0	19.9
Does not know	0.5	0.7	0.7	0.1	0.5

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
	3,564	985	585	998	996
Foods essential for child growth; % that said:					
Bread/rice/oatmeal	48.9	41.6	50.8	50.1	53.8*
Meat, chicken	20.6	18.8	20.3	23.3	19.9
Fish	25.4	24.1	26.7	25.2	26.3
Eggs	9.6	10.8	9.2	9.0	9.1
Fruits	43.9	44.2	44.1	45.0	42.3
Vegetables	78.3	83.1	78.8	76.2	75.5*
Milk	15.5	17.8	16.4	15.4	12.9
Beans	49.7	50.8	48.9	48.2	50.4
Foods perceived as vitamin-A rich; % that said:					
Fruits/vegetables (yellow/orange color)	38.3	33.9	35.7	39.5	42.8
Green leafy vegetables	56.4	51.9	55.9	55.8	61.8
Eggs	10.6	12.4	9.9	9.6	10.3
Liver	3.4	3.0	1.9	4.1	4.0
Breast milk	10.5	9.6	9.7	10.9	11.6
Cow milk	12.3	12.2	8.9	14.1	12.5
Consequences of iron deficiency among children; % that said:					
Altered studies	1.8	1.5	2.2	2.3	1.2
Altered development	56.8	57.4	56.4	59.3	53.9
Slow growth	18.3	19.3	18.5	18.1	17.5
Poor immunity	59.0	62.6	58.0	56.4	58.7
Fatigue	13.4	12.2	9.7	15.5	14.5*
Weakness	27.9	27.3	23.4	30.4	28.7
% that knows a child 12 months cannot eat without assistance	62.1	64.3	63.4	62.8	58.5
Methods to encourage eating among children; % that said:					
Feed slowly with patience	31.2	29.8	33.2	33.2	29.5
Talk to the child	15.3	14.9	14.0	17.5	14.3
Force feed	30.0	28.1	38.2	29.8	27.4
Reduce distractions	14.8	16.5	11.3	18.2	11.9
Give other food	24.4	24.9	22.6	24.6	24.7
Change the food's taste	21.1	21.8	20.7	21.0	20.7

* Maximum sample sizes presented. Sample sizes ranged from N = 3,527 to 3,564 in the full sample column; N = 977 to 985 in the T-24 arm; N = 577 to 585 in the T-18 arm; N = 986 to 998 in the T-NFP arm; and N = 987 to 996 in the control arm.

** Study arms differ, p-value < 0.05.

Hygiene knowledge was very similar among mothers of children in the two age groups. Even though nearly all mothers knew that soap is needed for handwashing, the importance of washing hands in relation to different events was not well understood. While the majority of mothers correctly stated that it was important to wash one's hands before eating (around 95%), less than half mentioned that hands should be washed before feeding a child or after using the toilet, and less than 20% mentioned that hands should be washed after cleaning a child who had defecated. These results are consistent with the low prevalence of using soap reported in Section 4.2. The most commonly reported strategies believed to prevent children from getting worms were keeping them from eating anything unsanitary (around 77%), washing the child's hands (around 67%), and paying attention to food preparation (around 35%). Around 70% of mothers mentioned at least one appropriate method of water purification.

Table 5.7a. Hygiene knowledge of mothers in households with children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		2,620	432	868	433
Appropriate time for hand washing; % that said:					
Before eating	95.4	95.1	94.6	95.4	96.3
After using the toilet	45.7	44.0	46.0	46.7	45.8
Before feeding a child	42.2	50.5	40.2	38.3	41.9
After cleaning a child who defecated	18.4	22.5	21.3	15.5	15.1**
Appropriate hand washing products; % that said:					
Soap (any)	99.3	99.5	99.5	98.6	99.3
Ash	2.4	2.1	2.8	1.9	2.4
Mud/sand	1.3	2.6	0.9	1.2	1.1
Appropriate worm-protection methods for children; % that said:					
Wash hands	65.1	66.4	63.5	70.4	63.5
Cut fingernails	5.7	6.7	3.7	5.5	7.1
Wear pants	2.3	3.2	2.8	2.3	1.2
Adequate food preparation	33.9	31.5	32.1	37.2	35.1
Wear shoes	1.2	2.1	1.0	1.2	0.9
Give treated water	10.9	11.3	10.3	12.3	10.6
Stop child from eating anything unsanitary	76.2	73.3	77.4	76.6	76.2
Appropriate purification methods for drinking water; % that said:					
Boiling	64.7	61.6	66.6	67.0	63.4
Chlorine	3.1	3.9	3.1	4.2	2.1
Filter water	1.0	0.0	0.0	0.0	1.0

* Maximum sample sizes presented. Sample sizes ranged from N = 2,617 to 2,620 in the full sample column; N = 865 to 868 in the T-18 arm; N = 432 to 433 in the T-NFP arm. There were no missing values in the T-24 and control arms.

** Study arms differ, p-value < 0.05.

Table 5.7b. Hygiene knowledge of mothers in households with children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		3,564	985	585	998
Appropriate time for hand washing; % that said:					
Before eating	94.9	93.7	93.9	95.5	96.0
After using the toilet	46.3	43.1	47.5	48.0	47.0
Before feeding a child	38.3	43.7	37.8	35.2	36.5**
After cleaning a child who defecated	17.0	17.4	18.0	16.9	16.0
Appropriate hand washing products; % that said:					
Soap (any)	99.1	99.2	99.5	99.0	98.9
Ash	2.8	3.6	2.7	2.6	2.4
Mud/sand	1.5	2.4	1.0	0.9	1.5
Appropriate worm-protection methods for children; % that said:					
Wash hands	68.5	67.5	66.0	71.6	67.8
Cut fingernails	6.9	8.0	3.6	7.2	7.4**
Wear pants	2.6	2.9	2.7	3.7	1.2**
Adequate food preparation	35.5	32.2	35.0	39.0	35.4
Wear shoes	1.5	1.9	1.7	1.6	0.9
Give treated water	11.2	9.9	12.1	11.1	12.0
Stop child from eating anything unsanitary	78.4	83.0	76.5	77.6	75.5
Appropriate purification methods for drinking water; % that said:					
Boiling	67.1	65.9	65.8	68.6	67.4
Chlorine	3.1	2.6	3.1	4.0	2.8
Filter water	1.0	0.0	0.0	0.0	1.0

* Maximum sample sizes presented. Sample sizes ranged from N = 3,560 to 3,564 in the full sample column; N = 584 to 585 in the T-18 arm; N = 997 to 998 in the T-NFP arm; and N = 993 to 996 in the control arm. There were no missing values in the T-24 arm.

** Study arms differ, p-value < 0.05.

5.3. PRE-, PERI-, AND POSTNATAL/POSTPARTUM HEALTH CARE PRACTICES OF MOTHERS

The following section describes maternal use of prenatal care services, delivery services, newborn and postpartum practices, and receipt of breastfeeding assistance among the mothers of children 0–23 months of age.²⁵

Although the use of at least some prenatal services was nearly universal among this population, the quality of the care received could be improved. The average number of prenatal visits was 3.2 and about 30% had the recommended 4 prenatal visits. On average, prenatal visits started at 5.1 months of pregnancy and ended around 8.3 months of pregnancy. At prenatal visits, most women reportedly had their weight taken (94.3%), about two-thirds of the women reported receiving a tetanus vaccination; less than 40% had their blood pressure taken or had blood drawn for a blood test; and only a minority (13.1%)

²⁵ As indicated in Table 2.4, data on pre-, peri-, and postnatal health care practices were collected only in mothers with children 0–23 months of age.

had a urine test. About one-third of the women were told where to seek help in case of pregnancy complications, but only about one-fifth were told how to identify pregnancy danger signs. While regular weighing of pregnant women and the provision of tetanus vaccinations appear to be common, the provision of other assessments at prenatal visits was not.

The use of a few key preventive measures during pregnancy, including the use of bednets and iron supplements, were reportedly practiced by the majority of mothers, but the prevalence of night blindness (a sign of vitamin A deficiency) among this population is a concern. Even though 72.1% of the women reported taking iron supplements during pregnancy, they began taking the supplements only toward the end of the second trimester (at about 5.6 months, close to the average time of the first prenatal visit) and continued taking the supplements for only about 2 months. Steps to prevent malaria were taken by a slight majority of the mothers, with 58.1% reporting that they had slept under a bednet during most of their pregnancy. Alarmingly, nearly 6% of the women interviewed had experienced night blindness during pregnancy. This level exceeds the 5% mark established by the WHO as representing a public health problem and is in line with the WHO's own report that found vitamin A deficiency to be a public health problem in Burundi among pregnant women and preschool children alike (WHO, 2009).

Table 5.8. Use of prenatal care services among mothers in households with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	2,579	422	861	426	870
Received any prenatal care; % yes	99.0	98.1	98.7	99.3	99.4
Had prenatal care; % that consulted:					
Doctor	5.7	10.6	4.6	4.3	5.2
Nurse/midwife/medical assistant	95.8	92.8	96.8	97.4	95.4
Trained traditional midwife	0.3	0.0	0.4	0.2	0.5***
Untrained traditional midwife	0.0	0.0	0.0	0.2	0.0
Prenatal care visits					
Total number of visits	3.2 (1.0)	3.2 (1.0)	3.2 (1.1)	3.3 (1.1)	3.2 (0.9)
% that had 4 visits	35.4	33.6	35.4	35.9	36.0
Month of pregnancy at first visit	5.1 (1.4)	5.0 (1.4)	5.1 (1.4)	5.0 (1.4)	5.0 (1.4)
Month of pregnancy at last visit	8.3 (0.9)	8.3 (0.8)	8.3 (0.9)	8.3 (0.8)	8.3 (1.1)
Prenatal care; % that went to:					
Public provider	97.9	98.8	98.0	95.2	98.7
Private provider	2.1	1.2	2.0	4.8	1.3
Prenatal services provided; % that:					
Received tetanus vaccination	65.6	69.8	66.2	63.7	63.9
Had weight taken	94.3	93.6	94.5	94.6	94.3
Had height taken	51.4	53.2	46.3	63.4	49.7
Had blood pressure taken	37.3	37.2	33.0	46.0	37.4
Gave a urine sample	13.1	12.9	12.0	17.7	12.1
Gave a blood sample	38.7	50.0	30.8	46.5	37.2
Pregnancy complications; % that were:					
Told how to detect signs	19.7	17.5	18.3	22.4	20.9
Told where to seek help if complications arose	31.7	32.8	28.4	33.7	33.6

N**	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
		2,579	422	861	426
Supplementation					
% that took iron	72.1	73.7	74.9	68.9	70.0
Months pregnant when supplementation began	5.6 (1.4)	5.5 (1.4)	5.5 (1.4)	5.8 (1.4)	5.6 (1.4)
Duration of supplementation	1.9 (1.3)	2.0 (1.4)	1.9 (1.3)	1.8 (1.3)	1.9 (1.3)
Number of pills per month	25.2 (10.4)	24.5 (11.9)	26.5(8.8)	23.6 (11.6)	25.1 (10.3)
During pregnancy; % that:					
Experienced night blindness	5.8	5.1	5.6	7.0	5.6
Slept under a bednet	58.1	57.1	61.5	61.1	53.8

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,475 to 2,579 in the full sample column; N = 404 to 422 in the T-24 arm; N = 827 to 861 in the T-18 arm; N = 409 to 426 in the T-NFP arm; and N = 830 to 970 in the control arm.

*** Study arms differ, p-value < 0.05.

Even though nearly all mothers visited a public health institution for their prenatal visits, only 57% delivered at this facility. It is remarkable that 8% gave birth while in transit. Around 60% of all births (irrespective of the place of delivery) were attended by a trained health professional and approximately 20% by a trained traditional midwife. The majority of women reported that their newborn infants were immediately cleaned (i.e., dried off) and wrapped, two important strategies to prevent hypothermia. Around 60% of the newborns were weighed at delivery.

Table 5.9. Services provided at birth and delivery to mothers with children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		2,574	422	860	426
Location of delivery; % that delivered at:					
Public institution	57.0	57.6	56.2	65.3	53.6
Private institution	1.5	1.2	1.7	2.4	0.9
At home	33.5	30.6	35.0	25.4	37.3
In transit	8.0	10.7	7.1	6.9	8.2
Medical staff at birth; % that had presence of:					
Doctor	5.3	6.7	4.3	6.6	5.1
Nurse/midwife/medical assistant	55.1	54.5	55.4	63.6	50.8
Trained traditional midwife	19.6	19.2	20.8	14.6	21.1
Untrained traditional midwife	9.6	12.1	8.1	6.6	11.4**
Parent/friend	9.6	8.5	10.6	8.7	9.5
Nobody	6.0	5.5	6.1	6.1	6.1
Services received at delivery: % that said:					
Child immediately cleaned	85.7	85.4	85.5	88.4	84.9
Child wrapped before placental delivery	85.9	86.2	88.5	84.5	83.8**
Child weighed	58.7	60.8	58.3	66.3	54.3

* Maximum sample sizes presented. Sample sizes ranged from N = 2,397 to 2,574 in the full sample column; N = 376 to 422 in the T-24 arm; N = 807 to 860 in the T-18 arm; N = 389 to 426 in the T-NFP arm; and N = 801 to 869 in the control arm.

** Study arms differ, p-value < 0.05.

Nearly all of the women received at least some medical care following delivery, as they did in the prenatal period. However, the use of preventive health measures was much lower than during pregnancy. While almost all mothers were examined by a health professional within 6 weeks of delivery, only about 20% were checked immediately after birth. The average time elapsing before the first postpartum visit was 1 week. Check-ups were most commonly performed by a nurse, midwife, or medical assistant at a public institution. Few women received a high-dose vitamin A supplement within 6 weeks of giving birth (15.6%), and even fewer still took iron supplements after giving birth (3.3%).

Table 5.10. Postpartum care practices among women with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	2,578	422	862	426	870
Postpartum check-up					
% of postpartum women that received check-up immediately after birth	21.9	24.9	19.9	23.8	21.4
Time elapsed before first check-up (weeks)	1.0 (1.7)	0.8 (1.5)	1.1 (2.1)	1.3 (1.4)	0.9 (1.4)
% of postpartum women received examination by health professional within 6 weeks	99.1	99.1	99.4	99.0	98.9
Postpartum check-up conducted by:					
Doctor	14.6	21.9	12.8	13.7	12.6
Nurse, midwife, or medical assistant	85.4	78.1	87.2	86.3	87.4
After birth, % of postpartum women that received postnatal care at:					
Public institution	96.6	96.2	95.9	92.9	99.5
Private institution	3.2	3.9	3.5	7.1	0.6
Home	0.2	0.0	0.6	0.0	0.0
Vitamin A					
During the 6 weeks after birth, % of postpartum women that received vitamin A	15.6	20.7	16.2	13.7	13.4
Postpartum supplements					
% of postpartum women that took iron supplements	3.3	3.8	4.2	2.4	2.5
Duration of supplementation (months)	0.8 (0.9)	1.0 (0.9)	0.7 (0.8)	0.8 (1.0)	0.7 (1.0)
Number of pills per month	21.4 (14.7)	24.0 (17.7)	18.8 (12.7)	21.6 (21.6)	23.8 (11.7)

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,573 to 2,578 in the full sample column; N = 421 to 422 in the T-24 arm; N = 858 to 862 in the T-18 arm; N = 424 to 426 in the T-NFP arm; and N = 868 to 870 in the control arm.

5.4. PERCEIVED MATERNAL STRESS

Self-reported stress was somewhat common among mothers included in the baseline survey. Nearly 20% scored above 10 on the SRQ-20 assessment, which indicates that these women are likely experiencing severe mental distress).

Table 5.11a. Mental health among mothers with children with children 0–23 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	2,621	432	868	433	888
SRQ-20 scale (Range: 0–20)	6.0 (4.6)	5.7 (4.3)	6.2 (4.6)	5.9 (4.7)	6.1 (4.6)
% scoring above 10 on SRQ-20 indicating severe mental distress	17.6	15.5	17.7	18.9	17.9

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,616 to 2,621 in the full sample column; N = 867 to 868 in the T-18 arm; N = 431 to 433 in the T-NFP arm; and N = 886 to 888 in the control arm. There were no missing values in the T-24 arm.

Table 5.11b. Mental health among mothers with children 24–41 months of age

	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
N**	3,564	985	585	998	996
SRQ-20 scale (Range: 0–20)	6.2 (4.6)	5.7 (4.5)	6.6 (4.7)	5.9 (4.6)	6.7 (4.7)***
% scoring above 10 on SRQ-20 indicating severe mental distress	18.8	15.7	21.9	17.4	21.4

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,563 to 3,564 in the full sample column; N = 997 to 998 in the T-NFP arm. There were no missing values in the T-24, T-18 and control arms.

*** Study arms differ, p-value < 0.05.

5.5. MATERNAL ANTHROPOMETRY AND HEMOGLOBIN

The vast majority of women included in the baseline survey had a normal BMI (kg/m^2). Those that fell outside of the normal range were more likely to be underweight (13.3% and 14.2 % of women included in the samples of children aged 0–23 and 24–41 months, respectively) as opposed to overweight (3.5% and 4.8% among mothers in the younger and older children samples, respectively). On average, mothers weighed 50.5 kg and had a height of 156 cm. About 3% of the mothers were less than 145 cm tall. Mean hemoglobin was 12.5g/dl, with around 30% of the mothers classified as anemic. Severe anemia was virtually absent among the women included in the baseline survey.

Table 5.12a. Anthropometric status of mothers of children 0–23 months of age

N**	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
		2,606	426	862	429
Weight (kg)***	50.2 (6.6)	50.9 (8.0)	50.3 (6.2)	50.4 (7.0)	49.8 (5.9)
Height (cm)	155.7 (6.2)	156.5 (6.2)	155.7 (6.6)	156.1 (6.0)	155.1 (5.8)
% less than 145 cm	2.8	2.6	2.3	3.3	3.2
Body Mass Index (BMI)					
Mean BMI (kg/m ²)***	20.7 (2.9)	20.8 (2.9)	20.8 (3.8)	20.7 (2.3)	20.7 (2.1)
Underweight (BMI < 18.5)	13.3	11.0	14.3	14.7	12.8
Normal (BMI 18.5–24.9)	83.5	85.0	82.2	82.5	84.7
Overweight (BMI ≥ 25.0)	3.1	4.0	3.5	2.7	2.5
Hb (g/dl)	12.6 (1.6)	12.9 (1.6)	12.6 (1.5)	12.9 (1.6)	12.4 (1.6) *****
% anemic (Hb < 12.0 g/dl)****	30.4	25.8	30.5	25.9	34.8*****
% severely anemic (Hb < 7.0 g/dl)	0.2	0.2	0.2	0	0.1

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 2,574 to 2,606 in the full sample column; N = 424 to 426 in the T-24 arm; N = 854 to 862 in the T-18 arm; N = 423 to 429 in the T-NFP arm; and N = 873 to 889 in the control arm.

*** Weight and BMI are reported only for women that reported not being pregnant at the time of the interview.

**** Cutoff for pregnant women was set to 11.0 g/dl.

***** Study arms differ, p-value < 0.05.

Table 5.12b. Anthropometric status of mothers of children 24–41 months of age

N**	Full sample*	Study arms*			
		T-24	T-18	T-NFP	Control
		3,546	978	581	990
Weight (kg)***	50.6 (7.0)	50.6 (7.1)	50.7 (6.8)	50.7 (7.2)	50.4 (6.7)
Height (cm)	155.8 (6.2)	156.5 (5.7)	156.2 (6.0)	155.3 (6.8)	155.4 (6.2)
% less than 145cm	3.1	1.9	2.6	4.6	3.2*****
Body Mass Index (BMI)					
Mean BMI (kg/m ²)***	20.9 (3.6)	20.7 (2.6)	20.8 (2.4)	21.1 (4.5)	21.0 (3.9)
Underweight (BMI < 18.5)	14.2	15.8	16.0	13.9	11.8
Normal (BMI 18.5–24.9)	81.0	80.3	79.5	80.4	83.2
Overweight (BMI ≥ 25.0)	4.8	3.9	4.6	5.7	5.0
Hb (g/dl)	12.5 (1.6)	12.8 (1.5)	12.3 (1.7)	12.7 (1.6)	12.2 (1.6) *****
% anemic (Hb < 12.0 g/dl)****	29.5	23.7	36.7	26.4	33.9*****
% severely anemic (Hb < 7.0 g/dl)	0.3	0.1	0.4	0.2	0.7

* Values are mean (SD) or %.

** Maximum sample sizes presented. Sample sizes ranged from N = 3,479 to 3,546 in the full sample column; N = 966 to 978 in the T-24 arm; N = 570 to 581 in the T-18 arm; N = 972 to 990 in the T-NFP arm; and N = 970 to 992 in the control arm.

*** Weight and BMI are reported only for women that reported not being pregnant at the time of the interview.

**** Cutoff for pregnant women was set to 11.0 g/dl.

***** Study arms differ, p-value < 0.05.

5.6. SUMMARY OF MATERNAL CHARACTERISTICS

Similar to the heads of household, mothers had very little, if any, formal education, and only about half were literate. Even though mothers' decision-making power differed across decision-making domains, for all these domains the proportion of mothers solely responsible for decisions was minimal. Very few women owned assets that they could sell or had money that they could spend autonomously.

Mothers were found to have limited child health and nutrition knowledge; in line with this limited knowledge, we found inadequate practices related to hygiene and sanitation, and health care seeking. Of the children that were left with someone else when the mother was away from home, a large proportion were left with minors younger than 15 years of age.

Although the use of at least some prenatal services was nearly universal among this population, only about 30% had the recommended four prenatal visits. Prenatal visits mostly consisted of evaluating the mother's weight. Even though a high percentage of mothers (nearly 3 out of 4) took iron supplements during pregnancy, supplementation on average started late in pregnancy (between the fifth and sixth month) and lasted for about 2 months. Less than 60% of the mothers slept under a bednet while pregnant. Alarmingly, nearly 6% of the women interviewed had experienced night blindness during pregnancy. Nearly 20% of all mothers were evaluated as suffering from severe mental distress.

The proportion of "short" mothers (less than 145 cm) was very low; 1 of 7 women, however, was underweight and very few were overweight. Finally, the prevalence of anemia was around 30%.

6. Results: Child Characteristics

The following sections present results on IYCF practices, child health, child development, and child anthropometry.

6.1. INFANT AND YOUNG CHILD FEEDING PRACTICES

Breastfeeding practices among this population were optimal in many aspects. Nearly all of the children 0–23 months of age (99.2%) had ever been breastfed and more than 85% were reportedly put to the breast within 1 hour of birth. Almost 80% of infants under 6 months of age were exclusively breastfed during the preceding 24 hours and nearly 90% were predominantly breastfed. In addition, almost all children were still breastfed at 1 year of age, and 77.7% of children were still being breastfed at 2 years. The high percentage of exclusive breastfeeding and continued breastfeeding explains the high rate of age-appropriate breastfeeding (85.6%). The use of bottles was virtually nonexistent, with less than 1% of mothers reporting having used a bottle to feed their child in the past 24 hours. Although breastfeeding practices were quite good in general among children that were not breastfed (7.3%), only 3.3% received at least two milk feeds per day as recommended.

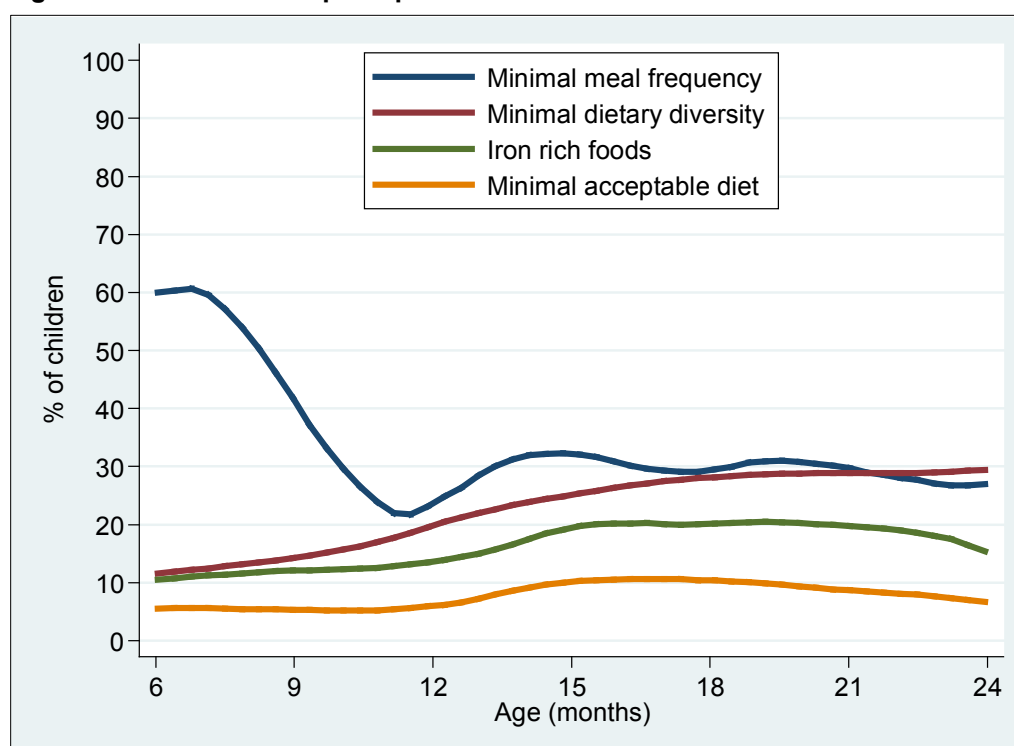
Of children aged 6–8 months, 93.2% had started eating complementary foods. The quality of the complementary foods and the feeding frequency, however, were suboptimal. Only a small proportion of children 6–23 months of age (16.6%) had consumed iron-rich foods in the past 24 hours and less than 25% had consumed foods from at least four different food groups in the past 24 hours. The proportion of children with a minimum dietary diversity increased with age, but was still low (around 30%) for the oldest children. In addition, only about one-third of children received the minimum number of meals recommended for their age (at least two for breastfed children 6–8 months of age, at least three for breastfed children 9–23 months of age, and at least four for non-breastfed children), and the percentage of children receiving the minimum number of meals dropped sharply with age, from around 60% at 6 months to around 30% for children 12 months and older. Only 7.9% of the children were classified as receiving a minimal acceptable diet.²⁶

²⁶ As explained in the methods section, 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, and for non-breastfed children, it was defined as having received at least two milk feedings, having consumed at least four food groups (out of six nutrient-rich food groups) and the minimum meal frequency in the past 24 hours.

Table 6.1. IYCF practices among children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
	2,591	427	863	427	874
Breastfeeding indicators					
Child ever breastfed	99.2	99.8	99.2	99.3	99.0
Early initiation of breastfeeding (within 1 hour of birth)	86.3	85.0	88.0	87.0	84.9
Exclusive breastfeeding among children < 6 months of age	78.1	82.5	81.5	79.0	71.8
Predominant breastfeeding among children < 6 months of age	88.5	90.3	88.3	89.6	87.1
Continued breastfeeding at 1 year (12–15 months)	97.1	96.9	98.1	95.2	97.4
Continued breastfeeding at 2 years or age (20–23 months)	77.7	70.0	80.6	76.9	78.5
Age-appropriate breastfeeding	85.6	85.3	86.9	85.9	84.4
Bottle feeding	0.9	0.9	1.4	1.2	0.2
Milk feeding frequency for non-breastfed children (≥ 2 feedings/day)	3.3	5.9	3.5	3.7	1.6
Complementary feeding indicators					
Introduction of solid, semi-solid, or soft foods (6–8 months)	93.2	95.2	93.5	88.9	93.6
Consumption of iron-rich or iron-fortified foods	16.6	16.7	15.8	19.9	15.7
Minimum meal frequency	32.8	37.8	33.9	24.6	33.1
Minimum dietary diversity (≥ 4 food groups)	23.1	25.2	22.8	28.3	19.8
Minimum acceptable diet	7.9	11.1	7.6	7.5	6.9
Corn-soy blend					
Child ate CSB yesterday	3.0	3.0	3.3	2.6	3.0
Mother ate CSB yesterday	2.2	2.3	2.2	2.4	2.1

* Maximum sample sizes presented. Sample sizes ranged from N = 181 to 2,591 in the full sample column; N = 34 to 427 in the T-24 arm; N = 58 to 863 in the T-18 arm; N = 27 to 427 in the T-NFP arm; and N = 62 to 874 in the control arm.

Figure 6.1. Food consumption practices of children 0–23 months


In line with the results from the knowledge questions, practices indicative of responsive feeding were not widely reported among women of children in either the younger or older age group. For example, when a child refused to eat, less than half of the mothers reported doing anything to encourage her child to eat more. Among those that did report doing something to encourage her child, the most commonly mentioned positive practice was offering different foods. Corresponding to the results from the knowledge questions, force-feeding children when they refuse to eat was a commonly mentioned strategy for encouraging children to eat more. When asked what they do when a child has a poor appetite for days or weeks in a row, most mothers responded that they took their child to the health clinic (62.1 % in the sample of children aged 0–23 months and 70.2% in the sample of children aged 24–41 months).

Table 6.2a. Methods used by mothers to increase dietary intake among children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		320	702	337	705
When child refuses to eat; % that use means to increase consumption					
Yes	30.7	28.5	33.2	27.4	30.8
No	48.4	45.6	47.8	50.9	49.0
Not yet weaned	21.0	25.9	19.0	21.6	20.2
Method to encourage eating if child does not want to eat**					
Force-feed	27.5	24.8	28.8	28.0	27.0
Caress child	19.7	26.5	20.7	21.2	14.8
Play with child	15.5	16.5	14.7	13.6	16.7
Give other food	36.5	32.2	34.7	35.6	40.7
Threaten child	0.6	0.0	0.7	0.9	0.8
Beat the child	0.3	0.0	0.4	0.9	0.0

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,064	320	702	337	705
When child does not have a strong appetite for several days/weeks; % of caregivers who:					
Give tea	0.9	0.9	0.7	0.9	1.0
Give vitamins	0.4	0.5	0.4	0.5	0.3
Take child to clinic	62.1	60.9	63.7	61.9	61.4
Take child to traditional healer	1.3	1.2	1.6	1.2	1.0
Nothing	18.0	20.7	17.3	18.6	17.0
Give favorite food	3.1	2.8	2.8	3.0	3.7
Always has good appetite	14.3	13.0	13.7	14.0	15.6

* Maximum sample sizes presented. Sample sizes ranged from N = 1,335 to 2,064 in the full sample column; N = 233 to 320 in the T-24 arm; N = 450 to 702 in the T-18 arm; N = 211 to 337 in the T-NFP arm; and N = 441 to 705 in the control arm.

** The method recorded here is the first method mentioned (of multiple possible responses) by the mother.

Table 6.2b. Methods used by mothers to increase dietary intake among children 24–41 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	3,529	969	583	985	992
When child refuses to eat; % that use means to increase consumption					
Yes	45.0	46.9	47.0	42.1	45.0
No	54.7	52.4	53.0	57.6	55.0
Not yet weaned	0.3	0.7	0.0	0.3	0.0
Method to encourage eating if child does not want to eat**					
Force-feed	30.4	31.9	31.2	26.9	31.7
Caress child	16.5	17.6	17.1	17.5	13.9
Play with child	9.3	7.9	8.0	11.9	8.9
Give other food	39.2	37.2	38.4	39.3	41.6
Threaten child	2.7	3.1	2.7	2.4	2.5
Beat the child	2.0	2.2	2.7	1.9	1.4
When child does not have a strong appetite for several days/weeks; % of caregivers who:					
Give tea	1.5	1.3	1.4	1.9	1.3
Give vitamins	0.5	1.0	0.2	0.4	0.3
Take child to clinic	70.2	69.2	70.3	70.3	71.2
Take child to traditional healer	1.4	0.7	1.2	2.6	1.1
Nothing	12.3	12.3	12.1	12.1	12.6
Give favorite food	3.7	4.1	4.3	2.7	4.0
Always has good appetite	10.3	11.4	10.5	9.9	9.6

* Maximum sample sizes presented. Sample sizes ranged from N = 1,577 to 3,529 in the full sample column; N = 461 to 969 in the T-24 arm; N = 263 to 583 in the T-18 arm; N = 415 to 985 in the T-NFP arm; and N = 438 to 992 in the control arm.

** The method recorded here is the first method mentioned (of multiple possible responses) by the mother.

6.2. CHILD HEALTH

The section below details child preventive health care practices, the prevalence of child morbidity symptoms and treatment, and maternal perceptions of child health.

The regular use of preventive health services among children 0–23 months of age appears to be uncommon. The majority of caregivers reportedly had a vaccination card for their children on which receipt of vaccinations and micronutrient supplements is documented and height and weight can be charted (78.7%), but only 69.2% had this card available at the time of the interview. Less than one-third of children had attended growth monitoring in the past 2 months. Of these children, 87.1% had their weight and 19.0% had their length recorded on the vaccination card. In line with the low attendance rates at growth monitoring visits, only half of the children had received vitamin A in the past 6 months. Among those children with a vaccination card available, the majority of children were fully vaccinated for their age (69.6%). In addition, for individual vaccines, children generally received them at the recommended ages, with delays of no more than about 1 month. While the majority of children that had vaccination cards had received the necessary vaccines and generally when they were supposed to, these numbers likely overestimate the actual situation among the population as a whole, as those that did not have cards are less likely to have received the necessary vaccines.

Children aged 24–41 months of age were even less likely than the children aged 0–23 months to have a vaccination card available at the time of the interview (40.1%) or to have utilized preventive health care. Only 10.6% of these children, for example, had attended a growth monitoring visit in the past 2 months, and a little less than half had received a vitamin A supplement in the past 6 months. The lower proportion of the older children with a vaccination card available is probably at least partially due to the fact that the last vaccination in the national vaccination schedule is given at the age of 9 months. Mothers may thus not perceive the need to keep the card beyond this age. Although the regular use of preventive health services appears to be lower among the older children compared to the younger children, the percentage of the older children that were fully vaccinated for their age (83.1%) was considerably higher than among the younger children. This might simply be due to selection bias: The vaccination data are based on what could be copied from the vaccination cards. Mothers that kept and could find the vaccination card might also be the ones that were more inclined to properly immunize their infants. Alternatively, the lower vaccination rates in the younger kids might indicate that the coverage of the national vaccination efforts have dropped over the last years. The differences between the recommended and actual vaccination age in children 24–41 months were very similar to those in the younger sample.

Table 6.3a. Preventive health care practices among children 0–23 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,615	431	868	431	885
Vaccination card					
% that reported having a vaccination card	78.7	79.0	78.3	76.3	80.2
% that could show vaccination card for inspection	69.2	71.8	67.9	64.7	71.4
Growth monitoring					
% that attended growth monitoring in the last 2 months	29.0	35.3	29.7	32.3	23.7
Weight recorded on vaccination card	87.1	86.3	87.0	87.7	87.5
Height/length recorded on vaccination card	19.0	16.3	24.3	21.9	13.0
Vitamins and vaccinations					
% that received vitamin A in last 6 months	50.9	53.3	49.9	49.1	51.7
% fully vaccinated for age	69.6	73.5	66.0	67.3	72.1

* Maximum sample sizes presented. Sample sizes ranged from N = 642 to 2,615 in the full sample column; N = 129 to 431 in the T-24 arm; N = 214 to 868 in the T-18 arm; N = 114 to 431 in the T-NFP arm; and N = 184 to 885 in the control arm.

Table 6.3b. Preventive health care practices among children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		984	585	998	995
Vaccination card					
% that reported having a vaccination card	58.5	62.4	54.7	57.9	57.4
% that could show vaccination card for inspection	40.1	44.5	40.0	36.0	40.0
Growth monitoring					
% that attended growth monitoring in the last 2 months	10.6	13.0	9.6	12.6	6.8
Weight recorded on vaccination card	82.0	77.7	75.0	87.4	84.3
Height/length recorded on vaccination card	26.1	28.2	41.9	20.7	22.0
Vitamins and vaccinations					
% that received vitamin A in last 6 months	49.3	49.7	52.4	47.6	48.6
% fully vaccinated for age	83.1	88.3	76.9	80.2	83.4

* Maximum sample sizes presented. Sample sizes ranged from N = 253 to 3,562 in the full sample column; N = 85 to 984 in the T-24 arm; N = 31 to 585 in the T-18 arm; N = 87 to 998 in the T-NFP arm; and N = 50 to 995 in the control arm.

Figure 6.2a. Actual and recommended vaccination age for children 0–23 months of age

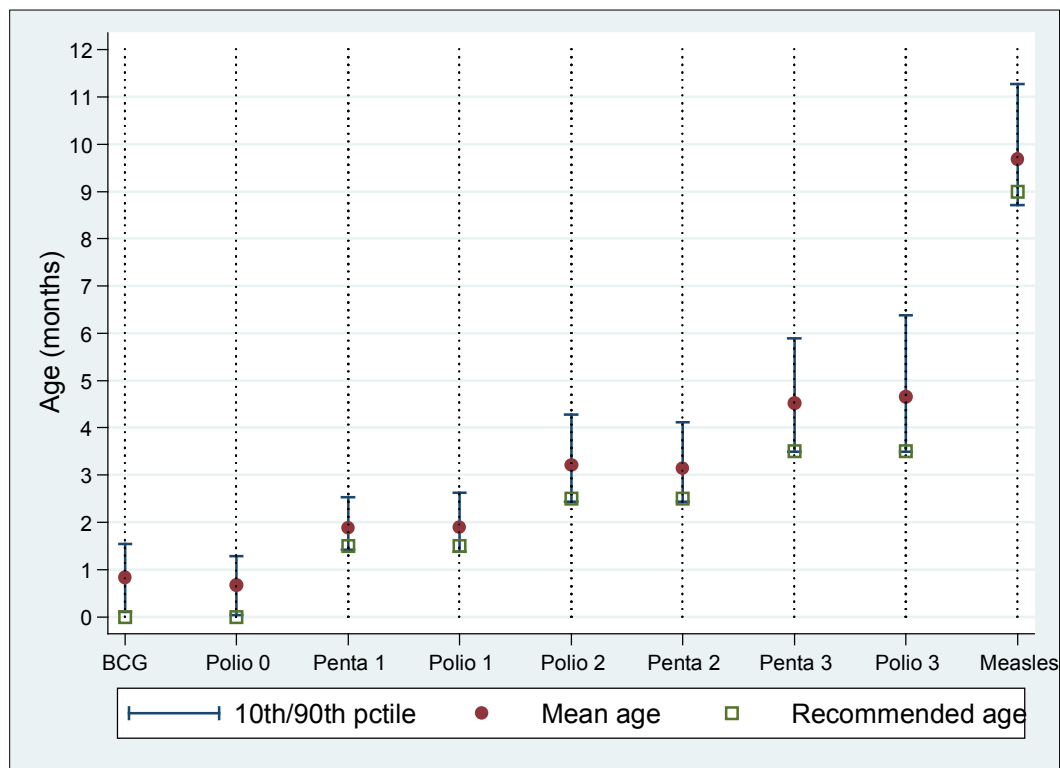
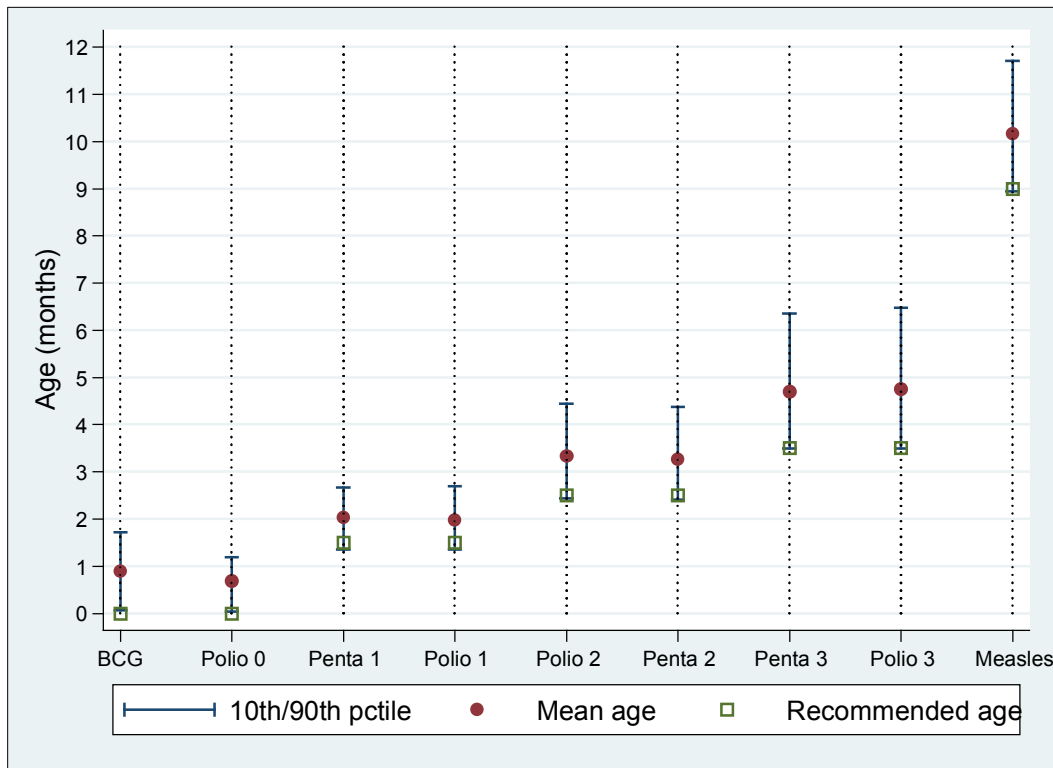


Figure 6.2b. Actual and recommended vaccination age for children 24–41 months of age



Illness was common among the children included in the baseline survey, and alarmingly severe illness was also common, especially among the children 0–23 months of age. Nearly half of the children 0–23 months of age and a little more than one-third of the children 24–41 months of age had experienced at least one symptom of illness in the past 2 weeks. The most commonly reported symptoms among children in both the younger and older age groups were coughing (31.1% and 25.7%, respectively), fever (29.6% and 25.0%, respectively), loss of appetite (27.2% and 25.1%, respectively), and watery diarrhea (22.4% and 13.6%, respectively). Among the children 0–23 months of age, 25.7% had experienced severe diarrhea (diarrhea with at least one of the following: fever, 6 or more loose stools per day, vomiting, not wanting to eat or drink, blood in the stool, or parents’ belief that the illness is not getting better) in the past 2 weeks, and close to 3.8% of children had severe respiratory problems (cough in the past 2 weeks along with difficulty or fast breathing due to chest problems). A lower percentage of children in the older age group had experienced either severe diarrhea (15.9%) or severe respiratory problems (2.7%) in the past 2 weeks, although these percentages are still a concern.

Table 6.4a. Child health and prevalence of morbidity symptoms among children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		2,621	432	868	433
During the past 2 weeks, % that experienced:					
Any illness	43.9	50.7	44.5	41.9	41.0
Fever	29.6	28.8	31.7	27.6	29.0
Convulsions	5.6	5.6	4.7	5.8	6.3
Problems drinking	17.5	16.9	18.8	17.4	16.6
Lost appetite	27.2	29.5	28.7	25.6	25.5
Vomit all (s)he ate/drank	16.0	14.6	16.2	16.5	16.1
Cough	31.1	39.4	29.9	33.2	27.0****
Difficulty breathing	20.0	21.6	20.3	19.5	19.1
Bloody diarrhea	3.3	4.2	3.3	3.7	2.7
Watery diarrhea	22.4	26.0	22.5	23.0	20.4
Other type of diarrhea	8.1	6.7	7.8	7.9	9.2
During the past 2 weeks, % that suffered from an illness requiring immediate medical attention					
Severe diarrhea**	25.7	29.0	25.4	26.5	23.9
Potential pneumonia***	3.8	5.6	4.4	1.2	3.7****

* Maximum sample sizes presented. Sample sizes ranged from N = 2,580 to 2,621 in the full sample column; N = 426 to 432 in the T-24 arm; N = 849 to 868 in the T-18 arm; N = 429 to 433 in the T-NFP arm; and N = 873 to 888 in the control arm.

** Diarrhea with at least one of the following: fever, 6 or more loose stools per day, vomiting, not wanting to eat or drink, blood in the stool, or parents' belief that the illness is not getting better.

*** Cough in the past 2 weeks along with difficulty or fast breathing due to chest problems.

**** Study arms differ, p-value < 0.05.

Table 6.4b. Child health and prevalence of morbidity symptoms among children 24–41 months of age

N*	Full sample 3,564	Study arms			
		T-24	T-18	T-NFP	Control
		985	585	998	996
During the past 2 weeks, % that experienced:					
Any symptom	37.3	42.1	34.1	37.2	34.4
Fever	25.0	24.4	21.7	25.9	26.8
Convulsions	4.9	4.6	3.6	4.8	6.2
Problems drinking	13.2	14.9	9.4	13.8	13.1
Lost appetite	25.1	26.9	22.4	25.6	24.6
Vomit all (s)he ate/drank	12.8	13.1	10.4	12.2	14.5
Cough	25.7	30.9	21.9	26.5	22.2****
Difficulty breathing	17.0	18.0	14.2	17.5	17.2
Bloody diarrhea	3.0	3.2	2.4	2.4	3.9
Watery diarrhea	13.6	16.0	12.0	13.2	12.7
Other type of diarrhea	4.7	5.0	3.8	5.6	3.9
During the past 2 weeks, % that suffered from an illness requiring immediate medical attention					
Severe diarrhea**	15.9	18.2	14.5	15.5	14.9
Potential pneumonia***	2.7	3.1	2.2	2.8	2.5

* Maximum sample sizes presented. Sample sizes ranged from N = 3,523 to 3,564 in the full sample column; N = 967 to 985 in the T-24 arm; N = 581 to 585 in the T-18 arm; N = 991 to 998 in the T-NFP arm; and N = 984 to 996 in the control arm.

** Diarrhea with at least one of the following: fever, 6 or more loose stools per day, vomiting, not wanting to eat or drink, blood in the stool, or parents' belief that the illness is not getting better.

*** Cough in the past 2 weeks along with difficulty or fast breathing due to chest problems.

**** Study arms differ, p-value < 0.05.

The majority of children that were reportedly ill had received some type of treatment. Children that had fever in the past 2 weeks received medication against fever (70.1% and 67.2% for younger and older children, respectively). However, only about 40% of those that had diarrhea had received ORS, despite a much higher percentage of women reporting that they knew of ORS (see Section 5.2). Equally alarming is the finding that approximately 39.7% of mothers of the younger children and 34.2% of mothers of the older children reported reducing the child's liquid intake when (s)he was suffering from diarrhea. Approximately two-thirds of mothers that reported that her child had a severe illness during the past 2 weeks sought care or advice from a trained professional. Seeking care from untrained individuals (such as traditional healers) was not commonly reported. Hospitalization for the treatment of malnutrition was also uncommon, with less than 1% of children under 41 months of age having been hospitalized during the 2 months preceding the survey. An equally low percentage of children were given Plumpy'nut®. These numbers, however, are not that surprising given that the prevalence of severe acute malnutrition among these children was 1.9% for children aged 0–23 months and 0.7% for children aged 24–41 months.

Table 6.5a. Treatment of illness and malnutrition among children 0–23 months of age

N*	Full Sample	Study arms			
		T-24	T-18	T-NFP	Control
		2,615	432	867	432
Malnutrition					
During the past 2 months, % that were hospitalized/institutionalized for treatment of malnutrition	0.6	0.5	0.7	0.7	0.5
During the past 2 months, % that used Plumpy'nut® for malnutrition treatment	0.6	0.5	0.7	0.5	0.6
Fever					
% that received medication against fever	70.1	59.2	71	65.8	76.3**
Diarrhea					
% that received ORS	38.8	41.4	42.8	45.1	29.9**
Liquids given; % that had:					
Nothing or less than normal	39.7	45.2	33.6	39.8	42.9
Same as normal	16.4	17.5	17.9	10.6	17.4
More than normal	43.8	37.3	48.5	49.6	39.7
Children with symptoms requiring immediate medical attention (severe diarrhea or respiratory problems); % that:					
Sought care/advice from trained professional	67.7	53.2	73.3	68.8	70.3
Sought care/advice from somebody else	0.5	0.8	0.5	0.0	0.5
Did not seek care	31.9	46.0	26.2	31.2	29.2

* Maximum sample sizes presented. Sample sizes ranged from N = 634 to 2,615 in the full sample column; N = 124 to 432 in the T-24 arm; N = 206 to 867 in the T-18 arm; N = 109 to 432 in the T-NFP arm; and N = 195 to 885 in the control arm.

** Study arms differ, p-value < 0.05.

Table 6.5b. Treatment of illness and malnutrition among children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		3,563	985	585	998
Malnutrition					
During the past 2 months, % that were hospitalized/institutionalized for treatment of malnutrition	0.3	0.5	0.2	0.1	0.2
During the past 2 months, % that used Plumpy'nut® for malnutrition treatment	1.6	2.0	1.2	1.8	1.3
Fever					
% that received medication against fever	67.2	60.3	74.2	67.8	69
Diarrhea					
% that received ORS	40.2	48.6	37.2	38.6	33.1
Liquids given; % that had:					
Nothing or less than normal	34.2	32.6	37.2	33.1	35.4
Same as normal	14.5	19.3	9.3	10.2	16.3
More than normal	51.3	48.1	53.5	56.7	48.3
Children with symptoms requiring immediate medical attention (severe diarrhea or respiratory problems); % that:					
Sought care/advice from trained professional	67.1	61.7	60.5	75.5	68.9
Sought care/advice from somebody else	0.2	0.0	1.2	0.0	0.0
Did not seek care	32.7	38.3	38.3	24.5	31.1

* Maximum sample sizes presented. Sample sizes ranged from N = 560 to 3,563 in the full sample column; N = 180 to 985 in the T-24 arm; N = 81 to 585 in the T-18 arm; N = 151 to 998 in the T-NFP arm; and N = 147 to 996 in the control arm.

6.3. CHILD DEVELOPMENT

The availability of learning materials and support for learning were extremely low for children in this population, and many were left with inadequate care in the week prior to the survey (i.e., either left in the care of other children or left alone). Virtually none of children in either sample had children's books, and only 12% of the younger children and 30% of the children 24–41 months of age had two or more playthings to play with at home. The playthings asked about in the survey included homemade toys, toys from a store, household items, and objects found outside. The percentage of children 36–41 months²⁷ of age with whom an adult engaged in four or more activities to promote learning and school readiness in the past 3 days was 26.5%; 28.2% of the children had fathers that engaged in one or more of these activities.²⁸ Nearly 25% of children aged 0–23 months had been left under inadequate care during the week preceding the survey; this proportion rose to 62% among the older children.

²⁷ The MICS instrument used to measure these outcomes is intended for use in children 36 months and older.

²⁸ Note that the cutoff as defined by MICS is lower for fathers than it is for any adult, hence the higher percentage for fathers.

Table 6.6a. Learning materials and adequacy of care among children 0–23 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		2,621	432	868	433
Learning materials					
Children's books: % with three or more	0.2	0.5	0	0.2	0.1
Playthings: % with two or more	12.2	14.8	13.1	12.0	10.1
Inadequate care (%)	23.9	23.1	24.7	25.9	22.7

* Maximum sample sizes presented. Sample sizes ranged from N = 2,613 to 2,621 in the full sample column; N = 867 to 868 in the T-18 arm; N = 429 to 433 in the T-NFP arm; and N = 885 to 888 in the control arm. There were no missing values in the T-24 arm.

Table 6.6b. Support for learning, learning materials, and adequacy of care among children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		3,564	985	585	998
Support for learning in children 36 months and older					
Any adult	26.5	28.5	22.2	29.8	23.4
Father	28.2	29.4	24.3	30.1	27.2
Learning materials					
Children's books: % with three or more	0.1	0.2	0.0	0.3	0.0**
Playthings: % with two or more	29.7	33.6	26.8	34.1	23.2**
Inadequate care (%)	61.7	63.4	54.0	63.1	63.0

* Maximum sample sizes presented. Sample sizes ranged from N = 1,215 to 3,564 in the full sample column; N = 333 to 985 in the T-24 arm; N = 185 to 585 in the T-18 arm; N = 359 to 998 in the T-NFP arm; and N = 338 to 996 in the control arm.

** Study arms differ, p-value < 0.05.

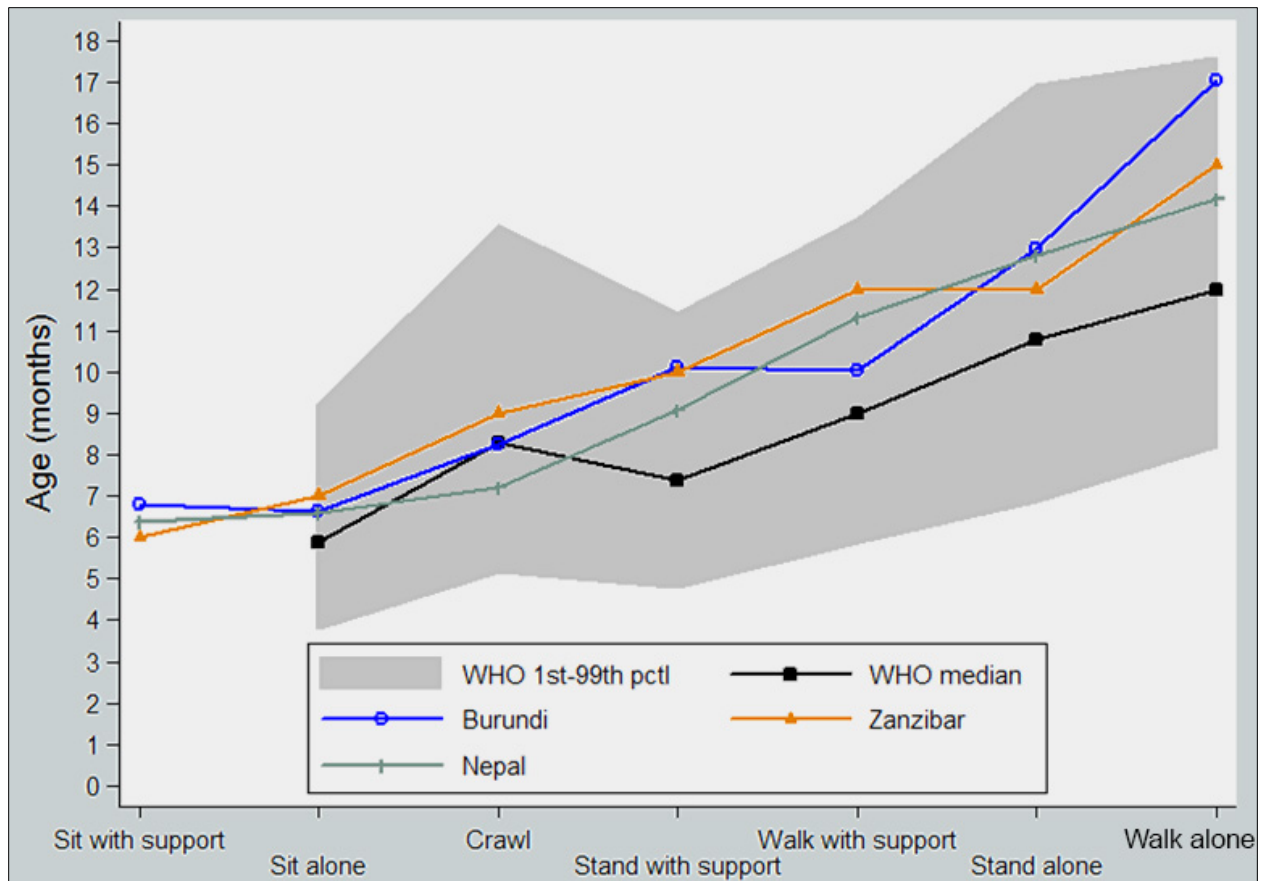
Motor development among children in Burundi falls within the “windows of achievement” established by the WHO (WHO Multicentre Growth Reference Study Group, 2006) for key motor milestones, although they tend to fall toward the later ages within those windows for a few of these milestones. For example, the median age of children for whom standing with assistance was the highest achieved milestone was 10.1 months and the median age for walking alone was 17.1 months. The “windows of achievement” established for these two key motor milestones by the WHO are between the ages of 4.8 and 11.4 and 8.2 and 17.6 months, respectively (WHO MGRT, 2006). The children in this sample had similar median ages of attainment for sitting, crawling, and standing as children in Nepal and Tanzania. However, the children in Burundi appear to be attaining the ability to walk alone at a later median age in comparison not only to the WHO standards, but also in comparison to children in Nepal and Tanzania (Siegel et al., 2005; Kariger et al., 2005).

Language development among the children in this sample again pushes the outer limits, and in some cases exceeds, what is considered normal by some experts.²⁹ The median age of children that had “making sounds while playing” as their highest achieved milestone was 6.1 months and those who were “able to make single syllable sounds such as da, ma, and ga” was 7.2 months. According to the Mayo Clinic, both of these language milestones should normally be attained by 6 months of age. The median age of children that had “saying one word” as their highest achieved milestone was 16.0 months. It is

²⁹ See “Developmental Milestones.” <http://www.med.umich.edu/yourchild/topics/devmile.htm>; “Language development: Speech milestones for babies.” <http://www.mayoclinic.com/health/infant-development/AN01026>; and “Typical Speech and Language Development.” <http://www.asha.org/public/speech/development/>.

generally stated that children should be able to say their first word by the age of 12 months.³⁰ According to the Mayo Clinic, children should be able to say up to 8–10 words by the time they are 18 months of age and 50 words by their second birthday. The median ages of children that could say 3, 6, and 20 words in this sample of Burundian children were 26.0, 27.8, and 32.3 months of age, respectively.

Figure 6.4. Motor milestone attainment by age among different populations (adapted with permission from Siegel et al., 2005). Ages of achievement are medians.



³⁰ Ibid.

Table 6.7. Mean and median age of motor milestone attainment among children 4–41 months of age

	Full sample		Study arms							
			T-24		T-18		T-NFP		Control	
	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median
N	5,696		1,314		1,303		1,347		1,732	
Pulls to sit	5.2 (1.1)	5.2	.	.	5.2 (1.7)	5.2	.	.	5.2 (1.1)	5.2
Raises head	5.8 (1.5)	5.5	8.6 (0.5)	8.6	5.3 (1.1)	4.8	5.5	5.5	5.5 (1.3)*	5.6
Rolls over	5.0 (0.6)	5.0	4.9 (0.6)	4.8	5.2 (0.7)	5.1	4.9 (0.6)	5.2	4.8 (0.5)	4.9
Holds head steady	6.3 (1.6)	5.7	6.1 (1.8)	6.2	6.6 (1.8)	6.8	6.3 (1.4)	5.8	5.9 (1.7)	5.2
Makes crawling movements on tummy	5.1 (0.6)	5.2	4.7 (0.4)	4.6	5.4 (0.5)	5.6	.	.	5.1 (0.6)	5.1
Sits with support	7.0 (1.7)	6.8	7.6 (2.4)	7.6	6.7 (1.0)	6.7	6.3	6.3	6.9 (1.8)	7.6
Sits without support	6.8 (1.5)	6.6	6.9 (1.4)	6.4	6.8 (1.7)	6.6	7.1 (1.3)	7.1	6.7 (1.4)	6.5
Supports body on hands and knees or feet	6.3 (1.5)	6.0	6.2 (0.8)	6.1	6.7 (1.7)	6.1	5.8 (1.2)	5.7	6.1 (1.6)	5.7
Creeps	6.9 (1.4)	6.8	7.2 (1.6)	6.3	6.8 (1.5)	6.7	7.2 (1.3)	7.3	6.8 (1.3)	6.6
Crawls	8.6 (1.9)	8.2	7.7 (1.4)	7.4	8.3 (1.8)	8.1	9.2 (2.1)	8.8	9.0 (2.1)*	8.7
Stands with support	10.3 (2.4)	10.1	10.4 (2.6)	9.8	10.2 (2.3)	10.0	10.5 (2.5)	10.3	10.4 (2.6)	10.3
Walks when both hands are held	10.4 (2.7)	10.1	10.1 (2.2)	10.1	10.4 (2.6)	10.0	10.7 (2.7)	10.3	10.7 (3.1)	10.1
Walks when one hand is held	11.7 (2.6)	11.4	11.1 (2.9)	10.1	12.3 (2.1)	11.9	11.4 (2.3)	11.6	11.9 (2.9)	11.1
Stands alone for a moment	13.0 (3.0)	12.8	12.8 (2.4)	12.6	12.4 (2.9)	12.7	12.2 (1.9)	12.8	13.7 (3.3)	13.3
Stands alone for a long time	13.6 (3.0)	13.0	13.7 (3.1)	13.5	13.0 (3.3)	12.6	13.4 (2.8)	12.3	14.2 (3.0)	14.1
Bends at the waist	13.7 (3.3)	13.7	15.7 (0.5)	15.9	13.6 (3.8)	11.6	12.6 (2.4)	11.3	13.7 (3.5)*	13.2
Walks alone	18.2 (4.9)	17.1	18.6 (4.9)	17.6	17.3 (4.5)	16.0	18.4 (5.5)	17.3	18.6 (4.8)	18.4
Runs	25.4 (6.7)	24.6	26.6 (6.8)	25.9	23.3 (6.2)	22.2	26.7 (6.6)	26.1	25.5 (6.8)*	24.1
Walks up stairs	25.6 (6.4)	24.7	28.4 (5.7)	29.2	24.8 (5.6)	25.1	24.9 (7.4)	24.2	24.8 (6.5)	24.1
Throws a ball	25.1 (7.9)	24.5	27 (7.1)	26.3	23.7 (7.5)	22.1	25.3 (9.0)	24.7	25 (7.7)	24.4
Walks up and down stairs	27.1 (7.2)	27.3	27.8 (6.7)	27.2	25.7 (7.9)	25.2	27.9 (7.1)	27.4	27 (7.3)	27.7
Kicks a ball forward	29.3 (7.1)	28.9	30.6 (6.4)	29.5	27.7 (7.8)	27.3	29.9 (7.2)	30.7	28.7 (6.9)*	28
Walks forward on a straight line	28.3 (7.0)	27.8	29.1 (6.5)	28.0	26.1 (7.1)	25.1	30 (6.5)	29.3	27.9 (7.3)*	27.2

N	Full sample		Study arms							
			T-24		T-18		T-NFP		Control	
	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median
	5,696		1,314		1,303		1,347		1,732	
Jumps with both feet	31.8 (6.5)	31.9	31.8 (5.8)	31.0	30.9 (7.3)	30.2	32.2 (6.3)	32.7	32.2 (6.7)	33.2
Stands on one foot	33.6 (6.3)	34.0	34.3 (6.2)	35.3	33.2 (7.0)	34.4	33.5 (5.7)	32.7	33.1 (6.7)	33.7
Walks backwards on a straight line	32.0 (6.5)	31.7	32.4 (6.2)	32.4	30.7 (6.9)	30.3	32.7 (6.3)	32.2	31.5 (6.6)	31.4
Walks on tiptoes	34.8 (5.7)	36.1	33.7 (5.8)	33.9	37 (4.4)	38.4	35 (5.9)	36.2	34.6 (5.7)*	35.2
Jumps 4 times	35.0 (5.4)	35.6	35.4 (4.8)	35.5	29.8 (5.3)	30.9	36.4 (4.8)	38.0	35.9 (5.3)*	36.5
Hops on one foot 20 times	37.7 (1.1)	37.6	39.1	39.1	.	.	37.6 (0.3)	37.6	36.6*	36.6
Skips using alternate legs	36.0 (5.0)	37.7	36.8 (4.6)	38.6	35.6 (5.2)	36.4	36.2 (4.8)	37.4	35.4 (5.4)	37.0

* Study arms differ, p-value < 0.05.

Table 6.8. Mean age of selected language milestone attainment among children 4–41 months of age

	Full sample		Study arms							
			T-24		T-18		T-NFP		Control	
	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median
	5,756		1,324		1,322		1,355		1,755	
Makes sounds while playing alone	6.5 (1.9)	6.1	6.3 (1.8)	5.9	6.6 (1.9)	6.6	7.0 (2.0)	6.6	6.2 (2.0)	5.8
Makes sounds like da, ba, ma, and ga	7.9 (2.6)	7.2	7.9 (2.7)	7.2	8.6 (3.0)	7.6	7.2 (1.5)	6.8	7.3 (2.0)	7.1
Makes sounds like da-da, ba-ba, ma-ma	8.5 (2.3)	8.4	8.5 (2.1)	8.0	8.3 (2.1)	7.9	8.9 (3.0)	8.6	8.4 (2.1)	8.6
Imitates single sounds	10.8 (3.3)	10.3	10.4 (3.6)	9.5	10.3 (3.1)	10.0	11.6 (3.2)	11.1	10.8 (3.3)*	10.5
Gives object when asked	15.5 (4.5)	14.9	16.2 (5.2)	15.5	15.2 (4.0)	14.7	14.8 (4.3)	14.3	15.8 (4.4)	15.5
Says one word	17.0 (4.9)	16.0	17.6 (5.2)	16.5	17.8 (4.9)	16.7	14.5 (3.5)	13.4	17.4 (5.2)*	16.7
Says goodbye at appropriate time	19.0 (4.8)	18.2	20.0 (5.5)	19.3	18.2 (4.5)	17.8	19.1 (5.3)	17.4	19.1 (4.5)	18.3
Points and makes sounds when s/he wants something	19.1 (5.1)	18.3	20.1 (4.9)	19.3	18.9 (4.6)	18.8	21.0 (5.6)	20.7	17.9 (5.1)*	16.7
Points to a cat or chicken when asked	22.7 (6.0)	22.6	24.4 (5.7)	24.5	21.0 (6.3)	19.7	24.8 (5.7)	24.7	22.1 (5.4)*	20.9
Says three words	25.6 (4.9)	26.0	27.3 (6.2)	26.5	24.2 (5.6)	26.1	25.4 (2.4)	25.8	25.4 (4)	25.3
Points to a person walking when asked	25.2 (6.6)	24.9	26.4 (6.7)	25.6	23.3 (6.1)	22.4	26.2 (7.1)	26.0	25.1 (6.4)*	24.6
Says six words	28.4 (6.3)	27.8	28.5 (5.1)	27.5	26.7 (6.3)	26.5	29.8 (6.5)	28.4	28.5 (6.7)	28.1
Uses pronouns like "I" and "you"	29.1 (6.4)	28.4	29.6 (5.9)	29.7	28.1 (7.5)	27.2	29.9 (5.5)	29.5	29 (6.5)	28.3
Constantly asks for names of objects	31 (6.1)	30.6	30.3 (5.3)	29.4	29.8 (6.2)	29.7	31.7 (6.3)	31.9	31.3 (6.2)	31.2
Starts a lot of questions with "when" and "what"	31.8 (5.7)	30.9	32.3 (5.8)	31.1	31.7 (5.7)	31.7	31.9 (5.6)	30.9	31.2 (5.7)	30.7
Says 20 or more words	32.3 (5.8)	32.3	31.0 (4.9)	31.6	30.7 (7.1)	30.3	33.3 (5.7)	34.8	32.9 (5.7)	33.5
Uses plurals	32 (5.8)	31.5	29.8 (4.2)	29.1	34.4 (6)	33.5	32.9 (6.9)	33.3	32.2 (5.4)*	31.7
Says what a knife is for	33.8 (5.6)	34.0	33.4 (5.5)	33.5	33.7 (5.8)	33.9	34.0 (5.1)	33.4	34 (6.3)	35.0
Says his/her full name	35.5 (5)	36.4	34.8 (5.1)	35.1	36.5 (4.7)	38.0	35.9 (4.8)	37.0	35.3 (5.2)	35.5
Says the opposite of the word "big"	34.8 (5.6)	36.1	34.5 (5.5)	35.7	33.5 (6.5)	33.5	35.4 (4.7)	35.7	35.5 (5.7)	37.3
Talks about things that happened in the past	36.5 (4.5)	37.7	36.6 (4.6)	38.0	36.7 (4.1)	38.0	36.1 (5.0)	37.3	36.9 (3.8)	37.6

* Study arms differ, p-value < 0.05.

6.4. CHILD NUTRITIONAL STATUS

The overall prevalence of stunting ($HAZ < -2$ SD) was very high, at 53.3% among children under 2 years of age and 65.2% among children 24–41 months of age. The prevalence of stunting was already very high in the youngest children (27% among 0–6-month-old children) and their linear growth continued to falter up to the age of 18–23 months, reaching a stunting prevalence of 70.1%. HAZ followed a similar pattern, reaching a nadir at -2.5 SD among children 18–23 months of age.

Mean WHZ was above 0 for the youngest children (0–6 months of age) and then dropped to -0.5 SD among children 6–17 months of age, after which a steady increase was seen, reaching a mean of 0 SD between the ages of 30 and 35 months. Correspondingly, the highest prevalence of wasting (9%–9.5% with a $WHZ < -2$ SD) was found among children 6–17 months of age. As would be expected, the prevalence of underweight ($WAZ < -2$ SD) was somewhere between the prevalence of wasting and stunting: About 28% of both the younger and older children were found to be underweight. WAZ dropped considerably in the first 12 months of life and stabilized thereafter at a level of -1.5 SD. As is commonly found, girls had considerably higher height-for-age, weight-for-age, and weight-for-height z-scores than boys.

The mean Hb concentration among children in this sample was 10.9 g/dl among the youngest children (0–5 months of age), declined to 10.2 g/dl among children 6–11 months of age, and then gradually rose to 11.0 g/dl among children 36–42 months of age. Correspondingly, the prevalence of anemia decreased with age, as would be expected. More than 70% of the children 6–11 months were anemic (71.8%), while among children 36–42 months of age 45.6% of the children were anemic. The prevalence of severe anemia was low among children included in the baseline survey (around 2%).

Table 6.9a. Anthropometric measurements of children 0–23 months of age

	Full sample*			Study arm*											
				T-24			T-18			T-NFP			Control		
	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys
N**	2,627	1,373	1,253	432	230	202	868	453	415	433	223	210	894	467	426
Age (months)	12.8 (6.8)	12.9 (6.8)	12.8 (6.8)	12.3 (7.1)	12.4 (7.1)	12.1 (7.0)	12.9 (6.7)	12.8 (6.7)	13.1 (6.7)	12.4 (6.6)	12.4 (6.9)	12.4 (6.4)	13.2 (6.8)	13.4 (6.7)	13.0 (6.9)
Sex (% male)	47.7	0.0	100.0	46.8	0.0	100.0	47.8	0.0	100.0	48.5	0.0	100.0	47.7	0.0	100.0
Length-for-age z-score (LAZ)	-2.1 (1.3)	-1.9 (1.3)	-2.2 (1.3)	-2.0 (1.2)	-1.9 (1.3)	-2.2 (1.2)	-2.0 (1.3)	-1.9 (1.4)	-2.2 (1.2)	-2.0 (1.4)	-1.8 (1.3)	-2.2 (1.5)	-2.2*** (1.3)	-2.1 (1.3)	-2.4 (1.3)
% stunted (LAZ < -2 SD)	53.3	48.3	58.8	50.5	45.1	56.6	54.2	49.8	59.1	48.3	39.7	57.7	56.1	52.5	60.2
WAZ	-1.4 (1.2)	-1.3 (1.2)	-1.5 (1.2)	-1.3 (1.1)	-1.2 (1.2)	-1.5 (1.1)	-1.4 (1.1)	-1.3 (1.1)	-1.5 (1.1)	-1.3 (1.2)	-1.2 (1.1)	-1.5 (1.3)	-1.4 (1.2)	-1.3 (1.2)	-1.6 (1.3)
% underweight (WAZ < -2 SD)	28.3	24.9	32.0	27.4	25.8	29.4	28.1	24.9	31.6	26.8	22.8	31.1	29.7	25.5	34.3
Weight-for-length z-score (WLZ)	-0.3 (1.2)	-0.3 (1.2)	-0.4 (1.3)	-0.3 (1.3)	-0.3 (1.2)	-0.4 (1.3)	-0.3 (1.3)	-0.3 (1.2)	-0.4 (1.3)	-0.3 (1.2)	-0.3 (1.1)	-0.3 (1.3)	-0.3 (1.2)	-0.2 (1.2)	-0.3 (1.3)
% wasted (WLZ < -2 SD)	7.2	5.7	8.9	6.1	4.4	8.0	8.1	6.8	9.5	7.8	5.1	10.7	6.6	5.7	7.7
Hb (g/dl)	10.6 (1.6)	10.7 (1.6)	10.5 (1.6)	10.9 (1.4)	11 (1.3)	10.9 (1.4)	10.5 (1.6)	10.6 (1.6)	10.3 (1.6)	10.8 (1.6)	10.8 (1.7)	10.9 (1.5)	10.6*** (1.6)	10.7 (1.6)	10.5 (1.6)
% anemic (Hb < 11.0 g/dl)	59.8	59.5	60.2	56.6	53.5	60.0	63.7	65.6	61.7	52.7	52.4	53.1	60.8***	59.4	62.3
% severely anemic (Hb < 7.0 g/dl)	2.0	2.1	2.0	0.3	0.6	0.0	2.8	2.5	3.0	1.8	3.1	0.6	2.2***	1.9	2.5

* Values are mean (SD) or %.

** Sample sizes ranged from N = 2,021 to 2,627 in the full sample column; N = 320 to 432 in the T-24 arm; N = 682 to 868 in the T-18 arm; N = 328 to 433 in the T-NFP arm; and N = 691 to 894 in the control arm.

*** Study arms differ, p-value < 0.05.

Table 6.9b. Anthropometric measurements of children 24–41 months of age

	Full sample*			Study arm*											
				T-24			T-18			T-NFP			Control		
	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys
N**	3,568	1,844	1,724	985	526	459	585	315	270	998	501	497	1,000	502	498
Age (months)	32.8 (5.6)	32.9 (5.6)	32.8 (5.6)	32.7 (5.6)	33.2 (5.6)	32.2 (5.7)	32.7 (5.4)	32.8 (5.6)	32.7 (5.2)	33.0 (5.6)	33.0 (5.7)	33.0 (5.5)	32.8 (5.6)	32.5 (5.4)	33.2 (5.8)
Sex (% male)	48.3	0.0	100.0	46.6	0.0	100.0	46.2	0.0	100.0	49.8	0.0	100.0	49.8	0.0	100.0
HAZ	-2.4 (1.2)	-2.3 (1.2)	-2.5 (1.2)	-2.3 (1.2)	-2.3 (1.1)	-2.4 (1.2)	-2.3 (1.3)	-2.2 (1.3)	-2.5 (1.3)	-2.4 (1.2)	-2.3 (1.2)	-2.4 (1.2)	-2.5* (1.2)	-2.4 (1.2)	-2.6 (1.3)
% stunted (HAZ < -2 SD)	65.3	62.9	67.9	64.8	63.5	66.2	62.5	57.1	68.7	64.8	64.2	65.4	68.1	64.5	71.7
WAZ	-1.5 (1.1)	-1.4 (1.0)	-1.5 (1.1)	-1.4 (1.0)	-1.4 (1.0)	-1.5 (1.1)	-1.4 (1.1)	-1.4 (1.1)	-1.5 (1.1)	-1.5 (1.0)	-1.5 (1.0)	-1.5 (1.0)	-1.5 (1.1)	-1.4 (1.0)	-1.6 (1.1)
% underweight (WAZ < -2 SD)	28.1	26.3	30.0	26.7	26.2	27.2	28.2	26.0	30.8	27.7	27.6	27.8	29.8	25.5	34.2
WHZ	-0.1 (1.0)	-0.1 (1.0)	-0.1 (1.1)	-0.2 (1.0)	-0.1 (0.9)	-0.2 (1.1)	-0.2 (1.1)	-0.2 (1.0)	-0.2 (1.1)	-0.1 (1.0)	-0.1 (1.0)	-0.1 (1.1)	-0.1 (1.1)	0.0 (1.0)	-0.1 (1.1)
% wasted (WHZ < -2 SD)	3.0	2.1	3.9	2.4	1.0	4.0	3.9	3.3	4.6	3.2	3.1	3.3	2.9	1.6	4.2
Hb (g/dl)	10.9 (1.5)	11 (1.5)	10.8 (1.5)	11.2 (1.3)	11.3 (1.3)	11 (1.3)	10.7 (1.6)	10.8 (1.6)	10.6 (1.4)	11 (1.5)	11 (1.5)	11 (1.5)	10.7*** (1.6)	10.7 (1.5)	10.6 (1.6)
% anemic (Hb < 11.0 g/dl)	47.8	44.4	51.5	43.2	39.3	47.7	51.4	46.9	56.6	44.3	42.7	46.0	53.8***	50.1	57.5
% severely anemic (Hb < 7.0 g/dl)	1.8	1.8	1.7	0.9	1.0	0.9	2.5	3.0	1.9	1.5	1.7	1.3	2.5	2.3	2.7

* Values are mean (SD) or %.

** Sample sizes ranged from N = 3,454 to 3,568 in the full sample column; N = 958 to 985 in the T-24 arm; N = 570 to 585 in the T-18 arm; N = 964 to 998 in the T-NFP arm; and N = 959 to 1,00 in the control arm.

*** Study arms differ, p-value < 0.05.

Figure 6.5. Prevalence of stunting (HAZ < -2.0), underweight (WAZ < -2.0), and wasting (WHZ < -2.0) by age

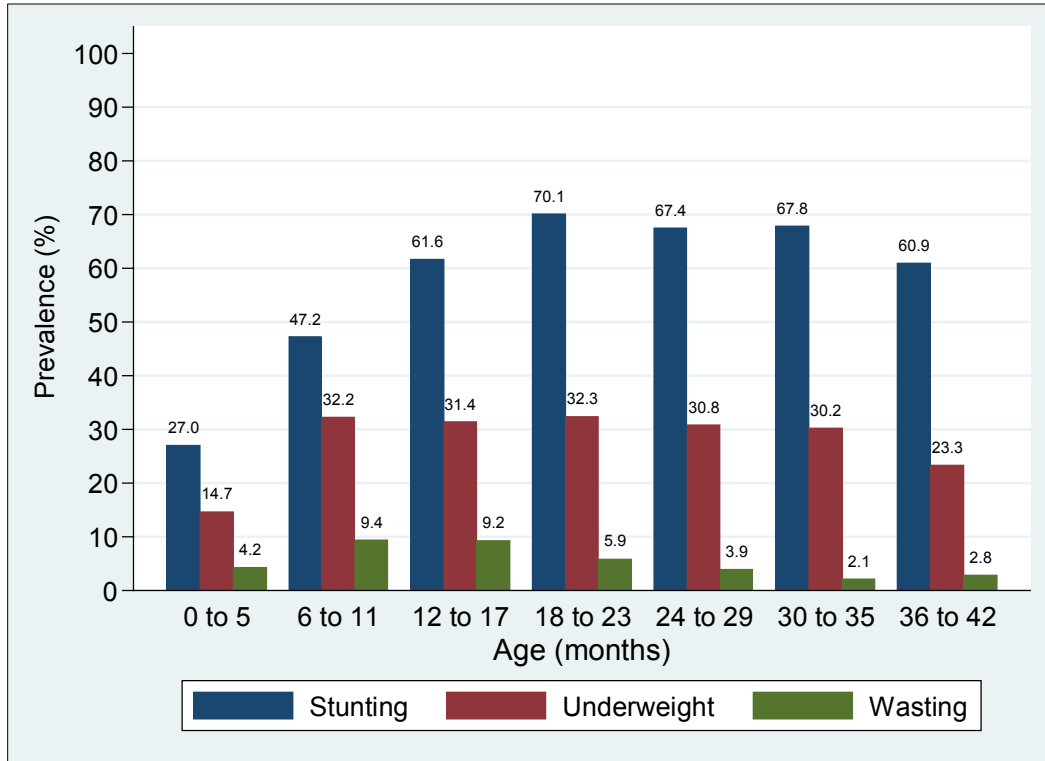


Figure 6.6. Mean z-scores for height-for-age, weight-for-age, and weight-for-height

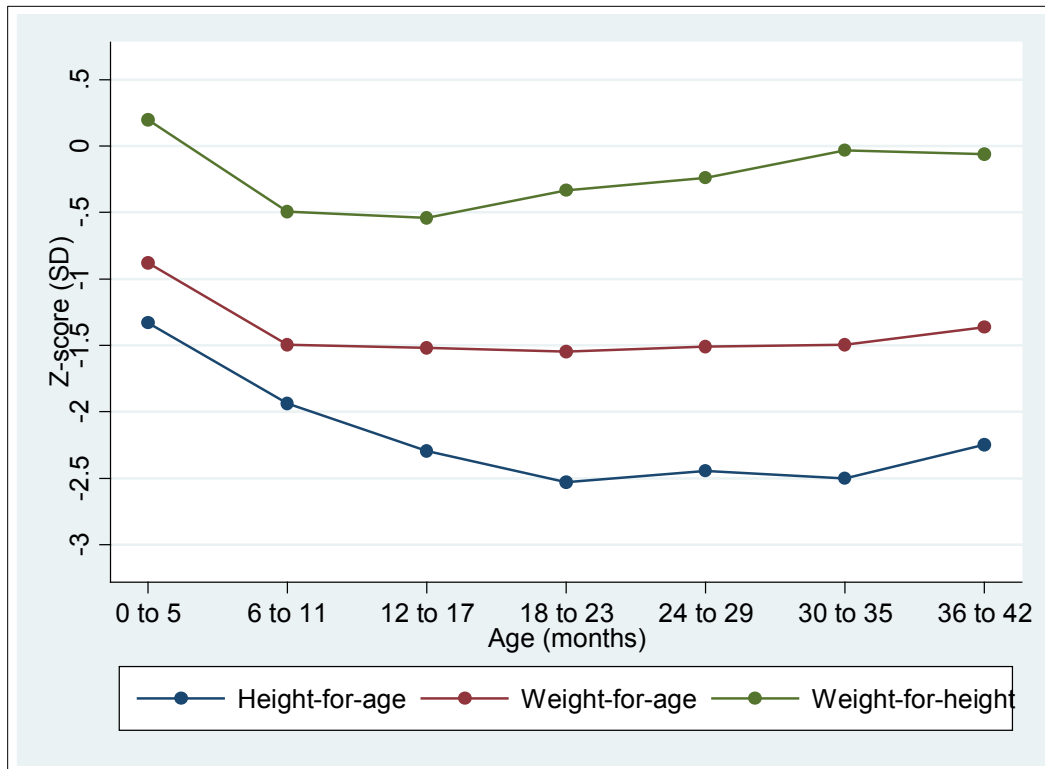
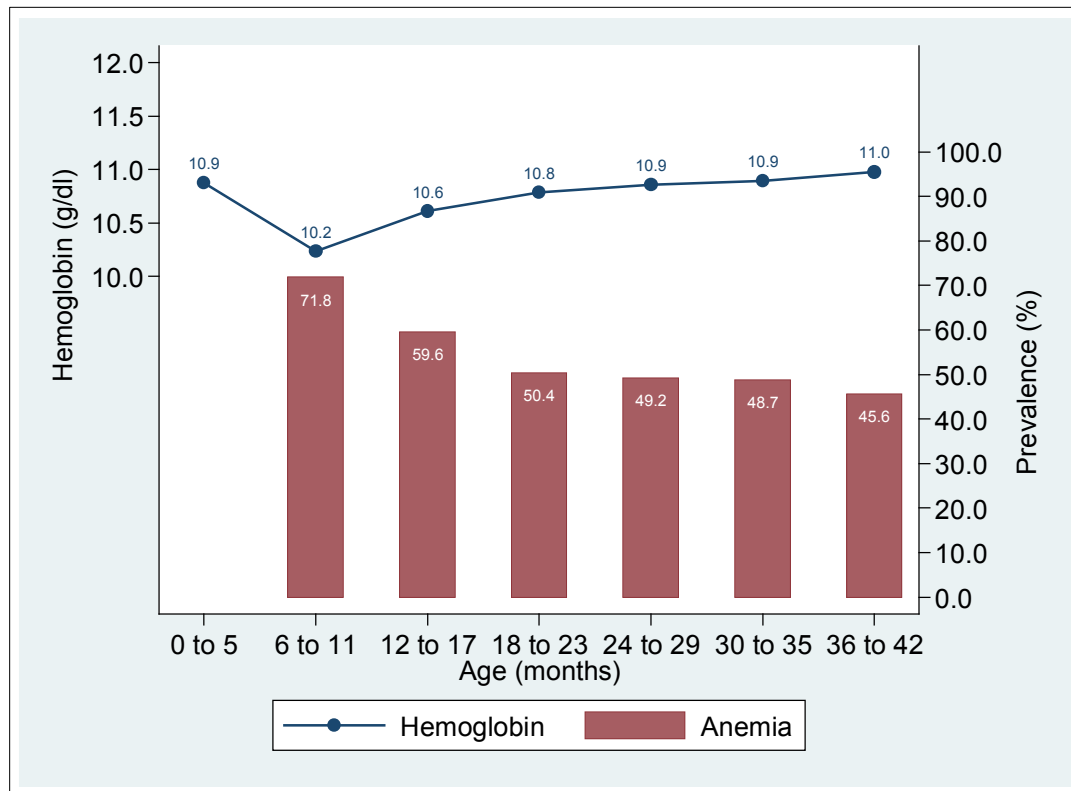


Figure 6.7. Hemoglobin and anemia³¹ (Hb < 11.0 g/dl) by child age



6.5. SUMMARY OF CHILD CHARACTERISTICS

Breastfeeding is universal in this population and breastfeeding practices during the child’s first 6 months were found to be generally in line with international guidance. Complementary feeding practices, however, were largely inadequate: The poor quality of complementary foods and the low frequency of complementary feeding were alarming. In line with the results from the knowledge questions, practices indicative of responsive feeding were not widely reported among women of children in either the younger or older age group. For example, when a child refused to eat, less than half of the mothers reported doing anything to encourage her child to eat more. Only a minority of children had attended growth monitoring in the past 2 months. Among the 70% of children 0–23 months of age with a vaccination card available, the majority of children were fully vaccinated for their age (69.6%). Around 83% of the children 24–41 months of age with a vaccination card (40% of all children) were fully vaccinated for their age. In addition, for individual vaccines, children generally received them at the recommended ages, with delays of no more than about 1 month.

Around 40% of the children had at least one morbidity symptom in the 2 weeks preceding the survey. The most commonly reported symptoms were coughing, fever, diarrhea, and loss of appetite. Two-thirds of the mothers that had a child with symptoms requiring immediate medical attention sought care or advice from a trained professional.

Learning materials, such as children’s books and playthings for young children, were virtually absent in the households, and only about one-third of the children 36–41 months of age had an adult engage with them in learning activities. Many children were left with other children when their mother was away. Even though the average age of attainment of key motor milestones fell within the “windows of achievement” as defined by the WHO, a few of them were close to the 95th and 99th percentiles (WHO MGRT, 2006),

³¹ The prevalence of anemia was not calculated for children under 6 months of age.

indicating that a number of children have likely been delayed in their acquisition of important motor milestones. Language development followed a similar pattern.

Child stunting was found to be excessively high, with more than half of the children under 2 years of age and 65.2% of the 24–41-month-old children being stunted. The prevalence of wasting was 7% in children 0–23 months of age and to 3% in the older age group.

The high prevalence of anemia can be categorized as a severe public health problem (defined as a prevalence above 40.0% by the WHO [WHO, 2008a]). The prevalence of severe anemia was low.

7. Differences between Study Arms

The statistically significant differences found between the study groups seem to indicate that the control arm might be worse off and the T-24 arm better off than the two other treatment arms. Variables pointing in this direction include the use of clean water and bednets, the number of household assets, the prevalence of hunger and low dietary diversity, Hb levels and anemia in mothers and children, and HAZ and stunting in children.

8. Discussion

8.1. SUMMARY OF KEY FINDINGS

8.1.1. Community Characteristics

The living conditions in the 60 surveyed *collines* were grim. None of the *collines* had access to an electricity network and very few were connected to a telephone landline. Most had access to mobile phone service, but the lack of access to electricity made charging the devices a challenge. Most access roads were unpaved, making it impossible for vehicles to transit for at least a 2 months each year during the rainy season. The most predominant form of transportation was walking; community residents walked to their local markets, churches, water sources, schools, and health care institutions. Even though three out of four *collines* had access to tap water or a public water fountain, the fact that it took mothers more than a half an hour on average to reach the water source suggests that these water access points were not easily accessible, which in turn is likely to limit water availability at the household level.

All *collines* grew manioc and nearly all grew maize, sweet potatoes, beans, groundnuts, and sorghum. Common tree and fruit crops included avocados, mangos, bananas, and pineapples. Many *collines* had formed associations, cooperatives, or other types of groups focused on agriculture activities. All *collines* reported having received assistance in the form of development programs in the last 5 years. The majority saw a net arrival of new residents over the last few years, which is consistent with the (forced) return of refugees from Tanzania (UNHCR, 2011). Most communities reported that their living conditions had worsened over the last 6 years.

Access to primary schools was generally good, while access to secondary schools and health centers was much more limited. Primary schools were available either in the *colline* or within 2.5 km of the *colline* on average. Only around one of three *collines* had a secondary school; residents of those *collines* that did not have a secondary school would have to travel an average of about 5 km to reach the nearest secondary school. Only 10 out of 60 *collines* had a local health center and residents of about half of the *collines* had to walk more than 5 km to reach one.

8.1.2. Community Health Care Infrastructure

Most health centers offered preventive and curative services for children and prenatal, delivery, and postpartum services to women. Most were equipped with inpatient beds. Preventive and curative services were provided 3 days per week, whereas emergency services were offered only half a day per week. Even though the quality of services was not measured directly in the survey, the lack of adequately trained health staff suggests that the quality of services might be low.

8.1.3. Household Characteristics and Food Security

The heads of household in our sample had little or no education and predominantly worked in agriculture. Housing conditions were poor with low quality floors, walls, and roofs; only a small minority of households had access to electricity. Even though three-quarters of the households had access to clean drinking water, getting the water took up a substantial amount of time each day. Most households used some form of latrine and many of them had soap and reported using it the preceding day; the adequate use of soap (for instance, after cleaning a child after defecating or before feeding a child), however, was suboptimal. Only a small proportion of mothers, children, and homes were found to be clean based on spot-check observations.

Nearly half of the households were classified as experiencing moderate or severe hunger; household dietary diversity was low with an average of four food groups consumed in the 24 hours preceding the survey. Nearly all households reported having experienced a shock in the past 12 months. The most common shocks related to crop losses and disease or injury of a household member. Shocks were perceived by the respondents as having had large negative effects on the household.

8.1.4. Maternal Characteristics and Status

Similar to the heads of household, mothers had very little, if any, formal education, and only about half were literate. Almost all reported occupational activities in the agricultural sector. Around 60% of the mothers were remunerated for their work, either in cash or kind, but their reported contribution to household expenses was small. Most children 0–23 months were taken with the mother when she was leaving the home, whereas older children tended to be left with someone else, often another child. Even though mothers' decision-making power differed across decision-making domains, for all these domains the proportion of mothers solely responsible for decisions was minimal. Only a small proportion of women owned assets that they could sell or had money that they could spend autonomously.

8.1.5. Maternal Knowledge

Mothers' knowledge with respect to maternal and child feeding, care, and health was limited. Most mothers could name at least one sign of complication during pregnancy. When asked about danger signs of childhood illness, nearly all mothers answered fever. Other signs that require immediate attention from a trained health professional (such as difficulty breathing or bloody diarrhea), however, were mentioned by very few mothers. Considerably more mothers knew what to do when asked about treating diarrhea or feeding a child during illness or convalescence.

Nearly all mothers knew that a baby should be breastfed immediately or very soon after birth and that a baby should be fed colostrum. When asked about the benefits of exclusive breastfeeding, the majority of mothers mentioned benefits for the child; very few mentioned lactational amenorrhea, however. The appropriate age for the introduction of foods and liquids other than milk was well known, but knowledge about what and how to feed was limited. Animal source foods, for instance, were mentioned by a minority of mothers as essential for child growth.³² This is consistent with the finding that the limited quantity of food was mentioned by many more mothers than inadequate dietary quality as a cause of child malnutrition. The mother's feeding style may also negatively affect the child's dietary intake: A large proportion of mothers did not know that a child 12 months of age needs assistance to eat and many mentioned force-feeding as an appropriate strategy to encourage children to eat. Even though nearly all mothers knew that soap is needed for handwashing, the right time for handwashing was not well understood. The limited handwashing knowledge is consistent with the limited use of soap reported above.

8.1.6. Prenatal, Perinatal, and Postpartum Health Care Utilization

Nearly all mothers attended prenatal services provided by a trained health professional in the public sector, but only one of three women had the recommended number of four prenatal visits. In addition, the quality of services appears to be low. The only procedure carried out nearly universally during prenatal visits was taking women's weight. Only two of three mothers reported receiving a tetanus vaccination; and blood pressure measurements, blood tests, and urine tests were uncommon. The low occurrence of these more complex procedures is consistent with the lack of properly trained staff in the health facilities. This may also explain that no more than around one-third of the women were told where to seek help in case of pregnancy complications, and even fewer (one-fifth) were told how to identify these pregnancy danger signs. Although a high percentage of mothers (nearly three of four) took iron supplements during pregnancy, supplementation on average started between the fifth and sixth month of pregnancy and lasted for about 2 months. Less than 60% of mothers slept under a bednet while pregnant.

The sharp drop from near-universal prenatal care utilization to only 57% of the women giving birth at a health center (and 8% giving birth while in transit) is probably due to the large distance to health centers and the lack of availability or affordability of adequate transportation. Around 60% of births were attended

³² It is not clear whether these results reflect true ignorance or whether mothers did not mention the foods they cannot afford due to a lack of resources.

by a trained health professional. The majority of newborn infants were immediately cleaned and wrapped, two important strategies to prevent hypothermia.

A postpartum check-up within 6 weeks of delivery was found to be near universal, but only about 15% of mothers received vitamin A. Virtually no mothers took iron supplements in the postpartum period. Given the high levels of night blindness in this population, the provision of a high-dose vitamin A supplement following birth is an important preventive health measure that should be improved.

8.1.7. Maternal Health and Anthropometry

More than a quarter of the mothers that had given birth in the past 2 years were evaluated as possibly suffering from a depressive illness. Nearly 20% of all mothers scored above the cutoff of 10 on the stress scale, indicating severe mental distress.

The maternal anthropometric and Hb measurements resulted in a number of interesting findings. First, the proportion of “short” mothers (less than 145 cm) was very low. This is surprising, given the very high prevalence of stunting found in children. Second, one out of seven women was underweight and very few were overweight, which is consistent with the high prevalence of hunger in this population. The prevalence of maternal anemia of around 30% is categorized as a moderate public health problem (defined as a prevalence between 20.0% and 39.9% [WHO, 2008a]).

8.1.8. Infant and Young Child Feeding

Breastfeeding is universal in this population and breastfeeding practices during the child’s first 6 months are generally in line with international guidance. Reported exclusive breastfeeding among children 0–6 months of age was around 78%, while predominant breastfeeding (breast milk and any other liquids, including water, but no solids) was practiced by 88%. The percentage of children still breastfeeding at around 2 years of age (20–23 months), as recommended, was also high (78%). Only a fraction of the children were reportedly fed with a bottle in the past 24 hours. The vast majority of mothers (more than 90%) also reported introducing complementary foods in the child’s diet between the ages of 6 and 8 months. Other complementary feeding practices, however, were much less optimal, and the poor quality of complementary foods and the low frequency of complementary feeding were found to be alarming. For example, only a minority of children 6–23 months of age had consumed iron-rich foods in the past 24 hours. Meal frequency was inadequate for 7 out of 10 children; the percentage of children meeting the appropriate frequency dropped as children grew older and the recommended number of feedings increases. Less than one-quarter of the children 0–24 months of age had consumed foods from at least four food groups (as recommended) in the past 24 hours. The proportion of children achieving a minimum dietary diversity increased with age, but was still low (around 30%) among the older children (24–41 months). Combining the breastfeeding, meal frequency, and dietary diversity indicators, a depressing 8% of the children younger than 2 years of age were classified as receiving a minimal acceptable diet.

8.1.9. Child Preventive Health Care Utilization

Among the children 0–23 months of age whose vaccination card could be reviewed (around 70%), just under one-third had attended growth monitoring in the past 2 months. Only half of these children had received vitamin A in the past 6 months, and less than 70% were fully vaccinated for their age. For those children that had received the vaccines, however, the delays between recommended age and receiving the vaccination was only about 1 month.

Only a minority of the older children with a vaccination card (around 60%) had attended growth monitoring in the past 2 months. Half of children had received vitamin A in the past 6 months. Interestingly, the percentage that was fully vaccinated was considerably higher (83.1%) than in the group of younger children, which is due to either selection bias (mothers that kept and could find the vaccination card might also be the ones that were more inclined to properly immunize their infants) or to a recent decline in the coverage of the national vaccination campaign.

8.1.10. Child Health and Curative Health Care Seeking

Approximately 44% and 37% of the mothers of the younger and older children, respectively, reported at least one morbidity symptom in the 2 weeks preceding the survey. The most commonly reported symptoms were coughing, fever, diarrhea, and loss of appetite. Even though the large majority of mothers knew about ORS, its appropriate use was quite low with less than 40% of children with diarrhea having received ORS; also of concern is that approximately 40% of mothers reported lowering the child's liquid intake when (s)he was suffering from diarrhea. Two out of three mothers that had a child with symptoms requiring immediate medical attention sought care or advice from a trained professional. Seeking care from untrained individuals (such as traditional healers) was virtually absent.

8.1.11. Child Development

Learning materials, such as children's books and playthings for young children, were virtually absent in the households included in the baseline survey, and only about one-third of the children 36–41 months of age had an adult engage with them in learning activities. The absence of books and learning materials is not surprising given the general poverty levels in the area. Many children were left with other children when their mother was away, and this was especially true for children between the ages of 24 and 41 months.

Children's motor and language development reflect the conditions in which these children are living and the associated nutrition and health problems they are experiencing. For key motor milestones, while the average age of attainment fell within the "windows of achievement" as defined by the WHO, a few of them were close to the 95th and 99th percentiles (WHO MGRT, 2006). This indicates that a number of children included in this survey have likely been delayed in their acquisition of important motor milestones, including the ability to walk on their own. Language development followed a similar pattern, with the acquisition of various milestones, such as increasing vocabulary, falling outside of what is considered normal in other contexts.

8.1.12. Child Nutritional Status

Child stunting was found to be excessively high, with more than half of the children under 2 years of age and 65.2% of the 24–41-month-old children being stunted. The prevalence of stunting was surprisingly high among young infants (27% in 0–6-month-old children), suggesting a possible low height at birth as a result of intra-uterine growth retardation. Stunting in this population followed the general age pattern found in many developing countries: a gradual increase in prevalence reaching a plateau at around the age of 18–24 months and subsequent stabilization at that level. As has been seen in many (African) countries, the prevalence of stunting was considerably higher in boys than in girls, which is thought to be due to boys being biologically weaker and thus more susceptible to infections and other insults that negatively affect growth (Wamani et al., 2007).

The prevalence of wasting was 7% in children 0–23 months of age and 3% in the older age group. The highest prevalence of wasting (slightly below 10%) was found in children 6–17 months of age, and is likely associated with high rates of infections at this age, as seen in most developing countries. As would be expected, the prevalence of underweight (WAZ < -2 SD) was somewhere between the prevalence of wasting and stunting. WAZ dropped considerably in the first 12 months of life and stabilized thereafter at a level of -1.5 SD.

The anemia prevalence constitutes a severe public health problem (defined as a prevalence above 40.0% by WHO [WHO, 2008a]). The prevalence was highest in children 6–12 months of age and then decreased with age. The prevalence of severe anemia was low.

8.1.13. Differences between Study Groups

The statistically significant differences found between the study groups suggest that the control arm might be worse off and the T-24 arm better off than the two other treatment arms. Variables pointing in this direction include the use of clean water and bednets, the number of household assets, the prevalence of hunger and low dietary diversity, Hb levels and anemia in mothers and children, and HAZ and stunting in children.

8.2. RECOMMENDATIONS

Many of the determinants of the poor health and nutrition situation of the population targeted by *Tubaramure* in Burundi are beyond the scope of what can be addressed by the program. The program operates under the sad reality of high levels of food insecurity; very limited dietary diversity; low education levels; and a lack of access to basic services, including health care, schools, electricity, and water and sanitation. The core activities of the *Tubaramure* program (strengthening the health services and improving health care seeking, delivering effective BCC and providing food rations), however, should go a long way in improving the nutrition and health situation of the beneficiary families.

8.2.1. Health Services

Tubaramure could contribute to improving the quality of care through the retraining of current staff, which is mainly composed of low-level nurses. Given the low levels of education of the beneficiary population, all health care personnel should also be trained on adult education didactics to ensure that knowledge is effectively transferred to the beneficiary population. The program should also promote adequate and timely health care seeking through its BCC campaigns: Mothers should be encouraged to attend prenatal care much earlier in pregnancy; they should also be taught how to recognize danger signs and to take children with potentially severe illness to a health center.

While the health system appears to be doing a good job of providing at least some medical care to women following delivery, the institutional strengthening activities should pay significant attention to improving some important aspects of postpartum care, such as the provision of vitamin A and iron supplements. Given the high levels of night blindness in this population, the provision of a high-dose vitamin A supplement following birth is an important preventive health measure that should be improved. Improvements in the continued provision and use of iron supplements following birth should also be made to be in line with the recommendation of the Burundian government to continue iron supplements for the first 3 months after birth.

8.2.2. Behavior Change Communication

A major emphasis of the *Tubaramure* BCC strategy should be on improving the caregivers' knowledge and practices. Topics should include keeping the interior and exterior of the house clean, handwashing, water treatment, recognition of danger signs, timely health care seeking, and adequate IYCF. In addition to improving mother's knowledge, the BCC should actively promote the adoption of these improved practices. BCC messages also need to be accompanied by support to caregivers and their families to facilitate putting the improved knowledge into practice. Given that very young children were often left under the care of minors (under the age of 15), the BCC strategy might need to look for ways to also reach these young caregivers to improve their caregiving skills.

In addition to BCC messages aimed at improving children's health and nutritional status, activities to stimulate child development should also be promoted. Simple messages related to the importance of parents engaging their children in learning activities and creating and providing simple playthings for their children could be incorporated into BCC campaigns related to improving children's health and nutrition. Although it is likely too late to include these messages in the *Tubaramure* program, their inclusion should be considered for future programs with the objective of improving the health and nutrition of pregnant women and children under 2 years of age.

8.2.3. Food Rations

The *Tubaramure* rations should be able to alleviate (at least) some of the household resource constraints preventing them from acquiring the necessary quantities and types of food. The BCC messages should pay particular attention to ensuring that the rations benefit the program beneficiaries, i.e., pregnant and lactating women and children 6 months to 2 years of age.

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Appendix A. Methods

Table A.1. Monthly ration size for the *Tubaramure* beneficiary population

	CSB (kg)	Vegetable oil (g)	Energy/ month (kcal)	Energy/ day* (kcal)	Energy/day/ capita** (kcal)
Target group					
Pregnant/lactating women	6	600	27,846	915	158***
Under 2s	3	300	13,923	458	79***
Family ration	12	1,200	55,692	1,831	316
Total ration					
Pregnant/lactating women	18	1,800	83,538	2,746	474
Under 2s	15	1,500	69,615	2,288	395

* Energy per day: using 30.42 days/month.

** Energy per capita is calculated based on the assumption of an average household size of 5.8 members.

*** Note that the individual ration is not meant to be shared, but this may be difficult to achieve, as the individual and the family ration include the same foods.

Table A.2. List of collines according to study treatment arm

Province	Commune	Colline	Study arm*
Cankuzo	Cankuzo	Kabezera	T-18
Cankuzo	Cankuzo	Murehe	T-NFP
Cankuzo	Cankuzo	Muterero	T24
Cankuzo	Cankuzo	Nyarutiti	T24
Cankuzo	Cendajuru	Gashirwe	Control
Cankuzo	Cendajuru	Gitaramuka	T-NFP
Cankuzo	Cendajuru	Kabageni	T-NFP
Cankuzo	Cendajuru	Nyamugari	T-18
Cankuzo	Gisagara	Gerero	T-18
Cankuzo	Gisagara	Gisagara	T24
Cankuzo	Gisagara	Gitwenge`	T-NFP
Cankuzo	Gisagara	Kibogoye	T24
Cankuzo	Gisagara	Murago	Control
Cankuzo	Kigamba	Rujungu	T-18
Cankuzo	Kigamba	Rwamvura	T-NFP
Cankuzo	Kigamba	Shinge	T24
Cankuzo	Mishiha	Buyongwe 1	Control
Cankuzo	Mishiha	Mwiruzi	Control
Cankuzo	Mishiha	Rugerero	Control
Cankuzo	Mishiha	Rutsindu	T-18
Ruyigi	Butaganzwa	Gikwiye	T-NFP
Ruyigi	Butaganzwa	Kanyinya	T-NFP
Ruyigi	Butaganzwa	Kirangara	Control
Ruyigi	Butaganzwa	Kiyabu	T24
Ruyigi	Butaganzwa	Masazi	T24
Ruyigi	Butaganzwa	Muriza	T-18
Ruyigi	Butaganzwa	Nyagashubi	T24
Ruyigi	Butaganzwa	Taba	T-18
Ruyigi	Butezi	Bwagiriza	T24
Ruyigi	Butezi	Muyange	T-NFP
Ruyigi	Butezi	Nombe	T24
Ruyigi	Butezi	Rutegama	Control
Ruyigi	Bweru	Gatwaro	T-NFP
Ruyigi	Bweru	Kirambi	T-18
Ruyigi	Bweru	Mubavu	T24
Ruyigi	Bweru	Nkanda	T24
Ruyigi	Bweru	Nyarunazi	T24
Ruyigi	Gisuru	Bunyambo	T24
Ruyigi	Gisuru	Kabingo	T-18
Ruyigi	Gisuru	Kabuyenge	Control
Ruyigi	Gisuru	Kinama	T-NFP
Ruyigi	Gisuru	Mwegereza	T-18
Ruyigi	Gisuru	Nkurubuye	Control

Province	Commune	Colline	Study arm*
Ruyigi	Gisuru	Nyabigozi	T24
Ruyigi	Gisuru	Rwerambere	T-NFP
Ruyigi	Gisuru	Taba	Control
Ruyigi	Kinyinya	Bugongo	T-NFP
Ruyigi	Kinyinya	Gataba	Control
Ruyigi	Kinyinya	Kabanga	T-NFP
Ruyigi	Kinyinya	Kinyinya	T-NFP
Ruyigi	Kinyinya	Nyakibere	Control
Ruyigi	Kinyinya	Nyamusasa	T-18
Ruyigi	Kinyinya	Vumwe	Control
Ruyigi	Nyabitsinda	Nyakiyonga	Control
Ruyigi	Nyabitsinda	Nyarumuri	T-18
Ruyigi	Nyabitsinda	Remba	T-18
Ruyigi	Ruyigi	Bunogera	Control
Ruyigi	Ruyigi	Buruhukiro	T-18
Ruyigi	Ruyigi	Rutonganikwa	T-18
Ruyigi	Ruyigi	Ruyigi rural	T-NFP

* T-24: 15 *collines* assigned to the intervention arm receiving the full *Tubaramure* program from pregnancy to 24 months.

T-18: 15 *collines* assigned to the intervention arm receiving the full *Tubaramure* program from pregnancy to 18 months.

T-NFP: 15 *collines* assigned to the intervention arm receiving the full *Tubaramure* program from pregnancy to 24 months, without food rations during pregnancy.

Control: 15 *collines* assigned to the control arm of the research study.

More details are provided in the text.

Table A.3. Supervisor form

See next pages. Note that the names were removed for privacy reasons.

NOM ET CODE DU CONTRÔLEUR [] [] _____	Nom et Code de la <u>Province</u> Ruyigi [1][6]	Nom et code de la <u>Commune</u> Ruyigi [0][7]	Nom et code de la <u>Colline</u> Rutonganikwa [2][4]	Nom et code de la <u>Sous-Colline</u> RUTONGANIKW A [0][4]	Quota d'enfants	
					0 à 23.9 mois	5
					24 à 41.9 mois	4

Code du ménage	Nom du chef de ménage	# du dénombrement	Résultat final de l'interview	Groupe d'âge de l'enfant éligible	Nombre atteint		Mesures anthropom. prises 1=Oui 2=Non		Test d'hémog. 1=Oui 2=Non		Code enquêteur	Remarque
					0 - 23.9 mois	24 - 41.9 mois	Enfant éligible	Mère/Tutrice éligible	Enfant éligible	Mère/Tu éligible		
[0][0][1]	Name removed for privacy reasons	[0][1][5][5]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][2]	Name removed for privacy reasons	[0][1][6][4]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][3]	Name removed for privacy reasons	[0][1][9][7]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][4]	Name removed for privacy reasons	[0][1][5][7]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][5]	Name removed for privacy reasons	[0][1][8][5]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][6]	Name removed for privacy reasons	[0][1][8][3]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][7]	Name removed for privacy reasons	[0][1][8][2]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][8]	Name removed for privacy reasons	[0][1][9][4]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][0][9]	Name removed for privacy reasons	[0][1][5][8]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][0]	Name removed for privacy reasons	[0][1][5][2]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][1]	Name removed for privacy reasons	[0][1][5][6]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][2]	Name removed for privacy reasons	[0][1][5][3]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	

NOM ET CODE DU CONTRÔLEUR [] [] _____	Nom et Code de la <u>Province</u> Ruyigi [1][6]	Nom et code de la <u>Commune</u> Ruyigi [0][7]	Nom et code de la <u>Colline</u> Rutonganikwa [2][4]	Nom et code de la <u>Sous-Colline</u> RUTONGANIKW A [0][4]	Quota d'enfants	
					0 à 23.9 mois	5
					24 à 41.9 mois	4

Code du ménage	Nom du chef de ménage	# du dénombrement	Résultat final de l'interview	Groupe d'âge de l'enfant éligible	Nombre atteint		Mesures anthropom. prises 1=Oui 2=Non		Test d'hémog. 1=Oui 2=Non		Code enquêteur	Remarque
					0 - 23.9 mois	24 - 41.9 mois	Enfant éligible	Mère/Tutrice éligible	Enfant éligible	Mère/Tu éligible		
[0][1][3]	Name removed for privacy reasons	[0][1][8][4]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][4]	Name removed for privacy reasons	[0][1][9][1]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][5]	Name removed for privacy reasons	[0][1][9][6]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][6]	Name removed for privacy reasons	[0][1][6][2]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][7]	Name removed for privacy reasons	[0][1][8][0]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][8]	Name removed for privacy reasons	[0][1][8][1]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][1][9]	Name removed for privacy reasons	[0][1][7][9]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][2][0]	Name removed for privacy reasons	[0][1][5][1]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][2][1]	Name removed for privacy reasons	[0][1][8][6]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][2][2]	Name removed for privacy reasons	[0][1][7][8]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][2][3]	Name removed for privacy reasons	[0][1][7][4]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	
[0][2][4]	Name removed for privacy reasons	[0][1][7][2]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[] []	

NOM ET CODE DU CONTRÔLEUR [][] _____	Nom et Code de la <u>Province</u> Ruyigi [1][6]	Nom et code de la <u>Commune</u> Ruyigi [0][7]	Nom et code de la <u>Colline</u> Rutonganikwa [2][4]	Nom et code de la <u>Sous-Colline</u> RUTONGANIKW A [0][4]	Quota d'enfants	
					0 à 23.9 mois	5
				24 à 41.9 mois	4	

Code du ménage	Nom du chef de ménage	# du dénombrement	Résultat final de l'interview	Groupe d'âge de l'enfant éligible	Nombre atteint		Mesures anthropom. prises 1=Oui 2=Non		Test d'hémog. 1=Oui 2=Non		Code enquêteur	Remarque
					0 - 23.9 mois	24 - 41.9 mois	Enfant éligible	Mère/Tutrice éligible	Enfant éligible	Mère/Tu éligible		
[0][2][5]	Name removed for privacy reasons	[0][1][6][5]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[][]	
[0][2][6]	Name removed for privacy reasons	[0][1][7][3]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[][]	
[0][2][7]	Name removed for privacy reasons	[0][1][9][8]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[][]	
[0][2][8]	Name removed for privacy reasons	[0][2][0][3]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[][]	
[0][2][9]	Name removed for privacy reasons	[0][1][7][0]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[][]	
[0][3][0]	Name removed for privacy reasons	[0][1][6][0]	[]	0 - 23.9.....1 24 - 41.9.....2			Poids....1 2 Taille....1 2	Poids ...1 2 Taille.....1 2	1 2	1 2	[][]	
Nombre de questionnaires complétés dans la sous-colline [][]			Nombre d'enfants éligibles de 0-23.9 mois [][]				Nombre d'enfants éligibles de 24-41.9mois [][]					



**NOTA BENE: CETTE FICHE DOIT ACCOMPAGNER LE LOT DES QUESTIONNAIRES POUR CHAQUE SOUS-COLLINE.
ELLE EST REMISE AU SUPERVISEUR AVEC LE LOT**

Appendix B. Households

Table B.1a. Spot-check observations in households with children 0–23 months of age

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,617	432	867	432	886
General appearance of mother (hygiene-wise); % dirty					
Hands	58.5	65.1	57.4	55.8	57.7
Hair	49.4	55.6	48.6	45.9	48.9
Body/clothes	71.7	73.4	72.1	73.1	69.8
Face	34.3	38.2	34.2	32.6	33.1
General appearance of child; % dirty					
Hands	50.2	52.9	51.9	52.1	46.2
Hair	42.1	45.5	43.3	42.2	39.1
Body/clothes	68.3	67.1	70.6	68.9	66.4
Face	38.2	41.8	39.7	37.8	35.1
General appearance of house interior; % dirty					
The floor inside house needed to be swept	68.1	67.7	66.7	66.9	70.3
Animal feces inside house	18.7	18.4	15.8	19.2	21.5
Drinking water container covered	52.6	50.9	47.9	58.4	55.1
Piles of dirty clothes inside house	72.0	72.1	71.8	73.2	71.3
General appearance of house exterior; % dirty					
Area around house needed to be swept and cleaned	63.0	65.1	62.0	61.0	64.0
Human feces around the house	2.9	3.2	3.0	3.0	2.6
Animal feces around the house	12.8	13.2	11.8	13.0	13.5
Garbage around house	62.8	62.9	61.9	64.3	62.9

* Sample sizes ranged from N = 1,293 to 2617 in the full sample column; N = 163 to 432 in the T-24 arm; N = 459 to 867 in the T-18 arm; N = 226 to 437 in the T-NFP arm; and N = 445 to 886 in the control arm.

Table B.1b. Spot-check observations in households with children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
	3,562	984	585	997	996
General appearance of mother (hygiene-wise); % dirty					
Hands	62.6	65.1	65.0	58.9	62.6
Hair	54.1	57.1	53.4	51.2	54.7
Body/clothes	73.4	74.9	73.1	72.5	72.9
Face	35.0	38.5	32.8	33.7	34.1
General appearance of child; % dirty					
Hands	76.0	78.5	75.5	75.5	74.3
Hair	68.5	73.7	65.8	68.0	65.5
Body/clothes	86.6	85.9	86.2	86.7	87.4
Face	62.0	65.1	60.1	62.0	59.9
General appearance of house interior; % dirty					
The floor inside house needed to be swept	66.6	67.3	62.8	67.9	66.7
Animal feces inside house	21.4	24.0	17.9	21.3	21.3
Drinking water container covered	53.9	46.0	54.2	57.9	56.1
Piles of dirty clothes inside house	70.0	67.4	67.8	71.1	72.5
General appearance of house exterior; % dirty					
Area around house needed to be swept and cleaned	64.4	64.4	62.6	64.4	65.4
Human feces around the house	3.2	3.3	3.3	3.7	2.6
Animal feces around the house	14.6	15.9	13.9	15.8	12.7
Garbage around house	64.1	64.0	59.8	65.4	65.5

* Maximum sample sizes presented. Sample sizes ranged from N = 1,752 to 3,562 in the full sample column; N = 404 to 984 in the T-24 arm; N = 325 to 585 in the T-18 arm; N = 527 to 997 in the T-NFP arm; and N = 496 to 996 in the control arm.

Table B.2a. Effect of shock on households with children 0–23 months of age

N*	Study arms				
	Full sample	T-24	T-18	T-NFP	Control
	1,709	290	576	274	591
Disease or wound of a household member					
No effect	43.1	48.0	43.4	34.4	44.6**
Small effect	18.4	16.4	19.4	22.6	16.3
Large effect	38.5	35.6	37.2	43.0	39.1
Loss of employment					
No effect	13.9	12.5	18.2	7.7	11.8
Small effect	20.3	18.8	12.1	7.7	47.1**
Large effect	65.8	68.8	69.7	84.6	41.2**
Disease/wound/death/loss of cattle					
No effect	36.5	29.1	40.0	33.8	38.7
Small effect	22.9	25.2	21.3	23.8	22.5
Large effect	40.6	45.6	38.8	42.5	38.7
Loss of crop due to flood					
No effect	7.3	6.6	8.2	6.0	7.5
Small effect	17.0	16.6	18.3	18.0	15.3
Large effect	75.7	76.9	73.5	76.0	77.2
Loss of crop due to drought					
No effect	7.6	6.1	8.6	5.1	8.3
Small effect	15.4	17.8	14.4	19.0	13.9
Large effect	77.0	76.2	77.0	75.9	77.8
Loss of crop due to hail					
No effect	17.0	30.0	14.7	12.4	11.2**
Small effect	14.4	16.4	10.8	14.8	17.2
Large effect	68.5	53.6	74.5	72.8	71.6
Loss of crops due to plant disease, insects, animal invasion, etc.					
No effect	7.6	10.1	3.3	9.4	9.6
Small effect	18.5	20.1	17.8	21.9	16.7
Large effect	73.9	69.8	78.9	68.8	73.7
Victim of theft of assets					
No effect	24.0	22.6	31.7	19.3	20.2
Small effect	21.9	30.7	16.8	24.6	20.2
Large effect	54.1	46.8	51.5	56.1	59.6
Damage/destruction to house or equipment					
No effect	22.2	38.9	16.0	33.3	8.7**
Small effect	16.1	11.1	24.0	13.3	13.0
Large effect	61.7	50.0	60.0	53.3	78.3
Company bankruptcy					
No effect	5.0	2.3	5.5	7.9	4.8
Small effect	28.0	34.1	32.7	18.4	25.4
Large effect	67.0	63.6	61.8	73.7	69.8

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	1,709	290	576	274	591
Conflicts, dispute, legal issues					
No effect	31.6	28.3	31.1	32.1	34.4
Small effect	21.7	37.0	17.6	17.9	17.2
Large effect	46.7	34.8	51.4	50.0	48.4
Death of a household member					
No effect	46.7	48.4	58.1	38.1	33.3
Small effect	7.8	12.9	8.1	0.0	7.4**
Large effect	45.6	38.7	33.8	61.9	59.3**
Return of refugees					
No effect	18.2	50.0	0.0	50.0	0.0
Small effect	18.2	0.0	20.0	0.0	50.0
Large effect	63.6	50.0	80.0	50.0	50.0

* Maximum sample sizes presented. Sample sizes ranged from N = 11 to 1,709 in the full sample column; N = 2 to 290 in the T-24 arm; N = 5 to 576 in the T-18 arm; N = 2 to 274 in the T-NFP arm; and N = 2 to 591 in the control arm.

** Study arms differ, p-value < 0.05.

Table B.2b. Effect of shock on households with children 24–41 months of age

N*	Study arms				
	Full sample	T-24	T-18	T-NFP	Control
	2,293	640	383	621	653
Disease or wound of a household member					
No effect	40.0	42.7	38.3	39.9	38.3
Small effect	20.3	21.6	21.6	18.5	20.1
Large effect	39.7	35.8	40.1	41.6	41.7
Loss of employment					
No effect	13.8	4.2	13.3	14.3	25.0
Small effect	16.1	16.7	26.7	14.3	10.0
Large effect	70.1	79.2	60.0	71.4	65.0
Disease/wound/death/loss of cattle					
No effect	34.6	28.6	38.8	37.6	36.8
Small effect	26.8	31.6	27.6	22.4	24.7
Large effect	38.6	39.9	33.6	40.0	38.6
Loss of crop due to flood					
No effect	6.2	4.8	7.9	4.6	9.3
Small effect	18.2	20.7	19.6	15.6	17.1
Large effect	75.6	74.5	72.5	79.8	73.6
Loss of crop due to drought					
No effect	7.3	6.7	8.6	7.5	6.8
Small effect	15.9	16.4	17.2	14.5	15.8
Large effect	76.9	76.8	74.2	78.0	77.4
Loss of crop due to hail					
No effect	17.5	20.8	17.7	14.3	16.9
Small effect	19.5	22.2	13.5	17.5	22.5
Large effect	63.0	57.0	68.8	68.2	60.6
Loss of crops due to plant disease, insects, animal invasion, etc.					
No effect	7.1	5.7	6.0	9.5	7.6
Small effect	19.0	22.5	15.1	20.1	16.3
Large effect	73.8	71.8	78.9	70.5	76.1
Victim of theft of assets					
No effect	25.3	18.2	36.8	23.9	26.4
Small effect	19.1	18.2	17.1	16.8	23.2
Large effect	55.6	63.6	46.1	59.3	50.4
Damage/destruction to house or equipment					
No effect	16.7	18.6	5.9	16.7	19.4
Small effect	10.3	16.3	0.0	10.0	8.3**
Large effect	73.0	65.1	94.1	73.3	72.2**
Company bankruptcy					
No effect	12.1	18.0	15.4	11.3	6.9**
Small effect	25.6	25.6	33.3	26.8	21.8
Large effect	62.3	56.4	51.3	62.0	71.3**

	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
N*	2,293	640	383	621	653
Conflicts, dispute, legal issues					
No effect	35.2	39.8	38.5	35.1	27.3
Small effect	19.7	16.3	25.0	15.6	24.7
Large effect	45.1	43.9	36.5	49.4	48.1
Death of a household member					
No effect	41.3	43.0	51.9	37.1	35.3
Small effect	9.2	12.7	7.4	4.3	11.8
Large effect	49.5	44.3	40.7	58.6	52.9
Return of refugees					
No effect	28.6	60.0	50.0	16.7	0.0**
Small effect	14.3	20.0	0.0	16.7	16.7
Large effect	57.1	20.0	50.0	66.7	83.3

* Maximum sample sizes presented. Sample sizes ranged from N = 21 to 2,293 in the full sample column; N = 5 to 640 in the T-24 arm; N = 4 to 383 in the T-18 arm; N = 6 to 621 in the T-NFP arm; and N = 6 to 653 in the control arm.

** Study arms differ, p-value < 0.05.

Appendix C. Mothers

Table C.1a. Women's status in households with children 0–23 months of age

N*	Full Sample	Study arms			
		T-24	T-18	T-NFP	Control
		2,620	432	868	433
Responsible for deciding if mother can work; % that said:					
Mother alone	13.2	13.0	13.0	10.6	14.7
Joint with partner	22.7	14.4	25.0	19.9	25.8**
Partner alone	53.2	60.2	52.1	58.2	48.4**
Other	1.1	0.7	1.3	0.9	1.1
N/A	9.9	11.8	8.6	10.4	10.0
Control over earnings; % that said:					
Mother alone	15.4	12.0	16.8	12.7	16.9
Joint with partner	17.0	10.2	17.8	18.5	18.7
Partner alone	40.0	43.1	38.6	44.6	37.7
Other	1.1	1.2	0.8	0.9	1.5
N/A	26.5	33.6	26.0	23.3	25.3
Responsible for deciding if mother can use birth control; % that said:					
Mother alone	11.3	12.0	10.4	10.6	12.1
Joint with partner	44.4	42.1	46.2	46.2	42.7
Partner alone	22.1	21.8	21.2	23.6	22.4
Other	0.2	0.0	0.1	0.2	0.2
N/A	22.1	24.1	22.1	19.4	22.6
Responsible for deciding if mother can have another child; % that said:					
Mother alone	8.2	10.0	8.7	6.7	7.7
Joint with partner	48.1	44.7	46.4	54.3	48.5**
Partner alone	18.8	16.9	19.7	18.0	19.2
Other	0.2	0.0	0.1	0.2	0.5**
N/A	24.6	28.5	25.1	20.8	24.2
Responsible for deciding if children should go to school; % that said:					
Mother alone	9.8	10.9	8.9	8.1	10.9
Joint with partner	37.8	32.6	40.7	38.8	37.0
Partner alone	35.2	38.9	32.6	37.4	34.8
Other	0.5	0.2	0.5	0.7	0.7
N/A	16.7	17.4	17.4	15.0	16.6
Responsible for deciding sick child care options; % that said:					
Mother alone	29.2	33.1	28.7	28.3	28.3
Joint with partner	49.9	41.7	53.1	49.7	50.7
Partner alone	20.1	25.0	17.4	21.4	19.7
Other	0.4	0.0	0.4	0.7	0.6**
N/A	0.4	0.2	0.5	0.0	0.7**

N*	Full Sample	Study arms			
		T-24	T-18	T-NFP	Control
	2,620	432	868	433	887
Responsible for child discipline; % that said:					
Mother alone	19.2	21.3	17.9	16.9	20.6
Joint with partner	59.5	56.3	62.6	60.4	57.5
Partner alone	17.5	18.1	15.6	19.2	18.2
Other	0.7	0.7	0.8	0.5	0.6
N/A	3.2	3.7	3.1	3.0	3.2
% of all (applicable) decisions taken by:					
Mother	19.0	20.0	18.0	16.0	19.0
Joint with partner	46.0	41.0	49.0	47.0	46.0
Partner alone	34.0	38.0	32.0	36.0	33.0
Other	1.0	1.0	1.0	1.0	1.0

* Maximum sample sizes presented. Sample sizes ranged from N = 2,618 to 2,620 in the full sample column; N = 867 to 868 in the T-18 arm; N = 431 to 433 in the T-NFP arm; and N = 886 to 887 in the control arm. There were no missing values in the T-24 arm.

** Study arms differ, p-value < 0.05.

Table C.1b. Women's status in households with children 24–41 months of age

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
		3,564	985	585	998
Responsible for deciding if mother can work; % that said:					
Mother alone	13.0	10.3	13.5	14.1	14.2
Joint with partner	23.4	18.4	25.0	24.2	26.8
Partner alone	50.1	55.5	47.5	49.1	47.3
Other	0.8	1.0	1.5	0.4	0.6
N/A	12.7	14.8	12.5	12.2	11.1
Control over earnings, % that said:					
Mother alone	15.3	13.4	18.5	14.1	16.7
Joint with partner	16.9	13.9	13.5	21.3	17.4
Partner alone	41.1	40.4	39.7	42.9	40.8
Other	1.0	0.9	1.4	0.7	1.0
N/A	25.8	31.4	27.0	21.1	24.2
Responsible for deciding if mother can use birth control; % that said:					
Mother alone	9.6	10.9	8.4	9.4	9.2
Joint with partner	44.5	46.0	45.6	43.2	43.5
Partner alone	21.6	20.4	19.3	24.8	21.0
Other	0.1	0.1	0.2	0.0	0.3
N/A	24.2	22.6	26.5	22.6	26.1
Responsible for deciding if mother can have another child; % that said:					
Mother alone	6.9	7.6	6.7	6.9	6.4
Joint with partner	49.1	47.8	46.3	51.5	49.5
Partner alone	17.7	17.3	17.8	18.0	17.8
Other	0.1	0.1	0.2	0.0	0.3
N/A	26.2	27.2	29.1	23.6	26.0
Responsible for deciding if children should go to school; % that said:					
Mother alone	9.9	9.8	8.9	9.7	10.9
Joint with partner	41.2	41.0	40.8	42.5	40.3
Partner alone	36.4	38.6	35.5	35.6	35.7
Other	0.6	0.3	1.2	0.7	0.5
N/A	11.8	10.4	13.7	11.5	12.6
Responsible for deciding sick child care options; % that said:					
Mother alone	27.3	27.4	27.0	27.0	27.7
Joint with partner	52.9	52.3	54.2	53.1	52.5
Partner alone	19.1	19.7	17.4	19.0	19.4
Other	0.6	0.6	1.0	0.7	0.3
N/A	0.1	0.0	0.3	0.2	0.1

N*	Full sample	Study arms			
		T-24	T-18	T-NFP	Control
	3,564	985	585	998	996
Responsible for child discipline; % that said:					
Mother alone	19.4	20.1	17.6	18.9	20.4
Joint with partner	62.1	61.7	63.1	61.6	62.3
Partner alone	17.0	17.0	16.9	17.9	16.1
Other	0.7	0.7	1.4	0.6	0.3
N/A	0.8	0.5	1.0	0.9	1.0
% of all (applicable) decisions taken by:					
Mother	18.0	17.0	18.0	17.0	18.0
Joint with partner	48.0	47.0	48.0	48.0	48.0
Partner alone	33.0	35.0	32.0	34.0	33.0
Other	1.0	1.0	1.0	1.0	1.0

* Maximum sample sizes presented. Sample sizes ranged from N = 3,560 to 3,564 in the full sample column; N = 584 to 585 in the T-18 arm; N = 996 to 998 in the T-NFP arm; and N = 9 to 996 in the control arm. There were no missing values in the T-24 arm.