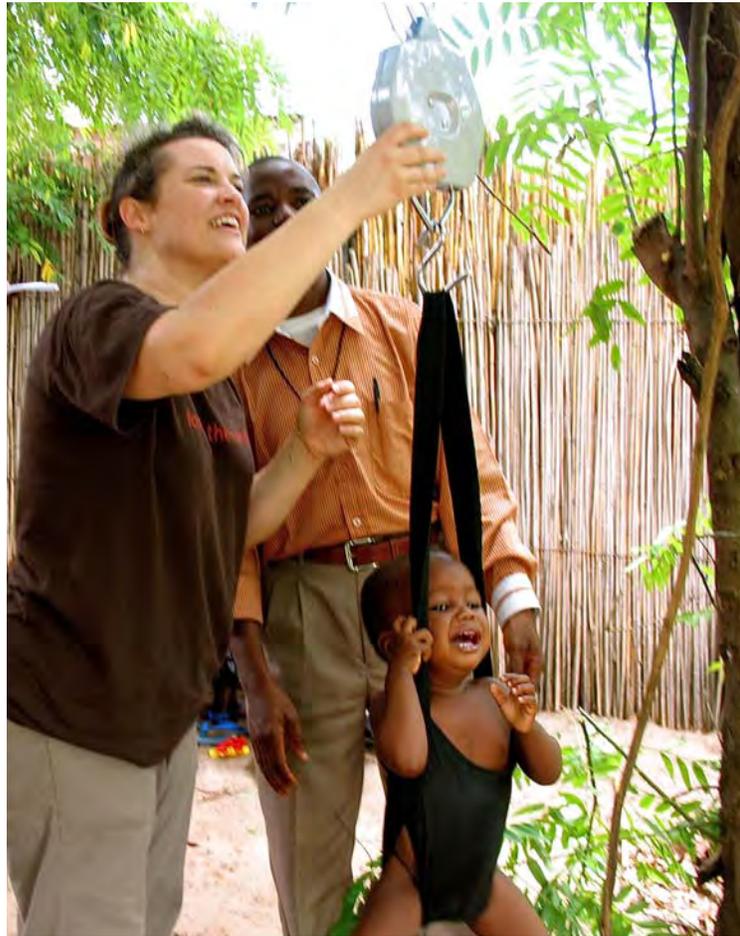


Food for the Hungry

Food Security MYAP Baseline Survey Report



*Katanga Province, Democratic Republic of the Congo
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List of Acronyms

AIDS	Acquired Immune Deficiency Syndrome
CI	Confidence Interval
CHW	Community Health Worker
C-IMCI	Community - Integrated Management of Childhood Illness
DHS	Demographic and Health Survey
DRC	Democratic Republic of Congo
EHA	Essential Hygiene Action
ENA	Essential Nutrition Action
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
FH	Food for the Hungry
GM/P	Growth Monitoring Promotion
Ha	Hecter
HAZ	Height for Age Z-score
HDDS	Household Dietary Diversity Score
HH	Household
HIV	Human Immunodeficiency Virus
IDDS	Individual Dietary Diversity Score
IPTT	Indicator Performance Tracking Table
ITN	Insecticide Treated Net
IYCF	Infant and Young Child Feeding
Kg	kilogram
Km	kilometer
KPC	Knowledge, Practice, Coverage
LQAS	Lot Quality Assurance Sampling
M	Months
MAHFP	Months of Adequate Food Provisioning
MOH	Ministry of Health
MUAC	Mid-upper Arm Circumference
MYAP	Multi-Year Assistance Program
NGO	Non-Governmental Organization
ORS	Oral Rehydration Salts
ORT	Oral Rehydration Therapy
OVC	Orphan and Vulnerable Children
PMTCT	Prevention of Mother to Child Transmission
POU	Point of use
PPS	Probability proportionate to size
SD	Standard deviation
SYAP	Single Year Assistance Program
UNICEF	United Nations Children's Fund
US	United States
USAID	United States Agency for International Development
WASH	Water and Sanitation/Hygiene
WAZ	Weight for Age Z-score
WHO	World Health Organization
WHZ	Weight for Height Z-score

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1 Introduction

There is now, more than at any time over the past decade, reason to believe that the Democratic Republic of Congo (DRC) has at last begun the long road to recovery and reconstruction. Since the outbreak of war in DRC in 1996, the Congolese population has suffered immensely through a conflict that has left over four million dead and caused one of the world's worst current humanitarian disasters. While emergency needs persist, an improving security situation is paving the way for longer term development interventions. The next three years are a crucial time period for the country, and a strategic, multi-year food security intervention that meets the needs of the most vulnerable populations and lays the foundation for growth and stability could have lasting impact in Eastern DRC and the broader Great Lakes region. In response to these changing conditions Food for the Hungry (FH) is initiating a USAID funded food security program to reduce food insecurity, increase household resiliencies and support recovery in two territories (Moba and Kalemie) in Katanga Province. These areas were selected based upon their high levels of food insecurity of vulnerable households and large current and expected influxes of IDP and refugee returnees. As this project begins, FH has commissioned the following baseline study to provide a snapshot in time of key health and agricultural conditions in the Moba and Kalemie regions of Katanga Province, DRC where this project is being realized. The baseline study will serve to provide key information for project planning and to establish a baseline for indicators to be used to monitor, and later evaluate, project impact.

2 Process and methodology

The baseline survey process was completed near the end of a period termed the “hunger season” and consisted of two distinct surveys, one for agriculture and one for health and nutrition. FH initially proposed to use Lot Quality Assurance Sampling (LQAS) for the health and nutrition survey but given logistical constraints related to conducting simultaneous health and agricultural surveys, and gaps in data needed to establish the sample frame for LQAS, consultants recommended that the two-staged cluster sample methodology be used for baseline and final evaluation surveys. The consultants however did recommend that LQAS be used for the monitoring of key indicators as needed between baseline and final surveys. Given these recommendations, a two-staged cluster sampling methodology was used for both health and agricultural surveys with thirty cluster samples and 10 households per cluster for a total of 300 households sampled for each of the two surveys. Probability proportionate to size (PPS) was used to select the clusters; the detailed sampling frame can be found in Appendix 1. Where recent census lists were available and had been verified by FH, starting households for each cluster were randomly selected from census lists. In communities where verified census lists were unavailable, starting households for clusters were selected using a spinning bottle method. For anthropometric indicators, the health and nutrition survey included a sampling of heights and weights of 300 children 0-23m of age (10 per cluster) and a parallel sample of 300 children 24-59m of age (10 per cluster). This total sample size of 600 children should allow FH to detect a change of approximately seven points from baseline to final on the anthropometric indicators with a 95% CI and 80% power. Respondents for the health and nutrition survey were primary caregivers of children 0-23 months of age, and where there was more than one child under the age of 24 months in the household, the youngest child was used as the index child. In households where more than one child would qualify for the parallel sample, a coin was tossed to randomly select which child to measure for the survey. Respondents for the agricultural survey were adult household members, residents in their community for a period of at least one year, with intimate knowledge of household agricultural production and marketing practices. The requirement for one year of residence in the community for the agricultural survey was necessary in order to ensure that crop production and marketing data gathered were relevant to the project area.

Initial draft questionnaires were developed by Buck Deines, a consulting agronomist, and by Julie Hettinger, a Washington D.C. based FH Maternal and Child Nutrition Specialist. Second drafts were developed following review and input from Food for the Hungry DRC staff. The questionnaires were then translated into French, back translated, field tested and revised before being finalized for the survey. The survey instruments were not translated into Swahili. However, enumerator training included sessions in which Swahili translation of key questions and phrases was reviewed, discussed and standardized. Use of the two survey questionnaires allowed FH to gather information related to a wide scope of food security related indicators and topics including household characteristics, agricultural production, agricultural marketing, maternal and child health, water and sanitation, and perceptions related to broader social and physical health related issues. Each survey took approximately one hour to complete. Copies of the two survey instruments are included in Appendix 2.

Given Food for the Hungry's desire to build the capacity of personnel in the DRC office to design and implement surveys, FH agricultural, health and nutrition staff received five days of intensive training in preparation for administering the survey. The training curriculum was prepared by Buck Deines and Julie Hettinger, and was delivered largely by select members of the FH DRC Core Survey Team with supervision and assistance by Deines and Hettinger. Agriculture, health and nutrition supervisors and enumerators were trained together in general topics related to the administration of the survey, but received separate training related to the testing and application of their respective survey instruments. For example, one day of training for health and nutrition staff focused on refining anthropometric techniques and ensuring accuracy of height and weight measurements, while supervisors and enumerators involved with the agricultural survey focused on improving the quality of crop yield estimates and estimates of areas of production. In addition, data entry supervisors received one full day of intensive training on controlling the quality of data entry prior to initiating data entry efforts. Twelve survey teams conducted the survey, six for agriculture and six for health. Each team consisted of a supervisor and two enumerators. In addition, each health team included two trained assistants to help with collecting anthropometric data. Data collection required five days. Data entry and analysis was conducted using EPI-Info 3.5.1.

Limitations of the study related to data collection and analysis include the following:

- The scope of this baseline survey is quantitative, neither focus groups nor key informant interviews were conducted as part of the survey. In some cases therefore, while it is possible to generalize results from a sample to the general population, information needed to more fully understand reasons and motivations underlying the results has not yet been collected. Qualitative follow-up through semi-structured interviews and formative research will be required in the coming months to supplement the analysis of the baseline survey results.
- Given the cluster sample methodology used and limitations on sample size, analysis of survey results in many cases did not allow for comparing or differentiating results between the Kalemie and Moba regions, or between different supervision areas. However, project plans to employ LQAS for monitoring changes in key impacts and behaviors will allow project managers to determine differences as needed between regions and supervision areas.
- Missing data was usually excluded from the analysis, unless its presence needed to be accounted for in an analysis calculation. For this reason, some of the percentages representing the answers to the questions from the survey may not total 100%. This is also the reason behind inconsistent denominators in the analysis calculations.
- The anthropometric height and length data had some limitations. The health and nutrition staff received only one day of training, which is brief compared to the standard anthropometric training protocol and is

not long enough to make the training participants experts. For many of the enumerators and assistants, measuring heights and lengths was a new skill and consistent measurements were not always obtained. The anthropometric data was carefully reviewed and corrected to make sure there were minimal errors introduced in the data entry process, and a review of the data showed that there were no systematic rounding errors. Outliers were removed from the analysis, and often the outlying data appeared to be length or height measurements.

- High variability in crop yields calculated from the baseline data, in addition to a significant number of improbable and impossible yields based on farmer provided data, indicate that errors in quantitative estimates have affected the quality of the results in estimating crop yields - despite efforts of the survey teams to minimize these inaccuracies. This result is not surprising. A number of studies indicate that farmer recall for estimating crop production is reasonably reliable, but that farmer provided yield estimates are often less reliable¹. For example, a 1991 review of six Cornell studies considering farmers' abilities to make accurate yield estimates, Rozelle found that farmer yield estimates varied greatly from place to place; in China and Indonesia farmers easily provided estimates on yields of almost all crops, but in Malawi farmers had great difficulty in estimating accurate yield estimates. The main reason for error was with farmers estimating area planted, not amounts produced. Additionally, intercropping is a common practice in many traditional agricultural environments, and error in yield calculations may be introduced if farmers are intercropping rather than growing crops in monoculture conditions. Given these difficulties, we would recommend that project staff consider alternatives to using the crop yield data from this survey. One alternative would be to use crop cuts under carefully controlled conditions for estimating yields of key crops. Another option would be to use data on household crop production as an impact indicator, rather than calculations of crop yields, as farmer reported production tends to be more reliable. (For additional information and options see FANTA's *Agricultural Productivity Indicators Measurement Guide* by Patrick Diskin, available online at FANTA's website: www.fantaproject.org.)
- The time allocated for data analysis was rather short given the underestimation of time needed for the lengthy survey training, implementation, and data cleaning process. Irregular and unreliable flight schedules in and out of Kalemie further reduced the time the consultants had with project staff for data analysis by two days from that which had originally been scheduled.

3 Food Security Indicators Common to Both Agricultural and Health Surveys

3.1 Months of Adequate Household Food Provisioning (MAHFP)

A household's ability to meet food needs throughout the year may vary due to any number of factors, such as inadequate crop production, labor shortages due to illness or other causes, a natural disaster, decreased income from employment, etc. Reducing vulnerability to these factors, or enhancing the ability of households and communities to ensure that food is available at a minimum level throughout the year, is the overall goal of food security programs. Measuring Months of Adequate Household Food Provisioning (MAHFP) is one means of capturing the combined effects of food security program strategies and interventions on household ability to ensure that food is available year round. The measurement serves as a proxy to indicate household food access.² To gather information on MAHFP, respondents in both the agricultural and health surveys were asked to indicate months, over each of the past 12 months, in which their households did not have enough food to meet their family's needs.

¹ Source: *Agricultural Productivity Indicators Measurement Guide*, FANTA, 1997.

² Source: *Months of Adequate Household Food Provisioning (MAHFP) for Measurement of Household Food Access: Indicator Guide*, FANTA, 2007.

Table 1 summarizes MAHFP results, with data stratified by region. In Kalemie the average household has insufficient food to meet the needs of their family during 4.2 months of the year, or, expressed in terms of number of Months of Adequate Household Food Provisioning (MAHFP), the average household has sufficient food provisions for 7.8 months. Food shortages in Kalemie are most pronounced between October and January. In Moba the average household has insufficient food during 3.7 months of the year (and sufficient food provisioning for 8.3 months). Food shortages in Moba are most pronounced during January through April.

Table 1. Months of *Inadequate* Food Provisioning

Month	Kalemie %	Moba %
January	48.2	46.0
February*	33.8	53.4
March*	29.1	57.7
April*	37.5	50.0
May	29.1	34.6
June*	27.1	16.8
July*	27.8	12.8
August*	23.7	11.1
September*	32.4	15.1
October*	40.5	17.1
November*	44.1	22.1
December*	46.8	29.5
	n=299	n=298

* Indicates months in which differences between Kalemie and Moba are statistically significant.

<p><i>Months of Adequate Household Food Provisioning by Region</i></p> <p><i>Kalemie: Mean 7.8 months, median 9 months</i></p> <p><i>Moba: Mean 8.3 months, median 9 months</i></p>

Table 2 below details consolidated MAHFP results for Kalemie and Moba regions.

Table 2. Months of Adequate Household Food Provisioning (MAHFP)

MAHFP	Frequency	Percent	Reverse Cumulative Percent
0	22	3.7%	100.0%
1	4	0.7%	96.4%
2	10	1.7%	95.7%
3	13	2.2%	94.0%
4	15	2.5%	91.8%
5	29	4.9%	89.3%
6	28	4.7%	84.4%
7	75	12.6%	79.7%
8	88	14.7%	67.1%

MAHFP	Frequency	Percent	Reverse Cumulative Percent
9	113	18.9%	52.4%
10	114	19.1%	33.5%
11	37	6.2%	14.4%
12	49	8.2%	8.2%
TOTAL	597	100.0%	100.0%

Baseline for Indicator: <i>Number of Months of Adequate Household Food Provisioning (MAHFP)</i> (Kalemie & Moba Consolidated)			
The average number of months the sample population households have adequate food provisioning is 8.07 months, median 9 months.			
Obs	Total	Mean	Variance Std Dev
597	4817.0000	8.0687	7.8191 2.7963
Minimum	25%	Median	75% Maximum Mode
0.0000	7.0000	9.0000	10.0000 12.0000 10.0000

3.2 Household Dietary Diversity Score (HDDS)

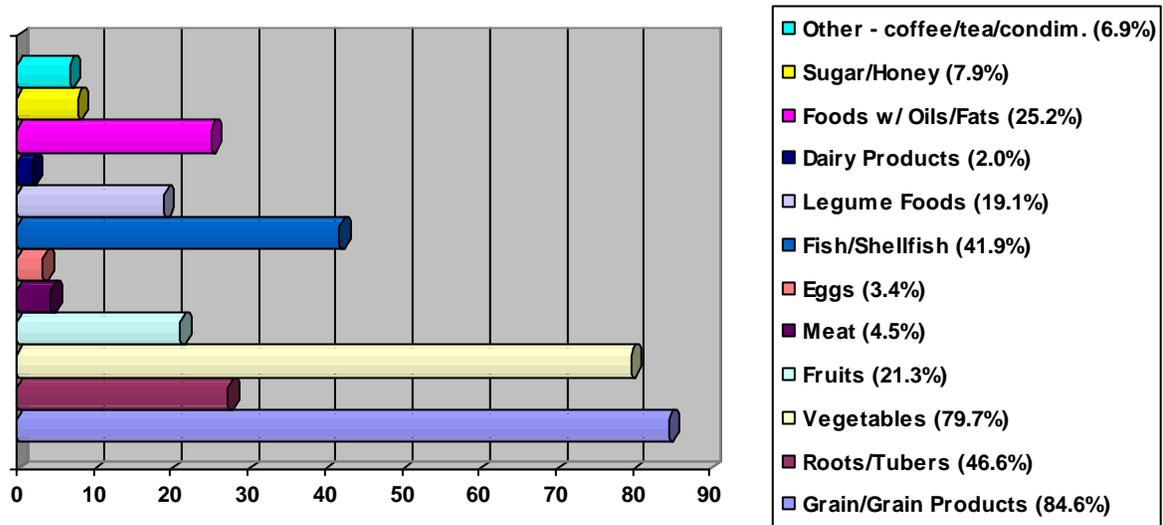
Household dietary diversity, the number of different food groups consumed the previous day, is an appealing proxy indicator to food access for the following reasons:³

- A more diversified diet is an important outcome in and of itself.
- A more diversified diet is associated with a number of improved outcomes in areas such as birth weight, child anthropometric status, and improved hemoglobin concentrations.
- A more diversified diet is highly correlated with such factors as caloric and protein adequacy, percentage of protein from animal sources (high quality protein), and household income.
- Even in very poor households, increased food expenditure resulting from additional income is associated with increased quantity and quality of the diet.

To better reflect a quality diet, the number of different food groups consumed is calculated, rather than the number of different foods consumed. Knowing that households consume, for example, an average of four different food groups implies that their diets offer some diversity in both macro- and micronutrients. This is a more meaningful indicator than knowing that households consume four different foods, which might all be cereals/grains. The following set of 12 food groups was used to calculate the HDDS: cereals and grain products, roots or tubers, vegetables, fruits, meat or poultry, eggs, fish or shellfish, foods made from legumes or nuts, dairy products, foods made with oils or fat, sugar or honey, and other foods such as condiments/coffee/tea. The cumulative total of food groups become the HDDS. Respondents in both the agricultural and health surveys were asked to indicate types of foods they, or anyone else in their household, ate the previous day or night. Survey results are summarized in Figure 1.

³ Source: Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (Version 2), FANTA, 2006.

Figure 1. % of Households that Consumed the Food Group the Previous Day/Night



HDSS were calculated from the previously noted food group consumption questions and are presented in Table 3. First, the HDSS variable was calculated for each household. The value of this variable, the *total number of food groups consumed by members of the household*, ranges from 0 to 12. Then the average HDSS indicator was calculated for the sample population (sum HDSS/total number of HHs) to give the final HDSS score.

HDSS scores for the project area are low, with over 60% of households indicating consumption of three or fewer food groups the previous day and over 90% of households indicating consumption of 5 or fewer food groups.

Table 3. Total Number of Food Groups Consumed by HH Members (HDSS)

HDSS	Frequency	Percent (%)	Cumulative Percent (%)
1	26	4.4	4.4
2	158	26.5	30.9
3	180	30.2	61.1
4	114	19.1	80.2
5	61	10.2	90.4
6	31	5.2	95.6
7	9	1.5	97.1
8	9	1.5	98.7
9	3	0.5	99.2
10	2	0.3	99.5
11	2	0.3	99.8
12	1	0.2	100
Total	n=596	100	100

Baseline for Indicator: Mean Household Dietary Diversity Score (HDDS)

The average total number of food groups consumed by members of households for the sample population is 3.43 food groups.

Obs	Total	Mean	Variance	Std Dev	
596	2045.0000	3.4312	2.6423	1.6255	
Minimum	25%	Median	75%	Maximum	Mode
1.0000	2.0000	3.0000	4.0000	12.0000	3.0000

4 Agricultural Survey Results and Discussion

4.1 General Household Information

Households within the project area are made up of, on average, 6.4 people, compared with the national average of 5.4 people. Overall, 25.2% of households in the project area are headed by women, compared with 21% nationally. About 81% of men and 48% of women are literate, compared with 85% of men and 60% of women nationally. For those who are literate within the project area, the average male has completed 5 years of school, compared with 2.5 years for women. Reported household religious affiliations include 75.7% Christian (Catholic or protestant), 12% with no faith affiliation and 5.3% Muslim.

Project considerations in light of these household demographics may indicate:

- a need to target educational materials to both literate and illiterate members of communities,
- a possible need to further explore differences in food security needs, vulnerabilities and coping strategies between male and female headed households, and
- opportunities to work with leaders of major faith groups to support, promote and reinforce desired food security related behavior changes.

Detailed Household Findings

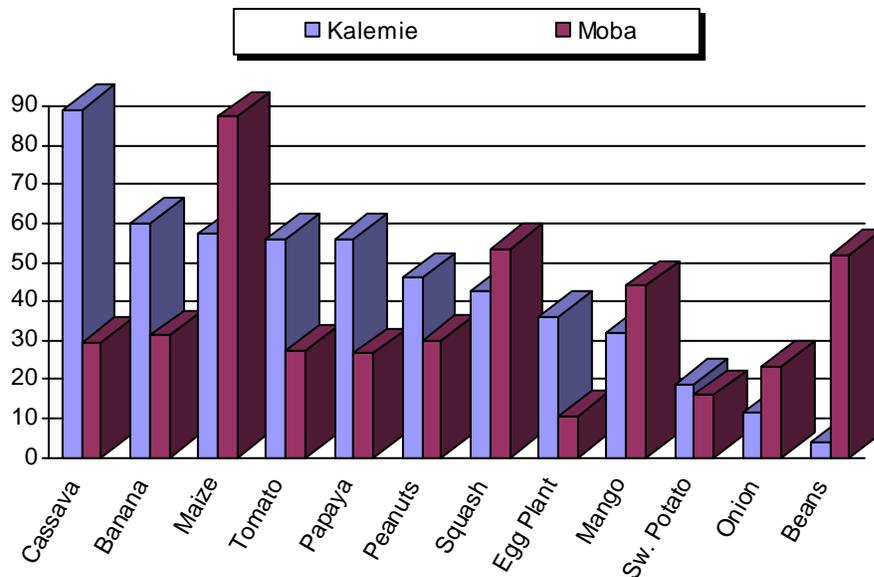
- Average number of people 18 years of age or older per household: 2.9
- Average number of people under 18 years of age per household: 3.5
- Average total number of people per household: 6.4
- Literacy rate of respondents (able to read and write):
 - Male 80.8%
 - Female 47.7%
 - Combined 64.3%
- Mean number of years of school completed by respondents:
 - Male 5.4 years (median 5; maximum 16)
 - Female 2.5 years (median 2; maximum 12)
 - Combined 4 years
- Gender of the Head of Household
 - Male 74.8%
 - Female 25.2%
- Religions practiced by people living within the households
 - None 12.0%
 - Catholic 32.7%

- Protestant 43.0%
- Muslim 5.3%
- Traditional 5.7%
- Other 5.0% (includes Bahai, Jehova’s Witnesses, JETAF, AFRIKISHA, & M. Seco)

4.2 Crop Production and Marketing

In terms of primary agronomic food crops, the survey indicates a high relative importance of production and sales of maize and beans in the Moba region, in contrast to Kalemie where cassava, maize and peanuts are the most important agronomic crops. For secondary horticultural crops, bananas, tomatoes, papaya, squash and mangos are most important in terms of both production and sales (see Figures 2 & 3 for summarized results, Table 4 for detailed results).

Figure 2. % of Households Producing Crops by Region



Bananas, tomatoes, papayas, squash, mangos, eggplant and onions are the horticultural crops most commonly grown and sold throughout the project area. Approximately 30% of households sold bananas, 25% tomatoes, 22% pumpkins or squash, 19% papayas and 17% mangos. The high percentage of households reporting production, and particularly sales of these crops indicates that these horticultural crops may play a significant role in household food security, although importance in terms of household income is difficult to determine without additional data on income to households from sales of horticultural crops. Further investigation into the importance of sales of horticultural crops would appear to be warranted.

Figure 3. % of HHs Producing vs. Sales of Crops

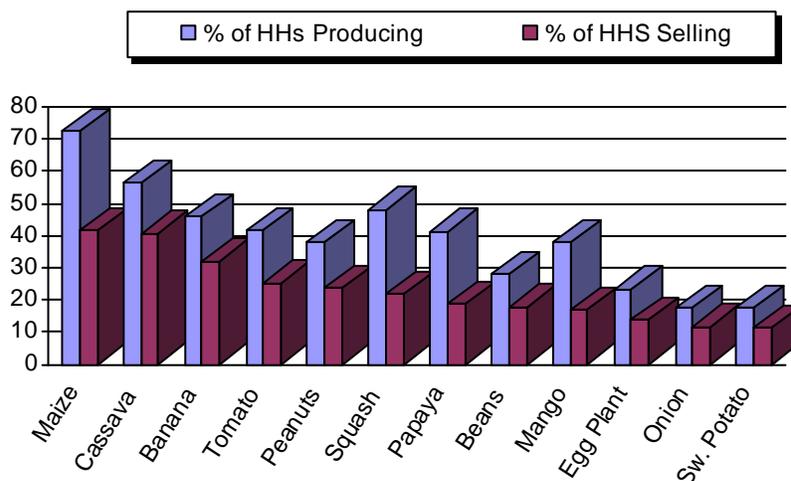


Table 4. Detailed Results - Production and Sales of Crops

Crop	% of Population Producing the Crop in past 12 months (Consolidated)	% of Population that Sold the Crop in past 12 months (Consolidated)	% of Population Producing the Crop (Kalemie)	% of Population Producing the Crop (Moba)
Maize*	72.3	41.7	57.3	87.3
Rice*	7.7	7.0	14.7	0.1
Sorghum	1.0	1.0	0.7	1.3
Cassava (fresh)*	56.3	40.7	89.3	23.3
Sweet Potato	17.3	11.3	18.7	16.0
Beans*	28.0	17.7	4.0	52.0
Peanuts	38.0	23.7	46.0	30.0
Chili Peppers*	14.0	8.0	24.7	3.3
Pineapple	5.3	2.0	8.0	2.7
Coconut	0.0	0.0	0.0	0.0
Onion	17.3	11.7	11.3	23.3
Kale	2.0	2.0	0.7	3.3
Eggplant*	23.3	13.7	36.0	10.7
Cucumber*	4.3	3.3	8.7	0.0
Tomato*	41.7	25.3	56.0	27.3
Pumpkin or Squash*	48.0	21.7	42.7	53.3
Leeks*	8.3	4.7	3.3	13.3
Spinach	5.0	2.0	8.7	1.3
Carrot	2.3	1.3	2.0	2.7
Cabbage	6.0	4.0	4.7	7.3
Lettuce	2.7	1.0	0.0	2.7

Crop	% of Population Producing the Crop in past 12 months (Consolidated)	% of Population that Sold the Crop in past 12 months (Consolidated)	% of Population Producing the Crop (Kalemie)	% of Population Producing the Crop (Moba)
Avocado*	18.3	3.7	15.0	26.7
Banana*	45.7	32.0	60.0	31.3
Citrus (Orange, Mandine, Lemon)	16.3	6.0	14.7	18.0
Mango	38.0	17.0	32.0	44.0
Papaya*	41.3	18.7	56.0	26.7
Palm Oil	6.3	6.3	--	--
Sugar Cane	5.6	5.6	--	--
Amaranth	4.3	4.3	--	--
Other	Other crops noted by 2% or less of households include tobacco, taro, sorrel, guava, coffee, okra, Bambarra groundnut, apple and soybeans.			

*Indicates a statistically significant difference between Kalemie and Moba regions (based on 95% confidence limits)

Table 5 below summarizes results for mean area planted, mean production per producer household, mean yield per household, mean quantity sold, and the mean value of sales (in US dollars) for the six most important agronomic crops identified in the survey.

Table 5. Productivity, Quantity of Sales and Value of Sales of Major Agronomic Crops

Crop	Mean Hectares Planted per Producer HH	Mean Kgs Harvested per Producer HH	Mean Yield per Producer HH Kgs/Ha	Mean Kgs Sold of HHs Reporting Sales	Value of Sales in US\$ for HHs Reporting Sales Exchange Rate (777 CF=US\$1)
Maize	0.42 (Median=0.25)	359 (Median=200)	1104 (Median=775)	263.6 (Median=100)	\$54 (Median=\$19)
Rice	0.27 (Median=0.18)	321 (Median=255)	1780 (Median=1606)	240 (Median 170)	\$84 (Median=\$70)
Cassava (fresh)	0.28 (Median 0.25)	1112 (Median=241)	4754 (Median=1133)	785 (Median=120)	\$82 (Median=\$21)
Sweet Potato	0.13 (Median=0.04)	157 (Median=68)	3125 (Median=1700)	178 (Median=47)	\$11 (Median=\$5.5)
Beans	0.35 (Median=0.25)	121 (Median=80)	425 (Median=310)	96 (Median=60)	\$36 (Median=\$17)
Peanuts	0.15 (Median=0.09)	102 (Median=60)	1230 (Median=817)	94 (Median=60)	\$20 (Median=\$12)

Maize - Survey results indicate that maize plays an important role in food security in both Kalemie and Moba regions, with 57.3% of households in Kalemie and 87.3% of households in Moba reporting production of maize. Households producing maize produced on average 359 kg, though 50% of households produced 200 kg or less. In the past 12 months more households within the project area reported selling maize than any other crop, with 41.7% of households reporting maize sales, followed by 40.7% of households reporting sales of cassava and 32% reporting sales of banana. While the mean income to households selling maize was \$54, it should be noted that 50% of families that sold maize

reported incomes of \$19 or less from maize sales. The reported mean maize yield of 1104 kilograms per hectare is fairly typical for small African producers that typically employ rudimentary methods for production, and well below the maize yields of 5 tons or greater which are often achieved by commercial African farms employing improved agricultural technologies and practices such as the use of improved seeds and soil fertility management. It should be noted however that during data analysis a number of highly improbable, though not theoretically impossible, maize yields were reported; these extremely high yields suggest reporting error, most likely due to farmer calculations of “area of production.” For example, if observations of reported maize yields exceeding a highly improbable 3499 kg/ha are removed from the sample, mean and median for maize yields would be 961 kg/ha and 720 kg/ha respectively. See Table 6 below for comparison.

Table 6. Yield calculation with observations of yields >3499 kg/ha removed

Crop	Baseline Average Yield Kg/Ha	Adjusted Yield Kg/Ha	Maximum Permitted Limit for Accepted Yield Results in Adjusted Sample
Maize	1104 (median 775; n=210)	961 (median 720, n=202, 3.8% of obs removed)	3499 kg/ha

Caution Related to Use of All Crop Yield Data from this Survey

The examples and discussion related to Tables 6-8 SHOULD NOT be construed as a recommendation to use the adjusted yield figures as baseline for the yield indicator. While some farmers clearly overestimated yields, it is entirely possible that other farmers grossly underestimated yields – though underestimated yields are more difficult to detect.

The purpose of Tables 6-8 is to illustrate the potential impact of bad data in calculating yields and to reiterate our earlier recommendation that project staff consider alternatives to using the crop yield data from this survey, such as crop cuts or the use of crop production data in lieu of yield data.

Cassava - Production and sales of cassava play an important role in household food security for 72.3% of households within the project area, with a mean production of 359 kg per household.

On average, households reported a mean yield of 4754 kilos per hectare and 50% of households reported productivity at 1133 kg per hectare or below. These figures not only fall well below the 20-25 tons per hectare that can be obtained with improved varieties and good management practices, but are also considerably less than the 8200 kg/ha 1994 average for the region⁴. Given a high variability of yields reported within clusters, and given the very low median reported yield of 1133 kgs/ha, it is likely that the quality of results has been affected by errors in farmers’ yield estimates for cassava. However, the low cassava yields relative to their potential may also be the result of other factors including:

- dependence on local cassava varieties which typically yield less than 6 tons per hectare,
- production systems which are mainly geared to cassava production to provide a safety net in case of cereal crop shortfalls,

⁴ Source: World Cassava Economy, FAO, 2000.

- poor crop rotation practices and tendencies to cultivate cassava on land where soil fertility has been greatly depleted,
- tendencies to intercrop cassava with other crops, rather than produce it in monoculture
- pests and weeds that can reduce yields by almost half (it has been estimated that the African cassava mosaic virus alone can lower yields by 28 percent to 40 percent).

Nearly 41% of households reported selling cassava, indicating an important role as a cash crop as well as a food crop. Average household income from the sale of cassava was \$82, however 50% of households reported sales incomes of \$21 or less.

Rice - Only 0.1% of households in Moba produced rice, compared with 14.7% of households that produced rice in Kalemie. Those that produced rice reported on average 321 kg of production. For the 7.0% of households within the project area that sold rice, the sale of rice provided a significant income, averaging \$84 per households, with 50% of households reporting incomes of \$70 or greater. The reported mean and median yields for rice were 1780 kg/ha and 1606 kg/ha respectively, as compared with a mean yield for sub-Saharan Africa of 1400 kg/ha⁵. As was the case with maize, a number of highly improbable, though not theoretically impossible, reported rice yields raise concerns about error related to farmer yield calculations. Table 7 indicates alternate yield calculations if rice yield observations of only three farmers exceeding 3500 kg/ha are removed from the sample. (See *Caution Related to Use of All Crop Yield Data from this Survey* box in the maize discussion above.)

Table 7. Yield calculation with observations of rice yields >3499 kg/ha removed

Crop	Baseline Average Yield Kg/Ha	Adjusted Yield Results Kg/Ha	Maximum Permitted Limit for Accepted Yield Results in Adjusted Sample
Rice	1780 (median 1606, n=22)	1385 (median 1020, n=19, 13.6% of obs removed)	3499 kg/ha

Beans - Common beans are important to food security in the Moba region where 52% of households produced beans, but less so in Kalemie where only 4% of households produced beans. Households cultivating beans produced on average 121 kg, while 50% of households produced 80 kg or less. Beans produce an average of \$36 in income for the 18% of households that reported sales. The average reported yield of 425 kg per hectare (310 kg median) is within the expected range of 300-700 kg per hectare, but far below the potential yield of 1.5 - 2.0 tons per hectare⁶ which may be obtained with improved varieties and optimal farmer management.

Peanuts - An important legume crop to both Kalemie and Moba, 46% of households in Kalemie and 30% in Moba produced peanuts with an average household production of 102 kg and a median production of 60 kg. Peanuts produced an average income of \$20 for the 24% of households that reported sales. Average reported yields were 1230 kg/ha, though 50% of households reported yields of 817 kg/ha or less. The average reported yield is suspect given studies of DRC peanut harvests showing no region producing a mean yield of more than 950 kg/ha⁷. It should be noted however that some improved varieties such as JL-24, which was identified decades ago, regularly produced more than 1,200 kg in farm trials during the 1990s, indicating that a properly chosen, high yielding variety can be expected to approximate yields reported in this survey. A number of highly improbable peanut yields also raise suspicions of reporting error related to farmer calculations of area of production. Table 8 indicates alternate yield calculations if

⁵ Source: Africa Rice Center (WARDA), 2007.

⁶ Source: African Agriculture, Nov. 2008

⁷ Source: PDA Micro Devru Food Security Program Report, 2005.

peanut yield observations exceeding 1499 kg/ha are removed from the sample. (See *Caution Related to Use of All Crop Yield Data from this Survey* box in the maize discussion above.)

Table 8. Yield calculation with observations of peanut yields >1499 kg/ha removed

Crop	Baseline Average Yield Kg per Hectare	Adjusted Yield Results Kg per Hectare	Maximum Permitted Limit for Accepted Yield Results in Adjusted Sample
Peanuts	1230 (median 817, n=108)	558 (median 400, n=73, 32.4% of obs removed)	1499 kg/ha

Sweet Potato - Sweet potato was produced by 17.3% of households with a mean production of 157 kg per household. Sweet potatoes produced an average income of \$11 for the 11.3% of households that reported sales. The average reported yield was 3125 kg/ha with a median yield of 1700 kg/ha, as compared to an average yield for Africa of 4-5 tons/ha (FAO 2000).

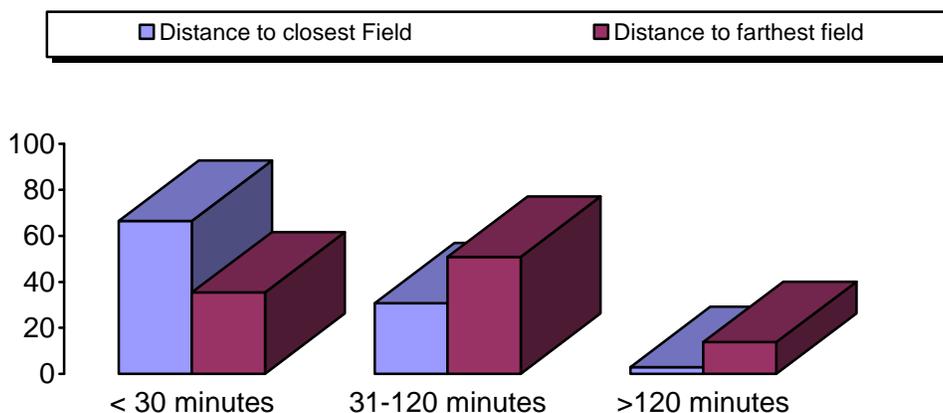
Sorghum - Given that only 1% of the population produced sorghum, it would not seem to merit major project attention at this point in time unless there were other reasons to promote sorghum production over maize, for example, in drought prone areas.

4.3 Access to Land

While access to land was not a problem for the majority of households, 18.8% percent reported insufficient land for growing food needed for their households. Reasons that these households lack access was not explored during the baseline survey, follow-up via semi-structured interviews and/or key informants is recommended to determine the nature of the problem and the extent to which the project might be able to provide advocacy or assistance in acquiring needed access to land. Prior to the survey a hypothesis was advanced that female headed households had less access to land than male headed households, however, survey results indicated no significant difference between male and female headed households (95% confidence limits).

Figure 4 summarizes access to land in terms of distance to fields. Differences between male and female headed households were insignificant within 95% confidence limits.

Figure 4. Distances to Closest and Farthest Fields (% of HHs)



4.4 Livestock Production and Sales

Access to livestock, particularly livestock other than poultry, remains limited. About 38% of households have no livestock (48% for female headed households with a 95% CI of 36.3 to 59.8%, and 34.5% for male headed households with a 95% CI 28.3 to 42.1%). Less than 1% of households own pigs or sheep, no households own cattle. Chickens are owned by 53.7% of households, ducks by 23.7% and goats by 14.3%. Numbers of animals owned per household are low, 50% of households that own goats or ducks own 4 animals or less and 50% of families that own chickens own 7 animals or fewer. Apart from the importance of livestock consumption within the diet, the sale of livestock to raise cash to purchase food was a common food security strategy among surveyed households. The average annual income to the 8.3% of households that sold goats was \$215. For the 5% of households that sold ducks and the 20.7% of households that sold chickens, average annual incomes were \$20 and \$15 respectively.

Figure 5. HHs Owning Livestock

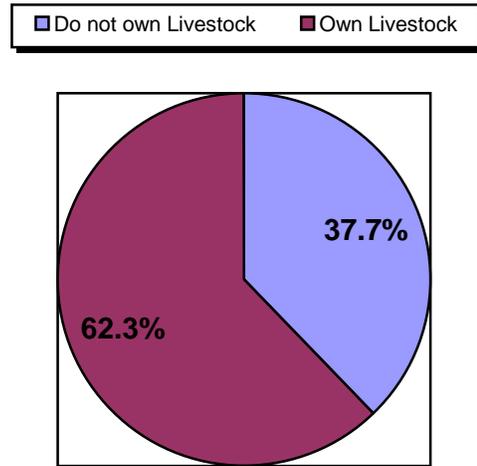


Figure 6. Livestock Production vs. Sales

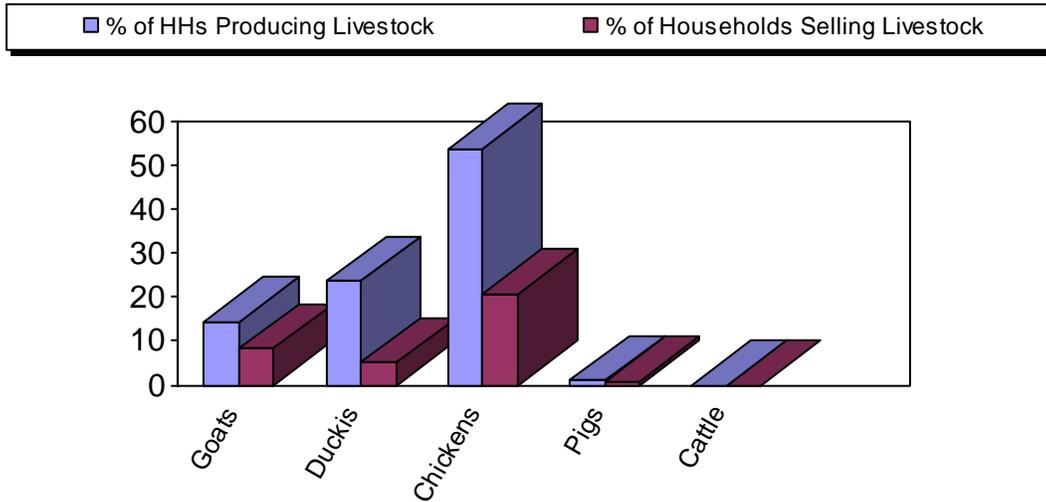


Table 10. Livestock Ownership, Sales and Incomes

Livestock Type	% of HHs Producing	% of HHs Selling (past 12 months)	Mean # of Animals Owned per Producing HH	Mean Annual Income from Sale of Livestock (US\$)
Goats	14.3 (n=43)	8.3	7.4 (Median=4; Max.=40)	\$215 (Median=\$145; Max=\$837)
Ducks	23.7 (n=71)	5	8.3 (Median=4; Max=113)	\$20 (Median=\$14; Max=\$112)
Chickens	53.7 (n=161)	20.7	15 (Median=7; Max=86)	\$15 Median=\$10; Max=\$176)
Sheep	0.3 (n=1)	0	15 (Median=15; Max=15)	0
Cattle	0.0	0	0	0
Pigs	1 (n=3)	0.7	6.6 (Median=8; Max=8)	\$163 (Median=163; Max=205)
Other	4.7% of households reported production of rabbits; 2% of households reported production of pigeons, data on sales was not collected for these animals.			

Baseline for indicator: *Percent of households in target area who own any livestock (goats and ducks)*
= 38.0%

4.5 Marketing of Produce

Where do households get information about market prices in order to determine at what price to market their produce? (multiple responses were permitted)

- 49.0% From buyers at the local market
- 41.7% From other farmers
- 0.0% From a farmer association
- 0.0% From the radio
- 0.3% From extension agents (government.or NGO)
- 0.0% From a marketing bulletin board
- 8.0% From local traders
- 7.3% From outside traders

During the past year, where did households sell their produce? (multiple responses were permitted)

- 54.9% In their own community
- 24.9% In a neighboring community (< 20km)
- 19.4% At a distant market (>20km)

To whom did households sell the largest quantity of produce in the past 12 months? (only one response was permitted)

- 18.7% A neighbor
- 13.4% A local shop or at the local market
- 49.2% A traveling buyer within the district
- 16.0% A traveling buyer from outside the district
- 0.4% An association or cooperative

- 0.0% A company or wholesale dealer
- 0.0% An NGO
- 0.4% An institution such as a school or hospital
- 1.9% Other

When households have production to sell, what means do they use to transport their produce to market? (multiple responses were permitted)

- 49.7% Walk/carry produce to market
- 23.0% Use a bicycle to transport produce to market
- 0.7% Borrow or hire a vehicle to transport produce to market
- 25.7% Buyer collects produce from farm

Two indications of improving marketing conditions include the 65% of households reporting sales of produce to traveling buyers from either within or outside the district, and nearly 26% of households reporting that buyers collected produce from their farms. At the same time, it should be noted that 98.3% of households are marketing their produce individually, and more than 75% transporting their produce to market on foot or by bicycle. Given this environment it seems likely that assisting farmers to better organize to market produce through informal or formal farmers groups could greatly improve marketing and produce transport options.

4.6 Sustainable Agricultural Technologies

Respondents were asked if they had used any of the ten FH recommended improved agricultural technologies and practices listed in Table 11 during the past 12 months. The percentage of households reporting use of each practice is noted in the table. Enumerators carried illustrations to clarify questions and ensure that farmers understood the terminology related to each practice.

Table 11. Adoption of Selected Sustainable Agricultural Practices

Sustainable Agricultural Practice	% of HHs
Use of improved seed for maize, beans and peanuts; or the use of improved cuttings for cassava.	8.4
Use of green manure	0.7
Compost (preparation or application)	1.0
Crop rotation	13.7
Intercropping	35.7
Incorporation of organic matter	21.1
Mulching	6.0
Use of one or more FH recommended grain storage technologies (natural pesticides for stored crops or drying racks to properly dry grains and legumes)	26.9
Use of FH recommended planting densities for maize, peanuts, rice or bean crops.	37.4
Use of FH recommended IPM practices (natural pesticides in the field or pest/disease resistant crop varieties).	10.4

It is unsurprising that the percentage of farmers using improved technologies such as improved seed, green manure, compost, and crop rotation is very low at the start of the project. On the other hand, given that this is a baseline survey, it seems somewhat surprising that 34.7% of households report using an FH recommended planting density for maize, peanuts, rice or beans; or that 26.9% of households report using one or more FH recommended grain storage technologies. There are two explanations that may at least partially account for these findings. First, households were deemed to be using an FH recommended planting density if they used the correct planting density for any one of the four crops mentioned.

Likewise, households were deemed to be using an FH recommended grain storage technology if they used either a recommended natural pesticide, or used drying racks to properly dry fruits or legumes. A second reason noted by project agronomists is that some of the technologies that FH will be promoting are known and practiced in limited geographic areas, but not yet widely used throughout the project area.

Baseline for the indicator *percent of beneficiaries who use the minimum number (3) of sustainable agricultural technologies* is derived from responses to the questions above by counting and summarizing the number of improved practices used by each household, as detailed in Table 12 below. Use of these improved agricultural practices is very low, 21.7% of households do not practice any of the ten practices and only 25.9% practice three or more. The low rate of adoption of these basic technologies for improving crop productivity highlights the importance of extension activities to promoting their use.

Table 12. Mean Number of Sustainable Ag. Technologies Practiced per Household

Number of Technologies Practiced	Frequency	%	Cumulative %
0	65	21.7	21.7
1	98	32.7	54.3
2	59	19.7	74.0
3	54	18.0	92.0
4	19	6.3	98.3
5	4	1.3	99.7
7	1	0.3	100.0
TOTAL	300	100	100

Baseline for indicator: Percent of beneficiaries who use the minimum number of 3 or more FH recommended sustainable agricultural technologies = 25.9%

4.7 Soil and Water Conservation Technologies

Respondents were asked if they had used any of the ten FH recommended soil and water conservation technologies listed in Table 13 during the past 12 months. The percentage of households reporting use of each practice is noted in the table. Enumerators carried illustrations to clarify questions and ensure that farmers understood the terminology related to each practice.

Table 13. Percent of HHs Using FH Recommended Soil and Water Conservation Technologies

Practice	% of HHs
Construction of hillside terraces	10.3
Planting of cover crops	0.7
Construction of check dams	13.7
Use of micro-basins	1.0
Use of trench bunds	6.0
Contour lines or ridging	31.4
Erosion control with live barriers (hedges, etc.)	8.3
Relay planting with leguminous trees (Taungya System)	0.3

Practice	% of HHs
Use of fast growing leguminous trees in fallow fields	1.7
Water capture and irrigation (par ruissellement)	20.7
Improvement of poorly draining soils	16.3

The relatively high percentage of household reporting the use of contour lines or ridging is not too surprising given the widespread use of these practices in the Moba area; however, the high percentage of households reporting the use of hillside terraces, check dams and water capture technologies (par ruissellement) does not seem credible to a number of FH agricultural program staff. Qualitative follow-up to the survey is recommended to investigate the likelihood of high percentages of households using these practices.

Baseline for the indicator, “Percent of beneficiaries who use the minimum number (3) of sustainable soil and water conservation technologies,” is derived from responses to the questions above by counting and summarizing the number of improved practices used by each household, as detailed in the table 14 below. Use of the FH recommended soil and water conservations are very low with approximately 46% of households not using any of the 11 recommended practices and only 17% of households using 3 or more of the recommended technologies.

Table 14. Mean Number of Soil and Water Conservation Technologies Practiced per Household

Number of Technologies Practiced	Frequency	%	Cumulative %
0	137	45.7	45.7
1	88	29.3	75.0
2	24	8.0	83.0
3	23	7.7	90.7
4	17	5.7	96.3
5	8	2.7	99.0
6	3	1.0	100.0
TOTAL	300	100	100

Baseline for indicator: Percent of beneficiaries who use the minimum number of 3 or more FH recommended Soil and Water technologies = 17.0%

Respondents were additionally asked to identify how much of the land which they currently farm has benefited from one or more of the above noted soil and water conservation technologies. The 300 families surveyed reported a total of 49.2 hectares are currently under improved soil and water conservation management. This result could be used in conjunction with project census data, to extrapolate a population based estimate related to information to be collected for the indicator “area under soil and water conservation management.” It should be understood that this information would be complementary to, rather than a substitute for, the methodology proposed by FH for collecting data related to this indicator.

4.8 Access to Agricultural Services and Inputs

- Only 12% of households reported having received any information or advice about improving agricultural production from either the government or from an NGO within the past 12 months.
- 13.8% of households reported that they are currently participating in an agricultural group or association assisted by FH, with an average length of participation of 10.4 months. (One might therefore have expected that at least an equal number of households would have received agricultural advice within the past 12 months; it is unclear as to why this is not the case.)
- 10.8% of households reported receiving some information about market prices for agricultural products via extension agents, radio, TV or bulletin boards during the past 12 months. (Note: In answer to a similar previous question only 0.3% of households reported that they had received marketing information from the radio, extension agents, or from a marketing bulletin board. The reason for this discrepancy is unclear.)

4.9 Post-harvest Storage of Crops

Crop losses in storage affected 49.1% of households within the past year, with a mean reported loss of 31.9% of the produce that was put into storage. This high rate of loss in storage indicates that significant gains in food security could be achieved by improving post-harvest storage technologies and practices.

5 Health and Nutrition Survey Results and Discussion

5.1 Caregiver and Child Demographic Information

An overwhelming majority of the caregivers surveyed are the biological mother of the child. 97.7% of the index children have a living biological father, and 99.3% have a living biological mother. This indicates that there are very few orphans in the target population. About 32% of the caregivers are literate, compared to 48% of women from the agricultural survey and 39% of women in Katanga province based on the 2007 DHS survey⁸. For those caregivers who are literate within the project area, the average number of years of schooling completed is 2.2 years. Reported household religious affiliations include 73.7% Christian (Catholic or Protestant), 17% with no faith affiliation and 2% Muslim.

Regarding the children's demographics, there were more females than males in the 0 to 23.9 month old index child sample, but the reverse in the 24 to 59.9 month old parallel sample population. Added together, there were 51.7% male children and 48.3% female children in the baseline sample population. In the index group of children 0 to 23.9 months, the age distribution of the sample was biased towards younger children because the sampling methodology instructed the enumerators to choose the younger child if there were two children in the same household that were under two years of age. 29.0% of the sample was in the 0 to 5.9 month age group, versus 19.1% in the 18 to 23.9 month age group. In the parallel group of children 24 to 59.9 months, the age distribution of the sample was also biased towards younger children. In this case the sampling methodology instructed the interviewers to randomly choose a child if there were two children in the same household that were between the ages of 24 and 59 months. The bias towards younger children may be due to younger children being more likely to be at home during the survey, or confusion on the part of the enumerators about how to select a child in the case of two in the household, and choosing the youngest child instead of choosing randomly. This would reflect an issue with the survey training.

⁸ Demographic and Health Survey 2007: Key Findings, Democratic Republic of the Congo Demographic and Health Survey (EDS-RDC), Jan – Aug 2007.

Detailed Household Findings

- Average age of caregivers: 27.2 years (median: 26 years, range: 15 to 56 years)
- Sex of caregivers:
 - Male 4.7%
 - Female 95.3%
- Relationship of caregiver to child:
 - Biological mother 98.0%
 - Adoptive mother 0.3%
 - Biological father 1.3%
 - Adoptive father 0.0%
 - Grandmother 0.3%
 - Aunt 0.0%
 - Other 0.0%
- Literacy rate of caregivers (able to read and write): 31.8%
- Mean number of years of school completed by respondents: 2.2 years (58% had completed 0 years of school)
- Religions practiced by caregivers:
 - None 17.0%
 - Catholic 28.0%
 - Protestant 45.7%
 - Muslim 2.0%
 - Traditional 4.0%
 - Other 3.3% (Baca, Jehovah's Witnesses, Branham, Moto moto)
- Sex of children 0-23.9 months:
 - Male 47.0%
 - Female 53.0%
- Sex of children 24-59.9 months:
 - Male 56.5%
 - Female 43.5%

Table 15. Index sample children by age group

Age Group (months)	Frequency	Percent
0-5.9 mo	88	29.0%
6-11.9 mo	89	29.4%
12-17.9 mo	68	22.4%
18-23.9 mo	58	19.1%
Total	303	100%

Table 16. Parallel sample children by age group

Age Group (months)	Frequency	Percent
24-29.9 mo	76	25.2%
30-35.9 mo	58	19.3%
36-41.9 mo	60	19.9%
42-47.9 mo	46	15.3%
48-53.9 mo	36	12.0%

54-59.9 mo	25	8.3%
Total	301	100%

Project considerations in light of these household demographics may indicate:

- A need to target educational materials to the particular needs of illiterate female caregivers, who in most cases are the child's biological mother.
- No special focus on orphans and vulnerable children (OVCs) is needed at the time being.
- Opportunities to work with leaders of major faith groups to support, promote and reinforce desired health and food security related behavior changes. It will be important to dialogue with faith leaders to assess their willingness to work alongside FH as communication channels for health and nutrition messages, and to determine their particular role in the communication process.
- Future monitoring and evaluation sampling methodology should stay the same, even though younger children are oversampled, in order to maintain consistency between the studies and to be able to compare those results with the baseline survey results.

5.2 Nutritional Status and Anthropometrics

Like many developing countries, malnutrition is a major public health issue in the DRC, particularly in the District of Tanganyika. Malnutrition can be generally categorized into chronic malnutrition (stunting) or acute malnutrition (wasting). Stunting is generally the result of inadequate nutrition and/or infectious diseases occurring during a relatively long period of time or many consecutive times that rob the body of necessary nutrients. It can be seen as a failure to grow adequately in height or length. Wasting is failure to gain sufficient weight relative to height or length, or weight loss. It reflects more recent undernutrition or illness.

Malnutrition can be measured by clinical signs, biochemical tests, or anthropometric measurements. For the baseline survey, FH used anthropometric measurements to assess the nutritional status of the sample children aged 0 to 59.9 months from the Title II USAID MYAP area of intervention. Weight for Age Z-score (WAZ), Height for Age Z-score (HAZ), and Weight for Height Z-score (WHZ) were used to measure malnutrition.

WAZ is an index used to assess the degree of being underweight among 0-59 month old children. It reveals if the child has the appropriate weight compared to normal healthy children of his/her same age. It cannot distinguish stunting or wasting but includes both types of malnutrition. 29.2% (87/298) of the 0-23m children and 28.5% (85/298) of the 24-59m baseline children are globally underweight ($WAZ < -2$). This is high compared to WHO classification for global underweight and is very close to the $\geq 30\%$ threshold, which indicates a very high prevalence of malnutrition.

13.1% (39/298) and 16.1% (48/298) of children 0-23m are severely ($WAZ < -3$) and moderately ($-3 < WAZ < -2$) underweight, respectively. The statistics are similar for children 24-59 months with 11.1% (33/298) severely and 17.4% (52/298) moderately underweight.

HAZ is used to measure stunting. Again the situation is very critical in the baseline children. 34.7% (77/222) of the children 6-23m are globally stunted ($HAZ < -2$) while 47.9% (140/292) of the children 24-59m are. According the WHO classification for global stunting, the prevalence is high (between 30-39%) for the 6-23m age group and very high ($\geq 40\%$) for the 24-59m age group.

WHZ is a specific measure of wasting including edema detection. 6.1% (18/294) of the children 0-23m are globally wasted ($WHZ < -2$) while 3.9% (11/283) of the children 24-59m are. According to the WHO classification system, a prevalence exceeding 5% is alarming, while 10-14% is regarded as a high and

serious prevalence of global wasting⁹. The level in the DRC baseline sample hovers around the alarming level.

Considering the 0-23m and 24-59m sample children together, the cumulative and weighted WAZ <-2 score is 28.8%, HAZ <-2 score is 43.5%, and WHZ <-2 score is 4.8%.

Table 17. Weight for age, Height for age, and Weight for height Z-scores < -2 with Confidence Intervals¹⁰

Z-score Categories	0-23.9 months	24-59.9 months	Consolidated and Weighted ¹¹
WAZ <-2	29.2% (CI: 21.9 – 36.5)	28.5% (CI: 21.3 – 35.8)	28.8%
HAZ <-2	34.7%* (CI: 25.8 – 43.5)	47.9% (CI: 39.8 – 56.0)	43.5%
WHZ <-2	6.1% (CI: 2.2 – 10.0)	3.9% (CI: 0.7 – 7.1)	4.8%

*calculated for 6-23.9 months

Before performing the anthropometric calculations for weight for age, height for age, and weight for height, the data was cleaned to remove the outliers, as defined by EPI-Info 3.5.1. Outliers determined to likely be errors were weight for height Z-scores above +6 or below -4, weight for age Z-scores above +6 or below -6, height for age Z-scores above +6 or below -6, and HAZ or WHZ <-3.09 in conjunction with HAZ or WHZ >+3.09. In the 0 to 23.9 month sample, 3.6% (11/305) of the sample were outliers. In the 24 to 59.9 month sample, 5.3% (16/303) of the sample were outliers. The literature recommends that the percentage of outliers should not exceed 2% of the sample, which the index and parallel samples did exceed slightly. The CDC 2000 growth charts were used as the standard for calculating the WAZ, HAZ, and WHZ scores.

To appropriately account for the different age distribution between the index and parallel groups, the samples were weighted for WAZ, HAZ, and WHZ index calculations. When considering the entire sample population, as in the case of calculating the WAZ and WHZ indices, the 0-23m group was weighted at 40% and the 24-59m group was weighted at 60%. When considering the subgroup of children 6 to 59.9 months, as in the case of calculating the HAZ index, the subset of children 6 to 23.9 months was weighted at 33.333%, and the 24-59m group was weighted at 66.667%.

A selection bias was introduced into the analysis by the methodology used to choose the sample children in the 0-23.9 month old category. However it was determined that this selection bias had a negligible effect on the HAZ indicator, which was selected because a smaller percentage point change would be expected for stunting reduction over the length of the MYAP program. The sampled rate of stunting (HAZ<-2) for 6-23m is 34.7% compared to the true rate expected when balanced by age group (33.0% for each 6 month interval) which is 35.8%, approximately a 1 percentage point difference. The sampled rate of stunting for 24-59m is 47.9% compared to the true rate expected when balanced by age group (16.7% for each 6 month interval) which is 48.4%, a 0.5 percentage point difference. What all this means is that the reported rate of stunting is probably about 3% lower than the actual rate in the MYAP area, a slight under estimation of the level of stunting among the sample population of children.

⁹ WHO Global Database on Child Growth and Malnutrition, World Health Organization, Geneva, 1997

¹⁰ 95% confidence intervals were calculated assuming a design effect of 2.0, chosen because of the cluster sampling methodology used in the survey.

¹¹ Because the consolidated and weighted percentages are based on an equation, it is impossible to calculate a confidence interval for them.

In comparison, the 2007 DHS survey reports that among Congolese children younger than five years old, 45 percent in Katanga are stunted or too short for their age, typically indicated by a height for age Z-score (HAZ) of less than -2, and therefore suffers from chronic malnutrition. Among children under five years of age, 12 percent in Katanga suffer from wasting or are too thin for their height. Typically defined as a weight for height Z-score (WHZ) of less than -2, wasting is an indicator of acute malnutrition. In addition, 20 percent of children under five years in Katanga are underweight or too thin for their age which is most commonly defined as weight for age Z-score (WAZ) of less than -2.

To respond to malnutrition issue, the Congolese health authority has developed a National Nutrition Plan with three main components: Growth Monitoring Promotion (GM/P) at health centers, management of acute malnutrition (PCCMA), and community based screening and nutrition education. The proposed FH MYAP program activities should actively support and promote these components.

The following tables provide more details about the WAZ, HAZ, and WHZ baseline indices.

Table 18. Weight for Age Z-Scores

Weight for Age Z-score categories	0-23.9 months Frequency (Percentage)	24-59.9 months Frequency (Percentage)
WAZ <-3	39 (13.1%)	33 (11.1%)
-3 ≤ WAZ <-2	48 (16.1%)	52 (17.4%)
-2 ≤ WAZ <-1	76 (25.5%)	99 (33.2%)
-1 ≤ WAZ <0	72 (24.2%)	74 (24.8%)
0 ≤ WAZ <+1	42 (14.1%)	33 (11.1%)
+1 ≤ WAZ	21 (7.0%)	7 (2.3%)
Total	n=298	n=298

Table 19. Height for Age Z-Scores

Height or Length ¹² for Age Z-score categories	6-23.9 months Frequency (Percentage)	24-59.9 months Frequency (Percentage)
HAZ <-3	25 (11.3%)	56 (19.2%)
-3 ≤ HAZ <-2	52 (23.4%)	84 (28.8%)
-2 ≤ HAZ <-1	74 (33.3%)	83 (28.4%)
-1 ≤ HAZ <0	47 (21.2%)	39 (13.4%)
0 ≤ HAZ <+1	14 (6.3%)	16 (5.5%)

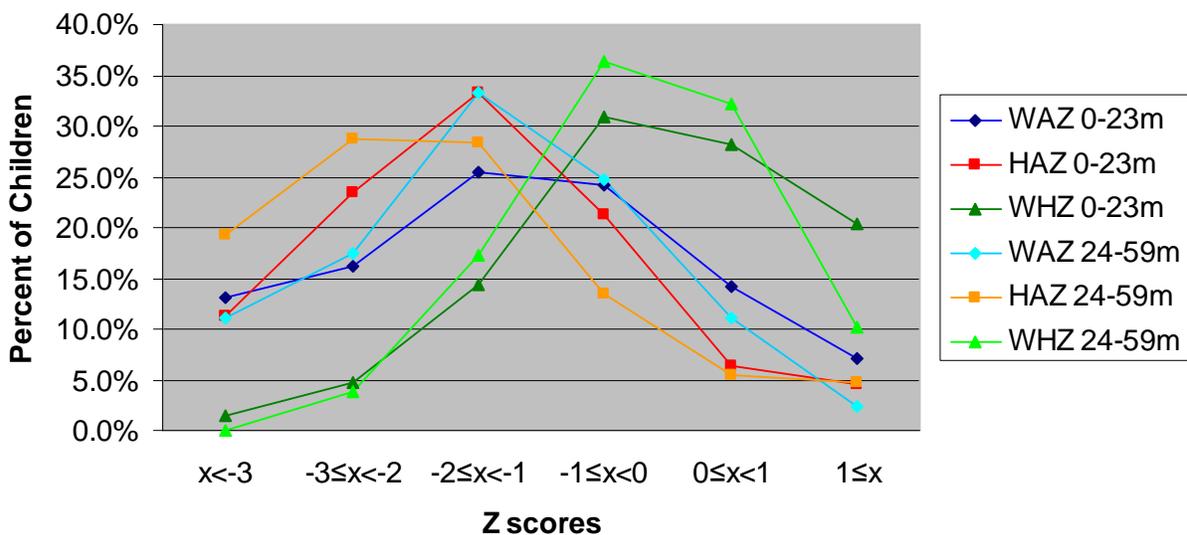
¹² Length for age was used to assess the nutritional status of children under age 24 months, height for age for children older than 24 months.

Height or Length ¹² for Age Z-score categories	6-23.9 months Frequency (Percentage)	24-59.9 months Frequency (Percentage)
+1 ≤ HAZ	10 (4.5%)	14 (4.8%)
Total	n=222	n=292

Table 20. Weight for Height Z-Scores

Weight for Height or Length ¹³ Z-score categories	0-23.9 months Frequency (Percentage)	24-59.9 months Frequency (Percentage)
WHZ <-3	4 (1.4%)	0 (0.0%)
-3 ≤ WHZ <-2	14 (4.8%)	11 (3.9%)
-2 ≤ WHZ <-1	42 (14.3%)	49 (17.3%)
-1 ≤ WHZ <0	91 (31.0%)	103 (36.4%)
0 ≤ WHZ <+1	83 (28.2%)	91 (32.2%)
+1 ≤ WHZ	60 (20.4%)	29 (10.2%)
Total	n=294	n=283

Figure 7. Curves generated from WAZ, HAZ, and WHZ scores of baseline sample children



¹³ Length for age was used to assess the nutritional status of children under age 24 months, height for age for children older than 24 months.

Looking at the distribution curves generated by the Z-scores plotted in a line format, the apexes for each index are shown. In the figure, the darker lines designate the 0-23m baseline sample of children, and the lighter lines designate the 24-59m sample children. The WAZ lines with the diamond shaped markers show the apexes of the curves to be at Z-scores between -2 and -1 for both samples. The apexes for the HAZ lines with the square shaped markers are different for the two sample populations: the apex of the Z-score curve for 6-23m is between -2 and -1 and the apex for 24-59m is shifted to the left and hovers around -2. The WHZ lines with the triangle shaped markers have the same apex for both samples, at Z-scores between -1 and -0.

Table 21. Severe Underweight (WAZ<-2) by Age and Sex Categories

Age categories	Males Numerator / Denominator (Percentage)	Females Numerator / Denominator (Percentage)
0-5.9 months	4/87 (4.6%)	5/87 (5.7%)
6-11.9 months	16/89 (18.0%)	12/89 (13.5%)
12-17.9 months	12/64 (18.8%)	11/64 (17.2%)
18-23.9 months	10/58 (17.2%)	17/58 (29.3%)
24-29.9 months	8/71 (11.3%)	9/71 (12.7%)
30-35.9 months	12/59 (20.3%)	8/59 (13.6%)
36-41.9 months	10/61 (16.4%)	6/61 (9.8%)
42-47.9 months	8/46 (17.4%)	6/46 (13.0%)
48-53.9 months	6/35 (17.1%)	5/35 (14.3%)
54-59.9 months	4/26 (15.4%)	3/26 (11.5%)

Table 22. Stunting (HAZ¹⁴<-2) by Age and Sex Categories

Age categories	Males Numerator / Denominator (Percentage)	Females Numerator / Denominator (Percentage)
0-5.9 months	5/85 (5.9%)	9/85 (10.6%)
6-11.9 months	10/86 (11.6%)	11/86 (12.8%)
12-17.9 months	10/63 (15.9%)	13/63 (20.6%)
18-23.9 months	9/59 (15.3%)	19/59 (32.2%)
24-29.9 months	15/70 (21.4%)	8/70 (11.4%)
30-35.9 months	22/57 (38.6%)	12/57 (21.1%)

¹⁴ Length for age was used to assess the nutritional status of children under age 24 months, height for age for children older than 24 months.

Age categories	Males Numerator / Denominator (Percentage)	Females Numerator / Denominator (Percentage)
36-41.9 months	18/61 (29.5%)	10/61 (16.4%)
42-47.9 months	17/44 (38.6%)	12/44 (27.3%)
48-53.9 months	9/34 (26.5%)	7/34 (20.6%)
54-59.9 months	6/26 (23.1%)	4/26 (15.4%)

The category of children with the lowest incidence of WAZ and HAZ<-2 were the infants younger than 6 months, a time period characterized by breastfeeding without complementary foods. Children 6-23m had the higher incidence of WAZ<-2 at 37.0% compared to 28.5% for the older 24-59m group. The reverse was true for the incidence of HAZ<-2. Only 34.7% of the younger children 6-23m had a HAZ<-2, while 47.9% of the older children 24-59m did. This demonstrates the need for early intervention in the prevention and treatment of malnutrition, and a strong reason for focusing activities towards the caregivers of younger children. The Care Group model that will be used in the MYAP program focuses primarily on the caregivers of children 0-23m, while still providing some services for older children 24-59m. The difference in WAZ and HAZ<-2 rates between male and female children was fairly minimal except for HAZ in older children. 30% of boys 24-59m had a HAZ<-2, while the same was true for only 18% of girls 24-59m.

5.3 Childhood Illness

Caregiver knowledge and behaviors pertaining to childhood illness were assessed by collecting information about the occurrence of common childhood diseases, examining caregiver knowledge of signs of childhood illness, and about behavior pertaining to feeding sick children, deworming, as well as investigating if mothers stopped breastfeeding when their child was sick.

The caregivers identified some of the signs of sickness that were postulated in the survey questionnaire, but also came up with many other signs on their own - some valid and some not valid. 21.7% of the caregivers knew at least three valid signs of childhood illness that would indicate the need for treatment.

The following table summarizes what caregivers reported¹⁵ as valid signs of illness that would indicate that the child needed treatment: (multiple responses were permitted)

Table 23. Signs of childhood illness recognized by caregivers

Signs	Frequency %
High fever	83.0%
Looks unwell or not playing normally	34.3%
Not eating or drinking	20.3%
Other valid signs, such as diarrhea, cough, palmar pallor, conjunctivitis, bloody stools, wasting, groaning, generalized edema, and refusal to breastfeed	17.7%
Fast or difficult breathing	10.0%
Vomits everything	9.0%
Convulsions	5.3%

¹⁵ These signs were indicated without prompting by the enumerator.

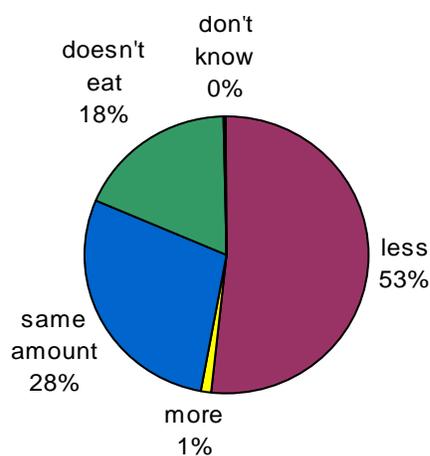
Signs	Frequency %
Lethargic or difficult to wake	3.7%

The baseline for the indicator, “Percent of participant mothers of children age 0-23.9m who know at least 3 signs of childhood illness that indicate the need for treatment,” is derived from responses to the questions above by counting and summarizing the number of signs of illness (postulated and valid others) recognized by each caregiver, as detailed in the table below.

Table 24. Total number of signs of childhood illness recognized by caregivers

Number of signs	Frequency	Percent	Reverse Cumulative Percent
0	16	5.3%	100%
1	99	33.0%	94.7%
2	120	40.0%	61.7%
3	48	16.0%	21.7%
4	11	3.7%	5.7%
5	6	2.0%	2.0%
6	0	0.0%	0.0%

Figure 8. Amount of food offered to sick children



An extraordinarily high number of children were sick in the recent past. Caregivers reported 74.9% (221/295) of the children 0-23.9 months had been sick with a cough, difficult breathing, fever, diarrhea, etc. at some time during the previous two weeks. Upon further inquiry, it was discovered that there had been a recent outbreak of the flu in the Moba and Kalamie areas. When asked if she offered the child less, more, or the same amount of food when the child was sick, the majority (51.5%) offered less food (Figure 8). 29.7% offered the same or more food to the child during illness. And 0.4% said they didn't know. However, 18.3% indicated that their child doesn't eat food¹⁶. Upon review of the results with the baseline supervisors, they believe this may reflect a misinterpretation of the question. Caregivers may have interpreted the question as asking “How much does the child eat when sick?” instead of

“How much food was offered?” For the subgroup of interest, children 6-23.9 months, the proportion of caregivers who gave the same or more food, which is the recommended practice, during a childhood illness in the past 2 weeks is only 28.2% (46/163).

7.1% (21/295) of the caregivers had stopped breastfeeding because the child showed signs of illness. The most popular signs that led to cessation of breastfeeding were diarrhea and fever (12 caregivers each). Vomiting or “other” signs each led two caregivers to stop breastfeeding. Multiple responses were permitted.

In line with WHO guidelines, the Congolese national health policy recommends deworming protocols for children 12-59 months. Since 2005, the protocol consists of providing deworming medicine two times a year during campaigns organized by the MOH with partners. In the district of Tanganyika, FH distributed

¹⁶ This option was given to allow an appropriate answer for those caregivers with children 0-5.9 months. However, this option was also chosen by 27 caregivers with children 6-23.9 months, children old enough to eat solid food. One possible explanation is that this option was chosen for those children who normally eat, but didn't eat when they were sick.

free deworming medicine for children under five during the Title II USAID SYAP program in 2008. Some other partners such as UNICEF and MDM supported health centers by providing deworming medicine. In the baseline sample population, 27.4% (34/124) of children 12-23.9 months have taken deworming medicine in the past six months.

In summary, a large percentage of the caregivers understood high fever to be a serious symptom that required treatment. All of the other symptoms were identified by 35% or less of the caregivers. In general, knowledge of appropriate and numerous signs that indicate need for treatment is low among caregivers. The recommended practice of offering a sick child more or at least the same amount of food was only practiced by about a quarter of the caregivers. Deworming rates are also low among the target population as only about a quarter of eligible children have received deworming medication recently in a timely manner. Fortunately, the practice of discontinuing breastfeeding when the child is sick seems to not be as critical of an issue as previously feared. The most alarming result was the large number of children recently sick, which can be accounted for mostly by the flu epidemic that was occurring at the same time as the baseline study. According to the 2007 DHS study, 15% of children under age five had symptoms of ARI, and 31% had a fever when they were measured between May and August 2007.

In light of the baseline caregiver population's practices and knowledge levels, the project should consider targeting health messages to raise the awareness of true danger signs according to C-IMCI protocol that indicate a sick child needs medical treatment, preventative measures to protect health (continued breastfeeding while sick, adequate nutrition, start deworming medication at 12 months and repeat every 6 months), as well as reinforce the necessity of offering a sick child the same or more food during and after illness, and how to encourage that child to continue eating. A calendar of disease "seasons" can be developed and FH staff can educate mother leaders to reinforce specific prevention and treatment messages according to the period of each illness affecting children in the project area.

5.4 Control of Diarrhea

The incidence and treatment practices of diarrhea were also assessed in the baseline index children. Caregivers reported that 37.7% of the children had been sick with diarrhea in the past two weeks. But only about a third of the caregivers (35%) of the children aged 6-23.9 months with diarrhea gave them oral rehydration solution (ORS) and/or recommended home fluids to treat the diarrhea. Within the 35% that received treatment:

- 27.5% (22/80) of children 6-23.9 months were treated with a fluid made from an ORS packet. 5 out of 33 (15.2%) children 0-5.9 months also were treated with ORS.
- 7.5% (6/80) of children 6-23.9 months were treated with a government-recommended homemade fluid made up of water, sugar, and salt. 3 out of 33 (9.0%) children 0-5.9 months also were treated with homemade fluid.

According to the 2007 DRC DHS survey, 15% of children under 5 years in Katanga province had diarrhea during the two weeks preceding the survey, which is less than half the incidence in the FH sample population. However, the DHS survey was done at a different time period than the FH baseline which, since diarrhea is more prevalent during the rainy season, limits its comparison value. Given that the access to clean water and sanitation in the FH survey is similar to that which was found in the DHS survey (see section 5.13 *Water and Sanitation*), one has to wonder why the rate of diarrhea is so much higher in the FH project area. This is an area that FH staff should investigate further so that preventative efforts are effectively targeted to improve the situation.

Overall, 45% of children with diarrhea in the DHS study were given oral rehydration therapy (ORT), that is oral rehydration salts (ORS) or a recommended home solution. The FH baseline sample population used ORS treatment less frequently than the DHS sample. In light of the lower treatment levels with ORS,

it would be interesting to discover why caregivers are not treating diarrhea with recommended means in the FH project population. Is it lack of knowledge, lack of resources, lack of access to ORS packets, or another dynamic that is affecting this behavior? This is a key behavior to follow up with using qualitative research means, such as key informant interviews or focus groups. A Barrier Analysis study on this behavior would also enable more targeted health messaging. Also noteworthy is that children 0-5.9 months who should be exclusively breastfeeding were also being offered ORS or similar treatment, which is not recommended. Health messages regarding ORS treatment for diarrhea should specify this is not an appropriate treatment for infants less than 6 months.

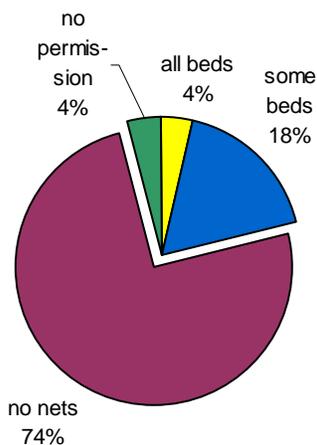
5.5 Malaria – Insecticide-Treated Bednet (ITN) Use

In DRC, according to the 2001-2005 MOH health statistics report, malaria remains one of the major diseases, the first cause of morbidity and among the three leading causes of death among children under five. Artemisinin-based combination therapy (ACT) and using insecticide-treated mosquito nets (ITNs) are recommended to reduce the rates of morbidity and mortality related to malaria. Unfortunately there is a problem of ITN availability in the district of Tanganyika. The past distribution of ITNs by UNICEF and ASF has been sporadic. For these reasons the FH baseline survey gathered information about ITN use in regards to malaria.

28.4% (85/299) of the caregivers reported that their household had mosquito nets to use while sleeping. Of the households with ITNs, the family members that slept under them the previous night included:

- No one 4.7%
- Index Child 3.3%
- Index Child and others 19.3%
- Just others (not including index child) 0.7%

Figure 9. Observed presence of ITNs



Enumerators also asked to see the ITNs in the house and observed the following: 3.6% of households with nets hanging above all beds, 17.9% of households with nets hanging above some beds, 74.6% of households with no nets hanging above the beds, and 3.9% of households did not grant permission to observe.

Reportedly, 22.7% (68/300) of children 0-23.9 months slept under an insecticide-treated bed net the previous night (based on the report of caregivers who said their child or their child plus others slept under a bednet the previous night). In actuality, 16% (48/300) of children 0-23.9 months slept under an insecticide-treated bed net the previous night (a more conservative estimate based on the report of caregivers who said their child or their child plus others slept under a bednet the previous night *and* nets were observed hanging over all or some beds in that house).

Compared to the DRC DHS study, the sample baseline population practice of ITN usage appears to be over the national average, but still relatively low. The DHS study determined that only 8% of households in Katanga own at least one ITN. Our interviewers observed ITNs in use in 21.5% of the households. In the DHS study 6% of children under age five in Katanga province slept under an ITN the night before the survey. The FH baseline study focused on a subset of that population, 0 to 23.9 months, and found that 16% slept under an ITN the previous night. It would be interesting to find out if FH staff have a plausible explanation for the wide difference in the DHS and FH baseline rates. The key point however is that in

general, ITN use is low. FH should consider opportunities to partner with organizations that provide ITNs for distributions. The FH Care Group structure using mother leaders to provide maternal and child health education would be an effective means to not only educate families on the dangers of malaria and how to prevent it, but also to train caregivers on how to properly hang nets and to coordinate ITN distribution at the household level. Low bednet usage may be indicative of low knowledge about malaria prevention in general, thus behavior change messages should be directed at all household members, not just caregivers.

5.6 Vitamin A Supplementation

Vitamin A deficiency is a public health problem in the DRC. According to a survey supported by PRONANUT, the prevalence of Vitamin A deficiency was about 61% in 2002. In line with WHO guidelines, Congolese national health policy recommends Vitamin A for children 6-59 months. Since 2002, vitamin A supplements are provided two times a year during campaigns organized by the MOH and partners as a part of the ongoing vitamin A supplementation program. In the district of Tanganyika, FH distributed free vitamin A supplements to children under five during the Title II USAID SYAP program in 2008.

In the subset of index children 6-23.9 months, 44.3% (92/212) of the caregivers reported that their child had received a dose of Vitamin A at one time. Regarding timely administration of Vitamin A supplementation, caregivers reported that 38.7% (82/212) of the children 6-23.9 months had received a Vitamin A supplement dose within the last six months. In comparison, the DHS survey reports that slightly more than half of the children 6-59 months nationally have received a vitamin A supplement in the six months before the survey, and more specifically 47% in rural areas. Although the FH baseline population lags behind the DHS rural average for Vitamin A supplementation, this can partly be attributed to the difference in age categories being measured.

Of interest is that almost all the children in the baseline survey who received Vitamin A did so in the previous six months. This could indicate that caregivers did not remember their child receiving this supplement longer ago than six months (which could indicate that awareness messages should be considered), or that campaigns for giving Vitamin A supplementation to children is relatively new in the baseline population area.

The ideal practice is starting Vitamin A supplementation at 6 months of age and repeating at 6 month intervals. This ideal behavior should be communicated through the Care Groups to the caregivers in the project area. Care Groups can also be used to mobilize mother leaders to spread awareness messages for the MOH campaigns to make sure that all caregivers for children 6-59 months are covered. In addition to these campaigns, mother leaders can contribute to the strategy of promoting the production and consumption of foods rich in vitamin A.

5.7 Nutrition Screening

To be successful, a community management of acute malnutrition program (CMAM) must assure a maximum of coverage. But before management can occur, malnourished children must first be identified through nutritional status screening. When screening is performed at a health center during a consultation, it mainly consists of measurement of the child's weight and height or length. When screening takes place in the community during an outreach intervention, it is usually done by measuring the child's mid-upper arm circumference (MUAC). Since access to health centers is very limited in the DRC, screening for acute malnutrition in the community is critical and recommended by the Congolese CMAM protocol (PCCMA).

In the Tanganyika district, particularly in Kalemie and Moba, FH supported the MOH by conducting community nutritional screenings, by measuring children's weights and heights or lengths at Rally Posts during the Title II USAID SYAP program in 2008. At health centers, health agents do GM/P and screen for acutely malnourished children through weighing or MUAC measurement. However, there is no regular and ongoing community nutritional screening.

During the baseline survey, when caregivers were asked if their child's arm had been measured within the past four months with a MUAC measuring tape, 7.3% (22/300) answered affirmatively. In addition, 21.7% (65/300) of the caregivers stated that their child had been weighed at least one time within the past four months. In order to assess if the weighing was indeed a health "card confirmed weighing", the enumerators asked to see the child's health card and observe if the child's weight had been recorded within the last 4 months. The answers to this question are the following:

- 19.3% Yes, the child's weight was recorded within the last 4 months
- 52.3% No, the child's weight was not recorded within the last 4 months
- 4.3% Unknown, because the health card is at the health post
- 24.0% Unknown, because the child does not have a health card

Considering the two methods of nutrition screening together, 22.7% (68/300) of the children had their nutritional status evaluated during the past 4 months by MUAC or a health card confirmed weighing.

In response to the low rates of nutritional screening, FH can train community health workers (CHW) in addition to mother leaders to conduct MUAC measurements on children in order to implement a regular community nutrition screening and referral program in accordance with the PCCMA protocol. However, the potential increase in demand for acute malnutrition treatment due to increased referrals must be anticipated and prepared for. FH is in a strategic position to provide technical support to the health system as they provide access to this treatment.

5.8 Breastfeeding / Infant and Young Child Feeding

A significant focus of the Title II USAID MYAP project is promoting essential nutrition actions (ENAs) such as appropriate breastfeeding and complementary feeding through the Care Group methodology. Immediate breastfeeding after birth, exclusive breastfeeding during the first six months, and continued breastfeeding until twenty-four months are all important ENAs during infancy and young childhood. Dietary diversity and sufficient feeding frequency are also important ENAs for the child engaged in complementary feeding.

The Congolese government, in line with WHO guidelines, recommends exclusive breastfeeding for children 0-5m, progressive complementary feeding and continued breastfeeding up to 24 months, and continuing and/or augmenting feeding or breastfeeding during and after illness.

5.8a Breastfeeding

To internally monitor the caregiver practice of immediate breastfeeding, caregivers were asked to recall within how many hours after birth they started breastfeeding their child. Of the more recent mothers with children aged 0-11.9 months, 39.9% (69/173) initiated breastfeeding immediately, defined as within the first 2 hours after giving birth. In that same group of recent mothers, 49.7% (86/173) started within 24 hours, 8.1% (14/173) started within the first 3 days, and 2.3% (4/173) responded with "other" or "don't know". The results of more recent mothers was used to measure this indicator in order to prevent recall

bias. However, when considered as a whole, the results for all of the caregivers was essentially the same. This demonstrates that the immediate breastfeeding rate of approximately 40% has stayed about the same for the past 2 years. In comparison, the 2007 DHS survey found 48% of biological mothers initiated breastfeeding in the hour following birth.

Exclusive breastfeeding was defined as children 0-5.9 months that are currently being breastfed, consumed breast milk yesterday, and do not consume anything else, including water. The exclusive breastfeeding rate of the baseline population of children 0-5.9 months is 28.4% (25/88). In the DHS survey population, 36% of the children under 6 months were being exclusively breastfed.

When considering all children 0-23.9 months, 86.7% (260/300) of them are currently being breastfed. Rates of continued breastfeeding can be seen in the following percentages:

- 100% (88/88) of children 0-5.9 months are breastfeeding (not exclusive)
- 95.5% (84/88) of children 6-11.9 months continue to breastfeed
- 88.1% (59/67) of children 12-17.9 months continue to breastfeed
- 50.9% (29/57) of children 18-23.9 months continue to breastfeed

A significant drop off in continued breastfeeding occurs after 18 months. In anticipation of this drop off, FH health staff should target mothers of 12-17.9 month olds with breastfeeding ENA messages to prevent premature weaning from breastfeeding. All breastfeeding related ENAs should be taught through Care Groups, with extra reinforcement messages related to exclusive breastfeeding and continued breastfeeding up to 24 months.

5.8b Food consumed by 0-5.9 month olds

The recommended nutrition for infants 0 to 5.9 months old is strictly exclusive breastfeeding, and no food or additional water. Among the baseline population, approximately three-quarters of the young infants are receiving food or water and not being exclusively breastfed.

Table 25. Infant foods consumed by 0-5.9 month olds

Q.G3 Yesterday during the day or night, did your child eat or drink...	Frequency for children 0-5.9 months (Percent)	Frequency for children 6-23.9 months (Percent)	Frequency for children 0-23.9 months (Percent)
Breastmilk?	98.9% (87/88)	82.5% (175/212)	87.3% (262/300)
Plain water?	53.4% (47/88)	88.6% (187/211)	78.3% (234/299)
Commercially produced infant formula	1.1% (1/88)	1.9% (4/212)	1.7% (5/300)
Any fortified, commercially available infant and young child food?	2.3% (2/88)	0% (0/211)	0.7% (2/299)
Any other porridge or gruel?	43.2% (38/88)	44.8% (95/212)	44.3% (133/300)

The variety of solid foods and liquids that caregivers reported the young infants were eating consists of the following:

- 5% ate bread, rice, noodles, or other foods made from grains
- 7% ate white potatoes, white yams, manioc, cassava (foufou), or other foods made from roots
- 1% ate carrots, squash, or yellow or orange sweet potatoes
- 6% ate dark green leafy vegetables
- 6% ate ripe mangos or papayas
- 6% ate foods made with red palm oil, palm nut, or palm nut pulp sauce
- 3% ate other fruits or vegetables like oranges, guava, tomato, eggplant, etc.
- 1% ate eggs
- 2% ate meat such as beef, pork, lamb, goat, sheep, chicken, or duck

- 7% ate fresh or dried fish or shellfish
- 5% ate foods made from beans, peas, soy, peanuts, coconut, or nuts
- 2% consumed oils, fats, butter, or foods made with any of these
- 10% consumed other liquids
- 8% ate sugary foods such as chocolates, candy, sweets, pastries, cakes, or biscuits
- 9% ate other solid or soft food

Caregivers of children 0-5.9 months reported that the infants were *not* offered the following types of solid foods and liquids:

- Cheese, yogurt, or other milk products
- Liver, kidney, heart, or other organ meats
- Grubs, snails, insects, or other small protein food
- Tea or coffee

FH health staff should focus the Care Group health messages related to complementary feeding on delaying the start of complementary foods and water until 6 months, as well as the advantages and importance to infant health of exclusive breastfeeding through the first 6 months. The caregiver behavior of early introduction of complementary food would be worth investigating with Barrier Analysis and qualitative investigation tools, in order to find out why caregivers are introducing water, porridge, and other foods early.

5.8c Dietary Diversity of 6-23.9 month olds

The recommended dietary diversity for young children 6 to 23.9 months old is a minimum of four different food groups daily. More diversity is always better; the more diverse a child’s diet is, the larger the variety of nutrients he/she receives which enhance his/her health and nutrition.

The baseline study measured the consumption from 8 different food groups. These 8 food groups were based on the methodology used in the 2008 KPC Rapid Core Assessment Tool on Child Health (CATCH) survey, and the foods listed in the 2006 version of Measure DHS survey. The dietary diversity of the baseline population of children 6 to 23.9 months is described in the following tables and statistics.

Table 26. Dietary Diversity among children 6-23.9 months

Food Group	Frequency (Numerator / Denominator)	Baseline %
Consumption of Dairy	9 / 212	4.2%
Consumption of Grain and Tubers/Roots ¹⁷	162 / 212	76.4%
Consumption of Vitamin A rich Fruits and Vegetables ¹⁸	145 / 212	68.4%
Consumption of Other Fruits and Vegetables	41 / 212	19.3%

¹⁷ Food items that were most commonly consumed by children 6-23.9 months in this food group:

- Bread, rice, noodles, or other foods made from grains (25%, 53/212)
- White potatoes, white yams, manioc, cassava (foufou), or other foods made from roots (40.6%, 86/212)

¹⁸ Food items that were most commonly consumed by children 6-23.9 months in this food group:

- Dark green leafy vegetables (53.8%, 114/212)
- Foods made with red palm oil, palm nut, or palm nut pulp sauce (43.9%, 93/212)

Food Group	Frequency (Numerator / Denominator)	Baseline %
Consumption of Eggs	5 / 212	2.4%
Consumption of Meat, Poultry, and Fish ¹⁹	105 / 212	49.5%
Consumption of Legumes/Nuts	50 / 212	23.6%
Consumption of Oils/Fats	51 / 212	24.1%

The most common food groups consumed were grains and tuber/roots and Vitamin A rich fruits and vegetables. Approximately half of the 6-23.9 month olds consumed meat, poultry, or fish. About a quarter of the children ate legumes/nuts and oils/fats. The food groups least commonly consumed were dairy and eggs. The DHS survey reports that 66 percent of children 6-35 months consumed foods rich in vitamin A, such as meat, liver, eggs, carrots, mangoes, green leaves, or orange-fleshed sweet potatoes, during the 24 hours prior to the survey. A similar percentage of children from the FH baseline survey population are consuming Vitamin A rich fruits and vegetables.

Children 6-23.9 months ate from an average of 2.72 food groups (out of 8 groups), SD 1.59. Put another way, the Individual Dietary Diversity Score (IDDS) of the baseline subset sample population is 2.72. Disaggregated by age category, children 6 to 11.9 months ate from an average of 2.05 food groups (SD 1.50), children 12 to 17.9 months ate from an average of 3.14 groups (SD 1.59), and children 18 to 23.9 months ate from an average of 3.24 groups (SD 1.35). As children got older in the baseline sample, they consumed a more diverse diet. However, only 31.6% met the dietary diversity recommendation and ate from 4 or more of the 8 food groups measured. The following table lists the frequency of the number of food groups consumed by age category.

Table 27. Number of food groups eaten by children 6-23.9m

Q.G4t Number of Food Groups	6-11 months	Frequency	12-17 months	Frequency	18-23 months	Frequency
0 ²⁰	12	13.6%	3	4.5%	0	0.0%
1	27	30.7%	7	10.4%	4	7.0%
2	18	20.5%	13	19.4%	15	26.3%
3	13	14.8%	20	29.9%	13	22.8%
4	12	13.6%	8	11.9%	17	29.8%
5	5	5.7%	10	14.9%	6	10.5%
6	1	1.1%	6	9.0%	1	1.8%
7	0	0.0%	0	0.0%	0	0.0%
8	0	0.0%	0	0.0%	1	1.8%
Total	88		67		57	

To address this issue of low dietary diversity, MYAP health activities should focus on more than just nutrition education. It is important to build a synergy between the agriculture and health components of the program so that participant families are gaining access to a more diverse array of foods. Actions within the two program components should be coordinated so that appropriate food will be available to children for utilization. For example, baseline data reveals that approximately half of the households are raising chickens, but less than 3% of the children 6-23m are consuming eggs. This underutilized food group should be targeted with qualitative investigation tools and perhaps a Barrier Analysis to assess the influences on egg consumption by children. When promoting food diversity, FH staff should develop a

¹⁹ Food items that were most commonly consumed by children 6-23.9 months in this food group:
-Fresh or dried fish or shellfish (47.6%, 101/212)

²⁰Breast milk was not included in the food groups.

list of locally available foods, their corresponding food group, and seasonal availability in order to better focus the health and agriculture messages related to dietary diversity. Based on the agricultural productivity already occurring in the MYAP project area, in addition to strengthening the consumption of grains/tubers and Vitamin A rich fruits/vegetables by children, it should not be difficult to promote the utilization of other fruits/vegetables and legumes being grown. Another household behavior that both agriculture and health components should address during the MYAP program is food purchasing choices once household income starts to increase. It will be important to promote spending increased income on priority foods, such as oil.

5.8d Feeding Frequency of 6-23.9 months olds

The recommended feeding frequency of breastfed children 6 to 8.9 months is a minimum of two times per day, while the recommended feeding frequency for breastfed children 10 to 23.9 months is a minimum of three times per day.

As a filter question, the baseline survey asked if the caregiver knew how often their child was eating. 38 caregivers out of 210 said “no” or “don’t know” and skipped the following question asking for the number of times the child ate the day before. Therefore, data for the question asking how many times did the child eat yesterday was collected from only 185 caregivers out of 212. Due to the problem created by the question structure, 12.7% of the potential data was absent from the analysis.

The average number of times children 6 to 23.9 months ate the day before the survey during the day or night was 1.81 times per day (SD = 0.80). Disaggregated by age category, the average number of times children 6-8m ate was 1.50 times per day (SD=0.79) and the average number of times for children 9-23m was 1.88 times per day (SD=0.78). 57.9% (22/38) of the children 6-8m met the feeding frequency recommendation of at least 2 times per day, and 14.3% (21/147) of the children 9-23m met the feeding frequency recommendation of at least 3 times per day.

Table 28. Feeding frequency of children 6-23.9 months

Number of times child ate yesterday during the day or night	6-8 months	Frequency	9-23 months	Frequency
0 ²¹	5	13.2%	3	2.0%
1	11	28.9%	38	25.9%
2	20	52.6%	85	57.8%
3	2	5.3%	16	10.9%
4	0	0.0%	4	2.7%
5	0	0.0%	1	0.7%
Total	38		147	

Although on average both subsets of children are not being fed with the recommended frequency, the older children 9-23m are in the most critical position. Nutrition messages about feeding frequency should place a strong emphasis on the increased needs of children 9-23m. However, the behavior change communication for this need must take in to account the context. For this reason, it would be good to understand why the minimum meal/snack frequencies are not being achieved. Is it a question of food accessibility, lack of knowledge, or a child care practice issue? This could be a good behavior to analyze with focus groups and/or a Barrier Analysis study.

²¹ Drinking liquids, such as breast milk, was not measured by this question.

5.8e Indicators for assessing Infant and Young Child Feeding (IYCF) practices

The three indicators that make up the IYCF component are continued breastfeeding, age appropriate dietary diversity, and age appropriate frequency of feeding. For the baseline study, the measurement of these indicators was limited to the age bracket of 6 to 23.9 month olds. For the IYCF indicator measurement as recommended by FANTA and WHO²², the combination of these 3 behaviors is being measured. Age appropriate dietary diversity is defined as consuming a minimum of 4 out of 7 food groups (all of the above 8 food groups mentioned in section 5.8c except for fats/oils). Per FANTA and WHO, "The cut-off of at least 4 of the above 7 food groups above was selected because it is associated with better quality diets for both breastfed and non-breastfed children. Consumption of foods from at least 4 food groups on the previous day would mean that in most populations the child had a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable that day, in addition to a staple food (grain, root or tuber)." Age appropriate frequency of feeding is defined as 2 times yesterday during the day and night for children 6 to 8.9 months, and 3 times for children 9 to 23.9 months.

The IYCF practices measured by the 2007 DHS survey in DRC were slightly different. Age appropriate dietary diversity for breastfed children was defined as 3 different food groups and age appropriate frequency of feeding was 2-4 times per day, depending on age. In the 2007 DHS study, 18% of breastfed children age 6-23m met these guidelines.

The baseline IYCF results have been broken up into the three components and summarized, determining the percentage of children that had all three components. The FH baseline results are:

- % of participant children 6-23.9m continuing to breastfeed: 81.1% (172/212)
- % of participant children 6-23.9m with age appropriate dietary diversity: 21.2% (45/212)
- % of participant children 6-23.9m with age appropriate frequency of feeding: 20.3% (43/212)
 - 57.9% (22/38) 6 to 8.9 month olds were fed at least 2 times
 - 14.3% (21/147) 9 to 23.9 month olds were fed at least 3 times
- **% of participant children 6-23.9m with all of the above: 5.7% (12/212)**

5.9 Iron Supplementation and Prenatal Care During Last Pregnancy

In line with WHO guidelines, Congolese national health policy recommends iron and folate supplements for pregnant women during the three months before and after delivery. Ideally, pregnant women should have access to iron supplements during the prenatal and postnatal period, however, the capsules are not always available at health centers. During the Rally Post activity of the Title II USAID SYAP project in 2008, FH distributed iron and folate supplements to pregnant and lactating women.

According to the 2007 DHS, less than half of pregnant women in rural areas received iron-folate tablets (40.8 %) during prenatal health care visits, compared to 54% in urban areas. 43% of women 15-49 years in rural areas received the four prenatal visits recommended by WHO. In the Katanga province, 79% received prenatal care from a health professional and 37.6% received iron-folate tablets.

In the FH baseline sample population, 91.8% (157/171) of the biological mothers of children 0-11.9m received prenatal care during their last pregnancy, and 73.5% (125/170) of the biological mothers of children 0-11.9m took iron supplements during their last pregnancy.

²² "Indicators for assessing infant and young child feeding practices" Part 1 Definitions: Conclusions of a consensus meeting held 6-8 November 2007 in Washington, DC, USA

Below is a table that summarizes the frequency that biological mothers of children 0-11.9m accessed prenatal care.

Table 29. Prenatal Care Frequency of Biological Mothers

Q.H2 How many times during your last pregnancy did you receive prenatal care?	Frequency	Percent
Once	6	3.8%
Twice	19	12.2%
Three times	46	29.5%
More than three times	82	52.6%
Don't know	3	1.9%
Total	156	

It appears that seeking prenatal care is already a common behavior amongst the target MYAP population. The FH baseline sample of mothers that reported receiving iron supplements was more than double that of the DHS sample, while the percent that received prenatal care was slightly higher. An important role that FH can play with the MOH is partnering with them to improve the quality of prenatal care offered in order to lower infant and maternal mortality rates. The MOH should be encouraged to systematically offer voluntary testing and counseling for HIV during the prenatal visits.

5.10 Health Messages on the Radio

According to the 2007 DHS survey, exposure to mass media in the DRC is low - 60 percent of women and 39 percent of men have no exposure to any media source. For those that do have exposure to media, radio is the most common media source for women and men age 15-49 (31 percent and 52 percent, respectively). 33% of the households in rural areas own radios.

The FH baseline found a similar level in the caregiver households, with 26.7% (80/300) of the households owning a radio. Of the households that do own a radio, 18.8% (15/80) heard a health message over the radio in the past 2 weeks. Caregivers reported listening to the following radio stations:

- Radio Okapi: 13.7% (41/300)
- Radio RTNC: 5.0% (15/300)
- Radio RCMO: 4.7% (14/300)
- Radio PAREC: 3.3% (10/300)
- Other radio stations (i.e. Radio Tanzania, BBC, Kwizera, Tanganika, Aucun, Free Africa, Radio Kenya, Voix D'allemagne, RFI, etc.): 12.7% (38/300)

The baseline indicator of “average number of indirect beneficiaries who received health promotion on maternal and child nutrition through radio messages” was assessed by the proxy measurement of number of households that own radios. This result could be used in conjunction with project census data, to extrapolate a population based estimate of indirect beneficiaries that listen to radio stations that play health messages.

Only 5% (15/300) of the caregivers heard health message from radios during the past 2 weeks. One major component of the Title II USAID MYAP health program is taking health messages communicated in Care Groups and disseminating them on the radio. Although FH can ask caregivers to listen to the radio, the non-availability of radios will hamper this communication strategy. Rather than focusing efforts on radio diffusion, it would be better to use more universal and effective communication channels that could easily be exploited by the communities, such as drama or group discussions.

In the baseline survey, caregivers indicated they received health and nutrition information from the following communication media:

- Health Center: 34.0% (102/300)
- Community Health Worker: 7.0% (21/300)
- Church announcement: 5.0% (15/300)
- Friends/Family members: 6.3% (19/300)
- Posters: 0.7% (2/300)
- Group discussion: 1.3% (4/300)
- Drama: 0.3% (1/300)
- Other (i.e. Reading documents, School, Grandmother's house, Other persons – FH promoter and community leader): 3.7% (11/300)
- None: 51.7% (155/300)

Approximately half of the caregivers were unable to think of a source that they received health and nutrition information from. This leaves the field wide open to for the FH MYAP project to develop a universal communication strategy for behavior change health messages. Qualitative methods such as focus groups and semi-structured interviews should be employed to determine the best communication channels to use. Since health centers are an accepted facilitator of health messages, these should also be leveraged as communication media. The project should focus on developing close collaboration with health agents at health centers in order to funnel key health messages to the target communities.

5.11 HIV/AIDS

The 2007 DHS survey found that nearly all women and men have heard of AIDS (92 percent of women and 97 percent of men). However, only 15 percent of women in Katanga have a comprehensive knowledge²³ of HIV/AIDS. In the FH baseline population, fewer caregivers (72% (216/300) have heard of HIV/AIDS, and hardly any (1.7%) had a complete comprehensive knowledge of HIV/AIDS. Many Congolese still have misconceptions about HIV/AIDS.

The following figures shows the beliefs and opinions, which make up the comprehensive knowledge of HIV/AIDS, of those caregivers who had heard of HIV/AIDS previously.

²³ Comprehensive knowledge means: knowing that the use of condoms during every sexual intercourse and having just one uninfected and faithful partner can reduce the chance of getting HIV; knowing that a healthy-looking person can have HIV; and rejecting the two most common local misconceptions about AIDS, namely, the transmission of HIV through mosquito bites and by supernatural means.

Figure 10. Caregiver Beliefs and Opinions about HIV/AIDS

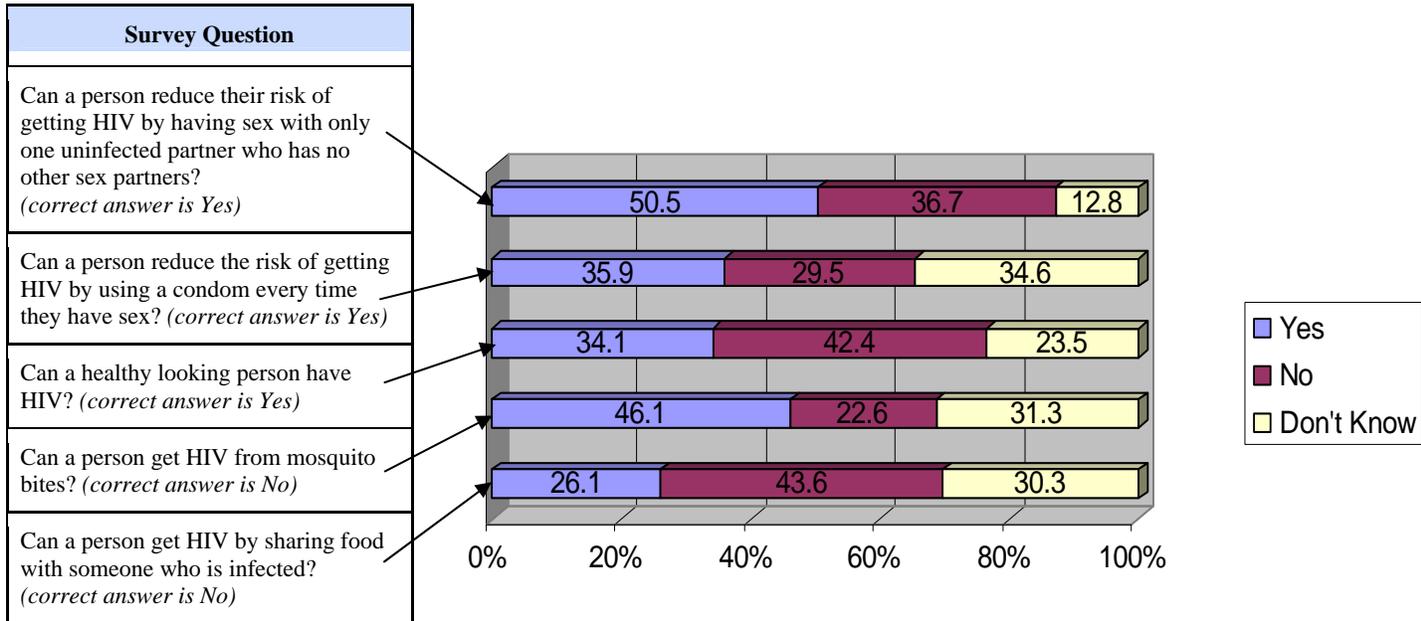
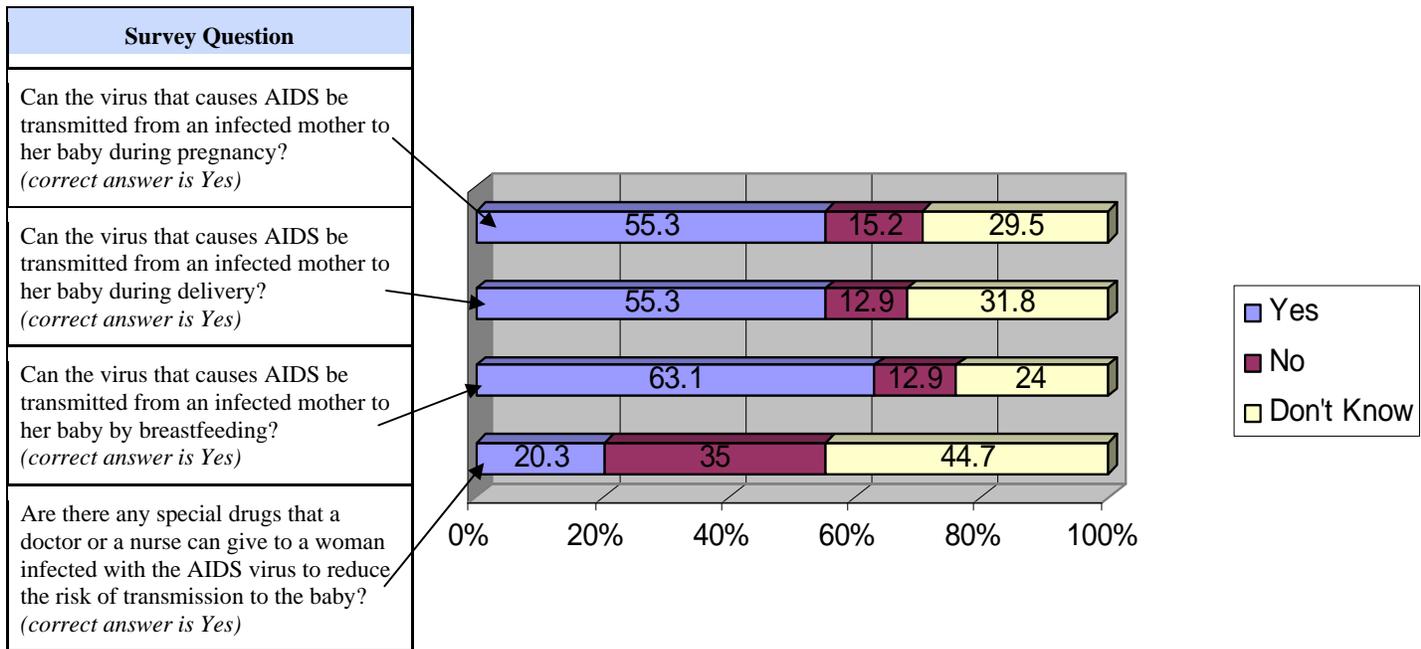


Figure 11. Caregiver Beliefs and Opinions about risk of HIV transmission from mother to child



In summary, 1.7% (5/300) of caregivers with children 0-23.9 months could both correctly identify ways of preventing the sexual transmission of HIV and reject major misconceptions about HIV transmission (answered correctly the 5 questions in Figure 10 above). And 6.7% (20/300) of caregivers with children 0-23.9 months are aware of the risk of HIV transmission from mother to child during pregnancy, during delivery, and through breastfeeding, and know about drugs that can reduce the risk of transmission to the baby (answered correctly the 4 questions in Figure 11 above).

At the community level, focusing on the truths about HIV/AIDS as it relates to children, mothers, and families in the Care Group training activities will be very important to raise awareness about the transmission of the virus. At the same time it is important to engage at the regional and national level by collaborating with the Multi-Country AIDS Program (PNMLS) and participating in PMTCT behavior change communication activities based on the DRC HIV/AIDS National Plan.

5.12 Contact with Community Health Workers

Within the Congolese MOH health system there is a network of official community health workers (CHWs). However, they are not well supported in their work and cannot cover their target populations adequately because of being insufficient in number and/or not being trained in health and nutrition behavior change communication.

The Rally Post activities that FH did during the Title II USAID SYAP program in the Kalamie and Moba areas could be construed as meeting with a CHW, however, those programmatic activities ended a couple of months before the baseline survey was conducted.

The baseline survey found that 9.3% (28/300) of the caregivers had met with a CHW within the past month to talk about health and nutrition. Of that subgroup, 66.7% (18/27) of the caregivers had met with a CHW at least one time during the past month. 29.6% (8/27) had met with a CHW 2 or more times during the past month. To find out if this frequency was biweekly or more often, the caregivers were also asked to state what days they met with a CHW in the previous month. Using those dates, the enumerators determined if the contact with the CHW was at least every two weeks or more often. The project indicator, the “proportion of beneficiary mothers of children 0-23.9 months of age who regularly (biweekly or more often) meet with a health promoter to learn about health”, was calculated to be 1.7% (5/300).

With the initiation of the MYAP Care Group activity which plans on meeting with mother leaders and CHWs every two weeks, who will then meet with their beneficiary mothers in the following days, this indicator result will rise.

5.13 Water and Sanitation

A significant focus of the Title II USAID MYAP project is promoting essential hygiene actions (EHAs) such as appropriate handwashing techniques, using latrines, making water safe to drink and keeping it safe through the Care Group methodology. Improving access to clean water and sanitation facilities through water and sanitation infrastructure is the other key focus.

Due to the years of conflict and subsequent loss of funding, the national DRC water and sanitation institutions (PNA, CNAEA, SNHR) have not been able to advance the coverage of clean drinking water and sanitation facilities for rural communities.²⁴ DRC does have National Drinking Water Supply and Sanitation Plans, completed in November 1998. However, there are no established official national water quality standards.²⁵ NGOs like FH do have a role to play in building human and technical capacity and establishing sustainable community managed maintenance systems at the local level, as well as

²⁴ Sanitation and hygiene in developing countries: identifying and responding to barriers, Tearfund, February 2007

²⁵ Water Supply & Sanitation Sector Assessment 2000

developing behavior change communication strategies and messages contextualized to the community water and sanitation situation.

5.13a Water Access

Having access to water that comes from an improved water source is a big obstacle in many areas of the DRC. According to the 2007 DHS survey, 24 percent of rural households use water from an improved water source. Water sources that are considered improved are those that provide water from public or private taps, are protected water sites, rainwater collection, or bottled water. The area where FH is working appears to have much better improved water source access than many other rural areas. In the baseline sample, the main source of drinking water for 47.4% (139/293) of the households, was from an improved water source. The reported source of drinking water, separated into improved and unimproved sources, are the following:

Improved water sources:

- 24.6% (72/293) from a public tap
- 8.5% (25/293) from a protected well
- 14.0% (41/293) from a protected spring
- 0.3% (1/293) from bottled water

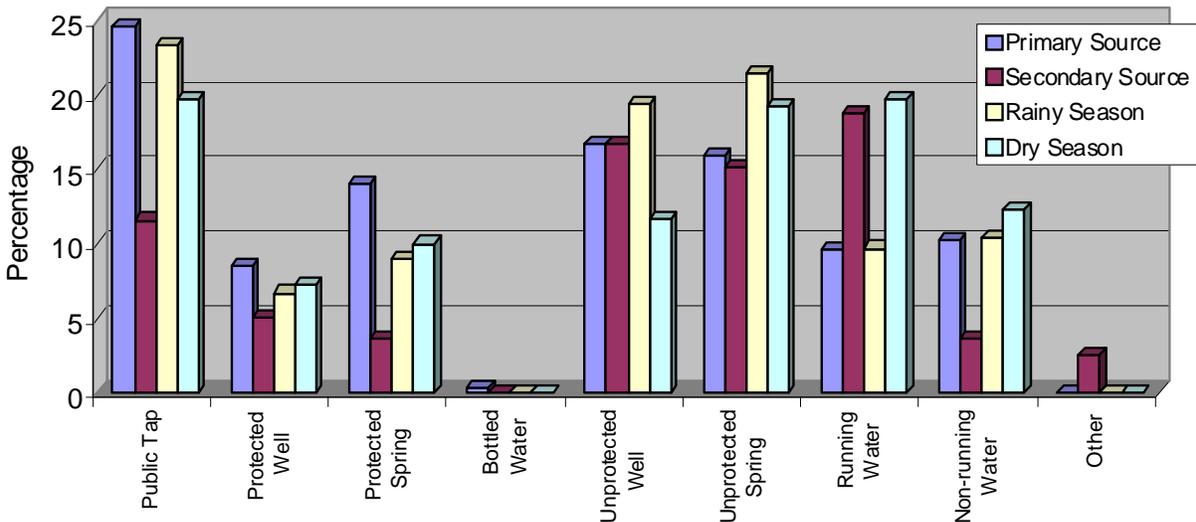
Unimproved water sources:

- 16.7% (49/293) from an unprotected well
- 16.0% (47/293) from an unprotected spring
- 9.6% (28/293) from running water
- 10.2% (30/293) from non-running water

In addition to water coming from an improved source, a second important characteristic that determines its usefulness is ongoing, year-round, access. Year-round access to water was measured by asking if the primary water source had been unavailable for at least a whole day during the previous 2 weeks. 25.7% (77/300) of the caregivers stated that during the past 2 weeks, water from this main source had been unavailable for at least one whole day. 22.8% (63/276) of the caregivers stated that their main source for drinking water was always available (and thus no need for a secondary water source.) This indicates that approximately three quarters of the households regularly use a secondary water source, and a quarter is dependent on having a secondary water source to guarantee water access.

For the households that do use a secondary water source, only 26.3% (56/213) draw from an improved water source. The most common sources were unprotected: running water (24.4%), unprotected wells (21.6%), and unprotected springs (19.7%). For 39.1% (117/299) of the households, the source of drinking water during the rainy season is from an improved water source. The most common sources were public taps (23.4%), followed by unprotected springs (21.4%) and unprotected wells (19.4%). For 37.0% (111/300) of the households, the source of drinking water during the dry season is from an improved water source. Approximately 20% each of the households obtained water from public taps (improved source), unprotected springs, and running water (unprotected sources). See the figure below for a comparison of primary, secondary, rainy and dry season water sources. The first four sources listed are improved water sources, while the latter five are unprotected water sources.

Figure 12. Improved and Unimproved Water Sources Used by Households



A third important characteristic that determines the water source usefulness is proximity to the household. Water sources that are either directly connected to the house or a public facility within 200 meters are considered accessible. In the baseline sample, 57.6% of the households are located within 200 meters of their main source of drinking water. Enumerators asked caregivers how far away from the house is the main source of drinking water and also verified the distance or time by observation. It was estimated that 100 meters took 12 minutes to travel. Reported household distances to their main water source were the following:

- Less than 100 meters: 40.0% (116/290)
- 100 to 200 meters: 17.6% (51/290)
- 200 to 400 meters: 30.0% (87/290)
- 400 to 600 meters: 3.1% (9/290)
- 600 meters to 1 kilometer: 2.8% (8/290)
- More than 1 kilometer: 1.0% (3/290)
- Don't know: 5.5% (16/290)

In comparison, per the 2007 DHS survey, almost half of Congolese households spend 30 minutes or more to reach a water source. For secondary water sources, 28.3% of the baseline households are located within 200 meters of their source of drinking water. Slightly more households from the FH sample population were located within an accessible distance to their water source compared to the DHS sample.

To determine the baseline indicator of “percent of households with year-round access to improved water sources, where access means either direct connection to the home or public facility within 200 meters of the home”, all three of the water access characteristics were considered together. In total, 15.7% (47/300) of the households had all three characteristics: they obtained their drinking water from an improved source, water had been available from this source daily for the previous two weeks, and the source was located 200 meters or less from the house.

There are several places where FH program activities could most impact community access to clean drinking water. The baseline data shows that the most common unimproved water sources for caregivers to draw their water from are unprotected wells and springs. In this case, upgrading existing

water points to make them protected water sources would be a beneficial activity. This strategy alone could enable 80% of the caregivers access to an improved water source. Water from the other unimproved sources could be made safe to drink using point-of-use treatments. Since 75% of the population relies on secondary water sources, FH should take this need for a minimum of two sources per household into account as it makes water plans with Community Development Committees. Approximately 60% of the households lie within 200 meters of their water source. Constructing new water points that strategically allow access to the most people will improve this proximity characteristic of clean water access.

5.13b Hygiene Behaviors

Adequate sanitation and proper hygiene synergistically enhance the benefits experienced by households from access to clean water. Water, sanitation and hygiene programming—which is also known by its acronym of WASH—has three main foci: 1) increasing and improving the quality of water used for household drinking, cooking and cleaning, 2) improving sanitation for households and schools, and 3) improving personal and household hygiene. Examples of program activities that focus on improving water quality include point of use treatments such as bio-sand filtration, ultraviolet and solar purification, and chlorination of water. Storing treated water in clean, covered containers is another means of maintaining good water quality. Sanitation activities may include latrine and handwashing station construction, proper waste water disposal, and promoting household cleanliness. Personal and household hygiene behavior activities focus on the Essential Hygiene Actions (EHAs) which include proper hand washing and proper treatment, storage and care of water in the home, as well as proper disposal of human excrement. In the FH baseline survey, five hygiene behaviors were given focus: point of use water treatment, the covering of water storage containers, essential handwashing supplies in place, household fecal disposal, and child fecal disposal. These behaviors were measured by questions asked by the enumerators, as well as observations made in the household.

When asked about point of use (POU) water treatments, 85.7% (251/293) of the caregivers don't do anything to the water to make it safer to drink. 14% (41/293) of the caregivers apply effective water treatment, such as boiling, adding chlorine, running it through a filter, or using solar disinfection to make their water safer for drinking. The most common POU treatment is adding bleach/chlorine (38/41) to the water. The remaining 3 caregivers boil the water. No caregivers reported using a water filter or solar disinfection as a POU water treatment. Of the caregivers that do effectively treat their household drinking water, 39% (16/41) do it on a regular basis (daily or every other day). Therefore, 5.4% (16/293) of all caregivers effectively and regularly treat their household drinking water.

Regarding clean water storage, 53.8% (161/299) of households were observed to be storing their drinking water safely in covered containers, as noted by all of their water storage containers being covered.

The availability of handwashing supplies proved to be problematic to measure. Section O questions 12 – 14 on the Health Survey collectively measured the access of the household to three essential handwashing supplies: designated location, soap readily available, and water readily available. The “skip” directions for the questions were worded in such a way that if the household did not describe a specific location for handwashing, then the enumerator was directed to skip to the next set of questions. Unfortunately, 94.8% (254/268) of the households did not have a specific place for handwashing. For this reason, the overwhelming practice of not having a specific place to wash hands dictated that the observation of the presence of soap and presence of water occurred in very few households.

However, out of the 20 caregivers that did answer Q.O13, which determined the presence of soap, some answering because they did have an established location for washing hands and some because the enumerator ignored the “skip” directions, 12 demonstrated that they had soap, detergent, or ash available

to wash their hands. The most common cleaning media observed for handwashing was soap. And the third supply, water, was observed in 8 out of 13 households. Considering all of the handwashing supplies together, only 1 out of 300 households (0.3%) met the indicator.

According to the 2007 DHS survey, 17 percent of households have no toilet in rural areas. In the FH baseline study household toilet presence was not measured, but caregivers were asked where members of the household disposed of feces. 84.7% (250/295) of the caregivers reported that their household appropriately disposes of fecal material in a toilet or latrine. This is approximately the same percentage of DHS survey households that have toilet access. The following table details where households dispose of feces, including toilets or latrines and unhygienic locations.

Table 30. Household disposal of fecal material

Q.O9 How do members of your household dispose of feces?	Frequency	Percent
Toilet or latrine	250	84.7%
Drain or ditch	0	0.0%
Thrown into garbage	0	0.0%
Buried or hole	14	4.7%
Left in the open	20	6.8%
Other	9	3.1%
Don't know	2	0.7%
Total	295	

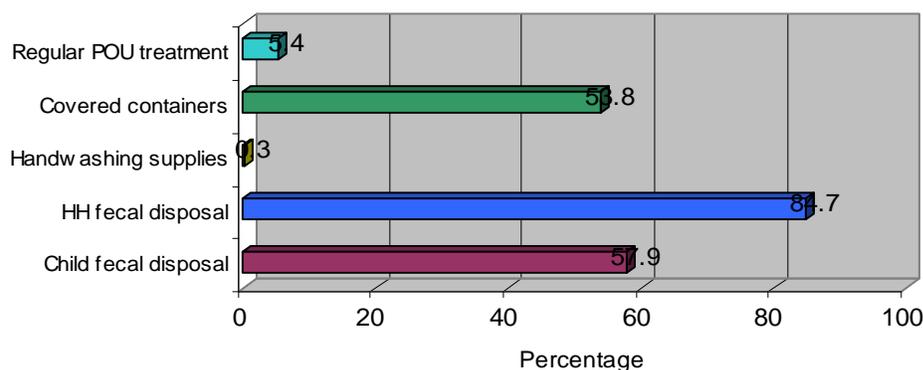
Child fecal disposal was also examined in the FH baseline survey. 57.9% (169/292) of the caregivers reported that their household appropriately disposes of the index child's fecal material in a toilet or latrine. The following table details where the index child or household members dispose of children's feces, including toilets or latrines and unhygienic locations.

Table 31. Disposal of child fecal material

Q.O10 The last time your child passed stools, what was done to dispose of the stools?	Frequency	Percent
Child used toilet or latrine	43	14.7%
Put/rinsed into toilet or latrine	126	43.2%
Put/rinsed into drain or ditch	4	1.4%
Thrown into garbage	12	4.1%
Buried or hole	19	6.5%
Left in the open	88	30.1%
Total	292	

The following figure summarizes the results of the five hygiene behaviors detailed above.

Figure 13. Summary of Appropriate Hygiene Behaviors Practiced by Caregivers



The baseline indicator related to hygiene behaviors examines the adoption of any of these five measured behaviors. 94.1% (282/300) of the beneficiaries have adopted an, or at least one, improved hygiene behavior. The following table details the total number of hygiene behaviors (0 to 5) adopted by caregivers.

Table 32. Percentage of beneficiaries adopting improved hygiene behaviors

# of Hygiene Behaviors	Frequency	Percent	Cumulative Percent
0 hygiene behaviors	18	6.0%	100%
1 hygiene behavior	65	21.7%	94.1%
2 hygiene behaviors	123	41.0%	72.4%
3 hygiene behaviors	89	29.7%	31.4%
4 hygiene behaviors	5	1.7%	1.7%
5 hygiene behaviors	0	0.0%	0.0%
Total	300	100.0%	

There are several places where FH program activities could most impact caregiver practice of the five key EHA behaviors measured in the baseline survey. The first place to start is the promotion of these five EHAs to caregivers through the Care Group curriculum. This will raise the awareness of caregivers to the benefit of these practices. Promoting POU water treatment with cost-effective practices, such as chlorine or PUR sachets, can be done through community demonstrations at health clinics, schools, or women’s meetings. Since chlorine/bleach is already the most common means of home water purification, the practice of adding a sachet of PUR to water should not be that difficult of a behavior to teach. It would be recommended to partner with PSI or National Medical Corps in order to obtain the PUR product and participate in their social marketing strategy. Formative research investigating why caregivers do not treat their water regularly to make it safe to drink would also be beneficial. This information will help shape the messages used to promote POU water treatment behavior. The same should be done with the practice of covering water storage containers, in order to determine why caregivers do not always cover their water storage vessels.

Community demonstrations could also be used to promote handwashing supplies. This could take the form of setting up simple handwashing stations with attached soap at schools or homes of mother leaders. Considering that such a small amount of caregivers were able to show enumerators a designated handwashing area, this seems to indicate a concept that is unfamiliar to many of them. Instructing mothers that a handwashing location does not necessarily require permanent infrastructure, but can merely be a designated spot in the yard, accessible at necessary handwashing times and a practical place to keep water and soap, may take away some of the confusion as to what is understood as a “designated location” for handwashing. With the current set of data, it is unknown what percentage of caregivers use soap for

handwashing. For this reason, it is recommended to look for the presence of soap and ask about the use of soap for handwashing during future KPC monitoring surveys.

Household use of latrines may increase with the proposed construction of latrines in the MYAP project. However, when comparing the data of the households that used a latrine for general fecal material disposal and households that used a latrine for child fecal material disposal, it was not necessarily the same household that did both practices. Of the 250 households that used a latrine for general disposal of fecal material, 40.8% did not use it for disposal of child fecal waste. Out of the 50 households that did not use a latrine for general fecal material disposal, 42% did use a latrine for disposal of child feces. This seems to indicate that using a latrine is not determined by having one available, but more so by the personal hygiene habits of the family. Promoting this behavior through the Care Group curriculum as well as other community behavior change communication means may be a complementary strategy for raising the level of latrine use.

Even though it appears that a majority of households dispose of fecal material in latrines or toilets, there is still a high rate of diarrhea among children under age two. It is recommended that project health staff scrutinize the quality and maintenance of the latrines used by households, which may be contributing to the high diarrhea rates. They should explore the situation by assessing the following: Are the latrines openings covered? Are families adequately maintaining them? Are families keeping the latrine clean? Are the latrines free of flies?

Since almost all of the beneficiaries are practicing at least one hygiene behavior, a more useful internal monitoring indicator would be the percentage of beneficiaries practicing at least 3 hygiene behaviors, as this is where the biggest drop in hygiene practice coverage occurred. At the present, only 31.4% of the beneficiaries are practicing at least 3 of the measured hygiene behaviors.

5.14 Summary of Health and Nutrition Results

5.14a Summary of Health and Nutrition Results related to Internally Monitored Indicators

Table 33. Internally Monitored Indicators

Indicator	Frequency (Numerator / Denominator)	Baseline %	Previous Estimate %
% of beneficiary children 12-23.9m who took deworming medication in the last 6 months	34 / 124	27.4%	NA
Percentage of beneficiary children 6-23.9m with diarrhea in the last 2 weeks who received oral rehydration solution and/or recommended home fluids	28 / 80	35.0%	47.7% DHS
Percentage of children 0-23.9m who did not have diarrhea in the last 2 weeks	184 / 300	61.3%	84% DHS
Proportion of mothers of children 6-23.9m who gave the same or more food during a childhood illness in the past 2 weeks	46 / 163	28.2%	<15% (est.)
% of participant children 0-11.9m whose biological mothers report giving their own breast milk to their infants within 2 hours of birth	69 / 173	39.9%	48% DHS

Indicator	Frequency (Numerator / Denominator)	Baseline %	Previous Estimate %
% of participant children 6-23.9m continuing to breastfeed	172 / 212	81.1%	NA
Percentage of biological mothers of children 0-11.9m who took iron tablets before the birth of their youngest child	125 / 170	73.5%	37.6% DHS
Percentage of caregivers of children 0-23.9m who both correctly identify ways of preventing sexual transmission of HIV and who reject major misconceptions about HIV transmission	5 / 300	1.7%	15% DHS
Percentage of caregivers of children 0-23.9m who are aware of risk of HIV transmission from mother to child during pregnancy, delivery, and breastfeeding	20 / 300	6.7%	NA
% of households whose main source of drinking water is from an improved water source	139 / 300	46.3%	24% DHS
Percentage of beneficiaries adopting at least 3 improved hygiene behaviors	94 / 300	31.4%	NA
Hygiene practice #1: % of households that apply effective water treatment regularly	16 / 293	5.4%	NA
Hygiene practice #2: % of households that appropriately dispose of fecal material	250 / 295	84.5%	NA
Hygiene practice #3: % of households that appropriately dispose of child's fecal material	169 / 292	57.9%	NA
Hygiene practice #4: % of households storing drinking water safely	161 / 299	53.8%	NA
Hygiene practice #5: % of households with 3 essential handwashing supplies readily available (location, soap, and water)	1 / 300	0.3%	NA

5.14b *Summary of Health and Nutrition Results related to the IPTT Table*

Table 34. Impact indicators for S02: Improved human capabilities of vulnerable households

Impact indicators	Baseline %	Previous Estimate %
Percentage of underweight (WAZ<-2) children aged 0-59m	28.8%	23.4% DHS 07
Percentage of stunted (HAZ<-2) children aged 6-59m	43.5%	48.13% DHS 07

Table 35. Summary Table IR2.1 Indicators with Confidence Intervals²⁶

Indicator	Frequency (Numerator / Denominator)	Baseline %	Previous Estimate %
% of participant children 6-23.9m with 3 appropriate infant and young child feeding practices	12 / 212	5.7% (CI: 1.3 – 10.1)	9% FH 07
Percentage of beneficiary children 0-5.9m who were exclusively breastfed in the last 24h	25 / 88	28.4% (CI: 15.1 – 41.7)	10% Malteser 36% DHS
Percentage of beneficiary children 6-23.9m who have received vitamin A supplements in the past 6 months	82 / 212	38.7% (CI: 29.4 – 48.0)	69.8% Malteser 47% DHS
Percentage of participant children aged 0-23.9m whose nutritional status was evaluated in the last 4 months by MUAC or card confirmed weighing	68 / 300	22.7% (CI: 16.0 – 29.4)	12% FH 07
Average number of indirect beneficiaries who received health promotion on maternal and child nutrition through radio messages	80 / 300	26.7% (CI: 19.6 – 33.7)	33% DHS

Table 36. Summary Table IR2.2 Indicators with Confidence Intervals

Indicator	Frequency (Numerator / Denominator)	Baseline %	Previous Estimate %
% of participant mothers of children age 0-23.9m who know at least 3 signs of childhood illness that indicate the need for treatment	65 / 300	21.7% (CI: 15.1 – 28.3)	<10% (est.)
Percentage of children 0-23.9m who slept under an insecticide-treated bed net the previous night	48* / 300	16% (CI: 10.1 – 21.9)	<15% (est.)
Proportion of beneficiary mothers of children 0-23.9m who regularly meet with a health promoter to learn about health	5 / 300	1.7% (CI: 0 – 3.7)	<2% (est.)

* conservative measurement

Table 37. Summary Table IR2.3 Indicators with Confidence Intervals

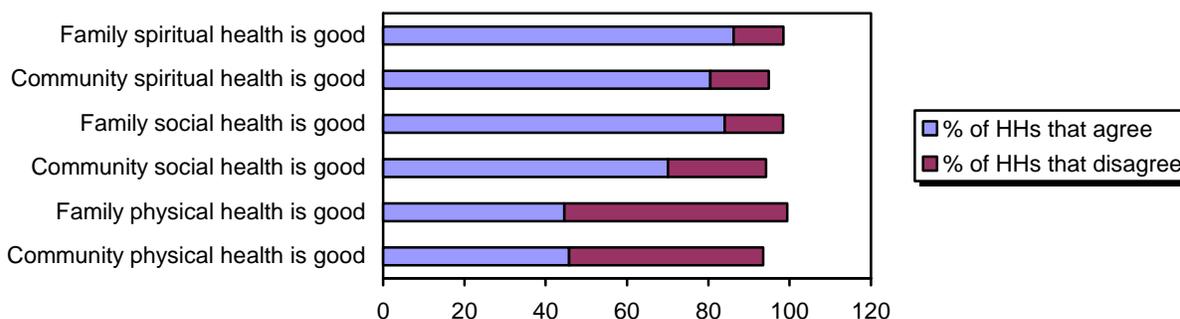
Indicator	Frequency (Numerator / Denominator)	Baseline %	Previous Estimate %
Percentage of beneficiaries adopting an improved hygiene behavior	282 / 300	94% (CI: 90.2 – 97.8)	<20% (est.)
% of households with year-round access to improved water sources	47 / 300	15.7% (CI: 9.8 – 21.5)	14.3% FH 07

²⁶ 95% confidence intervals were calculated assuming a design effect of 2.0, chosen because of the cluster sampling methodology used in the survey. We will be recalculating CIs using a different method that takes into account the actual design effect of each indicator and submit these updated indicator values under a separate cover.

6 Supplemental Holistic Health Survey

Good health, as defined by the World Health Organization (WHO), is "... a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." WHO, the Public Health Agency of Canada and other respected health organizations are increasingly recognizing the complex interrelationship between these various aspects of health, and in particular, the importance of a social determinants of health which greatly influence collective and personal well-being. To learn more about these broader aspects of health, questions were incorporated into the MYAP health and agriculture surveys. For each of the questions, respondents were presented with statements about their communities or families and asked whether they strongly agree, agree, somewhat agree, disagree, strongly disagree, or do not know. Those results have been summarized into *agree* and *disagree* in Fig. 14 and Fig. 15 (*agree* =strongly agree, agree, or somewhat agree; *disagree*= disagree or strongly disagree). Full results can be reviewed in Table 39.

Figure 14. Contrasting Perceptions of Physical, Social and Spiritual Health of Communities and that of Respondent's Own Families



Only 45.8% of respondents agreed that the physical health of families in their community is good, while they had a more positive view of social and spiritual health. Respondents in 70.1% of households agreed that the social health of people in their community is good and 80.5% agreed that spiritual health was good. Perceptions about the state of community versus health in the respondents own household were similar, with a slight tendency to view the physical health of one's own family as slightly worse than that that of the community in general, and the social and spiritual health of one's own family as somewhat better than that of the community in general.

While a high percentage of households agreed that the social/spiritual health of people in their community was good, they also shared these perceptions about problems within their community:

- 69.6% see alcohol abuse as a serious problem
- 42.2% agreed that violence against children is a serious problem
- 39.9% agreed that violence against women is a serious problem
- 40.6% do not feel that people of the community demonstrate concern for others in the community (by helping others beyond families and close friends)
- 36.9% do not feel that different political, religious and ethnic groups within the community work well together to solve problems faced by members of the community
- 51.1% do not feel that religious groups within the community assist those in the community who are most vulnerable (the poor, the sick, widows, orphans, etc.)
- 79.8% feel religious groups in the community help only those who belong to their own faith.

Taking a more positive perspective, the majority of respondents (63.2%) believe community leaders are working hard to improve the community, 64.2% believe that community leaders are generally honest, and 67% believe that children and youth in the community are respectful of other children, their parents and elders. See Figure 15 for additional findings.

Responses to the supplemental holistic health questions indicate a number of areas in which addressing social and spiritual problems could potentially have a meaningful positive impact on food security. For instance:

- Working with and encouraging community level religious institutions to promote values of honesty, and promoting values of honesty within marketing courses for project beneficiaries, could help to improve the marketing environment and opportunities.
- Working with and encouraging local religious groups to reach out to the most vulnerable within the community, regardless of their faith orientation, could help to strengthen the food security safety net for the most vulnerable.
- Reinforcing and acknowledging values of honesty and transparency among community leaders could help encourage leaders to serve with integrity, strengthen support for their leadership, and result in more effective and just development efforts under their leadership.
- Encouraging and supporting efforts of leaders and local religious groups to addressing issues of abuse of alcoholic beverages could increase the productivity of human capital, while potentially reducing the traumatic impact violence against women and children.

Figure 15. Perceptions about Social and Spiritual Health Issues

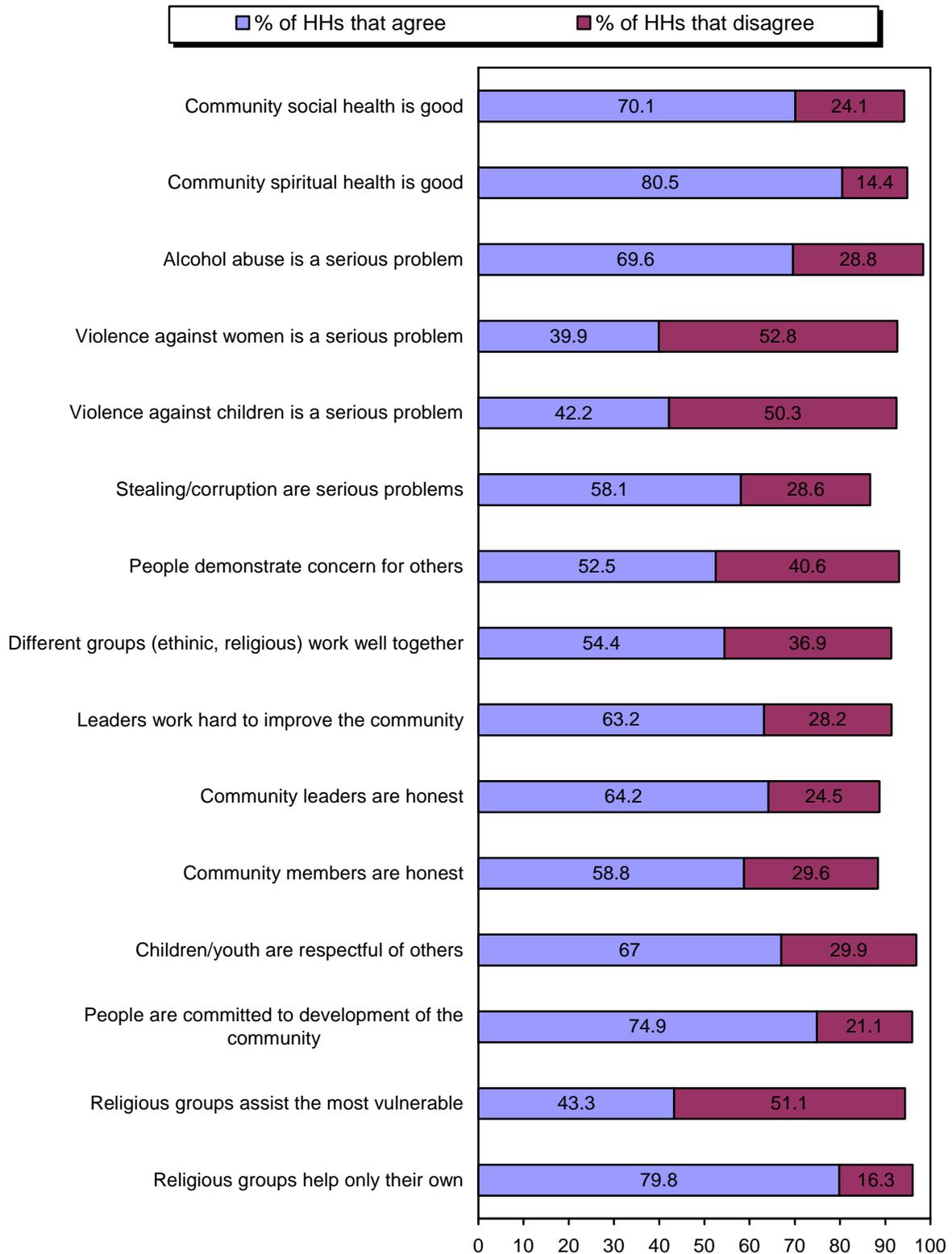


Table 38. Summary of Holistic Health Findings – Perceptions related to Physical, Social and Spiritual Health

Question	Responses	%	Grouped Results
The physical health of people in my community is generally good.	Strongly Agree	1.0	45.8% Agree
	Agree	10.2	
	Somewhat Agree	34.6	47.7% Disagree
	Disagree	41.8	
	Strongly Disagree	5.9	
Don't Know	6.5		
The social health of people in my community is generally good.	Strongly Agree	1.3	70.1% Agree
	Agree	43.7	
	Somewhat Agree	25.1	24.1% Disagree
	Disagree	22.6	
	Strongly Disagree	1.5	
Don't Know	5.7		
The spiritual health of people in my community is generally good.	Strongly Agree	2.3	80.5% Agree
	Agree	46.7	
	Somewhat Agree	31.5	14.4% Disagree
	Disagree	12.9	
	Strongly Disagree	1.5	
Don't Know	5		
The people of this community demonstrate concern for others in the community by helping others improve their own lives (beyond families and close friends)	Strongly Agree	1.0	52.5% Agree
	Agree	30.0	
	Somewhat Agree	21.5	40.6% Disagree
	Disagree	37.9	
	Strongly Disagree	2.7	
Don't Know	6.9		
Different groups (political, religious, ethnic) within the community work well together to solve problems faced by members of the community.	Strongly Agree	0.7	54.4% Agree
	Agree	33.8	
	Somewhat Agree	19.9	36.9% Disagree
	Disagree	34.5	
	Strongly Disagree	2.4	
Don't Know	8.8		
Religious groups within the community assist those in the community who are most unable to care for themselves (the poor, the sick, widows, orphans, etc.)	Strongly Agree	1.5	43.3% Agree
	Agree	26.6	
	Somewhat Agree	15.2	51.1% Disagree
	Disagree	45.4	
	Strongly Disagree	5.7	
Don't Know	5.5		
Religious groups within the community only help those who belong to their own faith.	Strongly Agree	10.2	79.8% Agree
	Agree	59.6	
	Somewhat Agree	10.0	16.3% Disagree
	Disagree	15.6	
	Strongly Disagree	0.7	
Don't Know	4.0		
The people of this community are generally honest. (Do not lie, do not cheat others in business, etc.)	Strongly Agree	4.9	58.8% Agree
	Agree	24.7	
	Somewhat Agree	29.2	29.6% Disagree
	Disagree	24.7	
	Strongly Disagree	4.9	
Don't Know	9.9		
Community leaders are working hard to improve the community.	Strongly Agree	1.8	63.2% Agree
	Agree	41.9	
	Somewhat Agree	19.5	28.2% Disagree
	Disagree	25.5	
	Strongly Disagree	2.7	
Don't Know	9.6		

Question	Responses	%	Grouped Results
The leaders of the community are generally honest.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	1.5 44.0 18.7 21.8 2.7 11.3	64.2% Agree 24.5% Disagree
Children and youth in the community are respectful of other children, their parents and their elders.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	1.3 33.8 31.9 25.9 4.0 3.0	67% Agree 29.9% Disagree
Stealing and/or corruption are serious problems in the community.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	1.1 44.2 12.8 23.4 5.2 3.4	58.1% Agree 28.6% Disagree
Excessive use of alcohol is a serious problem in the community.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	8.7 37.5 23.4 25.9 2.9 1.7	69.6% Agree 28.8% Disagree
Violence against women is a serious problem in the community.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	9.1 24.7 6.1 41.9 10.9 7.2	39.9% Agree 52.8% Disagree
Violence against children is a serious problem in the community.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	9.9 24.7 7.6 38.2 12.1 7.4	42.2% Agree 50.3% Disagree
The people of this community are committed to the development of the community.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	3.7 42.1 29.1 19.9 1.2 4.0	74.9% Agree 21.1% Disagree
The physical health of people in your family is generally good.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	1.3 17.8 25.5 47.6 7.2 0.7	44.6% Agree 54.8% Disagree
The social and emotional health of people in your family is generally good.	Strongly Agree Agree Somewhat Agree Disagree Strongly Disagree Don't Know	5.0 57.1 21.9 13.1 1.3 1.5	84% Agree 14.4% Disagree

Question	Responses	%	Grouped Results
The spiritual health of people in your family is generally good.	Strongly Agree	9.0	86.2%
	Agree	59.6	Agree
	Somewhat Agree	17.6	
	Disagree	10.1	12.3%
	Strongly Disagree	2.2	Disagree
	Don't Know	1.5	

7 Appendices

Appendix 1: Sampling Frame

Appendix 2: Survey questionnaires (French and English versions)

Appendix 3: Training Schedule for Supervisors and Interviewers

Due to size, the appendices were not included in this narrative report and can be found in separate digital documents.