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SPRING | RING Project baseline survey report:
**A summary of findings for key indicators in the SPRING | RING
project zone of influence in Northern Ghana**
July 2015

This publication was produced at the request of the United States Agency for International Development. It was prepared independently by the METSS II project and authored by consultants Duncan Mc Nicholl, Richmond Egyei, and Ekow Amisah. For further information, please contact info@metssghana.org.

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Implemented through



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ACRONYMS

BCC	Behavior Change Communication
CDC	Center for Disease Control
DHS	Demographic Health Survey
EA	Enumeration Area
FTF	Feed the Future
GLSS	Ghana's Living Standard Measurement Survey
HH	Household
IYCF	Infant and Young Child Feeding
IP	Implementing Partner
JMP	Joint Monitoring Programme
KSU	Kansas State University
KVIP	Kumasi Ventilated Improved Pit
MAD	Minimum Acceptable Diet
METSS	Monitoring, Evaluation and Technical Support Services
MSLC/BECE	Middle School Leaving Certificate/Basic Education Certificate Examination
OD	Open Defecation
PBS	Population-Based Survey
PSU	Primary Sampling Unit
RING	Resiliency in Northern Ghana
SHS	Senior High School
SPRING	Strengthening Partnerships, Results, and Innovations in Nutrition Globally
SSS	Senior Secondary School
SSU	Secondary Sampling Unit
UCC	University of Cape Coast
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WSUP	Water and Sanitation for Urban Poor
ZOI	Zone of Influence

1.0 EXECUTIVE SUMMARY

This report presents the findings of the Baseline Survey of Key Health and Nutrition Outcome Indicators for two projects in Northern Ghana: Strengthening Partnerships, Results and Innovations in Nutrition Globally (SPRING); and Resiliency in Northern Ghana (RING). Both projects are part of USAID/Ghana's Feed the Future (FTF), an initiative by USAID to sustainably reduce poverty and hunger in nineteen countries. The survey covered 25 districts in two regions in Northern Ghana: these were Northern Region (21 districts) and Upper East Region (4 districts). The SPRING project districts are: Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja and East Gonja, Mion, Yendi Municipality, Tatale, and Zabzugu (Northern Region), and Bongo, Bawku West, Garu Tempene and Talensi (Upper East Region). The RING project districts are: Mamprusi East, Karaga, Gushiegu, Kumbungu, Central Gonja, East Gonja, North Gonja, West Gonja, Savelegu/Nanton, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South and Kpandai (Northern Region only)

In the design phase, the baseline survey planned to study 3,800 households but in the end reached 3,708 households during implementation in March and April 2015. The reason for the difference is 92 household interviews data was lost in transfer of data from the field to the central server. Sample weights for these households were calculated and used in the analysis to determine the representative statistics by district. Sample sizes for various analyses are lower than this, due in part to non-responses, the applicability of questions to individual household demographics, and a small loss of data during data transfer.

1.1 Purpose of the Baseline Survey

The purpose of the baseline survey is to provide the two projects with data that is essential for their project implementation. Additionally, until now, there has not been statistically representative data at district level in Northern Ghana because the previously collected data for the 2012 Population Based Survey (PBS) was representative for Zone of Influence only. The availability of this data and its corresponding analysis may help:

1. Project implementers to target efforts effectively in Northern Ghana;
2. Future evaluators to understand any changes resulting from project activities; and
3. Provide a broader learning across USAID projects.

The questionnaire was designed with nine thematic sections including household identification and demographics, minimum acceptable diet for children aged 6-23 months old, exclusive breastfeeding for children aged 0-5 months old, anthropometry for children under 5 years old, knowledge attitudes, and skills of nutrition practices and behaviors, household water, sanitation and hygiene behaviors, household income status, perceptions of intra-household food allocation and vulnerability, and lastly, reduced exposure to and consumption of aflatoxin.

1.2 Summary of Findings and Conclusion

The following section provides the findings from the data and conclusions from the baseline survey.

1.2.1 Demographic Summary

The population in the study region is almost evenly split between males (50.16%) and females (49.84%). The population is largely young, with children under 15 years accounting for 43 percent of the respondent population in the 25 districts surveyed. Formal education is uncommon. A higher proportion of people over 15 years old in the two regions are illiterate (65%), and over 40 percent have never been to school.

1.2.3 Infant and Young Child Feeding (IYCF)

The survey finds that breastfeeding at some level is common practice. Full practice of recommended child nutrition is less complete, however. Exclusive breastfeeding for children 0-5 months old occurs in 58 percent of the population surveyed, and the prevalence of solid food introduction at 6 months (11%) is less common than recommended. Introduction of solid or semi-solid foods occurs with 8 percent of the population in the Northern Region, and 27 percent in the Upper East Region.

The Minimum Acceptable Diet (MAD) analysis combines the assessment of recommended breastfeeding practices and the introduction of solid or semi-solid foods for children 6-23 months old. The survey finds low rates of adherence to recommended practices. The survey finds that only 10 percent of children in this demographic in the Northern Region are receiving a MAD, and only 3 percent are receiving a MAD in the

Upper East Region. Pulling together the entire data gives an overall average of 9 percent due to Upper East Region having a smaller sample size.

1.2.4 Anthropometry Indices

The survey finds a tendency for malnutrition to be worse among boys than girls. Analysis further shows that the frequencies of underweight (i.e., moderate plus severe forms) in boys for the age groups 0-23 and 24-60 months are 34 percent and 33 percent respectively. In the case of girls, these frequencies are 32 percent and 27 percent, respectively.

Stunting, which was studied using Z-scores to quantify height for age, was identified in 30.5 percent of children in the study area.

1.2.5 WASH Summary

This analysis finds that 72 percent of the population have access to safe water as a primary source, but infrastructure breakdowns and lengthy water collection times may reduce this figure in practice. Access to sanitation facilities is much less prevalent; over 65 percent of the population reports practicing open defecation. Of those not open defecating, 43 percent indicated use of public instead of household facilities.

The overwhelming majority (98%) of survey respondents stated that they wash their hands. Although the prevalence of hand washing facilities (e.g. tippy-taps) is less than 4%. The reason for the contrast is unclear. It is possible that the claimed hand washing practices are more frequent than in reality. It is also possible that simple technologies such as cups or kettles may support hand washing practice without being easily identified as a "facility". Either way, 90 percent of respondents knew at least three critical times for hand washing, suggesting that hand washing practice might be more common than indicated by the presence of facilities quantified in this survey.

1.2.6 Messaging for Social and Behavior Change

The survey finds that most of the caregivers did not understand key behavior change messages. The survey indicates that as much as 64.54 percent of the caregivers' population has never heard about the Infant and Young Child Feeding (IYCF) messages. A closer look at the percentages in terms of the district reveals that the Central Gonja district had the highest percentages of caregivers who were not aware of the key behavior change messages.

1.2.7 Household Income

The survey finds household income sources and spending habits that differ between regions. Higher income is generated from poultry and livestock sale in Upper East Region (55% of income) compared to Northern Region, where households generate the most income through crop sales (62% of income). The survey identifies differences in spending habits as well. Households in the Upper East Region were found to be more likely to spend all income at once (59%) than the households in the Northern Region (32%).

The survey also found that over 70 percent of households indicated that children under 5 receive preferential meal treatment.

1.2.8 Aflatoxin Knowledge

The survey found that there are low levels of knowledge in aflatoxin reduction practices. Only 23 percent of the households surveyed were found to have adequate knowledge of aflatoxins in both of the study regions. One notable exception is the knowledge of lodged plants in the Upper East Region. Nearly 60% of households were aware of benefits from avoiding lodged plants during maize production.

The survey further explored household systems for maize and groundnut production, harvest, and storage. Adequate household knowledge, defined as knowledge of three or more practices, of maize production, harvest, and storage was found to be 1.7 percent, 8.3 percent, and 11.4 percent, respectively. Similarly, for groundnuts, adequate knowledge of production, harvest, and storage was found to be 2.1 percent, 5.8 percent, and 6.5 percent, respectively.

1.2.9 Conclusion

As part of the process to carry out this baseline survey, the METSS team worked closely with the staff of SPRING and RING projects to ensure that as much as possible the questionnaire, and the data collected, could provide the information the projects needed. It is however, very difficult to answer all questions asked, and therefore, METSS is available to provide the data files upon request, to enable further analysis to occur.

Lastly, METSS would like to thank the support of the SPRING and RING staff, the consultants, Ghana Statistical Service staff, the staff at USAID/Ghana, among others who have contributed to make this baseline survey report final.

2.0 INTRODUCTION

This report presents the findings of the Baseline Survey of Key Health and Nutrition Outcome Indicators for two projects in Northern Ghana: Strengthening Partnerships, Results and Innovations in Nutrition Globally (SPRING); and Resiliency in Northern Ghana (RING). Both projects are part of Feed the Future (FTF), an initiative by USAID to sustainably reduce poverty and hunger in nineteen countries.

This introduction summarizes the goals of the SPRING and RING projects under Feed the Future, and shares the rationale for the baseline survey. The data collection was planned to be collected from 3,800 participant households between March-April 2015 and across the 25 districts in the SPRING|RING Zone of Influence (ZOI) in Northern and Upper East Regions. The actual number of households collected was 3,708. However, the size is still a valid representative sample at a per district level.

2.1 USAID and the Feed the Future (FtF) Initiative in Ghana

“Feed the Future was born of the belief that global hunger is solvable.”¹

Feed the Future (FtF) responds to pressing global hunger and food security challenges. Launched by the U.S. Government through USAID in 2009, the initiative partners with nineteen countries globally to collaboratively tackle poverty with sustainable and scalable approaches. The partnership in Ghana is strong. Through FtF, and broader country strategic priorities of governance, education, health, and private sector development, USAID has become one of the principal supporters of Ghana’s political and socio-economic progress. FtF activities were developed in alignment with national development priorities² and began in Ghana in mid-2011 with the assistance of Implementing Partners (IPs).

Presently, the ambitious intent of FtF to tackle poverty and hunger in the FtF Zone of Influence – above the 8th parallel in Ghana – with a target of a 20 percent reduction in the prevalence of poverty and 20 percent reduction in stunting by 2017. This is being achieved through seeking ways to improve nutrition and inclusive agricultural sector growth. The broad scope of the baseline survey described in this report reflects the importance of understanding an issue such as nutrition from many angles, both from the many potential factors and the different demographics affected. Women of reproductive age and children under five are a particular focus of the nutrition work.

FtF is supporting a portfolio of initiatives in Ghana that will create inclusive agricultural sector growth through improved productivity and expanded markets, particularly for rice, maize, and soybeans. It will also increase the nutritional status of women and children by improving access to diverse and quality foods, promoting nutrition-related behaviors, and increasing use of health and nutrition services. These activities are supported by work to enhance policies to provide a strong enabling environment, and efforts to reduce the overall vulnerability of households.

2.2 Intent of the SPRING and RING Projects

Both projects target a priority region in Northern Ghana. RING works exclusively in the Northern Region, and SPRING targets the Northern Region plus four districts in the Upper East. The combined efforts of these projects total 25 districts across two regions. This is referred to as the SPRING|RING Zone of Influence (ZOI) as highlighted in Figure 1.

¹ <http://www.feedthefuture.gov/about>

² The Ghana Shared Growth and Development Agenda I (GSGDA I), the Comprehensive African Agriculture Development Program (CAADP), the Food and Agriculture Sector Development Policy (FASDEP) and the Medium-Term Agriculture Sector Investment Plan (METASIP)

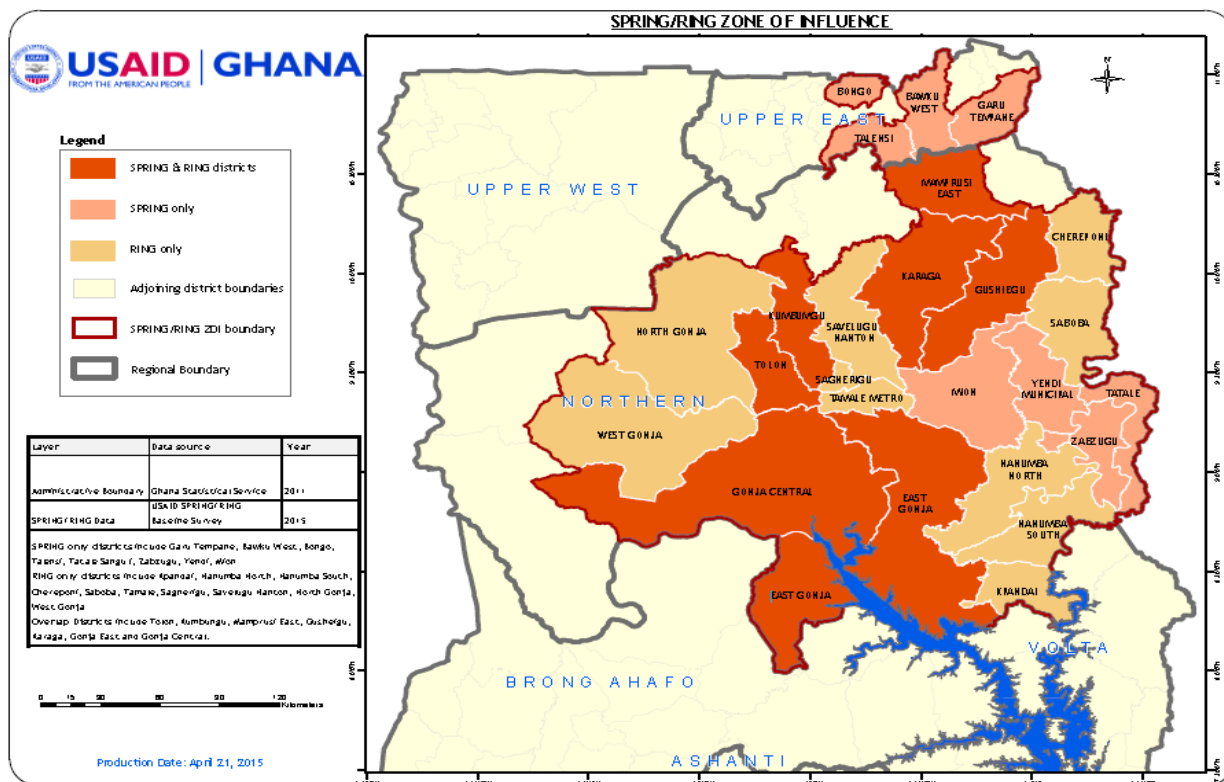


Figure 1- Projects' Zone of Influence (ZOI) (also presented in Appendices in larger view)

2.2.1 SPRING Project

Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) aims to contribute towards a reduction in stunting by 20 percent in two regions—Northern Region and Upper East Region. Stunting, the result of a complex interaction of factors, requires a multi-faceted response. SPRING/Ghana is developing a range of activities to tackle these challenges, including: anemia reduction; improved infant and young child feeding; improved water, sanitation, and hygiene; aflatoxin reduction; and cash transfers³. Specific activities and targets will be further informed by results of the baseline survey discussed in this report. SPRING works in 11 districts in the Northern Region⁴ plus four districts in the Upper East Region⁵.

2.2.2 RING Project

Resiliency in Northern Ghana (RING) targets 17 districts in the Northern Region only⁶. Directly aligned with the objectives of Feed the Future, RING will advance three complementary project components: increasing diverse and quality food consumption; improving nutrition and hygiene behaviors; and strengthening support networks for vulnerable households⁷. The needs of women and young children will be emphasized throughout this work.

2.3 Baseline Survey Objectives

Statistically representative data for the SPRING|RING ZOI has not been available until now. Feed the Future targets the entire area of Ghana north above the 8th parallel, and previous baseline surveys targeted statistically significant representation across this entire geographical area only. Different sampling specific to the SPRING|RING ZOI was necessary.

³ <https://www.spring-nutrition.org/countries/ghana>

⁴ Northern Region districts - Mamprusi East, Karaga, Gushegu, Kumbungu, Tolon, Central Gonja, East Gonja, West Gonja, North Gonja, Savelegu/Nanton, Sagnarigu, Tamale Metro, Mion, Yendi Municipal, Chereponi, Saboba, Tatali, Zabzugu, Nantumba North, Nantumba South, Kpandae (SPRING & RING)

⁵ Upper East districts - Talensi, Bongo, Bawku West, and Garu Tempone (SPRING only)

⁶ RING project districts: Mamprusi East, Karaga, Gushegu, Kumbungu, Central Gonja, East Gonja, North Gonja, West Gonja, Savelegu/Nanton, Tamale Metro, Chereponi, Saboba, Nantumba North, Nantumba South and Kpandae

⁷ <http://www.globalcommunities.org/ghana>

This baseline survey was designed to help address this data gap. Accurate, statistically representative baseline data at the district level will enable both target setting, and tracking of trends over time to effectively monitor and evaluate the impact of SPRING and RING initiatives. Data can further benefit the early stages of the projects to enable stronger evidence-based decision making about which districts to target, and which types of activities will have the most impact.

2.4 Structure of this Report

This report summarizes the baseline survey results from nine separate modules relating to health, nutrition, and other indicators informing the SPRING and RING projects. Findings are briefly discussed, and in some cases supplementary analysis explores data further. Limitations of findings are noted where relevant. Greater statistical detail for all key indicators can be found in the Appendices.

The numbers presented are weighted percentages unless indicated otherwise. This means that a weighting multiplier is applied to each response to indicate how many households that particular response indicates. These weights are calculated according to the number of households in each enumeration area. Each household typically represents one weighted data point, unless data were collected on a specific demographic (e.g. children) in which case the number of valid responses per household can vary.

2.5 Monitoring and Evaluation Technical Support Services (METSS II)

As requested by USAID/Ghana in January 2015, the preparation, coordination and field implementation of the survey and was spearheaded by the Monitoring, Evaluation and Technical Support (METSS II) project. Due to delays to get the baseline survey underway, METSS moved ahead using its internal staff resources. METSS is a USAID|Ghana project administered through a Participating Agency Service Agreement with the United States Department of Agriculture (USDA). Under the PASA, USDA, has engaged the Kansas State University (KSU) and the University of Cape Coast (UCC) to provide technical and management support for monitoring and reporting on the performance of USAID|Ghana's Economic Growth office's development interventions. The program also provides technical services relating to program design, monitoring, evaluation and analyses to support evidence-based and data-driven policy and regulatory reforms for increased agricultural growth and food security in Ghana.

3.0 SURVEY METHODOLOGY

3.1 Baseline Survey Design

The baseline survey was designed to support the SPRING and RING projects specifically by providing data for both setting targets, and later for evaluating mid-term and end-line progress against this baseline data. Survey design harbored the further intent to potentially support a diversity of other projects that could benefit from available data in this area. Statistically representative data was therefore required for each district. This informed the decision to divide enumeration areas randomly within districts, rather than across the entire SPRING|RING ZOI. The survey employs standard indicator definitions from USAID under the Feed the Future Initiative. Use of standardized definitions provides the further benefit of comparison against the same indicators across the entire FTF ZOI in Ghana.

A two stage stratified sampling design was used. A Primary Sampling Units (PSUs) was used by the Ghana Statistical Service to determine Enumeration Areas (EAs). Individual households were then identified as Secondary Sampling Units (SSUs) where data was collected. In the first stage of sampling, eight EAs were selected randomly from each district. Nineteen households were then randomly selected from each EA for data collection. Full details of the sample size calculation are provided in the *Baseline Survey Protocol* document available from METSS. This project baseline survey was carried out following all the relevant and necessary survey protocols and procedures when interviewing human subjects, and participant households signed a consent form.⁸

Table 1 shows the applicability of indicators in this survey to the SPRING and RING projects specifically. Additional indicators were collected within these headline indicators to provide opportunities for richer analysis and project target setting.

Table 1– Baseline indicators and their relationships to SPRING and RING

SN	Baseline Indicator	SPRING	RING
1	Prevalence of stunted children under 5 years of age	X	X
2	Prevalence of exclusive breastfeeding of children 0-5 months of age	X	X
3	Prevalence of children 6-23 months receiving a minimum acceptable diet	X	X
4	Appropriate introduction of complementary feeding among children 6-8 months of age	X	
5	Percent of caregivers reached by BCC activities who understood key messages	X	X
6	% of caregivers who are practicing or adopting improved nutrition practices	X	X
7	% of households using an improved drinking water source		X
8	% households using an improved sanitation facility or latrine	X	X
9	% of households with functional hand washing stations in recommended locations	X	X
10	% of people who know any 3 critical times of hand washing	X	X
11	Percent of households with maize and groundnut cultivation/storage systems meeting criteria needed for reducing aflatoxin levels.	X	
12	Percent of farmers with accurate knowledge of aflatoxin-related issues	X	

⁸ Even though all the relevant protocols were followed it did not receive an internal review board approval because the information is being used for a project baseline purpose for project implementation, and not to meet research institutions internal regulations. The survey protocol is available for review and the data is also available for peer reviewing purposes, upon request.

3.2 Survey Questionnaire Design

The survey contained nine thematic sections. These were written into an English enumeration form because of the difficulty with translating materials into the many languages in the two regions, and the difficulties with translating certain technical terms into indigenous languages. To overcome this factor enumerators were split into language groups.

The nine thematic sections were:

1. Household identification;
2. Household demographics;
3. Minimum acceptable diet for children 6-23 months old;
4. Exclusive breastfeeding for children 0-5 months old;
5. Anthropometry for children under 5 years old;
6. Knowledge, attitudes, and skills of nutrition practices and behaviors;
7. Household water, sanitation, and hygiene behaviors;
8. Household income status, perceptions of intra-household food allocation and vulnerability; and
9. Reduced exposure to, and consumption of aflatoxin.

The questionnaire⁹ modules 1 and 2 were adapted from the USAID FTF Population Based Survey (PBS) standard instrument that has already been adapted to Ghana's context in the 2012 PBS using Ghana's Living Standard Measurement Survey (GLSS) and Demographic and Health Survey (DHS) instruments. Module 3 through 6 were adapted from indicators for assessing infant and young child feeding practices Part 2 measurement document, the USAID FTF PBS standard instrument and the DHS instruments. Sections of module 7 were adapted from Water and Sanitation for Urban Poor (WSUP) standard baseline survey instruments in addition to draft questions developed by both RING and SPRING for performance measurement. Modules 8 and 9 were developed jointly by the METSS team in collaboration with M&E teams of the SPRING and RING projects.

3.3 Enumerator Selection and Training

A total of 45 enumerators were selected for training from those with experience from the 2012 Population-Based Survey. The diversity of languages spoken in the ZOI called for enumerators familiar with the vernacular, and selection of enumerators for training was primarily based on this. Training was held in Tamale over five days from February 22-28, 2015. Training content focused on the survey concept, methodology, key terminologies, and the Computer Assisted Personal Interview platform used to record survey responses. Field-testing took place after an initial three day orientation, and was followed by feedback on the exercise. Finally, enumerators were broken into language groups to practice dry runs of the survey with each other to further develop proficiency with the methods. In the end, 34 enumerators were selected to conduct the survey implementation under the direction of 6 supervisors.

3.4 Survey Implementation

3.4.1 Field work

Field teams consisting of five enumerators and a supervisor were each assigned to four districts consisting of eight EAs each. EAs were grouped as areas covering 152 households, of which 19 were selected randomly for the survey.

Surveys were completed using the Computer-Assisted Personal Interview technology developed for laptop use by Voto Mobile Technologies. All 19 household interviews were typically completed in one full day. Supervisors reviewed household responses and submitted them to a central server after confirming data quality. Omissions or errors were handled by either phoning the surveyed household for clarification, or traveling back to the location to collect additional data when necessary.

⁹ The baseline survey questionnaire is available upon request.

3.4.2 Survey completion rates

A total of 3,800 households participated in the survey, although not every household was able to answer every question. Some survey questions therefore reflect fewer responses than the total number of households interviewed. This is partly because of questions specific to certain demographics (e.g. children 0-5 months) that might not apply to all households, or simply because the desired knowledge was unavailable at the time of interview. The smaller sample sizes occur when questions target specific demographics that may not be represented in every household.

Data from 92 interviews were lost through transfer from the field to the central server; giving the total data set of 3,708 households. The households surveyed were then compared to total household populations for each EA to inform sample weight calculations.

3.4.3 Sample weight calculation

Appropriate sample weights were required to produce a statistically representative survey. Several sources of data informed sample weight calculations for each household:

- The total number of 2010 Population Census of households in each District
- The number of EAs (clusters) allocated to each District.
- The total number of households in each cluster (EA) of each District.
- The total number of households listed in each cluster (EA) of each District during the household listing operation.

Using the above information, sample weights were calculated. These were then applied across all survey analyses to produce population samples. By applying weights, the households surveyed are extrapolated to represent 449,201 households across the 25 districts surveyed.

3.4.4 Challenges

Fieldwork always encounters challenges. Some of these were anticipated at the outset, such as inadequate power supply, internet outages, and inclement weather. Although an instance of extended power cut and network access did pose challenges for enumeration teams, they were able to adapt to conditions and complete their work. A generator was hired to provide a power source in one instance. The challenges created some delays, not roadblocks.

Conducting household listing prior to sampling was a challenge not originally anticipated that extended the time needed to complete surveys in an EA. With documentation provided by Ghana Statistical Service on the enumeration areas and listing, it took a day to complete the final list of households in an EA in most cases. Enumeration sometimes went into the night as a result. Accessing remote areas also pushed activities into the night on occasion.

Gaining community entry was difficult at times. Some challenges arose from changes in hierarchy at the community level. In these cases an alternative entry point was sought, such as an opinion leader.

Finally, and perhaps most significantly, considerable challenges were encountered during data cleaning. Separate data collection forms used during surveying (form A and form B) led to mismatched household IDs. Further structural issues were encountered in some database modules, and not recognized for their significance until analysis had commenced. Extensive efforts were undertaken to rectify these challenges and produce robust analysis. Future surveys may benefit from investing more time initially in database design and anticipating data cleaning challenges to ensure that analysis can proceed smoothly following data collection.

4.0 SOCIAL AND DEMOGRAPHIC CHARACTERISTICS OF SURVEY RESPONDENTS

This section provides demographic information that underlies further analysis presented in this report. These results are specifically for the SPRING|RING Zone of Influence, and can later be compared to the most recent census data for verification, if desired.

4.1 Household Distribution

The results of the survey show that males constitute 50.16 percent and females 49.84 percent of the population in the two regions. This indicates a sex ratio of 99 females to every 100 males. In both regions, the proportion of males is higher than females (Table 2).

Table 2 – Regional distribution of households and genders

Region	District	Households	Individuals	Individuals (%)		
				Male	Female	Total
Northern	21	3,127	18,635	50.13	49.87	100
Upper East	4	617	3,399	50.31	49.69	100
Total	25	3,744	22,034	50.16	49.84	100

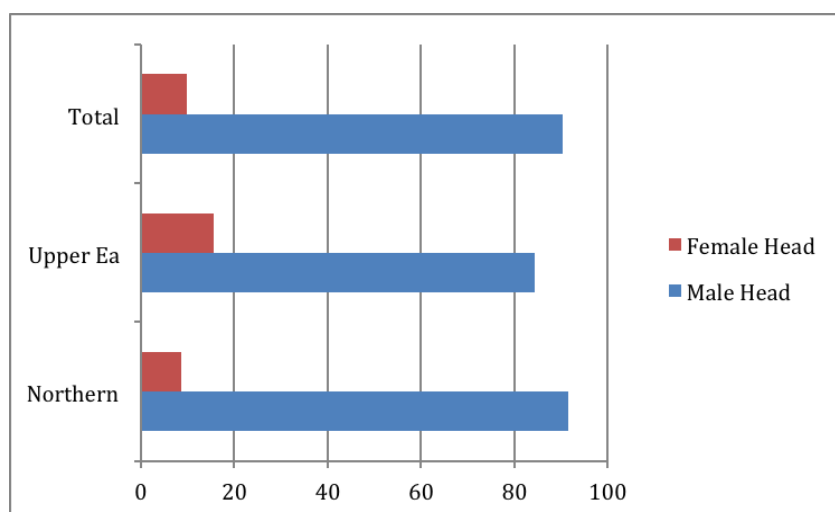


Figure 2 - Percentage of household types by sex and region

Survey results indicate that a higher proportion of households are headed by males (90.89%). The proportion of male-headed households is higher in Northern Region (92.01%) than in the Upper East Region (85.25%).

4.2 Household Size

The average household size for the two regions is 6.1 (Population Based Survey 2012, had an average of 5.5) and in comparison to the average household size of the country (6.7) from the 2010 Census. The average household sizes for both regions are on the lower side compared to the averages found in the 2010 census as shown in Table 3.

Table 3 – Mean Household (HH) size (people) by region

Region	2010 Census	HH Size
Northern	7.7	6.2
Upper East	5.8	5.6
Total	6.75	6.1

4.3 Distribution of Population by Age

Table 4 shows the average age of household heads. It indicates that female household's heads are older on average than their males in similar roles. The average age of a female-headed household is 48 years whereas the male average age is 45. The reason for this difference was not specifically investigated in the survey.

Table 4 – Average age of Household (HH) head by sex and region

Region	All (%)	Male Headed HH (%)	Female Headed HH (%)
Northern	45.18	45.03	46.77
Upper East	46.87	45.89	52.11
Total	45.48	45.17	48.28

As shown in Table 5, children less than 2 years (23 month) accounted for 2.57 percent of the population studied. Children between the ages of 2 to 15 years also account for 38.13 percent of the respondent while persons 65 years and older constitute 5.31 percent. The survey identifies a dependency ratio of about 90:100. This means there are approximately 9 persons in the dependent ages (0-14 and 65+) for every 10 persons in the working age group (15-64).

Table 5 – Distribution of population age groups by sex and region

Age Group	Northern Region (%)			Upper East Region (%)			All (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
less than 2	2.90	2.97	2.93	2.79	2.57	2.68	2.88	2.90	2.57
02-14	41.07	38.22	39.65	40.89	38.13	39.52	41.04	38.20	38.13
15 - 24	20.19	18.62	19.41	21.52	19.51	20.52	20.41	18.76	19.51
25 - 34	11.88	16.06	13.96	10.09	12.63	11.35	11.59	15.50	12.63
35 - 44	8.93	11.72	10.32	8.77	11.26	10.01	8.91	11.65	11.26
45 - 54	7.11	7.29	7.20	6.86	7.09	6.97	7.07	7.25	7.09
55 - 64	4.25	3.09	3.67	4.48	3.51	4.00	4.29	3.16	3.51
65+	3.66	2.05	2.86	4.60	5.31	4.95	3.82	2.57	5.31
Total	100	100	100	100	100	100	100	100	100

Table 6 – Regional distribution of age groups (months) for children under 2 years

Age	Northern Region (%)			Upper East Region (%)			All (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-5	26.51	30.07	28.24	20.31	24.39	22.35	25.57	29.17	27.33
6-8	13.82	12.04	12.96	16.14	11.93	14.03	14.17	12.02	13.12
9-11	11.22	13.33	12.24	17.53	12.61	15.06	12.17	13.21	12.68
12-15	20.32	19.16	19.76	20.62	19.62	20.12	20.36	19.24	19.81
16-19	12.8	14.15	13.46	12.36	20.73	16.56	12.73	15.2	13.94
20-23	15.34	11.25	13.35	13.05	10.73	11.89	14.99	11.16	13.12
Total	100	100	100	100	100	100	100	100	100

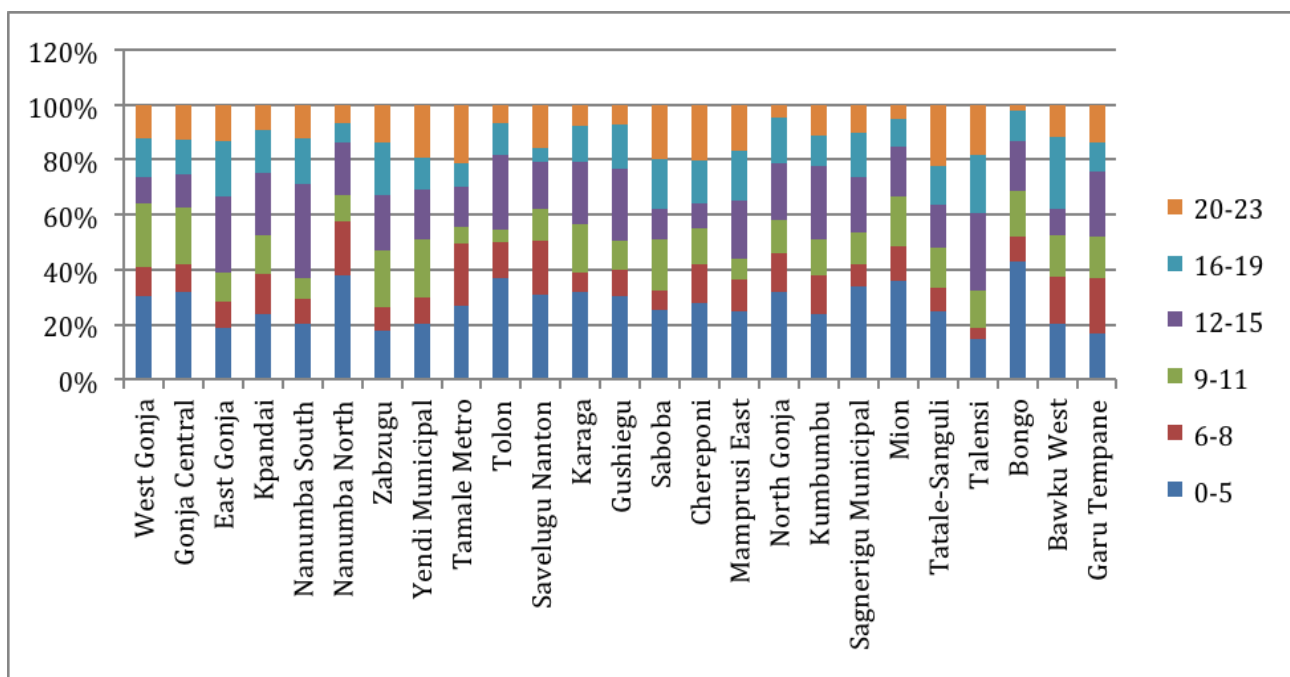


Figure 3 - District distribution of age groups (months) for children under 2¹⁰

Educational indicators for the adult population can be important for targeting development programs.

Table 7 and Figure 4 show the level of educational attainment of the population 15 years and older. Of the population studied, 42.46 percent have never been to school, while 26.36 percent have attained a MSLC/BECE. A further 27.02 percent have acquired Secondary/Senior Secondary School (SSS) or Senior High School (SHS) or a higher level of education. About 4.15 percent of the population interviewed has some other educational qualification.

Table 7 – Percentage education attainment for respondents aged 15 years and older

Level of Educational Attainment	Northern Region (%)			Upper East Region (%)			All (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Never been to school	34.94	44.53	38.74	56.34	64.92	59.79	38.69	48.19	42.46
MLSC/BECE/Vocation	27.53	29.26	28.22	16.97	18.89	17.74	25.68	27.4	26.36
Secondary/SSS/SHS and	33.75	21.46	28.88	21.75	13.41	18.39	31.64	20.01	27.02
Other education	3.79	4.75	4.17	4.95	2.77	4.07	3.99	4.4	4.15
Total	100	100	100	100	100	100	100	100	100

¹⁰ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

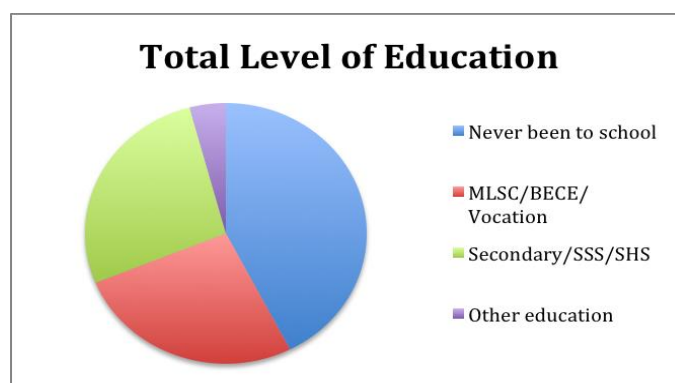


Figure 4 – Total level of educational attainment

As shown in Table 8, 35.44 percent of the respondents in the Northern Region can read and write. While 31.05 percent of the respondents in the Upper East can read and write. The ability to read and write in English is slightly higher for males than for females (43.56% and 26.27%, respectively). Substantial differences between the two regions were not observed.

Table 8 – Adult literacy rates by sex and region

Read and Write in English	Northern			Upper East			All		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Cannot read or write	53.66	71.97	63.01	60	73.54	67.04	54.74	72.23	63.67
Can sign write	0.67	0.66	0.66	0.33	0.05	0.19	0.61	0.56	0.59
Can read only	0.93	0.82	0.88	1.89	1.56	1.72	1.09	0.94	1.01
Can read and write	44.74	26.54	35.44	37.5	24.85	31.05	43.56	26.27	34.73
Total	100	100	100	100	100	100	100	100	100

Table 9 provides information on adults who are literate in English, Arabic and a Ghanaian Language. A higher proportion of the adult populations in the two regions are illiterate (65.01%). The results indicate that most who are literate in English Language only constitute slightly less than a third (29.84%) of the adult population studied.

Table 9 – Percentage of adult literacy by sex and region

Literate (Read and Write in)	Northern			Upper East			All		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
English only	35.87	23.61	29.61	37.5	24.85	31.05	36.13	23.81	29.84
Local language only	0.28	0.09	0.18	0	0	0	0.23	0.08	0.15
English and local language	4.72	2.06	3.36	0	0	0	3.95	1.72	2.81
Arabic only	0.16	0.07	0.12	0.11	0	0.06	0.15	0.06	0.11
English and Arabic	4.15	0.87	2.48	0	0	0	3.47	0.73	2.07
Illiterate	54.82	73.29	64.26	62.38	75.15	68.89	56.06	73.59	65.01
Total	100	100	100	100	100	100	100	100	100

4.4 Marital Status

Table 10 indicates that 63.76 percent of the population 15 years and older have ever married (consensual union, married, divorced, separated or widowed) while 36.25 percent have never married. The Northern Region (57.92%) proportionally has more people who are currently married than the Upper East (57.65%).

Table 10 – Percentage of marital status of respondents age 15 year and above by region

Marital Status	Region		Total
	Northern	Upper East	
Never married	36.74	33.72	36.25
Informal/cons	0.12	0.23	0.14
Married	57.92	57.65	57.87
Separated	0.54	0.83	0.59
Divorced	0.81	0.64	0.79
Widowed	3.87	6.92	4.37
Total	100	100	100

4.5 Ethnicity

Members of the same ethnic group share certain beliefs, values and norms that relate to a common cultural background. Table 11 indicates that the majority of the heads of households interviewed are Mole-Dagbani (63.66%) followed by Guan (13.36%).

Table 11 – Percentage of household heads by ethnicity and region

Ethnic group	Region (%)		Total (%)
	Northern	Upper East	
Akan	1.96	0.13	1.64
Ga Dangme	0.30	0.20	0.29
Ewe	2.13	0.16	1.78
Guan	16.25	0.00	13.36
Mole Dagbani	57.37	92.84	63.66
Grusi	2.71	0.73	2.36
Mande	2.64	0.53	2.26
Gurma	14.86	5.13	13.14
All other	1.77	0.29	1.51
Total	100	100	100

4.6 Religious Affiliation

Islam is practiced by a high proportion of household heads in the savannah areas of Ghana. Table 12 shows that 62.71 percent of heads of households are Moslem.

Table 12 – Household heads by religion and region

Religious Groups	Region (%)		Total (%)
	Northern	Upper East	
Christians	16.19	34.98	19.52
Catholic	3.33	11.55	4.78
Protestant Anglican	4.70	11.69	5.94
Pentecostal & Charismatic	4.97	10.80	6.01
Other Christian	3.19	0.94	2.79
Moslems	71.46	22.16	62.71
Traditionalist	11.25	40.76	16.48
Other	1.10	2.10	1.28
Total	100	100	100

5.0 RESULTS OF CORE INFANT AND YOUNG CHILD FEEDING (IYCF) INDICATORS

5.1 Early Initiation of breastfeeding

The survey asked women who had borne children about early initiation of breastfeeding. Responses were defined in three categories: immediately, within hours, and within days. As presented in Table 13, over 90 percent of mothers first breastfed children within the first day after giving birth.

Table 13 - Percentage of early initiation of breastfeeding

Region	Time to first put child to breast (%)		
	Immediately	Hours	Days
Northern	63.11%	31.69%	5.20%
Upper East	46.19%	43.95%	9.86%

5.2 Exclusive breastfeeding for children 0-5 months

The World Health Organization (WHO) guidelines specify that children should be exclusively breastfed during the first five months of their life. The analysis identifies the prevalence of adherence to this practice. Not every household interviewed, however, had a child in this demographic. Table 14 presents the findings, along with the “Weighted sample (N)”, which is the sample size represented by the survey.

Table 14 – Percentage of children under 5 months being exclusively breastfed

Exclusively breastfed?	Northern Region		Upper East Region		Total Area	
	Weighted N	Percentage	Weighted N	Percentage	Weighted N	Percentage
No	14,744	40%	2,702	52%	17,446	42%
Yes	21,786	60%	2,491	48%	24,277	58%
Total	36,530		5,193		41,723	

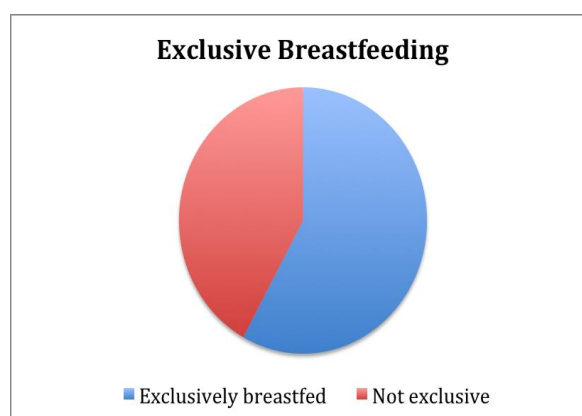


Figure 5 – Total percentage of exclusive breastfeeding

This analysis was inferred from participant responses about any other liquids or solids the child consumed or may have consumed in the past 24 hours. This is consistent with the data collection approach recommended by the WHO. Children classified as exclusively breastfed were recently breastfed, and had no other intake of solids or liquids, according to caregivers. A larger percentage of children in the Northern Region are being exclusively breastfed (60%) than in the Upper East Region (48%). These percentages are influenced by differing numbers of children under 5 months in each region, and a further breakdown by district is useful.

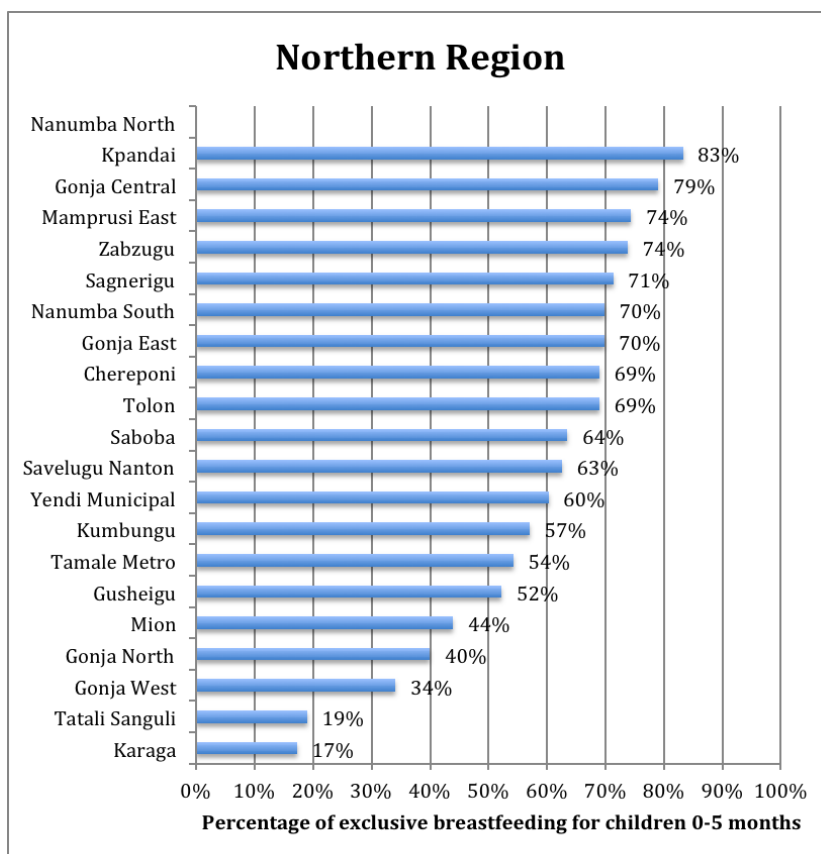


Figure 6 – Percentage of children under 5 months being exclusively breastfed in Northern Region¹¹

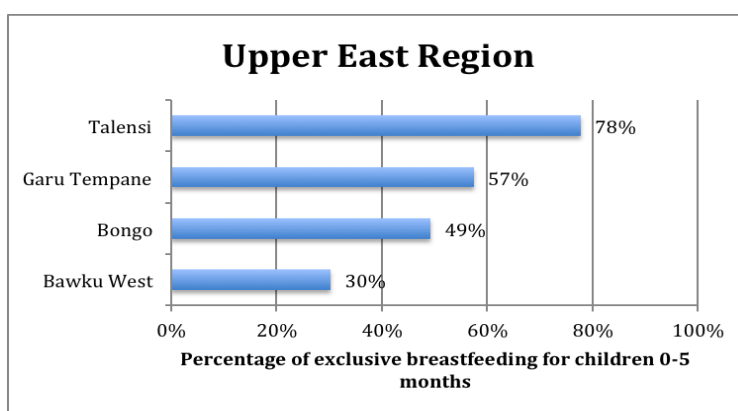


Figure 7 – Percentage of children under 5 months being exclusively breastfed in Upper East Region¹²

Figure 6 and Figure 7 show that Kpandai District has the highest prevalence of exclusive breastfeeding for this demographic (83%). The lowest prevalence is Karaga District (17%). No data is available for Nanumba North District because the households surveyed did not have children within this demographic.

¹¹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

¹² SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

5.3 Continued breastfeeding at one year

The vast majority of households with children 12-15 months old affirmed that breastfeeding is continuing. This uses the same method recommended by WHO that asks about breastfeeding behavior in the past 24 hours. Table 15 provides a summary and shows no percentage difference between regions. Further analysis by district has not been conducted because of the high prevalence of this behavior across the entire SPRING and RING project area.

Table 15 – Frequency of continued breastfeeding at one year

Continued breastfeeding at 1 year	Northern Region		Upper East Region		Total Area	
	Weighted N	Percentage	Weighted N	Percentage	Weighted N	Percentage
No	495	2%	106	2%	601	2%
Yes	24,449	98%	4,568	98%	29,017	98%
Total	24,944		4,674		29,618	

5.4 Introduction of solid, semi-solid, or soft foods

This analysis covers the demographic of children 6-8 months old. Responses were analyzed referring to solid foods that the child may have taken in the past 24 hours.

Table 16 – Prevalence of solid food introduction to infants at 6-8 months

Solid food introduced?	Northern Region		Upper East Region		Total Area	
	Weighted N	Percentage	Weighted N	Percentage	Weighted N	Percentage
No	15,135	92%	2,364	73%	17,498	89%
Yes	1,238	8%	895	27%	2,132	11%
Total	16,372		3,258		19,631	

Analysis of data finds that a larger percentage of children in the Upper East Region (27%) have had some form of solid food introduced into their diet in contrast with children in the Northern Region (8%).

5.4 Minimum Acceptable Diets (MAD) for Children 6-23 Months

Several criteria inform the Minimum Acceptable Diet (MAD) standard. This depends on two primary factors: the age of the child; and whether or not the child is being breastfed. Table 17 provides a summary¹³.

Table 17 – Minimum standards to meet MAD criteria

	Breastfed	Not-Breastfed
6-8 Months Old	• Two food feedings	• Two food feedings
9-23 Months Old	• Three food feedings	• At least two milk feedings

The types of food matter. The WHO guideline identifies seven categories, and the food feedings must cover at least four of these for a child to have a Minimum Acceptable Diet. The seven categories are:

1. Grains, roots, and tubers
2. Legumes and nuts
3. Dairy products (milk, yogurt, cheese)
4. Flesh foods (meat, fish, poultry, and liver/organ meats)
5. Eggs
6. Vitamin-A rich fruits and vegetables
7. Other fruits and vegetables

¹³ Summarized from SPRING and RING Baseline Survey Protocol Performance Indicator Reference Sheet

Table 18 – Percentage of children 6-23 months meeting MAD guidelines

Meeting MAD?	Northern Region		Upper East Region		Total Area	
	Weighted N	Percentage	Weighted N	Percentage	Weighted N	Percentage
No	81,553	90%	17,377	97%	98,931	91%
Yes	9,084	10%	571	3%	9,655	9%
Total	90,637		17,949		108,586	

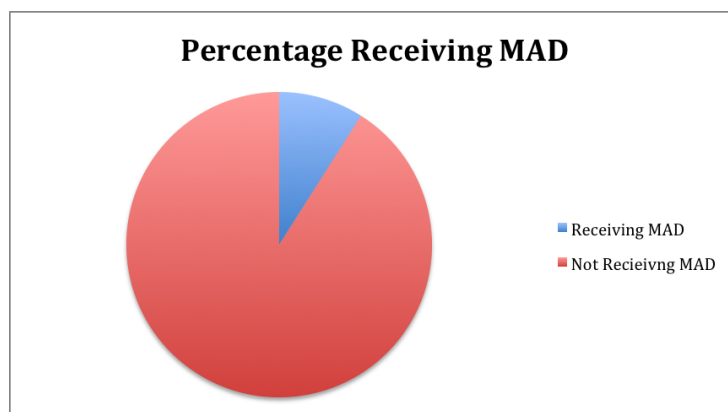


Figure 8 – Total percentage of children receiving a MAD

The summary analysis in Table 18 and visually represented in Figure 8 finds a minority of children receiving a MAD: 10 percent in the Northern Region, and only 3 percent in the Upper East Region. This headline indicator was also disaggregated by district to provide insight into the low prevalence of children receiving a Minimum Acceptable Diet.

Results from four districts (Figure 9 and Figure 10) report no children age 6-23 months receiving a Minimum Acceptable Diet: Chereponi, East Gonja, North Gonja, and West Bawku. All of these had children within the 6-23 month age demographic, but these were not receiving a MAD at the time of survey. Sagnerigu District had the highest prevalence of children receiving a MAD (29%).

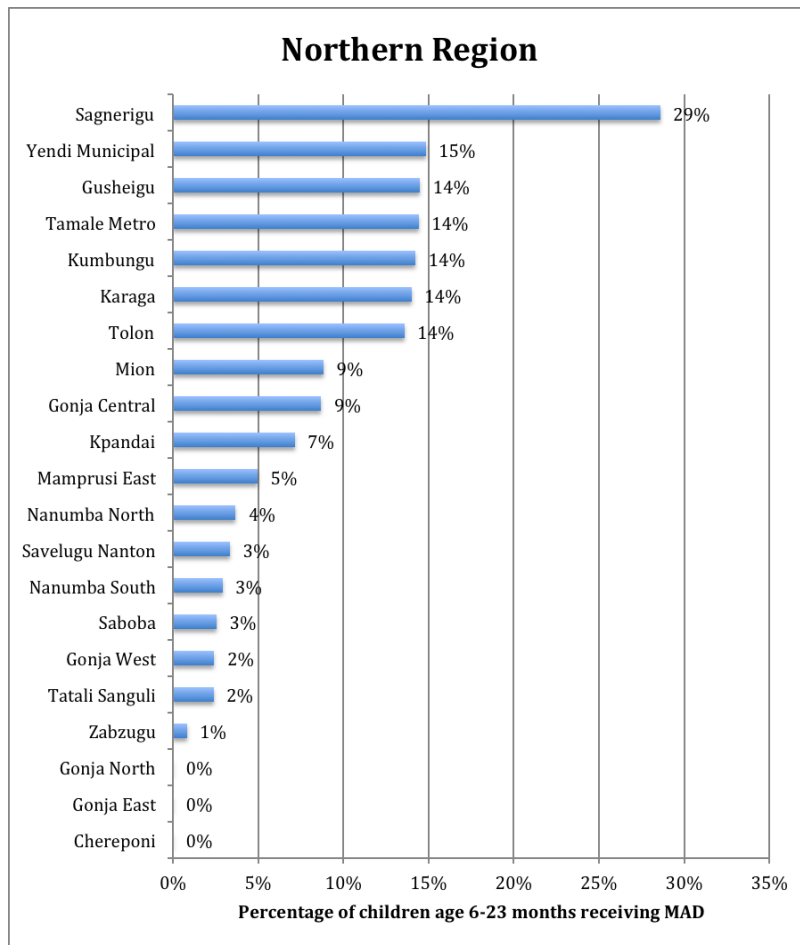


Figure 9 – Percentage of children 6-23 months receiving MAD in Northern Region¹⁴

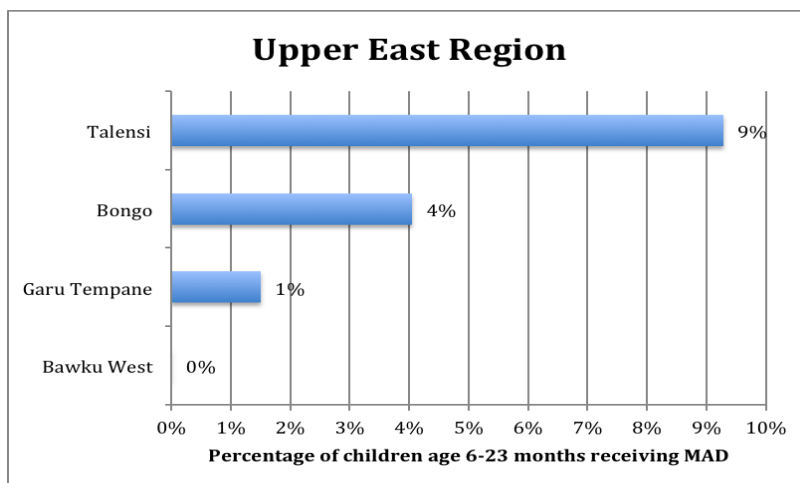


Figure 10 – Percentage of children 6-23 months receiving MAD¹⁵

¹⁴ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.
 SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu
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¹⁵ SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

6.0 RESULTS OF OPTIONAL IYCF INDICATORS

6.1 Children ever breastfed

As shown in Table 19, less than 1% of children have never been breastfed across the entire study area. Results are similar for both regions. This indicator does not speak to the continuity of breastfeeding, however. “No” responses came from 7 households that cumulatively represent the population reporting to have never breastfed their children. No immediate pattern is evident from the location of these responses (Table 20).

Table 19 – Prevalence of children born in past 24 months who were ever breastfed

Ever Breastfed?	Northern Region		Upper East Region		Total Area	
	Weighted N	Percentage	Weighted N	Percentage	Weighted N	Percentage
No	385	0.4%	109	0.6%	494	0.5%
Yes	90,252	99.6%	17,840	99.4%	108,091	99.5%
Total	90,637		17,949		108,586	

Table 20 – Location of households indicating never having breastfed children born in past 24 months

Region	District
Northern	Gonja West
Northern	Gonja North
Northern	Nanumba North
Northern	Mion
Northern	Chereponi
Upper East	Bawku West

6.2 Continued breastfeeding at 2 years

Survey design assessed if breastfeeding is occurring by asking if it has taken place in the period 24 hours prior to the survey. Table 21 presents the results summary for children age 20-23 months at the time of survey. This analysis also finds little difference between continued breastfeeding prevalence in the Northern and Upper East Regions (99% and 96%, respectively). These percentages appear higher than the number of children being breastfed at one year because of the differences in sample size. The absolute number of represented children at one year is greater than the number of represented children at two years.

Table 21 – Prevalence of continued breastfeeding at 2 years for children 20-23 months

Continued breastfeeding?	Northern Region		Upper East Region		Total Area	
	Weighted N	Percentage	Weighted N	Percentage	Weighted N	Percentage
Yes	16,732	99%	2,562	96%	19,295	99%
No	92	1%	109	4%	201	1%
Total	16,824		2,671		19,496	

6.3 Age-appropriate breastfeeding

“Age-appropriate” breastfeeding combines different types of analysis depending on the age of a child to present an overall picture of breastfeeding. Age-appropriate is defined as: exclusive breastfeeding 0-5 months; or continued breastfeeding daily up to 24 months. Results for the study region are summarized in Table 22.

Table 22 – Age appropriate breastfeeding by Region

Age Appropriate Breastfeeding	Northern Region		Upper East Region		Total Area	
	Weighted N	Percentage	Weighted N	Percentage	Weighted N	Percentage
Yes	31,476	59%	5,264	67%	36,740	60%
No	21,786	41%	2,600	33%	24,478	40%
Total	53,262		7,864		61,218	

Results identify a regional difference between the percentage of children being breastfed appropriately in the Northern Region (59%) and the Upper East Region (67%). Minimum Acceptable Diet figures (Section 5.4) show a more detailed breakdown of analysis that incorporates breastfeeding practices into analysis of district percentages.

7.0 RESULTS OF ANTHROPOMETRY INDICES AMONG CHILDREN AGED 0-59 MONTHS

This section presents analysis of child nutrition as assessed through age, weight, and height. A child is considered as stunted (moderate and severe) if the Z score is below minus two standard deviations from the median height for age of reference population; underweight (moderate) if the Z score is below minus two standard deviations from the median weight for age of reference population; severe - below minus three standard deviations from the median weight for age of reference population; and wasted (moderate and severe) if the Z score is below minus two standard deviations from the median weight for height of reference population¹⁶. Comparisons are presented against standard from the World Health Organization (2006 WHO child growth standards).

7.1 Height for Age (Stunting for children aged 0 to 59 months old)

Table 23 shows the nutritional status of both boys and girls according to height-for-age. Use of 2006 WHO child growth standards shows that the proportions of boys with normal, moderate, and severe forms of growth retardation are 63.90 percent, 17.92 percent and 14.27 percent, respectively. In the case of girls, these frequencies are found to be 65.45 percent, 17.54 percent and 11.14 percent, respectively. The overall indication is that prevalence of under-nutrition (moderate plus severe forms) for all age groups is higher in boys (32.19) than in girls (28.68%). Overall, about 30.46% of the population of children 0 to 59 months studied are stunted.

Table 23 – Nutritional status according to height-for-age¹⁷ by sex

Age Groups	Nutritional Status	BOYS	GIRLS	ALL
All	Above normal ($\leq + 2$ score)	3.92	5.87	4.87
	Normal (≤ -2 to $+2$ Z-score)	63.90	65.45	64.66
	Moderate (-2 to -3 Z-score)	17.92	17.54	17.73
	Severe (< -3 Z-score)	14.27	11.14	12.73
	Total	100.00	100.00	100.00
0-23month	Above normal ($\leq + 2$ score)	5.53	10.45	7.99
	Normal (≤ -2 to $+2$ Z-score)	69.47	67.51	68.49
	Moderate (-2 to -3 Z-score)	12.29	13.93	13.11
	Severe (< -3 Z-score)	12.72	8.11	10.41
	Total	100.00	100.00	100.00
24-60month	Above normal ($\leq + 2$ score)	2.83	2.56	2.70
	Normal (≤ -2 to $+2$ Z-score)	60.15	63.96	61.99
	Moderate (-2 to -3 Z-score)	21.71	20.15	20.95
	Severe (< -3 Z-score)	15.31	13.34	14.36
	Total	100.00	100.00	100.00

¹⁶ http://www.unicef.org/infobycountry/stats_popup2.html

¹⁷ 2006 WHO child growth standards

7.2 Weight-for-age (Underweight for children aged 0 to 59 months old)

Table 24 also shows the percentage distribution of children underweight. The table indicates that boys are more likely to be underweight as compared to girls. Analysis further shows that the frequencies of underweight (i.e., moderate plus severe forms) in boys for the age groups 0-23 and 24-60 months are 24.15 percent and 23.06 percent respectively. While in the case of girls, these frequencies are 18.49 percent and 20.39 percent, respectively. The overall prevalence rate for underweight children (i.e. moderate to severe) is 23.5 percent for boys, 19.59 percent for girls and 21.59 percent for all children 0-5 months studied.

Table 24 – Nutritional status according to weight-for-age¹⁸ by sex

Age Groups	Nutritional Status	BOYS	GIRLS	ALL
All	Above normal ($\leq + 2$ score)	1.40	2.27	1.82
	Normal (≤ -2 to $+2$ Z-score)	75.10	78.14	76.58
	Moderate (-2 to -3 Z-score)	14.47	12.59	13.55
	Severe (< -3 Z-score)	9.03	7.00	8.04
	Total	100.00	100.00	100.00
0-23month	Above normal ($\leq + 2$ score)	2.85	4.44	3.64
	Normal (≤ -2 to $+2$ Z-score)	73.00	77.08	75.04
	Moderate (-2 to -3 Z-score)	14.67	12.43	13.55
	Severe (< -3 Z-score)	9.48	6.06	7.77
	Total	100.00	100.00	100.00
24-60month	Above normal ($\leq + 2$ score)	0.42	0.68	0.54
	Normal (≤ -2 to $+2$ Z-score)	76.52	78.93	77.67
	Moderate (-2 to -3 Z-score)	14.34	12.70	13.56
	Severe (< -3 Z-score)	8.72	7.69	8.23
	Total	100.00	100.00	100.00

7.3 Weight-for-height (Wasting for children aged 0 to 59 months old)

Wasting or thinness indicates a recent and severe process of weight loss in most cases, which is often associated with acute starvation or severe disease. However, wasting may also be the result of a chronic condition. The result from the survey shows that there is not much difference between the sexes; however, in the 0-23 month age group the prevalence of wasting is higher in boys (22.33%) than in girls (20.68%). The overall prevalence rate for wasted children 0-59 months in the area studied is 14.69 percent. ts the full numerical details.

Table 25 presents the full numerical details.

Table 25 – Nutritional status according to weight-for-height¹⁹ by sex

Age Groups	Nutritional Status	BOYS	GIRLS	ALL
All	Above normal ($\leq + 2$ score)	3.66	4.21	3.93
	Normal (≤ -2 to $+2$ Z-score)	81.19	81.58	81.38
	Moderate (-2 to -3 Z-score)	7.67	7.83	7.75

¹⁸ US 2000 CDC Growth Charts; 1990 British Growth Charts; 2006 WHO child growth standards

¹⁹ Based on US 2000 CDC Growth Charts

	Severe (< -3 Z-score)	7.47	6.38	6.94
	Total	100	100	100
0-23month	Above normal ($\leq +2$ score)	3.85	4.92	4.39
	Normal (≤ -2 to $+2$ Z-score)	73.83	74.40	74.12
	Moderate (-2 to -3 Z-score)	11.41	13.34	12.39
	Severe (< -3 Z-score)	10.92	7.34	9.10
	Total	100	100	100
24-59month	Above normal ($\leq +2$ score)	3.53	3.66	3.59
	Normal (≤ -2 to $+2$ Z-score)	86.21	87.09	86.63
	Moderate (-2 to -3 Z-score)	5.13	3.61	4.40
	Severe (< -3 Z-score)	5.12	5.64	5.37
	Total	100	100	100

8.0 RESULTS OF MESSAGING FOR SOCIAL AND BEHAVIOR CHANGE COMMUNICATION (BCC)

8.1 Percentage of caregivers who understood key BCC messages

The survey sought to find out about how caregivers understood key BCC messages. Respondents were asked whether in the past one month they had heard about any messages on infant and young child feeding (IYCF). The results from Table 26 indicate that most of the caregivers interviewed had never heard of the IYCF messages. The percentages were even more pronounced for those in the Northern Region than the Upper East Region.

Disparities also exist between districts. Figure 11 reveals that caregivers in Central Gonja had the most number of people who had not heard any messages about IYCF; Tolon district, on the hand, recorded the most number of caregivers who had heard at least one of the IYCF messages.

Table 26 – Percentage of caregivers who have heard any messages about Infant and Young Child Feeding (IYCF)²⁰

Heard Any Messages about IYCF	Region		Total
	Northern	Upper East	
Not heard	65.32	60.94	64.54
At least one	34.68	39.06	35.46
Total	100	100	100

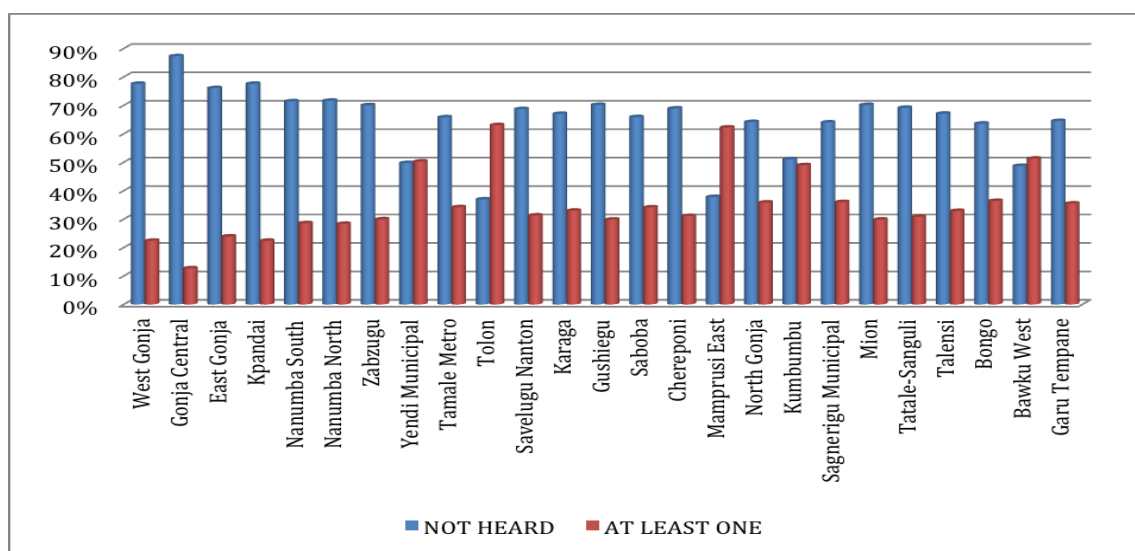


Figure 11 – Percentage of caregivers who have heard any messages about Infant and Young Child Feeding (IYCF) by district²¹

8.2 Percentage of caregivers who demonstrate knowledge of Essential Nutrition Actions (ENA)

Before respondents demonstrate knowledge of the ENAs, they must have first heard and or discussed them with health workers such as community health nurses or volunteers. Respondents were asked whether the community health

²⁰ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

²¹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

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volunteer had discussed nutrition topics with them. The result indicates that about 68 percent of the caregivers indicated that the community health volunteers did not discuss any nutrition topic with them.

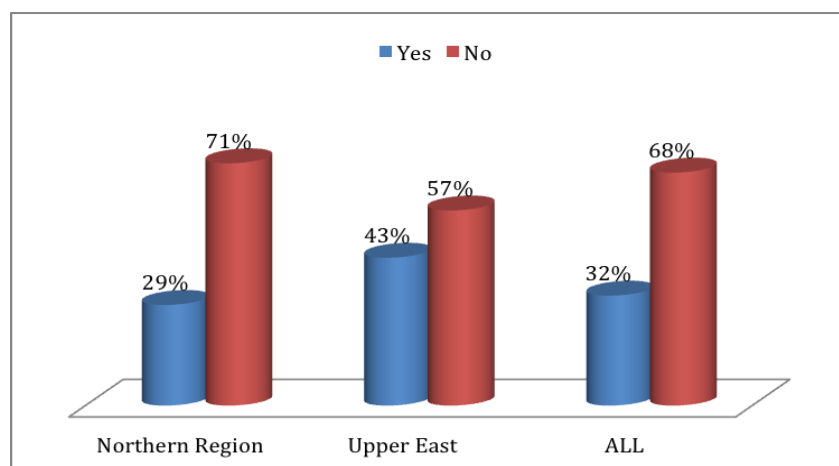


Figure 12 – Percentage of Caregivers who Discussed Nutrition Topics with a Community Health Volunteer

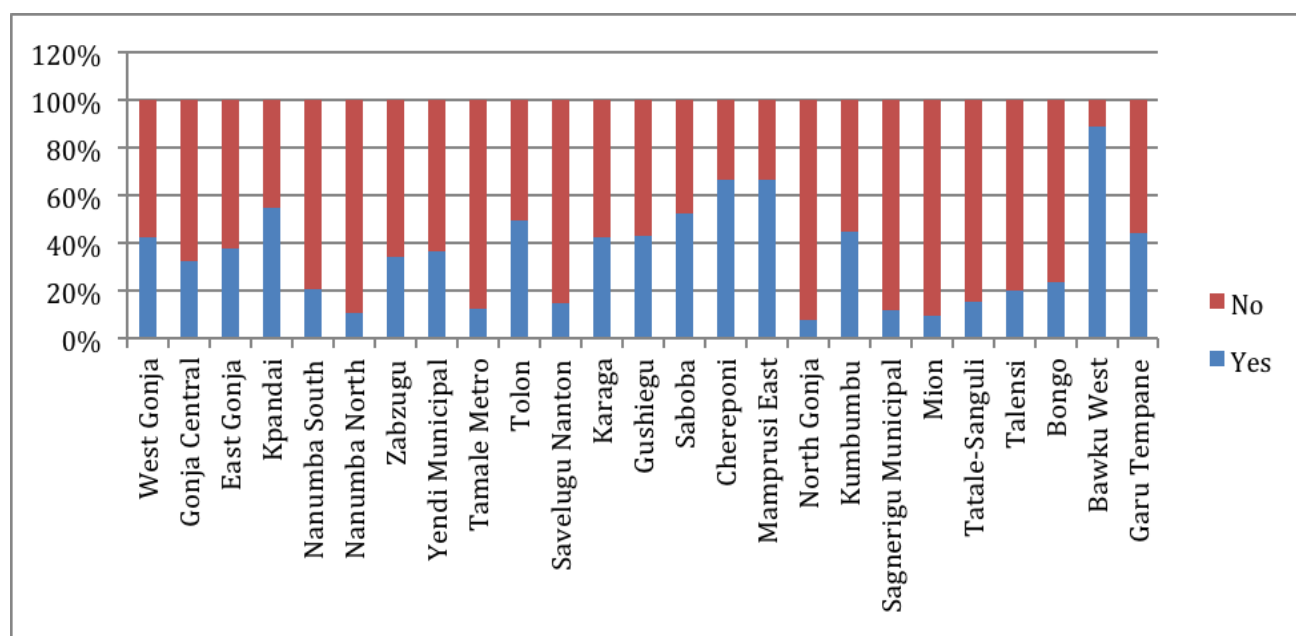


Figure 13- Percentage of Caregiver Community Health Volunteer discussed Nutrition topics discussed with by District²²

Respondents who answered “yes” they had heard a nutrition topic from community health volunteers, and listed the topics they had heard. The result from the survey indicates that about 5.92 percent of the caregivers, although acknowledging that the community health volunteer has discussed nutrition topics with them, still could not list these topics (Table 27).

²² SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.
 SPRING districts ONLY – Bongo, Bawku West, Garu Temppane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu
 RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Table 27– Percentage of caregivers who could repeat nutrition topics previously discussed with community health volunteers

Knowledge of Nutrition topics	Region		Total
	Northern	Upper East	
No knowledge	7.76	0.83	5.92
At least one	18.83	17.33	18.43
At least two	34.2	21.43	30.81
At least three	39.21	60.4	44.84
Total	100	100	100

8.3 Percentage of caregivers who are adopting community health volunteer recommendations

Respondents who indicated that the community volunteer had discussed nutrition topics were asked whether the information they had received has changed their behavior as caregivers. The result indicates that the majority of the caregivers (93%) who have received information on nutrition topics acknowledged that it has changed their behavior.

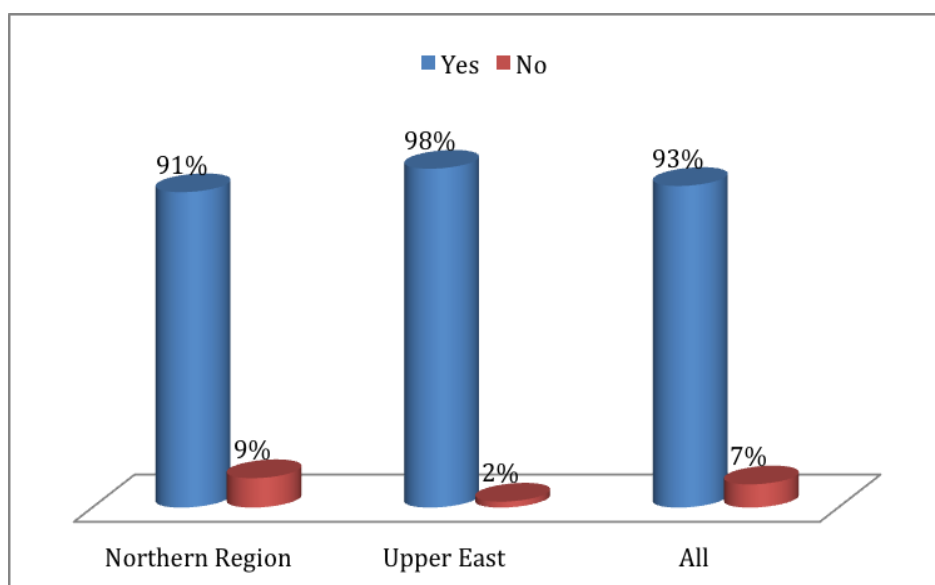


Figure 14– Percentage of Caregivers who reported changed behavior based on information received

9.0 WATER, SANITATION AND HYGIENE BEHAVIORS

Water, Sanitation and Hygiene (WASH) is a critical issue directly tied to poverty, nutrition, and child mortality. This section presents findings from a selection of WASH indicators included in the survey to present summaries of facility access, knowledge of issues, and adoption of recommended practices.

9.1 Percentage of households with access to an improved drinking water source

Respondents were asked about their primary water source. Households were then categorized into having access to either improved or unimproved according to international guidelines²³ to create an overall picture of water access.

Table 28 – Classification of water sources as protected or unprotected

Improved	Unimproved
Piped water into dwelling	Unprotected spring
Piped water into yard/plot	Unprotected dug well
Public tap or standpipe	Cart with small tank/drum
Tubewell or borehole	Tanker-truck
Protected dug well	Surface water
Protected spring	Bottled water
Rainwater	

Improved and unimproved water sources are defined by international standards that are summarized in Table 28. “An ‘improved’ drinking-water source is one that, by the nature of its construction and when properly used, adequately protects the source from outside contamination, particularly fecal matter.”²⁴ Categorizing water source finds that 28 percent of households in the study area remain without access to a safe water source (Table 29).

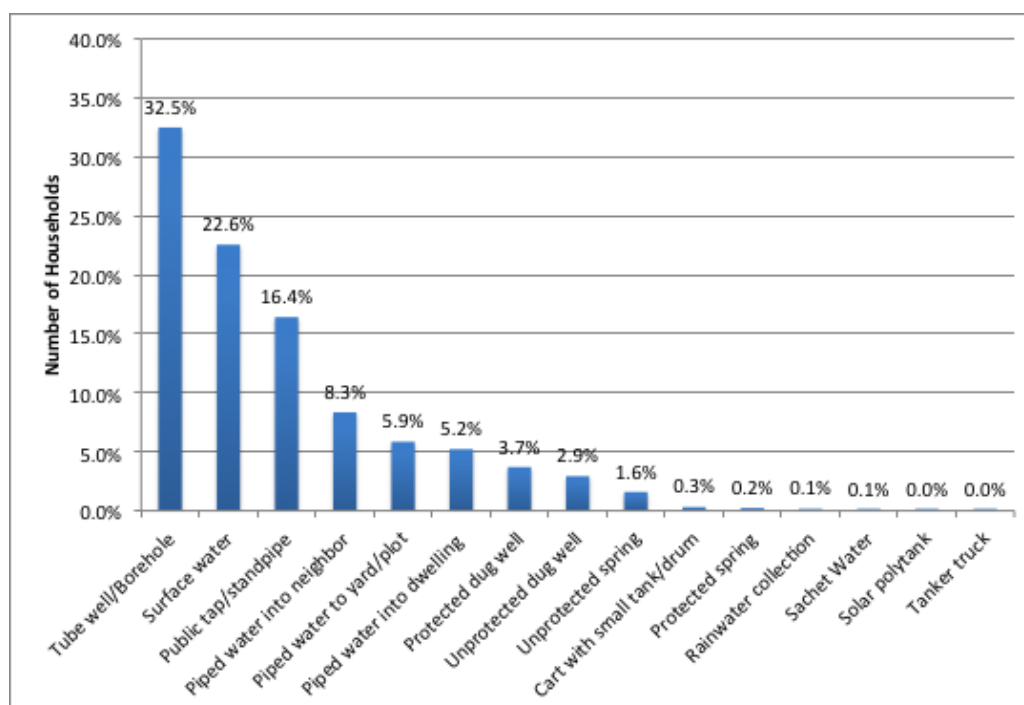


Figure 15 – Prevalence of primary water sources accessed by households

Results find that different options are available to communities. Not all water sources provide consistent supply, however. One respondent mixes improved and unimproved sources by both purchasing sachet water and fetching river

²³ From the WHO/UNICEF Joint Monitoring Programme

²⁴ <http://www.wssinfo.org/definitions-methods/watsan-categories/>

water. The percentages of households with access to an improved water source are presented in Figure 15 as the total number of weighted households. Inconsistency of access to these sources, however, may create challenges not represented by these figures.

Table 29 – Percentage of households without access to an improved water source

Main Water Source Type	Percentage
Improved	72%
Unimproved	28%

The details of improved water source access are presented in further detail by district in Figure 16 and Figure 17. Analysis finds that the three districts with highest percentage of access to improved water sources are in the Northern Region: Tamale Metro (99%), Sagnerigu (98%), and Gusheigu (97%). East Gonja has the lowest percentage of access to an improved water source (27%).

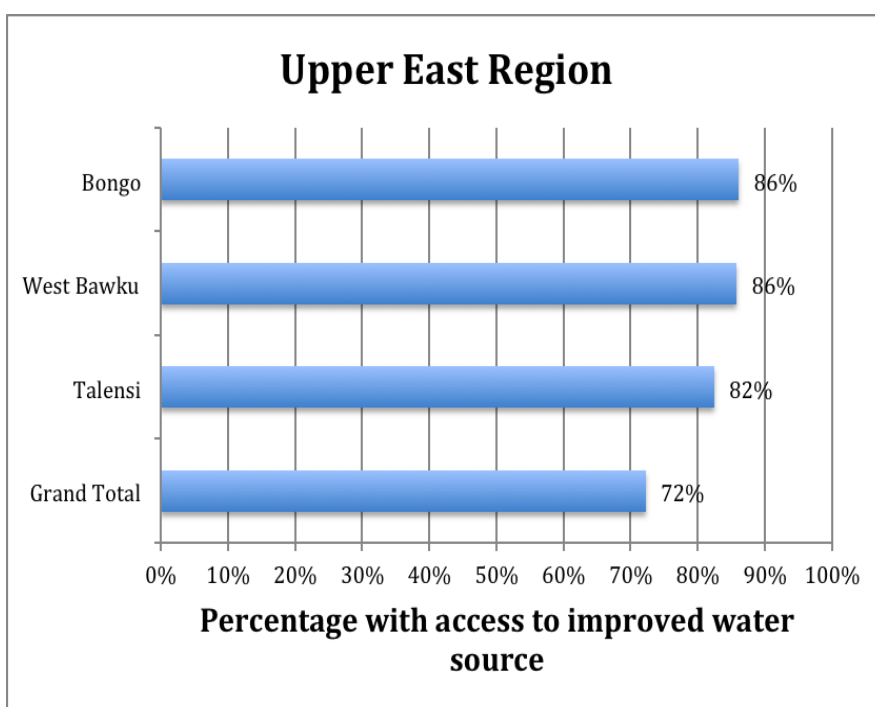


Figure 16 - Improved water access in Upper East Region

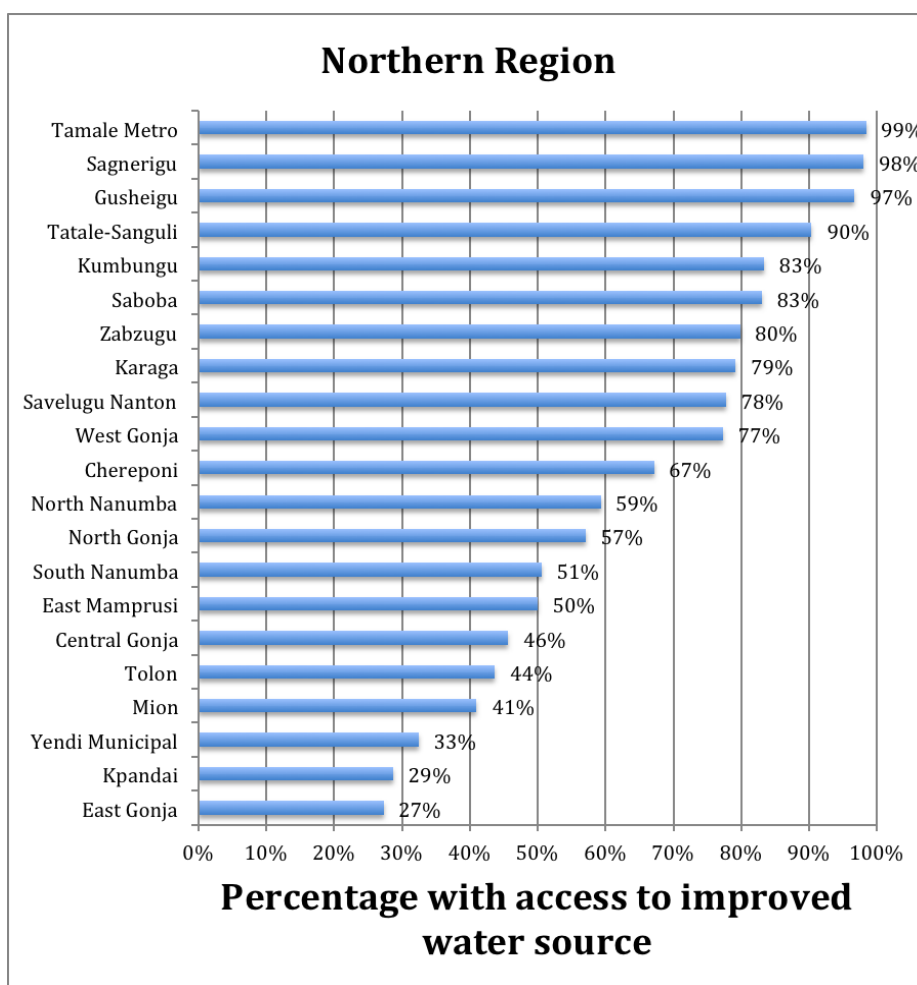


Figure 17 – Improved water access in Northern Region²⁵

9.1.1 Percentage of households without access to improved drinking water source treating water before use

Treating water before use provides an opportunity to mitigate negative effects of accessing unimproved water sources. Therefore, this analysis explores the prevalence of households without access to improved water sources that treat their water before use.

As shown in

Table 30, the percentage of households treating water before use is low. There is a difference, however, between the prevalence in the Northern Region (10%) and the Upper East Region (4%). The cause of this difference – or the ones evident between districts in Figure 18 and Figure 19 – is not known.

Table 30 – Summary of household water treatment prevalence in study regions

Region	Weighted N	Regional Percentage
Northern	35,967	10%
Upper East	2,966	4%
Overall	38,933	9%

²⁵ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

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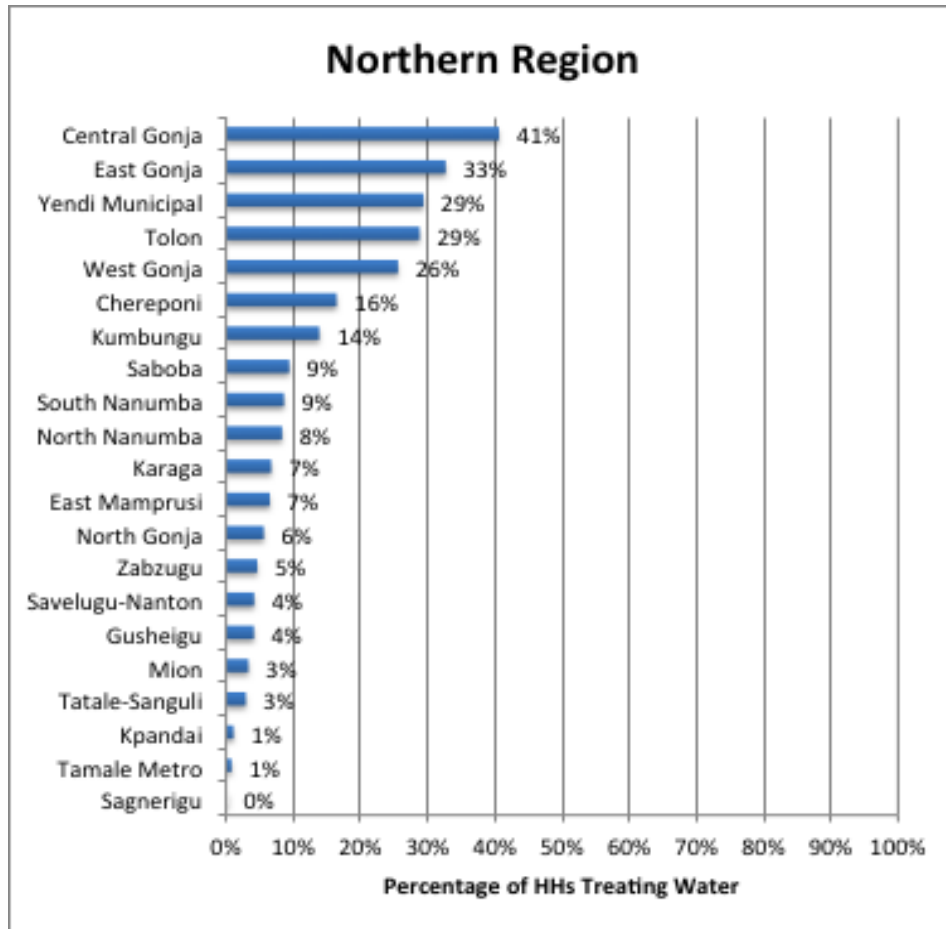


Figure 18 – Prevalence of household water treatment by district in Northern Region²⁶

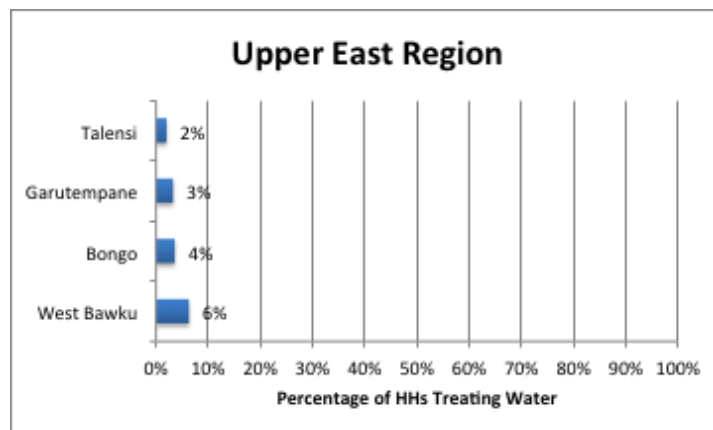


Figure 19 – Prevalence of household water treatment by district in Upper East Region

²⁶ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.
 SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu
 RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangereigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

The prevalence of households without improved water access as their primary source raises questions about alternatives. Perhaps these households can improve their quality of water access through household treatment. Analysis in Figure 20 explores the relationship between type of water source and willingness to treat water before use.

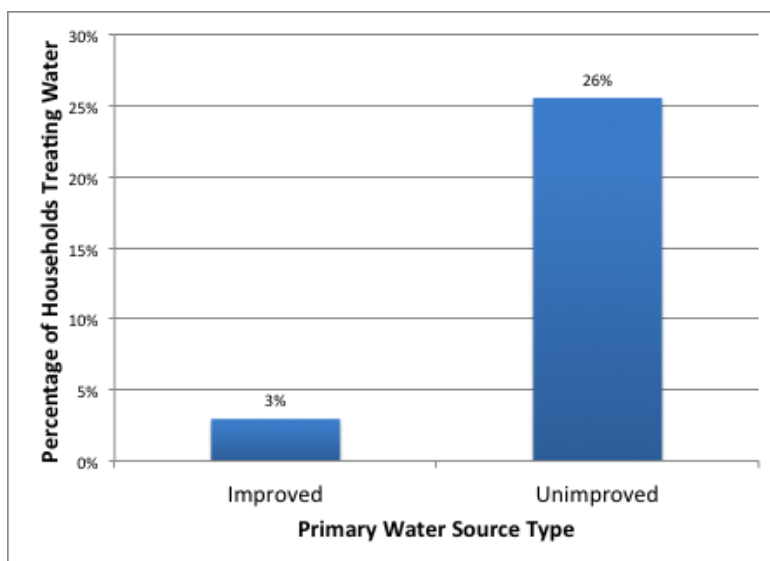


Figure 20 – Household treatment of water before use by source type

Figure 20 shows the contrast between two groups: those with improved sources and those without. This shows a greater propensity for households without safe water access to practice treatment behaviors. The overall picture, however, should not be lost. The majority of households do not treat their water. Only 3% of households with access to a protected source treat their water, and only one quarter of households primarily accessing unprotected water are treating it. Combined, these represent less than 1% of the population in the study area.

9.1.2 Prevalence of household water treatment types

Households that are treating water use a range of methods. Filtering is the most popular, followed by boiling. Figure 21 presents the breakdown by total weighted number of households.

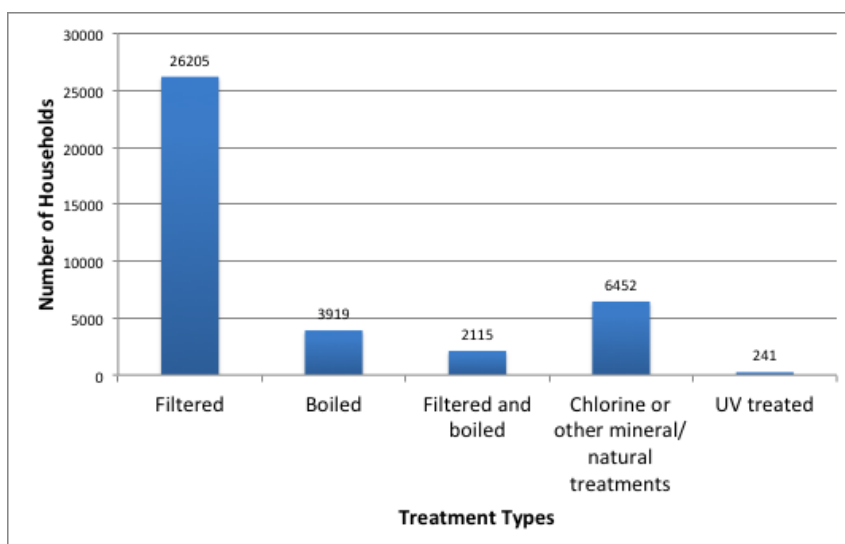


Figure 21 - Prevalence of water treatment practices

It should be remembered that a relative preference for filtering water does not mean this is common practice. Table 31 details the overall frequency of treatment practices. In the Northern Region 7 percent of households are filtering water, in contrast to only 2 percent doing so in the Upper East Region. Several respondents also indicated inconsistency when treating their water. This inconsistency represents a similar challenge to the one described for water access, where the distribution of behaviors may change over time. The practices of households are dynamic by nature.

Table 31 – Treatment type prevalence across the study area by Region

Treatment Type	Northern Region		Upper East Region	
	Weighted N	Percentage of HHs	Weighted N	Percentage of HHs
Filtered	24,594	7%	1611	2%
Boiled	3,517	1%	403	1%
Filtered and boiled	1,980	1%	135	0%
Chlorine or other mineral/natural treatments	5,635	2%	817	1%
UV treated	241	0%	0	0%
Total	35,967	10%	2,966	4%

9.1.3 Average time used to make a round trip to collect water

Data on the average time water collection takes provides further insight on access statistics. A household may primarily use an improved water source, but have to travel far to do so. This possible challenge may practically restrict the access of the household. Figure 22 presents the distribution. Times are for an average round trip.

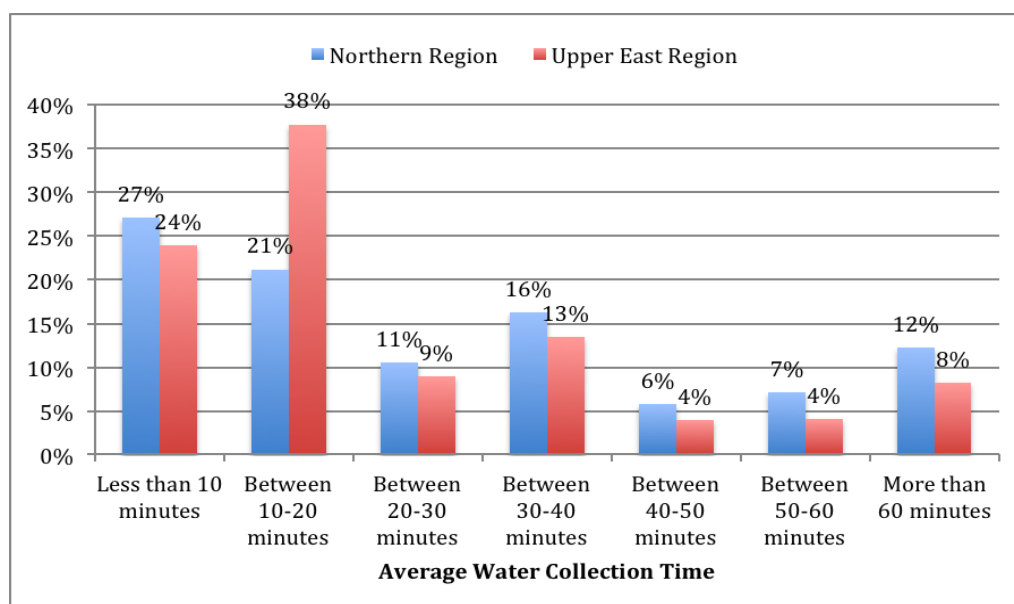


Figure 22 – Average round trip water collection time for households by Region

The distribution shows that some households are still spending over 60 minutes to collect water. According to a WHO/UNICEF JMP 2008 publication, studies have found that if the time spent in collecting water is between 3 and 30 minutes, the amount collected is fairly constant and suitable to meet basic needs (defined as between 15 to 20 liters per person per day).²⁷ Households in the study area can therefore be classified as those meeting or falling outside international guidelines for basic water needs.

Figure 23 and Figure 24 summarize the percentage of population meeting guidelines by District. Interestingly, Gusheigu District has the lowest performance in this analysis (19%), which stands in contrast to being one of the strongest performers when strictly assessed by the primary water source households are accessing. This suggests that strictly measuring access by primary water source may provide an incomplete picture of actual access. Tamale Metro (93%) and Sagnerigu (91%) remain strong in both analyses, however, possibly because both are urban or semi-urban districts.

²⁷ *Progress on Drinking Water and Sanitation, Special focus on Sanitation, (JMP 2008)*

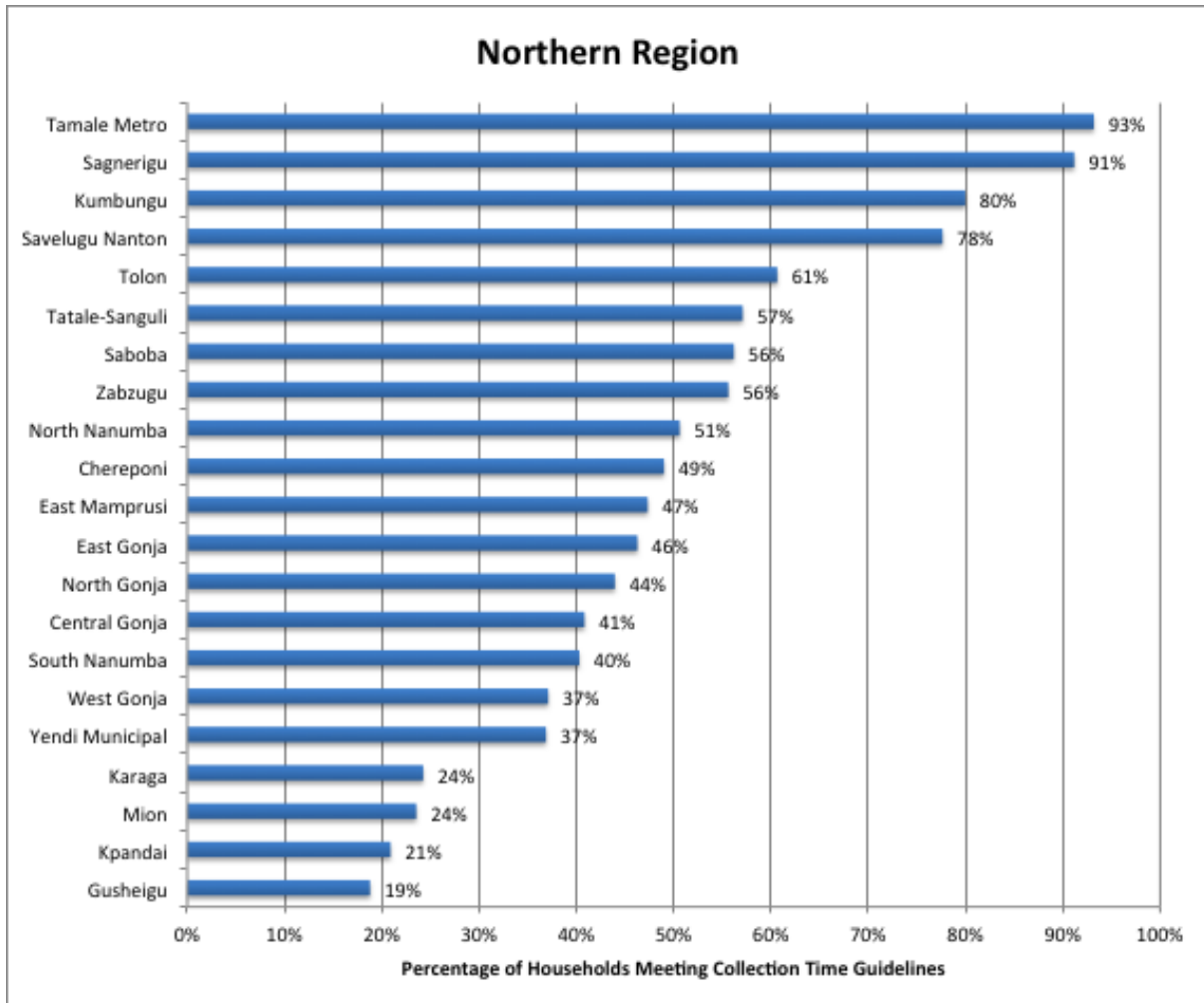


Figure 23 – Percentage of households meeting international water collection time guidelines for Northern Region²⁸

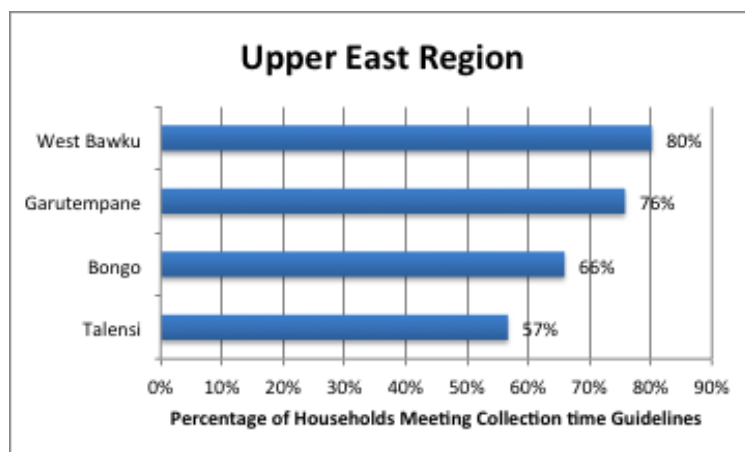


Figure 24 - Percentage of households meeting international water collection time guidelines for Upper East Region

²⁸ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.
 SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu
 RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangereigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

9.1.4 Household satisfaction of water source

Finally, household satisfaction surveys capture factors such as consistency, quality, and accessibility of water sources not easily interpreted through other indicators.

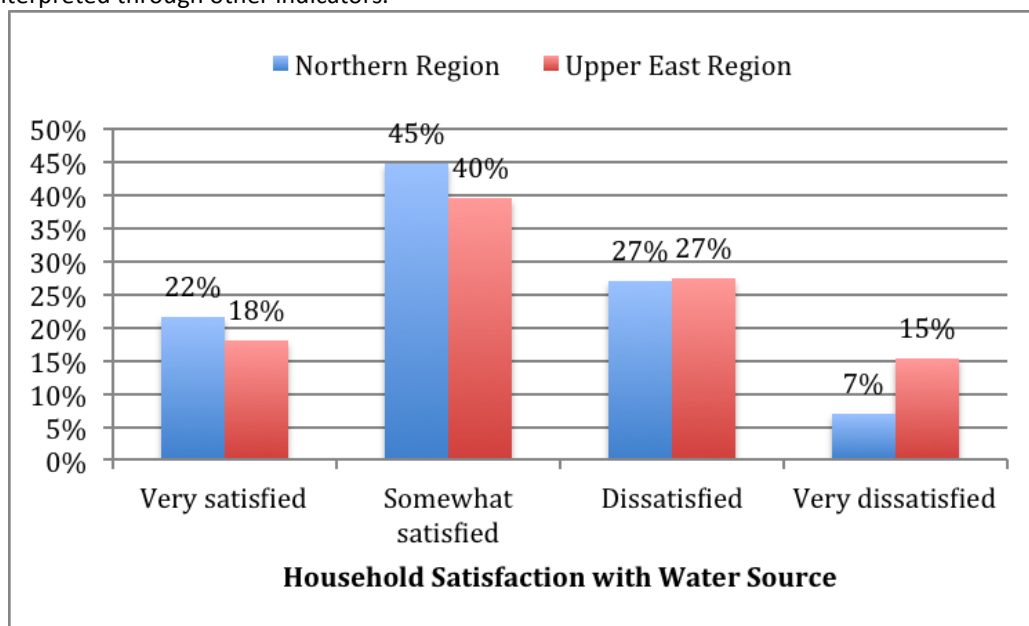


Figure 25 – Household satisfaction with water source

Although the majority of those surveyed were at least somewhat satisfied, nearly half indicate dissatisfaction. Figure 25 provides the percentage breakdown. This shows overall higher satisfaction in the Northern Region than the Upper East Region. Understanding specific reasons behind satisfactions can be partly inferred from other household responses, but full analysis would require additional research. It would be interesting to know why 15 percent of households in the Upper East Region are very dissatisfied, compared to only 7 percent in the Northern Region.

9.2 Percentage of households using an improved sanitation facility or latrine

Good sanitation is necessary for safely storing human fecal matter, and is an essential complement to safe water access for reducing poverty and improving nutrition. Sanitation access unfortunately lags behind water access in the same region of study. As shown in Table 32, over two-thirds of households (68%) practice open defecation, and the prevalence of this is much higher in the Upper East Region (90%).

Table 32 – Summary of Open Defecation (OD) prevalence by Region

Region	Some Facility	OD
Northern	36%	64%
Upper East	10%	90%
Total	32%	68%

Further analysis (Figure 26 and Figure 27) of sanitation facilities at the District level reveals further differences between populations in the study area.

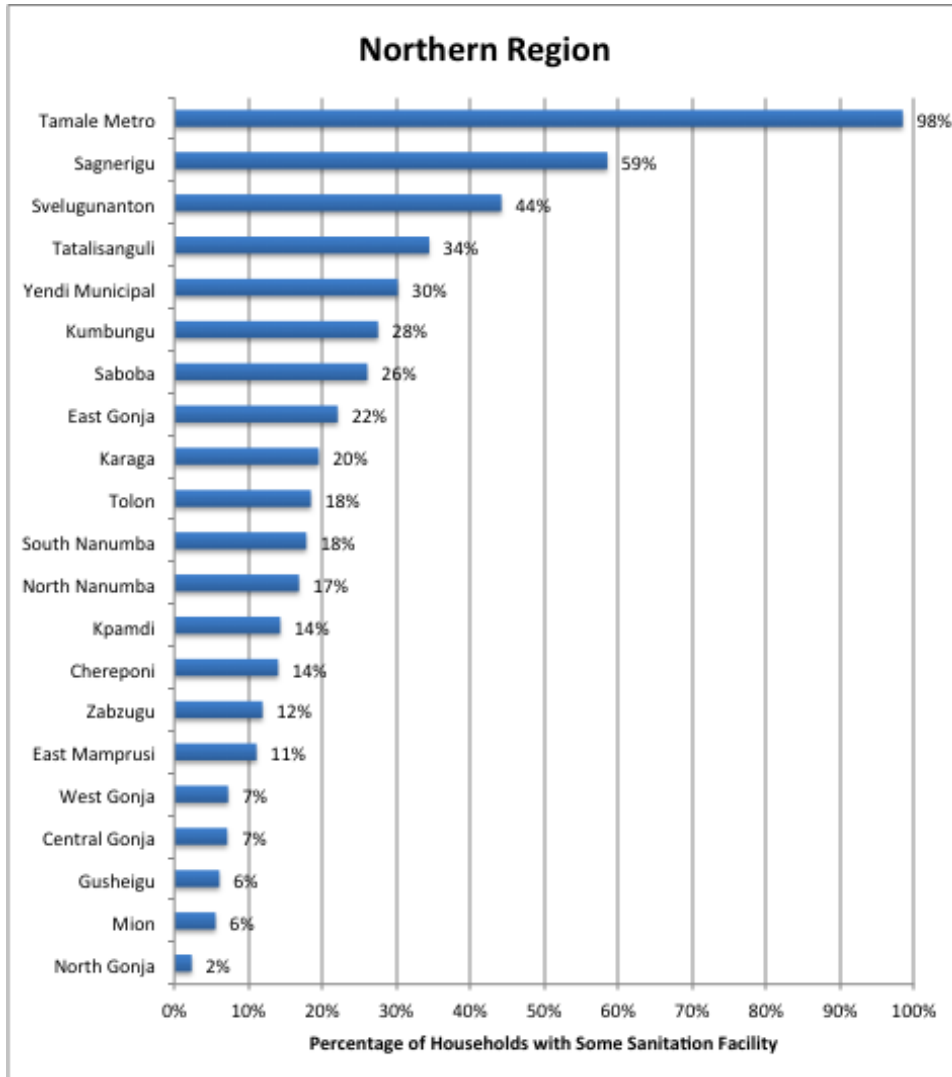


Figure 26 – Households with access to a sanitation facility in the Northern Region

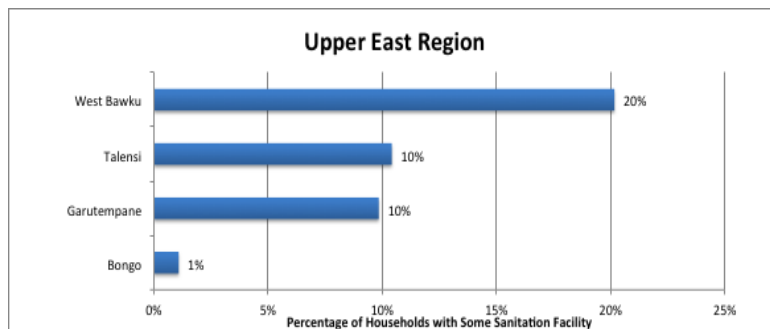


Figure 27 - Households with access to a sanitation facility in the Upper East Region²⁹

²⁹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.
 SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu
 RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangereigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

These figures are substantially higher than the numbers of the WHO/UNICEF Joint Monitoring Programme for Ghana, which combines multiple national surveys to project national figures. The 2014 projection for open defecation from the JMP was 33% in rural areas nationwide, whereas this survey finds 68% of respondents in the target area engaging in this behavior. Bongo District has the lowest prevalence of sanitation facilities (1%) in the Upper East Region. North Gonja has the lowest prevalence of facilities (2%) in the Northern Region. Only Tamale Metro was found to have near complete coverage (98%).

9.2.1 Kind of toilet facility used

This analysis explores the prevalence of primary household sanitation facilities, where they exist. Most not defecating in the open are using some kind of public facility, followed by unimproved pit latrines. Figure 28 presents the relative prevalence of these facilities.

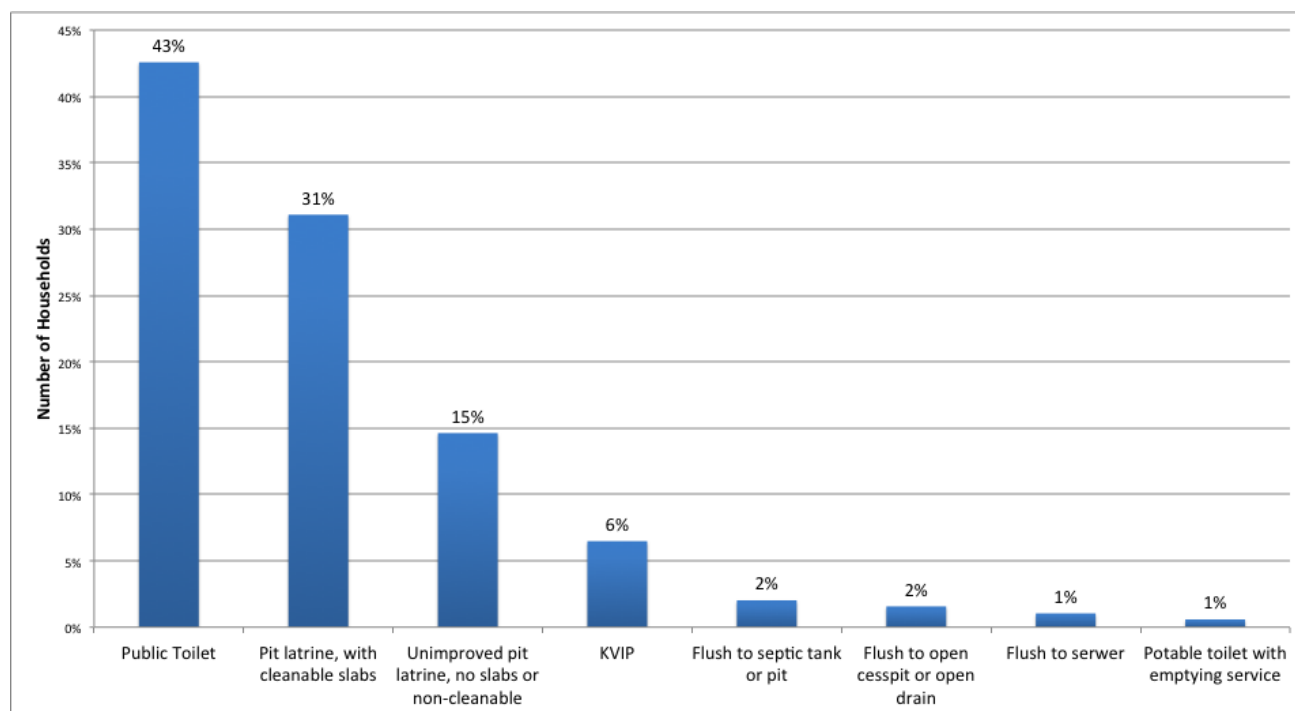


Figure 28 – Prevalence of primary sanitation facilities

Public facilities were not initially considered in survey design, and it is interesting to note how commonly households referenced them (43%). This prevalence is followed by unimproved household pit latrines (31%). It should also be noted that Kumasi Ventilated Improve Pit (KVIP) latrines are listed separately, although some of the public facilities are also KVIPs. This distinction is meant to highlight the difference between private household facilities and public ones.

9.2.2 Average number of household members using household sanitation facility

Most households are not using a latrine, as shown earlier. Households with a sanitation facility appear to be sharing it with their immediate family most commonly (73%).

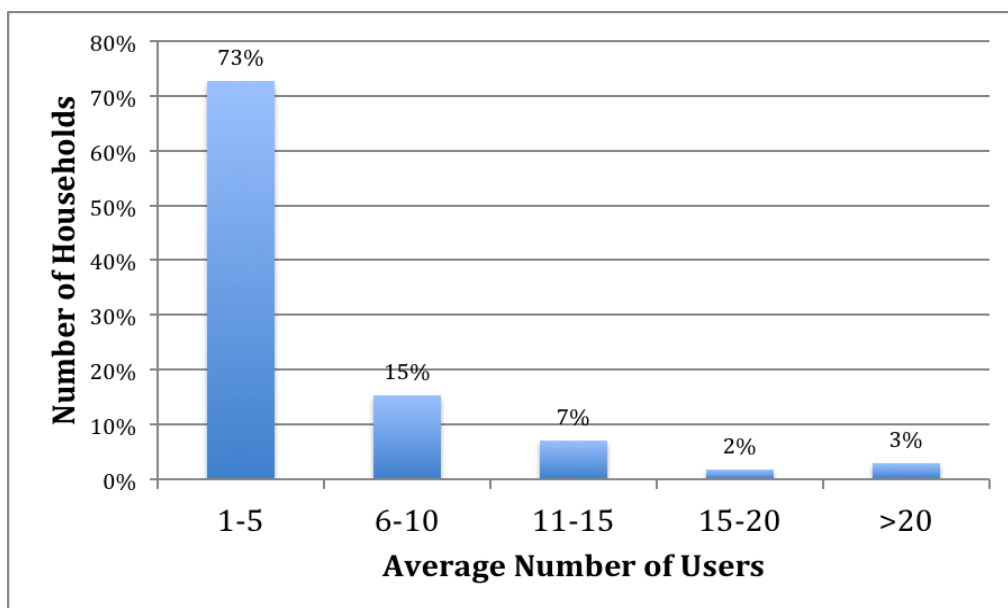


Figure 29 – Average number of household members using the sanitation facility

9.2.3 Percentage of HH adopting recommended practices in cleaning their latrines

Latrine cleaning is a small factor compared to the overwhelming majority that is not using latrines. Analysis of latrine cleaning practice finds the distribution in Table 33. Three important notes accompany this frequency table. Firstly, data for each household records the best practice mentioned, meaning that each household is mentioned only once. Secondly, this combines cleaning practices noted for different types of latrines by identifying the scrubbing solution but not the specific facility being cleaned. Finally, only households with latrines responded to this question. The most common practice is the daily disposal of waste paper (39%), although a larger percentage (42%) apply no practice at all (Figure 30).

Table 33 – Frequency of latrine cleaning practices

Latrine Cleaning Practices	Weighted Number of HHs	Percentage of HHs
Scrub with detergent	19,293	7%
Scrub with water only	30,131	11%
Use of ash/sawn dust	1,533	1%
Dispose waste paper daily	104,805	39%
No Practice	115,083	42%
Total	270,845	100%

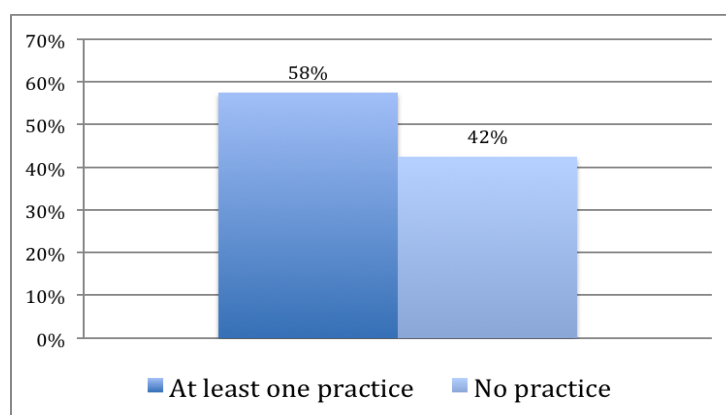


Figure 30 – Percentage of households practicing latrine cleaning

9.3 Percentage of households with functional hand washing stations

Hygiene completes the three components of WASH that improve community health. Hand washing facilities and behavior are the main indicators of hygienic practice, and constitute the analysis presented in this section. This section shows that hand washing facilities are relatively uncommon, but the overwhelming majority of survey participants stated that they wash their hands.

Table 34 – Percentage of households reporting hand washing behavior

Response to "Do you wash your hands?"	Northern Region	Upper East Region	Total
No	2%	2%	2%
Yes	98%	98%	98%

9.3.1 Percentage HHs with a hand washing station

As shown in Figure 31, few households in the area studied have hand washing facilities near latrines (3%). Even fewer households (<1%) have more than one facility. As other analysis in this section shows, however, this shortage of facilities may not be due to lack of hand washing knowledge or practice.

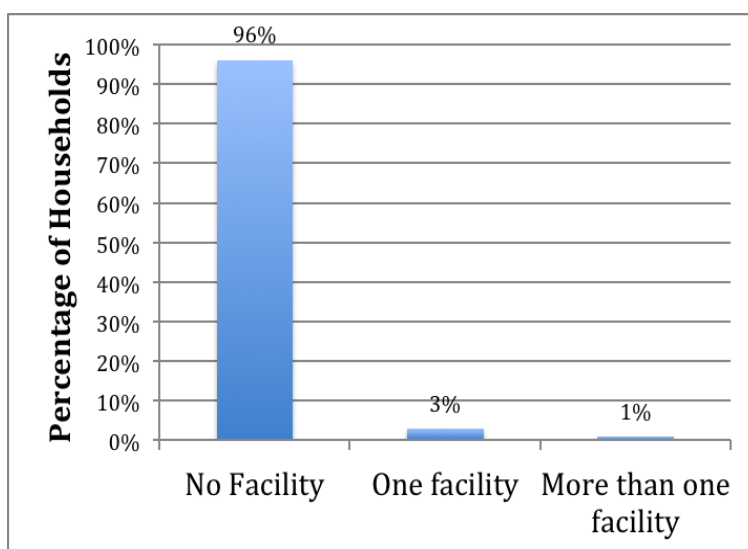


Figure 31 – Prevalence of household hand washing facilities near latrines

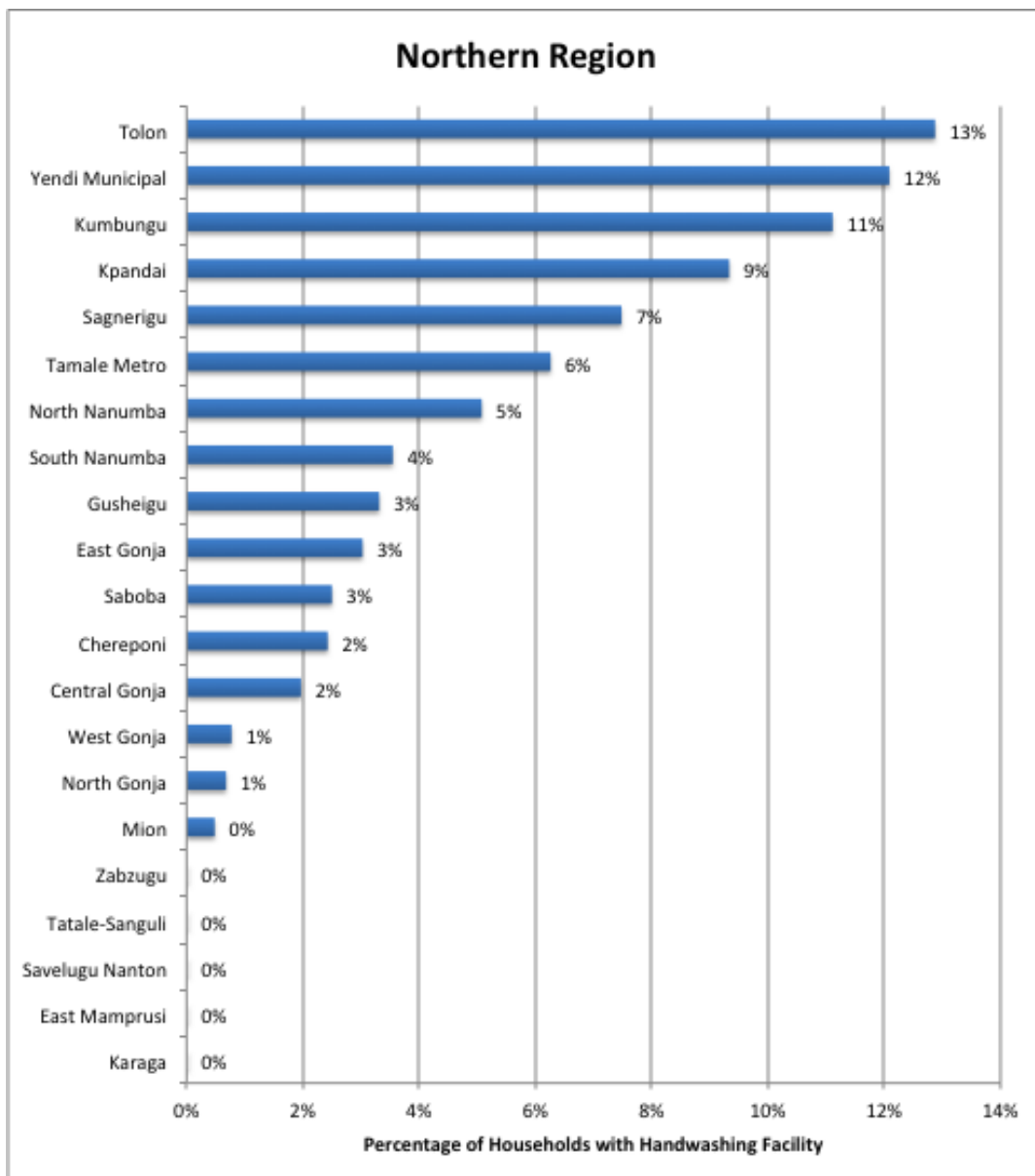


Figure 32 – Prevalence of household hand washing facilities near latrines

Figure 32 shows the distribution of hand washing facilities in Northern Region Districts. No figure is necessary for the Upper East Region because all Districts had 0 percent coverage. Several District in the Northern Region also have 1% or lower prevalence of hand washing facilities. These findings are interesting because they conflict with a high response rate (Table 34) affirming that hand washing occurs. This may be because households are practicing hand washing using other means than dedicated hand washing facilities.

9.3.2 Types of hand washing stations

Figure 33 presents a distribution of hand washing facility types. Of the minority using hand washing facilities, the ablution kettle is the most common (42%). This relative frequency represents only 1.6 percent of households in the area studied, however. The frequency distribution also shows a preference for simple technologies such as cups, buckets, or kettles. This preference for simple technologies that may not be immediately recognized as hand washing facilities may partly explain the discrepancy between the number of people stating that hand washing occurs, and the low prevalence of hand washing facilities identified in the survey.

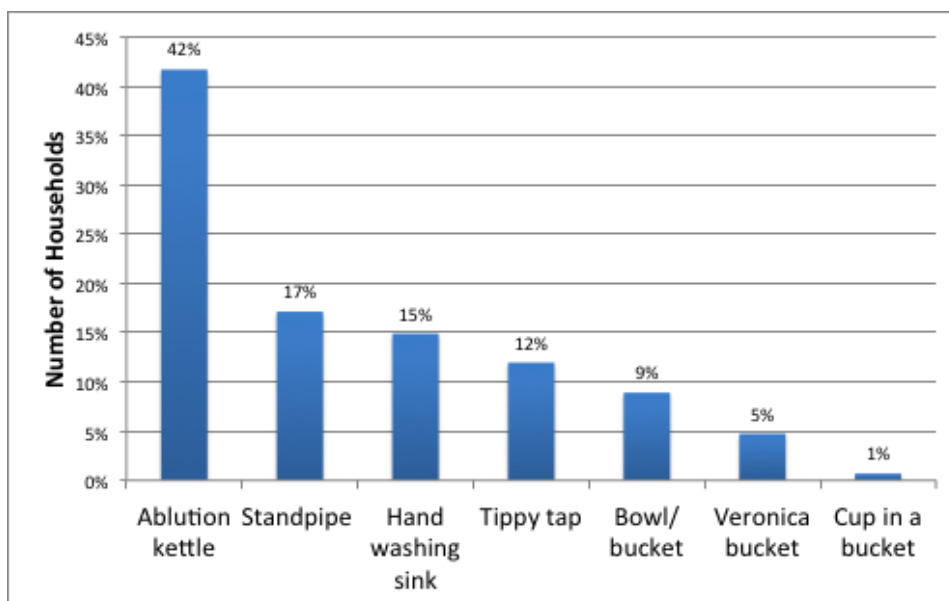


Figure 33 – Distribution of hand washing facilities used by households

9.4 Percentage of respondents who know any 3 critical times of hand washing

Despite the low prevalence of dedicated hand washing stations, 90 percent of households are able to identify at least three critical times for hand washing (Table 35). These responses included both anticipated categories coded into survey design and additional ones proposed by those surveyed. “Before praying” and “after working” were two new categories that emerged. Responses in the latter category were often straightforward. Simply put, people wash hands when they are dirty, and farming often makes hands dirty. Figure 34 and Figure 35 show the prevalence of hand washing knowledge by District, and indicate that 90 percent of all respondents in all districts know at least three critical times for hand washing.

Both categories suggest that hand washing may be a more common practice than is apparent by surveying the frequency of hand washing facilities (Figure 31).

Table 35 – Knowledge of critical hand washing times by Region

Knows at least three critical handwashing times	Northern Region	Upper East Region	Total
No	9%	10%	10%
Yes	91%	90%	90%

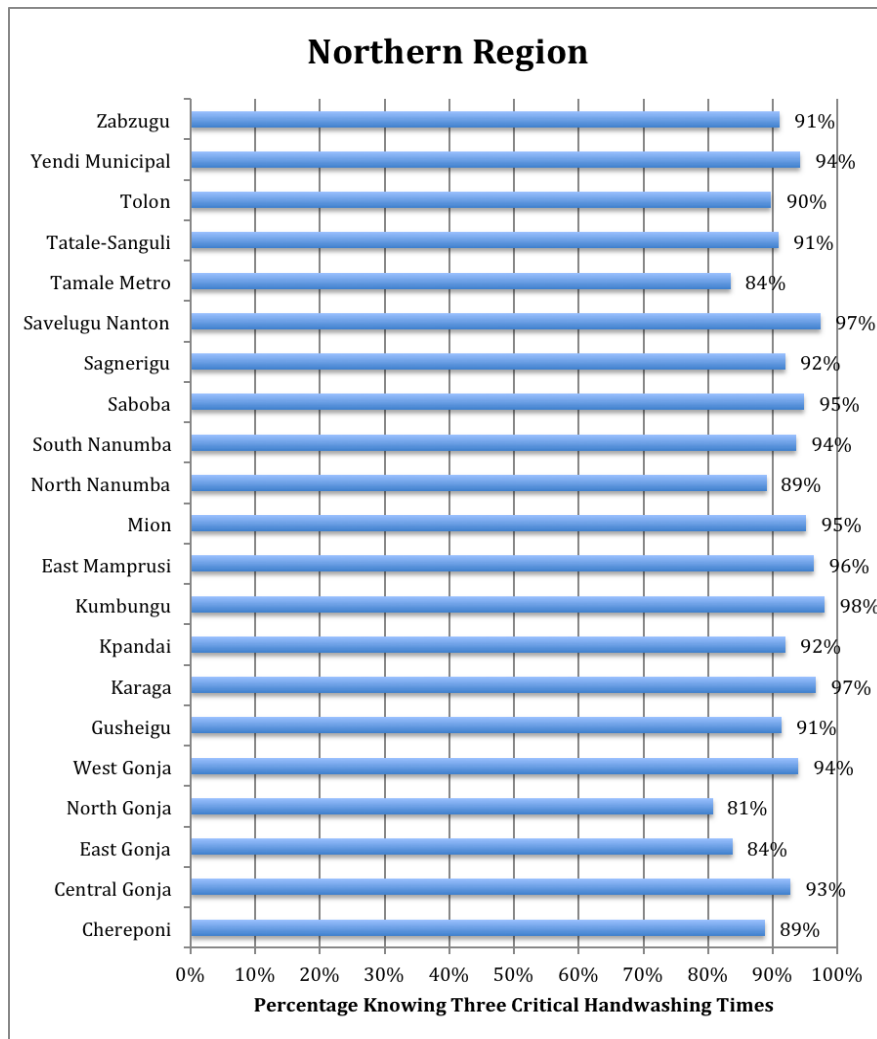


Figure 34 – Knowledge of critical hand washing times in Northern Region³⁰

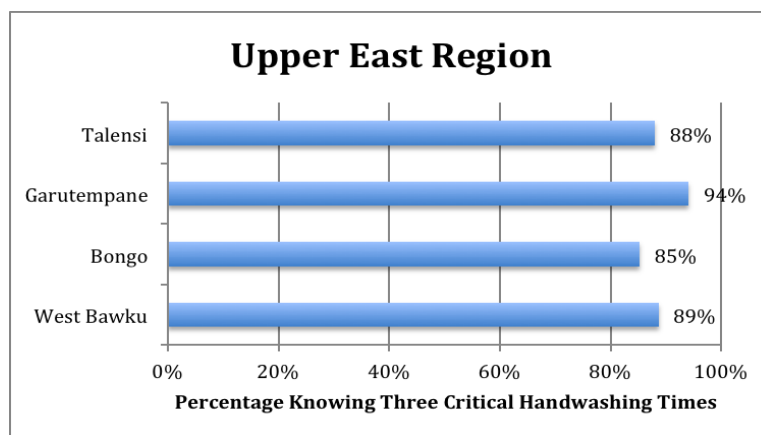


Figure 35 - Knowledge of critical hand washing times in Upper East Region

³⁰ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.
 SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu
 RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

10.0 RESULTS OF HOUSEHOLD INCOME STATUS, INTRA-HOUSEHOLD FOOD ALLOCATION AND VULNERABILITY STATUS

This section explores income, spending, and household food allocation to understand the vulnerability of households in the study area. These provide an overview of statistics that could be important for designing programs, and further analysis from the raw data could be possible at a later date could test and research targeted hypotheses. The findings could also lead to future studies, such as inquiry into types of predictable income sources and their associated risks.

10.1 Household Sources of Income

Survey results show (Table 36 and Figure 36) that sale of crop produce is the largest source of household income in both regions studied. Households in the Northern Region are found to generate a larger portion of household income from crop sales (62%) in comparison to the Upper East Region (40%), which produces a greater income proportion from livestock and poultry sales.

Table 36 – Percentage of Household income by source

Source of income	Northern Region (%)	Upper East Region (%)	Sample Size
Sale of crop produce	62.17	40.18	3,651
Petty trading	29.75	28.22	3,651
Sale of poultry	17.79	29.64	3,651
Sale of livestock	15.84	25.71	3,651
Shea Picking	11.31	9.32	3,651
Gift	5.04	11.96	3,651
Remittances	3.50	2.90	3,651
Rice Parboiling	2.02	0.71	3,651
TOTAL	100	100	

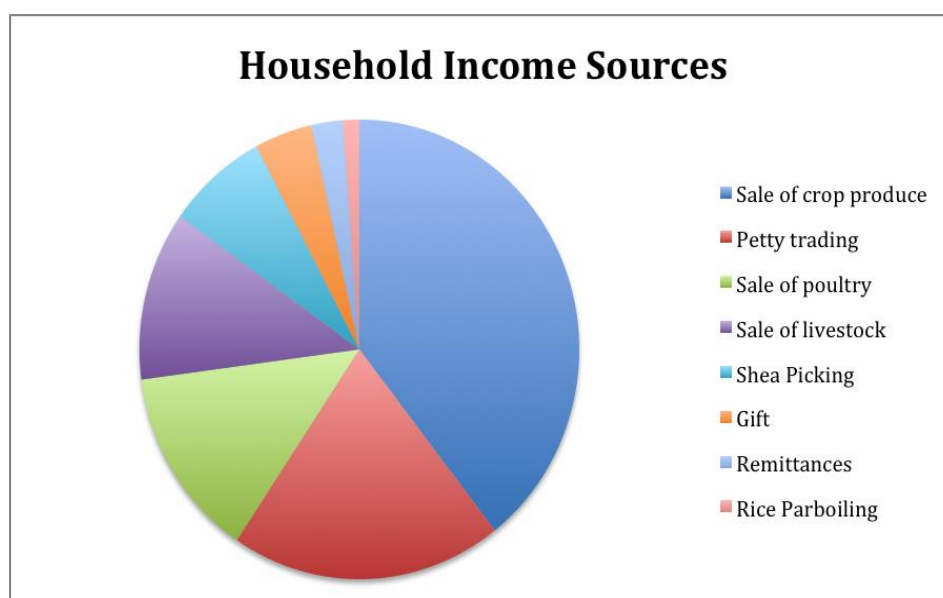


Figure 36 – Total percentage of household income sources for both regions

Figure 37 provides a breakdown by district showing the percentage of households that reported income from crop sales. This should not be conflated with the percentage of income from crop sales.

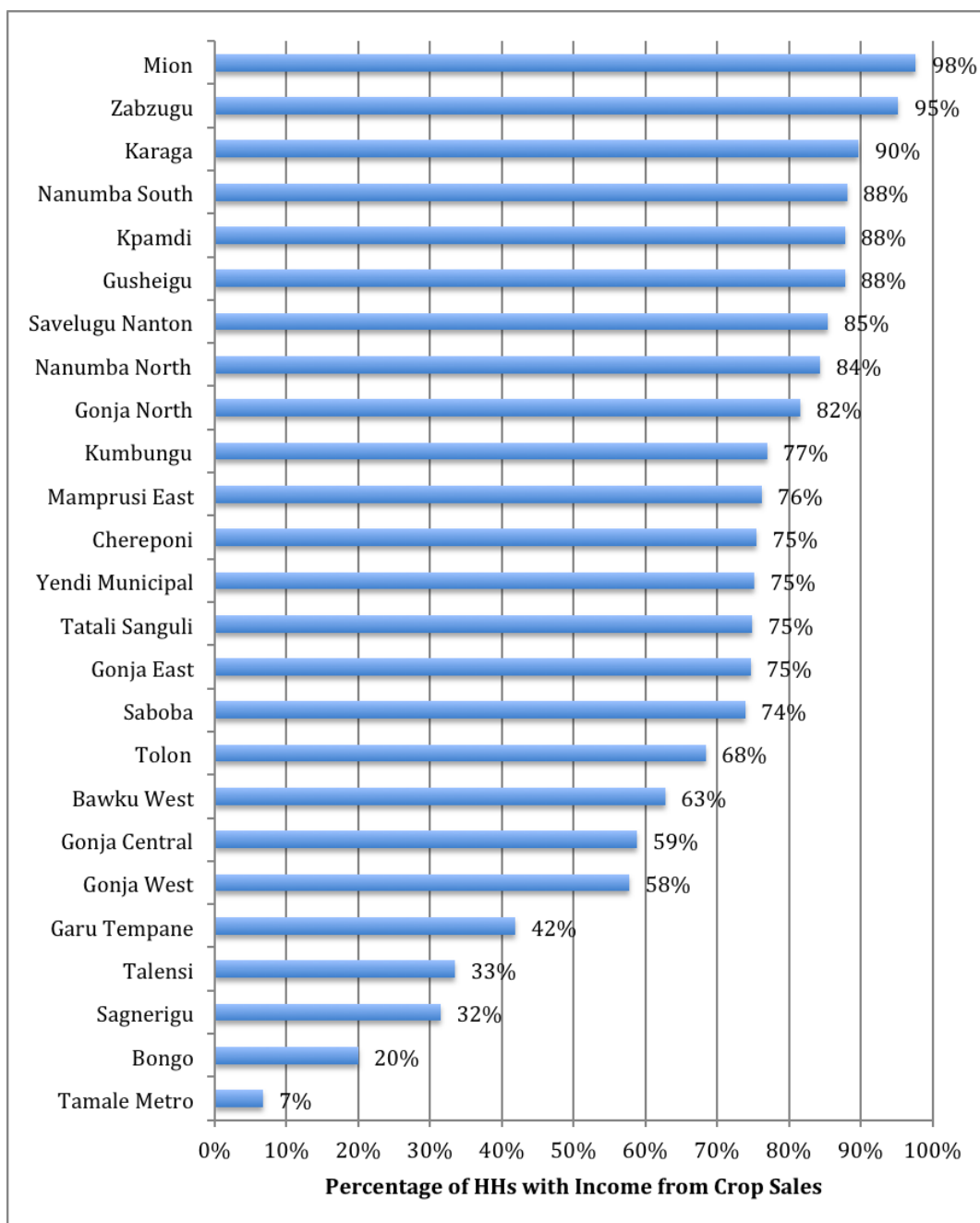


Figure 37 – Percentage of households with regular income from crop sales³¹

10.2 Percentage of Households with Regular Source of Income

As shown in Table 37, a larger percentage of households in the Northern Region were found to have a regular income (90%) than in the Upper East Region (72%). This may be influenced by the presence of the larger Tamale Municipality in the Northern Region providing more opportunities, but this hypothesis is speculative. The reasons for the regional difference were not explored further by the survey, but analysis by district may reveal insights important to project implementers (Figure 38). Tamale Metro, where 19 percent of households have some predictable income, emerges as an obvious leader that is distinct from other districts.

³¹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Table 37 – Percentage of households with regular income by Region

Do you have a regular (predictable) source of income	Northern Region (%)	Upper East Region (%)	Sample Size
Yes	90.41	71.86	3651
No	9.59	28.14	3651

Further detail by district is provided in Figure 38 and shows high percentages of predictable income reported in most districts. Follow up research could seek to understand these sources further, including how they are defined by households and associated risks.

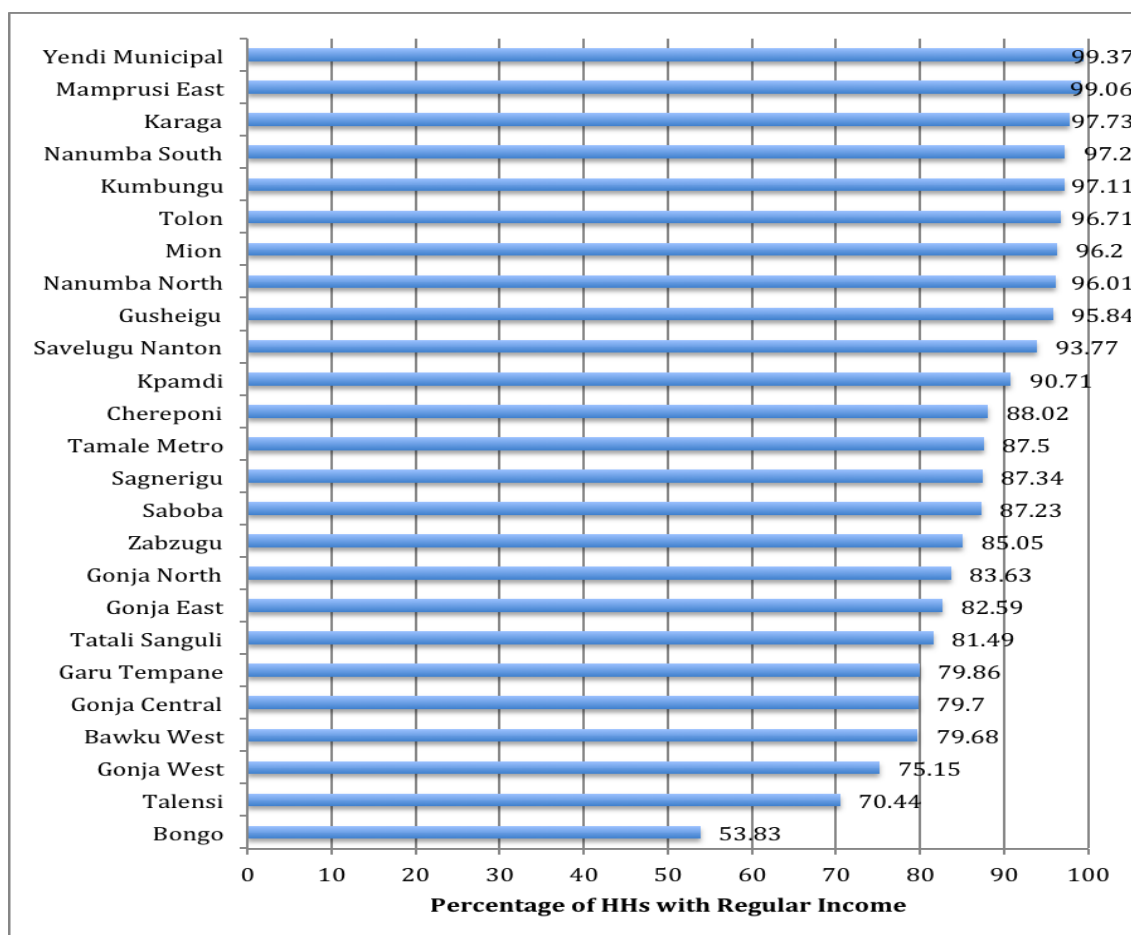


Figure 38– Percentage of households with predictable income sources by District³²

10.3 Household Use of Income from Sale of Crop Produce

Table 38 shows the analysis of household income use in the study region. Results show a higher propensity for saving income in the Northern Region than the Upper East Region. Only 32 percent of households in the Northern Region spend their entire income immediately compared to 59 percent of households in the Upper East Region.

³² SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Table 38 – Household income use by Region

Income After Sale of Surplus	Northern Region (%)	Upper East Region (%)	Sample Size
Spending all of it immediately	32.28	59.32	3651
Save most of it and spend a little	14.52	11.05	3651
Spend most of it and save a little	56.26	37.84	3651
Save all of it	1.23	0.28	3651
TOTAL	100	100	

10.4 Percentage of HHs Providing 3 Full Meals Daily for HH Members

Household ability to manage resources and provide for its members was assessed by understanding availability of meals throughout the year. Table 39 shows the distribution of households able to feed their members regularly. Nearly all households in the Northern Region (93%) meet this target, while only 67% do so in the Upper East Region. This may be linked to findings in Section 10.3 that finds a lesser likelihood of savings for households in the Upper East Region.

Table 39 – Percentage of households able to feed all members consistently by Region

Able to provide 3 full meals a day for every member the HH throughout the year	Northern Region (%)	Upper East Region (%)	Sample Size
Yes	92.7	66.56	3651
No	7.3	33.44	3651

10.5 Percentage of HHs with Appropriate Intra-household Food Allocation Attitudes

Meal availability within households can be further analyzed temporally. Monthly analysis, such as the one in Table 40, shows the times of greatest food stress for households in both regions. June is the most difficult month, with 80 percent and 84 percent of households unable to provide three meals in the Northern and Upper East Regions, respectively.

Table 40 – Percentage of HHs unable to provide three meals for household members by month

During which months are you not able to provide 3 full meals a day for every member of your HH?	Region (%)	
	Northern	Upper East
January	15.49	4.1
February	21.23	5.63
March	21.75	26.36
April	43.9	70.19
May	62.78	81.72
June	79.93	84.00
July	73.00	67.05
August	56.17	46.34
September	44.47	12.68
October	12.22	3.93
November	5.81	3.98
December	7.99	3.54

The survey finds that certain members of households are prioritized at all mealtimes. In both regions, as shown in Table 41, children are prioritized first.

Table 41 – Prioritization of food distribution within households by Region

Members of the HH who receives priority at mealtime	Region (%)	
	Northern	Upper East
Pregnant women	38.98	15.39
Women who just gave birth	30.77	12.99
Woman who is breastfeeding	44.00	10.64
Sick person	64.59	32.42
Child under 5 years	78.89	69.68
Elderly person	24.21	19.01
Head of Household / Landlord	7.32	5.07

Similarly to the results shown in, children are prioritized during meals, regardless of other circumstances. Table 42 presents the analysis. Children under five years old receive priority, followed by sick people.

Table 42 – Preferential meal distribution within households by Region

Circumstances under which preferential meals are given	Region (%)	
	Northern	Upper East
Pregnant women	38.00	25.41
Women who just gave birth	30.85	18.16
Woman who is breastfeeding	40.25	11.27
Sick person	67.25	48.36
Child under 5 years	75.05	64.47
Elderly person	22.24	18.75
Head of Household / Landlord	5.82	4.66

11.0 RESULTS OF HOUSEHOLDS KNOWLEDGE OF AFLATOXIN

Aflatoxins are toxic metabolites produced by fungal species during their growth under favorable conditions of temperature and moisture. The major aflatoxin producing species are *Aspergillus flavus* and *Aspergillus parasiticus*. The main cereals affected are maize, sorghum, rice and wheat and other crops such as groundnuts and cassava. This section assesses household knowledge of aflatoxin issues and reduction in the study area.

This section presents findings for household knowledge of aflatoxins, and practices related to crop production that can reduce aflatoxin exposure. These data are exclusively from household interviews and are not verified by observation of specific practices.

11.1 Percentage of Households with Accurate Knowledge of Aflatoxins

The majority of households interviewed, especially those in the Upper East region (61%), do not have any knowledge of aflatoxin, as seen in the below table.

Locality	Knowledge		
	Adequate	Inadequate	No knowledge
West Gonja	50.3	48.03	1.66
Central Gonja	34.99	40.37	24.64
East Gonja	57.13	42.87	0
Kpandai	10.84	65.61	23.55
Nanumba South	12.19	38.81	49.01
Nanumba North	7.76	30.87	61.37
Zabzugu	2.85	32.72	64.43
Yendi Municipal	66.28	20.08	13.64
Tamale Metro	32.21	6.77	61.02
Tolon	35.5	30.62	33.88
Savelugu Nanton	21.95	23.51	54.54
Karaga	7.64	17.22	75.15
Gushiegu	13.17	22.34	64.49
Saboba	15.23	25.65	59.12
Chereponi	10.78	39.78	49.44
Mamprusi East	75.6	14.33	10.07
North Gonja	19.6	29.46	50.94
Kumbumbu	27.69	35.94	36.37
Sagnerigu			
Municipal	23.58	24.38	52.04
Mion	8.17	17.03	74.8
Tatale-Sanguli	5.1	33.12	61.78
Talensi	23.15	7.39	69.4
Bongo	18.23	7.55	74.22
Bawku West	27.79	26.01	46.2
Garu Tempene	19.15	16.83	64.02
Northern	28.43	29.47	42.1
Upper East	22.24	16.51	61.25
All	27.22	26.93	45.86

The next Table 43 investigates household knowledge of aflatoxins, specifically about methods for aflatoxin reduction.

11.2 Percentage of Households with Systems for Reducing Aflatoxins in Maize

To reduce the level of aflatoxins in maize a number of good practices should be employed by households. The more a household knows about some of the good practices that is required to reduce the level of aflatoxin in maize, the likelihood the household will be able to put in place a good system that will reduce the level of aflatoxins during maize production, harvest and or storage. Respondents were therefore asked to outline some of the good practices that they

know about maize production, harvest and storage that reduces the level of aflatoxins in maize. Survey responses inform these data; verification of household systems was not performed.

Majority of the households interviewed did not have any knowledge of good practice for reducing aflatoxins during maize production. Only less than 2 percent of the households had knowledge of at least three good practices for reducing aflatoxin in maize. Approximately 63 percent of households in the Upper East Region did not have any knowledge of practices that can help reduce aflatoxins.

Table 43 – Percentage of Households with knowledge of aflatoxin reduction for maize processing

Good practice	Region		Total
	Northern	Upper East	
No Knowledge	48.98	63.48	51.83
At least in one	40.39	27.68	37.9
At least in two	9.51	5	8.62
At least in 3	1.12	3.85	1.65
Total	100	100	100

Table 44 details the percentage of practices employed by households processing maize and post harvest in the study area. This analysis is followed by

Table 45, which details the prevalence of maize storage practices for reducing aflatoxins.

Table 44 – Percentage of Households with knowledge of aflatoxin reduction for maize post harvest handling

Good practice	Region		Total
	Northern	Upper East	
No Knowledge	43.77	61.97	47.34
At least in one	32.7	21.85	30.57
At least in two	15.21	8.22	13.84
At least in 3	8.31	7.96	8.25
Total	100	100	100

Most households in the Upper East Region did not have any knowledge of post-harvest maize handling. Thus household in the Northern Region were relatively better in terms of reducing aflatoxins in maize than the households in the upper east region

Table 45 – Percentage of household knowing good maize storage practices for aflatoxin reduction

Good Practice	Region		Total
	Northern	Upper East	
No Knowledge	43.77	61.74	47.29
At least in one	26.91	25.9	26.71
At least in two	17	4.62	14.57
At least in 3	12.33	7.74	11.43
Total	100	100	100

The majority of households in the two regions studied did not know about good practices for reducing aflatoxin in maize. Overall, these findings indicate that the majority of households in the study area do not meet the minimum criteria for reducing aflatoxin levels in maize.

11.3 Percentage of Households with Systems for Reducing Aflatoxins in Groundnuts

Groundnut production also involves opportunities for aflatoxin reduction. Like production of maize, households were asked to outline some of the good practices that are required to reduce the level of aflatoxin in groundnut.

Table 46 – Percentage of Households knowing good groundnut production practices for aflatoxin reduction

Good Practice	Region		Total
	Northern	Upper East	
No Knowledge	75.08	85.92	77.21
At least in one	12.89	10.12	12.34
At least in two	10.04	1.57	8.38
At least in 3	1.99	2.39	2.07
Total	100	100	100

Table 47 – Percentage of Households knowing good groundnut processing practices for aflatoxin reduction

Good Practice	Region		Total
	Northern	Upper East	
No Knowledge	42.7	61.74	46.43
At least in one	39.7	28.22	37.45
At least in two	11.44	5.89	10.35
At least in 3	6.16	4.15	5.76
Total	100	100	100

Table 48 – Percentage of Households knowing good groundnut storage practices for aflatoxin reduction

Good Practice	Region		Total
	Northern	Upper East	
No Knowledge	43.06	61.45	46.66
At least in one	38.49	31.26	37.07
At least in two	11.22	3.66	9.74
At least in 3	7.23	3.62	6.52
Total	100	100	100

Basic knowledge of good practice in reducing the level of aflatoxin in groundnut production and storage was low. Majority of the households are not knowledgeable of any good practices for aflatoxin reduction. This therefore implies majority of the households do not meet the criteria for reducing aflatoxin levels.

This brings to conclusion the presentation of the findings from the baseline survey. The following pages of appendices provide supporting tables. Additionally, data sets are available upon request, for project staff, researchers or others to carry out further analysis.

APPENDIX: HEADLINE INDICATORS BY DISTRICT

A: Prevalence of stunted children under 5 years of age by District³³

Proportion of Children above the normal height for age (Z score > 2)

District	Proportion	Std. Err.	[95% Conf. Interval]		Sample size
West Gonja	0.120131	0.040171	0.060851	0.223423	88
Central Gonja	0.037025	0.020662	0.012189	0.106985	87
East Gonja	0.07231	0.02456	0.036623	0.1378	106
Kpandai	0.047972	0.021947	0.019257	0.114507	88
Nanumba South	0.063701	0.024223	0.029764	0.131106	125
Nanumba North	0.07697	0.030816	0.034392	0.163342	91
Zabzugu	0.058685	0.018411	0.03141	0.107028	188
Yendi Municipal	0.027588	0.016204	0.008603	0.084884	115
Tamale Metro	0.038093	0.019482	0.013767	0.101004	86
Tolon	0.069724	0.030315	0.029098	0.157848	140
Savelugu Nanton	0.057836	0.019951	0.029068	0.111796	150
Karaga	0.09687	0.030809	0.051021	0.176269	116
Gushiegu	0.056015	0.021904	0.025658	0.117939	155
Saboba	0.05053	0.021104	0.021967	0.111981	149
Chereponi	0.046753	0.016775	0.022905	0.093064	180
Mamprusi East	0.028385	0.012558	0.01182	0.066602	150
North Gonja	0.054857	0.02412	0.022776	0.126283	82
Kumbumbu	0.015216	0.008632	0.004968	0.045635	144
Sagnerigu Municipal	0.038036	0.018738	0.014276	0.097431	106
Mion	0.060261	0.030715	0.021655	0.156672	149
Tatale-Sanguli	0.049431	0.018859	0.023121	0.102538	152
Talensi	0.02574	0.020249	0.005393	0.114048	86
Bongo	0.073138	0.03081	0.031346	0.161366	85
Bawku West	0.063761	0.023895	0.030126	0.129918	102
Garu Tempene	0.005926	0.005933	0.000826	0.041199	114

³³ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Proportion of Children in the normal height for age range (≤ -2 Z score ≤ 2)³⁴

District	Proportion	Std. Err.	[95% Conf. Interval]		Sample size
West Gonja	0.757254	0.050654	0.645027	0.842655	88
Central Gonja	0.656685	0.049289	0.554727	0.745987	87
East Gonja	0.644434	0.047301	0.547312	0.730962	106
Kpandai	0.704929	0.059048	0.577896	0.806531	88
Nanumba South	0.416535	0.054483	0.315038	0.525639	125
Nanumba North	0.495601	0.058519	0.383031	0.608619	91
Zabzugu	0.561294	0.042824	0.476354	0.642788	188
Yendi Municipal	0.600594	0.055326	0.488905	0.702717	115
Tamale Metro	0.722816	0.049586	0.616115	0.809051	86
Tolon	0.617169	0.058397	0.498204	0.723579	140
Savelugu Nanton	0.575308	0.04239	0.490822	0.655612	150
Karaga	0.508044	0.046995	0.41664	0.598915	116
Gushiegu	0.540966	0.042293	0.457654	0.622049	155
Saboba	0.667995	0.04292	0.579222	0.746244	149
Chereponi	0.638808	0.041925	0.553256	0.716376	180
Mamprusi East	0.704302	0.038816	0.623008	0.774413	150
North Gonja	0.740628	0.047904	0.636491	0.823218	82
Kumbumbu	0.648987	0.048986	0.548065	0.73814	144
Sagnerigu Municipal	0.675665	0.053254	0.563979	0.77039	106
Mion	0.574004	0.084417	0.406402	0.726169	149
Tatale-Sanguli	0.586915	0.040645	0.505609	0.663742	152
Talensi	0.756188	0.049169	0.647681	0.839555	86
Bongo	0.636326	0.056851	0.519402	0.739092	85
Bawku West	0.780949	0.04703	0.67525	0.859409	102
Garu Tempene	0.753504	0.046834	0.650869	0.833677	114

³⁴ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Proportion of Stunted Children (Z score ≤ -2)³⁵

District	Proportion	Std. Err.	[95% Conf. Interval]		Sample size
West Gonja	0.122614	0.038209	0.065103	0.219027	88
Central Gonja	0.30629	0.046469	0.223317	0.404054	87
East Gonja	0.283255	0.04495	0.20382	0.378916	106
Kpandai	0.247098	0.056501	0.153193	0.373198	88
Nanumba South	0.519763	0.054078	0.414401	0.623397	125
Nanumba North	0.427429	0.057792	0.319631	0.542591	91
Zabzugu	0.380021	0.041185	0.303161	0.463408	188
Yendi Municipal	0.371819	0.053267	0.274545	0.480719	115
Tamale Metro	0.239091	0.047011	0.159164	0.342792	86
Tolon	0.313107	0.060905	0.207343	0.44269	140
Savelugu Nanton	0.366856	0.041873	0.289198	0.452103	150
Karaga	0.395085	0.047645	0.306408	0.49125	116
Gushiegu	0.403019	0.039881	0.327836	0.483054	155
Saboba	0.281475	0.038826	0.211875	0.363395	149
Chereponi	0.314439	0.039232	0.242986	0.395915	180
Mamprusi East	0.267313	0.037855	0.19983	0.347683	150
North Gonja	0.204516	0.043135	0.132585	0.301889	82
Kumbumbu	0.335797	0.048408	0.248292	0.436244	144
Sagnerigu Municipal	0.286299	0.051557	0.196506	0.396857	106
Mion	0.365736	0.070928	0.24045	0.512273	149
Tatale-Sanguli	0.363654	0.039152	0.290832	0.443313	152
Talensi	0.218072	0.045305	0.142093	0.319546	86
Bongo	0.290537	0.049716	0.203298	0.396577	85
Bawku West	0.15529	0.041473	0.08999	0.254712	102
Garu Tempene	0.24057	0.046555	0.161202	0.343035	114

³⁵ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

B: Prevalence of exclusive breastfeeding of children 0-5 months of age ³⁶

Row Labels	Proportion	SD	95% Confidence		Sample Size
Bawku West	0.302	0.189	0.162	0.442	7
Bongo	0.491	0.125	0.430	0.552	16
Chereponi	0.690	0.096	0.654	0.727	27
Garu Tempene	0.573	0.177	0.451	0.696	8
Central Gonja	0.791	0.134	0.721	0.861	14
Gonja East	0.698	0.151	0.609	0.787	11
Gonja North	0.399	0.158	0.301	0.497	10
Gonja West	0.342	0.134	0.272	0.412	14
Gusheigu	0.523	0.102	0.482	0.564	24
Karaga	0.174	0.129	0.108	0.239	15
Kpandai	0.833	0.151	0.744	0.922	11
Kumbungu	0.571	0.104	0.528	0.614	23
Mamprusi East	0.744	0.144	0.663	0.826	12
Mion	0.439	0.118	0.385	0.493	18
Nanumba North	0.000	0.000	0.000	0.000	0
Nanumba South	0.699	0.134	0.629	0.769	14
Saboba	0.635	0.177	0.513	0.758	8
Sagnerigu	0.714	0.125	0.652	0.775	16
Savelugu Nanton	0.627	0.125	0.565	0.688	16
Talensi	0.777	0.118	0.722	0.831	18
Tamale Metro	0.544	0.189	0.404	0.684	7
Tatali Sanguli	0.191	0.158	0.093	0.289	10
Tolon	0.690	0.144	0.608	0.772	12
Yendi Municipal	0.603	0.109	0.556	0.650	21
Zabzugu	0.739	0.144	0.657	0.821	12

³⁶ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

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C: Prevalence of children 6-23 months receiving a Minimum Acceptable Diet³⁷

District	Proportion	Std. Dev.	95% Confidence		Sample Size
Chereponi	0.000	0.061	-0.015	0.015	67
Central Gonja	0.087	0.094	0.052	0.122	28
Gonja East	0.000	0.082	-0.026	0.026	37
Gonja North	0.000	0.100	-0.039	0.039	25
Gonja West	0.024	0.091	-0.008	0.057	30
Gusheigu	0.145	0.069	0.126	0.164	52
Karaga	0.140	0.091	0.107	0.173	30
Kpandai	0.071	0.098	0.034	0.109	26
Kumbungu	0.142	0.069	0.124	0.161	53
Mamprusi East	0.050	0.076	0.027	0.073	43
Mion	0.088	0.079	0.064	0.113	40
Nanumba North	0.037	0.100	-0.003	0.076	25
Nanumba South	0.029	0.098	-0.009	0.067	26
Saboba	0.026	0.071	0.006	0.045	50
Sagnerigu	0.286	0.088	0.255	0.316	32
Savelugu Nanton	0.033	0.075	0.012	0.055	45
Tamale Metro	0.144	0.094	0.109	0.179	28
Tatali Sanguli	0.024	0.075	0.002	0.046	44
Tolon	0.136	0.076	0.113	0.159	43
Yendi Municipal	0.148	0.079	0.124	0.173	40
Zabzugu	0.008	0.057	-0.005	0.021	77
Bawku West	0.000	0.086	-0.029	0.029	34
Bongo	0.040	0.109	-0.006	0.087	21
Garu Tempene	0.015	0.077	-0.008	0.038	42
Talensi	0.093	0.088	0.062	0.123	32

³⁷ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

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D: Appropriate introduction of complementary feeding among children 6-8 months of age³⁸

District	Proportion	Std. Dev	95% Confidence		Sample Size
Bawku West	0.676	0.204	0.513	0.839	6
Bongo	0.741	0.289	0.414	1.067	3
Chereponi	0.471	0.139	0.396	0.547	13
Garu Tempane	0.285	0.144	0.203	0.367	12
Central Gonja	0.303	0.250	0.058	0.548	4
Gonja East	0.507	0.224	0.311	0.703	5
Gonja North	0.580	0.224	0.384	0.776	5
Gonja West	0.243	0.224	0.047	0.439	5
Gusheigu	0.305	0.177	0.182	0.427	8
Karaga	0.412	0.289	0.085	0.738	3
Kpandai	0.727	0.250	0.482	0.972	4
Kumbungu	0.430	0.177	0.308	0.553	8
Mamprusi East	0.758	0.177	0.635	0.880	8
Mion	0.526	0.177	0.403	0.648	8
Nanumba North	0.793	0.177	0.671	0.916	8
Nanumba South	1.000	0.289	0.673	1.327	3
Saboba	0.135	0.204	-0.028	0.299	6
Sagnerigu	0.833	0.250	0.588	1.078	4
Savelugu Nanton	0.000	0.144	-0.082	0.082	12
Talensi	0.495	0.354	0.005	0.985	2
Tamale Metro	0.289	0.167	0.180	0.398	9
Tatali Sanguli	0.562	0.224	0.366	0.758	5
Tolon	0.345	0.158	0.247	0.443	10
Yendi Municipal	0.793	0.224	0.597	0.989	5
Zabzugu	0.494	0.167	0.385	0.603	9

³⁸ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Ei: Percentage of caregivers reached by BCC activities who understood key messages³⁹

District	Proportion	Std. Err.	[95% Conf. Interval]		Sample size
West Gonja	0.224109	0.036469	0.160692	0.303503	145
Central Gonja	0.127066	0.029723	0.079254	0.197535	149
East Gonja	0.239162	0.036151	0.175548	0.316965	150
Kpandai	0.224002	0.040191	0.155011	0.312349	108
Nanumba South	0.285743	0.037618	0.217971	0.364759	152
Nanumba North	0.283592	0.036814	0.217213	0.360903	150
Zabzugu	0.299481	0.041907	0.224189	0.387431	136
Yendi Municipal	0.502719	0.042343	0.42038	0.58491	146
Tamale Metro	0.341974	0.040325	0.267791	0.424785	151
Tolon	0.630541	0.042876	0.543311	0.710002	148
Savelugu Nanton	0.31301	0.039304	0.241505	0.394671	154
Karaga	0.329852	0.042717	0.252044	0.418248	151
Gushiegu	0.298535	0.03681	0.231668	0.375276	151
Saboba	0.341261	0.040778	0.266328	0.425062	152
Chereponi	0.310738	0.039898	0.238321	0.393784	151
Mamprusi East	0.622247	0.041133	0.53892	0.698928	159
North Gonja	0.358477	0.036398	0.290637	0.432498	152
Kumbumbu	0.489638	0.046633	0.399552	0.580402	152
Sagnerigu Municipal	0.360085	0.039003	0.287641	0.439517	151
Mion	0.29859	0.046925	0.215293	0.397779	152
Tatale-Sanguli	0.308413	0.037143	0.240677	0.385535	174
Talensi	0.328943	0.040367	0.255116	0.412309	153
Bongo	0.364101	0.040798	0.288416	0.447166	153
Bawku West	0.512818	0.042214	0.430454	0.594492	158
Garu Tempene	0.354991	0.041533	0.27832	0.439909	157

³⁹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

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Eii: Percentage of caregivers who are practicing or adopting improved nutrition practices⁴⁰

District	Proportion	Std. Err.	[95% Conf. Interval]		Sample size
West Gonja	0.880597	0.119403	0.284746	0.992734	9
Central Gonja	0.822433	.	.	.	8
East Gonja	1	.	.	.	7
Kpandai	0.900923	0.070787	0.6305	0.979781	25
Nanumba South	0.946322	0.053678	0.638112	0.994359	18
Nanumba North	0.876695	.	.	.	7
Zabzugu	0.956369	.	.	.	21
Yendi Municipal	1	.	.	.	10
Tamale Metro	0.7579	.	.	.	5
Tolon	0.773267	.	.	.	20
Savelugu Nanton	1	.	.	.	8
Karaga	0.948435	.	.	.	22
Gushiegu	0.937787	.	.	.	18
Saboba	0.984895	0.015105	0.891555	0.99807	38
Chereponi	0.897819	0.051418	0.735602	0.965216	35
Mamprusi East	0.941072	.	.	.	38
North Gonja	0.666667	0.333333	0.003139	0.999214	3
Kumbumbu	0.958382	.	.	.	26
Sagnerigu Municipal	1	.	.	.	6
Mion	1	.	.	.	6
Tatale-Sanguli	0.816412	.	.	.	7
Talensi	1	.	.	.	9
Bongo	1	.	.	.	14
Bawku West	0.981557	0.018595	0.866885	0.997706	41
Garu Tempene	0.966745	.	.	.	25

⁴⁰ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

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F: Percentage of households using an improved drinking water source (weighted sample size)⁴¹

Region/District	Piped water into dwelling	Piped water into neighbor	Solar polytank	Piped water to yard/plot	Public tap/standpipe	Tube well/Borehole	Protected dug well	Rainwater collection	TOTAL	Percentage
Northern	21955	35363	0	24371	65219	82347	8917	349	238522	69%
Chereponi	0	0	0	0	324	5700	0	0	6024	67%
Central Gonja	911	0	0	1392	1801	3813	410	0	8326	46%
East Gonja	865	0	0	0	660	2340	2185	0	6050	27%
North Gonja	35	0	0	35	907	2522	0	0	3501	57%
West Gonja		0	0	52	117	4054	88	0	4311	77%
Gusheigu	215	0	0		2207	8738	2424	0	13584	97%
Karaga		114	0		804	6744	67	0	7730	79%
Kpandai	392	0	0	113	2506	1680	0	0	4692	29%
Kumbungu	361	241	0	464	6487	1253	0	42	8849	83%
East Mamprusi	188	0	0	94	754	6210	2573	0	9819	50%
Mion		0	0		1061	3855	151	0	5068	41%
North Nanumba	122	0	0	461	4880	7694	0	0	13158	59%
South Nanumba	855	266	0	269	3015	2272	0	0	6678	51%
Saboba	82	0	0	82	968	7523	0	0	8656	83%
Sagnerigu	6477	9452	0	7957	12543	503	0	0	36931	98%
Savelugu Nanton	994	0	0		9544	3261	0	0	13799	78%
Tamale Metro	10000	24922	0	12394	9958		958	0	58232	99%
Tatali Sanguli	274	0	0	463	1359	5840	0	0	7937	90%
Tolon		307	0	307	3944	776	0	307	5641	44%
Yendi Municipal	182	61	0	242	607	3353	61	0	4505	33%
Zabzugu		0	0	45	771	4216	0	0	5033	80%

⁴¹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

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RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Region/District	Piped water into dwelling	Piped water into neighbor	Solar polytank	Piped water to yard/plot	Public tap/standpipe	Tube well/Borehole	Protected dug well	Rainwater collection	TOTAL	Percentage
Upper East	178	0	90	422	4331	55330	6771	256	67379	86%
West Bawku	66	0	0	197	590	13154	2286	0	16292	86%
Bongo	0	0	0	0	0	14226	909	162	15297	86%
Garu Tempene	0	0	0	0	3333	15593	2909	0	21834	90%
Talensi	113	0	90	226	409	12357	668	94	13956	82%

Region/District	Piped water into dwelling	Piped water into neighbor	Solar polytank	Piped water to yard/plot	Public tap/standpipe	Tube well/Borehole	Protected dug well	Rainwater collection	TOTAL	Percentage
Grand Total	22133	35363	90	24794	69550	137678	15689	606	305901	72%

G: Percentage of households using an improved sanitation facility or latrine⁴²

Region/District	Open defecation	Public Toilet	Unimproved pit latrine, no slabs or non-cleanable	Pit latrine, with cleanable slabs	Flush to open cesspit or open drain	Flush to septic tank or pit	Flush to sewer	Potable toilet with emptying service	KVIP	Percentage with Facilities
Northern	219669	56788	16312	39532	2107	2608	1398	722	6589	36.46%
Chereponi	7705	97	847	313	0	0	0	0	0	14.03%
Central Gonja	16953	0	116	673	0	172	344	0	0	7.15%
East Gonja	17222	0	217	4214	0	0	446	0	0	22.07%
North Gonja	5981	0	66	77	0	0	0	0	0	2.34%
West Gonja	5163	0	82	322	0	0	0	0	0	7.26%
Gusheigu	13188	0	0	570	0	0	107	177	0	6.08%
Karaga	7850	0	0	808	0	0	0	114	981	19.51%
Kpandai	13953	0	1937	392	0	0	0	0	0	14.30%
Kumbungu	7682	1039	884	925	0	70	0	0	0	27.53%
East Mamprusi	17422	0	318	1670	0	0	0	0	188	11.10%
Mion	11664	0	0	448	0	0	0	0	239	5.56%
North Nanumba	18439	1261	1278	1195	0	0	0	0	0	16.84%
South Nanumba	10834	327	414	1410	0	68	0	133	0	17.84%
Saboba	7693	82	130	1761	0	0	0	82	659	26.08%
Sagnerigu	15626	11615	1971	6025	583	1071	0	0	786	58.53%
Savelugu Nanton	9886	995	3187	2421	0	0	108	215	908	44.21%
Tamale Metro	912	39816	864	13765	1450	1153	393	0	738	98.46%
Tatali Sanguli	5756	0	1006	1269	74	76	0	0	600	34.45%
Tolon	10531	766	791	762	0	0	0	0	65	18.46%
Yendi Municipal	9661	735	1912	189	0	0	0	0	1344	30.20%
Zabzugu	5548	54	292	323	0	0	0	0	81	11.91%
Upper East	69890	362	3327	2199	0	113	0	66	2117	10.48%
West Bawku	15178	0	1952	1619	0	0	0	66	197	20.17%

⁴² SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

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Bongo	17584	106	0	0	0	0	0	0	86	1.08%
Garu Tempane	21946	143	924	468	0	0	0	0	861	9.84%
Talensi	15181	113	452	113	0	113	0	0	974	10.42%
Grand Total	289558	57150	19639	41731	2107	2721	1398	787	8706	31.68%

H: Percentage of households with functional hand washing stations in recommended locations⁴³

Region	Ablution kettle	Standpipe	Hand washing sink	Tippy tap	Bowl/ bucket	Veronica bucket	Cup in a bucket	Percentage with Facilities
Northern	769	2785	2422	1448	113	6780	1944	5%
Chereponi	0	0	0	0	0	163	54	2%
Central Gonja	0	172	0	187	0	0	0	2%
East Gonja	0	223	446	0	0	0	0	3%
North Gonja	0	0	0	0	0	42	0	1%
West Gonja	0	0	0	43	0	0	0	1%
Gusheigu	0	0	0	116	0	349	0	3%
Karaga	0	0	0	0	0	0	0	0%
Kpandai	255	0	0	509	113	463	179	9%
Kumbungu	0	43	0	0	0	918	217	11%
East Mamprusi	0	0	0	0	0	0	0	0%
Mion	0	0	0	0	0	0	60	0%
North Nanumba	197	0	0	393	0	536	0	5%
South Nanumba	187	0	68	79	0	133	0	4%
Saboba	130	0	0	0	0	130	0	3%
Sagnerigu	0	1021	1151	0	0	648	0	7%
Savelugu Nanton	0	0	0	0	0	0	0	0%
Tamale Metro	0	1326	757	0	0	1617	0	6%
Tatali Sanguli	0	0	0	0	0	0	0	0%
Tolon	0	0	0	0	0	1663	0	13%
Yendi Municipal	0	0	0	120	0	120	1434	12%
Zabzugu	0	0	0	0	0	0	0	0%
Upper East	0	0	0	0	0	0	0	0%
West Bawku	0	0	0	0	0	0	0	0%
Bongo	0	0	0	0	0	0	0	0%
Garu Tempene	0	0	0	0	0	0	0	0%
Talensi	0	0	0	0	0	0	0	0%
Grand Total	769	2785	2422	1448	113	6780	1944	4%

⁴³ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

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RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

I: Percentage of people who know any three critical times of hand washing⁴⁴

District	Percentage	Std. Dev.	95% Confidence		Sample Size
Bongo	0.853	0.041	0.847	0.860	151
Central Gonja	0.928	0.042	0.921	0.935	142
Chereponi	0.889	0.042	0.883	0.896	145
East Gonja	0.839	0.041	0.832	0.846	146
East Mamprusi	0.964	0.042	0.957	0.971	140
Garu Tempane	0.941	0.041	0.935	0.948	150
Gusheigu	0.914	0.043	0.907	0.921	138
Karaga	0.967	0.041	0.961	0.974	148
Kpandai	0.920	0.053	0.909	0.931	90
Kumbungu	0.981	0.041	0.974	0.987	152
Mion	0.952	0.041	0.945	0.959	148
North Gonja	0.808	0.041	0.801	0.815	148
North Nanumba	0.891	0.042	0.884	0.898	145
Saboba	0.949	0.041	0.943	0.956	146
Sagnerigu	0.920	0.044	0.912	0.927	128
South Nanumba	0.937	0.042	0.930	0.944	140
Savelugu Nanton	0.974	0.041	0.968	0.981	146
Talensi	0.881	0.042	0.874	0.888	145
Tamale Metro	0.836	0.041	0.830	0.843	148
Tatali Sanguli	0.909	0.041	0.903	0.916	151
Tolon	0.898	0.048	0.889	0.907	109
West Bawku	0.887	0.041	0.881	0.894	150
West Gonja	0.940	0.038	0.935	0.946	173
Yendi Municipal	0.943	0.043	0.936	0.951	136
Zabzugu	0.911	0.041	0.905	0.918	150

⁴⁴ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

J: Percentage of households with maize and groundnut storage systems meeting criteria needed for reducing aflatoxin levels

Proportion of households with knowledge of at least one good practice for groundnut storage⁴⁵

District	Proportion	Std. Err.	[95% Conf. Interval]		Sample size
West Gonja	0.878	0.044	0.763	0.942	78
Central Gonja	0.605	0.052	0.5	0.702	80
East Gonja	0.863	0.038	0.77	0.923	96
Kpandai	0.434	0.059	0.323	0.552	71
Nanumba South	0.161	0.04	0.097	0.255	87
Nanumba North	0.175	0.042	0.107	0.272	90
Zabzugu	0.255	0.044	0.178	0.351	111
Yendi Municipal	0.538	0.047	0.445	0.629	119
Tamale Metro	0.39	0.123	0.188	0.638	16
Tolon	0.489	0.062	0.37	0.61	102
Savelugu Nanton	0.357	0.036	0.289	0.43	128
Karaga	0.066	0.024	0.032	0.132	139
Gushiegu	0.14	0.034	0.085	0.22	117
Saboba	0.348	0.048	0.26	0.447	120
Chereponi	0.43	0.048	0.34	0.524	117
Mamprusi East	0.369	0.041	0.292	0.453	136
North Gonja	0.335	0.034	0.272	0.405	112
Kumbumbu	0.596	0.049	0.498	0.686	136
Sagnerigu Municipal	0.425	0.069	0.298	0.562	57
Mion	0.049	0.025	0.017	0.13	135
Tatale-Sanguli	0.292	0.041	0.218	0.379	141
Talensi	0.22	0.055	0.13	0.346	66
Bongo	0.15	0.039	0.088	0.242	85
Bawku West	0.452	0.05	0.357	0.55	126
Garu Tempene	0.317	0.047	0.233	0.414	119

⁴⁵ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Proportion of households with knowledge of at least one good practice for maize storage⁴⁶

District	Proportion	Std. Err.	[95% Conf.	Interval]	Sample size
West Gonja	0.588	0.063	0.461	0.703	78
Central Gonja	0.482	0.054	0.379	0.587	80
East Gonja	0.546	0.050	0.447	0.642	96
Kpandai	0.374	0.063	0.260	0.504	71
Nanumba South	0.164	0.041	0.098	0.262	87
Nanumba North	0.160	0.041	0.095	0.258	90
Zabzugu	0.261	0.045	0.183	0.359	111
Yendi Municipal	0.418	0.047	0.329	0.513	119
Tamale Metro	0.176	0.095	0.056	0.435	16
Tolon	0.369	0.060	0.261	0.492	102
Savelugu Nanton	0.233	0.035	0.173	0.308	128
Karaga	0.009	0.006	0.002	0.036	139
Gushiegu	0.050	0.020	0.023	0.106	117
Saboba	0.269	0.043	0.193	0.362	120
Chereponi	0.279	0.044	0.201	0.373	117
Mamprusi East	0.232	0.038	0.166	0.314	136
North Gonja	0.316	0.037	0.248	0.392	112
Kumbumbu	0.375	0.049	0.284	0.475	136
Sagnerigu Municipal	0.232	0.058	0.137	0.365	57
Mion	0.036	0.023	0.010	0.124	135
Tatale-Sanguli	0.266	0.040	0.196	0.351	141
Talensi	0.171	0.048	0.096	0.287	66
Bongo	0.192	0.046	0.118	0.297	85
Bawku West	0.337	0.047	0.252	0.434	126
Garu Tempene	0.264	0.044	0.188	0.357	119

⁴⁶ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

K: Percentage of farmers with accurate knowledge of aflatoxin-related issues

Proportion of Households with Adequate knowledge of Aflatoxin⁴⁷

District	Proportion	Std. Err.	[95% Conf. Interval]	Sample size
West Gonja	0.095	0.039	0.041	88
Central Gonja	0.010	0.010	0.001	88
East Gonja	0.071	0.024	0.036	108
Kpandai	0.064	0.028	0.027	89
Nanumba South	0.077	0.026	0.039	127
Nanumba North	0.079	0.031	0.035	92
Zabzugu	0.058	0.018	0.031	189
Yendi Municipal	0.045	0.020	0.019	117
Tamale Metro	0.031	0.018	0.009	86
Tolon	0.066	0.030	0.027	140
Savelugu Nanton	0.057	0.020	0.028	152
Karaga	0.088	0.029	0.045	117
Gushiegu	0.056	0.024	0.024	158
Saboba	0.055	0.021	0.025	151
Chereponi	0.047	0.017	0.023	181
Mamprusi East	0.024	0.010	0.011	151
North Gonja	0.044	0.022	0.016	83
Kumbumbu	0.010	0.007	0.002	145
Sagnerigu Municipal	0.021	0.015	0.005	106
Mion	0.060	0.031	0.022	149
Tatale-Sanguli	0.071	0.022	0.038	157
Talensi	0.026	0.020	0.005	86
Bongo	0.061	0.025	0.027	86
Bawku West	0.072	0.024	0.037	102
Garu Tempene	0.006	0.006	0.001	114

⁴⁷ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Proportion of Households with Inadequate knowledge of Aflatoxins⁴⁸

District	Proportion	Std. Err.	[95% Conf.	Interval]	Sample size
West Gonja	0.813	0.047	0.703	0.889	88
Central Gonja	0.765	0.047	0.662	0.844	88
East Gonja	0.691	0.044	0.599	0.770	108
Kpandai	0.741	0.063	0.602	0.844	89
Nanumba South	0.493	0.052	0.392	0.594	127
Nanumba North	0.564	0.060	0.445	0.677	92
Zabzugu	0.645	0.041	0.560	0.721	189
Yendi Municipal	0.661	0.054	0.549	0.757	117
Tamale Metro	0.795	0.045	0.692	0.871	86
Tolon	0.712	0.049	0.606	0.799	140
Savelugu Nanton	0.652	0.043	0.564	0.730	152
Karaga	0.638	0.044	0.548	0.720	117
Gushiegu	0.616	0.044	0.526	0.698	158
Saboba	0.695	0.042	0.607	0.770	151
Chereponi	0.725	0.038	0.645	0.792	181
Mamprusi East	0.804	0.033	0.732	0.860	151
North Gonja	0.787	0.047	0.681	0.864	83
Kumbumbu	0.733	0.050	0.624	0.819	145
Sagnerigu Municipal	0.753	0.050	0.643	0.838	106
Mion	0.677	0.074	0.518	0.803	149
Tatale-Sanguli	0.623	0.042	0.539	0.701	157
Talensi	0.837	0.044	0.731	0.906	86
Bongo	0.732	0.053	0.618	0.822	86
Bawku West	0.815	0.041	0.721	0.883	102
Garu Tempane	0.877	0.038	0.781	0.935	114

⁴⁸ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Proportion of Households without any knowledge of Aflatoxins⁴⁹

District	Proportion	Std. Err.	[95% Conf. Interval]	Sample size
West Gonja	0.092	0.032	0.045 0.176	88
Central Gonja	0.224	0.046	0.146 0.328	88
East Gonja	0.238	0.039	0.171 0.322	108
Kpandai	0.195	0.054	0.110 0.321	89
Nanumba South	0.430	0.050	0.335 0.530	127
Nanumba North	0.357	0.058	0.252 0.477	92
Zabzugu	0.298	0.038	0.228 0.378	189
Yendi Municipal	0.294	0.054	0.200 0.408	117
Tamale Metro	0.174	0.042	0.105 0.272	86
Tolon	0.222	0.047	0.144 0.326	140
Savelugu Nanton	0.291	0.042	0.217 0.379	152
Karaga	0.274	0.043	0.199 0.365	117
Gushiegu	0.329	0.038	0.259 0.407	158
Saboba	0.251	0.037	0.186 0.330	151
Chereponi	0.229	0.034	0.169 0.301	181
Mamprusi East	0.172	0.031	0.120 0.242	151
North Gonja	0.169	0.044	0.099 0.273	83
Kumbumbu	0.258	0.050	0.172 0.367	145
Sagnerigu Municipal	0.226	0.049	0.144 0.335	106
Mion	0.263	0.059	0.164 0.394	149
Tatale-Sanguli	0.306	0.041	0.232 0.391	157
Talensi	0.138	0.040	0.076 0.236	86
Bongo	0.206	0.045	0.131 0.309	86
Bawku West	0.113	0.035	0.060 0.201	102
Garu Tempene	0.117	0.038	0.061 0.214	114

⁴⁹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

L: Percentage of households with regular income by District⁵⁰

District	Predictable Source of Income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	79.68	3.57	71.79	85.8	3651
Bongo	53.83	4.32	45.33	62.12	3651
Chereponi	88.02	2.65	81.78	92.32	3651
Garu Tempane	79.86	3.46	72.22	85.81	3651
Central Gonja	79.7	3.41	72.2	85.58	3651
Gonja East	82.59	3.18	75.44	87.98	3651
Gonja North	83.63	3.22	76.3	89.01	3651
Gonja West	75.15	3.5	67.69	81.36	3651
Gusheigu	95.84	1.89	90.08	98.32	3651
Karaga	97.73	1.41	92.51	99.34	3651
Kpamdi	90.71	2.79	83.62	94.92	3651
Kumbungu	97.11	1.19	93.61	98.72	3651
Mamprusi East	99.06	0.67	96.29	99.77	3651
Mion	96.2	2.17	88.79	98.78	3651
Nanumba North	96.01	1.67	91.1	98.27	3651
Nanumba South	97.2	1.43	92.52	98.98	3651
Saboba	87.23	2.66	81.05	91.61	3651
Sagnerigu	87.34	3	80.22	92.15	3651
Savelugu Nanton	93.77	2.07	88.24	96.79	3651
Talensi	70.44	3.97	62.11	77.6	3651
Tamale Metro	87.5	2.73	81.09	91.95	3651
Tatali Sanguli	81.49	3.19	74.41	86.95	3651
Tolon	96.71	2.36	87.3	99.21	3651
Yendi Municipal	99.37	0.63	95.64	99.91	3651
Zabzugu	85.05	3.15	77.77	90.25	3651

⁵⁰ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Sources of Household Income by District⁵¹

District	Sale of crop produce as source(s) of HH income (%)	Sale of poultry as source(s) of HH income (%)	Sale of livestock as source(s) of HH income (%)	Petty trading as source(s) of HH income (%)	Remittance as source(s) of HH income (%)	Shea Picking as source(s) of HH income (%)	Rice Parboiling as source(s) of HH income (%)	Gift as source(s) of HH income (%)	N
Bawku West	62.75	41.72	40.64	20.3	1.66	18.2	0.8	13.88	3651
Bongo	19.98	28.34	17.71	29.01	2.84	6.79	0.6	6.48	3651
Chereponi	75.46	16.99	10.22	10.02	0.98	5.77	3.8	1.45	3651
Garu Temppane	41.81	14.96	20.39	31.2	1.74	4.78	0.9	16.31	3651
Central Gonja	58.82	0.95	3.58	27.56	0.55	6.03	.	1.56	3651
Gonja East	74.66	3.92	3.43	15.71	3.03	11.7	1.8	3.94	3651
Gonja North	81.58	0.95	.	15.6	.	7.57	0	2.4	3651
Gonja West	57.78	1.65	3.08	25.92	6.36	11.36	0	8.55	3651
Gusheigu	87.77	14.74	29.5	11.39	4.66	7.4	1.74	11.35	3651
Karaga	89.67	26.41	26.55	21.28	1.6	20.1	2.36	4.83	3651
Kpamdi	87.78	18.78	11.49	10.75	0.85	.	.	3.39	3651
Kumbungu	76.95	64.66	47.2	33.35	2.52	14.36	9.5	9.9	3651
Mamprusi East	76.16	51.22	48.16	25.06	3.61	61.78	.	4.91	3651
Mion	97.62	18.67	25.15	11.21	2.72	21.2	3.2	2.4	3651
Nanumba North	84.37	1.71	0.84	21.42	.	.	.	0.93	3651
Nanumba South	88.07	12.75	5.15	14.97	0.96	1.15	0.9	0.96	3651
Saboba	73.89	8.7	12.13	17.99	7.33	2.34	1.2	2.58	3651
Sagnerigu	31.53	23.65	19.29	42.58	5.05	3.14	3.5	7.93	3651
Savelegu Nanton	85.42	19.86	23.94	26.81	8	31.5	8.6	5.3	3651
Talensi	33.49	38.41	24.83	32.09	6.04	8.44	0.3	9.27	3651
Tamale Metro	6.79	3.51	2.7	63.68	4.01	.	1.7	8.98	3651
Tatali Sanguli	74.9	4.14	5.75	19.68	5.27	1.27	1	4.25	3651
Tolon	68.41	57.38	33.57	21.89	7.36	12.09	0.9	1.32	3651
Yendi Municipal	75.17	41.53	39.24	31.47	2.74	45.38	0.7	2.39	3651
Zabzugu	95.2	14.19	14.34	14.08	6.06	0.98	0.4	.	3651

⁵¹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Temppane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Sale of crop produce as source(s) of Household income⁵²

District	Sale of crop produce as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	62.75	4.29	54.03	70.71	3651
Bongo	19.98	3.43	14.08	27.56	3651
Chereponi	75.46	3.89	67.06	82.28	3651
Garu Tempane	41.81	4.31	33.67	50.43	3651
Central Gonja	58.82	4.35	50.1	67.01	3651
Gonja East	74.66	4.01	66.02	81.7	3651
Gonja North	81.58	3.11	74.69	86.93	3651
Gonja West	57.78	4.01	49.79	65.39	3651
Gusheigu	87.77	3	80.59	92.54	3651
Karaga	89.67	3.07	81.93	94.32	3651
Kpamdi	87.78	3.29	79.75	92.91	3651
Kumbungu	76.95	4.28	67.52	84.27	3651
Mamprusi East	76.16	3.8	67.94	82.81	3651
Mion	97.62	1.09	94.22	99.04	3651
Nanumba North	84.37	3.11	77.28	89.55	3651
Nanumba South	88.07	2.9	81.11	92.7	3651
Saboba	73.89	3.91	65.53	80.82	3651
Sagnerigu	31.53	4.12	24.06	40.09	3651
Savelugu Nanton	85.42	3	78.51	90.38	3651
Talensi	33.49	4.13	25.92	42.01	3651
Tamale Metro	6.79	2.05	3.72	12.08	3651
Tatali Sanguli	74.9	3.98	66.34	81.88	3651
Tolon	68.41	5.82	56.09	78.59	3651
Yendi Municipal	75.17	3.7	67.23	81.71	3651
Zabzugu	95.2	1.44	91.44	97.36	3651

⁵² SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Sale of poultry as source of Household income⁵³

District	Sale of poultry as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	41.72	4.46	33.31	50.63	3651
Bongo	28.34	3.8	21.52	36.33	3651
Chereponi	16.99	3.14	11.69	24.04	3651
Garu Tempane	14.96	2.92	10.08	21.63	3651
Central Gonja	0.95	0.67	0.24	3.73	3651
Gonja East	3.92	1.78	1.59	9.35	3651
Gonja North	0.95	0.95	0.13	6.43	3651
Gonja West	1.65	1.16	0.41	6.35	3651
Gusheigu	14.74	3.03	9.72	21.73	3651
Karaga	26.41	3.97	19.39	34.89	3651
Kpamdi	18.78	3.85	12.36	27.5	3651
Kumbungu	64.66	4.57	55.27	73.04	3651
Mamprusi East	51.22	4.48	42.5	59.87	3651
Mion	18.67	3.93	12.14	27.61	3651
Nanumba North	1.71	0.98	0.55	5.18	3651
Nanumba South	12.75	2.84	8.13	19.43	3651
Saboba	8.7	2.15	5.31	13.93	3651
Sagnerigu	23.65	3.75	17.1	31.75	3651
Savelugu Nanton	19.86	3.31	14.16	27.14	3651
Talensi	38.41	4.28	30.43	47.07	3651
Tamale Metro	3.51	1.44	1.55	7.72	3651
Tatali Sanguli	4.14	1.5	2.02	8.31	3651
Tolon	57.38	5.9	45.63	68.36	3651
Yendi Municipal	41.53	4.38	33.28	50.28	3651
Zabzugu	14.19	2.99	9.27	21.11	3651

⁵³ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Sale of livestock as source of Household income⁵⁴

District	Sale of livestock as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	40.64	4.45	32.3	49.56	3651
Bongo	17.71	3.21	12.26	24.9	3651
Chereponi	10.22	2.51	6.24	16.29	3651
Garu Tempane	20.39	3.3	14.67	27.63	3651
Central Gonja	3.58	1.63	1.45	8.58	3651
Gonja East	3.43	1.5	1.44	7.94	3651
Gonja North	.	.	.	.	3651
Gonja West	3.08	1.42	1.24	7.48	3651
Gusheigu	29.5	3.85	22.55	37.55	3651
Karaga	26.55	3.82	19.76	34.67	3651
Kpamdi	11.49	3.31	6.43	19.72	3651
Kumbungu	47.2	4.69	38.21	56.39	3651
Mamprusi East	48.16	4.48	39.53	56.9	3651
Mion	25.15	4.41	17.51	34.72	3651
Nanumba North	0.84	0.84	0.12	5.73	3651
Nanumba South	5.15	1.82	2.55	10.13	3651
Saboba	12.13	2.74	7.71	18.59	3651
Sagnerigu	19.29	3.48	13.36	27.03	3651
Savelugu Nanton	23.94	3.6	17.61	31.68	3651
Talensi	24.83	3.67	18.35	32.69	3651
Tamale Metro	2.7	1.33	1.01	6.97	3651
Tatali Sanguli	5.75	1.85	3.03	10.65	3651
Tolon	33.57	5.18	24.27	44.34	3651
Yendi Municipal	39.24	4.36	31.1	48.02	3651
Zabzugu	14.34	2.98	9.43	21.22	3651

⁵⁴ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Petty trading as source of Household income ⁵⁵

District	Petty trading as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	20.3	3.65	14.06	28.4	3651
Bongo	29.01	3.98	21.87	37.37	3651
Chereponi	10.02	2.72	5.8	16.75	3651
Garu Tempane	31.2	4.18	23.64	39.91	3651
Central Gonja	27.56	4.01	20.42	36.06	3651
Gonja East	15.71	3.22	10.37	23.09	3651
Gonja North	15.6	2.98	10.6	22.36	3651
Gonja West	25.92	3.59	19.51	33.56	3651
Gusheigu	11.39	2.8	6.94	18.13	3651
Karaga	21.28	3.62	15.04	29.22	3651
Kpamdi	10.75	3.03	6.09	18.28	3651
Kumbungu	33.35	4.75	24.76	43.22	3651
Mamprusi East	25.06	4	18.06	33.66	3651
Mion	11.21	2.47	7.2	17.04	3651
Nanumba North	21.42	3.46	15.41	28.96	3651
Nanumba South	14.97	3.23	9.68	22.45	3651
Saboba	17.99	3.57	12.02	26.07	3651
Sagnerigu	42.58	4.38	34.3	51.3	3651
Savelugu Nanton	26.81	3.77	20.09	34.82	3651
Talensi	32.09	4.13	24.58	40.65	3651
Tamale Metro	63.68	4	55.55	71.1	3651
Tatali Sanguli	19.68	3.68	13.44	27.89	3651
Tolon	21.89	4.75	13.99	32.58	3651
Yendi Municipal	31.47	3.99	24.21	39.76	3651
Zabzugu	14.08	2.8	9.43	20.51	3651

⁵⁵ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Remittance as source of Household income⁵⁶

District	Remittance as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	1.66	1.17	0.42	6.41	3651
Bongo	2.84	1.3	1.15	6.88	3651
Chereponi	0.98	0.7	0.24	3.95	3651
Garu Tempane	1.74	1.36	0.37	7.79	3651
Central Gonja	0.55	0.55	0.077	3.8	3651
Gonja East	3.03	1.55	1.1	8.07	3651
Gonja North	.	.	.	.	3651
Gonja West	6.36	1.79	3.63	10.92	3651
Gusheigu	4.66	2.09	1.9	10.94	3651
Karaga	1.6	1.23	0.35	6.95	3651
Kpamdi	0.85	0.85	0.12	5.79	3651
Kumbungu	2.52	1.14	1.03	6.04	3651
Mamprusi East	3.61	1.52	1.57	8.1	3651
Mion	2.72	2.05	0.61	11.33	3651
Nanumba North	.	.	.	.	3651
Nanumba South	0.96	0.96	0.14	6.49	3651
Saboba	7.33	2.51	3.69	14.03	3651
Sagnerigu	5.05	1.92	2.37	10.46	3651
Savelugu Nanton	8	2.37	4.42	14.05	3651
Talensi	6.04	2.4	2.73	12.86	3651
Tamale Metro	4.01	1.62	1.8	8.7	3651
Tatali Sanguli	5.27	2.09	2.39	11.22	3651
Tolon	7.36	3.79	2.6	19.12	3651
Yendi Municipal	2.74	1.26	1.1	6.66	3651
Zabzugu	6.06	1.8	3.36	10.7	3651

⁵⁶ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Shea Picking as source of Household income ⁵⁷

District	Shea Picking as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	18.2	3.43	12.41	25.9	3651
Bongo	6.79	2.08	3.68	12.19	3651
Chereponi	5.77	1.79	3.1	10.47	3651
Garu Tempane	4.78	1.58	2.48	9.02	3651
Central Gonja	6.03	1.93	3.19	11.12	3651
Gonja East	11.7	2.76	7.28	18.28	3651
Gonja North	7.57	2.3	4.12	13.49	3651
Gonja West	11.36	2.58	7.2	17.48	3651
Gusheigu	7.4	2.17	4.12	12.95	3651
Karaga	20.1	3.54	14.04	27.93	3651
Kpamdi	.	.	.	.	3651
Kumbungu	14.36	2.92	9.53	21.07	3651
Mamprusi East	61.78	4.33	53.01	69.83	3651
Mion	21.2	4.31	13.95	30.86	3651
Nanumba North	.	.	.	.	3651
Nanumba South	1.15	0.82	0.28	4.55	3651
Saboba	2.34	1.06	0.95	5.63	3651
Sagnerigu	3.14	1.55	1.18	8.08	3651
Savelugu Nanton	31.5	3.9	24.39	39.6	3651
Talensi	8.44	2.35	4.83	14.35	3651
Tamale Metro	.	.	.	.	3651
Tatali Sanguli	1.27	0.74	0.41	3.92	3651
Tolon	12.09	2.75	7.65	18.6	3651
Yendi Municipal	45.38	4.41	36.96	54.08	3651
Zabzugu	0.98	0.97	0.14	6.61	3651

⁵⁷ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Rice Parboiling as source of Household income⁵⁸

District	Rice Parboiling as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	0.8	0.83	0.12	5.67	3651
Bongo	0.6	0.59	0.084	4.11	3651
Chereponi	3.8	1.52	1.73	8.21	3651
Garu Tempane	0.9	0.96	0.14	6.53	3651
Central Gonja	.	.	.	.	3651
Gonja East	1.8	1.28	0.45	7.01	3651
Gonja North	.	.	.	.	3651
Gonja West	.	.	.	.	3651
Gusheigu	1.74	1	0.56	5.31	3651
Karaga	2.36	1.25	0.83	6.56	3651
Kpamdi	.	.	.	.	3651
Kumbungu	9.5	2.82	5.26	16.66	3651
Mamprusi East	.	.	.	.	3651
Mion	3.2	1.37	1.41	7.33	3651
Nanumba North	.	.	.	.	3651
Nanumba South	0.9	0.96	0.14	6.49	3651
Saboba	1.2	1.21	0.17	8.14	3651
Sagnerigu	3.5	1.75	1.31	9.12	3651
Savelugu Nanton	8.6	2.31	5.09	14.42	3651
Talensi	0.3	0.38	0.053	2.63	3651
Tamale Metro	1.7	1	0.54	5.27	3651
Tatali Sanguli	1	1.02	0.15	6.93	3651
Tolon	0.9	0.7	0.24	3.88	3651
Yendi Municipal	0.7	0.75	0.11	5.16	3651
Zabzugu	0.4	0.42	0.059	2.93	3651

⁵⁸ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatali, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelugu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Gift as source of Household income⁵⁹

District	Gift as source(s) of HH income (%)	Std. Error	[95% Conf. Interval]		N
Bawku West	13.88	2.99	8.98	20.85	3651
Bongo	6.48	2.18	3.31	12.32	3651
Chereponi	1.45	1.11	0.32	6.33	3651
Garu Tempane	16.31	3.36	10.73	24	3651
Central Gonja	1.56	1.11	0.38	6.14	3651
Gonja East	3.94	1.92	1.49	9.98	3651
Gonja North	2.4	1.22	0.88	6.4	3651
Gonja West	8.55	2.48	4.78	14.84	3651
Gusheigu	11.35	2.85	6.85	18.23	3651
Karaga	4.83	2.02	2.1	10.72	3651
Kpamdi	3.39	1.75	1.21	9.11	3651
Kumbungu	9.9	3.34	5.01	18.62	3651
Mamprusi East	4.91	2.06	2.13	10.93	3651
Mion	2.4	1.11	0.96	5.86	3651
Nanumba North	0.93	0.92	0.13	6.28	3651
Nanumba South	0.96	0.96	0.14	6.49	3651
Saboba	2.58	1.54	0.79	8.08	3651
Sagnerigu	7.93	2.37	4.37	13.99	3651
Savelugu Nanton	5.3	1.96	2.54	10.75	3651
Talensi	9.27	2.76	5.09	16.29	3651
Tamale Metro	8.98	2.33	5.34	14.71	3651
Tatali Sanguli	4.25	1.9	1.74	9.98	3651
Tolon	1.32	0.78	0.42	4.13	3651
Yendi Municipal	2.39	1.24	0.86	6.47	3651
Zabzugu	.	.	.	.	3651

⁵⁹ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempane, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Percentage of HHs unable to provide three meals for household members by month⁶⁰

During which months are you not able to provide 3 full meals a day for every member of your HH?	Northern Region				Upper East Region				N
	Mean	Std. Error	[95% Conf. Interval]		Mean	Std. Error	[95% Conf. Interval]		
January	15.49	3.53	9.74	23.73	4.1	1.68	1.82	8.99	421
February	21.23	3.75	14.79	29.52	5.63	1.98	2.78	11.06	421
March	21.75	3.28	15.99	28.88	26.36	3.45	20.15	33.67	421
April	43.9	4.07	36.13	51.99	70.19	3.46	62.98	76.52	421
May	62.78	4.1	54.44	70.43	81.72	2.97	75.16	86.85	421
June	79.93	3.35	72.53	85.72	84	2.93	77.37	88.96	421
July	73	3.93	64.63	80	67.05	3.64	59.55	73.78	421
August	56.17	4.13	47.97	64.05	46.34	3.83	38.94	53.89	421
September	44.47	4.01	36.79	52.43	12.68	2.37	8.7	18.12	421
October	12.22	2.47	8.13	17.97	3.93	1.23	2.12	7.19	421
November	5.81	1.82	3.1	10.61	3.98	1.56	1.82	8.48	421
December	7.99	2.12	4.69	13.28	3.54	1.28	1.72	7.14	421

Prioritization of food distribution within households by Region

Members of the HH who receives priority at mealtime	Northern Region				Upper East Region				N
	Mean	Std. Error	[95% Conf. Interval]		Mean	Std. Error	[95% Conf. Interval]		
Pregnant women	38.98	4.18	31.14	47.45	15.39	2.77	10.69	21.64	421
Women who just gave birth	30.77	3.83	23.78	38.77	12.99	2.57	8.71	18.94	421
Woman who is breastfeeding	44	4.09	36.18	52.14	10.64	2.43	6.72	16.44	421
Sick person	64.59	4.01	56.37	72.03	32.42	3.49	25.97	39.62	421
Child under 5 years	78.89	3.25	71.8	84.57	69.68	3.63	62.1	76.32	421
Elderly person	24.21	3.18	18.52	31	19.01	2.91	13.94	25.39	421
Head of Household / Landlord	7.32	2.03	4.21	12.45	5.07	1.62	2.69	9.37	421

⁶⁰ SPRING & RING districts – Mamprusi East, Karaga, Gusheigu, Kumbungu, Tolon, Central Gonja, & East Gonja.

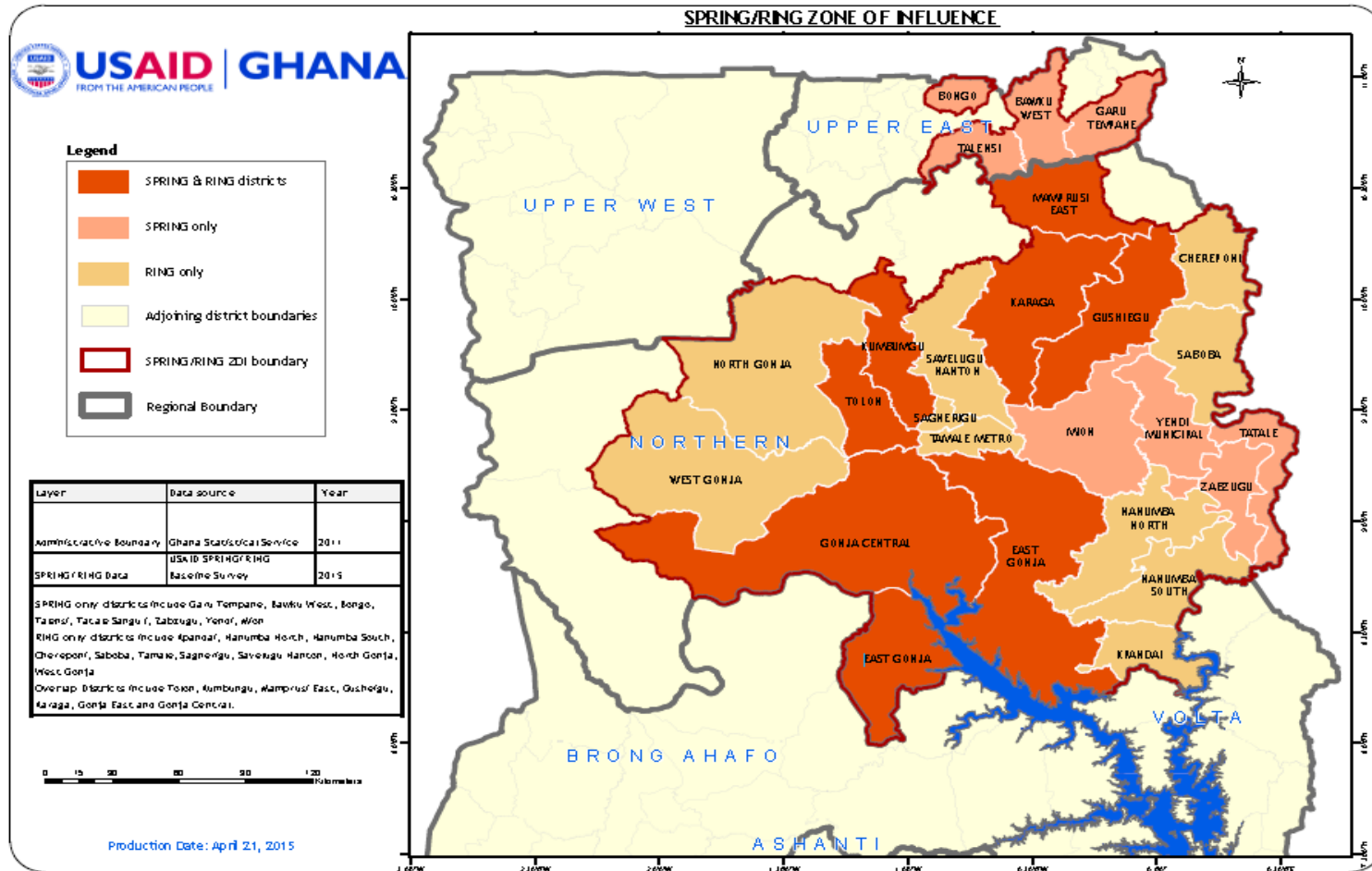
SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandai

Preferential meal distribution due to circumstances within households by Region

Circumstances that will give Member of the HH priority at meal time	Northern Region	Std. Error	[95% Conf. Interval]		Upper East Region	Std. Error	[95% Conf. Interval]		N
Pregnant women	38	4.07	30.39	46.25	25.41	3.27	19.54	32.35	421
Women who just gave birth	30.85	3.84	23.85	38.86	18.16	2.92	13.12	24.6	421
Woman who is breastfeeding	40.25	4.05	32.61	48.39	11.27	2.43	7.31	16.99	421
Sick person	67.25	4.04	58.88	74.65	48.36	3.84	40.9	55.9	421
Child under 5 years	75.05	3.48	67.62	81.25	64.47	3.77	56.75	71.5	421
Elderly person	22.24	3.22	16.55	29.21	18.75	2.92	13.67	25.17	421
Head of Household / Landlord	5.82	1.64	3.32	10.01	4.66	1.57	2.38	8.91	421

J:SPRING|RING Zone of Influence⁶¹



⁶¹ SPRING & RING districts – Mamprusi East, Karaga, Gushegu, Kumbungu, Tolon, Central Gonja, & East Gonja.

SPRING districts ONLY – Bongo, Bawku West, Garu Tempene, Talensi, Mion, Yendi Municipality, Tatale, & Zabzugu

RING districts ONLY – North Gonja, West Gonja, Savelegu/Nanton, Sangnerigu, Tamale Metro, Chereponi, Saboba, Nanumba North, Nanumba South & Kpandae

METSS

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