FEED THE FUTURE INDICATORS FOR NORTHERN REGION, GHANA 2015

DISTRICT BASELINE ESTIMATES

USAID-METSS

JULY 2016

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List of Acronyms

5DE	5 Domains Empowerment
BMI	Body Mass Index
CDC	Center for Disease Control
DANIDA	Danish International Development Agency
DRIC-UCC	Directorate of Research, Innovation & Consultancy-University of Ghana
EA	Enumeration Area
EU	European Union
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agricultural Organization
FHI360	Family Health International 360
FTF	Feed the Future
FTFMS	Feed the Future Monitoring System
GHS	Ghana Health Service/Ghanaian cedi
GIZ	Gesellschaft für Internationale Zusammernarbeit
GLSS6	Ghana Living Standards Survey 6
GoG	Government of Ghana
GPI	Gender Parity Index
GSS	Ghana Statistical Services
HHS	Household Hunger Scale
IMF	International Monetary Fund
IPs	Implementing Partners
JICA	Japan International Cooperation Agency
KSU	Kansas State University
LSMS	Living Standards Measurement Survey
METSS	Monitoring Evaluation and Technical Support Services
MDD-W	Women's Minimum Dietary Diversity
MDG	Millennium Development Goal
MoFA	Ministry of Food and Agriculture
PBS	Population Based Survey
PPP	Purchasing Power Parity
PSU	Primary Sampling Unit
SD	Standard Deviation
SSU	Secondary Sampling Unit
UCC	University of Cape Coast

UNDP	United Nations Development Program
UNICEF	United Nations Children's Emergency Fund
USAID	United States Agency for International Development
USD	United States Dollar
USG	United States Government
WEAI	Women's Empowerment in Agriculture Index
WDDS	Women's Dietary Diversity Score
WHO	World Health Organization
ZOI	Zone of Influence

Introduction and Background

In 2009, the U.S. Government launched its Feed the Future initiative in response to pressing global hunger and food security challenges. The Feed the Future initiative aims to sustainably reduce global hunger and poverty. The initiative tackles their root causes and employs proven strategies for achieving large scale and lasting impacts. It encourages improved agricultural productivity by supporting better government response to anticipated climate change, improved women's and children's nutrition, and enhanced economic development through gender equity and regional balance. Improvements in the livelihoods of participating households are measured by their economic wellbeing; hunger and dietary diversity; women and children anthropometry; and women's empowerment (Zereyesus et al. 2016).

In Ghana, the initiative started in mid-2011 in Northern Region, Upper East Region, Upper West Region, and selected areas in Brong Ahafo Region lying above the Latitude 8°N. This area, referred to as the USAID Zone of Influence (ZOI), was selected because of the relatively higher incidences of poverty, malnutrition, and stunting among children aged less than five years compared to the rest of the country (Zereyesus et al. 2016).

Feed the Future seeks to bring about positive changes in the economic, food security and nutritional status in the ZOI in Ghanaian households. By implementing activities in northern Ghana where prevalence of poverty, underweight, and stunting among children below five years of age are higher than the national average, USAID aims to bring significant changes in the population. USAID|Ghana has already engaged some Implementing Partners (IPs) to execute activities in the Feed the Future ZOI. The IPs undertake activities to contribute to the achievement of the high level Feed the Future indicators at the goal and first level objectives. These indicators are: prevalence of stunted, wasted and underweight children under five years of age; prevalence of underweight women; prevalence of poverty (percent of people living on less than $1.25/day); daily per capita expenditure (as a proxy for income) in U.S. Government (USG) assisted areas; and Women's Empowerment in Agriculture Index (USAID 2014).

USAID leads the execution of the Feed the Future initiative by leveraging the resources and capabilities of other U.S. Government agencies to achieve the initiative's objectives. Some of the U.S. Government agencies involved in the Feed the Future initiative are the Department of State, Peace Corps, Millennium Challenge Corporation, Department of Treasury, U.S. Trade Representative, Overseas Private Investment Corporation, U.S. African Development Foundation, and the U.S. Department of Agriculture. USAID|Ghana is also working closely with the Government of Ghana, local non-governmental organizations, private sector organizations, and international development partners (World Bank, World Health Organization (WHO), the International Monetary Fund (IMF), the German Organization for International Cooperation (GIZ - Gesellschaft für Internationale Zusammernarbeit), the Danish International Development Agency (DANIDA), European Union (EU) Micro Project, and the Japan International Cooperation

Agency (JICA)) to efficiently achieve the objectives of the Feed the Future initiative by avoiding duplications in efforts and activities. To monitor the initiative's activities in the ZOI at the household level, it became important to collect district level data.

Purpose of Report

This report is designed to provide point estimates of the Feed the Future indicators at the district level for the Feed the Future ZOI. The document provides information that could be used to assess progress of Feed the Future interventions, primarily aimed at achieving its poverty reduction and food security enhancement objectives at the district level where the relevant indicators have not been adequately analyzed and reported before. District level reports are prepared for all the districts in the four regions involved in the Feed the Future initiative. This report focuses on districts in Northern Region.

Profile of Northern Region

Northern Region is Ghana's largest region in terms of land mass (70,384 square kilometers) and represents 29.5 percent of the total land mass in Ghana. It spans the entire width of Ghana and shares country borders with Togo to the east and Côte d'Ivoire to the west and regional borders with Upper East and Upper West Regions to the north and Brong Ahafo and Volta Regions to the south (GSS 2013).

The entire region lies within the Guinea Savannah agro-ecological zone, which experiences a single growing season that lasts between 180 to 200 days (Oppong-Anane 2006). The unimodal rainfall pattern for this agro-ecological zone provides an annual rainfall of 750 to 1,050 millimeters (GSS 2013). The rainy season begins in May and lasts till October and then the dry season begins from November to March/April. The dry season is accompanied by the harmattan winds in December and February, and these winds greatly affect the temperatures, which can range from 14°C at night to 40°C during the day. The terrain in Northern Region is mostly low lying except for areas in the north-east and along the western border. Two main rivers run through the region - the Black Volta and White Volta. The main vegetation in Northern Region is grassland with guinea savannah woodland interspersed. Drought-resistant trees such as acacia, mango, baobab, shea nut, *dawadawa, and neem,* are found within the region (GSS 2013).

Northern Region is divided into 26 districts; all of which are within the Feed the Future ZOI. Based on the 2010 Population and Housing Census, the population in Northern Region is 2,479,461 and it is diverse in ethnicity and languages. It is a predominately rural region with 69.7 percent of its population living in rural areas, and the majority of population participates in agricultural activities. The main crops cultivated are yam, maize, millet, guinea corn, rice, groundnuts, beans, soybeans, and cowpeas (GSS 2013).

This document is organized into eight sections, this background section (Section 1), a survey methods section (Section 2), household demographics and dwelling characteristics (Section 3). The following four sections are devoted to each of the principal indicator groups: Household Economic Status; Hunger and Dietary Intake; Health Status of Women and Children; Women's Empowerment in Agriculture. The last section (Section 8) provides the summary and conclusions.

Survey Method

Survey Design

The practical demand for representative district level data has been the main driving force for the collection of the district level data and analysis. To meet this demand, the interim PBS 2015 was framed to allow collection of representative samples at the district level. This was done by calculating the required sample of households using the prevalence of poverty indicator as the primary survey design indicator. Other indicators are not considered as design indicators at the district level due to the required large number of sample sizes and the ensuing high cost implications. This implies that individual level indicators, such as stunting and wasting, will only be included in the analyses and reported if statistically reliable number of observations are available in the data.

In order to arrive at the effective sample size at the district level, standard sample size calculation was adopted. A two stage sampling design was followed with the designation of the EA as the primary sampling units (PSU) and the households as the secondary sampling units (SSU). The following assumptions were made with respect to the variables used to determine the sample size:

1. A poverty prevalence rate of 20 percent at the household level (this is the mean value of the poverty indicator estimated based on the average Feed the Future 2015 target using 2012 baseline values)
2. A 10 percent margin of error
3. A design effect of 2.37 (based on the 2012 PBS ZOI Deff)
4. A significance level of 95 percent
5. A 5 percent non-response rate

With the forgoing assumptions, the computational formula used in determining the district level required sample size for the poverty indicator is given by equation 1 as follows:

$$N = Deff \frac{(Z_{\alpha/2})^2 (p(1-p))}{M^2} \qquad (1)$$

where N is the sample size, $Deff$ is the design effect, $Z_{\alpha/2}$ is the Z value (1.96 for 95 percent confidence level), p is the proportion of poverty, and M is the proportion margin of error. The mean value of M for the poverty indicator is estimated based on the average Feed the Future 2015 target. Based on the assumptions and using equation 1, the sample size was calculated to be 150 as shown in Table 1.

Table 1: Effective Sample Sizes for Poverty Indicator in Each District

Design Indicator	Mean	Margin of Error (M)	DEFF	Nominal N	5 % Non-Response Inflation Rate	Effective N
Poverty	0.20	0.10	2.37	143	7	150

Source: District Level Survey Data, Ghana 2015

Survey Implementation

The survey field work was conducted by the Directorate of Research, Innovation and Consultancy of the University of Cape Coast (DRIC-UCC) supported by Kansas State University (KSU) and USAID- METSS staff. Listing and respondent verification support were provided by the GSS. District assembly representatives and staff facilitated community entry for enumerators, improving household participation and response rates.

As mentioned in the survey design section, the implementation of the district level data collection was coordinated together with the interim PBS 2015 data collection exercise. Since the sampling design for at the ZOI level and not at the district level, the allocation of households in each district is not uniform. While some districts have been allocated with more than 150 households, others have been allocated with less than 150 households. The implementation strategy of the district level data collection is to ensure that at least 150 households are allocated in each district. Thus, once the baseline households were interviewed, non-baseline households were added, if needed, to ensure that at least 150 households were interviewed in each district. However, there will be districts that have more than 150 households because of the sampling design for the interim PBS 2015. The sample sizes in each of the district, the actual responses and the response rates, is shown in Table 2. The list of districts shown is based on the recent administrative classification and shows a total of 26 districts in Northern Region.

Table 2: Sample Size, Sample Responses, and Response Rate by District

District	Sample Size	Responses	Response Rates
Bole	150	227	151.3
Bunkpurugu Yonyo	180	175	97.2
Chereponi	150	140	93.3
East Gonja	211	193	91.5
Gonja Central	150	143	95.3
Gushegu	150	171	114.0
Karaga	150	131	87.3
Kpandai	150	154	102.7
Kumbungu	^	^	^
Mamprugu Moagduri	150	20	13.3
Mamprusi East	150	139	92.7
Mamprusi West	150	177	118.0
Mion	^	79	^
Nanumba North	150	153	102.0
Nanumba South	150	142	94.7
North Gonja	^	69	^
Saboba	150	150	100.0
Sagnerigu	^	82	^
Savelugu Nanton	150	197	131.3
Sawla/Tuna/Kalba	150	151	100.7
Tamale Metropolitan	399	303	75.9
Tatale Sanguli	^	84	^
Tolon Kumbugu	214	133	62.1
West Gonja	150	125	83.3
Yendi	157	84	53.5
Zabzugu Tatali	150	100	66.7

^ Data not available for newly formed or newly split districts.
Source: District Level Survey Data, Ghana 2015.

Challenges and Limitations

The problem of household head's names differing from their official names on record, encountered in 2012, remained a challenge in the 2015 verification process for the 2012 households. Although this was not a problem for the new districts, this problem re-emerged because the corrected names collected during the 2012 baseline survey did not become the official names in the Ghana Statistical Service's records and these records were the ones used for the listing and verification of households. Enumerators ended up using multiple identification characteristics to confirm or re-confirm household identities, delaying the commencement of interviews and putting pressure on enumerators. Also, not all households had been verified because there were instances where households had moved away from the community or where people had died. In fact, one enumeration team walked into the funeral of a household head who had died the day before its arrival. These uncomfortable situations were addressed as respectfully and gracefully as possible.

The electricity problem identified during the 2012 survey remained a challenge during 2015. Cognizant of this challenge, the management team provided extra computers to supervisors as well as cash so that they could bring computers with depleted power to

neighboring towns to be recharged and returned to enumerators. As a final backstop to the power problem, enumerators were provided with copies of the paper questionnaires to use in case their computer failed and they could not get access to another computer.

There are a couple challenges worth noting regarding the survey implementation. First, the sampling of non-baseline households followed a simple random sampling rather than a two stage sampling. Because of the difference in the sampling approach between the baseline and non-baseline households, it is not possible to safely apply sampling weights while reporting estimates. Because of this, the district report is prepared without the application of sampling weights. Second, the listing of households in the field for the purpose of sampling was implemented using 'old' districts' administrative classification. This has imposed shortage of sample size for those newly formed districts as well as those districts that are split into two. The low and irregular number of households reported in Table 2 are as a result of such limitations.

Household Demographics and Dwelling Characteristics

Household Demographics

Table 3 presents demographic characteristics in Northern Region by district. The sub-population categories correspond to the disaggregates for the Feed the Future indicators, which encompassed children by specific age range and adult women. The average household size is approximately six members. The range is between 4.9 in Mamprusi West District to 7.4 in Gushegu, Kumbungu and Tatale Sanguli Districts. Seven districts have average household sizes less than six people per household. The estimated population for adult females ranges from 42.2 percent in Nanumba South to 56.9 percent in Sawla/Tuna/Kalba District. The average adult female population is 50.4 percent in Northern Region. Children between the ages of 5 to 17 years comprise the majority of the children between ages zero to 17 years. The average number of children five to 17 years old is 2.4 per household compared to 0.4 for children less than two and 1.0 for children between zero and four years.

Table 3: Household Size and Age Distribution by District

District	Size	Children <2 yrs	Children 0 to 4 yrs	Children 5 to 17 years	Adult[1] Females	Percent of Adult Females	n[2]
Bole	5.6	0.3	0.8	2.0	1.4	54.8	227
Bunkpurugu Yonyo	5.9	0.3	0.8	2.3	1.4	51.8	175
Chereponi	6.5	0.5	1.2	2.3	1.5	48.2	140
East Gonja	5.9	0.3	0.8	2.3	1.4	50.9	193
Gonja Central	5.8	0.4	1.0	2.1	1.4	49.6	143
Gushegu	7.4	0.4	1.3	3.2	1.6	51.8	171
Karaga	6.6	0.4	1.1	2.6	1.6	53.4	131
Kpandai	7.1	0.4	1.1	2.8	1.5	46.7	154
Kumbungu	7.4	0.5	1.2	2.9	1.7	53.0	68
Mamprugu Moagduri	^	^	^	^	^	^	^
Mamprusi East	6.9	0.3	0.9	2.9	1.5	50.4	139
Mamprusi West	4.9	0.3	0.7	1.8	1.3	51.9	177
Mion	6.9	0.5	1.2	2.9	1.4	46.7	79
Nanumba North	6.9	0.3	1.2	2.7	1.6	51.4	153
Nanumba South	5.9	0.3	1.1	2.2	1.2	42.2	142
North Gonja	6.0	0.5	1.2	2.3	1.2	47.4	69
Saboba	6.9	0.4	0.9	2.7	1.6	48.8	150
Sagnerigu	5.2	0.3	0.8	1.9	1.3	51.7	82
Savelugu Nanton	5.8	0.4	1.0	2.0	1.5	53.9	197
Sawla/Tuna/Kalba	6.2	0.2	0.7	2.4	1.5	56.9	151
Tamale Metropolitan	5.2	0.2	0.5	1.8	1.4	45.7	303
Tatale Sanguli	7.4	0.4	1.1	2.9	1.9	55.6	84
Tolon Kumbugu	6.4	0.5	1.1	2.3	1.6	51.9	133
West Gonja	7.0	0.4	1.1	2.8	1.6	49.9	125
Yendi	5.8	0.2	0.8	2.3	1.4	46.3	84
Zabzugu Tatali	6.8	0.3	1.2	2.1	1.9	52.1	100
Northern Region	**6.2**	**0.3**	**1.0**	**2.4**	**1.5**	**50.4**	**3,570**

^ Results not statistically reliable, n<30.

[1] An adult is defined as an individual age 18 or older. Females age 15-17 are of reproductive age, but are not considered adults by this definition.

[2] Sample n is the unweighted count of all households that responded to the survey.

Source: District Level Survey Data, Ghana 2015.

Households in Gushegu District have the highest number of children ages five to 17 years old with more than 3.0 per household.

Table 4 presents the distribution of adult respondents by their educational level and district. More than three-quarters of the adult household members have received no formal education. Sawla/Tuna/Kalba District has the highest prevalence of adults without any formal education (93.8 percent), followed by Mion and North Gonja Districts (93.4 percent). Sagnerigu District has the lowest rate of adults with no formal education (61.4 percent) but has the highest rate for adults with secondary level education (29.0 percent) and one of the highest rates for adults with primary level education (7.9 percent). For primary level education, the rates range from 1.8 percent in Karaga to 9.6 percent in West Gonja District. Only 2.0 percent of the adults residing in Sawla/Tuna/Kalba have secondary level education.

Table 4: Adult Education Attainment by District

	Adult Education Attainment			
District	No Education	Primary Level Education	Secondary Level Education	n
Bole	76.6	7.9	14.6	213
Bunkpurugu Yonyo	81.8	7.0	11.1	175
Chereponi	91.5	2.8	4.8	140
East Gonja	87.2	6.6	6.2	188
Gonja Central	87.1	6.3	6.6	140
Gushegu	92.0	3.9	3.4	169
Karaga	92.6	1.8	5.2	131
Kpandai	90.1	5.5	4.4	151
Kumbungu	87.7	6.1	6.2	68
Mamprugu Moagduri	^	^	^	^
Mamprusi East	92.0	3.6	4.3	138
Mamprusi West	77.1	7.7	15.1	169
Mion	93.6	2.5	3.9	75
Nanumba North	90.6	4.2	4.8	149
Nanumba South	88.3	3.4	6.9	137
North Gonja	93.6	3.3	3.1	69
Saboba	76.2	9.0	14.6	145
Sagnerigu	61.4	7.9	29.0	81
Savelugu Nanton	85.0	6.0	8.8	196
Sawla/Tuna/Kalba	93.8	4.3	2.0	136
Tamale Metropolitan	72.6	6.3	20.9	301
Tatale Sanguli	87.3	3.0	9.7	84
Tolon Kumbugu	93.1	3.2	2.6	132
West Gonja	82.3	9.6	7.8	119
Yendi	85.8	3.8	10.4	83
Zabzugu Tatali	85.9	5.9	8.2	100
Northern Region	**85.1**	**5.5**	**9.1**	**3,489**

^ Results not statistically reliable, n<30.

Source: District Level Survey Data, Ghana 2015.

Household Dwelling Characteristics

Table 5 shows dwelling characteristics of the households in Northern Region. The characteristics of the households are evaluated based on sources of water, energy, waste disposal, cooking fuel source, and number of people per sleep room.

Table 5: Dwelling Characteristics by District

District	Water Source[1]	n	Sanitation[2]	n	Persons per Sleep Room[3]	n	Solid Fuel[4]	n	Electri-city	n
Bole	95.7	211	10.0	211	2.3	201	93.8	211	77.3	211
Bunkpurugu Yonyo	58.9	141	12.2	172	1.6	171	90.6	127	34.7	150
Chereponi	69.0	113	5.5	109	1.6	113	95.6	113	37.5	112
East Gonja	32.8	177	11.8	178	2.0	178	98.3	176	51.4	177
Gonja Central	30.4	135	3.6	137	1.8	136	99.3	135	48.9	137
Gushegu	70.2	161	13.1	160	1.7	161	97.5	161	32.3	161
Karaga	74.6	130	0.8	129	1.4	130	99.2	130	50.8	130
Kpandai	38.1	126	13.0	146	1.7	144	99.2	126	52.6	135
Kumbungu	69.2	65	12.3	65	2.0	65	95.4	65	75.4	65
Mamprugu Moagduri	^	^	^	^	^	^	^	^	^	^
Mamprusi East	27.3	132	7.7	130	1.6	132	100.0	132	25.8	132
Mamprusi West	61.0	154	11.4	158	1.4	158	96.8	154	41.4	157
Mion	59.3	59	3.4	59	2.4	59	100.0	59	20.3	59
Nanumba North	48.4	155	6.5	155	1.7	155	99.4	155	61.3	155
Nanumba South	72.9	133	6.8	133	1.7	134	99.2	132	47.4	133
North Gonja	70.3	64	4.7	64	1.5	64	100.0	64	1.6	64
Saboba	53.6	125	19.4	124	1.9	125	96.8	125	68.5	124
Sagnerigu	85.7	77	50.0	74	1.8	76	79.2	77	98.7	77
Savelugu Nanton	63.5	181	7.2	181	1.4	181	93.9	181	76.8	181
Sawla/Tuna/Kalba	87.6	137	4.4	137	1.9	137	100.0	137	18.2	137
Tamale Metropolitan	73.2	284	38.6	277	1.3	298	86.9	283	94.6	295
Tatale Sanguli	86.6	82	17.3	81	2.0	82	100.0	82	28.0	82
Tolon Kumbugu	40.8	130	7.9	126	1.7	128	100.0	130	65.4	130
West Gonja	89.7	107	26.2	107	1.8	105	100.0	107	56.1	107
Yendi	67.2	67	22.4	67	1.9	67	90.9	66	52.2	67
Zabzugu Tatali	85.0	100	14.0	100	2.1	100	100.0	100	57.0	100
Northern Region	**63.9**	**3,246**	**13.7**	**3,280**	**1.7**	**3,300**	**96.2**	**3,228**	**54.3**	**3,278**

^ Results not statistically reliable, n<30.

[1] Improved water sources include *piped water into the dwelling, piped water into the yard, a public tap/standpipe, a tube well/borehole, a protected dug well, a protected spring,* and *rainwater* (WHO and UNICEF 2006). The proportion of the population with sustainable access to an improved water source is the 2015 MDG indicator #30 (UNDP 2003); however, as in most major international survey programs, the measure reported here reflects only access to an improved water source, and not the sustainability of that access.

[2] Improved sanitation facilities are those that separate human excreta from human contact and include the categories *flush to piped sewer system, flush to septic tank, flush/pour flush to pit, composting toilet, ventilated improved pit latrine,* and a *pit latrine with a slab*. Because shared and public facilities are often less hygienic than private facilities, shared or public sanitation facilities are not counted as improved (WHO and UNICEF 2006). The proportion of the population with access to improved sanitation is the 2015 MDG indicator #31 (UNDP 2003).

[3] The average number of persons per sleeping room is a common indicator of crowding (UNDP 2003).

[4] Solid fuel is defined as *charcoal, wood, animal dung,* and *agriculture crop residue.* The proportion of the population using solid fuels is MDG indicator #29 (UNDP 2003). The *other* and *no food cooked in household* categories are removed from percentages.

Source: District Level Survey, Ghana 2015.

Sixty-four percent of the households have access to improved water sources and slightly more than half of them have electricity but only 13.7 percent of the households have access to improved sanitation. The average number of people per sleeping room is 1.7. Approximately, 96

percent of the households use solid sources of fuel for cooking, which includes charcoal, wood, crop residues and/or animal waste. Safe water access rates range from 27.3 percent of households in Mamprusi East to 95.7 percent in Bole District. Sagnerigu District has the highest number of households with access to clean sanitation (50.0 percent) and access to electricity (98.7 percent). Safe sanitation rates are lowest in Karaga District (0.8 percent). In North Gonja District, only one household out of 64 (1.6 percent) reports having access to electricity.

Household Economic Status Indicators

Household economic status is measured by per capita household expenditures and the prevalence of poverty, using the consumption expenditure method. The Household Consumption Expenditure modules of the population-based survey questionnaire were used to collect the data necessary to calculate the per capita expenditures and prevalence of poverty indicators. These modules are similar to those in the Living Standards Measurement Survey (LSMS) of the World Bank. The modules collect information on households' consumption expenditure on various food and non-food items as a proxy for household income. Deaton (2008) has argued that expenditure data are less prone to error, easier to recall in survey situations, and more stable over time than income data. These observations are valid and using expenditures as a proxy for income may be fairly accurate for poor people because the income elasticity of consumption is near unity. However, the effectiveness of the proxy deteriorates as incomes increase and the income elasticity of consumption ceases to be unity. After estimating total household expenditure on an annual basis, it is converted into a daily and per capita basis by dividing by 365 days and then by the number of household members.

Daily per Capita Expenditure in 2010 USD Constant Prices

The indicator developed to provide the primary information on household economic well-being in the report is the average household daily per capita expenditure[1] expressed in 2010 U.S. dollars (USD) after adjusting for the 2005 Purchasing Power Parity (PPP)[2]. Table 6 presents average household daily per capita expenditure for all districts in Northern Region. The average household daily per capita expenditure is $4.91. Saboba and Chereponi Districts have the lowest average household daily per capita expenditures in Northern Region; $2.59 and $2.76, respectively. The highest average household daily per capita expenditure is $8.99 in Tamale Metropolitan, followed by $7.70 in Bole and $7.46 in Nanumba South.

[1] Note that expenditure data are not collected at the individual level but rather at the household level; individuals' per capita expenditures are then derived by dividing total household expenditures by the number of household members.

[2] Adjustments are made according to PPP conversions. These conversions are established by the World Bank to allow currencies to be compared across countries in terms of how much an individual can buy in a specific country. The $1.25 in 2005 PPP means that $1.25 could buy the same amount of goods in another country as $1.25 could in the United States in 2005.

Table 6: Mean Daily per Capita Expenditure (in 2010 USD) by District

District	Mean	n
Bole	7.70	211
Bunkpurugu Yonyo	4.58	168
Chereponi	2.76	139
East Gonja	4.21	186
Gonja Central	5.10	138
Gushegu	3.07	163
Karaga	3.48	131
Kpandai	5.24	145
Kumbungu	3.70	66
Mamprugu Moagduri[1]	5.37	19
Mamprusi East	3.07	124
Mamprusi West	5.89	174
Mion	3.28	74
Nanumba North	4.71	139
Nanumba South	7.46	134
North Gonja	3.63	67
Saboba	2.59	146
Sagnerigu	5.62	80
Savelugu Nanton	4.55	190
Sawla/Tuna/Kalba	3.20	144
Tamale Metropolitan	8.99	285
Tatale Sanguli	4.35	83
Tolon Kumbugu	4.24	129
West Gonja	4.23	124
Yendi	4.48	80
Zabzugu Tatali	4.85	99
Northern Region	**4.91**	**3,419**

[1] Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Prevalence and Depth of Poverty

International Poverty Line

The international poverty line of $1.25 USD in 2005 PPP represents extreme poverty and is used to estimate the prevalence of poverty and the depth of poverty (World Bank 2011). The prevalence of poverty, sometimes called the poverty headcount ratio, is measured by determining the proportion of households living below an established poverty threshold. For this study, the poverty threshold is set at $1.25 in 2005 PPP. Depth of poverty, or poverty gap index, measures the extent to which those households classified as poor fall below the poverty line (World Bank 2011).

Table 7 presents the overall poverty prevalence estimates at the $1.25 per day (2005 PPP) threshold and the overall depth of poverty for the districts in Northern Region. Overall, the average prevalence of poverty is 16.3 percent and the average depth of poverty is 6.1 percent. Savelugu Nanton District has the lowest poverty prevalence rate and the lowest depth of poverty;

6.3 percent and 1.6 percent, respectively. Mamprusi East District has the highest prevalence of poverty at 33.1 percent, followed by Saboba (31.5 percent) and Bunkpurugu Yonyo Districts (30.4

Table 7: Poverty at the $1.25 (2005 PPP) by District

	Prevalence of Poverty[1]		Depth of Poverty[2]	
District	Percent Population	n	Percent of Poverty Line	n
Bole	7.6	211	2.7	211
Bunkpurugu Yonyo	30.4	168	12.2	168
Chereponi	28.8	139	7.8	139
East Gonja	16.7	186	7.0	186
Gonja Central	11.6	138	2.7	138
Gushegu	16.6	163	5.3	163
Karaga	18.3	131	5.5	131
Kpandai	15.2	145	6.1	145
Kumbungu	13.6	66	3.7	66
Mamprugu Moagduri[3]	15.8	19	5.8	19
Mamprusi East	33.1	124	14.2	124
Mamprusi West	13.2	174	4.1	174
Mion	27.0	74	15.4	74
Nanumba North	9.4	139	2.7	139
Nanumba South	7.5	134	3.1	134
North Gonja	16.4	67	5.9	67
Saboba	31.5	146	11.2	146
Sagnerigu	11.3	80	3.4	80
Savelugu Nanton	6.3	190	1.6	190
Sawla/Tuna/Kalba	27.1	144	9.9	144
Tamale Metropolitan	7.0	285	2.5	285
Tatale Sanguli	20.5	83	10.4	83
Tolon Kumbugu	14.0	129	3.9	129
West Gonja	10.5	124	3.9	124
Yendi	20.0	80	10.3	80
Zabzugu Tatali	15.2	99	9.8	99
Northern Region	**16.3**	**3,419**	**6.1**	**3,419**

[1] The prevalence of poverty is the percentage of households living below the national poverty line. Poverty prevalence is sometimes referred to as the poverty incidence or poverty headcount ratio.
[2] The depth of poverty, or poverty gap, is the average consumption shortfall multiplied by the prevalence of poverty.
[3] Results not statistically reliable, n < 30. For poverty prevalence and depth, districts with n < 30 were considered for possible future case analysis.
Source: District Level Survey Data, Ghana 2015.

percent). Mamprusi East and Saboba Districts are among the five districts in the region with the lowest daily per capita expenditure. The depth of poverty in Mion District is highest in the region with 15.4 percent compared to Mamprusi East at 14.2 percent. Other districts with a depth of poverty larger than 10 percent are Yendi, Saboba, Tatale Sanguli, and Bunkpurugu Yonyo. Maps representing the geographical distribution of poverty prevalence and depth of poverty rates by district in presented in Appendix 2.

National Poverty Line

National poverty lines for Ghana are based on the Ghana Living Standards Survey 6 (GLSS6), which was conducted in 2012/2013 by the Ghana Statistical Services (GSS). It makes

use of a consumption-based standard of living measure as is the practice in many country statistics services. An absolute poverty line can be defined as that value of consumption necessary to satisfy minimum subsistence needs. In the case of food consumption, nutritional requirements in terms of daily calorie intake can be used as a guide. GSS (2014) calculated the average expenditure of the food consumption basket for the bottom 50 percent of individuals ranked by the standard of living measure, and derived the amount of calories in this basket. The price of one calorie was then calculated by dividing the adult equivalent expenditure of the food basket by the amount of adult equivalent calories provided by the basket. This calorie price was representative of the price paid by a typical household in the bottom 50 percent. This price was then multiplied by 2,900 calories, which was used to calculate the poverty lines for the 2012/13 survey. Expenditure on non-food consumption, determined by household whose total food expenditure was at or near the level of the extreme poverty line (10 percent of individuals below and above the line), was added to the poverty line.

Two nutritionally-based national poverty lines are:

- The national extreme poverty line: This is the lower poverty line of GHS 792.05 per adult equivalent per year. It corresponds to GHS 2.17 per day per adult equivalent expenditure. It focuses on what is needed to meet the nutritional requirements of household members. Individuals whose total expenditure falls below this line are considered to be in extreme poverty. They are unable to purchase or consume enough food to supply them with the minimum daily per-capita energy requirement for a good healthy life. If they allocated their entire budget to food, they would not be able to meet their minimum nutrition requirements (which Ghana selected to be 2,900 calories). These are also the individuals who do not have enough resources to consume or purchase both adequate food and non-food items and are forced to sacrifice food items to obtain essential non-food items. GSS placed this line as 27 percent of the mean consumption level in 2012/13.
- The national absolute poverty line: This is the upper poverty line of GHS 1,314 per adult equivalent per year was also established. This corresponds to GHS 3.60 per day per adult equivalent expenditure. This line incorporates both essential food and non-food consumption. Individuals consuming above this level may be considered able to purchase enough food to meet their nutritional requirements and their basic non-food needs. This line is 45 percent of the mean consumption level in 2012/13.

Using the national absolute poverty line as described above, the mean percentage of households below the GHS 3.60 daily per capita expenditure threshold is 46.2 percent and ranges from 20.1 percent in Nanumba South District to over 75.3 percent in Saboba District (Table 8). The poverty prevalence rates at the national absolute poverty line are, on average, twice as high as the poverty prevalence rates at the $1.25 international poverty line. However, the pattern of the national absolute poverty prevalence rates is similar to the $1.25 international poverty prevalence rates, with Tamale Metropolitan, Namumba South, and Bole Districts having some of

the lowest poverty rates, while Sawla/Tuna/Kalba, Chereponi, Bunkpurugu Yonyo, Saboba and Mamprusi East Districts having the some of the highest rates. The depth of poverty for Northern Region averages around 18.6 percent of the national absolute poverty line. Nanumba South and Saboba Districts also have the lowest and highest prevalence rates for poverty depth; 8.6 percent and 35.0 percent, respectively.

Table 8: Poverty at the National Absolute Threshold of GHS 3.60 (2012/13) by District

District	Prevalence of Poverty[1]		Depth of Poverty[2]	
	Percent Population	n	Percent of Poverty Line	n
Bole	28.0	211	10.1	210
Bunkpurugu Yonyo	63.1	168	29.9	168
Chereponi	73.4	139	28.0	139
East Gonja	43.0	186	17.7	186
Gonja Central	35.5	138	12.3	138
Gushegu	58.3	163	21.9	163
Karaga	58.0	131	21.6	131
Kpandai	44.8	145	18.1	145
Kumbungu	43.9	66	15.5	66
Mamprugu Moagduri[3]	47.4	19	17.0	19
Mamprusi East	63.7	124	31.4	124
Mamprusi West	39.7	174	16.0	173
Mion	58.1	74	28.6	74
Nanumba North	37.4	139	11.2	139
Nanumba South	20.1	134	8.6	134
North Gonja	61.2	67	21.8	67
Saboba	75.3	146	35.0	146
Sagnerigu	27.5	80	10.0	80
Savelugu Nanton	35.8	190	12.4	190
Sawla/Tuna/Kalba	59.7	144	26.5	144
Tamale Metropolitan	31.2	285	9.9	285
Tatale Sanguli	48.2	83	21.3	83
Tolon Kumbugu	46.5	129	16.4	129
West Gonja	48.4	124	18.1	124
Yendi	45.0	80	21.6	80
Zabzugu Tatali	37.4	99	18.2	99
Northern Region	**46.2**	**3,419**	**18.6**	**3,417**

[1] The prevalence of poverty is the percentage of households living below the national poverty line. Poverty prevalence is sometimes referred to as the poverty incidence or poverty headcount ratio.
[2] The depth of poverty, or poverty gap, is the average consumption shortfall multiplied by the prevalence of poverty.
[3] Results not statistically reliable, n < 30. For poverty prevalence and depth, districts with n < 30 were considered for possible future case analysis.
Source: District Level Survey Data, Ghana 2015.

Extreme National Poverty Line

The estimates of the prevalence of poverty and depth of poverty based on the extreme national poverty line, i.e., GHS 2.17 per adult per day measured in 2012/13, are shown in Table 9. The rates based on the national poverty lines generally seem to give slighter higher estimates compared to rates based on the international poverty lines. The ranking of districts by prevalence rates is similar to the rankings from the international poverty line. The six districts with the highest poverty prevalence rates and the five districts with the lowest rates using the $1.25

international poverty line are the same districts with the highest and lowest rates using the extreme national poverty line. Tamale Metropolitan District has the lowest prevalence rate of poverty in Northern Region with 8.8 percent of the households falling below the poverty line of GHS 2.17 per adult per day, while Saboba District has the highest prevalence of poverty with almost half of the households falling below this national poverty line. The depth of poverty ranges from 3.2 percent in Savelegu Nanton to 17.6 percent in Mamprusi East Districts.

Table 9: Poverty at the National Extreme Threshold GHS 2.17 (2012/13) by District

District	Prevalence of Poverty[1]		Depth of Poverty[2]	
	Percent Population	n	Percent of Poverty Line	n
Bole	9.5	211	3.3	210
Bunkpurugu Yonyo	36.9	168	15.7	168
Chereponi	33.8	139	11.4	139
East Gonja	19.9	186	8.7	186
Gonja Central	14.5	138	4.2	138
Gushegu	24.5	163	7.4	163
Karaga	26.7	131	7.8	131
Kpandai	20.7	145	8.7	145
Kumbungu	16.7	66	5.2	66
Mamprugu Moagduri[3]	21.1	19	8.4	19
Mamprusi East	41.1	124	17.6	124
Mamprusi West	19.0	174	6.1	173
Mion	33.8	74	17.3	74
Nanumba North	13.7	139	4.0	139
Nanumba South	11.2	134	4.2	134
North Gonja	26.9	67	8.1	67
Saboba	47.3	146	16.8	146
Sagnerigu	11.3	80	4.3	80
Savelugu Nanton	13.7	190	3.2	190
Sawla/Tuna/Kalba	33.3	144	13.0	144
Tamale Metropolitan	8.8	285	3.5	285
Tatale Sanguli	21.7	83	12.0	83
Tolon Kumbugu	19.4	129	6.1	129
West Gonja	21.0	124	5.9	124
Yendi	25.0	80	12.5	80
Zabzugu Tatali	21.2	99	11.6	99
Northern Region	**21.9**	**3,419**	**8.2**	**3,417**

[1] The prevalence of poverty is the percentage of households living below the national poverty line. Poverty prevalence is sometimes referred to as the poverty incidence or poverty headcount ratio.
[2] The depth of poverty, or poverty gap, is the average consumption shortfall multiplied by the prevalence of poverty.
[3] Results not statistically reliable, n < 30. For poverty prevalence and depth, districts with n < 30 were considered for possible future case analysis.
Source: District Level Survey Data, Ghana 2015.

Hunger and Dietary Diversity Indicator

Household Hunger Scale

The household hunger scale (HHS) is used to calculate the prevalence of households experiencing moderate or severe hunger. The HHS was developed by the USAID-funded Food and Nutrition Technical Assistance II Project (FANTA-2/FHI 360) in collaboration with the United Nations Food and Agriculture Organization. It has been cross-culturally validated to allow comparison across different food-insecure contexts. The HHS is used to assess, geographically target, monitor, and evaluate settings affected by substantial food insecurity. The HHS is used to estimate the percentage of households affected by three different severities of household hunger: little to no household hunger (HHS score 0-1); moderate household hunger (HHS score 2-3); and severe household hunger (HHS score 4-6). The HHS should be measured at the same time each year, and ideally at the most vulnerable time of year (such as right before the harvest or during the dry season) (Deitschler et al. 2011).[3]

The results for households with moderate to severe hunger are presented in Table 10. Approximately a quarter all of the households in Northern Region experience moderate to severe hunger. Districts with the lowest prevalence of moderate to severe household hunger include: Sagnerigu (7.9 percent), Tamale (8.6 percent), and Zabzugu Tatale (9.7 percent). The three districts with the highest prevalence of moderate to severe hunger are Bole (49.5 percent), Mamprusi East (56.2 percent), and Saboba (56.7 percent).

Dietary Diversity in Women

Two indicators are used to measure women's dietary diversity: Women's Dietary Diversity Score (WDDS) and Women's Minimum Dietary Diversity (MDD-W). The WDDS is based on nine food groups: (1) Grains, roots, and tubers; (2) Legumes and nuts; (3) Dairy products; (4) Organ meat; (5) Eggs; (6) Flesh food and small animal protein; (7) Vitamin A-rich dark green leafy vegetables; (8) Other vitamin A-rich vegetables and fruits; and (9) Other fruits and vegetables. A woman's score is based on the sum of different food groups consumed in the 24 hours prior to the interview. The mean of this count across respondents produces the average WDDS. The WDDS is an indicator of the micronutrient adequacy of women's diets based on the diversity of the diet (FAO 2011). Women's Minimum Dietary Diversity (MDD-W) represents the proportion of women consuming a minimum of five food groups out of the possible ten food groups based on their dietary intake within the 24 hours preceding the survey interview (FAO and FHI 360 2016).

Table 11 represents the differences between the food groups for WDDS and MDD-W.

[3] For further description of the household hunger indicator and its calculation, please refer to the Feed the Future Indicator Handbook, available at http://feedthefuture.gov/resource/feed-future-handbook-indicator-definitions.

Table 10: Percentage of Households with Moderate to Severe Hunger by District

District	Moderate to Severe Hunger (%)	n
Bole	49.5	210
Bunkpurugu Yonyo	36.1	169
Chereponi	46.4	125
East Gonja	19.0	179
Gonja Central	20.9	139
Gushegu	10.1	158
Karaga	9.2	131
Kpandai	26.8	142
Kumbungu	15.4	65
Mamprugu Moagduri	^	^
Mamprusi East	56.2	137
Mamprusi West	33.5	161
Mion	13.8	58
Nanumba North	19.9	156
Nanumba South	27.8	133
North Gonja	10.6	66
Saboba	56.7	134
Sagnerigu	7.9	76
Savelugu Nanton	21.1	185
Sawla/Tuna/Kalba	48.9	137
Tamale Metropolitan	8.6	291
Tatale Sanguli	12.5	80
Tolon Kumbugu	12.2	131
West Gonja	20.9	115
Yendi	15.4	65
Zabzugu Tatali	9.7	103
Northern Region	**25.6**	**3,346**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Table 11: Differences in Food Groups between WDDS and MDD-W

WDDS	MDD-W
Group 1: Starchy staple	Group 1: All starchy staple foods
Group 2: Legumes, nuts and seeds	Group 2: Beans and peas Group 3: Nuts and Seeds
Group 3: Milk and milk products	Group 4: Dairy
Group 4: Meat and Fish Group 5: Organ Meat	Group 5: Flesh Foods
Group 6: Eggs	Group 6: Eggs
Group 7: Dark green leafy vegetables	Group 7: Vitamin A–rich dark green leafy vegetables
Group 8: Other Vitamin A–rich vegetables and fruits	Group 8: Other Vitamin A–rich vegetables and fruits
Group 9: Other vegetables and fruits	Group 9: Other vegetables Group 10: Other fruit

Adapted from FAO (2011) and FAO and FHI 360 (2016).

Women's Dietary Diversity Score

The mean and median values for WDDS in Northern Region are 3.7 and 4.0, respectively (Table 12). The mean WDDS across the districts ranges between 3.0 in Mamprusi East to 4.7 in Karaga District. Seventeen districts score a mean WDDS less than 4.0, and 13 districts score a median WDDS under 4.0. Karaga District has the highest median WDDS at 5.0. Besides Mamprusi East, the other districts with the lowest WDDS values are Saboba and Chereponi with 3.1 and Gonja Central with 3.3.

Table 12: Women's Dietary Diversity Score by District

District	Mean	Median	n
Bole	3.4	3.0	232
Bunkpurugu Yonyo	3.6	3.5	160
Chereponi	3.1	3.0	120
East Gonja	3.3	3.0	174
Gonja Central	3.3	3.0	139
Gushegu	4.2	4.0	230
Karaga	4.7	5.0	169
Kpandai	3.8	4.0	178
Kumbungu	3.5	3.0	87
Mamprugu Moagduri	^	^	^
Mamprusi East	3.0	3.0	132
Mamprusi West	4.1	4.0	135
Mion	3.5	3.0	69
Nanumba North	3.8	4.0	177
Nanumba South	4.0	4.0	120
North Gonja	3.5	3.0	62
Saboba	3.1	3.0	169
Sagnerigu	4.5	4.0	78
Savelugu Nanton	3.9	4.0	196
Sawla/Tuna/Kalba	3.3	3.0	145
Tamale Metropolitan	4.2	4.0	282
Tatale Sanguli	3.6	3.0	139
Tolon Kumbugu	3.5	3.0	153
West Gonja	3.8	4.0	130
Yendi	4.4	4.0	53
Zabzugu Tatali	4.0	4.0	140
Northern Region	**3.7**	**4.0**	**3,669**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Women's Minimum Dietary Diversity

Table 13 shows the percentage of women of reproductive age who have achieved the minimum dietary diversity threshold. More than half of the female population of reproductive age achieve minimum dietary diversity in only five districts in Northern Region: Sangerigu, Tamale Meteropolitan, Yendi, Gushegu, and Karaga. The average prevalence rate of women achieving dietary diversity is 42.8 percent. Approximately 76 percent of women in Karaga District consume food from five or more food groups. Mamprusi East has the lowest percentage of women

achieving minimum dietary diversity at 15.0 percent, followed by 25.4 percent in Saboba and 25.9 percent in East Gonja.

Table 13: Women's Minimum Dietary Diversity by District

District	Percent of Women	n
Bole	37.9	232
Bunkpurugu Yonyo	41.3	160
Chereponi	26.7	120
East Gonja	25.9	174
Gonja Central	31.7	139
Gushegu	62.2	230
Karaga	76.3	169
Kpandai	47.2	178
Kumbungu	36.8	87
Mamprugu Moagduri	^	^
Mamprusi East	15.0	133
Mamprusi West	46.7	135
Mion	31.9	69
Nanumba North	48.0	177
Nanumba South	45.8	120
North Gonja	41.9	62
Saboba	25.4	169
Sagnerigu	55.1	78
Savelugu Nanton	44.9	196
Sawla/Tuna/Kalba	33.1	145
Tamale Metropolitan	57.8	282
Tatale Sanguli	36.7	139
Tolon Kumbugu	37.9	153
West Gonja	45.4	130
Yendi	58.5	53
Zabzugu Tatali	41.4	140
Northern Region	**42.8**	**3,670**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Health Status of Women and Children

The nutritional status of children and women are measured by four indicators, three indicators for children and one for women. The three anthropometric measurements used for children measures the prevalence of stunted, wasted and underweight children under 5 years old. Standardized Z-scores for these measurements have been developed in reference to a healthy population of children, which took into account age and gender. If the Z-score of the measurements are below -2 standard deviations (<-2 SD) of the median z-score measurement for the reference group, then a child is considered as stunted, wasted and underweight, respectively. Severe stunting, wasting or underweight are associated with measurement below -3 standard deviations (<-3 SD). A mean Z-score of less than 0 (i.e., a negative value for stunting, wasting, or underweight) suggests that the distribution of an index has shifted downward and, on average, children in the population are less well-nourished than the reference group (WHO 2006). Appendix 2 has maps presenting the geographical distribution of stunted, wasted and underweight children by district.

Stunted Children

Stunting, or height-for-age, is an indicator of linear growth retardation, most often due to a prolonged inadequate diet and poor health. Reducing the prevalence of stunting among children, particularly age 0-23 months, is important because linear growth deficits accrued early in life are associated with cognitive impairments, poor educational performance, and decreased work productivity as adults (Black et al. 2008, Victora et al. 2008). Table 14 presents the prevalence rates of stunted (<-2 SD) and severely stunted (<-3 SD) children ages 0 to 59 months residing in Northern Region.

The average prevalence rates for stunted and severely stunted children are 31.1 percent and 15.4 percent, respectively. Gushegu, Zabzugu Tatali, and Sagnerigu Districts have the highest rates of stunting among children in Northern Region with rates greater than 40.0 percent. Eleven districts have average prevalence rates below 30 percent. East Gonja District has the lowest rates of stunted and severely stunted children in Northern Region (20.2 percent and 9.6 percent, respectively) while Sagnerigu District has the highest rates of stunting and severely stunting (47.6 percent and 28.6 percent, respectively). The mean Z-scores for stunting averaged -1.0 and range between -1.6 to -0.3.

Wasted Children

Wasting, or low weight-for-height, is an indicator of acute malnutrition. Children who are malnourished face a higher risk of mortality than well-nourished children (ICF Macro 2010). This indicator also provides the prevalence rate for children with a high weight-for-height measurement, and are considered overweight and obese. Table 15 presents the mean Z-scores

for children 0-59 months, along with the percentage of children who are acutely malnourished (<-2SD), severely wasting (<-3SD), overweight (>+2SD) and obese (>+3SD).

Table 14: Prevalence of Stunting among Children under 5 Year Olds by District

District	% Stunted (<-2 SD)	% Severely Stunted (<-3SD)	Mean Z-Score	n
Bole	21.8	9.2	-1.0	142
Bunkpurugu Yonyo	31.3	14.8	-1.3	115
Chereponi	40.0	22.5	-1.3	80
East Gonja	20.2	9.6	-0.5	104
Gonja Central	28.9	10.5	-1.0	114
Gushegu	40.7	23.1	-1.1	199
Karaga	29.2	18.3	-0.7	120
Kpandai	23.1	9.2	-1.1	130
Kumbungu	27.8	11.1	-1.3	72
Mamprugu Moagduri	^	^	^	^
Mamprusi East	37.3	21.6	-0.9	51
Mamprusi West	35.8	13.2	-0.6	53
Mion	26.7	18.3	-1.1	60
Nanumba North	32.2	18.3	-1.2	115
Nanumba South	27.6	18.4	-1.4	76
North Gonja	35.0	20.0	-1.3	60
Saboba	30.2	22.2	-0.7	63
Sagnerigu	47.6	28.6	-1.6	42
Savelugu Nanton	38.8	16.3	-1.3	160
Sawla/Tuna/Kalba	20.5	8.2	-0.8	73
Tamale Metropolitan	27.1	5.7	-0.3	70
Tatale Sanguli	35.2	16.9	-0.9	71
Tolon Kumbugu	27.7	10.8	-0.7	130
West Gonja	30.2	14.0	-0.8	86
Yendi	30.0	20.0	-1.1	40
Zabzugu Tatali	42.5	17.5	-1.2	80
Northern Region	**31.1**	**15.4**	**-1.0**	**2,306**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

The three districts with the lowest prevalence rate of wasting are Saboba (3.2 percent), Sawla/Tuna/Kalba (4.2 percent) and West Gonja (6.0 percent). Those with the highest levels are Mamprusi East (23.5 percent), Mion (23.3 percent) and Mamprusi West (22.5 percent). No incidences of severe wasting were found in Saboba and Kumbungu Districts. Yendi and Mion Districts have the highest prevalence rates of severe wasting in children under 5 years with 12.8 percent and 13.3 percent, respectively. The mean Z-scores for wasting average -0.4 and range between -0.7 to 0.1. Fifteen districts report having obese children and 23 districts have overweight children.

Table 15: Prevalence of Wasting among Children under 5 Years Old by District

District	% Wasted (<-2SD)	% Severely wasted (<-3SD)	% Overweight (>+2SD)	% Obese (>+3SD)	Mean Z-Score	n
Bole	6.4	2.1	1.4	0.0	-0.2	140
Bunkpurugu Yonyo	11.6	1.8	10.7	1.8	-0.2	112
Chereponi	8.8	3.8	10.0	0.0	-0.2	80
East Gonja	20.0	7.6	3.8	2.9	-0.6	105
Gonja Central	15.0	7.1	5.3	2.7	-0.7	113
Gushegu	20.3	12.5	16.7	6.8	-0.2	192
Karaga	22.0	9.3	14.4	4.2	-0.4	118
Kpandai	11.8	3.9	6.3	2.4	-0.3	127
Kumbungu	12.5	0.0	0.0	0.0	-0.6	72
Mamprugu Moagduri	^	^	^	^	^	^
Mamprusi East	23.5	11.8	25.5	3.9	0.1	51
Mamprusi West	22.5	12.2	16.3	4.1	-0.3	49
Mion	23.3	13.3	8.3	0.0	-0.7	60
Nanumba North	8.8	2.6	5.3	0.9	-0.0	114
Nanumba South	11.5	5.1	2.6	0.0	-0.4	78
North Gonja	6.8	1.7	6.8	0.0	-0.1	59
Saboba	3.2	0.0	4.8	1.6	-0.4	62
Sagnerigu	19.1	9.5	9.5	4.8	-0.5	42
Savelugu Nanton	14.7	5.1	0.6	0.0	-0.7	157
Sawla/Tuna/Kalba	4.2	1.4	2.8	1.4	-0.1	72
Tamale Metropolitan	17.1	7.1	7.1	1.4	-0.6	70
Tatale Sanguli	12.7	4.2	8.5	5.6	-0.4	71
Tolon Kumbugu	11.7	7.0	0.0	0.0	-0.7	128
West Gonja	6.0	3.6	7.1	0.0	-0.1	84
Yendi	20.5	12.8	2.6	0.0	-0.7	39
Zabzugu Tatali	6.3	3.8	5.0	2.5	-0.3	80
Northern Region	**13.6**	**5.9**	**7.0**	**2.0**	**-0.4**	**2,275**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Underweight Children

Underweight, weight-for-age, is a reflection of acute and/or chronic undernutrition. The prevalence of children aged 0-59 months who are underweight (<-2SD) and severely underweight (<-3SD) are presented in Table 16, along with their mean Z-scores. The average prevalence of underweight children in Northern Region is 18.5 percent. Sagnerigu District has the highest rate of underweight children in the region with 31.0 percent, followed by Mion District (28.3 percent) and Savelegu Nanton District (25.2 percent). The districts with the lowest prevalence of underweight are Bole (10.0 percent), Sawla/Tuna/Kalba (11.1 percent), Mamprusi East (11.8 percent) and West Gonja (11.6 percent). Bole and Sawla/Tuna/Kalba Districts have the lowest prevalence rate of severely underweight children with 1.4 percent compared to North Gonja, which has the highest rate at 15.3 percent. The mean Z-scores for underweight average -1.0 and range between -1.6 to -0.3.

Table 16: Prevalence of Underweight among Children under 5 Years Old by District

District	% Underweight (<-2SD)	% Severely Underweight (<-3SD)	Mean Z Score	n
Bole	10.0	1.4	-1.0	142
Bunkpurugu Yonyo	13.2	3.5	-1.3	115
Chereponi	17.3	8.6	-1.3	80
East Gonja	17.3	5.8	-0.5	104
Gonja Central	20.2	9.6	-1.0	114
Gushegu	22.7	4.0	-1.1	199
Karaga	13.6	2.5	-0.7	120
Kpandai	15.7	2.4	-1.1	130
Kumbungu	20.5	5.5	-1.3	72
Mamprugu Moagduri	^	^	^	^
Mamprusi East	11.8	5.9	-0.9	51
Mamprusi West	15.8	3.5	-0.6	53
Mion	28.3	8.3	-1.1	60
Nanumba North	17.7	10.6	-1.2	115
Nanumba South	25.0	7.9	-1.4	76
North Gonja	20.3	15.3	-1.3	60
Saboba	20.6	3.2	-0.7	63
Sagnerigu	31.0	9.5	-1.6	42
Savelugu Nanton	25.2	7.5	-1.3	160
Sawla/Tuna/Kalba	11.1	1.4	-0.8	73
Tamale Metropolitan	14.3	5.7	-0.3	70
Tatale Sanguli	21.1	11.3	-0.9	71
Tolon Kumbugu	19.2	2.3	-0.7	130
West Gonja	11.6	3.5	-0.8	86
Yendi	22.5	7.5	-1.1	40
Zabzugu Tatali	25.0	5.0	-1.2	80
Northern Region	**18.5**	**5.6**	**-1.0**	**2,306**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Anthropometry for Women of Reproductive Age

An individual's health can be assessed by her Body Mass Index (BMI), which is a simple, unobtrusive and inexpensive anthropometric measure. BMI is defined as the ratio of an individual's weight in kilograms to her height in meters squared (kg/m^2) (WHO 2014, CDC 2014). BMI is a reliable measure of body composition and it is used widely in health screenings of adults to identify potential health problems associated with body weight. An individual can be classified into four different body mass composition categories based on their BMI score: (1) underweight (BMI <18.5); (2) normal weight (18.5 ≤ BMI < 25.0); (3) overweight (25.0 ≤ BMI < 30.0); and (4) obese (BMI ≥ 30.0).

Table 17 provides estimates for all non-pregnant women age 15-49 years for each district. The BMI for all districts ranges from 20.9 in Saboba to 23.8 in three districts; Mamprusi East, Mamprusi West and Tamale Metropolitan. Districts with percentage of underweight women within the top quintile for Northern Region are: Sawla/Tuna/Kalba (15.8 percent), Saboba (16.7

percent), Tatale Sanguli (18.7 percent), Tolon Kumbugu (20.6 percent) and Zabzugu Tatali (30.7 percent). Sagnerigu District has the lowest the prevalence of underweight women with 2.9 percent.

Table 17: Prevalence of Underweight, Normal Weight, Overweight, and Obese Women by District

District	Mean BMI	Body Mass Index (BMI) Category (%)				n
		Under-weight	Normal	Over-weight	Obese	
Bole	22.4	7.8	74.2	14.2	3.9	205
Bunkpurugu Yonyo	22.9	8.1	59.5	30.4	2.0	148
Chereponi	21.5	15.7	73.0	5.2	6.1	115
East Gonja	22.3	14.7	62.4	19.1	3.8	157
Gonja Central	21.8	15.7	69.4	9.1	5.8	121
Gushegu	21.5	7.0	86.0	6.5	0.5	214
Karaga	21.4	8.2	84.4	7.5	0.0	147
Kpandai	22.0	10.3	73.9	14.6	1.2	165
Kumbungu	22.4	6.9	74.0	16.4	2.7	73
Mamprugu Moagduri	^	^	^	^	^	^
Mamprusi East	23.8	8.6	55.6	23.9	12.0	117
Mamprusi West	23.8	10.6	55.8	19.5	14.2	113
Mion	22.3	12.1	69.0	15.5	3.5	58
Nanumba North	22.5	5.0	75.6	16.9	2.5	160
Nanumba South	23.0	10.1	61.5	23.9	4.6	109
North Gonja	22.2	12.5	62.5	21.4	3.6	56
Saboba	20.9	16.7	75.0	5.1	3.2	156
Sagnerigu	22.9	2.9	75.4	15.9	5.8	69
Savelugu Nanton	22.6	11.1	69.0	15.8	4.1	171
Sawla/Tuna/Kalba	21.2	15.8	74.0	9.6	0.7	146
Tamale Metropolitan	23.8	5.9	62.8	22.2	9.2	239
Tatale Sanguli	21.2	18.7	70.7	7.3	3.3	123
Tolon Kumbugu	21.1	20.6	64.5	12.1	2.8	141
West Gonja	22.5	8.9	78.1	8.9	4.1	123
Yendi	22.8	3.9	69.2	21.2	5.8	52
Zabzugu Tatali	21.5	30.7	52.8	11.8	4.7	127
Northern Region	**22.2**	**11.5**	**69.6**	**14.6**	**4.3**	**3,305**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

The percentage of women with normal BMI is lowest in Zabzugu Tatali (52.8 percent) and highest in Gushegu (86.0 percent). Districts with the highest prevalence rate of overweight and obese women are Banakprugu Yonyo District (30.4 percent) and Mamprusi West (14.2 percent), respectively. No obese women are found in Karaga Distric tand Saboba District has the lowest rate of overweight women with 5.1 percent.

Women's Empowerment in Agriculture

Women play a prominent role in agriculture, yet they face persistent economic and social constraints. Women's empowerment is a main focus of Feed the Future in order to achieve its objectives of inclusive agriculture sector growth and improved nutritional status. The WEAI is comprised of two weighted sub-indexes developed by Alkire et al (2013): 5 Domains Empowerment Index (5DE) and Gender Parity Index (GPI). The 5DE examines the five domains of empowerment: production, resources, income, leadership and time. The GPI compares the empowerment of women to the empowerment of their male counterpart in the household. Data collected in this district level survey allows for calculation of the ten individual empowerment indicators in the 5DE for both primary adult female and adult men decision markers[4]. This section presents the results from these empowerment indicators of the 5DE.

The *Production* domain assesses the ability of individuals to provide input and autonomously make decisions about agricultural production. The *Resources* domain reflects individuals' control over and access to productive resources. The *Income* domain monitors individuals' ability to direct the financial resources derived from agricultural production or other sources. The *Leadership* domain reflects individuals' social capital and comfort speaking in public within their community. The *Time* domain reflects individuals' workload and satisfaction with leisure time (Zereyesus et al. 2016).

The production domain includes activities ranging from food and cash crop farming, livestock rearing, fishing, to nonfarm economic activities such as wage and salaried employment. The income domain addresses whether there is a sole or joint control over income and expenditure. Table 18 presents the percentage of women who perceive they have input in production decision making, autonomy in production, and control over the use of income. On average, 84.8 percent of the women in Northern Region are adequate in decision making for agricultural production decisions. Sagnerigu District has the lowest percentage of adequate women in production decision and Karaga District has the highest rate (98.3 percent). Nine districts are below the average and 15 are above the average. Approximately sixty-eight percent of women and 74.5 percent of men in Northern Region perceive to have autonomy in production. Along all the districts men present higher rates on autonomy in production than women except in Gonja Central, North Gonja, and Sagnerigu Districts. In Yendi District the rates on autonomy on production for men and women are almost the same. Kumbungu District has the highest rate for both women and men, 92.7 percent and 100 percent, respectively. West Gonja and North Gonja Districts have the lowest rates on autonomy in production for women (approximately 28 percent). North Gonja and Gonja Central Districts have the lowest rates on autonomy in production for men (15.4 percent and 37.0 percent, respectively). Nearly 34 percent of the

[4] The primary adult decision-makers are individuals age 18 or older who are self-identified as the primary male or female decision-maker during the collection of the household roster. These primary decision-makers in the households may not be representative of the entire female and male populations in the surveyed area.

women in Northern Region perceive to have some control over income. This percentage of women ranges across Northern Region districts from 21.6 percent in North Gonja to 56.5 percent in Sagnerigu District.

In both input in production decision and control over the use of income, the men have higher rates along the districts. The average adequacy in production decision inputs is 93.6 percent for men as opposed to 84.8 percent for women. In Mion, Nanumba North, and North Gonja Districts men had 100 percent adequacy in production decision inputs. Tamale Metropolitan has the lowest adequacy rate for men (67.3 percent), which is only 0.5 percentage points higher than the rate for women in this district. Sagnerigu Distirct has the largest difference in percentage rates between men and women, with 80.6 percent of men being adequate in production decisions compared to 56.0 percent of women. The percentage of men with input or perceived input in income decisions is more than double that of women; 80.5 percent for men compared to 33.7 percent for women. The rates for men ranged from 60.3 percent in Bunkpurungu Yongo to 98.3 percent in Kumbungu District.

Table 18: Production and Income Domains by District

	Input in Production Decisions				Autonomy in Production				Control Over Use of Household Income			
District	**Women**	**n**	**Men**	**n**	**Women**	**n**	**Men**	**n**	**Women**	**n**	**Men**	**n**
Bole	89.3	122	91.5	106	65.0	117	71.7	99	55.4	121	94.3	105
Bunkpurugu Yonyo	86.5	133	94.4	143	70.5	129	72.9	144	22.6	133	60.3	141
Chereponi	80.5	123	95.7	94	73.3	101	82.1	78	25.4	122	62.8	94
East Gonja	77.1	118	91.5	130	67.8	118	74.6	122	23.6	123	75.0	132
Gonja Central	86.7	83	94.9	78	43.4	76	37.0	73	31.3	83	84.8	79
Gushegu	93.3	150	96.1	153	70.9	148	77.3	150	27.3	150	92.1	151
Karaga	98.3	119	99.2	121	70.9	117	73.7	118	24.4	119	89.3	121
Kpandai	84.2	114	97.3	113	77.5	111	79.4	107	30.6	111	66.4	113
Kumbungu	88.5	61	98.3	58	92.7	55	100.0	46	34.4	61	98.3	58
Mamprugu Moagduri	^	^	^	^	^	^	^	^	^	^	^	^
Mamprusi East	76.4	106	86.9	122	56.5	108	60.6	109	25.2	103	60.5	119
Mamprusi West	79.6	103	90.4	94	67.3	104	77.1	96	40.0	105	65.3	95
Mion	88.0	50	100.0	52	68.8	48	97.9	48	30.0	50	86.5	52
Nanumba North	87.7	114	100.0	104	86.9	107	88.0	92	33.3	114	91.3	104
Nanumba South	96.1	102	99.0	99	79.7	79	91.8	85	30.4	102	88.9	99
North Gonja	94.6	37	100.0	42	28.6	35	15.4	39	21.6	37	90.5	42
Saboba	89.7	117	94.8	96	76.1	88	91.9	74	29.1	117	76.8	95
Sagnerigu	56.0	50	80.6	36	62.7	59	56.9	51	56.5	62	75.0	48
Savelugu Nanton	84.8	158	98.7	149	83.3	150	89.3	131	39.7	156	85.2	149
Sawla/Tuna/Kalba	91.9	99	97.3	75	71.4	91	90.0	70	40.4	99	88.0	75
Tamale Metropolitan	66.8	196	67.3	156	51.6	192	55.2	165	38.6	210	61.7	167
Tatale Sanguli	83.1	71	93.4	61	73.1	67	87.0	54	48.6	70	85.2	61
Tolon Kumbugu	84.5	110	97.4	116	88.7	106	95.1	102	36.4	110	93.1	116
West Gonja	85.7	77	92.3	78	28.0	82	45.3	75	35.4	79	78.8	80
Yendi	85.7	42	87.5	48	78.6	42	78.7	47	31.1	45	80.0	50
Zabzugu Tatali	85.9	92	96.7	90	72.2	79	74.7	75	31.9	91	83.3	90
Northern Region	**84.8**	**2,547**	**93.6**	**2,414**	**68.2**	**2,409**	**74.5**	**2,250**	**33.7**	**2,573**	**80.5**	**2,436**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Results for the resource domain are presented in Table 19. The resource domain includes three indicators: asset ownership; decision making power over productive resources such as land, livestock, agricultural equipment, consumer durables and credit or loans; and access to credit. Approximately 68 percent for women and 95.2 percent for men, on average, are adequate in asset ownership. North Gonja District has the lowest rate of adequate women in asset ownership (57.8 percent) and Tamale Metropolis has the lowest rate (84.8 percent) for men. Almost 80 percent of the women are adequate in asset ownership in Chereponi compared to 100 percent of men in Karaga. The percentage of women and men considered adequate in the right to purchase, sell or transfer of assets is about 84.4 percent and 91.6 percent, respectively. These rates vary across the districts. For women, the range of prevalence rates is 53.6 percent in Tamale Metropolitan District to 95.4 percent in Karaga District, and for men, it is 68.5 percent in Tamale Metropolitan District to 97.4 percent in North Gonja District.

Table 19: Resource Domain by District

	Asset Ownership				Right to Purchase, Sell, and Transfer Assets				Access to and Decisions on Credit			
District	**Women**	**n**	**Men**	**n**	**Women**	**n**	**Men**	**n**	**Women**	**n**	**Men**	**n**
Bole	63.9	241	94.3	105	84.5	245	91.6	107	16.0	156	19.1	68
Bunkpurugu Yonyo	67.6	262	94.1	135	94.7	262	96.3	135	25.1	259	26.9	130
Chereponi	79.1	220	96.8	94	86.8	219	93.5	93	1.9	103	2.2	45
East Gonja	73.5	275	93.8	130	86.1	273	92.3	130	25.7	261	27.9	122
Gonja Central	67.4	187	93.4	76	93.2	191	96.2	79	17.7	175	20.0	70
Gushegu	63.1	298	97.3	149	94.3	298	96.0	149	10.4	278	11.4	140
Karaga	65.6	241	100.0	120	95.4	241	96.7	121	20.9	225	27.4	113
Kpandai	64.9	231	93.9	115	90.1	233	93.9	115	19.0	147	23.7	76
Kumbungu	75.8	120	98.3	59	91.7	120	96.6	59	37.8	119	35.1	57
Mamprugu Moagduri	68.8	32	^	^	76.5	34	^	^	26.5	34	^	^
Mamprusi East	69.4	222	90.8	109	74.3	214	81.4	102	29.3	246	32.5	120
Mamprusi West	70.3	212	90.7	97	79.6	211	83.7	98	26.6	203	31.4	86
Mion	59.6	104	98.1	53	95.2	104	96.2	53	17.2	93	19.1	47
Nanumba North	63.2	220	96.2	104	88.6	220	96.2	105	12.8	164	16.5	79
Nanumba South	66.7	204	93.1	102	89.8	206	92.2	103	14.6	171	18.5	81
North Gonja	57.8	109	97.4	39	92.7	109	97.4	39	11.7	111	15.0	40
Saboba	71.2	215	95.9	98	90.6	212	96.8	94	6.3	111	7.0	43
Sagnerigu	74.5	110	89.6	48	54.4	103	76.9	39	12.6	87	17.1	35
Savelugu Nanton	73.3	318	99.3	148	84.5	316	96.6	146	23.3	288	26.7	135
Sawla/Tuna/Kalba	69.1	175	98.6	73	86.8	174	95.8	72	^	^	^	^
Tamale Metropolitan	65.4	390	84.8	171	53.6	364	68.5	146	17.0	312	22.4	125
Tatale Sanguli	67.9	137	96.8	62	83.0	135	95.0	60	17.0	100	18.2	44
Tolon Kumbugu	70.6	238	97.5	120	84.5	238	90.8	120	26.8	231	26.7	116
West Gonja	67.2	195	97.4	78	79.7	192	89.5	76	16.1	180	16.9	71
Yendi	67.3	101	95.9	49	84.2	95	93.2	44	13.7	73	15.8	38
Zabzugu Tatali	69.2	182	95.5	89	80.1	176	87.1	85	13.3	181	12.4	89
Northern Region	**68.2**	**5,239**	**95.2**	**2,423**	**84.4**	**5,185**	**91.6**	**2,370**	**18.4**	**4,308**	**20.4**	**1,970**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Of the three indicators in the resource domain, the adequacy rates for women and men are the lowest for access to credit. On average, 18.4 percent of women are adequate in having access to credit while 20.4 percent of men are adequate. Chereponi District has the lowest percentage of women and men who are adequate in having access to credit; 1.9 percent for women and 2.2 percent for men. In Kumbungu District, which has the highest prevalence rates

for both men and women, a slightly higher percentage of women are adequate in having access to credit than men (37.8 percent compared to 35.1 percent).

The leadership domain defines membership in economic or social groups such as agriculture producers', water users, credit or microfinance, mutual help, trade, local government, civic and religious groups. It also defines the level of comfort when speaking in public on issues affecting their communities. On average, 64.2 percent of the women in the region perceived they achieved adequacy in group membership compared to 69.1 percent of the men (Table 20). Sagnerigu District has the lowest prevalence rates of adequacy in group membership for women (38.6 percent) and men (47.6 percent). Sawla/Tuna/Kalba District has the highest prevalence rate for women (84.9 percent) and Mion District for men (88.9 percent).

A higher percentage of men are adequate in speaking in public compared to women, 92.8 percent and 68.5 percent, respectively. Chereponi District has the lowest rates of women and men being adequate in public speaking; 49.6 percent for women and 79.6 percent for men. In Karaga District, all of the men are adequate in public speaking and 85.0 percent of women in Nanumba North District are adequate.

Table 20: Leadership Domain by District

	Group Membership				Public Speaking			
District	**Women**	**n**	**Men**	**n**	**Women**	**n**	**Men**	**n**
Bole	70.6	119	67.0	103	62.8	121	95.2	105
Bunkpurugu Yonyo	66.1	124	59.1	127	72.0	132	90.7	140
Chereponi	53.1	98	55.7	79	49.6	123	79.6	93
East Gonja	78.0	100	77.7	112	79.8	124	96.1	129
Gonja Central	79.7	69	74.6	59	70.8	65	93.8	65
Gushegu	57.8	83	68.1	91	55.6	117	97.7	132
Karaga	61.9	63	73.9	88	56.5	92	100.0	104
Kpandai	55.8	77	70.1	87	65.2	112	85.3	116
Kumbungu	75.4	57	58.9	56	59.0	61	98.3	58
Mamprugu Moagduri	^	^	^	^	^	^	^	^
Mamprusi East	61.4	88	64.9	97	81.2	85	88.8	80
Mamprusi West	74.2	97	82.8	87	84.9	93	98.8	84
Mion	69.4	36	88.9	36	71.4	49	96.1	51
Nanumba North	47.1	104	61.5	91	85.0	113	92.2	102
Nanumba South	57.9	95	68.9	90	78.4	102	94.9	98
North Gonja	60.6	33	64.1	39	^	^	^	^
Saboba	45.1	91	49.4	83	57.6	118	88.4	95
Sagnerigu	38.6	44	47.6	42	69.5	59	93.6	47
Savelugu Nanton	52.9	138	63.9	144	60.1	148	92.9	141
Sawla/Tuna/Kalba	84.9	93	71.4	70	73.0	100	98.6	74
Tamale Metropolitan	56.5	170	65.2	141	67.1	207	82.2	163
Tatale Sanguli	63.3	60	76.9	52	77.3	66	91.1	56
Tolon Kumbugu	69.3	101	69.2	107	60.0	110	94.7	113
West Gonja	74.6	71	73.9	69	54.4	68	89.9	69
Yendi	84.6	39	86.0	43	77.3	44	95.7	47
Zabzugu Tatali	67.1	82	88.0	83	75.9	87	93.3	89
Northern Region	**64.2**	**2,132**	**69.1**	**2,076**	**68.5**	**2,396**	**92.8**	**2,251**

^ Results not statistically reliable, n < 30.

Source: District Level Survey Data, Ghana 2015.

The time domain is comprised of two indicators workload and leisure time presented in Table 21. Workload is measured by determining the time allocation to various activities including:

sleeping, personal care, working at a business, farming, watching television, social and activities and hobbies and domestic work.

On average, 74.1 percent of the women in the region perceive themselves as having adequate workload compared to 89.1 percent of the men. Workload adequacy levels for women range from 49.5 percent (Gushegu District) to 98.8 percent (Saboba District). For men, the rates range from 66.7 percent (Karaga District) to 100 percent (North Gonja and Saboba Districts). Almost 60 percent of women in Northern Region express satisfaction with the amount of leisure time available compared to 63.3 percent of the men. Women's leisure time satisfaction levels range from 19.8 percent in Tolon Kumbugu District to 79.6 percent in Sawla/Tuna/Kalba District. For men, the level of satisfaction ranges from 28.6 percent in Kumbungu District to 82.8 percent in Gushegu District.

Table 21: Time Domain by District

	Satisfaction with Workload				Satisfaction with Leisure Time			
District	**Women**	**n**	**Men**	**n**	**Women**	**n**	**Men**	**n**
Bole	76.1	88	81.3	80	70.1	117	50.5	107
Bunkpurugu Yonyo	73.5	102	92.2	103	77.0	135	75.5	143
Chereponi	97.8	89	98.4	64	59.0	122	65.9	91
East Gonja	79.4	97	89.9	99	63.4	123	65.1	126
Gonja Central	89.2	65	89.4	47	66.3	83	72.2	79
Gushegu	49.5	97	80.4	102	65.5	148	82.8	151
Karaga	64.0	75	66.7	84	70.3	118	79.2	120
Kpandai	77.0	100	94.3	87	67.0	115	74.6	114
Kumbungu	61.9	42	87.2	47	30.0	60	28.6	56
Mamprugu Moagduri	^	^	^	^	^	^	^	^
Mamprusi East	74.0	77	92.8	69	44.1	111	45.7	116
Mamprusi West	60.0	60	81.4	59	67.0	109	65.3	98
Mion	62.5	32	88.6	35	78.4	51	78.4	51
Nanumba North	81.1	90	97.3	75	33.9	112	45.2	104
Nanumba South	76.8	82	94.5	73	52.5	99	54.5	101
North Gonja	93.9	33	100.0	33	52.6	38	59.5	42
Saboba	98.8	82	100.0	64	59.8	117	72.3	94
Sagnerigu	62.5	48	73.7	38	57.1	63	57.7	52
Savelugu Nanton	70.9	117	89.9	109	39.0	159	39.2	148
Sawla/Tuna/Kalba	80.7	83	86.9	61	79.6	103	79.7	74
Tamale Metropolitan	72.8	158	87.3	102	60.2	226	65.6	180
Tatale Sanguli	60.0	50	89.5	38	75.3	73	75.0	64
Tolon Kumbugu	65.9	91	87.8	98	19.8	106	29.1	110
West Gonja	88.2	68	96.2	53	60.3	78	64.6	82
Yendi	60.0	35	86.1	36	64.6	48	75.5	49
Zabzugu Tatali	76.7	60	96.8	63	78.3	92	81.3	91
Northern Region	**74.1**	**1,921**	**89.1**	**1,719**	**59.6**	**2,606**	**63.3**	**2,443**

^ Results not statistically reliable, n < 30.
Source: District Level Survey Data, Ghana 2015.

Summary and Conclusions

The focus of this district-level assessment is to provide a frame of reference to track the performance of initiatives to reduce poverty and hunger and improve health and nutrition in Northern Region, which is part of the study area for Feed the Future Initiative in Ghana. The total number of households involved in this study is 3,570. The study assesses indicators from four major groups: (1) household economic status; (2) hunger and diet diversity; (3) health status of women and children; and (4) women's empowerment. The major findings from this study include:

- The average household size in Northern Region is 6.2 people per household. Households range in size from 4.9 in Mamprusi West to 7.4 in Gushegu. On average, 1.7 people share a sleeping room.
- Approximately 50 percent of the adult population in Northern Region is female. Nanumba North's adult population is 42.2 percent female compared to 56.9 percent in Sawla/Tuna/Kalba.
- Eighty-five percent of the adults in Northern Region have received no formal education. Sagnerigu District has the highest rate of adults with secondary level education (29.0 percent) followed by Tamale Metropolitan (20.9 percent) while Sawla/Tuna/Kalba has the lowest rate at 2.0 percent.
- Almost all the households use solid fuel as a cooking source, 64 percent have access to improved water sources, 54 percent have electricity but only 13.7 percent have access to improved sanitation.
- The average household per capita daily expenditure is $4.91 with the lowest expenditure in Saboba District ($2.59). Tamale Metropolitan has the highest per capita daily expenditure with $8.99, followed by $7.70 in Bole and $7.46 in Nanumba South.
- The overall prevalence of poverty at the international poverty line ($1.25) is 16.3 percent and it ranges from 6.3 percent in Savelugu Nanton to 33.1 percent in Mamprusi East. The average depth of poverty in Northern Region is 6.6 percent with Savelugu Nanton having the minimum rate at 1.6 percent and the maximum rate in Mion at 15.4 percent.
- Forty-six percent of the households are considered to be living in poverty based on the national absolute poverty line, with Saboba and Chereponi having the highest poverty rates (75.3 percent and 73.4 percent, respectively). The depth of poverty for Northern Region is 18.6 percent.
- The average estimates of the prevalence of poverty and depth of poverty based on the extreme national poverty lines (2.17 GHS) are 21.9 percent and 8.2 percent, respectively.

- The mean WDDS is 3.7 out of a possible 10 and across the districts, the WDDS ranges from 3.0 in Mamprusi East to 4.7 in Karaga Distirct. The median WDDS in Northern Region is 4.0 and ranges from 3.0 for eighteen districts to 5.0 in Karaga District. Approximately, 43 percent of women achieve the minimum dietary diversity threshold. In five districts, more than half of the women of reproductive age achieve minimum dietary diversity.
- Approximately a quarter of the households experience moderate to severe hunger. Mamprusi East District has over half of households experiencing hunger while Tamale Metropolitan only has 8.6 percent.
- The average prevalence rates of stunting, wasting and underweight for children age 0-59 months old in Northern Region are 31.1 percent, 13.6 percent and 18.5 percent, respectively. Seven percent of the children are overweight and 2.0 percent are considered obese.
- The BMI for all districts range from 20.9 in Saboba to 23.8 in Mamprusi East, Mamprusi West and Tamale Metropolitan Districts, and the average BMI in Northern Region is 22.2, which is within the normal BMI category. On average, 11.5 percent of women are underweight, 69.6 percent are normal weight, 14.6 percent are overweight and 4.3 percent are obese. No women residing in Karaga District are considered obese.
- Based on the 5DE, women and men achieve a high level of adequacy in production decisions (84.8 percent for women and 93.6 percent for men); right to purchase, sell or transfer of assets (84.4 percent for women and 91.6 percent for men); and workload (74.1 percent for women and 89.1 percent for men). Access to credit is an indicator that only a small percentage of women and men have achieved adequacy (18.4 percent for women and 20.4 percent for men).
- There is a large difference in the percentage of women adequate in the following 5DE indicators compared to men: asset ownership (68.2 percent for women and 95.2 percent for men); control over the use of income (33.7 percent for women and 80.5 percent for men); speaking in public (68.5 percent for women and 92.8 percent for men). Women and men have achieved a similar level of adequacy in the following indicators: group membership (64.2 percent for women and 69.1 percent for men); autonomy in production (68.2 percent for women and 74.5 percent for men); leisure time (59.6 percent for women and 63.3 percent for men); and group membership (64.2 percent for women and 69.1 for men).

The indicators in this report are structured to provide a frame of reference to assess and evaluate the impact of current and future initiatives' outcomes and their contributions in achieving the stated objectives of the Feed the Future programs in Ghana's Northern regions. These benchmark results also may enable implementing partners to identify factors that influence these indictor results and can contribute to effective evaluation of project performance in current and planned interventions.

References

Alkire, S., H. Malapit, R. Meinzen-Dick, A. Peterman , A. Quisumbing, G. Seymour, and A. Vaz. 2013. *Instructional Guide on the Women's Empowerment in Agriculture Index.* Washington, DC: International Food Policy Research Institute (IFPRI).

Black, R.E., L. H Allen , Z. A. Bhutta, L.E. Caulfield, M. De Onis, M. Ezzati, C. Mathers, J. Rivera, and Maternal and Child Undernutrition Study Group. 2008. "Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences." *The lancet* 371 (9608): 243-260.

CDC. 2014. *Healthy Weight: Assesing your Weight: BMI: About Adult BMI.* Accessed August 18, 2014. http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html.

Deaton, A. 2008. *The Analysis of Household Surveys: A microeconomic approach to development policy.* Working Paper No 135. Washintong, D.C: The World Bank.

Deitchler, M., T. Ballard, A. Swindale, and J. Coates. 2011. *Introducing a simple measure of household hunger for cross-cultural use.* Washington, D.C: Food and Nutritional Technical Assistance. http://www.fao.org/fileadmin/user_upload/wa_workshop/docs/HH_Hunger_Scale.pdf.

FAO. 2011. *Guidelines for Measuring Household and Individual Dietary Diversity.* Rome: FAO and European Union.

FAO and FHI 360. 2016. *Minimum Dietary Diversity for Women: A Guide for Measurement.* Rome: FAO.

Ghana Statistical Service. 2012. "2010 Population and Housing Census: Summary Report of Final Results." Accra, Ghana, May. http://www.statsghana.gov.gh/docfiles/2010phc/Census2010_Summary_report_of_final_results.pdf

—. 2013. *2010 Population and Housing Census Regional Analytical Report: Northern Region.* Ghana Statistical Services. Accessed July 25, 2016. http://www.statsghana.gov.gh/docfiles/2010phc/2010_PHC_Regional_Analytical_Reports_Northern_Region.pdf

—. 2014. "Ghana Living Standards Survey Round 6 (GLSS6): Main report." Accessed January 10, 2016. http://www.statsghana.gov.gh/docfiles/glss6/GLSS6_Main%20Report.pdf.

ICF Macro. 2010. *Trends in Demographic, Family Planning, and Health Indicators in Ghana, 1960-2008: Trend Analysis of Demographic and Health Surveys Data.* Calverton, Maryland, USA: ICF Macro.

UNDP. 2003. *Indicators for Monitoring the Millennium Development Goals: Definitions, rationale, concepts and sources.* Vol. 95. New York: United Nations Publications. Accessed January 10, 2016. http://www.armstat.am/file/doc/99465263.pdf.

USAID. 2014. *Feed the Future Handbook of Indicator Definitions.* October. https://feedthefuture.gov/resource/feed-future-handbook-indicator-definitions.

Victora, C.G., L. Adair, C. Fall , P.C. Hallal, R. Martorell, L. Richter, H.S. Sachdev, and Maternal and Child Undernutrition Study Group. 2008. "Maternal and Child Undernutrition: Consequences for Adult Health and Human Capital." *The lancet* 371 (9608): 340-357.

WHO and UNICEF. 2009. *WHO Child Growth Standards and the Identification of Severe Acute Malnutrition in Infants and Children: A joint statement.* World Health Organization and United Nations Children's Fund, Geneva: World Health Organization. http://apps.who.int/iris/bitstream/10665/44129/1/9789241598163_eng.pdf?ua=1.

WHO. 2006. *Multicentre Growth Reference Study Group. WHO Child Growth Standards: Length/Height-for-Age, Weight-for-Lenght, Weight-for-Height and Body Mass Index-for-Age: Methods and Development.* Geneva, Switzerland: WHO.

—. 2014. *Global Database on Body Mass Index.* Accessed August 18, 2014. http://www.who.int/mediacentre/factsheets/fs311/en/ .

World Bank. 2011. *FAQS: Global Poverty Line Update.* Accessed September 15, 2015. http://www.worldbank.org/en/topic/poverty/brief/global-poverty-line-faq.

Zereyesus, Y.A., V. Amanor-Boadu, K.L. Ross, and C. Guvele. 2016. "Feed the Future GHANA 2015 Zone of Influence Interim Assessment Report." Manhattan, KS, USA, July, 2016.

Appendix 1: Key Findings in Northern Region

Table A.1 provides the major findings of the principal indicators and some household demographic and dwelling characteristics in Northern Region. The table provides the overall regional averages for the indicators. District level results are also presented for the districts that exhibit the minimum and maximum values for these indicators and these values are in parentheses.

A.1: Summary of Key Findings in Northern Region

Characteristic	Northern Region	District – Min. Value		District – Max. Value		n
Demographics						
Household Size	6.2	Mamprusi West	(4.9)	Gushegu, Kumbungu, & Tatale Sanguli	(7.4)	3,570
Adult's educational attainment (%)						
No Education	85.1	Sagnerigu	(61.4)	Sawla/Tuna/ Kalba	(93.8)	3,489
Primary	5.5	Karaga	(1.8)	West Gonja	(9.6)	3,489
Secondary	9.1	Sawla/Tuna/ Kalba	(2.0)	Sagnerigu	(29.0)	3,489
Dwelling						
Water Source (%)	63.9	Mamprusi East	(27.3)	Bole	(95.7)	3,246
Sanitation (%)	13.7	Karaga	(0.8)	Sagnerigu	(50.0)	3,280
Persons per Sleep Room	1.7	Tamale Metro.	(1.3)	Mion	(2.4)	3,300
Solid Fuel (%)	96.2	Sagnerigu	(79.2)	*Various*[1]	(100)	3,228
Electricity (%)	54.3	North Gonja	(1.6)	Sagnerigu	(98.7)	3,278
Economic Status						
Daily per capita expenditure (in 2010 USD)	4.91	Saboba	(2.59)	Tamale Metro.	(8.99)	3,419
Prevalence of poverty ($1.25 2005 PPP)	16.3	Tamale Metro.	(7.0)	Mamprusi East	(33.1)	3,419
Depth of poverty ($1.25 2005 PPP)	6.1	Savelugu Nanton	(1.6)	Mion	(15.4)	3,419
Prevalence of poverty (GHS 3.60)	46.2	Nanumba South	(20.1)	Saboba	(75.3)	3,419
Depth of poverty (GHS 3.60)	18.6	Nanumba South	(8.6)	Saboba	(35.0)	3,417
Prevalence of poverty (GHS 2.17)	21.9	Tamale Metro.	(8.8)	Saboba	(47.3)	3,419
Depth of Poverty (GHS 2.17)	8.2	Savelugu Nanton	(3.2)	Mamprusi East	(17.6)	3,417
Hunger and Dietary diversity						
Prevalence of Severe to Moderate Hunger (%)	25.6	Sagnerigu	(7.9)	Saboba	(56.7)	3,346
Women's Dietary Diversity Score	3.7	Mamprusi East	(3.0)	Karaga	(4.7)	3,669
Women's Minimum Dietary Diversity (%)	42.8	Mamprusi East	(15.0)	Karaga	(76.3)	3,670

A.1: Summary of Key Findings in Northern Region (cont'd)

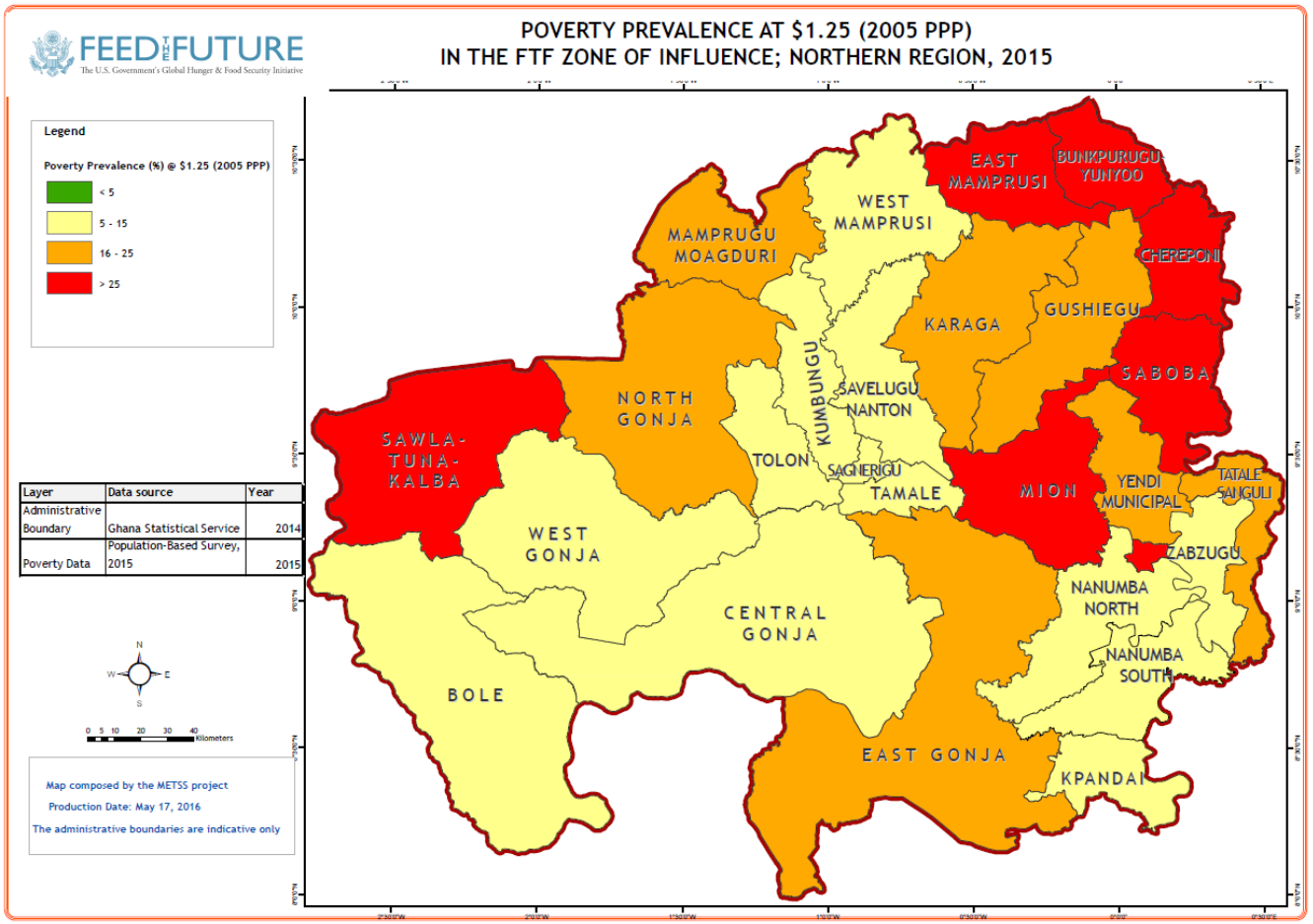
Characteristic	Northern Region	District – Min. Value		District – Max. Value		n
Health Status of Children (%)						
Stunting	31.1	East Gonja	(20.2)	Sagnerigu	(47.6)	2,306
Wasting	13.6	Saboba	(3.2)	Mamprusi East	(23.5)	2,275
Underweight	18.5	Bole	(10.0)	Sagnerigu	(31.0)	2,306
Anthropometry for Women of Reproductive Age						
BMI	22.2	Saboba	(20.9)	Mamprusi East, Mamprusi West &Tamale Met.	(23.8)	3,305
Underweight (%)	11.5	Sagnerigu	(2.9)	Zabzugu Tatali	(30.7)	3,305
Normal Weight (%)	69.6	Zabzugu Tatali	(52.8)	Gushegu	(86.0)	3,305
Overweight (%)	14.6	Saboba	(5.1)	Bunkpurugu Yonyo	(30.4)	3,305
Obese (%)	4.3	Karaga	(0.0)	Mamprusi West	(14.2)	3,305
Women's Empowerment in Agriculture Index (%)						
Production						
Input Decision Making	84.8	Sagnerigu	(56.0)	Karaga	(98.3)	2,547
Autonomy in Production	68.2	West Gonja	(28.0)	Kumbungu	(92.7)	2,409
Income						
Control over Use of Income	33.7	North Gonja	(21.6)	Sagnerigu	(56.5)	2,573
Resources						
Asset Ownership	68.2	North Gonja	(57.8)	Chereponi	(79.1)	5,239
Purchase, Sale or Transfer of Assets	84.4	Tamale Metro.	(63.6)	Karaga	(95.4)	5,185
Access and Decision to Credit	18.4	Chereponi	(1.9)	Kumbungu	(37.8)	4,308
Leadership						
Public Speaking	68.5	Chereponi	(49.6)	Nanumba North	(85.0)	2,396
Group Membership	64.2	Sagnerigu	(38.6)	Sawla/Tuna/ Kalba	(84.9)	2,132
Time						
Leisure Time	59.6	Tolon Kumbugu	(19.8)	Sawla/Tuna/ Kalba	(79.6)	2,606
Work Load	74.1	Gushegu	(49.5)	Saboba	(98.8)	1,921

[1] All households in the following districts report using solid sources of fuel for cooking: Mamprusi East, Mion, North Gonja, Sawla/Tuna/Kalba, Tatale Sanguli, Tolon Kumbugu, West Gonja, and Zabzugu Tatali.

Source: District Level Survey Data, Ghana 2015.

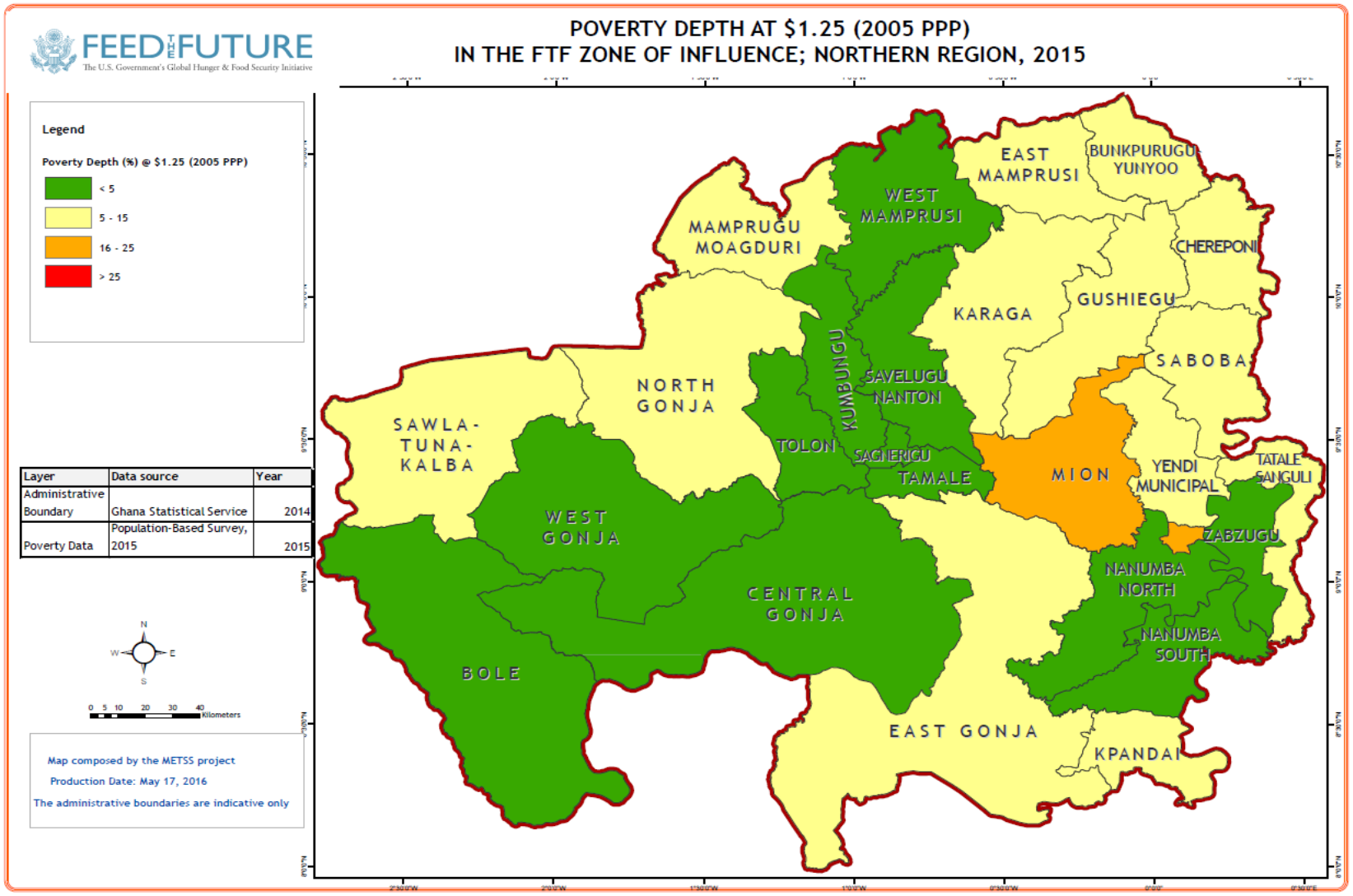
Appendix 2: Geographical Distribution of Poverty and Children's Health Status

Figure 1: Poverty Prevalence at $1.25 (2005 PPP) by District



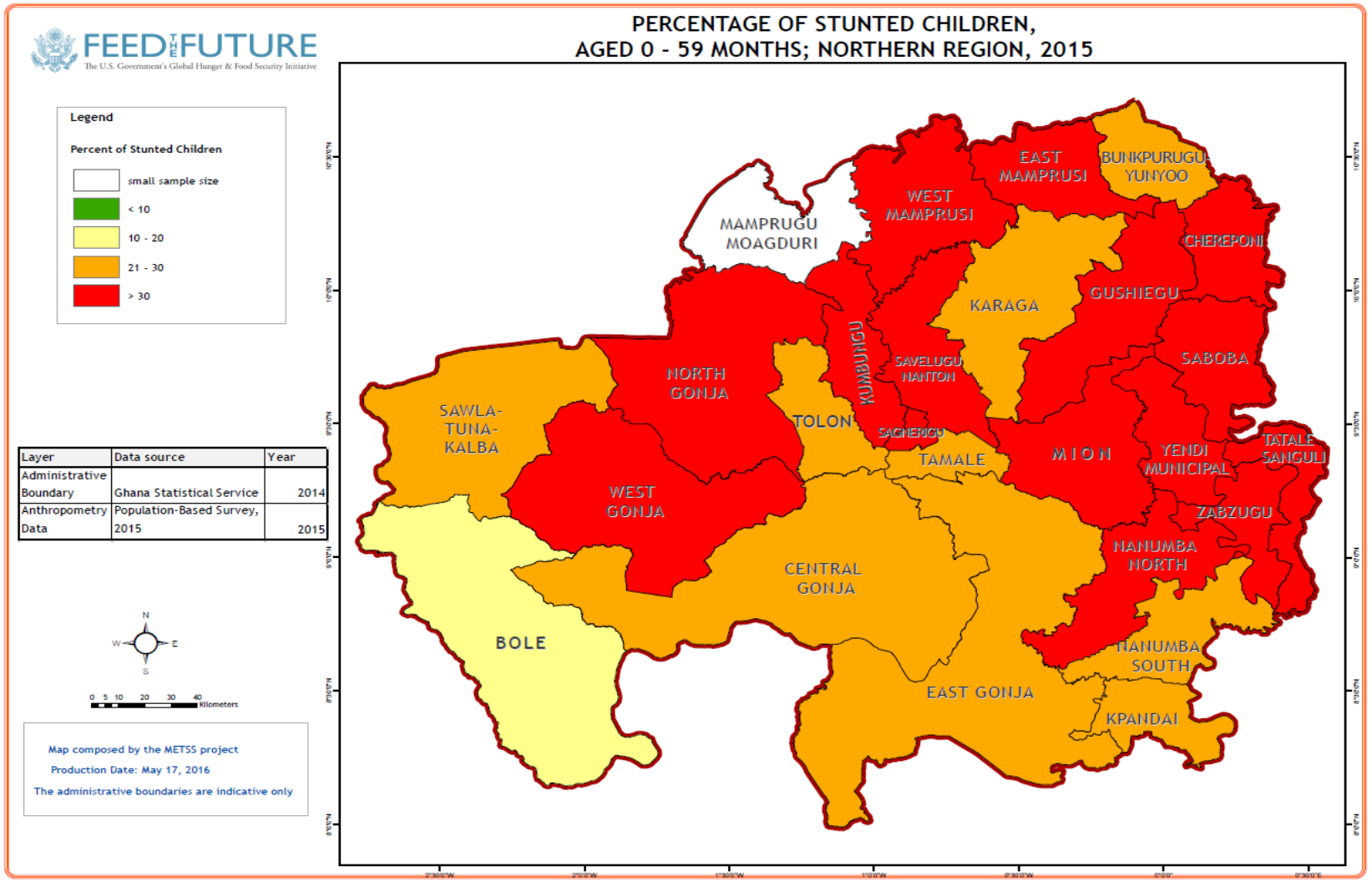
Source: District Level Survey Data, Ghana 2015

Figure 2: Poverty Depth at $1.25 (2005 PPP) by District



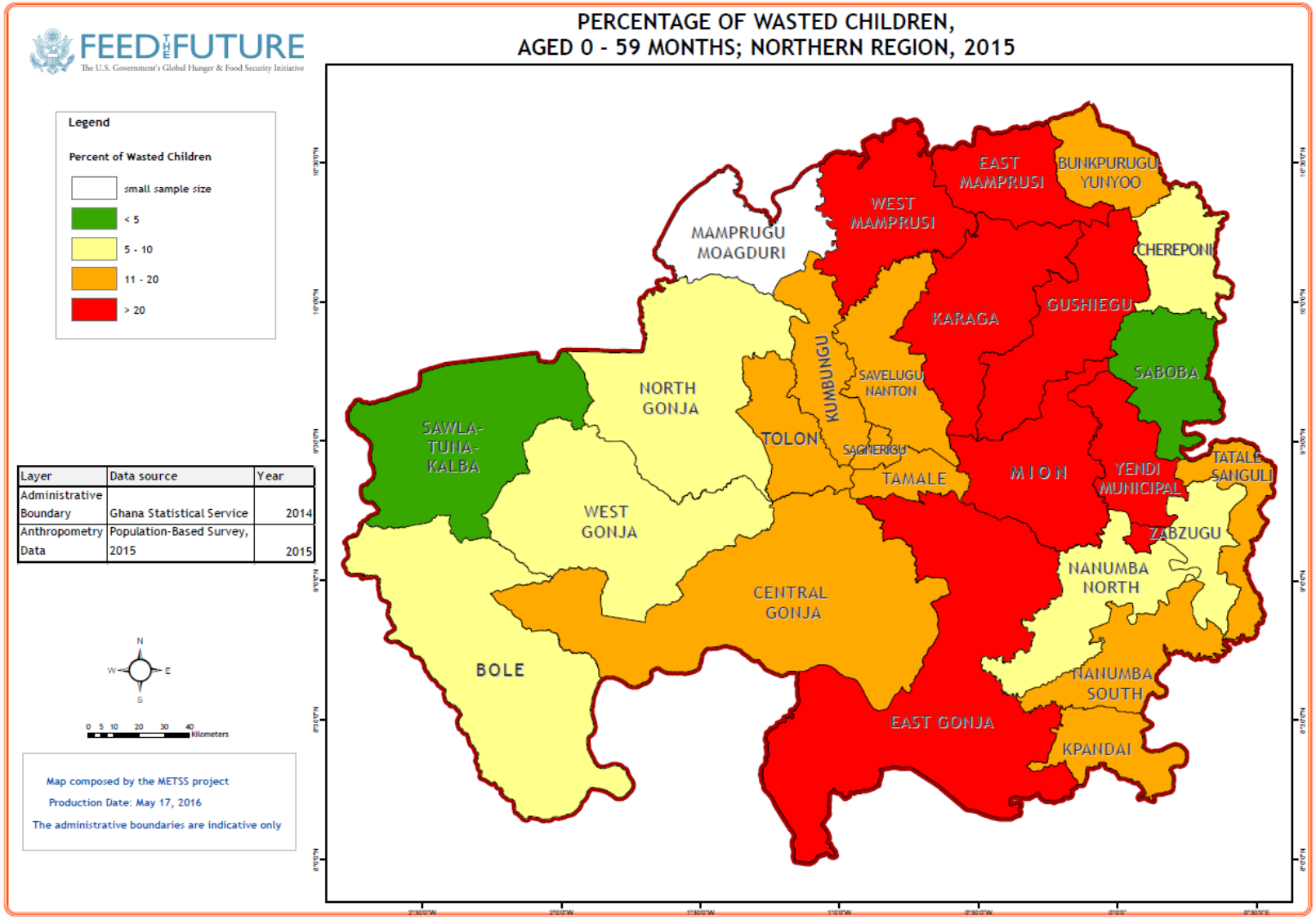
Source: District Level Survey Data, Ghana 2015

Figure 3: Percentage of Stunted Children (0-59 months) by District



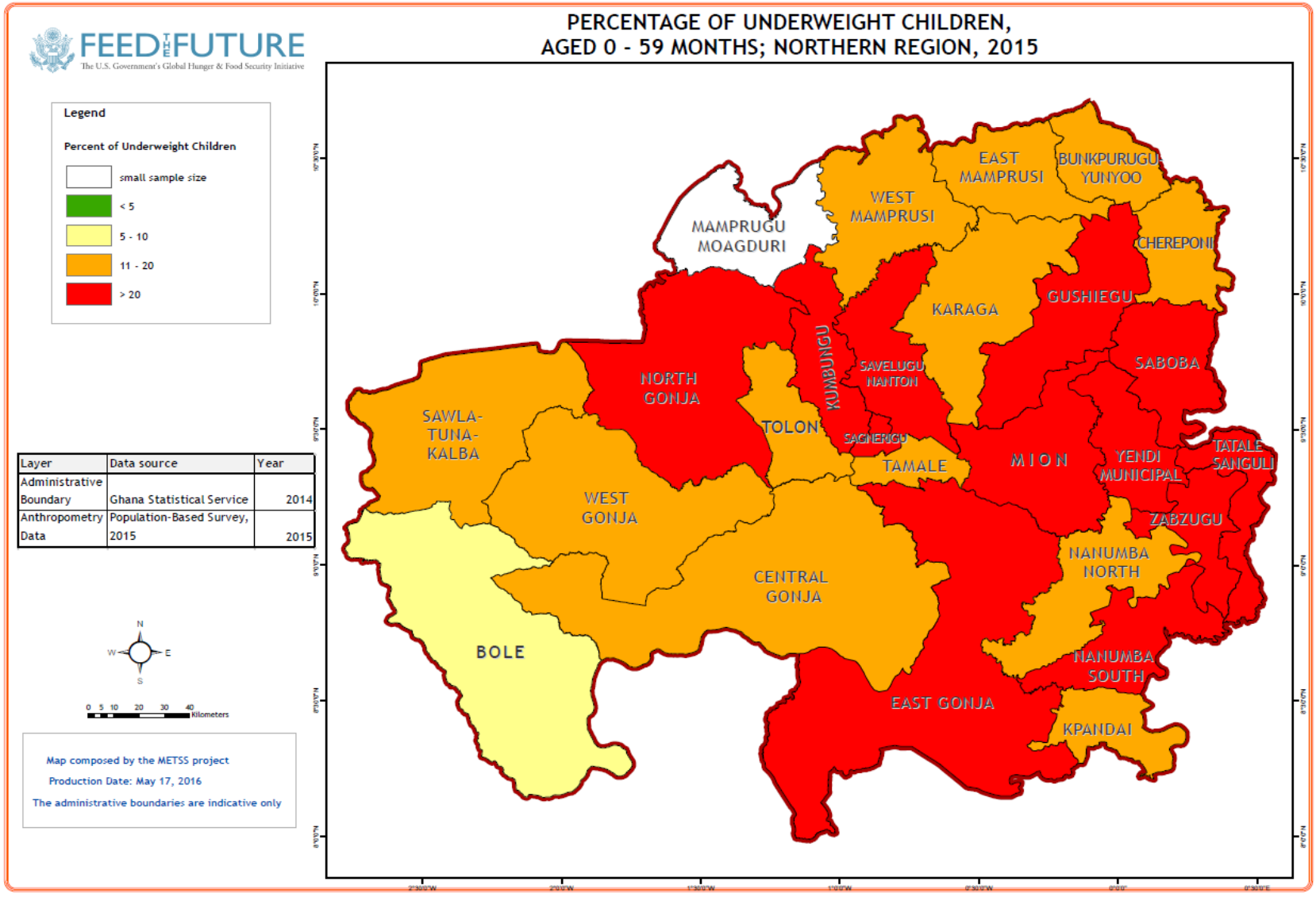
Source: District Level Survey Data, Ghana 2015

Figure 4: Percentage of Wasted Children (0-59 months) by District



Source: District Level Survey Data, Ghana 2015

Figure 5: Percentage of Underweight Children (0-59 months) by District



Layer	Data source	Year
Administrative Boundary	Ghana Statistical Service	2014
Anthropometry Data	Population-Based Survey, 2015	2015

Source: District Level Survey Data, Ghana 2015