Influence of Mothers' Participation in Intra-Household Decision Making on Nutritional Status of Children Under Five Years in the Northern Region of Ghana

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ABSTRACT— ***The purpose of this paper is to investigate effects of mothers' participation in intra-household decision making on the nutritional status of their children. The paper relied solely on analysis of data for Northern Region of Ghana, collected as part of United States Agency for International Development (USAID) Feed the Future population baseline survey conducted in 2012. Multiple Linear Regression Model was used in examining mothers' participation in intra-household decision making on children's weight-for-age, height-for-age and weight-for-height which were used as proxies for children's nutritional status. Results of the analysis revealed that, the Region is still far from achieving the MDG 1 target of attaining 1.8% malnutrition prevalence rate, as stunting, underweight and wasting prevalence rates among children in the region were found to be 27%, 25% and 13% respectively. The analysis also found mothers' participation in intra-household decision making, ownership and control of household resources as significant in influencing positively children's nutritional status. Increasing participation and power of women in intra-household decision making process are imperative in improving children nutritional status and reducing malnutrition prevalence among children under five years. It is therefore recommended that programmes and projects aimed at promoting sustainable nutritional wellbeing among children should consider empowering mothers of children so as to promote their status and barging power in intra-household decision making process.***

Keywords— Intra-household, Decision, Underweight, Wasting, Stunting, and Nutritional Status

1. INTRODUCTION

Growth faltering and nutritional deficiencies continue to be highly prevalent in infants and young children living in low and middle income countries (UNICEF, 2009). Children under 5 years of age are often at risk of malnutrition because this is a period of rapid growth and development characterised by changes in body size and composition and increased physical activity. In 2011, an estimated 165 million children under five years of age worldwide were stunted (UNICEF, WHO & World Bank, 2011). A joint study by UNICEF, WHO and World Bank on 'Levels and Trends in Child Malnutrition' in 2011, observed high prevalence levels of stunting among children less than five years of age in Africa, which constituted 36% of the global figure of stunting level compare with Asia which constituted 27% of the global figure. The consequences of malnutrition are severe and long lasting when it occurs at an early age (UNICEF, 1998). Malnutrition in Ghana is still high with prevalence rates in the Northern Region being extremely high among the ten regions of the country. For instance, stunting increased tremendously from 32% in 2008 to 51% in 2011 (GSS, 2011). Underweight also increased from 24% in 2008 to 30.4% in 2011 (GSS, 2011). According to Maberry et.al. (2014), more than 1 in 5 households live below the $1.25 poverty line and only 15.5% of children in the SADA area in northern Ghana receiving minimum acceptable diet and that 36%, 18.4% and 10.9% of children under five in the SADA area are stunted, underweight and wasted respectively.

The global dilemma of malnutrition can be understood and addressed with the aid of the UNICEF theoretical frameworks. These frameworks categorised the causes of malnutrition as basic, referring to poor economic and political structures; immediate, referring to poor dietary intake, psycho-social stress and trauma and diseases such as diarrhoea and acute respiratory conditions, which further complicate malnutrition; underlying causes, referring to household food

insecurity, lack of knowledge and education, caring practices and health services as well as an unhealthy environment. Hunger and undernutrition arise from food consumption, poor care and unhealthy facilities, and, indirectly through agricultural barriers, lack of employment opportunities and women's status in society (Klugman 2002; Kurz & Johnson-Welch 2001 and WHO, 2001a). Malnutrition in children is the consequence of much food insecurity at the household level, which stems from poor food quality and quantity, severe repeated infections or combinations of all three. These conditions are linked to the standard of living and whether basic needs can be met (UNICEF 2007a; WHO 2001a). A lack of knowledge on the nutritional needs of children and the benefits of breastfeeding contributes to malnutrition (UNICEF, 2007a). The extent of hunger has also been associated with low energy intake, low micronutrient intake and poor income levels. This affects growth patterns negatively (Labadarios, 2005). A well-nourished child is one with access to adequate food supply, care and health. Such a child will have weight and height measurements that compare very well with the standard normal distribution of heights (H) and weights (W) of healthy children of the same age and sex. Thus, the best way to evaluate the nutritional status and overall health of a child is to compare the child's growth indices with set cut –off points in the standard normal distribution of well-nourished children that are associated with adequate growth (de Onis, Monteiro, Akre & Clugston, 2003). Malnutrition is one of the most important health and welfare problems among infants and children under five years in Ghana. It usually occurs as a result of both inadequate food intake and illness. Inadequate food intake is a consequence of insufficient food available at the household level, improper feeding practices, or both (GDHS, 2009).

With the growing problem of childhood malnutrition, research had for some time now been focusing on family and social influences on children's eating patterns (Patrick & Nicklas, 2005). A review of literature showed that the numerous studies including studies such as Ming, Ying and Kassim, (2006), Wardle *et. al*., (2003), Nicklas, *et al*, (2003) and Nicklas, *et al*, (2001) have demonstrated that children's eating patterns are strongly influenced by characteristics of both the physical and social environment. With regard to the physical environment, children are more likely to eat foods that are available and easily accessible at the family and household levels. Additionally, characteristics of the social environment including various socioeconomic and sociocultural factors such as parents' level of education, time constraints and ethnicity influence the types of foods children eat.

However, very few studies recognized the influences of mothers in intra-household decision making processes on nutritional status of children under five years and the context in which these studies have been conducted reflects different social and physical environments and need further research regarding control of household decision making processes on foods purchased and meals served, household food security and household food expenditure. The purpose of this paper therefore was to examine how the participation of mothers of children under five years in their households decision making processes affect the nutritional status of their children using METSS-Feed the Future baseline study results in Northern Region.

2. MATERIAL AND METHODS

This paper is purely a desk study of analysis of already collected data from USAID/GHANA FEED THE FUTURE population-Based line Survey in Northern Ghana. In 2012, the United States Agency for International Development's (USAID's) Feed the Future Initiative conducted a population based survey in Northern Ghana to provide baseline metrics on 11 indicators to facilitate international comparability across countries where USAID is conducting similar studies. The survey was limited to the SADA area, which encompasses the area above Ghana's 8th parallel with the results from the study focusing on the socioeconomic, health and nutrition conditions prevalent in the SADA area between July and August 2012 (Maberry et. al., 2014). Out of the total population of over 25,000,000 people in Ghana, the Savanna Acceleration Development Authority (SADA) zone has a population of 5.16 million people (GSS, 2011). USAID funded the Population-Based Survey in the Feed the Future (FTF) Ghana Zone of Influence (ZOI). The actual field survey was implemented through collaborative efforts of Monitoring Evaluation and Technical Support Services (METSS) programme, the Institute of Statistical, Social and Economic Research (ISSER) of the University of Ghana and the Ghana Statistical Service (GSS) with the US Department of Agriculture (USDA) and USAID providing technical support. The full survey results which provided data for this study may be viewed here: http://www.metss-ghana.ksu.edu/population.html.

The sample in the survey included 4,410 households with nearly 25, 000 individuals in 45 districts across the four regions namely, Brong/Ahafo, Northern, Upper East and Upper West Regions. The study delimited three types of gendered households: Male and Female Adults; Female Adult Only; and Male Adult Only. Only households with children under five years in the Northern Region out of the four regions captured by the population baseline survey were used for this current paper.

2.1 Data Analysis

Weight-for-age (defined as a child's weight given his or her age); Height-for-age (defined as a child's height given his/her age) and finally Weight-for-height (defined as a child's weight given his/her height) are the three common anthropometric measures of malnutrition and the nutritional status of under-five-year-old children. These indicators were calculated from the data set for standardization and comparism of children with the same age bracket in the population,

Weight-for-age (WAZ), Height-for-age (HAZ) and Weight-for-height (WHZ) are typically expressed as a z-score using the WHO standardisation method (WHO , 2006).

$$\text{Z-score} = \frac{\text{(Observed value) - (Median value of the reference value)}}{\text{(Standard deviation of the reference population)}}$$

The Z-score provide bases for standardization of indicators for nutritional status and long life health and cognitive development of children (UNICEF, WHO & World Bank, 2011). Data of the standardised anthropometric measures are used in formulating policy targets and evaluating the nutritional and health programmes for children under five years. According to the WHO (2006) stunting is height-for-age below –2 standard deviation (SD), whilst, underweight is weight-for-age below –2SD, with wasting being weight-for-height below –2SD and Overweight is weight-for-height above +2SD. Relatively shorter children have negative z-scores of height-for-age; tall children have positive z-scores of height-for-age. Stunting is related to the defect of children during their formative years and constitutes serious development issues, since stunted children may never regain the height lost as a result of poor growth, and most children will never gain the corresponding body weight (Omilola 2010). This has a permanent impact on children's physical development and cognitive ability which affect the country's human resource development.

2.1.1 Regression Analysis

The data extracted from the results of USAID/Ghana Feed the Future population baseline survey was subjected to Descriptive and Multiple Linear Regression Analysis using the Ordinary Least Square (OLS) method to analyse the influence of intra-household characteristics on nutritional status of children under five years of age.

The theoretical model of OLS multiple linear regression is usually stated as:

$$y_i = b_o + b_i X_{1,i} + b_2 X_{2i} + \ldots + b_m X_{m,i} + \epsilon i$$

Where the Coefficient b_o is the vertical intercept, just as in the simple OLS model. The m coefficients b_1 to b_m are slope coefficients; each coefficient b_i for $i>0$ represents the change induced by a change in variable x_{ji} holding all other variables constant.

2.1.2 Specified Model

$$\text{ChildHNS}ij = \beta_0 + \beta_1 (\text{ParticipationHHD}_{ij}) + (\text{X}ij) + \text{Ɛ}$$

Where Child HNSij represents the health and nutritional status for child i^n in household j. Participation HHD_{ij} is the main variable of interest under investigation representing participation of mother or primary caregiver of a child i^n in a household j, measured by whether the mother actively participate in household decision making processes. With Matrix Xij being a vector presenting intervening variables including mothers' personal attributes such as age, educational background, and marital status among others. Also household characteristics such as household status, household size and household food expenditure were included in the model. With Ɛ representing stochastic errors.

The main hypothesis being investigated is:

H_o: $\beta_1 = 0$

H_a: $\beta 1 > 0$.

Z-scores of Weight-for-age (WAZ), Height-for-age (HAZ) and Weight-for-height (WHZ) were used as proxies for child health and nutritional status in three separate regression models as:

$$\text{ZWAZ}ij = \beta 0 + \beta 1 (\text{ParticipationHHD}ij) + 1 (\text{X}ij) + \text{Ɛ} \quad \ldots\ldots (1)$$

$$\text{ZHAZ}ij = \beta 0 + \beta 1 (\text{ParticipationHHD}ij) + 1 (\text{X}ij) + \text{Ɛ} \quad \ldots\ldots (2)$$

$$\text{ZWHZ}ij = \beta 0 + \beta 1 (\text{ParticipationHHD}ij) + (\text{X}ij) + \text{Ɛ} \quad \ldots\ldots (3)$$

Mothers or primary caregivers of children play a central role in managing and ensuring the health and nutritional status of children under five years. As such their role in intra-household decision making is expected to have a greater effect on the health and nutritional status of their children. This current paper relied on cross sectional baseline survey data by

METSS in Northern Region and other operational zones of the SADA, a government institution established by an act of parliament with a mandate of helping bridge the developmental gap between the northern and southern Ghana.

This paper examined the effect of mothers and for that matter women's participation in intra-household decision making process, household resource allocation, access and control and other personal attributes of mothers and of children such as literacy, main occupation, age and marital status on the nutritional and health status of children under five years. In the study, three indicators of malnutrition such as 'weight-for-age', 'height-for-age' and 'weight-for-height' were used as proxies for measuring children under five years health and nutritional status. Similarly Raykar (2012) also used these indicators as proxies for measuring children's health and nutritional status. Definitions of variables used in the model and expected sign of the coefficients as either negative or positive are presented in the Table 1.

Table 1: Definitions of Variables used in the Models

Variable	Description	Aprior Expectation
AGECH	Child's Age in years	
WEICH	Child's weight in kg	
HEICH	Child's height in metres	
SEXCH	Child's Sex (1 = boy; 0 = girl)	
CHBMI	Child Body Mass Index	
ZSWFA	Z-score of weight-for-age	
ZSHFA	Z- score of height-for-age	
ZSWFH	Z-score of weight-for-height	
STUNT	Stunting:(height-for-age below –2 SD = 1;otherwise = 0)	
UNWEIG	Under weight (weight-for-age below –2SD = 1;otherwise = 0)	
WASTG	Wasting: weight-for-height below –2SD = 1;otherwise = 0)	
EXBRF	Child exclusively breast fed during the first six months (1= yes; 0 = no)	+
HHSTA	Household status (1= Female headed; otherwise = 0)	+
MOAGE	Mother's or primary caretaker's age in years	+
MOBMI	Mother's or primary caretaker's body mass index	+/-
LOC	Location (1 = rural; 0 = urban)	+/-
HHSIZE	Household size	+/-
RELIG	Religious background of head of household (1 = Islam; otherwise = 0)	+/-
ETNTY	Ethnicity (1 = mole Dagomba; otherwise = 0)	+
MARST	Marital status of mother or primary caretaker (1 = married; otherwise = 0)	+/-
LIENG	Literacy in English (1 = yes can read and/or write; 0 = otherwise)	+
LILOL	Literacy in local language (1 = yes can read and/or write; 0 = otherwise)	+
HHFS	within the last 4weeks was there ever no food to eat(1= yes; 0 = no)	+/-
MAOC	Main occupation (1 = farming; otherwise = 0)	+/-
FARMZ	What was the approximate farm size cultivated in last season (in Acres)	+
HHEXF	Household annual expenditure on food	+
HHHD	Who mostly take decisions in the household (1 = jointly; other member take = 0)	+
POHHD	You have no option to alter decision taken (1 =yes; otherwise = 0)	-
ACCRE	Has name taken loan within the last twelve months (1= yes; 0 = no)	+/-
MMGP	Do you belong to any group (1 = yes; otherwise = 0)	+/-
CDEGP	Does anyone have control over your decision to join a group (1 = yes; 0= no)	+/-
STKAST	How many assets do the household currently have	+
POSELL	Who will you say mostly decide when to sell household assets (1 = self; 0 = otherwise)	+
OWHHR	Who will you say own most of the household resources (1 = self; otherwise = 0)	+
COHHA	Who will you say control most of the household assets (1= self; 0 = otherwise)	+
WHDF	Who will you say mostly decide on household food purchase (self = 1 otherwise = 0)	+

Source: Authors, 2014

3. RESULTS AND DISCUSSION

This section presents results and discussion of the analysis of METSS-USAID Feed The Future Population Baseline Survey for Northern Region collected between May to June, 2012.

3.1 Descriptive Statistics of Socio-demographic Characteristics

Results of analysis of descriptive statistics of intra-household characteristics and variables related to children's nutritional and health indicators are presented in Table 2. Households with children under five (5) years of age in the database of METSS's baseline survey for northern region were included in the analysis of this current paper. As shown in the table, the average age of children involved in this study was 2.44years (SD = 1.36) with a mean weight of 11.85kg (SD = 4.97) and height of 0.83m (SD = 0.144). Children under five years involved in this study were fairly represented by sex with slightly more than half (0.506) being boys. The analysis of the data also found the mean Body Mass Index (BMI) of the 2,367 children under five years surveyed by the METSS's and Feed the Future baseline survey in northern region to be 17.37 (SD = 7.5). Also the average Z-score of children weight-for-age was -0.0034 (SD = 0.99) with mean Z-score of height-for-age being -0.0003 (SD= 0.99) and Z-score of weight-for-height of -0.0004 (SD= 1). Findings of the study revealed a worrisome situation of stunting, underweight and wasting among children under five years in northern Ghana. Applying the WHO classification which indicates that Stunting: (height-for-age below –2 SD), Underweight: (weight-for-age below –2SD), Wasting: (weight-for-height below –2SD) and Overweight (weight-for-height above +2SD**) (**WHO, 2006**).** The study established that, about 27%, 25% and 13% of the children surveyed were stunting, underweight and wasting respectively. Overweight children in the area were found to be almost insignificant with only 3.8% of children surveyed falling within the overweight category. This compares fairly well with the findings of GSS, (2011) which report 24% prevalence of underweight children in Northern Ghana. Also Maberry *et.al*, (2014), found that 36%, 18.4% and 10.9% of children under five in the SADA area, which includes Northern Region, are stunted, underweight and wasted respectively

Also the analysis of the data revealed that most of the children under study were exclusively breastfed in their first six months. As shown in the Table 2, analysis of response to the question 'did the child exclusively breastfed during the first six months (1= yes; 0 = no)' produced an average of 0.74 (SD = 0.44), which is important in building the immune system of the children and preventing diarrhoeas. According to Sheila & Timothy, (2003), the benefits of breastfeeding for children include increase resistance to infectious diseases, such as gastroenteritis, respiratory tract infections, and ear infections. They further assert that breastfed children also display lower rates of chronic diseases including diabetes, obesity, asthma, and leukaemia. Most of the households surveyed under the METSS's Feed the Future baseline survey in northern region, were male headed households with a mean household status (1= Female headed; otherwise = 0) of 0.13 (SD = 0.33) with average household size of 5.67 (SD =3.41) which compare fairly well with the national average household size of 4 persons per household (see GSS, 2012) as shown in the Table 2.

Mothers of the children interviewed during the METSS's field survey were fairly young, with a mean age of about 29years (SD = 8.75) with a little over one-third of them being single mothers with a mean marriage score on 'Marital status of mother or primary caregivers (1 = married; otherwise = 0)' being 0.36 (SD = 0.48). Close to half of them were of the Mole Dagomba ethnic group, as the mean of 'Ethnicity (1 = mole Dagomba; otherwise = 0)' being 0.46 (SD = 0.5), reflecting the ethnic distribution of northern region as reported by the 2010 Population and Housing Census (see GSS, 2012). Also majority of them were of the Islamic religious background as shown in the Table 2, with a mean score on 'Religious background of head of household (1 = Islam; otherwise = 0)' of 0.56 (SD = 0.5), with a mean score on 'Location (1 = rural; 0 = urban)' being 0.74 (SD = 0.44) indicating that most of the mothers of children under five years interviewed were from the rural areas of the region.

Using Body Mass Index (BMI) as a proxy for measuring health status, the analysis indicated that mothers of the children were healthy with a mean BMI of 22.41 (SD = 4.2) which fall within standard range of 20 to 24.9 BMI as demonstrated by Leite, Santos, Monteiro, Gomes, Veloso & Costa, (2012). Most of the mothers were generally illiterates in English, the national official language, and their local language, the mean literacy in English (1 = yes can read and/or write; 0 = cannot read and/or write)' is 0.18 (SD = 0.39) and that of local language (1 = yes can read and/or write; 0 = cannot read and/or write) of 0.18 (SD = 0.27).

Inspite of the fact that most of the respondents interviewed during the METSS baseline survey were from the rural communities, majority of them engaged in non-agricultural activities as their main livelihood. As shown in the Table 2 below, the mean of 'Main occupation (1 = farming; otherwise = 0) is 0.36 (SD = 0.48) indicating that only 36% of the women of child bearing age range interviewed in engaged in farming as their main livelihood enterprises. The average farm size was 3.6 acres (SD = 4.66), with food security situation as measured by response to the question 'within the last 4weeks was there ever no food to eat in the household'? (1= yes; 0 = no)' being 0.38 (SD = 0.49). Indicating that a little over one-third of the 2,367 household surveyed in northern region as part of the METSS baseline survey experienced some level of food insecurity. However, average annual expenditure on food per household in the study area was found to be GHS 1,372.73 (SD = 807.19). Intra-household dynamics regarding household decision making process, intra-household resource allocation, ownership and control were analysed. As shown in Table 2, the analysis of

respondents answer to the question 'who mostly take decisions in the household (1 = jointly; other member take = 0)' were found to have an average score of 0.35 (SD = 0.36), indicating that only a little over one-third of mothers or primary caregivers of children under five years interviewed mostly participate in their household decision making process. In probing further, respondents were asked whether they have no option to alter or vary decisions taken by male heads of households or other male members of household, which was measured as 'yes = 1' or 'no = 0. As shown in the table, a mean score of 0.62 (SD= 0.49) demonstrating that, they women generally were unable to vary decision taken within their households.

With regard to access to loan to help run their livelihood and consumption, respondents surveyed have very poor access to credit of any form (cash or kind). As shown in the table, the mean score on the question 'has name taken loan within the last twelve months (1= yes; 0 = no)' was 0.21 (SD = 0.18). This could be attributed to their general low involvement in group activities, which have been demonstrated to have impact on rural people access to formal credit (see Akudugu, 2012). As shown in the table, more than two-third of the mothers surveyed do not belong to any group, yielding a 'yes' mean score of 0.32 (SD = 0.47) on the question 'Do you belong to any group (1 = yes; otherwise = 0)'. Velasco & Marconi (2004) arguing in favour of group loans states that women benefit more from group loans than individual loans.

A list of household assets ranging from household wares to productive assets and other personal belongings were shown to respondents and they were asked to indicate which ones were owned by their households. For analysis, the assets were classified into household durable assets such as furniture, TV, radio, among others; household productive assets such as hoe and cutlass, food processing equipment, sewing machines, donkey carts, bullocks and tractors among others; consumables such as stock of food and liquid assets such as animals and physical cash. As shown in the table average mixed of the categories of household assets owned per household was 4.38 (SD = 5.37). Most of the household assets are owned by other members of the household other than mothers. Asked 'who will you say own most of the household resources (1 = self; otherwise = 0)'yielding a mean response of 0.37 (SD = 0.05) indicating most of the household productive resources are owned by male members of the households. With regard to control of decision to sell household assets including food and farm produce, analysis of responses gathered regarding a question 'who will you say mostly decide when to sell household assets (1 = self; 0 = otherwise)' with average score of 0.48 (SD = 0.5) indicating that nearly half of mothers or caregivers of children interviewed mostly involved in such decisions. Also a little over two-third of the respondents mostly involved in decision regarding purchase of food for the household. As shown in the Table, respondents average score on the question 'who will you say mostly decide on household food purchase (self = 1; otherwise = 0) is 0.66 (SD = 0.48), indicating that women have greater role in decision regarding household purchase which is important in child nutrition and health.

Table 2: Distribution of Intra-household Characteristics and Children Attributes

Variable	Observation	Mean	SD	Min	Max
AGECH	2367	2.444	1.365	0.1	4.5
WEICH	2367	11.8501	4.967	1.35	46
HEICH	2367	0.8285	0.144	0.42	1.38
SEXCH	2367	0.5065	0.500	0	1
CHBMI	2367	17.371	7.500	10.23	29.23
ZSWFA	2367	-0.0034	0.997	-0.706	15.270
ZSHFA	2367	-0.0003	0.987	-0.498	7.655
ZSWFH	2367	-0.0004	0.999	-2.418	13.973
STUNT	2367	0.2733	0.4457	0	1
UNWEIG	2367	0.2506	0.4385	0	1
WASTG	2367	0.1309	0.33	0	1
EXBRF	2367	0.7360	0.441	0	1
HHSTA	2367	0.1263	0.332	0	1
MOAGE	2367	28.9603	8.746	15	49
MOBMI	2367	22.4074	4.182	11.904	68.457
LOC	2367	0.7359	0.441	0	1
HHSIZE	2367	5.6650	3.405	1	35
RELIG	2367	0.5610	0.496	0	1
ETNTY	2367	0.4597	0.499	0	1
MARST	2170	0.3585	0.480	0	1
LIENG	2178	0.1818	0.386	0	1
LILOL	2180	0.1780	0.268	0	1
HHFS	2367	0.3819	0.486	0	1

MAOC	2367	0.3608	0.480	0	1
FARMZ	854	3.6550	4.657	0.4	90
HHEXF	2367	1372.73	807.19	337.50	3601.5
HHHD	2367	0.3534	0.360	0	1
POHHD	2349	0.6190	0.486	0	1
ACCRE	2367	0.2132	0.182	0	1
MMGP	2367	0.3194	0.466	0	1
CDEGP	2367	0.4778	0.500	0	1
STKAST	2367	4.3800	5.366	1	35
POSELL	2367	0.4837	0.500	0	1
OWHHR	2367	0.3742	0.048	0	1
COHHA	2367	0.3769	0.485	0	1
WHDF	2367	0.6623	0.476	0	1

Source: Analysis of data from Feed the Future Population Baseline Survey, 2012; SD = Standard deviation; obs = number of observations

3.2 Intra-household Characteristics and Nutritional Status of Children under five years

MDGs 1, which aims at eradicating extreme poverty and hunger by reducing by half between 1990 and 2015, the proportion of people who suffer from hunger. The indicator set for this target was achieving 1.8 prevalence of underweight children under-five years of age by the close of 2015. Less than one year to the deadline set under the MDGs, this current paper examines nutritional status of children under five years using Z-scores in analysing anthropometric data obtained from the baseline survey of MEST-Feed the Future. The Z-scores of 'weight-for-age', 'height-for-age' and 'weight-for-height' of children under five years surveyed were analysed and categorised as 'underweight', 'wasting' and 'stunting' by comparing with the WHO Standard, which states that Stunting: (Z-score of height-for-age below –2 SD), Underweight: (Z-score of weight-for-age below –2SD), Wasting: (Z-score of weight-for-height below –2SD) and Overweight (Z-score of weight-for-height above +2SD) (WHO 2006). Each of these indices—height-for-age, weight-for-height, and weight-for-age—provides different information about growth and body composition which are useful in assessing status (GHDS, 2009). For instance, the height-for-age index is an indicator of linear growth retardation and cumulative growth deficits, whilst weight-for-height index measures body mass in relation to body height or length and describes current nutritional status with Weight-for-age being a composite index of height-for-age and weight-for-height and it takes into account both acute and chronic malnutrition (GHDS, 2009).

And also to test the extent to which selected intra-household characteristics such as household status, sex of children, location of children as either rural or urban, mothers or primary caregivers level of participation in household decision making process and their ownership and control over household resources, a chi-square was conducted and results summarised in Table 3. Analysis of the survey data found prevalence rates of stunting, underweight and wasting among children under five years in Northern region as 27%, 25% and 13% respectively. Indicating that the Region is still far from achieving the 1.8 prevalence rate target of the MDG 1. However, overweight children in the area were found to be insignificant. From the Chi-square test results, presented in the Table 3, there exist significant relationship between nutritional status of children under five years in the region and household characteristics such as household status, sex of children, location (either rural or urban), household decision making process, ownership and control of household resources and household food security situation. These findings confirmed early studies by Maberry et.al. (2014), Klugman (2002), Kurz & Johnson-Welch (2001) and WHO, (2001a). As shown in the Table, there was significant difference ($\chi 2$ (1) =2.2; P = 0.0136) at 90% confidence level between number of stunting children in male headed households from that of female headed household. Out of the 647 children who were found to be too short for their age (stunting), 576 (89%) came from male headed households. Similarly, girls were more likely, at 5% level of significant with $\chi 2$ (1) =5.4;P = 0.0.02, to weigh low for their height (wasting) as compare with their boys counterparts. Majority (55%) of the 310 children found to be wasting were girls. however, number of underweight and stunting children were not significantly different across sex. Also respondents' location, as either rural or urban was found to be significant predictor of children nutritional status. Whiles children from urban communities were found more likely to have low prevalence rates of underweight, wasting and stunting, contrarily results were observed with their counterparts from the rural communities. As shown in the Table 3, from a total of 599 underweight children, about 82% were from rural parts of the region. Also, overwhelming majority (84.7%) of the 647 stunting children was from rural areas whiles the remaining 15.3% came from the urban centres.

Mothers or primary caregivers of children under five years participation in intra-household decision making process was found to be significant at 1% level in influencing children under five years nutritional status. Respondents in the survey indicated that, they mostly either partakes jointly in making household decisions or other members of their households (mostly husbands or elderly male members) solely take household decisions on their behalves. As shown in the Table 3, a Crosstabulation of household decision making process (either jointly or solely taken by others) and underweight status (either 'yes' underweight or 'no' not underweight) yield a Chi-square test of $\chi2$ (1) = 10.9;P = 0.001 indicating a strong significant relationship at 99% confidence level, between household decision making process and children underweight status. Out of the 599 children who were found be underweight only 117 (19.5%) came from households where decisions are jointly taken with mothers. the same results were observed regarding participation in household decision making process and prevalence of stunting among children surveyed. A Chi-square test ($\chi2$ (1) =56; P = 0.000) between household decision making process and prevalence of stunting among children established 1% significant association between the two variables. Overwhelming majority (81.3%) of the 647 stunted children came from households were mothers of these children hardly participate in household decision making. From these findings it can be opined that mothers of children involvement in intra-household decision making is a significant predictor of the nutritional status of their children. As such to reduce prevalence of stunting, underweight and wasting among children under five years, measures should be put in place to improve mothers' power to negotiate in taking households decisions which mostly may involve challenging socio-cultural barriers and empowering women.

Also household resource ownership (as either mostly owned by mothers or other household members) and control of such resources (either mostly controlled by mothers or other household members) were found to be significant predictors of children nutritional status. From the 310 children who were found to weigh low for their height (wasting), most of them (73%) were children of mothers who indicated that most of their household resources were owned by other household members. Similarly, 226 of the 310 children who have their ZWFH<-2SD (wasting) were from homes where their mothers mostly do not exert any control over their household resources. As expected, households who reported to have suffered food shortage within the last 4weeks to the time of the field survey, were found more likely to have high prevalence of underweight, wasting and stunting children as compared with other households which do not suffered from food shortage within the said period. As shown in the Table, about 51% of underweight children, 67.4% of children weighing low for their height (wasting) and 54% of stunting children were all from households which have suffered from food shortage within the last 4weeks to the time of the survey. Confirming the common knowledge that household food security situation affect children nutritional wellbeing and their physiological development which have bearing on their future co

Table 3: Intra-household Characteristics and Children Nutritional Status

Intra-household Characteristics	***Nutritional Status***								
	Underweight(ZWFA<2SD			**Wasting(ZWFH< 2SD**			**Stunting(ZHFA< –2SD)**		
	No	**Yes**	**Total**	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
Household Status:									
Male Headed	1,538	530	2,068	1,804	264	2,068	1,492	576	2,068
Female Headed	230	69	299	253	46	299	228	71	299
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	χ^2 (1) =0.90;P = 0.343			**χ2 (1) =1.6;P = 0.210**			**χ2 (1) =2.2;P = 0.0136***		
Sex:									
Girl	866	302	1,168	996	172	1,168	839	329	1,168
Boy	902	297	1,199	1,061	138	1,199	881	318	1,199
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	χ2 (1) =0.4;P = 0.5			**χ2 (1) =5.4;P = 0.0.02****			**χ2 (1) =0.8;P = 0.0.37**		
Location:									
Urban	515	110	625	534	91	625	526	99	625
Rural	1,253	489	1,742	1,523	219	1,742	1,194	548	1,742
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	χ2 (1) =26.7;P = 0.0.00***			**χ2 (1) =1.6;P = 0.2**			**χ2 (1) =56;P = 0.000*****		
Marital Status:									
Married	1,177	401	1,578	1,377	201	1,578	1,146	432	1,578
Single	591	198	789	680	109	789	574	215	789
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	χ2 (1) =0.03;P = 0.867			χ2 (1) =0.53;P = 0.46			χ2 (1) =0.0043;P = 0.9		
Household decision making:									
Other household members	1,522	482	2,004	1,737	267	2,004	1,478	526	2,004
Jointly	246	117	363	320	43	363	242	121	363
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	χ2 (1) = 10.9;P = 0.001***			**χ2 (1) =0.6;P = 0.44**			**χ2 (1) =7.8;P = 0.005*****		
No Power to alter decision:									

No	677	236	913	805	108	913	649	264	913
Yes	1,091	363	1,454	1,252	202	1,454	1,071	383	1,454
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	$\chi 2$ (1) = 2.1;P = 0.15			**$\chi 2$ (1) =1.87;P = 0.17**			**$\chi 2$ (1) =1.9;P = 0.17**		
Household Resource Ownership									
Other members	1,351	468	1,819	1,594	225	1,819	1,319	500	1,819
Self	417	131	548	463	85	548	401	147	548
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	$\chi 2$ (1) =0.74:;P = 0.389			**$\chi 2$ (1) =3.7;P = 0.046****			**$\chi 2$ (1) =0.09;P = 0.76**		
Control of Household Resource									
Other members	1,358	471	1,829	1,603	226	1,829	1,326	503	1,829
Self	410	128	538	454	84	538	394	144	538
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	$\chi 2$ (1) =0.84:;P = 0.39			**$\chi 2$ (1) =3.9:;P = 0.049****			**$\chi 2$ (1) =0.11:;P = 0.74**		
Decision on food purchase:									
Other members	1,153	395	1,548	1,356	192	1,548	1,126	422	1,548
Self	615	204	819	701	118	819	594	225	819
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	$\chi 2$ (1) =0.1:;P = 0.75			**$\chi 2$ (1) =1.9:;P = 0.17**			**$\chi 2$ (1) =0.012:;P = 0.91**		
Within the last 4weeks were there ever no food to eat:									
Yes	1,163	300	1,463	1,254	209	1,463	1,113	350	1,463
No	605	299	904	803	101	904	607	297	904
Total	**1,768**	**599**	**2,367**	**2,057**	**310**	**2,367**	**1,720**	**647**	**2,367**
	$\chi 2$ (1) =46.7:;P = 0.00***			**$\chi 2$ (1) =4.76;P =0.029****			**$\chi 2$ (1) =22.4:P = 0.000****		

Note: (***) indicate variable is significant at 1%; (**) indicate variable is significant at 5% and (*) indicate variable is significant at only 10% S.D = Standard Deviation; WFA = Weight-for-age; HFA = Height-for-age and WFH = Weight-for-height

Source: Analysis of data from Feed the Future Population Baseline Survey, 2012

gnitive development (see Omilola, 2010 & Labadarios, 2005).

3.3 Results of OLS Regression Analysis

Three multiple regression models, one for each of the three indices using the Ordinary Least Square (OLS) estimation were used to determine the significance of mothers' participation in intra-household decision making regarding household resource allocation, access, control and ownership, on children under five years nutritional and health status. The coefficients, standard errors and z test of the variables are presented in Table 4, 5 and 6 respectively for the regression models with 'Weight-for-age', 'Height-for-age' and 'Weight-for-height'.

3.4 Intra-households Characteristics Influencing Weight-for-Age of Children

Results of the OLS regression analysis with weight-for-age as the dependent variable as shown in the Tale 4, yielded R-square of 0.424 with adjusted R-square of 0.36 indicating that over one-third of the variation in children weight-for-age is accounted for by the variation of the selected independent variables. As shown in the Table, 'LOC' (location of mothers; as either urban or rural) and age of children were found to be significant at 1%, and negatively related to weight-for-age. These findings demonstrate negative relationship between weight-for-age and location of respondents implying that children in the rural communities were more likely to weigh lower for their age as compared to those in the urban communities. Also, the negative relationship between weight-for-age and age of children meant that, older children are more likely to weigh lower for their age. Also, the variable 'LILO' (literacy in local language) was significant at 1%, and positively related to children's 'weight-for-age', implying that mothers who could read and write in their local language were more likely to have their children weighing higher for their age whilst those who could neither read nor write were more likely to have their children weighing lower for their age. Demonstrating the importance of mothers' literacy in promoting children nutritional and health wellbeing. Similar finding was observed by Raykar (2012), in addition to other previous studies which have demonstrated connection between mothers' educational attainment with health outcomes of their children. Abu-Ghaida and Klasen (2004) argued that more educated women are more capable of processing information, using health care facilities, and keeping their living environment clean.

In addition, the variables which were found to be significant at 5% and positively related to children's 'weight-for-age were HHFS and HHHD indicating that household food security status significantly influenced children's weight-for-age, with households who did not experience any food shortage within the last four weeks being more likely to have

their children weigh higher for their age and vice versa. Also the significant and positive relationship of the variable 'HHHD (How is decision taken in the household (1 = jointly with other members; otherwise = 0)) in relation to weight-for-age, meant that mothers of children under five years interviewed who indicated that they jointly and actively took part in decision making processes within their households regarding household resource utilization were found more likely to have their children weighing higher for their age. Thus the main hypothesis and argument of this paper that mothers of children whose participation in household decision making will have significant influence on their children's health status – proxy measured in this paper as 'weight-for-age, have been proven with empirical analysis.

Also, variables such as LIEN, POSELL, OWHHR, WHF and COHHA were found to be significant at only 10% and positively related to children weight-for-age as the OLS results presented in the Table 3 illustrate. Implying that mothers who can read and write in English Language were found more likely to have their children weighing higher for their age. Also respondents who indicated that they have some level of control (COHHA) over their household resources, as well as those who have power over decision to purchase food for their households (WHF) and sell out household assets (POSELL) and ownership right over their household asset were found more likely to have their children weighing higher for their age. Variables such as HHSTA, SEXCH, MOAGE, RELIG, ETNTY and MARST as well as FARMZ, PHHD and MMGP were included in the regression analysis but however, were shown not to be significant in influencing children weight-for-age.

Table 4: OLS Regression Results of Intra-household of Characteristics Weight-for-Age

	Coef.	*Std. Err.*	*z*	*P>[z]*
HHSTA	-0.2443009	0.2110844	-1.16	0.248
SEXCH	0.0859674	0.1310974	0.66	0.513
MOAGE	0.0110792	0.0479054	0.23	0.817
LOC	-0.4605255	0.1728627	-2.66	0.008***
HHSIZE	-0.0024687	0.021668	-0.11	0.909
RELIG	-0.212338	0.170859	-1.24	0.215
ETNY	0.2856779	0.1730678	1.65	0.100
MARST	0.1613005	0.138495	1.16	0.245
LIENG	0.4296313	0.2187344	1.96	0.051*
LILOL	0.757631	0.2883935	2.63	0.009***
HHFS	0.3352799	0.1431551	2.34	0.020**
FARMZ	-0.0081307	0.0167956	-0.48	0.629
AGECH	-0.4949225	0.0461814	-10.72	0.000***
HHHD	0.2047145	0.1373922	1.49	0.028**
PHHD	0.0757243	0.1348949	0.56	0.575
MMGP	0.0888943	0.1338184	0.66	0.507
POSELL	0.5247732	0.3103466	1.69	0.092*
OWHHR	0.78977	1.06726	0.74	0.058*
WHDF	0.8028096	0.4613848	0.97	0.071*
COHHA	0.5295949	0.4981738	1.74	0.051*
MOBMI	-0.0022392	.013415	-0.17	0.868
_cons	1.291676	0.7971021	1.62	0.107

R-squared = 0.424; Adj R-squared = 0.360: Note: (***) indicate variable is significant at 1%, (**) indicate variable is significant at 5% and (*) indicate variable is significant at only 10%

Source: Analysis of data from Feed the Future Population Baseline Survey, 2012

3.5 Influence of Intra- household Characteristics on Children's Height-for-Age

Z-scores children's height-for-age as dependent variables was regressed against independent variables depicting mothers and primary caregivers of children participation in household decision making and other household and personal characteristics to determine their influence on children's height-for-age. Results of OLS regression model showing co-efficient (Coef), standard (Std Err), z-test and probability (p) are presented in the Table 5. The OLS regression analysis showed R-square of 0.46 with adjusted R-square of 0.403 indicating that 40.3% of variation in children under five years height-for-age is jointly explained by the variation in the independent variables in the model. As shown in the Table, variables LOC. (location; 1= rural; urban = 0), AGECH (age in years of child), HHHD (how household decisions are

taken; as jointly or otherwise) are significant at 1% level in influencing Z-score of children 'height-for-age'. The coefficients of LOC and AGECH are negatively related to Z-score of height-for-age, indicating that children from rural areas were more likely to measure low for their age as compared with their counterpart from urban communities. Also young children were more likely to be tall for their age as compared with older ones. However, variables HHHD are positively related to Z-score of height-for-age, demonstrating that households where decisions are jointly taken were more likely to have their children being taller for their age. Also variables LIENG (literacy in English; 1 = can read and write English; otherwise = 0) and FARMZ (farm size cropped last season) are positive and significantly related to Z-score of height-for-age at 5% levels. Thus mothers of children who could read and write in English were more likely to have their children being tall for their age. Also respondents from households with large farm size were found more likely to have their children measuring higher for their ages. Variables such as LILOL (literacy in local language; 1= can read and write in local language; otherwise = 0), POSELL (having no power to vary decision taken; 1 = yes; otherwise = 0), OWHHR (Ownership of household resource; 1 = self; otherwise =0) and WHDF (control of decision on household purchase of food; 1 = self; otherwise =0) and COHHA (control of household asset; 1 = self; otherwise =0) were positive and significantly related to children Z-score of height-for-age.

Table 5: OLS Regression Results of Intra-household of Characteristics Height-for-Age

Variables	*Coef.*	*Std. Err.*	*z*	*P>z*
HHSTA	-0.0221	0.1982	-1.11	0.266
SEXCH	0.0419	0 .1231	0.34	0.734
MOAGE	0.0400	0.0450	0.88	0.379
LOC	-0.0469	0.1623	-2.89	0.004***
HHSIZE	-0.0062	0.0203	-0.31	0.760
RELIG	-0.2429	0.1605	-1.51	0.132
ETNY	0.1839	0.1627	1.13	0.259
MARST	0.1302	0.1301	1.00	0.318
LIENG	0.4093	0.2054	-1.99	0.048**
LILOL	0.5065	0.2709	1.87	0.063*
FARMZ	0.3027	0.1345	2.25	0.025**
AGECH	-0.5248	0.0434	-12.10	0.000***
HHHD	0.9964	0.2024	4.92	0.002***
PHHD	0.0860	0.1267	0.68	0.498
MMGP	-0.0251	0.1257	-0.20	0.842
POSELL	0.6628	0.4915	1.34	0.068*
OWHHR	-0.5455	0.9982	-0.55	0.585
WHDF	0.3979	0.5684	0.70	0.090*
COHHA	0.1983	0.2792	0.71	0.080*
MOBMI	0.0044	.01260	0.35	0.726
_cons	1.0190	0.7487	1.36	0.175

R-squared = 0.462; Adj R-squared = 0.403: Note: (***) indicate variable is significant at 1%, (**) indicate variable is significant at 5% and (*) indicate variable is significant at only 10%

Source: Analysis of data from Feed the Future Population Baseline Survey, 2012

3.6 Influence of Intra-household Characteristics on Children Weight-for-Height

OLS regression model with Z-Score of Weight-for-Height as dependent variable was regressed against intra-household characteristics and results presented in the Table 6. The analysis yielded R-square of 0.32 with adjusted R-square of 0.29 indicating that, only 29% of the variation in children's weight-for-height is jointly explained by the selected intra-household characteristics used in the model. As shown in Table 6, variables such as LILOL, AGECH, HHHD, WHDF and COHHA were found to be significant in influencing children's weight-for-height. Variable AGECH (age of children in years) was positively and significantly related to children weight-for-height at 1% while LILOL, HHHD, WHDF and COHHA were positively and significantly related to weight-for-height at 10%. Thus older children were more likely to weigh higher for their heights as compared with younger ones, whiles households who take decisions jointly with mothers of children under five years were found more likely to have their children weighing higher for their heights. Also households in which mothers control household food purchase decision were found more likely to have their children weighing higher for their heights as against those households where mothers have limited control over household food purchase decision. Similar observations were made with regard to households where assets are mostly

controlled by mothers. These findings give empirical evidence to the assertion that, mothers of children who participated in intra-household decisions, ownership and control over households' assets is significant in influencing children's nutritional status.

Table 6: OLS Regression Results of Intra-household Characteristics and Weight-for-Height

Variables	*Coef.*	*Std. Err.*	*z*	*P>z*
HHSTA	0.1966	0.1590	1.24	0.218
SEXCH	0.0558	0.0989	0.57	0.573
MOAGE	-0.0419	0.0360	-1.16	0.247
LOC	-0.0472	0.1302	-0.36	0.717
HHSIZE	0.0012	0.0163	0.07	0.942
RELIG	0.0729	0.1279	0.57	0.572
ETNY	-0.0794	0.1304	-0.61	0.543
MARST	-0.0298	0.1043	-0.29	0.775
LIENG	-0.1933	0.1648	-1.17	0.242
LILOL	0.4477	0.2173	2.06	0.041*
HHFS	-0.0466	0.1079	-0.43	0.666
FARMZ	0.0197	0.0126	1.56	0.121
AGECH	0.2895	0.0348	8.32	0.000***
HHHD	0.5219	0.2623	1.99	0.093*
PHHD	0.1582	0.1016	1.56	0.121
MMGP	-0.0006	0.1008	-0.01	0.995
STKAST	-0.0075	0.0099	-0.76	0.451
POSELL	0.2502	0.2338	1.07	0.286
OWHHR	-0.3267	0.8005	-0.41	0.684
WHDF	0.4419	0.2851	1.55	0.082 *
COHHA	0.2916	0.1997	1.46	0.045*
MOBMI	-0.0048	0.0101	-0.48	0.634
_cons	-0.2157	0.6005	-0.36	0.720

R-squared = 0.3166;Adj R-squared = 0.295: Note: (***) indicate variable is significant at 1%, (**) indicate variable is significant at 5% and (*) indicate variable is significant at only 10%

Source: Analysis of data from Feed the Future Population Baseline Survey, 2012

4. CONCLUSIONS AND RECOMMENDATIONS

Analysis of the survey data found prevalence rates of stunting, underweight and wasting among children under five years in Northern region as 27%, 25% and 13% respectively. Indicating that the Region is still far from achieving the 1.8 prevalence rate target of the MDG 1. This paper concludes from the findings of analysis of the population baseline survey data, that there is significant relationship between nutritional status of children under five years in the region and household characteristics such as household status, sex of children, location (either rural or urban), household decision making process, ownership and control of household resources and household food security situation. Results of the Multiple Linear Regression analysis identified age of children, location of mothers as either urban or rural, literacy in local language, household decision making processes, as either jointly or otherwise and household food security as significant in influencing weight-for-age of children under five years surveyed. Households in which mothers participated all time in taking household decisions on production and food purchase were found more likely to have their children weighing high for their age. Also location and age were found to be negatively related to Z-score of height-for-age, indicating that children from rural areas were more likely to shorter for their age as compared with their counterpart from urban communities. Finally, the regression analysis of factors influencing weight-for-height of children under five years of age found variables LILOL, AGECH, HHHD, WHDF and COHHA were found to be significant in influencing children's weight-for-height.

Therefore this study concluded that mothers of children who participated in household decision making processes, had control over assets and contributed to household food purchase decision are significant in influencing positively children's nutritional and health status. Increasing participation and power of women in intra-household decision making processes is therefore imperative in promoting child nutritional status and reducing malnutrition

prevalence among children under five years. It can also be concluded that, the Northern Region of Ghana is still far from achieving the MDG 1 target of attaining 1.8% malnutrition prevalence rate, as stunting, underweight and wasting prevalence rates among children in the region still high at 27%, 25% and 13% respectively. It is therefore recommended that programmes and projects aimed at promoting sustainable nutritional wellbeing among children should consider empowering mothers of children at the household level as a way of promoting their status and barging power in household decision making processes.

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AUTHORS' CONTRIBUTIONS

The first author managed the literature searches and wrote the first draft of the manuscript. The second author extracted the data from USAID/METSS-FTF database, performed the statistical analysis and managed the results and discussion of the study. 'All authors read and approved the final manuscript

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