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An Assessment of the Nutritional Status of under Five Children in Four Districts in the Central Region of Ghana

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Abstract

The study determined the nutritional status of under five children in Komenda Edina Eguafo Abirem (KEEA) districts in Central region, Ghana. Weight and height measurements for 120 children selected from 4 clusters were taken and survey data collected by structured questionnaire from mothers of the selected children. Prevalence of underweight/severely underweight stunting/severely stunted and wasting/severely wasted was 13.3%, 34.2% and 10.8% respectively. Results also indicated that stunting, wasting and underweight were more prevalent in girls than in boys and in children aged >2 - 5 years than those <2 years. Wasting only occurred in a small percentage of the boys and girls, and children <2 years. Survey revealed that there is a significant association between nutritional status of children and mothers' age, education, nutrition knowledge and feeding practices. Wald statistics and confidence intervals after adjusting for mother's age, education, occupation, father's occupation and feeding practices showed mothers nutrition knowledge, feeding practices and mothers' education as predictors of children nutrition status. Curbing teenage pregnancy, encouraging girls to pursue education, developing and implementing a comprehensive nutrition education programme for mothers with emphasis on providing quality nutritious and adequate food to children is highly recommended.

Keywords: Malnutrition, nutritional status, predictive factors, nutrition assessment

Introduction

Malnutrition occurs when there is deficiency (under nutrition), excess (over nutrition) or imbalance of certain important nutrients in an individuals' diet (Blossner *et al.,* 2005). The World Food Program (2005) defined malnutrition as "a state in which the physical function of an individual is impaired to the point where he or she can no longer maintain adequate bodily performance processes such as growth, pregnancy, lactation, physical work or resisting and recovering from disease". It affects people of all age groups but is more common in children, the elderly and pregnant women. The World Health Organization (2005) estimated prevalence of malnutrition world-wide to be 17.6% in 2015 stressing greater number of malnourished population will be from developing countries in southern Asia and sub-Saharan Africa. Other organizations like UNICEF specify that Africa has the worst nutritional status with high underweight, stunting and wasting incidences (UBOS, 2000-2001).

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When demands of the body are not met, it can lead to effects on growth, physical health, mood, behaviour and other functions of the body. Malnutrition in children however is the consequence of a range of factors that are often related to poor food quality, insufficient food intake, and severe and repeated infectious diseases, or frequently a combination of the three (WHO, 2003). Malnourished children are easily irritable, loose focus easily and fail to grow to their required height as reported by WHO (2005) when it projected that 29% of malnourished children from developing countries will have stunted growth due to poor nutrition in 2015.

Malnutrition-related deaths often do not occur during sudden food crises and famines but result from long-term chronic hunger that gradually destroys the immune system and expose children to diseases. Malnourished children are twice as likely to die from malaria as well-nourished children and this risk is nine fold for severely undernourished children (WHO, 2008). UNICEF (2006) reported that under nutrition accounted for 5.6 million deaths of children under 5 in the developing world and 146 million underweight children. It further added that in the least developed countries, 42% of children under 5 were stunted and 36% underweight as a result of poor nutrition.

Following this report, other studies have also come up with staggering figures on malnutrition related deaths and other health conditions. Every year, about 9 million children across the world die before age 5 and one-third of these deaths are attributed to under nutrition (Black *et al.*, 2008). DFID (2010) reported that 178 million children under age 5 worldwide were stunted, 55 million acutely underweight and wasted, and 19 million severely wasted worldwide while WHO (2010) estimated that approximately 150 to 200 million pre-school children (<5-years) in developing countries were underweight and stunted.

From 1980-2000, the number of pre-school children stunted in Africa increased from about 12.9 million to 22 million with prevalence of wasting and underweight remaining at 10% from 1990-2004 (WHO, 2005). Overall averages however tend to hide disparities between and within the countries. The 1998 and 2003 Ghana Demographic Health surveys showed 26% versus 30% of children were stunted, 10% versus 22% wasted and 25% versus 7% underweight respectively (Ghana Statistical Service (GSS) and Macro International Inc. (MI), 1999; Ghana Statistical Service (GSS), Noguchi Memorial Institute for Medical Research (NMIMR), and ORC Macro., 2004). Unfortunately, the under 5 mortality is expected to increase in Sub-Saharan Africa where the prevalence of childhood malnutrition is about 41% compared to other regions of the developing world (Smith and Haddad, 2000; United Nations Children's Fund, 2007; United Nations, 2004).

Studies have reported that the prevalence of childhood malnutrition is disproportional according to regions and socio-economic status of the family, as well as ecological zone where these families find themselves (Wag staff Watanabe, 2000; Hong, 2006). Others suggested poverty, low parental education, poor feeding practices, lack of sanitation, and family size as factors that cause malnutrition among children (WHO, 1999; FAO, 2006).

The Ghana Health Service (2007) in a similar study using 250 children under 5 in the same four communities (KEEA) reported a malnutrition rate of 18.3% for children 6 months to 2 years. This study was aimed at assessing the nutritional status of children under five in the KEEA municipality by determining the z-scores of weight-for-age, weight-for-height and height-for-age. Other objectives include; finding the relationship between nutritional status of children and the following factors: mothers' age, education, occupation,

nutrition knowledge and feeding practices as well as fathers' occupation; and to recommend appropriate intervention for improving the nutritional status of these children.

Materials and methods

The study area KEEA municipality is located along the Gulf of Guinea specifically within longitude 1º 20´ West and 1º 40´ West and latitude 5º 05´ North and 5º 15´ North. The study area has an estimated land area of 1372.45 square kilometers (919.95 square miles) and a projected population of about 138, 711 (KEEA Municipality Directorate Statistics, 2009). The inhabitants are predominantly fisher folks with few peasant farmers. A cross-sectional, 4-cluster study was done choosing children under five years and their mothers from each cluster. A list of all the villages under each of these four districts (clusters) was obtained from the KEEA municipal directorate and 3 villages were randomly selected out of each district/cluster totalling 12.

Snow balling was used to identify 10 children and their mothers from each of the 12 selected villages making a total of 120 children and 120 mothers. Mothers with more than one child under 5 had the youngest child picked to ensure that all mothers presented only one child for the study. Weight-for-age, height-for-age and weight-for-height were obtained using a meter rule and weighing scale and used to assess the nutritional status of the children. These indices were derived as a standard deviation (SD) or Z-score of a child's measurement to the median weight of the international standard reference, i.e., the growth reference of the Centre for Disease Control-USA (CDC, 2000). The Z-score of -2 is generally considered as the cut-off point for screening the individuals who are likely to be malnourished. The formula for SD or Z-score is as follows: Z = (Child's measurement – Reference median) divided by the Reference SD, where, Child's measurement = height or weight of a given child at age X; Reference median = mean or 50th percentile of the reference population at age X; Reference SD = standard deviation of the reference population at age X. An attempt was made to follow as far as possible the standard techniques of taking the measurements as described in the IBP Handbook (Weiner and Lourie, 1981).

A well-developed structured questionnaire was administered to the 120 mothers' in their home settings after their consents were obtained and they were assured of confidentiality of the responses they provide. The questions on the questionnaire sought information on demographics of mothers, children feeding practices, mothers' knowledge in nutrition and fathers' occupation. Prior to administering the questionnaires to the 120 mothers, few questionnaires were pre-tested using 20 mothers from Amisano, one of the villages in the KEEA municipality which was not sampled for the study. A Cronbach α of 0.86 obtained from analysing responses from the protest confirmed the validity of the questions.

Results presentation and analysis

Information collected from the questionnaire is presented using simple descriptive statistics such as frequency distribution tables and percentages. The information were earlier coded, quantified and analysed statistically using SPSS Windows software version 17.0 to calculate means, percentages and binary logistic regression coefficient after the raw scores were dichotomized for analysing the effects of maternal age, education, occupation, nutritional knowledge and father's occupation and feeding practices on the three anthropometric indices – weight-for- age, height-for-age and weight-for-height. Logistic regression helped to determine predictive powers of the

parameters tested in relation to the nutritional status of the children.

The z-scores for weight-for-age, weight-for-height and height-for-age of children are presented using simple descriptive statistics such as frequency distribution tables and percentages.

The study was based on anthropometric data from 120 children under 5 and survey results from 120 mothers. The results of the field survey show that most of the mothers in the study area are in the range of 15 – 19 years. Results also show that most of the mothers do not either have any formal education or never completed basic education (Table 1). There were more male children (about 58%) to females (42%); and 60% of the children were within 2 -5 years with 40% under 2 years (Table 1). For this study, prevalence of underweight /severely underweight, stunting/severely stunted and wasting/severely wasted was 13.3% (11.7% +1.6%), 34.2% (25.0% +9.2%) and 10.8% (8.3% + 2.5%) respectively. Results also indicated that stunting, wasting and underweight were more prevalent in girls than in boys and in children aged >2 - 5 years than those <2 years. Wasting only occurred in a small percentage of the boys and girls, and children <2 years.

Table 1: Demographic information of study sample

Parameter	Frequency N=120	Percentage %
Age (years)		
Children		
≤ 2	48	40
> 2 -5	72	60
Mothers		
15-19	48	40.0
20-25	36	30.0
26-30	25	20.8
31-35	8	6.7
> 35	3	2.5
Gender (Children)		
Males	69	57.5
Females	51	42.5
Mothers Education		
No formal education	25	20.8
Primary education	48	40.0
Junior high school	35	29.2
Senior high school	12	10.0
Tertiary education	0	0.0
Other (specify)	0	0.0
Mothers Occupation		
Trading	82	68.4
Farming	26	21.6
Other (specify)	12	10.0
Fathers Occupation		
Fishing	57	47.5
Farming	18	15.0
Other (specify)	45	37.5

Source: Field survey, 2013

Table 2: Prevalence of malnutrition among children below 5 years of age in the KEEA municipality by sex

	Weight for Age Z score			Weight for Height Z score			Height for Age Z score		
Sex of Children	Severely under weight	Under weight	Normal	Severely wasted	Wasted	Normal	Severely stunted	Stunted	Normal
Male	1 0.8%	3 2.5%	65 54.2%	2 1.7%	2 1.7%	65 54.2%	6 5.0%	12 10%	51 42.5%
Female	1 0.8%	11 9.2%	39 32.5%	1 0.8%	8 6.6%	42 35.0%	5 4.2%	18 15.0%	28 23.3%
Total	2 1.6%	14 11.7%	104 86.7%	3 2.5%	10 8.3%	107 89.2%	11 9.2%	30 25.0%	79 65.8%

Source: Field survey, 2013

Table 3: Prevalence of Malnutrition among children below 5 years of age in the KEEA Municipality by age

	Weight for Age Z score			Weight for Height Z score			Height for Age Z score		
Age of Children (months)	Severely under weight	Under weight	Normal	Severely wasted	Wasted	Normal	Severely stunted	Stunted	Normal
0-24	0 0.0%	4 3.3%	44 36.7%	1 0.8%	3 2.5%	44 36.7%	2 1.7%	13 10.8%	33 27.5%
25-60	2 1.7%	10 8.3%	60 50.0%	2 1.7%	7 5.8%	63 52.5%	9 7.9%	17 14.7%	46 38.3%
Total	2 1.7%	14 11.6%	104 86.7%	3 2.5%	10 8.3%	107 89.2%	11 9.2%	30 25.0%	79 65.8%

Source: Field survey, 2013

Table 4: Unadjusted odds ratio predicting association between mothers' age, education, occupation, nutritional knowledge, fathers' occupation, feeding and nutritional status of children

Parameter Unadjusted	Wald statistic	df	Sig. (p-value)	Odds Ratio	Confidence Interval (95%)
Mother's age*	10.93	1	.04	9.33	1.07-8.57
Mother's education*	13.93	1	.03	14.74	1.17-16.26
Constant	9.70	1	.00	0.08	-
Mother's Occupation	.00	1	1.00	.00	.00
Constant	.000	1	.00	5.94	-
Mother's nutritional Knowledge	10.14	1	.023	9.859	1.39-11.91
Constant	.953	1	.001	.558	-
Father's Occupation	0.71	1	.79	1.38	0.14-13.60
Constant	0.37	1	.00	0.08	-
Feeding Practices	10.66	1	.02	14.57	.25-14.33
Constant	.01	1	.00	.94	-

* Mother's age and education had the same constant. The Wald statistic and significance or p-value is used to evaluate whether or not the logistic coefficient is different than zero. The effect of the predictor increases when the logit odd ratio >1.0; has no effect when it is 0; and decreases when it is < 1.0.

Table 5: Adjusted odds ratio showing which factor best predicts association with nutritional status of the children

Parameter adjusted	Wald statistic	df	Sig. (p-value)	Odds ratio	Confidence interval (95%)
Mother's age	2.07	1	.15	.316	.07-1.52
Mother's education	6.04	1	.05	5.20	11.21-6.74
Father's occupation	0.00	1	.99	8.20	.00
Mother's occupation	0.00	1	.99	.00	.00
Feeding practices	8.91	1	.04	10.52	1.21-8.74
Mother's nutrition knowledge	10.69	1	.03	11.68	1.28-16.69
Constant	0.00	1	1.00	3.07	

The Wald statistic and significance or p-value is used to evaluate whether or not the logistic coefficient is different than zero. The effect of the predictor increases when the logit odd ratio >1.0; has no effect when it is 0; and decreases when it is < 1.0.

Discussion of results

The aim of this study was to determine how the anthropometric profile of children under 5 and factors such as mother's educational level, age, occupation, nutritional knowledge, father's occupation and feeding practices predict the nutritional status of children under 5 in the KEEA municipality compared to the national profile as these types of data on children are limited in Ghana. The results of the field survey showed that most of the mothers in the study area are in the range of 15 – 19 years and had no formal education or just completed basic education.

This result is expected because the Central region has been leading the rest of the regions in Ghana in terms of teenage pregnancy and adolescent fertility figures. Ghana Statistical Service (GSS) and Macro International Inc. (MI). (1994) reported 33.3% of teenage girls start child bearing in the Central region as against the national average of 22% and the lowest regional figure of 11.1 % from Volta region from the 1993 Ghana Demographic Health Survey. The KEEA district is predominantly rural with most of the population involved in fishing and is not an exception to the high teenage pregnancy situation in the region. Also because they end up getting pregnant early in life, they are not able to achieve high education.

Prevalence of stunting/severely stunted, wasting/severely wasted and underweight /severely underweight was 34.2%, 10.8% and 13.3% respectively. This implies that about a third of the children were shorter in height for their age. The results of this study also indicated that stunting, wasting and underweight were more prevalent in girls than in boys and in children aged >2 - 5 years than those <2 years. There is a possibility that the children may have been well breastfed but have not been properly fed after weaning. Although catch-up growth is possible when circumstances change, malnourished children never achieve optimal growth (Golden, 1994). Wasting only occurred in a small percentage of the boys and girls, and children <2 years. It seems as if the children in this study experienced a chronic, rather than acute, insufficient food and nutrient intake (UNCF, 2007).

GDHS (2003) stipulated a 30% stunting, 22% wasting and 7% underweight among Ghanaian children under 5 and the rate of stunting in this study is comparable to that stipulated, although wasting is lower and underweight slightly higher than stipulated. Five years later, UNICEF (2008) reported a 23% stunting and 7% severe stunting among Ghanaian children which is similar

to that reported by GDHS (2003) showing that there was no improvement in stunting among children under 5 in Ghana from 2003 -2008. The findings in this study indicated similar results to that of UNICEF (2008) with stunting of 30% (23% stunting and 7% severely stunted) in children under 5 years nationally. Nti and Lartey (2007) study of under 5 children in Manya Krobo district in the Eastern region of Ghana revealed a stunting rate of 20% lower than the national rate of prevalence. Although the same publication reported a slightly higher malnutrition prevalence rate for males (18.3%) than females (17.1%), malnutrition prevalence rate (per underweight, wasting and stunting) for female children (36.6%) in this study was rather higher than that for the males (21.7%).

A study conducted by the Ghana Health Service (GHS) in 2007 at the Elmina Urban Health and Rehabilitation Centre revealed that out of the 250 children studied, 18.3% of them, between the ages of 6 months-2 years, were malnourished. Five years later, the rate of malnutrition among children in the same area was found to be 19.1% for children <2 years and 40.1% for children >2-5 years. This shows that probably not much has been done to reduce malnutrition among these children or if certain measures are in place for reducing malnutrition, then probably they are not effective. In an earlier report Ghana Statistical Service (GSS), Noguchi Memorial Institute for Medical Research (NMIMR), and ORC Macro (2004) recorded slight improvements in rates of underweight and wasting among children under 5 years between the 1998 and 2003 Ghana Demographic Health Surveys, but deterioration in stunting rates (GDHS, 2003). This shows stunting has always been a big challenge in the health of children in most parts of Ghana and need to be critically looked at and efforts put in place to reduce it as much as possible.

Results indicated that mother's age (Wald χ^2 = 10.93, CI = 1.07-8.57, odds ratio = 9.33, p= .04) can be used to predict the nutritional status of the child if the following variables are unadjusted: mother's educational level, occupation, nutritional knowledge, father's occupation and feeding practices. Once these variables are adjusted, mothers' age (Wald χ^2 = 2.07, Odds ratio = 1.32, p= .15, CI = 0.66-1.52) can no longer be used to predict child's nutritional status.

Mothers' educational level however can be used to predict child's nutritional status for both adjusted and unadjusted mother's age, occupation, nutritional knowledge, father's occupation and feeding practices (unadjusted-Wald χ^2 = 13.93, CI = 1.17-16.57, odds ratio = 14.74, p = .03) and (adjusted-Wald χ^2 = 6.04, odds ratio = 5.20, p = 0.05, CI = 1.21-6.74). Webb and Lapping (2002) identified mothers' education and nutritional knowledge as significant but independent factors associated with children nutrition outcomes. They explain that children of educated mothers are often more healthy and better cared for. The low educational attainment of these mothers may impact the prevalence of malnutrition among these children although there may be other more important factors like income. Probably, providing more nutrition knowledge to these mothers during post natal visits to the clinic could help improve children feeding and reduce malnutrition.

Mothers' nutrition knowledge (Wald χ^2 = 10.14, CI = 1.39-11.91, odds ratio = 9.86, p = .023) significantly associated with the nutritional status of children and can be used to predict the nutritional status of the children with or without adjusting mother's age, educational level, occupation, father's occupational status and feeding practices. Mothers' nutrition knowledge is the most significant variable with the highest predictive index. The fact that the nutritional knowledge of mothers in this

study can predict children nutritional status supports earlier studies by Bloss *et al.*, (2004) who found maternal nutritional knowledge as key to determining the nutritional status of children especially those below five years and Odunayo and Oyewole (2006) who found a significant association between the nutritional status of children and the feeding practices of their families when they studied a group of Nigerian children below the age of 5 years. Kumar *et al.*, (2006) identified improper feeding practices as accounting for poor nutrition among children and contribute to 1 out of 2 deaths associated with infectious disease.

Also, both mothers' occupation (Wald χ^2 = 0.00, CI = .00, odds ratio = .00, p = 1.00) and father's occupation (Wald χ^2 = 0.71, CI = 0.14-13.60, odds ratio = 1.38, p= .79) cannot be used to predict the nutritional status of the children in this study without adjusting for mother's age, educational level, occupation, nutritional knowledge and feeding practices. After adjusting for mother's age, educational level, occupation, feeding practices and nutritional knowledge, father's occupation was still not significant and could not predict nutritional status of children in the KEEA municipality. When all predictors were adjusted, results did not show any statistical significance for any of the predictors in association with children nutritional status.

Reyes *et al.* (2004) identified poor socioeconomic conditions such as low paying jobs of fathers to promote malnutrition in children. Fathers' occupations in this study were weak in predicting the nutritional status of the children probably because most of them were either small scale farmers or fishermen who usually live on low incomes or had unstable jobs. In a recent study of children under 5 in India, Temsutola and Varte (2012) identifies low prevalence of wasting (weight-for-height measurements) but believe it to be independent of age, whereas indices of underweight and stunting are dependent of age. Temsutola and Varte further states that weight-for-height measurements are better indicators of nutritional status of children under 5. The prevalence of wasting in this study was low (10.8%) and using it as the better and only indicator of nutritional status may not be very appropriate or may underscore the rate of malnutrition that really exists.

Conclusion

Overall, the nutritional status of the children in this study indicated a need for intervention. Since occupation of both fathers' and mothers' had no association with the nutritional status of children in this study but rather age and education with children of older and more educated mothers better nourished, curbing teenage pregnancy and encouraging girls to pursue education may help improve the nutritional status of these children. There is the need for development and implementation of a comprehensive nutrition education programme for mothers with emphasis on mothers providing quality nutritious and adequate food to children. Focus on general healthy eating, menu planning, food preparation and serving of nutrient-adequate, economical meals is highly recommended.

Menu planning education should specifically address important principles such as portion or serving sizes, meal variety and nutritional considerations for various age groups. The above recommendations can be achieved if guidelines that pertain to healthy eating are made available and linked to. In addition, it may be important to establish more effective nutritional surveillance systems to help monitor the nutritional status of children more frequently.

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