Research Article

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Journal of Clinical Nutrition & Dietetics
ISSN 2472-1921

2018
Vol.4 No.1:4

DOI: 10.4172/2472-1921.100066

Assessing the Relationship between Dietary Intake, Hygienic Practices and Protein Energy Malnutrition among Children under Five at Ahafo Ano North District

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Citation: Amponsah SK, Apenkwa J, Ojo L, Solomon KA, Akwasi E, et al. (2018) Assessing the Relationship between Dietary Intake, Hygienic Practices and Protein Energy Malnutrition among Children under Five at Ahafo Ano North District. J Clin Nutr Diet Vol.4 No.1:4

Abstract

Malnutrition is a disease of Public Health importance hindering the success of MDGs 4 & 5. The disease continues claiming the lives of majority of children under five years globally, especially in Africa. A cross-sectional study was designed for 386 mothers with children less than 5 years to explore the association between dietary intake and hygienic practices at Ahafo-Ano North District, in Ashanti Region of Ghana. Simple random sampling, systematic and purposive sampling techniques were used to choose mothers with children under five years from 5 selected communities for the administration of questionnaire and taking of children's MUAC. At the end of the study, the study found 6.7% of the under five children at Ahafo Ano North district were severely malnurished 43.8% mildely or moderately malnurished and the remaining 49.5% also found to be normal. The study also found relationship between vitamins, initiation time of water, kind of food introduced during weaning and malnutrition. Finding however showed a significant relationship between mothers decision child feeding, forbidden foods and fetching of water by children and malnutrition. On socio-economic status of mother's relationship with malnutrition, mothers occupation, age, marital status and religion were all found to be associated with malnutrition. From the study, environmental factors such as defecating place of the household, closeness of toilet to the kitchen, washing of hands by mothers before feeding and storing place of cooked food were all found. Based on the findings, it was recommended that, the District Health Directorate should educate mothers/caregivers on appropriate feeding practices needed to improve child's growth in order to promote children's nutritional status.

Keywords: Healthy diet; Dietary intake; Malnutrition

Received: April 10, 2018; **Accepted:** April 19, 2018; **Published:** April 26, 2018

Introduction

Comprehensively, lack of healthy diet is considered one of the causal components of Malnutrition, is universally the most vital hazard factor for ailments and demise, influencing particularly a huge number of youthful kids. It is at present the main source of worldwide weight of infection [1].

The World Health Organization report [2] demonstrated that malnutrition was responsible for 54% of the 10.8 million mortality for every year in less than five kids, out of which 53% of the deaths are related with irresistible illnesses in developing countries.

It is evaluated that no less than 1,500 individuals in developing nations pass away every twenty minutes from at least one of a reiteration of infirmities alluded to as ignored sicknesses, a large portion of which are firmly identified with nutrition and poverty [3]. Seven and a half years since 147 Heads of State met in New York to address the predicament of poor people, it is just suitable to take a gander at where we have come to particularly with the situation of the African kid in an under-advantaged setting.

Consistently, 5,500 children crosswise over 21 nations in Eastern and Southern Africa alone keep on dyeing before they achieve their fifth birthday celebration [4].

In spite of the fact that malnutrition keeps on being a noteworthy public health issue all through the developing countries, in Ghana there has been generous extent of advance in lessening malnutrition rate. The predominance of underweight fell logically from 30% out of 1988 to 21% out of 2003. The prevalence of stunting decreased from 29% to 26% in the vicinity of 1988 and 1993, and after that increased again to 29% amid the period 1993-2003. The level of wasting stayed insecure amid the period 1993-2003 [5]. However the 2003 Ghana statistic and health review report showed that, malnutrition represented 40% of under 5 mortality in Ghana [5]. UNICEF [6] revealed that 22.4% of the under-five children were stunted and 17% also underweight. Nti & Lartey (2006) likewise expressed that the predominance of stunting among kids in the vicinity of 12 and three years in the ManyaKrobo District of Ghana was as high as 20% [7]. The prevalence rate of malnutrition recognized in an investigation in Kumasi in the Ashanti Region was 21.2% [8] These outcomes were steady with the 22.1% announced by the World Food Program Ghana in 2005 [2]. The report additionally expressed that one [1] out of each fifth kid in Ghana was malnourished.

Reports from DHIMS2 reveals that out of 9,262,338 children under five that reported at Child Welfare Clinic (CWC) in 2011, 321 were prevalent to severe underweight. The figure went up to 27614 in 2012 out of the total 11,450,515 and doubled in 2013 by 46,626 out of the 12,270,440 children that attended to CWC.

Similar to Ahafo Ano North District, 3616 underweight cases were reported out of 82,347 under five children in 2013 at their CWCs. This means that in 2013, 4.39% of under five children were underweight. The district in its 2014 half year review reported 3,956 underweight cases out of 33,345 representing prevalence rate of 11.86% among children under five patronising CWC in the district. This figure therefore calls for a study to investigate the relationship between dietary intake, hygienic practices and Malnutrition.

Research Objectives

General objective

This study seeks to determine the relationship between dietary intake, hygienic practices and malnutrition among children under five at Ahafo Ano-North District in order to formulate necessary recommendations to help reduce the high prevalence rate of Malnutrition.

Specific objectives

Based on preliminary readings, this study focused on the following specific objectives;

1. To determine the prevalence rate of malnutrition among children under five at Ahafo Ano North District.
2. To establish the relationship between dietary intakes, hygienic practices and the nutritional status of children under five years in Ahafo Ano North District
3. To identify the relationship between socio-economic status of study population and malnutrition among children under five in the Ahafo Ano South District.

Hypotheses of the study

1. H_{01}: Male children under five years are prevalent to malnutrition than their female counterpart.
2. H_{02}: There is no significant relationship between dietary intake, hygienic practices and malnutrition among children under five years.
3. H_{03}: There is no significant relationship between environmental conditions and malnutrition among children under five years.
4. H_{04}: There is no significant relationship between socio-economic status and malnutrition among children under five years.

Research Methodology

Background of the study area

Ahafo Ano North District is located in the North Western part of Ashanti Region. It is bounded in the East by Tano and Asutifi District in the Brong Ahafo Region and in the South by Ahafo Ano South in the Ashanti Region.

The district is located on the forest-dissected plateau. It rises from about 700 feet in the western part to about 900 feet above sea level. The total land area of the district is 55,734 hectares of which 80% are Agricultural lands.

The District's total length of the feeder road is about 320 km. The road network consists of most untarred feeder roads linking the smaller settlements and the main Kumasi – Goaso highway, which is tarred. Major rivers and streams include the Tano, Abu, Kwasu, Anyinasu and Supon. Most of the streams in the District dry-up during the dry season.

The major river in the entire District is the Tano, which with many of the rivers; exhibit a dendritic pattern of flow. The river Anyinasuso, a major tributary of Tano, flows from the east to the west.

The district lies within the wet semi equatorial zone marked by double maxima rainfall in June and October with a mean annual rainfall of 175 cm. Temperatures are fairly high with a range between 26°C in August and 30°C in March.

The current population of the district is estimated at 103936. In the Ahafo Ano North District majority of the population are Ashantis, and they constitute about 61% of the population; the rest are made up of Brong Ahafo 2.6% Ewes 7.0% Akuapims 2.6% and about 18.7% from tribes in the Northern, Upper-East and Upper-West Regions.

The main occupation of the people is farming. It employs about 83% of the total labour force, both direct and indirect. The second sector is Commerce, which also engages about 13% and industry (mainly small scale) takes the remaining 4%.

Analysis of the religious background of the population reveals

that 75% are Christians, 18% Moslems, and the rest i.e. 6.2% practice traditional religion. There also 9 health facilities within the district. These health facilities include 4 private clinics, 4 healthcare centres and 1 government hospital.

Study type

In order not to intervene, the researcher used the non-interventional study type. Non-interventional study was also used due to the larger number of respondents the researcher wants to involve in order to give true reflection of entire under two children in the district. Because little is known about malnutrition among women or caregivers in the district, the researcher used exploratory study. Again exploratory study type was used to explore factors predisposing children under five years of age to malnutrition and also for the researcher to find new insight about the topic under study.

Study design

The study was an exploratory cross sectional study designed to enable the researcher measure the prevalence rate of malnutrition in children under two across the Ahafo-Ano North district. The researcher used exploratory study design to the assertion that most mothers with children less than two years are illiterates and do not have better understanding to factors that cause malnutrition. The researcher also used an exploratory study design in order to ask more questions that would draw more from mothers or caregivers. The sample constituted 390 mothers with their children from twelve communities from the district. In all 390 mothers with their children were selected from the 12 communities using the simple random, purposive and systematic sampling technique. The researcher used the systematic sampling technique after obtaining the sample frame of houses in each of the two communities from the 5 sub-district starting from the Catholic Church in each of the communities. The researcher used interview guide and anthropometric parameters as the data collection tools.

Study population

The population for the study included mothers with their children aged between 0-59 months suffering or who have ever suffered or have not suffered from malnutrition from the five sub-districts (Ayinasuso; Betiako, Manfo, Subriso and Tepa).

The researcher believed that at this age when the child is denied breast milk, does not have the appetite and the digestive system not ready to take much solid and calorie foods, the consequence will lead him/her to malnutrition. Children were used because of the prevalence rate the researcher wanted to investigate; however, the researcher believed that mothers were the best people to get relevant information from with regards to the state of their children. In all, the total population for the study based on relevant data from the District Health Directorate was 14,423 children from 0-23 months (**Table 1**).

Study variables and indicators

Sampling technique and sample size: Though the computed sample size was 384, 390 eligible respondents were estimated and sampled. This was based on the prevalence rate of malnutrition (50%) in the district. Using the formula adapted from (www.ifad.org) Retrieved.11/6/2010) as (Formula- appropriate sample size for a population based survey design based on simple random sample).

$$n = t^2 \times p(1-p)/m^2$$

Where,

n=required sample size

t=confidence level at 95% (standard value of 1.96)

p=estimated prevalence of Malnutrition in the Ahafo-Ano North District (50%=0.5)

m=margin of error at 5% (standard value of 0.05)

Hence, $n = (1.96)^2 \times 0.5(1-0.5)/(0.05)^2$

Table 1: Variables and Indicators (Source: field work, 2014).

Variables	Indicators
Prevalence rate of malnutrition	Measurement of weight of children under two Measurement of height children under two Age of child(ren)
Environmental Factors	Sanitation Amenities Access to health facility
Socio-economic Factors	Size of the family Income status Decision making Educational Level of Parents Occupation of Parents
Dietary Intake Factors	Practice fo EBF Weaning practices Complementary feeding practices
Hygienic Practices	▪ Environmental sanitation practices

$$n = 3.8416 \times 0.5(0.5)/0.0025$$

$$n = 384.16 \approx 384$$

Based on the above calculations, it stands to reason that the sample size should be larger than this to make room for non-response error, the researcher therefore used 386 mothers whose children (under- two years) have ever suffered from malnutrition before; or are suffering from malnutrition; or are not suffering from malnutrition; in order to get a true reflection of children 0-59 months of age. Also, 386 children were selected for their data on mid-upper arm circumference and age to help determine children that were malnourished. The child health records were reviewed to support the data gathered from each household. Physical conditions of the children were also observed for more information.

Each community in the 5 sub-districts constituted 77 respondents (mothers with children under 2 years). Respondents were selected using systematic and simple random sampling technique. Thus, for the systematic sampling technique, the researcher stood in front of the Roman Catholic Church and counted 4 houses, this was used as the startup and subsequently each fourth house in the community was involved in the study. In an instance whereby there is no under 5 child in the fourth house, the nearest house with a qualified child was used and the next fourth house located for the study. In houses where mothers with children less than five years of age were more than one, the researcher used simple random sampling technique to select one from the two or three. Thus, a coin was tossed and a mother who chose the head was involved in the study. This was repeated throughout till the researcher obtained the entire sample size for each community.

The purposive sampling technique was used in selecting the 10 communities in the six sub-districts in Ahafo-Ano North District; with 2 communities in each sub-district. Purposive sampling technique was used to select the 10 community since the communities were noted to be areas where malnutrition is predominant found in the district.

Data Collection Techniques and Tools

A well-structured interview guide comprising of open and close-ended questions was designed for the study. Interview guide was however designed by the researcher and not from elsewhere. Interview was conducted in the local language for easy understanding. Also, anthropometric measurements such as Mid-Upper Arm Circumference (MUAC) and Childs age were taken to assess the nutritional status of the children. Children were examined to find signs of malnutrition (Kwashiorkor, Marasmus and Marasmic-Kwashiorkor) with the help of 8 health professionals.

Anthropometric technique

Anthropometric measurements using child's Mid-Upper arm circumference was employed. Children with Mid-Upper Arm Circumference (MUAC) below 11.5 cm were those considered malnourish. Those with MUAC of 11.5 cm-12.5 cm were also noted to be those with mild/moderate malnutrition. However, children with MUAC above 12.5 cm were those that were normal.

Data Analysis

Data obtained was coded and entered into Microsoft excel worksheet. This was analyzed using SPSS version 21 for the nutritional survey analysis. The frequency distribution of the study participants according to age, sex, religion, educational status, socioeconomic status, environmental conditions, birth order and dietary intake and hygiene practices were analyzed. Prevalence of malnutrition was worked out along with 95% confidence interval. In addition to overall prevalence rate, the prevalence of malnutrition was also estimated in relation to certain selected factors such as age, sex, religion, educational status, socioeconomic status, sanitation, birth order and dietary intake practices and hygiene practices. To find out the association

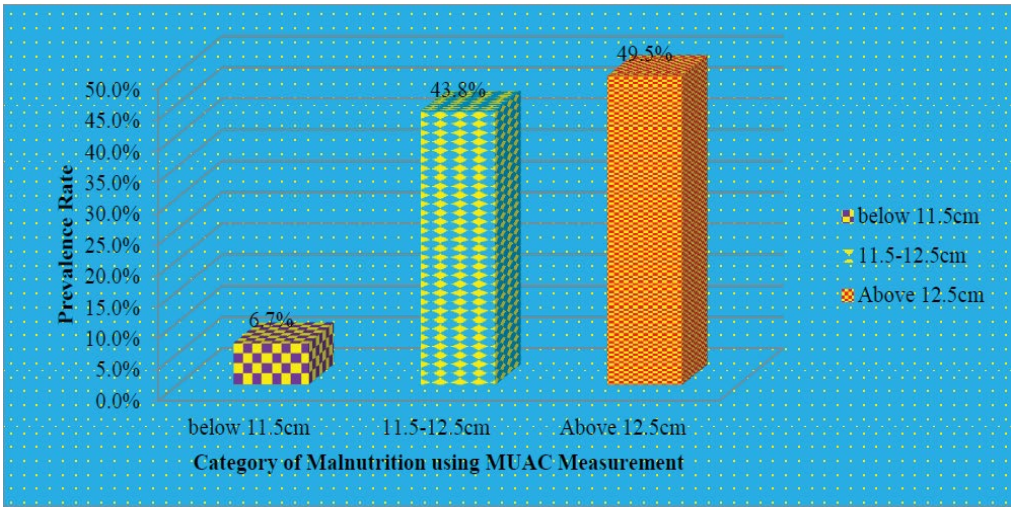

Figure 1 Prevalence rate of malnutrition (*Source: Field Data (2014)*).

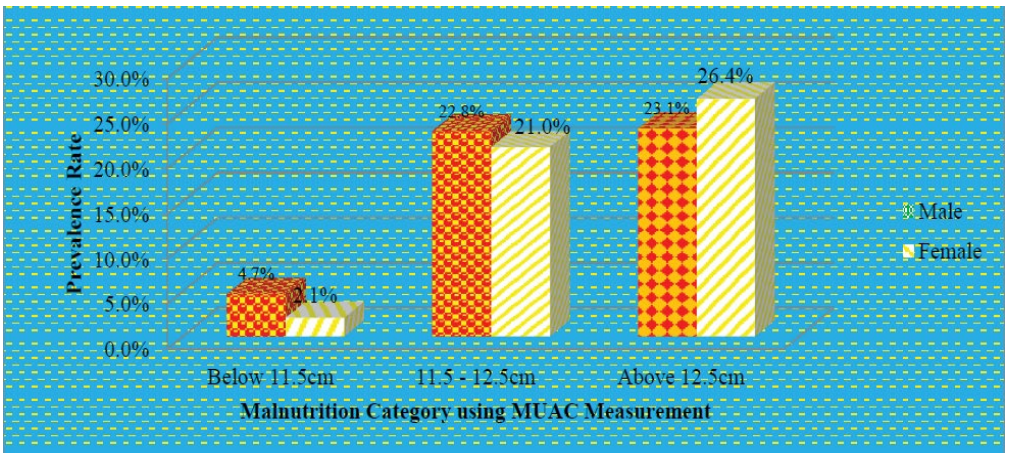

Figure 2 Prevalence of malnutrition according to gender (*Source: Field Data (2014)*.

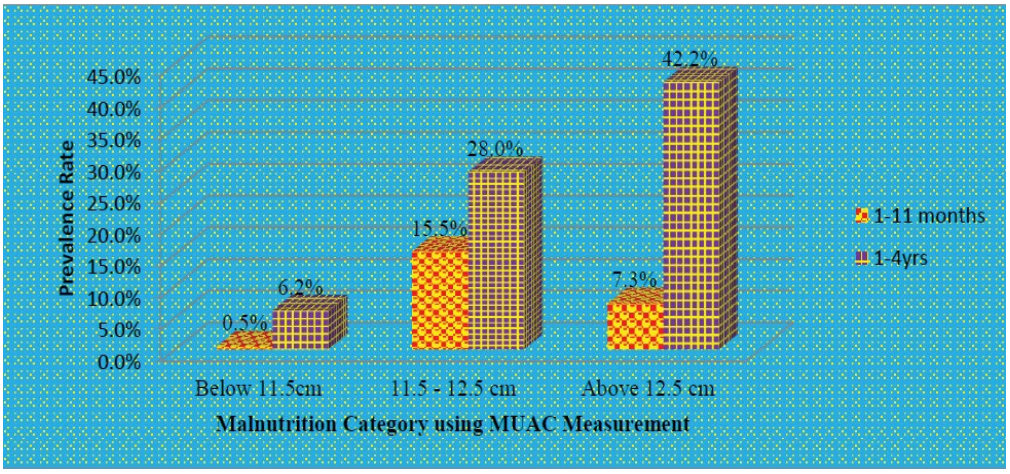

Figure 3 Prevalence rate of malnutrition by age category (0-59 months) (*Source: Field Data (2014)*).

of malnutrition with the above factors, chi-square test and Fisher exact test was applied for each of the factor. The statistical significance was evaluated at 5% level of significance. Microsoft Word and Microsoft Excel were used to generate graphs and tables.

Presentation of Results and Discussion

Presentation of results

Prevalence of malnutrition:

Figure 1 illustrates that 6.7% of the respondents had their MUAC below 11.5 cm, 43.8% had

11.5 cm-12.5 cm and 49.5% above 12.5 cm.

Figure 2 results shows that MUAC below 11.5 cm was high among males with a percentage of 4.7% while's female counterparts scored 2.1%. MUAC of 11.5 – 12.5 cm was little higher in male with 22.8% whiles female counterparts scored 21%.

From **Figure 3**, majority of children had a MUAC measurement above 12.5 cm. Thus 42.2% of children 1-4 years had a MUAC measurement above 12.5 cm (normal). A significant proportion (28%) of children age 1-4 years also had a MUAC measurement of 11.5–12.5 cm (moderate/Acute malnutrition) with minority (6.2%) of them with MUAC of below 11.5 (Severe). MUAC below 11.5 cm was also prevalent among children age 1-4 at a rate of 6.2% and 0.5% among 1-11 months.

Relationship between Socio-economic status and malnutrition:
Table 2 age of the mother was significantly related to malnutrition (chi=32.188; p=0.000). Mothers with children with MUAC below 11.5 cm, (3.6%) were within age category of 15-20 years, and 2.2% also between ages 21-25 years. At the same category of age (15-20 years), 18.9% had MUAC of 11.5-12.5 cm. Marital status was also found to have direct relationship with malnutrition. Thus marital status was statistically found to be associated with prevalence of malnutrition (chi=44.303; p=0.000). As depicted in the table, 4.9% of the mothers were found to be single with their children's MUAC measuring below 11.5 cm; also 27.2% single mothers had their children's MUAC measuring 11.5-12.5

Table 2: Socio-economic Characteristics of Respondents (Source: Field Data, 2014).

MUAC				Chi square(p-value)
Demographical Data	**Below 11.5cm**	**11.5-12.5cm**	**Above 12.5cm**	
Age of Mother				
15-20 yrs	3.6% (n=14)	18.9% (n=73)	11.4% (n=44)	32.188 (0.000)
21-25 yrs	2.2% (n=8)	8.8% (n=34)	19.2% (n=74)	
31-40 yrs	0% (n=0)	9.8% (n=38)	9.1% (n=35)	
41 and above	1% (n=4)	6.2% (n=24)	9.8% (n=38)	
Marital status				
Married	0.5% (n=2)	9.3% (n=36)	18.1% (n=70)	44.303 (0.000)
Divorced	0.3% (n=1)	3.1% (n=12)	8.5% (n=33)	
Single	4.9% (n=19)	27.2% (n=105)	15.8% (n=61)	
Widowed	0.8% (n=3)	3.1% (n=12)	4.4% (n=17)	
living-in	0.3% (n=1)	1% (n=4)	2.6% (n=10)	
Educational level				
Basic/primary	0.5% (n=2)	5.4% (n=21)	7.3% (n=28)	5.768 (0.450)
Secondary/technical	3.9% (n=15)	24.1% (n=93)	30.3% (n=117)	
Tertiary	1.3% (n=5)	5.7% (n=22)	4.1% (n=16)	
No formal education	1.0% (n=4)	8.5% (n=33)	7.8% (n=30)	
Occupation of mother				
Farming	2.6% (n=10)	10.9% (n=42)	22.3% (n=86)	28.479 (0.000)
Trading	3.4% (n=13)	25.9% (n=100)	21.5% (n=83)	
Artisan	0% (n=0)	3.6% (n=14)	0.5% (n=2)	
Civil servant	0.5% (n=2)	1.6% (n=6)	2.6% (n=10)	
Unemployed	0.3% (n=1)	1.8% (n=7)	2.6% (n=10)	

cm. Educational level was revealed not to be significantly related to prevalence of malnutrition (chi=5.768; p=0.450) in this study. Mothers with secondary or technical educational backgrounds were found to score the highest (3.9%) with children's MUAC below 11.5 cm whiles 24.1% were also with MUAC 11.5 –12.5 cm. Occupation was statistically significant to the prevalence of malnutrition (chi=28.479; p=0.000). Trading mothers (3.4%) scored the highest occupation with children with MUAC of below 11.5 cm followed by farmers (2.6%). Trading mothers (25.9%) and farmers (10.9%) were also with children with MUAC 11.5-12.5 cm.

Relationship between dietary intake related factors and malnutrition: (**Table 3**) Vitamins were found to be significantly related to malnutrition (chi=13.304; p=0.001). Initiation of breastfeeding after birth did not have any statistical relationship with malnutrition (chi=4.129; p=0.127). Time children were given water was found to be significantly related to malnutrition (chi=24.628; p=0.000). Among children that were given water, 4.9% of those given water within 12-23 months with reason that they want to prevent infections were found with MUAC below 11.5 cm and 33.7% also with MUAC of 11.5 cm. Mothers that breastfed their children up to 6-12 months and 12-23 months (3.1%) were found to have children with MUAC below 11.5 cm whiles 25.1% of mothers that breastfed their children 6-12 months were measured with MUAC 11.5-12.5 cm; and 14.8% were also with children with MUAC measurement of above 12.5 cm.

The kind of food introduced as complementary /weaning food were found to have a positive relationship with malnutrition (chi=37.777; p=0.000). From the table, heavy food was found to score the highest (2.6%) food with children measured with MUAC (below 11.5 cm) followed by porridge (2.3%). Porridge (15%), heavy food (9.1%) and cerelac (8.3%) were found to be introduced to children with MUAC 11.5 cm-12.5 cm. Complementary feeding practices were also found to be associated with malnutrition (chi=23.486; p=0.000). Thus, majority (6%) and 40.9% that were introduced to complementary feeding were measured with MUAC below 11.5 cm and 11.5 cm-12.5 cm respectively.

Relationship between household factors and malnutrition: Table 4 reveals that the number of children in a household have no significant relationship with malnutrition (chi=4.047; p=0.400). The table continued that mothers (4.1%) with children 1-3 have their children with MUAC below 11.5 cm and 27.7% of the mothers with children 1-3 with MUAC of 11.5–12.5 cm. Giving food to the entire family as revealed in **Table 2** was found not to be related to prevalence of PEM (chi=1.477; p=0.478). From the table mothers that were not feeding the entire family was found to form majority (4.1%); and 24.4% of mothers with MUAC below 11.5 cm and also MUAC of 11.5-12.5 cm. From **Table 3**, finding as revealed that majority of mothers that used borehole 2.8% had MUAC below 11.5 cm and 18.9% also had MUAC 11.5 -12.5 cm and pipe 2.3% had their child/children with MUAC below 11.5 cm and 13.7% also had MUAC 11.5-12.5 cm. The study however did not find any statistical significance (chi=0.640; p=0.996) between source of domestic water and malnutrition. The table continued that the person that decide the type of food have significant association with malnutrition (chi=24.436; p=0.000). From the table decision from mothers on the kind of food to be given to a child scored the highest as majority (5.7% and 37.6%) had children

Table 3: Dietary Intake Factors (Source: field data, 2014).

MUAC				Chi square(p-value)
Dietary Intake Related Factors	**Below 11.5 cm**	**11.5-12.5 cm**	**Above 12.5 cm**	
Has the child received vitamin?				
Yes	5.5% (n=21)	39% (n=152)	37% (n=142)	13.304 (0.001)
No	1.3% (n=5)	4.4% (n=17)	12.2% (n=47)	
Time Breastfeeding Started				
After delivery	3.9% (n=15)	30% (n=118)	29.8% (n=115)	4.129 (0.127)
6 hours after birth	2.8% (n=11)	13% (n=51)	19.7% (n=76)	
Time First Water was initiated				
<6 months	0% (n=0)	0% (n=0)	2.3% (n=9)	24.628 (0.000)
6-12 months	1.8% (n=7)	10.1% (n=39)	14% (n=54)	
12-23 months	4.9% (n=19)	33.7% (n=130)	30.3% (n=117)	
above 23 months	0% (n=0)	0% (n=0)	2.8% (n=11)	
How long did you breastfeed your child?				
Still breastfeeding	0.3% (n=1)	0% (n=0)	1.8% (n=7)	25.456 (0.000)
<6 months	0.3% (n=1)	3.9% (n=15)	8% (n=31)	
6-12 months	3.1% (n=12)	25.1% (n=97)	17.1% (n=66)	
12-23 months	3.1% (n=12)	14.8% (n=57)	22.5% (n=87)	
Have you weaned your child?				
Yes	5.7% (n=22)	39.4% (n=152)	45.6% (n=176)	1.726 (0.422)
No	1% (n=4)	4.4% (n=17)	3.9% (n=15)	
Kind of food introduced at weaning				
Tom brown	0.3% (n=1)	4.4% (n=17)	6% (n=23)	37.777 (0.000)
Weanimix	0.3% (n=1)	1.8% (n=7)	7% (n=27)	
Lactogen	0% (n=0)	0.8% (n=3)	0% (n=0)	
Porridge	2.3% (n=9)	15% (n=58)	10.9% (n=42)	
Cerelac	0.3% (n=1)	8.3% (n=32)	4.7% (n=18)	
Heavy food (banku, Fufu, rice & Ampesi)	2.6% (n=10)	9.1% (n=35)	17.1% (n=66)	
Have you started complementary Feeding?				
Yes	6% (n=23)	40.9% (n=158)	37% (n=143)	23.486 (0.000)
No	0.8% (n=3)	2.8% (n=11)	12.4% (n=48)	

with MUAC below 11.5 cm and 11.5-12.5 cm respectively. From the table majority (4.4% and 34.5%) of households that forbid certain kind of food were found to have MUAC below 11.5 cm and 11.5-12.5 cm. Thus forbidden foods were found to have statistical significance with malnutrition (chi=12.306; p=0.002). Children that were found (5.4%) not fetching their own water were measured with MUAC below 11.5 cm and that of 11.5-12.5 cm (34.5%). However, there was a relationship between children fetching their own water and malnutrition (chi=6.499; p=0.039).

Relationship between environmental related factors and malnutrition: Table 5 depicts that majority (4.4% and 26.9%) of mothers that did not have toilet in their houses had children with MUAC below 11.5 cm and 11.5 cm-12.5 cm respectively. The finding did not however find any significance between presence of toilet in homes and malnutrition. From the same table, 3.6% of the mothers that defecate at the public toilet and 1.3% that defecated in the bush were all found to have MUAC below 11.5 cm. The same table also found 20.5% of mothers defecating in Public toilet and 4.4% of mothers defecating in bushes with children of MUAC 11.5-12.5 cm. Place of defecating was however found to be associated with malnutrition (chi=19.414; p=0.013). Meanwhile defecating place for children under five was found not to have statistical influence on malnutrition (chi=8.895; p=0.180). Closeness of toilet to the kitchen was found to be associated with malnutrition prevalence (chi=10.039; p=0.007). From the table hygienic nature of the environs of water sources was found to be statistically related to prevalence of malnutrition. From the table, results shows that 2.6% of mothers that were found with unhygienic environs of the source of water were found to have children with MUAC below 11.5 cm whiles, 28.8% also had children with MUAC of 11.5–12.5 cm. From the same table, though 6.2% mothers that were found washing their hands before feeding were found to have children with MUAC below 11.5 in addition to 37.6% with MUAC of 11.5 to 12.5 cm. Meanwhile hand washing before feeding was found to be associated with prevalence of malnutrition (chi=6.189; p=0.045). Storing place of cooked food were also found to be significantly related to malnutrition among children under five (chi=44.453; p=0.000). From the table, 6.2% of mothers that were found keeping their cooked food in cooking pots were found with children with MUAC below 11.5 cm and 41.7% mothers also with children with MUAC of 11.5 to 12.5

Table 4: Household Related Factors, (Source: field data, 2014).

Household Factors	MUAC Measurement			Chi-square (p-value)
	Below 11.5 cm	11.5-12.5 cm	Above 12.5 cm	
Number of Children				
1-3 children	4.1% (n=16)	27.7% (n=107)	26.9% (n=104)	4.047 (0.400)
4-6 children	1.6% (n=6)	10.1% (n=39)	15.8% (n=61)	
Above 6 children	1% (n=4)	6% (n=23)	6.7% (n=26)	
Do you give food that entire family?				
Yes	2.6% (n=10)	19.4% (n=75)	18.9% (n=73)	1.477 (0.478)
No	4.1% (n=16)	24.4% (n=94)	30.6% (n=118)	
Place for obtaining domestic water				
Borehole	2.8% (n=11)	18.9% (n=73)	22% (n=85)	0.64 (0.996)
Pipe	2.3% (n=9)	13.7% (n=53)	14.8% (n=57)	
Well	0.8% (n=3)	7% (n=27)	7.8% (n=30)	
Stream	0.8% (n=3)	4.1% (n=16)	4.9% (n=19)	
Who decide food to be given to the child?				
Mother	5.7% (n=22)	37.6% (n=145)	40.2% (n=155)	24.436 (0.000)
Family Member	0.3% (n=1)	0.8% (n=3)	7.0% (n=27)	
Father	0.8% (n=3)	5.4% (n=21)	2.3% (n=9)	
Do the household forbid certain food?				
Yes	4.4% (n=17)	34.5% (n=133)	30.6% (n=118)	12.306 (0.002)
No	2.3% (n=9)	9.3% (n=36)	18.9% (n=73)	
Do children under five fetch their own water?				
Yes	1.3% (n=5)	9.3% (n=36)	16.1% (n=62)	6.499 (0.039)
No	5.4% (n=21)	34.5% (n=133)	33.4% (n=129)	

cm. Access to healthcare was found to be statistically significant to prevalence of malnutrition (chi=23.517; p=0.000). From the table, 1.3% mothers and 4.4% mothers that did not have access to CWC were found to have children with MUAC below 11.5 cm and that of 11.5 to 12.5 cm respectively. Child immunization was however found not to be statistically significant to prevalence of malnutrition (chi =4.170; p =0.124). Meanwhile, 2.8% of mothers that were found with children not immunized had their children's MUAC below 11.5 cm and 12.7% also with children with MUAC 11.5 to 12.5 cm.

Discussion

Prevalence rate of malnutrition

The world is now suffering from high prevalent of malnutrition and remains one of the major causes of under five mortality. In view of this, this study sought to determine the prevalent rate of PEM among children less than five years. At the end of the study, finding came out that 6.7% of the under five children at Ahafo Ano North district were severely malnurished (PEM), 43.8% mildly or moderately malnourished and the remaining 49.5% also found to be normal. This finding is indifferent from findings by Amponsah & Apenkwa [9] which found malnutrition to be prevalent at Ahafo Ano South District. Their study did not however used the MUAC measurement in determining the malnutrition prevalence. This finding indicates high prevalent of malnutrition in the district which needs prompt attention. Finding continued that among children that were severely malnourished, male counterparts formed majority (4.7%) as compared to their female counterpart with a percentage of 2.1. The severity of malnutrition among male counterparts could be as a case of activities carried out by the male counterparts when they are crawling. It can also be due to the time mothers spend on their female counterparts as compared to the male counterparts. This study is consistent to the study by Al-Mekhlafi et al. [10] which found high prevalence of malnutrition among males as compared to their female counterparts. Hamidu & Hamma [11] indicated in their studies conducted in Northern region of Nigeria that Marasmus was also found to be more common among children of the ages between 6 and 12 months while kwashiorkor and marasmic-kwashiorkor were highest between the ages of 13 to 18 months and 19 to 24 months, respectively. With regards to age category, 1-4 years children formed majority (28%) of children that were mildly malnurished as compared to 1-11 months children (15.5%). On the same age group 1-4 years children scored the highest mark among children with severe malnutrition (PEM) with a percentage of 6.3% as compared to 0.5% among children with age 1-11 months. Children 1-4 years can be said to be mostly mildly or severely malnurished due to the care mothers give to children 1-11 months. This means that the result is in one way or the other consistent to the study by Hamidu & Hamma [11]. However, this study did not found the relationship between kwashiorkor and Marasmic Kwashiorkor.

Relationship between socio-economic status and malnutrition

In a study by Nabag, Elfaki & Ahmed [12] finding revealed that several risk factors were found to be associated with malnutrition including, low education level of the mother, number of children

Table 5: Environmental related factors (Source: field data, 2014).

MUAC				
Environmental Related Factors	**Below 11.5 cm**	**11.5-12.5 cm**	**Above 12.5 cm**	**Chi square (p-value)**
Do you have toilet in your house				
Yes	2.3% (n=9)	16.8% (n=65)	14.8% (n=57)	2.976 (0.226)
No	4.4% (n=17)	26.9% (n=104)	34.7% (n=134)	
Where do you defecate				
Public Toilet	3.6% (n=14)	20.5% (n=79)	23.3% (n=90)	19.414 (0.013)
Free range	0.3% (n=1)	3.1% (n=12)	5.2% (n=20)	
Rap & throw	0% (n=0)	0.8% (n=3)	0% (n=0)	
Bush	1.3% (n=5)	4.4% (n=17)	10.6% (n=41)	
Where does your child/children defecate				
Pampers	0.8% (n=3)	8%(n=31)	7.0% (n=27)	8.895 (0.180)
Chamber pot	4.9% (n=19)	30.6% (n=118)	31.1% (n=120)	
Public Toilet	0.5% (n=2)	1.8% (n=7)	4.4% (n=17)	
Open Space	0.5% (n=2)	3.4% (n=13)	7.0% (n=27)	
Is the toilet closer to the kitchen				
Yes	2.8% (n=11)	7.3% (n=28)	8.8% (n=34)	10.039 (0.007)
No	3.9% (n=15)	36.5% (n=141)	40.7% (n=157)	
How hygienic is the environs				
Very hygienic	1.6% (n=6)	3.4%(n=13)	14.2% (n=55)	58.431 (0.000)
Hygienic	2.6% (n=10)	11.7% (n=45)	21.8% (n=84)	
Not hygienic	2.6% (n=10)	28.8% (n=111)	13.5% (n=52)	
Do you wash your hand before feeding?				
Yes	6.2% (n=24)	37.6% (n=145)	38.3% (n=148)	6.189 (0.045)
No	0.5% (n=2)	6.2% (n=24)	11.1% (n=43)	
How do you store cooked food?				
In cooking pot	6.2% (n=24)	41.7% (n=161)	36.5% (n=141)	44.453 (0.000)
Bowl	0.5% (n=2)	0.5% (n=2)	3.1% (n=12)	
Fridge	0% (n=0)	0% (n=0)	7.5% (n=29)	
Flask	0% (n=0)	0% (n=0)	2.3% (n=9)	
Are you able to access CWC				
Yes	5.4% (n=21)	39.4%(n=152)	34.2% (n=132)	23.517 (0.000)
No	1.3% (n=5)	1.3% (n=5)	15.3% (n=59)	
Has the child received all immunizations				
Yes	3.9% (n=15)	31.1% (n=120)	37.6% (n=145)	4.17 (0.124)
No	2.8% (n=11)	12.7% (n=49)	11.9% (n=46)	

in the family, and age of the child. About 39.1% of the respondent had 5-6 children, 74.2% of the respondent had 1-2 children in family less than 5 years. The higher the families size with the younger ages, the more vulnerable to have PEM than those of older age. Age of the mother was found significantly related to malnutrition (chi=32.188; p=0.000). From the study, mothers with age category of 15-20 years had more children experiencing severe malnutrition or PEM (3.6%) than 2.2% mothers aged 21-25 years (2.2%). At the same category of age (15-20 years), 18.9% had children with mildly or moderate malnutrition. Age category was found to be associated with malnutrition due to lack of knowledge among mothers on proper feeding practices. Marital status was statistically found to be associated with malnutrition prevalence (chi=44.303; p=0.000). Thus, the study came out that 4.9% of the mothers were single with severe malnourished (PEM) children and also 27.2% single mother's also having children with mild or moderate malnutrition. This finding means that children with single parents are mostly malnourished. This is because single mothers without job are incapable of taking good care of their children. Educational level was however revealed not to be related to prevalence of malnutrition (chi=5.768; p=0.450) which is found to be interesting. The study further came out that mothers with Senior or technical educational levels were found to score the highest (3.9%) with children suffering from severe malnutrition (PEM) whiles 24.1% were also having children suffering from mild malnutrition. The current finding is inconsistent with the study by Akorede & Abiola [13] which revealed mothers' education do affected the health status of the children; 81.8% of the mothers with no education did not give colostrum to their children, 16.7% of the mothers exclusively breastfed and majority (60.0%) of those that did not exclusively breastfeed had little or no education. This means that one's educational background cannot have direct impact on children. Literally, mothers with higher educational background can

be said to have a negative associated with malnutrition in the sense that they have good occupation, knowledge and income which are perceive to be linked with malnutrition. Occupation was statistically significant to the prevalence of Malnutrition (chi=28.479; p=0.000). Thus, traders (3.4%) scored the highest occupation with children suffering from severe malnutrition and moderate types (25.9%) followed by farmers with 2.6% and 10.9% respectively. This finding is consistent to the finding by UNICEF [14] which found mothers occupation precisely unemployment to be associated with malnutrition among children under five. Trading was the major occupation related to malnutrition due to the absence of mothers during their trading days. Thus, they either leave the children at home for trade or go with them to trade without giving the children enough attention due to the nature of the job.

Relationship between nutritional related factors and malnutrition

Vitamins were found to be significantly related to malnutrition (chi=13.304; p=0.001). The current finding is similar to the finding by Kimati & Scrimashaw [15] which revealed lack of vitamin A as a major contributing factor of malnutrition. This means that malnutrition is related to malnutrition. Time at which breastfeeding started did not have any statistical relationship with malnutrition (chi=4.129; p=0.127). This means that the time a child is given breast milk at birth does not have any implication on the child with regards to malnutrition. Initiation time of water was found to be significantly related to malnutrition (chi=24.628; p=0.000). This finding is close to the finding by Jelliffe & Jelliffe [16] which revealed breast milk as an influential factor of malnutrition. Among children that were given water, 4.9% of those given water within 12-23 months were found to be severely malnourished (MUAC below 11.5 cm) and 33.7% also with moderate or mild malnutrition (MUAC 11.5 to 12.5 cm). This finding is similar to the finding by Senbanjo, et al. [17] which revealed initiation of water at the early stage of childhood to be associated with malnutrition. This finding indicates that giving water to children early can be associated with the high prevalence of malnutrition. This can be due to the unhygienic nature of water given to children or the water filling the small stomach of the child preventing him/her from eating. Water may contain pathogens that needs to be treated before the water is given to the children. Mothers that breastfed their children between 6-12 months and 12-23 months (3.1%) were found to be severely malnourished (MUAC below 11.5 cm) where as 25.1% of mothers that breastfed their children 6-12 months were with moderate or mildly malnourished children and 14.8% were also with children with moderate or mild malnourished children (MUAC 11.5 cm–12.5 cm). This finding means that the duration of breastfeeding is associated with prevalence of malnutrition. This is because, breast milk contains nutrients that build up child immunity to help fight against diseases and infections. And so therefore children who are not breastfed or breastfed up to the required age (24 months) are likely to be predisposed to infections and diseases which may trigger malnutrition. The kind of food introduced as complementary/weaning food were found to have a positive relationship with Malnutrition (chi=37.777; p=0.000). From the study, heavy food was found to score the highest (2.6%) food with children that were severely malnourished (MUAC below 11.5 cm), followed by porridge (2.3%). The finding is similar to the finding by Jelliffe & Jelliffe [16] which revealed the kind of food introduce as weaning to be related to malnutrition. This means that heavy food at the early stages of childhood feeding practices is not good. This is because at this stage, the intestines of children are not well developed to be able to absorb heavy food. Moreover, most of these heavy foods are not prepared under hygienic conditions “full of pathogens that are likely to predispose children to infectious diseases”. Porridge (15%), heavy food (9.1%) and cerelac (8.3%) were found to be introduced to children with moderate or mild malnutrition (MUAC 11.5 cm-12.5 cm). Complementary feeding practices were also found to be associated with malnutrition (chi=23.486; p=0.000). Thus, majority (6%) that were introduced to complementary feeding when measured were severe malnutrition (MUAC below 11.5 cm) and that of moderate or mild malnutrition, 40.9%, (MUAC 11.5 cm-12.5 cm). This study is related to findings by Muoki [16] which revealed that infected water and food are the main contributors of malnutrition. Porridge and cerelac were mostly found to be associated with malnutrition due to storage and also water used in preparing the cerelac. For example the processing of ingredients for the preparation for porridge is not done under hygienic conditions. Moreover, feeding bottles used in storing porridge are sometimes not in good condition “not hygienic”. The cost of buying cerelac is high and so parents may be tempted to alter the measurements to make the content last longer. This can also lead to the child being under fed with adequate nutrients.

Relationship between household factors and malnutrition

On the relationship between household factors and malnutrition, findings from this study revealed that the number of children in a household have no significant relationship with malnutrition (chi=4.047; p=0.400). The study continued that mothers (4.1%) having 1-3 children had the highest cases of severe malnutrition (MUAC below 11.5 cm) and 27.7% moderate malnutrition (MUAC 11.5 cm-12.5 cm). This finding is indifferent to findings by Akorede & Abiola [13] which revealed size of household to be related to the high prevalence of malnutrition. Number of children in a household was not found to be associated with malnutrition due to the occupational status of mothers. Given food to the entire family as revealed in the study did not relate to prevalence of malnutrition (chi=1.477; p=0.478). Thus from the study, mothers that were not feeding the entire family were found to form majority (4.1%) of mothers with severe malnutrition (MUAC below 11.5 cm) and also and 24.4% for moderate or mild malnutrition (MUAC 11.5 cm-12.5 cm). Finding revealed that majority of mothers that used borehole (2.8%) and pipe (2.3%) had their children becoming severe malnutrition (MUAC below 11.5 cm) and moderate malnutrition, 18.9% and 13.7% respectively (MUAC 11.5 cm-12.5 cm). The study however did not find any statistical significance (chi=0.640; p=0.996) between source of domestic water and malnutrition. This finding is consistent with the finding by Senbanjo et al. [18] who also

found no association between the source of drinking water or social class and malnutrition. Source of drinking water did not influence malnutrition because most of this pipe water is well treated. It is however interesting that mothers relying on pipes and boreholes still have children with malnutrition. The study continued that the person that decide the type of food have significant association with malnutrition (chi=24.436; p=0.000). From the study, decision from mothers on the kind of food to be given to a child scored the highest as majority (5.7%) had children with severe malnutrition (MUAC below 11.5 cm) and moderate/mild malnutrition (37.6%) (MUAC 11.5 cm-12.5 cm). This finding means that there is a greater influence of decision making on kind of food to be given to children under two and malnutrition. We are however surprise that mothers who decide what which foods are to be given to their children have their children malnourished. This finding is consistent with the finding by UNICEF [14] which revealed household decision to have influence on child's nutritional status. Finding also came out that majority (4.4%) of households that forbid certain kind of food were having children with severe malnutrition (MUAC below 11.5 cm) and moderate or mild malnutrition (34.5%) (MUAC 11.5 cm-12.5 cm). Thus forbidden foods were found to have statistical significance with malnutrition (chi=12.306; p=0.002). This finding indicates the influence of forbidden foods on nutritional status of children under five. This is because most of the forbidden foods spelt out by mothers were found to be food with nutritious content required for child's growth (state few examples). There was a relationship between children fetching their own water and malnutrition (chi=6.499; p=0.039). This means that children that fetch their own water are likely to be predisposed to infections that are capable of contributing malnutrition.

Relationship between environmental related factors and malnutrition

From the study, majority (4.4%) of mothers that did not have toilet in their house had children with MUAC below 11.5 cm and 11.5 cm – 12.5 cm (and 26.9%). The finding did not however find any significance between presence of toilet in homes and malnutrition. This means that absence of toilet facility do not have any negative implications on children under five years. From the same study, 3.6% of the mothers that defecate at the public toilet and 1.3% that defecated in the bush were all found to have MUAC below 11.5 cm. The same study found 20.5% of mothers defecating in Public toilet and 4.4% of mothers defecating in bushes with children of MUAC 11.5-12.5 cm. Place of defecating was however found to be associated with malnutrition (chi=19.414; p=0.013). The finding of this current study is consistent to the finding by Abate et al. (2001) which found households with child waste inside the house to have 7.5 times greater chance of experiencing malnutrition than those that had a clean environment within the house or ten metres from the home. This means that defeacating around by parents are likely to influence the spread of infections, which may result in malnutrition. Meanwhile defecating place for children under five was found not to have statistical influence on malnutrition (chi=8.895; p=0.180). Closeness of toilet to the kitchen was found to be associated with malnutrition prevalence (chi=10.039; p=0.007). Finding is similar to the finding by Amponsah et al. [9] which revealed closeness of toilet to kitchen to be a contributing factor of malnutrition (p=0.001). This means that every household whose toilets were found to be closer to the kitchen can be directly linked to the cause of child's nutritional status. This is because, flies were observed to be moving from the toilet facilities to stand on food thereby releasing pathogens into the food and others. From the study, the hygienic nature of the environs of water source was found to be statistically related to prevalence of malnutrition. Thus, results showed that 2.6% of mothers that were found with unhygienic environs of the source of water were found to have children with MUAC below 11.5 cm whiles, 28.8% also had children with MUAC of 11.5 – 12.5 cm. The current finding is similar to the finding by Maxwell et al. [20] which revealed unhygienic source of water as a major contributing factor of malnutrition. Water source that were found unhygienic were associated with malnutrition due to the pathogens that are found in the water. This sometimes contributes to diarrheoa, cholera or malaria among children under five. Though, 6.2% mothers that were found washing their hands before feeding were found to have children with MUAC below 11.5 cm, and 37.6% with MUAC of 11.5 to 12.5 cm, hand washing before feeding was found to be associated with prevalence of malnutrition (chi=6.189; p=0.045). The current finding is indifferent from the study by Abate et al. [19] which found unwashed hands to be at 2.5 times more likely to be linked to malnutrition and in 29.7% of households hands are washed before feeding. This finding means that mothers were not found washing their hands properly before feeding. They only add up pathogens that predisposed children to infectious diseases that were capable of causing malnutrition. Storing place of cooked food were also found to be significantly related to malnutrition among children under five (chi=44.453; p=0.000). Thus, from the study 6.2% of mothers that were found keeping their cooked food in cooking pots were found with children with MUAC below 11.5 cm and 41.7% mothers also with children with MUAC of 11.5 to 12.5 cm. This finding is close to finding by Akorede & Abiola [13] which revealed a positive correlation between infants nutritional status (under-weight) and hygienic practices (food preservation) (r=0.15; p<0.05). The finding means that most of the storage materials like feeding bottles and cooking pots are not hygienic. Access to healthcare was found to be statistically significant to prevalence of malnutrition (chi=23.517; p=0.000). Thus, 1.3% mothers and 4.4% mothers that did not have access to CWC were found to have children with MUAC below 11.5 cm and that of 11.5 to 12.5 cm respectively. This finding is similar to the finding by Mwaniki [21] which found access to healthcare as major contributors of malnutrition. Access to healthcare was found to be associated to malnutrition because CWC activities by health facilities are characterized by prompt detection of malnutrition, treatment or rehabilitation of children with malnutrition. It also means that most of the children did not get access to CWC services or mothers did not show up for CWC services. Child immunization was however found not to be statistically significant to prevalence of malnutrition (chi=4.170; p=0.124). Meanwhile, 2.8% of mothers that were found with children not immunized had their child with MUAC below 11.5

cm and 12.7% also with children with MUAC 11.5 to 12.5 cm. This finding means that majority of children under five were found immunized. It also means that dietary intake and hygienic practices are the major contributors of child's malnutrition.

Conclusion and Recommendation

Conclusion

This study was aimed at determining the dietary intake practices and hygienic practices that predispose children under five at Ahafo Ano North District to Malnutrition. At the end of the study, 6.7% of the under five children at Ahafo Ano North district were found to be severely malnurished, 43.8% mildely or moderately malnurished and the remaining 49.5% normal. On the relationship between diatary intake and malnutrition, vitamins, initiation time of water, kind of food introduced during weaning were all found to be significantly related to malnutrition. On the relationship between household factors and malnutrition, size of children per household was found to have no significant relationship with malnutrition. Finding however showed a significant relationship between mothers decision child feeding, forbidden foods and fetching of water by children and malnutrition. On socio-economic status of mother's relationship with malnutrition, mothers occupation, age, marital status and religion were all found to be associated with malnutrition. From the study, environmental factors such as defecating place of the household, closeness of toilet to the kitchen, washing of hands by mothers before feeding, storing place of cooked food, access to healthcare (CWC) and unhygienic nature of the environment were found to be related to malnutrition.

Recommendation

1. The District Health Directorate should educate mothers/caregivers on appropriate feeding practices needed to improve child's growth in order to promote children's nutritional status.
2. Mother's/caregivers should inculcate the habit of practicing exclusive breastfeeding in order to reduce prevalence rate of malnutrition among children under five years of age living within the district.
3. Domestic water should be treated well by mothers or caregivers in order to help deal away pathogens that are found in water which in one way the order leads to infectious diseases.
4. Traditional leaders, family heads and mothers/caregivers should eschew traditions surrounding food intake in order to help improve the nutritional status of children under five years of age.
5. Mothers/caregivers should make frequent use of CWC in order to help reduce infectious diseases that predispose children under five years of age to malnutrition.

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