NUTRITIONAL STATUS OF SCHOOL-AGE CHILDREN IN THE NKWANTA SOUTH DISTRICT - VOLTA REGION OF GHANA

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Abstract

Background: Childhood malnutrition is still a public health concern affecting both children and adolescents in Ghana. However, school-age children are not always included in national surveys. This study explored the prevalence of malnutrition among school-age children in the Nkwanta South District, of the Volta Region, Ghana.

Methods: The study was cross-sectional in design involving school-age children aged 10-19 years in public basic schools in the district. A multistage sampling technique was used to select 650 respondents from schools on feeding programme and schools not on feeding programme. An anthropometric measurement of weight and height was measured by standard methods. Prevalence of overweight, thinness, and stunting was determined by WHO Z-scores criteria and cut offs points for school-age children.EpiInfo version 7 and Stata version 11 were used to enter and analyze data.

Results: Three hundred and forty-seven (53.4%) of the sampled students/respondents were females. Respondents had a mean age of 13.4 years. Prevalence of overweight was 6.9%, stunting 50.3% and thinness 19.4%. Prevalence of stunting and thinness was higher among children in schools on feeding programme, while overweight was higher among children in schools not on feeding programme. Area of residence, community type, taboos/beliefs, sex, age, type of school, feeding programme, and some sub-districts were found to be associated with overweight, stunting and thinness.

Conclusions: malnutrition rates in this study are higher than national averages for children under five years of age. Interventions such as public awareness and education on child and adolescent nutrition in the district, inclusion of adolescent nutrition in national surveys are recommended.

Keywords: School-age Children; Stunting; Thinness; Overweight, Malnutrition

Introduction

Malnutrition is a nutritional disorder which occurs in people and can destroy once health. It is caused by a lack or surplus or imbalance of nutrients in the body (Hasan & Zulkifle, 2010). Undernutrition includes stunting, wasting and underweight is a consequence of consuming too few essential nutrients or using or excreting them more rapidly than they can be replaced.Overnutrition which includes overweight and obesity resultsfromeatingtoomuch,eatingtoomanyofthewrongthings,notexercisingenough,ortakingtoomanyvitaminsorotherdietaryreplacements. Genetics has also been implicated in overnutrition.

About 8%, 26% and 16% of children worldwide suffer from wasting, stunting and underweight respectively while the prevalence is about 10%, 38% and 23% for developing countries and 9%, 28% and 14% in Ghana (UNICEF, 2013). At the same time, prevalence of overweight and obesity are rising rapidly with an estimated 10% of school-age children carrying excess body fat (Cole, Bellizzi, Flegal, & Dietz, 2000; Lobstein, Baur, & Uauy, 2004). The 2008 Ghana Demographic and Health survey estimated the prevalence of childhood malnutrition (stunting, wasting and underweight) to be declining from 35% in 2003 to 28% in 2008, 14% in 1993 to 9 percent in 2008, and 23% in 1993 to 14% in 2008 respectively.

In developing countries such as Ghana, malnutrition is seen as undernutrition though the issue of overweight is rising (Cole, Flegal, Nicholls, & Jackson, 2007) resulting in what is called double burden of malnutrition. The prevalence of overweight has increased steadily in Ghana over the past 20 years from less than 1% in 1988 to 5% in 2008 as it has been for global and Africa trends (GSS,GHS & Macro, 2009).

Maluccio et al, (2006); Srivastava, Mahmood, Srivastava, Shrotriya, & Kumar, (2012) and Mekonnen, Tadesse, & Kisi, (2013) enumerate the unbearable effects of malnutrition to include but are not limited to stunted growth, poor academic performance, lowered educational levels and inability to perform job function, weakens the immune system among others. These have been described as being the most detrimental factors responsible for poverty (Van de Poel et al., 2007; (Payandeh, Saki, Safarian, Tabesh, & Siadat, 2013). According to a nutrition report published byUthman, (2009) and UNICEF (2013), malnutrition in developing countries has been connected to a considerable increase in the risk of morbidity and mortality. Indeed, the penalties of malnutrition are frequently expanded not only into later life but into future generation as well (Lobstein et al., 2004; Mundial, 2005). It affects the countries prospects for development because it imposes

significant economic cost on individuals and the nation as malnourished children need more extreme care from their parents and caregivers.

Given the above-stated direct and collateral consequences of malnutrition, monitoring and reducing its prevalence is important (Caulfield, de Onis, Blössner, & Black, 2004). Nutritional surveys and care, or suitable nutritional intercession programmes in a community can be established based on the frequency of malnutrition among school-age children in the area (Sunguya, Koola, Atkinson, & Sunguya, 2006).

The nutrition indicators from Ghana's national surveys (Multiple Indicator Cluster Surveys, and Demographic and Health Surveys) do not include that of school-age children (GSS, GHS & Macro, 2009). In the studied district, prevalence of underweight and stunted has been 11% and 15% in the past years and is currently 7.8% and 11.2% respectively. This is far less the national prevalence of underweight and stunting (Nkwanta South District Health Report, 2012). This offers quick notion that there are not much problems with malnutrition in the district and it is quite misleading as records from the district hospital (17.2% stunting, 9.3% wasted and 12.9% underweight of all under fives admissions) indicates that the level might be higher than what has been portrayed (Nkwanta South District Hospital Report, 2012).According to the District annual reports, (2012), the district noted that even though school health programme were in place, there was not enough data on the nutritional status of these school-age children.However, children at this stage in life need good nutrition for proper psychosocial development and malnutrition affects their ability to attend school regularly, stay at school, concentrate during teaching and learning, and to performed well.

Motivated by the urgent need to bridge the data gap, this study assessed the prevalence of malnutrition among school-age children in the Nkwanta South District of Volta Region. This study will help intensifyefforts to increase public awareness and education on childhood and adolescent malnutrition.

Methods

The study was a cross-sectional in design, and assessed the nutritional status of public basic school children aged between 10 and 19 years, took place from June 2014 to July 2014.

The district is located in the north-eastern part of the Volta region which is one of the 25 administrative districts in the region. It has an estimated population of about 129,357 based on the 2010 population census, and with a growth rate of 3.9% and a land mass of 389 sq km with 216 communities. The district is in a transitional zone lying between the northern Savanna and the forest zones. The major food and cash crops cultivated in

the area are; Yam, Maize, Cassava, Groundnuts, Cocoyam, Plantain, fruits, vegetables and Cocoa. Livestock such as Goats, Sheep, fowls as well as fisheries are rear in the area. The major food production season in the area is between the months of August and January with the peak of the lean season being April to June each year.

The outcome variables of the study wereoverweight, thinness and stunting, and the predictor variables were; age, sex, area of residence, type of community, school type, feeding programme, occupation, and beliefs/taboos.

The sample size for the study was 650. This was determined using the formula: $n = z^2 \times p(q) \div d^2$, where **n** was the desired sample size, **z(1.96)** was the standard normal deviate, **p(0.28)** was the proportion of outcome variable of interest in the target population, **q(0.72)** was **1.0 – p**, and **d(0.05)** was degree of accuracy desired.With the national prevalence of stunting (28%) being the highest among all the indicators, the calculation was based on stunting figure with confidence level of 95%.With the extra uncertainty about the true prevalence of stunting due to a cluster sample survey design, design effect was considered in the sample size calculation. Therefore, the sample size became n × design effect (which was 2 in this case). Also, a 5% non-response rate was factored in the calculations and the sample size was upwardly adjusted and rounded to 650 participants.. This was to ensures, with probability of 95% that, the estimated prevalence falls within ±5% of the true population prevalence.

Multi-stage sampling method was used to select the 650 respondents. The district was stratified into four sub-districts. A sample size was proportionately allocated to each stratum based on number of school-age children. For each stratum, two schools each for feeding and non-feeding were randomly selected. Based on the sample size calculated for each stratum and the total population of school-age children for each school, proportionate allocation was used to select number of pupils per school. Based on the sample size per school, proportionate allocation was used again to determine the number of pupils per class. In each class, those within the ages of 10 and 19 years were identified and balloting (YES or NO) was then used to randomly select the require respondents for the study. Pupils who picked YES were interviewed with their parents and have their anthropometric measurements taken.

The selected children completed a quantitative questionnaire on demography, socioeconomic and educational characteristics. Additionally, care givers of sampled children were interview on background and demographic characteristics influencing childhood malnutrition in the district. Trained data collectors administered the questions to the selected respondents and their care-takers on one-on-one basis, and away from other people to avoid interference and destruction of attention, as well as to ensure

confidentiality. The school children were interviewed first and separated from care-takers.Their responses were recorded on the question sheet.

Weight was measured with respondents not wearing shoes and heavy clothing except their school uniforms. Each school child was made to stand on the scale without holding onto any support with feet closed, hands by the sides and head in a forward position. The measurements were taken to the nearest 0.1kg by means of a UNICEF electronic scale manufactured by SECA. Scale was calibrated with a known weight before starting each day's work and was repeated after weighing every five pupils.

Height was taken with respondents not wearing footwear, head gears or hats. Each pupil stood with back against a wall, heels together and in line with the buttocks, shoulders and head, with a horizontal line of sight to the respondent. Readings were taken to the nearest 0.1cm using a wall-mounted microtoise.

Respondents age was assessed using their Birth Certificates. Where certificates were not available, events calendar were used to assess their age or the estimated age was obtained from the children schools records.

Participation in the study conformed to the required ethical guidelines regarding the use of human subjects. The study was reviewed and approved by the Ethical Review Committee of the Ghana Health Services, Research and Development Division, Accra. Participation in the study was voluntary, and consent and assent was sought from the children, the school authorities as well as parent/guardians of the selected children.

Data entry was performed and checked for completeness and consistency using Epi Info version 7. WHO z- score system for adolescents was used to classify the nutritional status of the children according to the cut-off points; overweight: >+1SD (equivalent to BMI 25 kg/m2 at 19 years), Obesity: >+2SD (equivalent to BMI 30 kg/m2 at 19 years), Thinness: <-2SD, Severe thinness: <-3SD and Normal: > -1 to < +1 SD. Stunting: < -2SD, Severe stunting: < -3SD, Tall: >+2SD, Too tall: >+3SD. Severe thinness and thinness were combined into thinness, overweight and obesity were combined into overweight, and tall and too tall were also combined into tall, while stunting and severe stunting were combined into stunting. Data then transferred to Stataversion 11 (StatCorp, college Station, Texas, USA) for analysis. Descriptive statistics including percentages, mode and cross-tabulation were calculated and presented in tables. Beyond descriptive statistics, Pearson Chi-square test was used to examine the associations between each outcome variable and the background and demographic factors. Multiple logistic regression analysis was used to assess strength of associations between the outcome variables and explanatory variables. P-value < 0.05 was considered as statistical significant.

Results

A total of 650 adolescents participated in the study, out of these, 46.6% were boys and 53.4% were girls. The ages of the pupil were categorized into three groups: 10 -13 years (Early Adolescent), 14 – 16 years (Middle Adolescent) and 17 – 19 years (Late Adolescent). More than half (52.9%) of the pupil were in their early adolescent, followed by those in the middle adolescent with 37.7%, while the rest (9.4%) were in late adolescent stage. The mean age of the children was 13.4 years and ± 2.2 standard deviation. Majority (81.4%) of the children were from rural areas. The most practiced religion was the Christianity (84.2%). A little below half (48.6%) of the adolescents were Komkomba and the rest from ethnically diverse backgrounds: Akan, Ewe, Ga, Ntrobo and Adele. Over three-quarters (76.3%) of the pupil have no beliefs or taboos that prevent them from eating certain foods. Only 4.3% of the study population came from a fishing community, while the rest (95.7%) were from farming community. All of the 650 pupil were from public mixed (boys and girls) schools. Out of the 650 pupil, 470 (72.3%) were in primary school and 180 (27.7%) were in Junior high school. For those who were in primary school, surprisingly, 36.2% of them were found to be in lower primary (class 1-3) with the remaining (63.8%) in upper primary (class 4-6). Out of the 180 pupil in the Junior High School (JHS), 37.2%, 42.8% and 20.0% were in JHS 1, JHS 2 and JHS 3 respectively. Out of the 470 who were in the primary school, 42.6% were in schools with feeding programme, while the rest 57.4% were in schools with no feeding programme (Table 1).

Table 1: Background and demographic profile of the pupil

Attribute		Frequency (N=650)	%
Subdistrict	Nkwanta	244	37.5
	Tutupkene	130	20.0
	Brewaniase	92	14.2
	Bonakye	184	28.3
Sex of Pupil	Male	303	46.6
	Female	347	53.4
Age of Pupil	Early adolescent (10 – 13yrs)	344	52.9
	Middle adolescent (14 – 16yrs)	245	37.7
	Late adolescent (17 – 19yrs)	61	9.4
Area of residence	Rural	529	81.4
	Urban	121	18.6
Community type	Fishing Community	28	4.3
	Farming Community	622	95.7
Religion	None	11	1.7
	Christianity	547	84.2
	Islam	55	8.5
	Traditional	37	5.7
Ethnicity	Akan	158	24.3

	Ewe	117	18.0
	Ga	1	0.2
	Komkomba	316	48.6
	Ntrobo	26	4.0
	Adele	32	4.9
Taboos/beliefs	Had taboos/beliefs	154	23.7
	Had no taboos/beliefs	496	76.3
Type of school	Primary	470	72.3
	Junior High School(JHS)	180	27.7
Levels in Primary	Class 1-3	170	36.2
	Class 4-6	300	63.8
Levels in JHS in Form	JHS 1	67	37.2
	JHS 2	77	42.8
	JHS 3	36	20.0
School feeding	School feeding	200	30.8
	Non-school feeding	450	69.2

Over fifty percent (50.3%) were found to be stunted in terms of height-for-age z-score (HAZ), while 6.9% and 19.4% were overweight and wasted respectively in terms of body mass index-for-age z-score (BAZ). Some twenty-three (3.5%) out of the 650 were also found to be too tall for their age. In comparing the prevalence among children in schools on feeding programme to children in schools not on feeding programme, it was noticed that prevalence of stunting (63.0%) and thinness (21.5%) was higher among children in schools on feeding programme compared with 44.7% stunting and 18.5% thinness among those in schools not on feeding programme. However, the prevalence of overweight (7.3%) was higher among children in schools not on feeding programme compare with the 6.0% overweight from schools on feeding programme (Table 2).

Table 2: Nutritional status of the pupil

Attribute	**All**	**School feeding**	**Non-school feeding**
	Freq (%)	**Freq (%)**	**Freq (%)**
Height-for-age z-score (HAZ)			
Normal	300 (46.2)	66 (33.0)	234 (52.0)
Tall	23 (3.5)	8 (4.0)	15 (3.3)
Stunted	327 (50.3)	126 (63.0)	201 (44.7)
Total	650 (100.0)	200 (100.0)	450 (100.0)
Body Mass Index-for-age z-score (BAZ)			
Normal	479 (73.7)	145 (72.5)	334 (74.2)
Overweight	45 (6.9)	12 (6.0)	33 (7.3)
Thinness	126 (19.4)	43 (21.5)	83 (18.5)
Total	650 (100.0)	200 (100.0)	450 (100.0)

To explore the associations between overweight, thinness and stunting and predictor variables, Pearson Chi-square for association was used for bivariate analysis. The results showed a significant associations between

overweight and sub-districts (p=0.001), and type of community (fishing or farming) (p=0.002). There was also associations between thinness and sub-district (p= 0.003), and taboos/beliefs (p= 0.021). The findings also showed associations between stunting and sex of pupil (p= 0.001), type of school (p< 0.001), and feeding programme (p< 0.001).

To further examine the strength of associations, multiple logistic regression analysis was done to confirm associations between outcome and the explanatory variables. The analysis did confirmed associations between overweight and type of community, and also indicated that children from farming communities were 86.2% less likely to be associated with overweight than children from fishing communities. However, there was no associations between overweight and sub-districts except Bonakye sub-district. Children from Bonakye sub-district were 6.75 times more likely to be associated with overweight than children from Nkwanta sub-district. The analysis did not confirmed associations between thinness and taboos/beliefs. However, it did confirmed associations between thinness and sub-district. It also reveals significant associations between thinness and age of pupil, and whether the child's household head can read/write or not, these were not shown at the bivariate level of analysis. The associations also indicated that children from Tutupkene, Brewaniase, and Bonakye sub-districts were 54.2%, 46.0%, and 63.8% respectively less likely to be associated with thinness than children from Nkwanta sub-district, children between aged 14 – 16 years and 17 – 19 years were 2.76 times and 2.84 times respectively more likely to be associated than children between aged 10 – 13 years, also children from homes where the household heads cannot read/write were 38.5% less likely to be thin than children from homes where household heads can read/write. Finally, the analysis did confirmed associations between stunting and sex of pupil, type of school, and feeding programme. The associations also indicates that females were 42.0% less likely to be associated with stunting than males, also children from Junior High Schools (JHS) were 59.1% less likely to be associated with stunting than children from primary schools, and children from schools not on feeding programme were 38.3% less likely to be associated with stunting than those in schools on the feeding programme (Table 3).

Table 3: Associations between background characteristics and overweight, thinness and stunting

	OVERWEIGHT				
Attribute	**Not overweight**	**Overweight**	**Pearson Chi-Square**		**OR[1] (95% CI)**
	N=605 (%)	**N=45 (%)**	**Chi-square**	**P-value**	
Sub-district					
Nkwanta	226 (37.4)	18 (40.0)	17.5214	0.001	-
Tutupkene	126 (20.8)	4 (8.9)			2.218 (0.739 - 6.654)

Brewaniase	77 (12.7)	15 (33.3)			0.975 (0.259 – 3.663)
Bonakye	176 (29.1)	8 (17.8)			6.748 (2.333 – 19.517)
Type of community					
Fishing	22 (3.6)	6 (13.3)	9.5544	0.002	-
Farming	583 (96.4)	39 (86.7)			0.138 (0.044 – 0.430)
		THINNESS			
	Not Thin N=524 (%)	**Thin N=126 (%)**			
Sub-district					
Nkwanta	207 (39.5)	37 (29.4)			-
Tutupkene	106 (20.2)	24 (19.0)	13.7545	0.003	0.458 (0.249 – 0.843)
Brewaniase	79 (15.1)	13 (10.3)			0.540 (0.303 – 0.963)
Bonakye	132 (25.2)	52 (41.3)			0.317 (0.155 – 0.649)
Taboos/beliefs					
Have taboos	134 (25.6)	20 (15.9)	5.2858	0.021	-
No taboos	390 (74.4)	106 (84.1)			1.601 (0.928 – 2.760)
Age of pupil (In years)					
10 – 13	275 (52.5)	69 (54.8)			-
14 – 16	194 (37.0)	51 (40.5)	3.9802	0.137	2.758 (1.007 – 7.554)
17 – 19	10 (10.5)	6 (4.7)			2.836 (1.109 – 7.255)
Can HH head read/write					
Can read	183 (34.9)	47 (37.3)	0.2512	0.616	-
Cannot read	341 (65.1)	79 (62.7)			0.615 (0.384 – 0.987)
		STUNTING			
	Not Stunt (N=323) %	**Stunted (N=327) %**			
Sex of pupil					
Male	129 (39.9)	174 (53.2)	11.5034	0.001	-
Female	194 (60.1)	153 (46.8)			0.580 (0.417 – 0.805)
Type of school					
Primary	207 (64.1)	263 (80.4)	21.6708	<0.001	-
JHS	116 (35.9)	64 (19.6)			0.409 (0.250 – 0.669)
School Feeding programme					
On feeding	74 (22.9)	126 (38.5)	18.6161	<0.001	-
Not on feeding	249 (77.1)	201 (61.5)			0.617 (0.413 – 0.921)

Discussion

World Health Organization has recommended various indices based on anthropometry to evaluate the nutritional status of the school aged children and has recognized Body Mass Index (BMI) as the most appropriate variable to assess nutritional status of adolescents (WHO, 1995). Anthropometric examination is appropriate means in any research to evaluate health and nutritional condition in children and the indices does not only directly reflect the socioeconomic status of the family, health and social wellbeing of the population, but also the competence of the health care system, and the influence of the immediate surroundings, and can also predict academic performance (Faber & Wenhold, 2007; Prista, Maia, Damasceno, & Beunen, 2003; Srivastava et al., 2012). Anthropometric data is related to measurement of physical characteristics of the body and can

therefore be collected by both medical and non-medical personnel (Latham, 1997).

The three common anthropometric indicators for assessing nutritional status of children includes height-for-age (stunting), weight-for-age (underweight) and weight-for-height (wasting) (Wamani, \AAstrøm, Peterson, Tumwine, & Tylleskär, 2006). Therefore, the impact on reduction in child mortality can be achieved once consideration is given to all levels of malnutrition through appropriate identification, this identification is only likely if anthropometric measurements are regularly done (Müller & Krawinkel, 2005; Caulfield et al., 2004).

In this present study 19.4% of children were found to be wasted (thin) when Body Mass Index-for-age criteria was used. The prevalence was lower than prevalence of underweight recorded among school children by other studies conducted by (Mekonnen et al., 2013), Bloss, Wainaina, & Bailey (2004) and Kwena et al (2003) as 59.7%, 30.0% and 25.0% respectively. However, the prevalence from this study is higher than prevalence reported among children under 5 by study conducted by GSS, GHS & Macro (2009) as 14.0%. Though, these studies did not include older children up to 19 years. A little difference in the prevalence of thinness among children in the schools on feeding programme and those in schools not on the feeding programme was observed using BMI-for-age criteria, though feeding programme is not associated with thinness in the study. A study by Van Stuijvenberg et al (1999) concluded that fortified foods resulted in a significant improvement in the nutritional status of primary school children from poor rural communities and appeared to have a favourable effect on anthropometric status. This means the children in the non-feeding schools are doing well without the supplementary foods.

This study revealed a stunted prevalence of 50.3% when a height-for-age criterion was used. This prevalence is far higher than what other studies conducted in Kenya by Mekonnen et al (2013) and Kwena et al (2003) as 30.7% and 42.0% respectively. Though, Ghana Demographic and Health Survey (DHS) is of the viewed that prevalence of malnutrition differs from one geographical area to another, the prevalence of stunting in this study is higher compared with what the DHS reported on children under 5 years in the 1998, 2003 and 2008 for both national and regional. The present study also observed an alarming difference in the prevalence of stunting by using Height-for-age criteria among children on school feeding (63.0%) and children not on school feeding (44.7%). Feeding programme is significantly associated with stunting in this study, and children from schools not on feeding programme are 38.3% less possibly to be stunted than those in schools on feeding programme. Indications that those not on school feeding are doing well and needs to be investigated further. This could be that,

parents of children in schools on feeding programme might have reduced the food portion and size at home for these children in the sense that the children would be fed at school, or could be that communities with schools on the feeding programme are having higher nutritional problem and are poorer than communities without feeding programme.

This study revealed a prevalence rate of overweight to be 6.9%. This is comparable to childhood overweight/obesity prevalence rate of 7.6% found by Peltzer & Pengpid (2011) among a sample of children from Ghana and Uganda. However, it waslower than overweight prevalence of 17.0% among children aged 10-16 years in Greece and Italy (Janssen et al., 2005). Also it waslower than prevalence estimates of other countries including Aboriginal families in Australia where 26.8% of children aged 5 - 15 years were overweight (Schultz, 2012) and Saudi Arabia where 29.0% of children aged 5-19 years were overweight (El Mouzan et al., 2010). The adolescent overweight found in this study can be said to be one of the lowest in West Africa. A study conducted among children between 2-18 years in Nigeria reported overweight prevalence of 14.2% (Ene-Obong, Ibeanu, Onuoha, & Ejekwu, 2012). The differences could be due to the different methods used in the classification of weight status of the children as well as the ages of study population. The Nigerian study defined overweight/obesity using the International Obesity Task force cut-off points. The IOTF makes used of BMI-for-age percentile curves instead of the WHO BMI-for-age Z-scores used in this study. The Ugandan and Ghanaian study measured the heights and weights of the studied participants based on self-report. The used of self-reported weight and heights could lead to underestimation of overweight and obesity (Elgar, Roberts, Tudor-Smith, & Moore, 2005). A studies conducted by Cole et al (2000), Lobstein et al (2004) and Gupta et al (2012) concludes that overnutrition and obesity weregradually rising in children in poorer communities in the developing world due to adoption of western lifestyles. It wasnot a surprised that the prevalence wasat this level.(Lobstein et al (2004) also estimated that 10% of school-age children wereoverweight and wereat risked of getting type2 diabetes if measures werenot put in place. If compared, the prevalence wasa slight higher among children in non feeding schools (7.3%) than those in feeding schools (6.0%). This could be that those in the non feeding schools werenot getting enough nutrition education, though feeding programme wasnot associated with overweight in this study.

In this study, more female (57.8%) were found to be overweight. However, in conformity with the findings of McDonald et al (2009) among Columbian children (aged 5 to 12 years) and Schultz (2012) among Australian children (aged 5 to 15 years), overweight was not associated to gender. Contrary to the findings of the present study, Peltzer & Pengpid (2011) among a sample of 5613 Ugandan and Ghanaian children aged 13-15

years observed a significant association between gender and overweight/obesity. Majority (52.9%) of the study participants were those between 10 - 13 years, the prevalence of overweight were found higher (60.0%) among this age group, nevertheless overweight wasnot associated with age in this study. Overweight was found to be higher (80.0%) among rural areas with significant disparities among the sub-districts. Even though, overweight washigher among rural folks, children in the urban communities weremore likely to be overweight. This wasconsistent with the findings of Tharakan & Suchindran (1999) and Fotso & Kuate-Defo, (2006) studies toevaluate urban–rural differentials in childhood malnutrition. Overweight wasalso higher among farming communities than fishing communities and is significantly associated (p=0.002) with overweight. This has been concurred by study in rural Ghana which revealed significant undernourished among young children from farming communities than young children from fishing communities (Fentiman et al., 2001). But children in the farming communities wereless (86.2%) likely to be associated with this condition than those in the fishing communities.

As if a "double edged sword", a thinness prevalence of 19.4% was observed indicating the co-existence of under nutrition and over nutrition culminating to the double burden of malnutrition. In this present study, more (51.6%) females were thin for their age, although they wereabout 6.3% lesser to be associated with thinness. In conflict with a study among children aged 5-14 years in India (Fazili, 2012), significantly more male children were thinner than female children. A study by Kimani-Murage et al (2010) among rural South African children, also reported the prevalence of underweight to be significantly higher in boys, than in girls. A study by Mogre et al (2013) among school-aged children in Tamale, Ghana and several other studies in other Sub-Saharan African countries have reported a coexistence of under nutrition and overweight/obesity(Ene-Obong et al., 2012). Similar findings have also been reported in the Middle East, North America and Latin America (De Onis & Blössner, 2000). This occurrence presents the double burden of malnutrition experienced by countries in nutrition transition (McDonald et al., 2009). This study revealed a significant association (p=0.021) between wasting and taboos/beliefs. Thus pupil who had no taboos was more (84.1%) wasted, and about 2 times more likely to be associated thinness than their mates who had taboos. Frongillo et al (1997)wereof the viewed that ideological factors served as one of the basic causes of childhood malnutrition especially stunting and wasting. Beliefs and taboos regarding causes of illnesses and accepted food ideologies have obvious and clear-cut repercussion on child health and nutrition. It has become clearer that cultural patterns also contains beliefs and taboos which werebeneficial or harmful, scientifically rational or otherwise (Jelliffe,

1957). Parents' beliefs about children's nutritional needs and their attitudes toward mealtimes can also make a difference for children's weight (Gable & Lutz, 2000).

This study also revealed a significant association between stunting and sex ($p=0.001$), type of school ($p<0.001$) and feeding programme ($p<0.001$). This concurred with recent review of school feeding programmes, which foundsignificant associations with child growth and cognitive performance of disadvantaged children. Though, this will be achieved only if the food supplements are rich in energy, protein, and vitamins and continued for a substantial period (Greenhalgh et al., 2007). It wastherefore not a surprised to notice that children in schools not on feeding programme were38.3% less likely to be associated with stunting. However, efforts to prevent stunting should start from preconception period through to the first two years of age since stunting and its effects are almost irreversible two years after birth. It waslikely that the stunting problems observed in the studied children werethe product of disease and poor nutrition before they enrolled in school. More (53.2%) males were stunted than females, though females were42.0% less likely to be associated with stunting. Various studies have reported significant differences in stunting and wasting rate between boys and girls. In their study, Hasan & Zulkifle (2010), Wamani et al (2007) and Mikki et al (2009) measured the prevalence of stunting and underweight to be higher among males. However, Al-Saffar (2009) and Peltzer & Pengpid (2011) concluded that prevalence was higher among females.

Limitation(s)

Regardless of the consistency in findings in this study, some limitations should be considered. The study design used in this study was cross-sectional which wasnot appropriate to establish a causal relationship between malnutrition (overweight, thinness and stunting) and the demographic and socioeconomic characteristics of pupil and their care-takers. Also, dietary intake of the school children was not measured, and therefore the results cannot be associated with dietary intake. Comparison of the anthropometric criteria for the children and their care-takers was not considered in this study, which mightbe a drawback. The results of this study werebased on a sample 650 pupils and may not begeneralizeable to all school-aged children in the region or Ghana. We nevertheless believe that these limitationswere not significant enough to invalidate the findings of the study.

Conclusion

The nutritional standards on school children in this study were found to be unsatisfactory.With the prevalence of stunting (50.3%), thinness

(19.4%) and overweight (6.9%), malnutrition is a major nutritional problem among school children in Nkwanta South despite the presence of several intervention programmes including School Health and Environmental Programme (SHEP), School Health Services and School Feeding Programme to reduce it.

Upon all the supplementary foods for children in the schools on the feeding programme, thinness (21.5% vs. 18.5%) and stunting (63.0% vs. 44.7%) were still high among these children than children in schools not on feeding programme.

Recommendations

Based on the findings of this study, it is important that different approaches be used to improve the nutritional status of school children. The following recommendations are based on the study findings.

Practice

The district health management team should intensify public awareness and education on childhood and adolescent malnutrition. Especially, nutrition at preconception, conception and after delivery.

District Health Services and District Education Services should educate parents and guardians of children in schools on feeding programme that school feeding is not a replacement feeding but rather a supplementary feeding to improve children's nutritional status.

Teachers can also adopt the effective nutrition education for parents during Parent Teachers Association and School Management Committee meetings in order to educate parents on their role on child nutrition.

Policy

Apart from the influence of nutrition on education, it also plays an important role in reproduction and development of chronic conditions like obesity, cardiovascular diseases and diabetes. Ministry of Health and Ghana Health Service should therefore give equal attention to adolescent nutrition as being given to adolescent reproductive health.

Ghana Health Services in partnership with Ghana Education Service should review and strengthening school-based health services as a top priority for public health and nutrition action.

Ghana Statistical Services in collaboration with concerned authorities should continue with the demographic and health survey as a priority for public health action. However, efforts should be made to include adolescent nutrition to the measured indicators and to generate national based nutrition data on adolescents.

Research

Further studies should be conducted to assess the factors that are contributing to the improved nutritional status of children in schools not on feeding over those in schools on feeding programme.

Since this study was conducted on only adolescents in public schools, it is recommended that studies be conducted on all adolescents (in school and out of school) to establish the true prevalence of malnutrition in the district and other parts of the country.

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