ORIGINAL ARTICLE

Prevalence and Risk Factors for Overweight and Obesity among Nurses in the Tamale Metropolis of Ghana

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Prevalence of overweight and obesity is increasing in various populations, and is becoming a huge problem among occupational/professional groups that are perceived as preponderantly sedentary. An attendant acquisition or imposition of a lowered physical activity level and other lifestyle with such occupations may contribute to the development of obesity and overweight. The objectives of the study were to determine the prevalence of obesity and overweight among nurses using Body Mass Indexes (BMI) and waist-to-hip ratios (WHR), to assess dietary habits, ascertain daily life-styles in terms of physical activity and nutrition and to determine the associations between age, marital status, dietary habit, physical activity and BMI/WHR. The study was conducted in the four main hospitals within the Tamale metropolis of the Northern region of Ghana. A cross sectional analytical design was used for the study. Two hundred and twenty (220) nurses were selected based on a probability proportionate to size (PPS). A structured questionnaire was used as the instrument for data collection and both qualitative and quantitative data were collected and analysed statistically using SPSS. The ages of respondents ranged from 20 to 60 years. The 20-30 years age group had the highest number of respondents (67.3%) with the age group of 41-50 having the lowest number (5.0%). In terms of gender, females dominated with 146 respondents representing 66.4% and males were 74 representing 33.6%. One hundred and nineteen (54.0%) of the respondents were married whilst 92 (41.8%) were never married, 6 (2.7%) were widowed and 3 (1.4%) were divorced in that order. The prevalence of overweight and obesity among the nurses were 26.4% and 16.9% respectively. Physical inactivity and dietary habit especially skipping of meals was found to be contributing factors to overweight and obesity among the nurses. Age, gender and marital status had an influence on the level of obesity and overweight among the nurses as the older nurses were more likely to be obese than the younger ones, female nurses were significantly more likely to be obese than the males, whilst those married had a higher tendency to be overweight and obese than the never married, divorced and widowed respectively. Prevalence of overweight and obesity among nurses in the Tamale metropolis is high and of public health significance. Lifestyle and eating habits associated with the nature of the occupation, especially skipping of meals and a predominance of physical inactivity may be significant contributors to the high prevalence of obesity and overweight among the nurses.

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INTRODUCTION

Overweight and obesity refers to an abnormal or excessive fat accumulation in the body that presents

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a risk to an individual's health. Overweight and obesity constitute major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer, and various other physical, psychological, and social morbidities as well as depression, discrimination and weight-related bias (Rockville, 2001; Candib, 2007). Excessive fat accumulation in the body tends to increase the risk of

high blood pressure, high cholesterol, asthma, arthritis, and brings about a general poor health status (WHO, 2000; Centers for Disease Control and Prevention, 2005).

Although the problem of obesity and overweight was once an issue only in high income countries, its prevalence has now drastically risen in low- and middle-income countries that are now facing a "double burden" of disease (Popkin, 1994; 1997; Prentice, 2005; Akpa and Meta, 2008; Abubakari *et al.,* 2008). While many low and middle income countries continue to deal with the problems of infectious disease and under-nutrition, they are also experiencing a rapid upsurge in chronic disease risk factors, which includes obesity and overweight, particularly in urban settings (WHO, 2005; Akpa and Meta, 2008).

The plethora of factors that may account for the growing global epidemic of overweight and obesity include genetics and social factors such as socio-economic status, race/ethnicity, media and marketing, and the physical environment, which influences energy consumption and expenditure (Bouchard *et al.,* 2003; Fezeu *et al.,* 2006; Christensen *et al.,* 2008). The nutritional and socio-economic transition that is occurring in much of the developing world may have contributed to the upsurge in overweight and obesity (Popkin, 1994; 1997; Prentice, 2005). However, overweight and obesity is generally caused by a lack of physical activity, unhealthy eating patterns resulting in excess energy intake, or a combination of the two (Flegal *et al.,* 2002).

Physical inactivity and increased sedentary nature of daily activities have become serious threats to the body as they increase the risk of overweight and obesity, which may be harmful to normal body function and job productivity (Ogunjimi *et al.,* 2010). The quest for ways to make life easier and more comfortable, that is, from the perspective of conserving efforts and human energy through the use of labour saving devices and the disdain for sweating may add to the increasing tendency of overweight and obesity. Technological advancements in the sciences have simplified life and work for many professionals (including health professionals) bringing about a re-

duction in physical activity levels for many individuals in such professions. The result of a reduction in energy expenditure may have implications for overweight and obesity if individuals are exposed to such conditions over a long period.

Anecdotal evidence has shown that many health professionals, especially female nurses, in Ghana have a tendency to be overweight or obese (Health Foundation of Ghana, 2009). In Nigeria (Ogunjimi *et al.,* 2010) and the United States of America (Miller *et al.,* 2008), studies have revealed high prevalence of overweight and obesity among nurses. In Nigeria, for instance, prevalence of overweight and obesity among nurses was found to be 62.2% whereas in the USA it was 54%. Such high prevalence rates, as observed in the two studies may suggest that our healthcare professionals are at an increased risk for various non-communicable diseases (NCD), and if nothing is done to halt this trend then sooner than later our care-givers may become major care receivers (Ogunjimi *et al.,* 2010). According to the studies by Ogujimi *et al.,* (2010) and Miller *et al.,* (2008) the health and healthcare implications of weight gain are clear for most nurses who are well informed about this menace. It is imperative to investigate the prevalence and potential determinants of obesity and overweight among nurses in Ghana as this would serve as a source of information for health policy formulation in the management of overweight and obesity among health professionals.

MATERIALS AND METHODS

The study is a cross-sectional analytical design where both exposure (nutrition and other lifestyle variables) and outcome (anthropometric variables) were measured simultaneously. A sample size of 220 nurses was selected from a sample frame of 749. Respondents were selected from the four main hospitals within the Tamale metropolis; Tamale Teaching hospital, West and Central hospitals and Seventh Day Adventist (SDA) hospital using a probability proportional to size (PPS). Respondents who were 18 years and above, non-pregnant (females only) and willing to participate were included in the study.

A structured questionnaire was used to collect data on socio-demographic characteristics, nutrition and other lifestyle (physical activity levels) as well as anthropometry. Anthropometric measurements of weight were taken to the nearest 0.1kg using an electronic scale (Uniscale, UNICEF 2008) whilst height, waist and hip circumferences were taken to the nearest 0.1cm using a microtoise (wall-mount retractable non-stretch tape) and a simple non-stretch tape respectively. Body mass index (BMI) was expressed as weight in kg/height in m². Waist-to-Hip ratio (WHR) was derived from the waist and hip circumference measurements. Using WHO (2006) classifications overweight and obesity were defined by BMI 25 to <30 for overweight and ³30 for obesity, and for central obesity a WHR of >0.90 (Males) and >0.80 (Females) depicted a significant risk.

Statistical Analysis
Data was analyzed using SPSS (version 17.0, SPSS Inc., USA). Continuous variables were expressed as means ± SEM whilst categorical variables were expressed as proportions and/or percentages. Levels of association were determined using Chi-square and linear regression analyses, and a p<0.05 was set as the level at which differences were accepted as being statistically significant.

RESULTS
Socio-demographic characteristics of respondent nurses
The socio-demographic characteristics of the nurses tested for association by gender using Chi-square test as shown in Table 1 (with p-values and difference of margin – phi, φ). From Table 1, it is evident that there was no significant association between gender, religion and ethnicity (p>0.05). However, marital status and age grouping showed a significant association with gender (p<0.001)implying that females were significantly more likely to be older and married compared to their male counterparts.

Nurses of Akan origin were appreciably more compared to the other northern tribes aside Dagombas-

Table 1: The socio-demographic characteristics of respondent nurses stratified by gender

Variable	Male (N=74)	Female (N=146)	Total	Chi-square (χ2)
Marital status				
Never married	51 (68.9%)	41 (28.1%)	92 (41.8%)	p<0.00, φ=0.42
Married	23 (31.1%)	96 (65.7%)	119 (54.0%)	
Divorced	0 (0.0%)	3 (2.1%)	3 (1.4%)	
Widowed	0 (0.0%)	6 (4.2%)	6 (2.7%)	
Religion				
Christianity	36 (48.5%)	85 (58.2%)	121 (55.0%)	p=0.18, φ=0.91
Islam	38 (51.5%)	61 (41.8%)	99 (45.0%)	
Ethnicity				
Dagombas	38 (51.4%)	64 (43.8%)	102 (46.4%)	p=0.16,φ=0.19
Akans	14 (18.9%)	26 (17.8%)	40 (18.2%)	
Frafras	8 (10.8%)	26 (17.8%)	34 (15.4%)	
Dagaos	6 (8.1%)	18 (12.3%)	24 (10.9%)	
Kokombas	7 (9.5%)	5 (3.4%)	12 (5.5%)	
Others	1 (1.4%)	7 (4.8)	8 (3.7%)	
Age group (years)				
20-30	63 (85.1%)	85 (58.2%)	148 (67.2%)	p<0.00, φ =0.31
31-40	7 (9.4%)	16 (10.9%)	23 (10.5%)	
41-50	3 (4.1%)	8 (5.5%)	11 (4.9%)	
51-60	1 (1.4%)	37 (25.3%)	38 (17.3%)	

Φ means difference of margins

giving credence to the fact that the Tamale metropolis is rapidly urbanizing and therefore has become a melting pot for many ethnic groupings to settle and work thus reflecting the relatively larger proportion of Akan migrants within the metropolis. With regards to age distribution, higher percentages (67.3%) of nurses fell within the 20-30 years age group with the 41-50 years age group making up (5.0%) of the respondent population. The large number of younger nurses may reflect the enrolment into the study of a relatively large number of freshly graduated nurses doing their rotation within the urban hospitals as opposed to the fewer middle aged nurses (31-40 and 41-50 years) who usually move on after further training. The relatively larger number of 51-60 year olds over the middle aged nurses could probably be explained by the retention of older and more experienced staff (especially midwifes) or the preference of older nurses to remain in the big hospitals as they reach their retirement age (Table 1).

Determination of overweight and obesity
The results for the anthropometric measurements from which overweight and obesity indicators were derived are shown in Table 2. Male nurses were evidently more likely to be taller on average than their female counterparts. However, in contrast, females were on average more likely to be heavier and for that matter have higher BMI than males. With regards to waist and hip circumferences, female nurses

had on average bigger waist and hip lines than the males but still had lower mean WHRs than their male counterparts.

Using the WHO cut-offs as reference, the BMI categorizations for the study population (Figure 1) showed2.7% of the nurses (0.9% for males and 1.8% for females) were underweight, 26.4%(8.2% males and 18.2% females) were overweight and 16.9%(1.4% males and 15.5% females) were obese. There was a significant association between gender and BMI (p<0.001). Thus, female nurses had a much greater tendency to be overweight and obese than their male counterparts.

With respect to central obesity, 54 (24.5%) were considered at risk based on their WHRs. Among these, 12 (5.5%) were males whiles the remaining 42 (19.0%) were females (Table 3). Clearly, female nurses were significantly more likely to be at risk for central obesity than their male counterparts (p<0.001). BMI and WHR were compared to show which of the two indicators was more sensitive at determining obesity. The outcome showed that 6 (2.7%) males and 10 (4.5%) females with normal BMI were at risk of central obesity. The implication is that BMI alone is not able to determine the degree of obesity/overweight in the study population especially when body fat distribution is considered.

Risk factors for overweight and obesity in the study population
Socio-demographics: Gender, marital status, age and number of years in service
The relationship between gender and overweight/

Table 2: Anthropometric Measurements of Respondents with their various Indices classified by gender

Variables	Male	Female	P Values
Height (cm)	169.8±1.0	161.2±0.5	0.026
Weight (kg)	66.4±1.0	68.3±1.2	0.003
BMI (kg/m2)	23.0±1.0	26.0±1.0	<0.001
WC (cm)	80.0±0.4	86.4±0.4	<0.001
HC (cm)	94.5±0.3	104.4±0.4	0.001
WHR	0.94±0.1	0.87±0.1	0.005

BMI – Body mass index; WHR – Waist-to-hip ratio; WC— Waist circumference; HC—Hip circumference

Table 3: Waist-to-Hip Ratio categorization of the Nurses with respect to gender

Variables	Male	Female	Total
Normal	62(83.8%)	104(71.2%)	166(75.5%)
At Risk	12(16.2%)	42(28.8%)	54(24.5%)
Total	74(100.0%)	146(100.0%)	220(100.0%)

Normal (<0.80 for females and <0.90 for males), At risk (>80 for women and >90 for men)

obesity has clearly been depicted with both BMI and WHR categories showing significant relationships with gender. It can therefore be inferred that female nurses are more likely to be overweight and obese as well as at risk for central obesity than their male counterparts.

The association between marital status and BMI was shown to be positive but of borderline significance (p=0.048). From the results, 10.0% of the unmarried nurses were overweight and 4.0% were obese with 15.0% of the married nurses being overweight whiles 12.7% were obese. With divorced and widowed nurses the percentages for overweight (0.5% and 0.9%) and obese (0.9% and 1.4%) were much lower. This shows that, married nurses were more likely to be overweight and obese than single nurses (never married, divorced and widowed). A significant positive correlation was obtained between age and BMI (r=0.437, p=0.007). The implication here is that as the nurses' age, their likelihood of becoming overweight or obese also increases.

To assess the influence of the number of years in service on BMI, a linear regression analysis (Figure 2) depicted a significant association between the number of years in service and their BMI (p=0.047). The BMI of the nurses is more likely to increase with number of years in service increases.
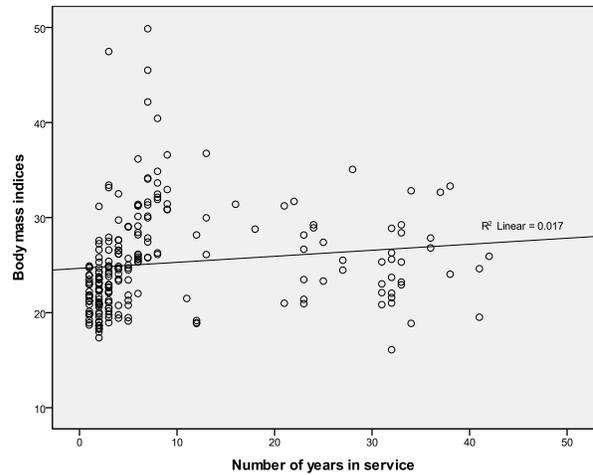

Figure 2: Scatter diagram showing Number of Years in Service with respect to BMI

Family Line of Fatness
Respondents were asked if any member of their family were perceived to be fat (overweight or obese). With respect to those who responded yes, 14.5% were overweight whiles 11.4% were obese. On the other hand, 11.8% of those who said no were overweight whiles 5.5% were obese. Those who had families perceived to be fat were significantly more likely to be obese and overweight (p=0.042) than those with no family relations perceived to be fat or obese.

Physical Activity: Means of transportation, exercise levels and television viewing time
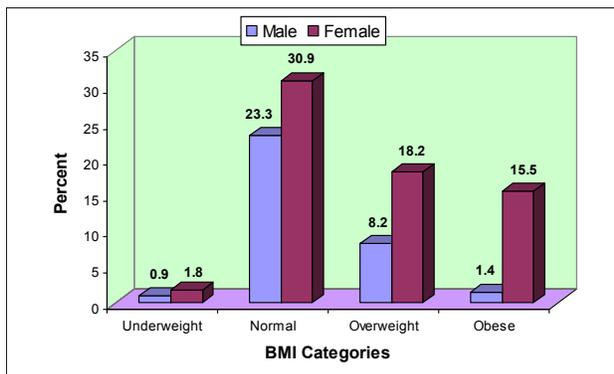With regards to the predominant means of trans-

Figure 1: BMI Classification of Nurses with respect to Gender using WHO cut offs as reference. Underweight (<18.5 kg/m², normal (³18.5 – 24.99 kg/m²), overweight (25-29.99 kg/m²) and obese (≥ 30 kg/m²)

Figure 3: Association between Exercise levels and BMI categories

portation to work by the respondents, about 50.9% went to work mainly by motorbike, 30.5% by car, 17.3% on foot and 1.4% by bicycle. Means of transportation was grouped as motorized (cars/ motorbike) or un-motorized (foot/bicycle) to reflect the level of energy expended when going to work. However, there was no significant association between the means of transportation and BMI (p=0.118).

With respect to exercise levels reported by the respondents were grouped as vigorous, moderate, low and no exercise depending on the kind of activity involved (Figure 3). The association between exercise levels and BMI categories was positive and significant (p=0.011) and nurses who reported to indulge in no exercise regimen were more likely to be overweight (6.7%) and obese (7.4%) compared to those who reported to engaging in some form of exercise. The average time spent watching television daily was grouped into 1-3 hours, 4-6 hours and 7-9 hours. These groupings were compared to the BMI's (Figure 4). The relationship although positive was not significant (p=0.087).

Dietary Habits: Meal skipping and dietary diversity

With respect to meal skipping, 118 (53.6%) responded yes whiles 102 (46.4%) said no. Figure 5, presents the relation between meal skipping and BMI categories. The Chi-square test showed a positive significant association between meal skipping and BMI
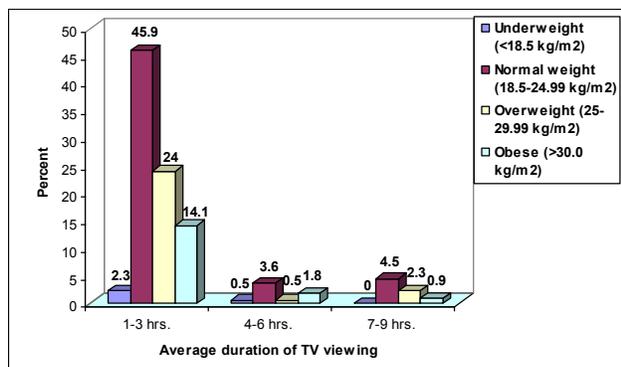
(p=0.002). Meal skipping was ascribed by some nurses to the nature of their work, which puts them on red alert, especially when they are on call.

The individual dietary diversity score (IDDS) was derived as a measure of diversity in the diet of respondents. Frequency of consumption of 8 different food groups were scored for dietary diversity and are as summarized in table 4. Correlation between the IDDS and BMI was negative and significant (r=-0.246, p=0.001) which meant that, obesity and overweight decreased as IDDS increased. Thus, nurses with less diverse dietary habits are more likely to be overweight and obese.
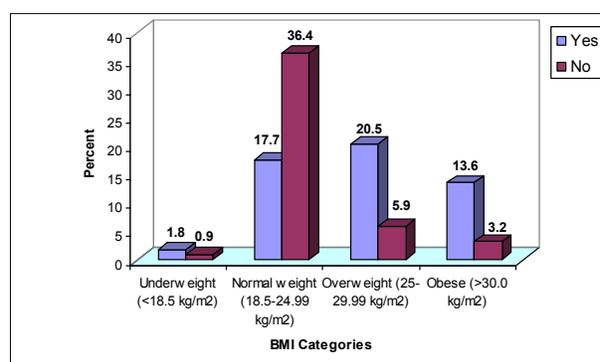

Figure 5: Relationship between Skipping Meals and BMI of the Nurses

Table 4: Dietary diversity scores derived from consumption of various food groups

Food group	Minimum	Maximum	Mean	SEM
Cereal and tubers	4	7	5.2	0.1
Meat and fish	1	7	5.4	0.1
Milk and milk products	0	3	2.1	0.1
Vegetables	0	4	1.2	0.1
Fruits	0	3	0.5	0.0
Pulses	0	3	0.5	0.0
Sugars	0	7	3.3	0.1
Fats and oils	1	7	5	0.1

Figure 4: Association between times spent viewing television by the Nurses and BMI

DISCUSSION
Prevalence of overweight and obesity
This study has shown that underweight exists despite the high levels of overweight/obesity in the study population, which may lend credence to the existence and persistence of the phenomenon described as a 'double burden' of disease, which is common in many developing countries (Popkin, 2004, Prentice, 2006). The comparatively higher prevalence of overweight and obesity in this study population to that of the general Ghanaian population, according to the GDHS, (2008) (26.4% and 16.9% cf. 21% and 9%), may be explained by the a possibly higher socio-economic status in the study population compared to the average Ghanaian population or perhaps because the study population is largely female dominated, as these attributes have been known to be associated with overweight and obesity (Sobal and Stunkard, 1989; Benkeser *et al.,* 2012). The study findings are also consistent with those of Ogunjimi *et al.,* (2010) and Miller *et al.,* (2008) who reported prevalences of overweight/obesity of public health significance among nurses in Nigeria and the USA respectively. Nevertheless, the levels in the 2 studies cited were much higher perhaps because the USA study, for instance, reflected the very high levels in the American population and for that matter the female population, whilst in the Nigerian study this could be attributed to the use of female subjects only for the study.

The use of WHR for central obesity has also demonstrated that female nurses in this study are at a higher risk for chronic diseases such as hypertension, diabetes and arteriosclerosis than their male counterparts. This finding agrees with that of Azadbakht *et al.,* (2004) and Azadbakht *et al.,* (2005) who reported high prevalence of central obesity in Iranian women compared to men and also depicted their risk for such chronic diseases. The pattern of body fat distribution as measured by WHR has been reported to be a more important determinant of chronic diseases than general obesity (Wei *et al.,* 1997; Esmaillzadeh *et al.,* 2006). Kissebah and Krakower, (1994) also established that WHR provides useful indices of abdominal fat accumulation and provides a better correlation with an increased risk of ill health than BMI

alone. This point is further echoed by the WHO statement that BMI can be used to estimate the prevalence of obesity within a population but cannot account for the wide variation in body fat distribution (WHO, 2005). The essence of the finding in this study of overweight and obesity levels that can be compared to those of affluent countries, coupled with the rates at which such countries are experiencing the fall outs from this epidemic, in terms of rising NCDs, may buttress the important point of Ogunjimi *et al.,* (2010) that if corrective measures are not put in place our care providers sooner than later would become care receivers.

Risk factors for overweight and obesity in the study population
Clearly, socio-demographic and socio-economic status are related to overweight and obesity in many populations (Sobal and Stunkard, 1989; Benkeser *et al.,* 2012), thus the finding in this study of significant associations between gender, marital status as well as age and overweight or obesity only goes to buttress this point. First, female gender is a significant risk factor for overweight and obesity in this study which conforms to the general trend for gender relationships with BMI in several other studies. For instance, studies from developing countries including Ghana have shown that obesity is more common in women than men (Martorell *et al.,* 2000; Amoah, 2003a; Azadbakht *et al.,* 2005). This gender trend also occurs in industrialized countries (Flegal, 2002; Odom, 2006) where fat intake as well as genetic predisposition is supposed to contribute to it (Heitmann *et al.,* 1995). The reasons for this association of overweight/obesity with gender may be explained from West African or Ghanaian cultural and historical perspectives.

A social desirability for overweight and obese women in West Africa is often cited together with historical records showing that some ethnic groups in Africa preferred overweight women (Jackson *et al.,* 2005; Agyemang *et al.,* 2008; Fezeu *et al.,* 2008) whilst some embraced cultural practices that encouraged female obesity (as in the pre-marital "fattening rooms" of Nigeria) (Brink, 1995; Benkeser *et al.,* 2012).The perception of overweight

and obesity as a sign of good health, wealth and beauty in many African countries (Amoah, 2003b) may also fuel this growing epidemic of obesity in females especially.

Secondly, married nurses in this study were more likely to be overweight and obese than single nurses (never married, divorced and widowed) which may imply that marital status of nurses was likely to have an influence on their BMI. This finding conforms to that of Mohsen, (2008) and Lipowk-z *et al.,* (1998), who reported in their respective studies that married persons, were more likely to be overweight and obese than never married individuals. The finding is also supported by that of Ogunjimi and his colleagues (2010) who found a high degree of obesity in married than unmarried female nurses in Nigeria. Marriage may come with much physical, psycho-social and financial support from partner and relations, which may facilitate comfort and a tendency for decreased physical activity or energy expenditure together with other lifestyle changes that may be associated with weight gain. For most marriages also fecundity or number of children is expected to increase, which culturally comes with lessening of physical activity and increased food intake on the part of the female spouse. Benkeser *et al.,* (2012) in their study in women in Accra established that given birth to 2 or more children was a higher risk for obesity and being unmarried and living in a rural environment rather had a protective effect.

Thirdly, age has been established as a very important predictor of overweight/obesity among both men and women (Lipowk-z *et al.,* 1998) as our study findings confirm. In Ghana Amoah (2003b) also observed that obesity increases with age. The propensity for obesity in both men and women as they age may be explained by pubertal and body fat compositional changes associated with the hormonal influences that come with sexual growth and development. The female hormones are more effective in this respect as reproduction and other physiological functions are at stake.

The ageing of nurses may correspond with their length of service, which may mean that longer serv-

ing nurses would have a greater tendency to be overweight and obese as the findings suggest. A plausible explanation to this finding comes from the consideration that nurses' may tend to acquire an increased sedentary routine and expend less energy as they assume senior or supervisory positions in the service. This can increase the risk for becoming overweight and obese. Notwithstanding the socio-demographic relationships with overweight and obesity depicted in this study, the contribution of heredity cannot be overruled as demonstrated by the greater tendency for individuals with a family member perceived as overweight or obese to be overweight or obese themselves. A study by Senekal et al in 2003 also showed that an individual is likely to become overweight having at least one overweight family member, more specifically a parent.

Many studies have shown that unhealthy lifestyle behaviors, particularly lack of exercise which invariably leads to low physical activity contribute significantly to overweight and obese tendencies (Steyn *et al.,* 2006; Kruger *et al.,* 2005; Senekal *et al.,* 2003; Schmitz *et al.,* 2000). In this respect, our findings which showed a significant relationship between reported exercise levels and BMI lends support. In addition, Television (TV) viewing for longer periods connoting a sedentary lifestyle has been associated with increasing obesity tendencies (Gortmaker *et al.,* 1996; Crespo *et al.,* 2001; Hu *et al.,* 2003). Even though TV viewing related obese tendencies occurred mostly in children (Gortmaker *et al.,* 1996; Crespo *et al.,* 2001) who were more likely to indulge in an increased energy intake concurrently, the study by Hu *et al.,* (2003) revealed that women who watched much TV were more likely to be predisposed to obesity and diabetes mellitus type II. In our study, it is likely that watching of TV for more than 3 hours was occasioned by intermittent and scheduled viewing of programmes perhaps to the extent that some of the time was spent doing other activities whilst the TV was switched on, and therefore the true picture of the relationship was not revealed. Furthermore, the preponderant use of motorized means of transport to work and other places though common among the nurses did not

yield any significant relationship with BMI simply because many of the nurses also footed or used bicycles as alternative means.

A particular habit of meal skipping is becoming a norm rather than an exception with most professionals as they become inundated with work. Ironically, the meal that is skipped most is breakfast, which happens to be the most important meal of the day. With the nursing profession, unexpected or emergency cases present at any time with some taking quite a long time to resolve, which more often than not obligates meal skipping. The significant finding in our study which relates meal skipping to overweight and obesity shows that meal skipping can be a contributing factor to weight gain and obesity as established in the studies by Jenkins *et al.,* (1994), Fabry, (1964) and Yunsheng *et al.,* (2003) who reported that skipping meals was associated with a significantly higher risk for overweight and obesity.

Obviously, meal skipping, especially breakfast, is an inappropriate dietary habit with nutritional consequences (Rashidi *et al.,* 2007). The evidence for skipping meals such as breakfast does not only interrelate with obesity but also leads to an increased vulnerability to undernutrition due to restricted food intake (Niclas *et al.,* 1998). Thus, skipping of meals possibly engenders a poorly diversified diet, which may come as part of the nutrition transition associated with the pressures of urbanization and increased workload. In the work of Sarrafzadegan *et al.,* (2009) an inverse association between IDDS, obesity and abdominal adiposity was observed among female students of Isfahan University in Iran, lending support to the inter-relationship between less than optimal dietary intakes and obesity.

CONCLUSION

Results from this study have revealed that prevalence of overweight and obesity is high among the nurses within the Tamale metropolis mediated heavily by socio-demographic characteristics such as age, gender and marital. A predominance of physical inactivity and dietary habit of meal skipping as well

as low dietary diversity were found to be significant contributors to overweight and obesity among the nurses.

By virtue of their occupation and various sedentary tendencies associated with it, the nurses are at significant risk of becoming overweight and obese as well as developing central obesity, which may have serious implications on their health and for that matter their productivity.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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