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ORIGINAL ARTICLE

Prevalence and risk factors of obesity among practicing nurses at three selected hospitals in Kumasi Metropolis, Ghana

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Prevalence and risk factors of obesity is increasing in several populations, and is becoming an enormous problem among occupational/professional groups. The study determined the prevalence and risk factors of obesity among practicing nurses in three selected hospitals in the Kumasi metropolis. This cross-sectional study recruited 825 nurses from Suntreso, Manhyia and Kumasi South Hospitals. Structured questionnaire was used to obtain information on socio-demographic characteristics, and lifestyle behaviours of all participants. Obesity was assessed using body mass index (BMI), waist circumference (WC), waist-to-hip ratios (WHR) and Waist to height ratio (WHtR). The prevalence of obesity among nurses was 55.9% by WHtR, 35.7% by WC, 29.4% by BMI classification and 27.3% by WHR classification. The pattern of increased prevalence was higher among female nurses and nurses with high professional rank irrespective of the anthropometric parameters used. Logistic regression model indicates that taking meals late at night [odds ratio (OR) = 2.5 (1.1 to 5.7), p=0.0398], taking meals at stressful hours [OR=7.9 (2.1 to 29.8); p=0.0009], and fast food intake [OR=2.6 (1.1 to 6.0), p=0.0370) were independent risk factors of obesity classified by BMI. Taking meals at stressful hours [OR=3.33 (1.4 to 8.2); p=0.0091] and being female [OR=26.8 (3.5 to 207.7); p<0.0001] were significant independent risk factors of obesity classified by WC. Using WHR, being a female [OR=22.1 (1.31 to 380.0); p=0.0009] was an independent risk factor for obesity. Taking meals late at night [OR=2.4 (1.2 to 4.7); p=0.0121], taking meals at stressful hours [OR=3.1 (1.3 to 7.4); p=0.0148], and physical inactivity [OR=2.2 (1.0 to 4.5); p=0.0478] and being a female [OR=4.6 (1.7 to 12.4), p=0.0024] were independent risk factors of obesity using WHtR. Obesity among nurses in the Kumasi metropolis is on a rise and of public health significance. The need to foster healthy lifestyle is essential in health profession and pertinent to prevent obesity and future morbidity and mortality associated with cardiovascular metabolic risk factors.
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INTRODUCTION

Obesity is a major risk factor for a number of chronic diseases, including diabetes, cardiovascular diseases, cancer and other physical, psychological and social morbidities as well as depression and discrimination. Obesity in adulthood increases the risk of diabetes, high blood pressure, high cholesterol, asthma, arthritis, and a general poor health status (Centers for Disease Control Prevention, 2006).

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Although obesity was once an issue only in high income countries, its prevalence has now drastically risen in low- and middle-income countries who are now facing a "double burden" of disease, while they 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, particularly in urban settings (Ogden *et al.*, 2014). Genetics and social factors such as socio-economic status, race/ethnicity, media and marketing, and the physical environment

influence energy consumption and expenditure. Technological advancements in medical science have simplified life to the lowest term such as the use of computers in working, use of elevators and the use of cars which has tend to reduce the physical activity level in most work and thus has turn them to be sedentary in nature and therefore reducing the energy expenditure of most people.

Evidence has determined genetic susceptibility to be an important risk factor for obesity. Other studies indicate that 50-70% of a person's body mass index (BMI) and degree of adiposity (fatness) is determined by genetic influences and that there is a 75% chance that a child will be overweight if both parents are obese, and a 25-50% chance if just one parent is obese (Skelton *et al.*, 2009). Such works which includes teaching, administrative work, nursing among others have therefore exposed many people to the risk of becoming overweight and obese (Miller *et al.*, 2008). With careful observation, it is noticed that many nurses are overweight or obese. Although the healthcare implications of weight gain are clear to nurses, it is not clear whether the ability of an obese nurse to counsel patients about weight loss has any positive outcome (Miller *et al.*, 2008).

Obesity and overweight is now found to be increasing among nurses who are noted to know more about its implications as observed in Nigeria and the United States of America (Ogunjimi *et al.*, 2010). In these countries, the prevalence of obesity was found to be higher among nurses. For instance, in Nigeria, prevalence of obesity was found to be 62.2% among nurses whereas in the United States, it was found to be 54% (Miller *et al.*, 2008) which was higher compared to their national statistics of 65% in the entire US population (Ogunjimi *et al.*, 2010). Previous study in the Tamale metropolis, Ghana reported that 16.9% and 26.4% of nurses were found to be obese and overweight (Aryee *et al.*, 2013). However, information on the prevalence of obesity among nurses in Ashanti region of Ghana is limited and as such this study was conducted to determine the prevalence and risk factors of obesity among practicing Nurses, in three selected hospitals in the Kumasi metropolis.

MATERIALS AND METHODS

Study design

This hospital based cross-sectional study was conducted at Kumasi South, Manhyia and Suntreso Government Hospitals in the Kumasi Metropolis, Ghana. Kumasi Metropolis is the most populous district in Ashanti region. According to the 2010 population and housing census, the metropolis recorded a total population of 2,035,064. It has such a large population because it is a regional capital and also the most commercialized city in the region and it has other major arterial routes linking it to other parts of the country.

Study population

Using a simple randomized sampling technique, a total of 825 practicing nurses comprising 283, 260 and 282 from Manhyia, Kumasi South and South Suntreso respectively were recruited from a population of 120,143 practicing nurses, which forms about 5.9% of the total population in the metropolis. All study participants were recruited spanning a period of 3 weeks. Structured questionnaire was used to obtain information from all study respondents. The structured questionnaire was divided into three (3) sections with open and close-ended questions. Section A: involved questions that elicited information on socio-demographic variables of the nurses such as age, gender, marital status, qualification, professional ranking, year of experience, and ethnicity. Section B: included questions on lifestyle behaviours such as nutrition and eating habits, physical activity, alcoholic beverage intake etc. and Section C: questions were designed to obtain information relating to obesity measurements such as height, weight, waist circumference and hip circumference of studied.

Anthropometric measurements

Weight and Height

Participating nurses were made to stand without their sandals, bags or anything of significant weight on the weighing scale (Seca, Hamburg, Deutschland) and against the stadiometer (Seca, Hamburg, Deutschland). The weight was read to the nearest 0.1 kilogram and recorded. The value for the height was recorded to the nearest 0.1 centimeter and then

converted to meters. The body mass index (BMI) was calculated using formula (weight/height squared) and expressed in kg/m².

Waist Circumference and Hip Circumference
Gulick II spring-loaded measuring tape (Gay Mills, WI) was used to measure waist circumference midway between the inferior angle of the ribs and the suprailiac crest, whereas hip circumference was measured at the outermost points of the greater trochanters (WHO, 1995). WHR and WHtR were recorded to the nearest 2 decimal places. WHR and WHtR were measured during first phase of sample collection.

Definition of Anthropometric Terms
BMI (kg/m²) was categorized, using the current World Health Organization definitions (WHO, 2000). BMI of <18.5 kg/m², 18.5-24.9 kg/m², 25-29.9kg/m² and 30kg/m² were used to define underweight, normal, overweight and obese respectively. Waist circumference (WC) was defined for both males and females with WC <94 cm, 94-101.9 cm and ≥102 cm defined as normal, overweight and obese respectively for males, and <80 cm, 80-87.9 cm, and ≥88 cm defined as normal, overweight and obese respectively for females. WHR was also defined for both males and females with WHR <0.90, 0.90-0.99 and ≥1.0 defined as normal, overweight and obese respectively for males and <0.80, 0.80-0.84, and ≥0.85 defined as normal, overweight and obese respectively for females. WHtR was also defined for both males and females with WHtR < 0.5 and ≥.0.5 defined as normal and obese (WHO, 1995; Ashwell, 2009).

Ethical Consideration
Permission was sought and obtained from the Regional Health Directorate, Kumasi and the administrative offices of the three hospitals. Written informed consent was obtained from all participants prior to enrolment into the study.

Data Analysis
Data analysis was performed using the Statistical Package for Social Sciences for Windows (SPSS, Version 20.0). Independent sample t-test was employed to compare two groups of continuous variables. Categorical data were analyzed using Chi-Square test and logistic regression was employed to assess the associated risk factors of obesity. All statistical tests performed were 2- tailed and statistical significance was defined by a p value < 0.05.

RESULTS

The average age of the study participant was 31.6 ± 9.7 years. Females comprised 83.9% (692/825) while males (501/825) making up the remaining 16.1% (133/825). More than half of the participants were single (60.8%). Majority of the nurses (59.4%), were between the ages of 20-29 years, with 49.7% being diploma holders, 35.7% (294/825)

Table1 Socio-demographic characteristic of Nurses

Variables	Frequency	Percentages (%)
Mean Age (year) Mean ± SD	31.55 ± 9.67	
Age group (years)		
20-29	490	59.4
30-39	167	20.3
40-49	103	12.5
50-59	65	7.9
Gender		
Male	133	16.1
Female	692	83.9
Marital status		
Single	501	60.8
Married	312	37.8
Widowed	12	1.4
Qualification		
Certificate	190	23.1
Diploma	410	49.7
Post diploma	122	14.9
Degree	103	12.6
Nursing rank		
Enrolled Nurse	161	19.6
Staff Nurse	294	35.7
Snr. Staff Nurse	121	14.7
Nursing Officer	63	7.7
Snr. Nursing Officer	63	7.7
Principal Nursing officer	98	11.9
DDNS	23	2.8
Hospital of affiliation		
Manhyia	282	34.2
Kumasi south	261	31.5
South Suntreso	282	34.2
Year of experience (years)		
<1	231	27.9
1-3	225	27.3
4-6	115	13.9
>6	254	30.8

Data presented as number, percentages, mean ± standard deviation, DDNS: Deputy Director of nursing services: SD: standard deviation

staff nurses, and 30.8% having more than 6 years' work experience (Table 1).

About the lifestyle characteristics of nurses as shown in table 2, majority 57.3% (472/825) of the nurses ate thrice a day, 59.4% (472/825) took snacks in between meals, skipped in between meal (68.5%) and took meals late at night (52.4%) between 7 and 8 pm

Table 2 Lifestyle characteristics of Nurses

Nutritional Lifestyle/Dietary	Frequency
Number of times taken meals per day	
Twice	287(34.9)
Thrice	472(57.3)
Four times	56(6.9)
Snack in between meals	
Yes	490(59.4)
No	335(40.6)
Skipping between Meals	
Yes	565(68.5)
No	260(31.5)
Fast Foods Intake	
Yes	403(48.9)
No	422(51.0)
Taking Meals at stressful hours	
Yes	185(22.4)
No	640(77.6)
Taking meals late at night	
Yes	432(52.4)
No	393(47.6)
Time for taking late meal	
5	104(12.6)
6	156(18.9)
7	242(29.4)
8	242(29.4)
≥9	81(9.8)

Data is presented as number and percentages

(29.4%). Most (62.2%) of the participants took their meals around 6pm.

Approximately sixty-nine percent (68.5%) did regular physical exercise such as walking (68.4%), jogging (16.3%) and going to the gym (3.1%) while 31.5% did not do regular physical exercise. A higher proportion (56.1%) of them performed daily physical exercise every week. One hundred and twenty-one (121) of 825 had history of alcoholic beverage intake. Majority (85.7%) of the participants' intake of

Table 3 Physical activity, alcoholic intake history and other health-related characteristics of Nurse

Variables	Frequency (%)
Physical activity	
Regular exercise	
Yes	565(68.5)
No	260(31.5)
Type of exercise	
Walking	564(68.4)
Jogging	135(16.3)
Gyming	25(3.1)
Walking and jogging	25(3.1)
jogging and Gyming	16(2.0)
Number of weekly exercise	
Once	152(18.4)
Twice	16(2.0)
Thrice	16(2.0)
Daily	463(56.1)
Alcohol intake	
Yes	121(14.7)
No	704(85.3)
Number of Bottles/day	
1-2 bottles/day	707985.7)
3-4 bottles/day	118(14.3)
Working under stressful hours	
Yes	329(39.9)
No	496(60.1)

Data is presented as number and percentages

alcoholic beverage ranged between 1-2bottles/day (table 3).

The mean BMI (27.9 ± 0.49 vs. 24.6 ± 0.9 kg/m^2; p = 0.008), WC (81.52 ± 1.51 vs. 86.46 ± 1.17cm; p=0.048), HC (94.6 ± 1.7 vs.106.4 ± 1.1 cm; p<0.0001), WHR (0.86 ± 0.01 vs.0.81 ± 0.01; p=0.0021) and WHtR (0.48 ± 0.01 vs.0.54 ± 0.01: p=0.0019) were statistically significantly higher among female compared to males (p<0.05) (table 4). Males were significantly taller (1.69 ± 0.01m) than the female (1.61 ± 0.01m) participants (p<0.0001).

The prevalence of obesity among nurses was 55.9% (461/825) by WHtR classification, 35.7% (294/825) by WC classification, 29.4% (242/825) by BMI

Table 4 Anthropometric characteristics of Nurses

Anthropometric	Total	Males	Females	P-value
Weight	71.73 ± 1.19	70.00 ± 2.10	72.06 ± 1.36	0.527
Height	1.62 ± 0.01	1.69 ± 0.01	1.61 ± 0.01	< 0.0001
BMI	27.34 ± 0.45	24.64 ± 0.87	27.86 ± 0.49	0.008
WC	85.66 ± 1.02	81.52 ± 1.51	86.46 ± 1.17	0.048
HC	104.5 ± 0.99	94.61 ± 1.70	106.4 ± 1.05	< 0.0001
WHR	0.82 ± 0.01	0.86 ± 0.01	0.81 ± 0.01	0.002
WHtR	0.53 ± 0.01	0.48 ± 0.01	0.54 ± 0.01	0.002

Data presented as Mean ± SD. SD: Standard deviation; BMI: Body mass index; WC: waist circumference; HC: Hip circumference; WHR: Waist to hip ratio; WHtR: waist to height ratio

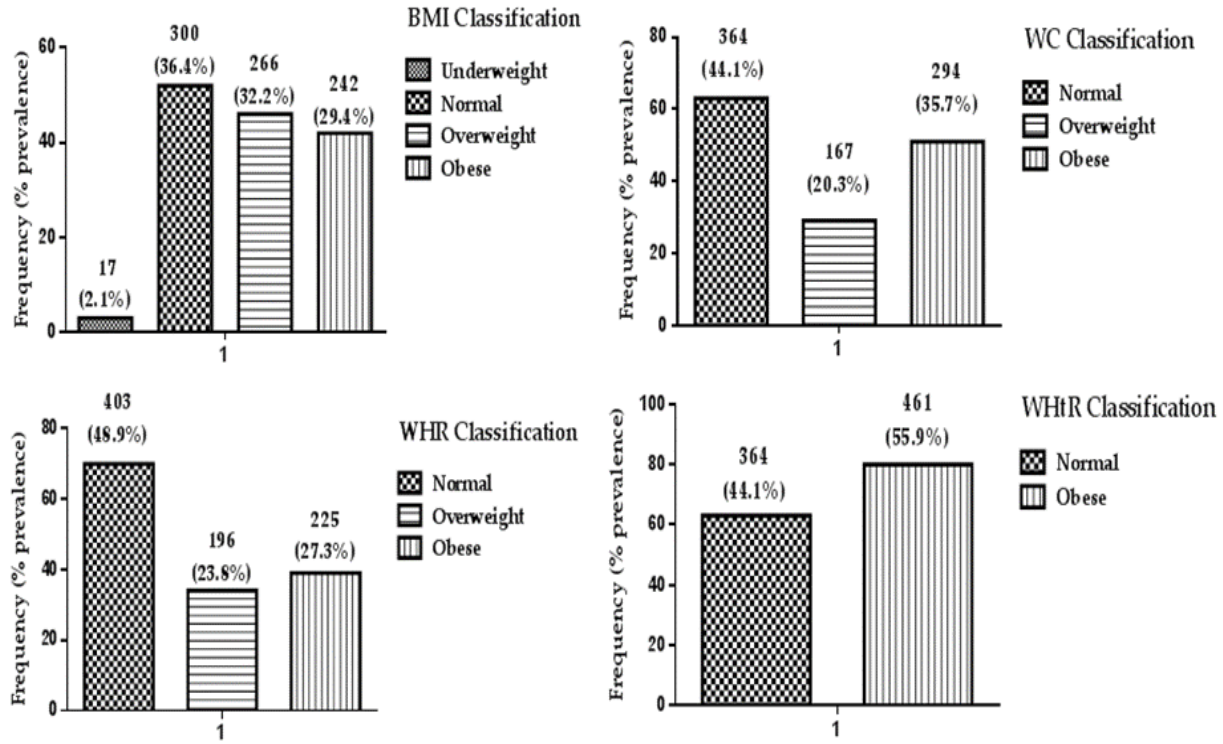

Figure 1: Prevalence of Obesity using BMI, WC, WHR and WHtR classification

classification and 27.3% (225/825) according to WHR classification respectively (Figure 1).

In table 5, obesity was categorized according to gender using BMI classification, 88.9% female participants versus 11.1% males were obese (p=0.0392). Out of a total of 87 nurses who were morbidly obese, all (100.0%) of them were females. Prevalence of obesity in male compared to females was 2.0% versus 98.0% (p<0.0001) using WC, 0.0% versus 100.0% (p=0.0056) using WHR and 7.5% versus 92.5% (p=0.0016) using WHtR. The difference in proportion was statistically significant irrespective of the method used. In general, there was a

Table 5 Prevalence of obesity stratified by gender

Anthropometrics	Total	Male	Females	p-value (X2, df)
BMI				0.0392 (10.07, 4)
Underweight	17	11(66.7%)	6(33.3%)	
Normal	300	64(21.2%)	236(78.8%)	
Overweight	265	40(15.2%)	225(84.8%)	
Obese	156	17(11.1%)	139 (88.9%)	
Morbid obesity	87	0(0.0%)	87 (100.0%)	
WC				< 0.0001 (29.66, 2)
Normal	364	127(34.9%)	237(65.1%)	
overweight	167	0(0.0%)	167(100.0%)	
Obese	294	6(2.0%)	288(98.0%)	
WHR				0.0056 (10.35, 2)
Normal	404	86(21.4%)	318(78.6%)	
overweight	196	46(23.5%)	150(76.5%)	
Obese	225	0(0.0%)	225(100.0%)	
WHtR				0.0016 (9.913, 1)
Normal	363	98(27.0%)	265(73.0%)	
Obese	462	35(7.5%)	427(92.5%)	

Values are presented in frequency with percentages in parenthesis. X^2: Chi-square value; df: degree of freedom. p<0.05 show statistically significance difference. BMI: Body mass index; WC: Waist circumference; WHR: Waist to hip ratio; WHtR: Waist to height ratio

significantly higher proportion of obesity among females compared to male participants.

As shown in table 6, the prevalence of obesity in relation to grade/ranking; using BMI, the prevalence of obesity was higher in Principal Nursing Officers (76.5%) followed by DDNS (75.0%), Senior Staff Nurse (28.6%), Nursing Officers (27.3%), Enrolled Nurse (14.2%) and Staff Nurse (11.8%). Using WC, the prevalence of obesity was high among DDNS

Table 6: Prevalence of obesity in relation to professional rank of Nurses and Hospital of affiliation classified by BMI, WC, WHR and WHtR

		Prevalence of obesity			
Variables	**Total**	**BMI**	**WC**	**WHR**	**WHtR**
Nursing rank					
Enrolled Nurse	162	23(14.2%)	35(21.4%)	35(21.4%)	87(53.6%)
Staff Nurse	294	35(11.8%)	58(19.6%)	29(9.8%)	104(35.3%)
Snr. Staff Nurse	121	35(28.6%)	35(28.6%)	23(19.0%)	75(61.9%)
Nursing Officer	63	17(27.3%)	11(18.2%)	11(18.2%)	29(45.5%)
Snr. Nursing Officer	63	17 (27.3%)	40(63.6%)	23(36.4%)	46(72.7%)
Principal Nursing officer	99	76(76.5%)	93(94.1%)	87(88.2%)	99 (100.0%)
DDNS	23	17(75.0%)	23(100.0%)	17(75.0%)	23(100.0%)
Hospital of affiliation					
Manhyia	283	81 (28.5%)	98(34.7%)	58(20.4%)	156(55.1%)
Kumasi South	260	81(31.1%)	75(28.9%)	69(26.7%)	133(51.1%)
South Suntreso	282	69(24.5%)	115(40.8%)	98(34.7%)	173(61.2%)

Values are presented in frequency with percentages in parenthesis. BMI: Body mass index; WC: Waist circumference; WHR: Waist to hip ratio; WHtR: Waist to height ratio

(100.0%), followed by Principal Nursing Officer (94.1%), Senior Nursing Officer (63.6%), Senior Staff Nurse (28.6%), Enrolled Nurses (21.4%), Staff Nurse (21.4%), and Nursing Officers (19.6%). According to WHR classification, obesity was prevalent among Principal Nursing Officers (88.2%) followed by DDNS (75.0%), Senior Nursing Officers (36.4%), Enrolled Nurses (21.4%), Senior Staff Nurse (19.0%), Nursing Officer (18.2%) and Staff Nurse (9.8%).The prevalence of obesity using WHtR classification was high among Principal Nursing Officers (100.0%) and DDNS (100.0%), followed by Senior Nursing Officers (72.7%), Senior Staff Nurse (61.9%), Enrolled Nurses (53.6%), Nursing Officer (45.5%) and Staff Nurse (35.3%). Overall, the prevalence of obesity increased with increasing nurse ranking.

The logistic regression of risk factors associated with obesity as classified by BMI, WC, WHR, WHtR. Logistic regression model indicates that taking meals late at night [OR=2.46; 95% CI (1.062 to 5.67), p=0.0398], taking meals at stressful hours [OR=7.89; 95% CI (2.087 to 29.79); p=0.0009], and fast food intake [OR=2.57; 95% CI (1.11 to 5.97), p=0.0370) were independent risk factors of obesity classified by BMI.

Taking meals at stressful hours [OR=3.3; 95%CI = 1.35 to 8.23); p=0.0091] and being female [OR=26.8; 95% CI (3.466 to 207.7); p<0.0001] were significant independent risk factors of obesity classified by WC. Being a female [OR=22.1; 95%CI (1.281 to 380.0); p=0.0009] was an independent risk factor for obesity classified by WHR.

Taking meals late at night [OR=2.4; 95% CI (1.21 to 4.69); p=0.0121], taking meals at stressful hours [OR=3.1; 95% CI (1.26 to 7.38); p=0.0148], and Physical inactivity [OR=2.2; 95% CI (1.02 to 4.52); p=0.0478] and being a female [OR=4.6; 95% CI (1.675 to 12.40), p=0.0024] were independent risk factors of obesity classified by WHtR (table 7).

DISCUSSION

This study assessed the prevalence of obesity and associated risk factors among nurses in three select-

Table 7: Logistic regression of risk factors associated with obesity as classified by BMI, WC, WHR, WHtR

Variables	BMI	WC	WHR	WHtR
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odd Ratio (95% CI)	Odds Ratio (95% CI)
Snack in between meals	p=0.4018	p=0.4459	p=0.3081	p=0.1054
Yes	1.48(0.64 to 3.42)	1.38(0.64 to 2.94)	1.59(0.71 to 3.56)	1.91(0.93 to 3.88)
No	1.0	1.0	1.0	1.0
Taking meals late at night	p=0.0398	p=0.1915	p=0.1649	p=0.0121
Yes	2.46(1.062 to 5.67)	1.68(0.79 to 3.54)	1.81(0.82 to 3.99)	2.39(1.21 to 4.69)
No	1.0	1.0	1.0	1.0
Taking Meals at stressful hours	p=0.0009	p=0.0091	p=0.1609	p=0.0148
Yes	7.89(2.087 to 29.79)	3.33(1.35 to 8.23)	1.95(0.78 to 4.84)	3.05(1.26 to 7.38)
No	1.0	1.0	1.0	1.0
Fast Foods Intake	p=0.0370	p=0.4457	p=0.6904	p=0.6140
Yes	2.57(1.11 to 5.97)	1.41(0.66 to 2.99)	0.83(0.37 to 1.83)	1.233(0.64 to 2.39)
No	1.0	1.0	1.0	1.0
Regular physical exercise	p=0.0831	p=0.1559	p=0.1005	p=0.0478
Yes	1.0	1.0	1.0	1.0
No	2.24(0.95 to 5.32)	1.89(0.85 to 4.21)	2.00(0.89 to 4.50)	2.15(1.02 to 4.52)
Gender	p=0.3591	p< 0.0001	p=0.0009	p=0.0024
Male	1.0	1.0	1.0	1.0
Female	2.15(0.54 to 8.47)	26.83(3.466 to 207.7)	22.06(1.281 to 380.0)	4.558(1.675 to 12.40)

Data is presented as p-value and odds ratios at 95% confident interval (CI), BMI: Body mass index; WC: Waist circumference; WHR: Waist to hip ratio; WHtR: Waist to height ratio

ed Hospitals in the Kumasi metropolis. Anthropometric measurement such as BMI, WC, WHR, and WHtR were used to determine obesity. The prevalence of obesity among nurses was 55.9% according to WHtR classification, 35.7%% according to WC, 29.4% according to BMI classification and 27.3% according to WHR classification. In a study conducted among nurses in South Africa, the prevalence of obesity were 68.2%, 80.5%, 56.5% using WC, WHR and WHtR respectively (Goon *et al.*, 2014). A current study by Aryee *et al.* (2014) and colleagues among nurses in the Tamale Metropolis found the prevalence of obesity to be 16.9% using BMI and WHR.

Compared with the study by Aryee and colleagues, the prevalence of obesity among nurses in the Kumasi metropolis was higher. The study findings are also consistent with some studies Ogunjimi *et al.* (2010) who reported that the prevalence of overweight/obesity is of significance to public health among nurses in Nigeria and the USA respectively. The pattern of body fat distribution as measured by BMI, WC, WHR and WHtR has been reported to be a more important determinant of chronic diseases than general obesity (Wei *et al.,* 1997; Esmaillzadeh and Azadbakht, 2008). It has also been established that markers such as WC, WHR and WHtR provides useful indices of abdominal fat accumulation and provides a better correlation with an increased risk of ill health than BMI (Goon *et al.*, 2014).

The prevalence of obesity using WC, WHR and WHtR was significantly higher compared to using BMI. In agreement with findings of this study, previous studies have also reported increased prevalence of obesity by WHR,WC and WHtR (Akpinar *et al.*, 2007; Bhurosy and Jeewon, 2014). However, other cohort studies found both WC and BMI as having equal diagnostic accuracy for obesity a component for metabolic syndrome (Han *et al.*, 2002). Inconsistencies in results suggest that predictive ability of each index of obesity may differ by age, gender and ethnic group and thus the discrete criteria to select particular obesity index should include age, gender and ethnic group specific. The measure of WC, WHR and WHtR are underutilized in clinical setting in Ghana and thus it is important to incorporate these measurements as part of routine assessment for obesity.

This study also showed that irrespective of the anthropometric measure used, prevalence of obesity was significantly high among female nurses compared to male nurses. This finding is consistent with a study conducted by Aryee *et al.* (2014) who found a significantly higher proportion of obesity among female than male Nurses. The result demonstrates that female nurses in this study are at a higher risk for chronic diseases such as hypertension, diabetes and arteriosclerosis than their male counterparts. In addition, studies in Ghana have shown that obesity is more common in women than men (Martorell *et al.*, 2000; Azadbakht *et al.*, 2005; Frempong, 2013).

The finding of a higher prevalence of central obesity was in females compared to males are also in agreement with that of Azadbakht *et al.* (2005) who reported high prevalence of central obesity in Iranian women compared to men. This gender trend also occurs in industrialized countries where fat intake as well as genetic predisposition is supposed to contribute to it (Flegal *et al.*, 2002). The reasons for this association of 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; Fezeu *et al.*, 2008) whilst some embraced cultural practices that encouraged female obesity (Benkeser *et al.*, 2012). The perception of overweight and obesity as a sign of good health, wealth and beauty in many African countries may also fuel this growing epidemic of obesity in females especially (Amoah, 2003).

Another interesting finding is the increased prevalence of obesity with increasing professional rank. The prevalence of obesity increased in the order of Staff Nurse, Enrolled Nurse, Nursing Officer, Senior Staff Nurse, Senior Nursing Officer, Principal Nursing Officer and Deputy Director of Nursing Services (DDNS) irrespective of the anthropomet-

ric parameter used. It was alarming to observe all the DDNS's were obese according to WC and WHtR classification while BMI and WHR classification gave an obesity prevalence of 75%. This finding concurs with that observed by Miller *et al.* (2008) who observed that prevalence of obesity was high in advanced practicing nurses and nurse educators. The observed high prevalence of obesity in relation to increasing professional ranking is not well understood. However, it is a significant observation because these groups of professionals are presumed to have an advanced knowledge of both the health-related risks of obesity and methods of management. A probable explanation to the increased prevalence of obesity among nurses could be due to unhealthy lifestyle behaviours such taking snacks in between meals, eating at late hours, eating at stressful hours, physical inactivity and alcoholic beverage intake as observed in this study. Taking meals at night and snacking in between meals were the most important lifestyle factors likely to contribute to increased prevalence of overweight/obesity observed in this study.

Taking meals at late hours was associated with a 2.5 times increased risk of obesity according to BMI and WHtR respectively. Taking meals at late hours has been linked to meals skipping in obese individuals. A particular habit of meal skipping is becoming a norm rather than an exception with most professionals as they become inundated with work. This finding from this present study supports the fact the taking meals at late hours is a contributing factor to weight gain and obesity as established in some studies (Jenkins *et al.*, 1994; Ma *et al.*, 2003) who reported that skipping meals or late eating was associated with a significantly higher risk for overweight and obesity. Other unhealthy lifestyle behaviours such as taking meals at stressful hours was significantly associated with a 7.9 times risk of obesity classified according to BMI, 3.3 times risk of central obesity (WC) and 3.1 times risk of obesity by WHtR. This is consistent with studies by Drapeau *et al.* (2003) and Nishitani and Sakakibara (2006) who observed an association between stress and obesity.

Many studies (Senekal *et al.*, 2003; Kruger *et al.*, 2005; Steyn and Damasceno, 2006) have shown that unhealthy lifestyle behaviours, particularly lack of exercise which invariably leads to low physical activity contribute significantly to overweight and obese tendencies. In this respect, our findings showed that nurses who did not engage in regular physical activity were 2.1 times increase risk of obesity when WHtR was used. 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).

However the study did not observed any significant association of physical inactivity and obesity. The effect of fast food intake on obesity has been reported by Dodor (2013) in a previous study among adults population. From this study, it was observed that that fast food intake was associated with 2.6 times risk of obesity. Females gender were 26.8 times risk of obesity by WC classification, 22.06 times by WHR classification and 4.55 times increase risk by WHtR classification respectively. This confirms that earlier findings of this study which observed high prevalence of obesity in females compared to male participants.

CONCLUSION

Results from this study have showed that prevalence of obesity is high among the nurses within the Kumasi metropolis. Being a female coupled with high nurse rank was associated with high prevalence of obesity. Taking of snacks in between meals, eating meals late at night, and eating meals at stressful hours, physical inactivity, excessive fast food intake and alcoholic beverage intake were independent risk factors of obesity. By virtue of their occupation and various sedentary tendencies associated with obesity, nurses are at significant risk of becoming overweight and obese 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.

REFERENCE

Akpinar E., Bashan I., Bozdemir N. and Saatci E. (2007) Which is the best anthropometric technique to identify obesity: body mass index, waist circumference or waist-hip ratio? *Collegium antropologicum* 31(2), 387-393.

Amoah A.G. (2003) Sociodemographic variations in obesity among Ghanaian adults. *Public health nutrition* 6(08), 751-757.

Aryee P., Helegbe G., Baah B., Sarfo-Asante R. and Quist-Therson R. (2013) Prevalence and Risk Factors for Overweight and Obesity among Nurses in the Tamale Metropolis of Ghana. *Journal of Medical and Biomedical Sciences* 2(4), 13-23.

Aryee P., Helegbe G., Baah B., Sarfo-Asante R. and Quist-Therson R. (2014) Prevalence and Risk Factors for Overweight and Obesity among Nurses in the Tamale Metropolis of Ghana. *Journal of Medical and Biomedical Sciences* 2(4), 13-23.

Ashwell M. (2009) Obesity risk: importance of the waist-to-height ratio. *Nursing Standard* 23 (41), 49-54.

Azadbakht L., Mirmiran P., Shiva N. and Azizi F. (2005) General obesity and central adiposity in a representative sample of Tehranian adults: prevalence and determinants. *International journal for vitamin and nutrition research* 75 (4), 297-304.

Benkeser R., Biritwum R. and Hill A. (2012) Prevalence of overweight and obesity and perception of healthy and desirable body size in urban, Ghanaian women. *Ghana medical journal* 46(2), 66-75.

Bhurosy T. and Jeewon R. (2014) Overweight and Obesity Epidemic in Developing Countries: A Problem with Diet, Physical Activity, or Socioeconomic Status? *The Scientific World Journal* 2014.

Centers for Disease Control Prevention (2006) State-specific prevalence of obesity among adults--United States, 2005. *MMWR. Morbidity and mortality weekly report* 55(36), 985.

Dodor B.A. (2013) Effects of religiosity on physical activity, fast food intake, and obesity in emerging adults. *Journal of Behavioral Health* 2(1), 19-26.

Drapeau V., Therrien F., Richard D. and Tremblay A. (2003) Is visceral obesity a physiological adaptation to stress? *Panminerva medica* 45 (3), 189-196.

Esmaillzadeh A. and Azadbakht L. (2008) Major dietary patterns in relation to general obesity and central adiposity among Iranian women. *The Journal of nutrition* 138(2), 358-363.

Fezeu L.K., Assah F.K., Balkau B., Mbanya D.S., Kengne A.P., Awah P.K. and Mbanya J.C.N. (2008) Ten-year Changes in Central Obesity and BMI in Rural and Urban Cameroon. *Obesity* 16(5), 1144-1147.

Flegal K.M., Carroll M.D., Ogden C.L. and Johnson C.L. (2002) Prevalence and trends in obesity among US adults, 1999-2000. *Jama* 288(14), 1723-1727.

Frempong G.A. (2013) Perceived Body Weight and Actual Body Mass Index (BMI) among Urban Poor Communities in Accra, Ghana, University of Ghana.

Goon D., Maputle M., Olukoga A., Lebese R., Khoza L. and Mothiba T. (2014) Anthropometrically determined abdominal obesity among nurses in Vhembe and Capricorn Districts, Limpopo, South Africa. *Biomedical Research* 25(4), 567-572.

Han T.S., Williams K., Sattar N., Hunt K.J., Lean M.E. and Haffner S.M. (2002) Analysis of obesity and hyperinsulinemia in the development of metabolic syndrome: San Antonio Heart Study. *Obesity research* 10(9), 923-931.

Jackson J.E., Doescher M.P., Saver B.G. and Hart L.G. (2005) Trends in professional advice to lose weight among obese adults, 1994 to 2000. *Journal of general internal medicine* 20(9), 814-818.

Jenkins D., Jenkins A.L., Wolever T., Vuksan V., Rao A.V., Thompson L.U. and Josse R.G. (1994) Low glycemic index: lente carbohydrates and physiological effects of altered food frequency. *The American journal of clinical nutrition* 59(3), 706S-709S.

Kruger H.S., Puoane T., Senekal M. and Van der Merwe M. (2005) Obesity in South Africa: challenges for government and health professionals. *Public health nutrition* 8(05), 491-500.

Ma Y., Bertone E.R., Stanek E.J., Reed G.W., Hebert J.R., Cohen N.L., Merriam P.A. and Ockene I.S. (2003) Association between eating patterns and obesity in a free-living US adult population. *American journal of epidemiology* 158(1), 85-92.

Martorell R., Khan L.K., Hughes M.L. and Grummer-Strawn L.M. (2000) Obesity in women from developing countries. *European journal of clinical nutrition* 54(3), 247-252.

Miller S.K., Alpert P.T. and Cross C.L. (2008) Overweight and obesity in nurses, advanced practice nurses, and nurse educators. *Journal of the American Academy of Nurse Practitioners* 20(5), 259-265.

Nishitani N. and Sakakibara H. (2006) Relationship of obesity to job stress and eating behavior in male Japanese workers. *International journal of obesity* 30(3), 528-533.

Ogden C.L., Carroll M.D., Kit B.K. and Flegal K.M. (2014) Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama* 311(8), 806-814.

Ogunjimi L., Ikorok M.M. and Olayinka Y. (2010) Prevalence of obesity among Nigeria nurses: the Akwa Ibom State experience. *International NGO Journal* 5(2), 045-049.

Senekal M., Steyn N.P. and Nel J.H. (2003) Factors associated with overweight/obesity in economically active South African populations. *Ethnicity & disease* 13(1), 109-116.

Skelton J.A., Cook S.R., Auinger P., Klein J.D. and Barlow S.E. (2009) Prevalence and trends of severe obesity among US children and adolescents. *Academic pediatrics* 9(5), 322-329.

Steyn K. and Damasceno A. (2006) Lifestyle and related risk factors for chronic diseases. *Disease and mortality in sub-Saharan Africa* 2247-265.

Wei M., Gaskill S.P., Haffner S.M. and Stern M.P. (1997) Waist Circumference as the Best Predictor of Noninsulin Dependent Diabetes Mellitus (NIDDM) Compared to Body Mass Index, Waist/hip Ratio and Other Anthropometric Measurements in Mexican Americans—A 7-Year Prospective Study. *Obesity research* 5(1), 16-23.

WHO (1995) Physical status: The use of and interpretation of anthropometry, Report of a WHO Expert Committee.

WHO (2000) *Obesity: preventing and managing the global epidemic*: World Health Organization.

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