

Prevalence of Overweight/Obesity and its Associated Factors among Undergraduate Nursing and Midwifery Students in Northern Region of Ghana.

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Abstract

The worldwide increase of overweight and obesity has become a serious concern and impacts all ages and people of every class. The World Health Organization (WHO) reports an increase of overweight youngsters due to change of lifestyles, eating habits and a decrease in exercise. Academic pressure, poor eating, and inactivity make university students a particularly high-risk group to gain overweight status. In Ghana, the burden of overweight and obesity has been increasing, with evidence suggesting a growing prevalence among young adults, including tertiary students. However, very little information is available to understand the implications of overweight and obesity on health for nursing and midwifery students who are the future health practitioners. Understanding the implications of overweight and obesity for this group is very important, as it will impact their health behaviours, and, in turn, their ability to adopt a healthy lifestyle, and, to influence health behaviours in the community. This study therefore sought to determine the prevalence of overweight and obesity and examined the associated factors among undergraduate nursing and midwifery students in the Northern Region of Ghana.

Method

An institutional-based study with a cross-sectional design was employed with quantitative approach. This study was conducted among undergraduate nursing and midwifery students of University for Development Studies (UDS) on Tamale Campus. The study employed a probability sampling technique and sampled 422 students from all the department under School of Nursing and Midwifery. Bivariate analysis was conducted to test the relationship between the dependent variable (prevalence of overweight/obesity) and the independent variables with a confidence interval of 95% ($p=0.05$).

Results

The study showed that 30.3% of students were 25 years or younger, and while 69.4% had a normal weight, about 30.6% were overweight or obese. Specifically, 25.5% were overweight and 5.1% were obese. Age, level of study, and marital status were all significantly associated with students' nutritional status, whereas place of residence showed no significant relationship. Further analysis revealed that age, level of study, and marital status were also significant predictors of overweight and obesity. Notably, students aged 36–40 years were almost four times more likely to develop overweight or obesity compared to those aged 25 years and below (AOR = 3.912, 95%CI: 1.798 to 8.512, $p = 0.001$).

Conclusion

The study revealed that although most nursing and midwifery students maintained a normal weight, a considerable proportion were overweight or obese. This highlights the need for targeted interventions to address weight-related health risks among undergraduate nursing and midwifery students. It is recommended that universities implement regular nutrition and lifestyle education programmes, focusing particularly on older students and those at higher levels of study, to promote healthy habits and reduce the risk of overweight and obesity.

Keywords: Prevalence, Obesity, Overweight, Nutritional Status, and Student

1. Introduction

Background

The vast majority of cardiovascular diseases (CVDs), which account for the leading cause of death across the globe, are preventable by addressing changing behavioural risk factors (1). Over a ten-year period, 57% of women reported more incidences of CVD as compared to 53% of men which were attributed to modifiable risk factors and can be changed to reduce the risk of CVD (2). In 2021, CVDs caused 20.5 million deaths globally, approaching one-third of all global deaths (3). Moreover, 80% of all deaths occurred in low to moderate income countries signifying substantial health disparities and that 80% of all early myocardial infarction and cerebrovascular accidents are avoidable (4).

The leading causes of death worldwide, such as diabetes, heart disease, and some types of cancer, are known to be associated with obesity (5). It is associated with certain lifestyle behaviours, including bad diet and exercise, sedentary behaviour, alcohol and tobacco use, and poor sleep quality, among undergraduates, who are primarily part of the young adult demographic (6,7).

Overweight/obesity is the fifth and sixth level two public health issue for women and men, respectively, as it adds to global morbidity and mortality rates (8). The exposure rate continues to rise by more than 0.5% each year, making it one of the highest contributors to attributable disability-adjusted life years (DALYs) (9). In the last 50 years, obesity has become exceedingly prevalent, at pandemic levels, with 39 million children, 340 million adolescents and 650 million adults identified as obese (10,11). According to predictions, 167 million people and children would become less healthy by 2025 as a result of the obesity

pandemic (10). Obesity may have significant effects on population health and healthcare costs in the future, particularly in emerging nations (12).

Based on recent national data, the prevalence of being overweight and obese is expected to be 25.4% and 17.1%, respectively (13). Obesity is more common in women than in males among Ghanaian adults, and it reflects the degree of urbanization (13). A meta-analysis of sixteen studies including 29,160 Ghanaian children under the age of 19 found that 10.7% were overweight and 8.6% were obese (14). Numerous studies have quantified Ghana's obesity burden, with particular attention to the overall adult population, women, school-age children, adolescents, healthcare professionals, civil servants, and commercial workers. However, there is a lack of information regarding young Ghanaian adults' experiences with obesity and overweight. Based on the small amount of research conducted in Ghana, overweight and obese among young adults is between 4.2 and 39.3% (15–17). Variation in lifestyle and health behaviours among the age groups lead to population non-representativeness.

Nurses are the biggest healthcare profession addressing risk factors and lowering risk for all patients receiving care for their CVD in primary, secondary, and tertiary settings (18). Nurses have an opportunity to offer guidance and assistance for improving modifiable lifestyle factors related to CVD and to decrease the risk of CVD. The current research literature indicates that the behaviour of nurses influences the way patients and the wider public respond to health education, suggesting that it is important for nurses to behave in ways that model healthy lifestyle behaviours (19,20). It may be assumed that nurses would exhibit less engagement in such behaviours because of their professional training and daily contact to patients or clients suffering from illnesses connected to CVD-related risk factors like smoking and obesity, but this is not the case. It has been discovered that between 55% and 79% of nurses worldwide were overweight and obese, respectively (21). Nurses and midwives have been shown to have high rates of smoking, dangerous alcohol use, not meeting the recommended 150 minutes of physical exercise each week, and unhealthy dietary choices, such as consuming five fruits and vegetables each day (19,20). The demographics of undergraduate nursing and midwifery students likewise exhibit this degree of harmful lifestyle behaviour.

The pressures of attending university result in undergraduate nursing students engaging in unhealthy lifestyle behaviours such as meal preparation, adapting to new shift patterns and being away from home (22). In a qualitative study in Australia with nursing students, health promoting lifestyle behaviours consisted of eating a healthy diet, regular exercise and refraining from alcohol and smoking (23). However, a global meta-analysis of smoking among midwives and nursing students showed a pooled frequency of 26.6%, which is greater than the general population's prevalence of 22.3% (36.7% men and 7.8% women) (21).

A third modifiable behaviour is drinking alcohol. In one Irish cohort, for example, 19.2% of female nursing students drank more than the recommended limit of alcohol for a week, and 10% in Scotland; in a study in Mexico, 4.6% of students were at high-risk for alcohol consumption (24–26). Reduced physical activity and poor diet are two of the other modifiable behaviours among nursing students, in addition to smoking and drinking. Generally, nursing students in Iran and Thailand had a poor health-promoting lifestyle with low physical activity (27). University students in general often have a poor diet and low physical fitness.

According to cross-sectional research, 34.7% of nursing and midwifery students in Brazil, 57% in the USA, 61.3% in Australia, 50% in English College, 79.1% in South Africa, 69% at Scotland were overweight or obese (28–32). Furthermore, nursing students were sedentary for an average of up to six hours a day on weekdays and had a maximum daily sedentary time of 20 hours (28–32). A systematic review of students reported a maximum sedentary time of 14.35 hours (33). Although the sedentary time is higher for some nursing students, it is not the norm.

With regard to nutrition, 40% of students reported consuming high-fat and high-sugar foods on a daily basis, and 29% reported eating less than five servings of fruit and vegetables (29). Early in their studies, nursing students often adopt negative behaviours that are difficult to change as they transition into academic and clinical environments, such as stress, unhealthy diets, and sedentary behaviour (34,35).

Despite the increasing global concern, there is limited empirical data on the prevalence and determinants of overweight and obesity among nursing and midwifery students in Ghana, particularly in Tamale. Understanding the magnitude of the problem and identifying the associated factors within this population are crucial for developing targeted interventions to promote healthier lifestyles among future healthcare providers. Early detection of risk factors of overweight or obesity among college students can enable focused treatments to promote better lives and possibly lower future health issues (36). In addition to being crucial since nursing students will be the future workforce and health advocates for those under their care, their personal lifestyle choices during their professional education might have a favourable or negative impact on their future health status. Therefore, this study aims to determine the prevalence and factors associated with overweight and obesity among nursing and midwifery students in Tamale.

Materials and methods

Study design

This institutional-based study was conducted by using a cross-sectional design between February 2022 to June 2022 at University for Development Studies' Campus at Dungu-Tamale. The study was quantitative in nature. The cross-sectional design allowed for gathering data to assess both the prevalence of overweight and obesity, and a detailed list of possible associated factors, at one point in time. It is a manageable and cost-effective design advantageous for describing the current health and lifestyle behaviours of the participants. It also allows an examination of relationships between variables, without requiring data from follow up. Meanwhile, the quantitative approach helped to gather numerical data on measurable variables, including weight, height and lifestyle, then analyse it statistically. This approach provides objective, generalisable data to inform evidence-based strategies to promote healthy lifestyles among nursing and midwifery students.

Study Settings

The study was conducted at School of Nursing and Midwifery (SoNM) of University For Development Studies (UDS) on Tamale Campus. The SoNM was established to prepare nurses and midwives who are competent, caring, and community-minded, with the intent to provide safe and effective health care in Ghana and beyond. The SoNM has undergraduate programmes and postgraduate programmes in Nursing, Midwifery, Public Health Nursing, and Community Health Nursing, designed to deliver a curriculum that draws on both classroom learning, clinical learning, and community-based learning.

The SoNM educates a large, diverse body of future health professionals from various regions in Ghana, providing an excellent opportunity to examine health-related behaviour and outcomes in student nurses and midwives. These students must be prepared to be positive health role models and advocates for healthy lifestyle within their communities. Thus, understanding their own health status - including overweight and obesity - is an important first step to increase their ability to engage positively with the healthy lifestyle advocacy process. Second, students at university will often experience lifestyle changes such as increased irregular dietary habits, decreased physical activity levels, increased academic stress, which could contribute to weight gain. Conducting the study in this environment takes advantage of information on the academic and social aspects of student life, and how these may impact their health. During the period of the study, the SoNM had two thousand, one hundred and fifty-nine (2159) students.

Study population

The study was conducted among nursing and midwifery students at UDS. All regular students who were on campus during the period of the study were eligible to participate in the study. Students who were pregnant were excluded from the study.

Sampling techniques

The sample size was allocated proportionately for each academic programme within the SoNM. The students were stratified using a stratified sampling technique into four groups: BSc Midwifery, BSc Nurse Practitioner, BSc Nursing, and BSc Paediatric Nursing. Stratification was also applied to academic levels (Levels 200 to Level 400), so that students were represented from each year of study. Proportionate-to-size method was used to determine the number of students to be recruited from each programme and level. Within each level, systematic sampling was employed to select individual participants. Class lists, which included all year levels, were obtained to use as a sampling frame. A calculated sampling interval was applied to the class lists to select participants at regular intervals. The students who were selected were invited to attend the data collection event at a common venue. This method was incorporated to also include students who did not consistently attend classes and helped to minimize possible selection bias. The table below provides the total number of students in each programme with the number sampling for the study.

Table 1 Population of students and sample selected from each

Department /programme	Level/Category	Population (N)	Sample (n)
Nursing (n=1095)	Top Up 400	70	14
	Top Up 300	219	43
	Mature 400	97	19
	Matured 300	224	44
	Generic 400	100	20
	Generic 300	160	31
	Generic 200	225	44
Midwifery (n=915)	Top Up 400	206	40
	Matured 400	57	11

	Matured 300	67	13
	Matured 200	84	17
	Generic 400	156	31
	Generic 300	213	42
	Generic 200	132	26
Advance Nursing (n = 73)	Practitioners 400	36	7
	Practitioners 300	37	7
Pediatrics (n = 67)	Pediatrics 400	67	13
Total		2150	422

Data collection techniques

Anthropometric measurements, including weight and height, were obtained from all participants following standard procedures. Participants' weight was measured using a calibrated electronic Charter Medical weighing scale, recorded to the nearest 0.1 kilogram (kg). All participants were measured barefoot, wearing light clothing, and with empty pockets to ensure accuracy. Prior to each measurement, the scale was verified to read zero (0) kg. Height was measured in centimeters (cm) using a wall-mounted stadiometer, with participants standing upright, barefoot, and with their heels, buttocks, and back of the head touching the measuring surface. The recorded heights were then converted into meters (m) for analysis. Body Mass Index (BMI) was calculated as weight in kilograms divided by the square of height in meters (kg/m²), and values were recorded to one decimal place.

Sample size calculation

The Cochran's formula was employed to determine the appropriate sample size for the study, using the following parameters: a margin of error (d) of 5%, a confidence interval (CI) of 95%, and an estimated population proportion (p) of 0.5 (50%), representing the assumed prevalence of hypertension in the absence of a known estimate. Using the Cochran's formula:

$$n = \frac{z^2 pq}{d^2}, \text{ where: } n = \text{sample size; } z = \text{confidence interval at 95\%} = 1.96$$

$$p = \text{estimated proportion of prevalence of hypertension} = 50\% = 0.5$$

$$q = 1 - p \text{ (i.e. } q = 1 - 0.5 = 0.5\text{); } d = \text{error margin} = 0.05$$

$$= \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = \frac{3.8416(0.25)}{0.0025} = \frac{0.9604}{0.0025} = 384.16 \approx 384$$

Therefore, the minimum sample size required was approximately 384 participants. To compensate for a possible 10% non-response rate, the sample size was adjusted as follows:

$$384 + (0.10 \times 384) = 422$$

Hence, a total of **422 participants** were selected as the final representative sample for the study.

Statistical analysis

Data collected through Google Forms were downloaded into Microsoft Excel for initial cleaning and coding before being imported into IBM Statistical Package for the Social Sciences (SPSS) version 24 for analysis. Descriptive statistics were used to summarize the data: means and standard deviations were computed for continuous variables, while frequencies and percentages were generated for categorical variables. The Body Mass Index (BMI) of each participant was calculated as weight in kilograms divided by height in meters squared (kg/m^2).

Univariate analysis was performed to explore the distribution of variables, followed by bivariate analysis using Pearson's chi-square test to examine associations between categorical independent variables and the dependent variable. Subsequently, a binary logistic regression model was employed to determine the strength and direction of associations between selected factors and overweight or obesity. A p-value < 0.05 was considered statistically significant. The prevalence of overweight and obesity was then compared among the different categories of students.

Ethical consideration

Ethical clearance for the research was granted by the Committee on Human Research, Publication and Ethics (CHRPE) of Kwame Nkrumah University of Science and Technology (KNUST), with the reference number: CHRPE/019/22. Permission to undertake the research was also granted by the School of Nursing and Midwifery, University for Development Studies (UDS). Researchers ensured that all possible participants were presented with the purpose and process of the study, and that confidentiality was maintained prior to data collection.

Prior to administering the questionnaire, written informed consent was obtained from each volunteer participant, in duplicate. Each participant was given a study information sheet that addressed the study's purpose, risks and benefits of participation, confidentiality, that participation was voluntary, the opportunity to withdraw at any time, and contact information in case of questions. The consent form included statements that confirmed the participant's voluntary agreement and that the researcher obtained informed consent.

In an effort to maintain anonymity and confidentiality, all the questionnaires were assigned unique codes and not names or personal identifiers. All data collected were held completely confidential and only used for the purposes of research.

Results

Socio demographic characteristics of students

The study recruited 422 nursing and midwifery students from University for Development Studies to respond to the survey. Two female students were excluded because they were pregnant, and eight students did not report for data collection. This gave the study a 97.6% response rate.

The study showed that 50.2% of the respondents were nursing students. The majority (76.9%) of the respondents were female. A good proportion (30.3%) of the respondents were aged 25 years and below.

It was revealed that 22.3% of the respondents Dagomba. It was found that 51.9% of the respondents lived in urban areas. The majority (93.4%) of the respondents lived in off-campus hostels.

It was further revealed that 24.0% of the respondents were studying Midwifery Generic. A good proportion (37.0%) of the respondents were in Level 400. The study showed that 52.7% of the respondents were Christians. It was found that 63.1% of the respondents were single. Table 1 contains more information.

Table 1 Socio-demographic Characteristics of Nursing and Midwifery Students in UDS (n=412)

Variable	Frequency (percentage)
Sex	
Male	95(23.1)
Female	317(76.9)
Department	
Advance nursing	14(3.4)
Midwifery	178(43.2)
Nursing	207(50.2)
Paediatric nursing	13(3.2)
Marital status	
Married	122 (29.6)
Single	260 (63.1)
Dating	27 (6.6)
Separated	1 (0.2)
Age (years)	
=<25	125(30.3)
26 – 30	122(29.6)
31 – 35	121(29.4)
36 – 40	37(9.0)
≥41	7(1.7)
Level	
200	82(20.0)
300	176(43.0)
400	154(37.0)
Ethnicity	
Northerner	299 (72.6)
Southerner	113 (27.4)
Religion	
Christianity	217 (52.7)
Traditionalist	1 (0.2)
Muslim	193 (46.8)
None	1 (0.2)

Prevalence of overweight/obese among the students

It was found that 19(4.6%), and 267(64.8%) of the students were underweight and normal weight respectively. Moreover, 105(25.5%) of the students were overweight and 21(5.1%) were obese. Figure 1 shows more information.

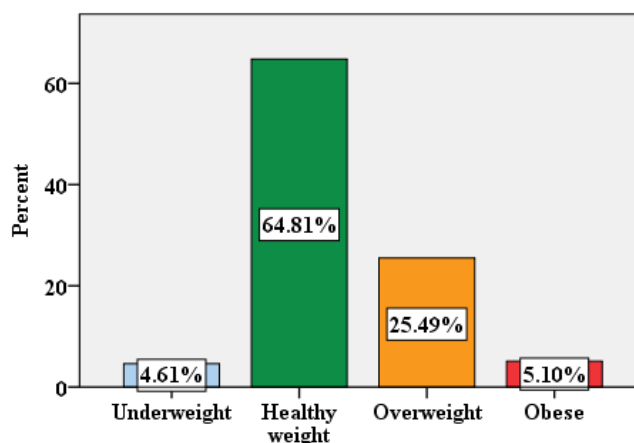


Figure1: The prevalence of overweight/obese among the students

Distribution of BMI classification according students' characteristics

It was indicated that a higher proportion of students aged 41 years and above (14.3%) reported more underweight as compared to their counterparts in the various age group. It was revealed that 69.6% of respondents aged 25 years and below were more likely to have normal weight as compared to their counterparts. It was 42.9% respondent aged 41 years and above were more likely to be overweight as compared to their counterparts. However, students aged 25 years and below were more likely to be obese as compared to their counterparts. There was a significant association between age of respondents their nutritional status ($X^2 = 33.700$, $p = 0.001$).

Moreover, students who resides in urban areas (6.5%) reported a higher proportion of underweight than their counterparts in rural areas. It was indicated that students who resides in rural areas reported (68.2%), and (26.3%) higher proportion of normal weight, and overweight respectively as compared to their counterpart. The result indicated that students who live in urban areas (7.0%) were more likely to be obese as compared to those who live in rural areas. The result showed no significant association between respondents' residence and their nutritional status ($X^2 = 7.554$, $p = 0.056$).

The result showed that students in Level 200 reported (7.3%), and (71.9%) higher proportion of underweight and normal weight respectively as compared to their counterparts. Again, students in Level 400 (31.3%) were more likely to be more overweight, compared to their counterparts. It was indicated that students in Level 200 (7.3%) reported a higher proportion of obesity as compared to their counterparts. The result found a significant association between Level of students and their nutritional status ($X^2 = 15.853$, $p = 0.015$).

The result indicated that (50.0%) students who were cohabitating were more likely to report underweight, compared to their counterparts. It was showed that students who were separated (100.0%) reported a higher proportion of normal weight as compared to their counterparts. Again, students who were married

(33.6%), and (8.2%) reported higher proportion of overweight, and obesity respectively as compared to their counterparts. Marital status of respondents showed significant association with their nutritional status ($X^2 = 25.515$, $p = 0.013$). Table 2 contains more information.

Table 2: Distribution of BMI classification according students' characteristics

Variable	BMI Classifications				Chi-square (P-value)
	Underweight n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	
Name of department					
Advance nursing	0(0.0)	8(57.1)	6(42.9)	0(0.0)	8.214 (0.513)
Midwifery	6(3.4)	113(63.5)	46(25.8)	13(7.3)	
Nursing	12(5.8)	138(66.7)	49(23.7)	8(3.9)	
Paediatric Nursing	1(7.7)	8(61.5)	4(30.8)	0(0.0)	
Sex					
Male	2(2.1)	68(71.6)	21(22.1)	4(4.2)	3.300 (0.348)
Female	17(5.4)	199(62.8)	84(26.5)	17(5.4)	
Age (years)					
≤25	10(8.0)	87(69.6)	22(17.6)	6(4.8)	33.700 (0.001)
26 – 30	6(4.9)	83(68.0)	30(24.6)	3(2.5)	
31 – 35	2(1.7)	76(62.8)	38(31.4)	5(4.1)	
36 – 40	0(0.0)	18(48.6)	12(32.4)	7(18.9)	
≥41	1(14.3)	3(42.9)	3(42.9)	0(0.0)	
Residence					
Urban	14(6.5)	132(61.7)	53(24.8)	15(7.0)	7.554 (0.056)
Rural	5(2.5)	135(68.2)	52(26.3)	6(3.0)	
Residence on campus					
Campus hostel	2(7.4)	20(74.1)	3(11.1)	2(7.4)	3.518 (0.318)
Off-campus hostel	17(4.4)	247(64.2)	102(26.5)	19(4.9)	
Level					
200	7(7.3)	69(71.9)	13(13.5)	7(7.3)	15.853 (0.015)
300	8(4.7)	111(65.7)	46(27.2)	4(2.4)	
400	4(2.7)	87(59.2)	46(31.3)	10(6.8)	
Religion					
Christianity	10(4.6)	141(65.0)	55(25.3)	11(5.1)	1.116 (0.999)
Islamic	9(4.7)	124(64.2)	50(25.9)	10(5.2)	
Traditionalist	0(0.0)	1(100.0)	0(0.0)	0(0.0)	
Marital status					

Single	13(5.0)	179(68.8)	57(21.9)	11(4.2)	25.515 (0.013)
Married	2(1.6)	69(56.6)	41(33.6)	10(8.2)	
Separated	0(0.0)	1(100.0)	0(0.0)	0(0.0)	
Dating	3(11.1)	17(63.0)	7(52.9)	0(0.0)	
Cohabiting	1(50.0)	1(50.0)	0(0.0)	0(0.0)	

Source: Field survey, 2022

The prevalence of overall overweight/obesity among the students

The result of the study indicated 286(69.4%) of the students reported normal weight. However, 126(30.6%) of the students reported overweight/obesity.

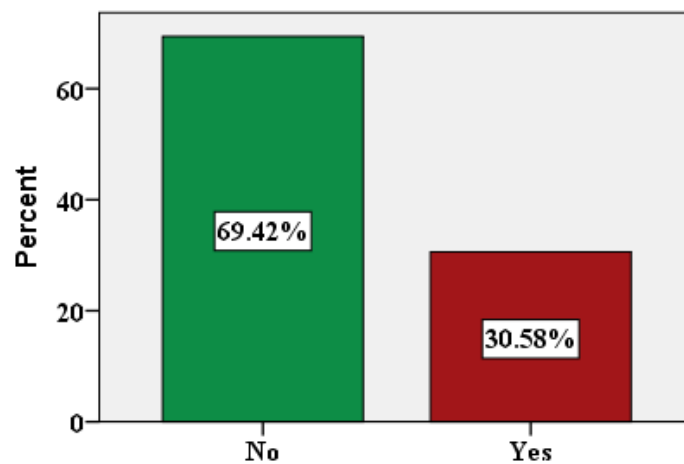


Figure 2: Prevalence of overweight/obesity among undergraduates' students

Distribution of prevalence of overweight/obesity among students' characteristics

It was revealed that 77.6% of respondents aged 25 years and below had greater likelihood of having normal weight as compared to their counterparts. However, 51.4% of respondents aged 36 to 40 years had a greater likelihood of having overweight/obesity, compared to their counterparts. Respondents' age was found to be a significant predictor of overweight/obesity ($X^2 = 14.073$, $p = 0.007$).

Moreover, 79.2% of students in Level 200 had a higher likelihood of having normal weight as compared to their counterparts. Meanwhile, 38.1% of students in Level 400 reported a higher likelihood of having overweight/obesity, compared to their counterparts. The Level of students had a significant association with prevalence of overweight/obesity ($X^2 = 8.285$, $p = 0.016$).

The result also indicated that students who were separated (100.0%), and cohabitating (100.0%) equally had a greater chance of having normal weight, compared to their counterparts. However, students who were married reported a higher proportion of overweight/obesity as compared to their counterparts. The marital status of the students was a significant predictor of having prevalence of overweight/obesity ($X^2 = 11.235$, $p = 0.024$). More information is showed in Table 3.

Table 3: Distribution of o prevalence of overweight/obese among students' characteristics

Variable	Prevalence of overweight/obese		Chi-square (P-value)
	No n (%)	Yes n (%)	
Name of department			
Advance nursing	8(57.1)	6(42.9)	2.450 (0.484)
Midwifery	119(66.9)	59(33.1)	
Nursing	150(72.5)	57(27.5)	
Pediatric Nursing	9(69.2)	4(30.8)	
Sex			
Male	70(73.7)	25(26.3)	1.059 (0.303)
Female	216(68.1)	101(31.9)	
Age (years)			
≤25	97(77.6)	28(22.4)	14.073 (0.007)
26 – 30	89(73.0)	33(27.0)	
31 – 35	78(64.5)	43(35.5)	
36 – 40	18(48.6)	19(51.4)	
≥41	4(57.1)	3(42.9)	
Residence			
Urban	146(68.2)	68(31.8)	0.299 (0.585)
Rural	140(70.7)	58(29.3)	
Residence on campus			
Campus hostel	22(81.5)	5(18.5)	1.981 (0.159)
Off-campus hostel	264(68.6)	121(31.4)	
Level			
200	76(79.2)	20(20.8)	8.285 (0.016)
300	119(70.4)	50(29.6)	
400	91(61.9)	56(38.1)	
Religion			
Christianity	151(69.8)	66(30.4)	0.907 (0.824)
Islamic	133(68.9)	60(31.1)	
Traditionalist	1(100.0)	0(0.0)	
Marital status			
Single	192(73.8)	68(26.2)	11.235 (0.024)
Married	71(58.2)	51(41.8)	
Separated	1(100.0)	0(0.0)	
Dating	20(74.1)	7(25.9)	
Cohabiting	2(100.0)	0(0.0)	

Binary logistic regression of prevalence of overweight/obesity according to their characteristics

A binary logistic regression analysis was performed with odd ratio estimated. When the module was not adjusted, the odds of students aged 36 to 40 years developing overweight/obesity were 2.8 times more likely as compared to students aged 25 years and below (OR = 2.8, 95% CI: 1.072 to 7.138). Students aged 36 to 40 years were found to be a significant predictor of developing overweight/obesity ($p = 0.0035$). However, no other variable showed a statistically significant association with development of overweight/obesity. More information is provided in table 4.

Table 4: Binary logistic regression of prevalence of overweight/obesity according to their characteristics

	Coefficient	P-value	Odds Ratio	95% C.I. for Odds Ratio	
				Lower	Upper
Name of department					
Advance nursing	Reference				
Midwifery	-0.227	0.711	0.797	0.240	2.644
Nursing	-0.387	0.511	0.679	0.214	2.153
Pediatric Nursing	-0.886	0.297	0.412	0.078	2.180
Sex					
Male	Reference				
Female	0.483	0.117	1.622	0.886	2.969
Age (years)					
≤25	Reference				
26 – 30	0.109	0.738	1.115	0.591	2.104
31 – 35	0.392	0.265	1.481	0.743	2.950
36 – 40	1.017	0.035	2.766	1.072	7.138
≥41	0.928	0.294	2.530	0.447	14.311
Place of Residence					
Urban	Reference				
Rural	-0.284	0.223	0.753	0.477	1.189
Place of Residence on Campus					
Campus Hostel	Reference				
Off-campus Hostel	0.420	0.435	1.522	0.531	4.362
Leve					
200	Reference				
300	0.446	0.180	1.561	0.814	2.997
400	0.626	0.069	1.869	0.952	3.673
Religion					
Christianity	Reference				
Islamic	0.092	0.689	1.096	0.699	1.718

Traditionalist	-20.185	1.000	0.000	0.000	.
None	-19.530	1.000	0.000	0.000	.
Marital status					
Single	Reference				
Married	0.352	0.228	1.422	0.803	2.518
Separated	-21.297	1.000	0.000	0.000	.
Dating	0.087	0.855	1.091	0.428	2.782
Cohabiting	-20.518	0.999	0.000	0.000	.

Binary logistic regression of prevalence of overweight/obesity according to their characteristics

When the model was adjusted, it was revealed that students aged 31 to 35 years were 1.9 times more likely to develop overweight/obesity as compared to students aged 25 years and below (AOR = 1.905, 95% CI: 1.087 to 3.337, $p = 0.024$). Respondents aged 31 to 35 years had a significant association with prevalence of overweight/obesity ($p = 0.024$).

It was also indicated that students aged 36 to 40 years were 3.9 times more likely to develop overweight/obesity as compared to students aged 25 years and below (AOR = 3.912, 95%CI: 1.798 to 8.512, $p = 0.001$). The result showed a significant between students aged 36 to 40 years and development of overweight/obesity.

Moreover, students in Level 400 were 2.3 times more likely to develop overweight/obesity as compared to students in Level 200 (AOR = 2.338, 95% CI: 1.290 to 4.238). Students being in Level 400 showed a significant association with developing overweight/obesity ($p = 0.005$).

The result of the study revealed that students who were married were 2.0 times more likely to develop overweight/obesity as compared to students who are single (AOR = 2.028, 95% CI: 1.288 to 3.193, $p = 0.002$). Respondents being married was a significant predictor of developing overweight/obesity ($p = 0.002$).

No other variable was statistically significant among the students and the development of overweight/obesity in this study. Table 5 contains more information.

Table 5: Binary logistic regression of prevalence of overweight/obesity according to their characteristics

	Coefficient	P-value	Adjusted Odds Ratio	95% C.I. for Adjusted Odds Ratio	
				Lower	Upper
Name of department					
Advance nursing	Reference				
Midwifery	-0.414	0.462	0.661	0.219	1.993
Nursing	-0.680	0.226	0.507	0.168	1.524
Pediatric Nursing	-0.523	0.517	0.593	0.122	2.887
Sex					

Male	Reference				
Female	0.269	0.304	1.309	0.783	2.189
Age (years)					
≤25	Reference				
26 to 30	0.272	0.358	1.313	0.735	2.344
31 to 35	0.645	0.024	1.905	1.087	3.337
36 to 40	1.364	0.001	3.912	1.798	8.512
≥41	0.965	0.224	2.625	0.555	12.426
Place of Residence					
Urban	Reference				
Rural	-0.117	0.585	0.889	0.584	1.354
Place of Residence on Campus					
Campus Hostel	Reference				
Off-campus Hostel	0.701	0.167	2.017	0.746	5.452
Leve					
200	Reference				
300	0.468	0.122	1.597	0.882	2.889
400	0.849	0.005	2.338	1.290	4.238
Religion					
Christianity	Reference				
Islamic	0.032	0.883	1.032	0.678	1.571
Traditionalist	-20.375	1.000	0.000	0.000	.
None	-20.375	1.000	0.000	0.000	.
Marital status					
Single	Reference				
Married	0.707	0.002	2.028	1.288	3.193
Separated	-20.165	1.000	0.000	0.000	.
Dating	-0.012	0.980	0.988	0.400	2.441
Cohabiting	-20.165	0.999	0.000	0.000	.

Discussion

This study indicated that students in nursing and midwifery were 25.5% overweight and 5.1% obese. In addition, the study examined the strong associations of age (older students overweight/obese), level of study (higher levels overweight/obese), residence (rural vs urban) and marital status (married students overweight/obese)..

When compared with Ghanaian literature, both convergences and divergences emerge. For example, a recent study among Ghanaian undergraduate students (aged 16–25) reported an obesity prevalence of 6.7% among males and 9.4% among females (using combined adiposity indices) and an overall

overweight/obesity prevalence of 17.0% for males and 33.8% for females (9). The overweight/obesity estimate (30.6%) in the current study falls fairly close to the higher end of this range (33.8%) for females, suggesting that nursing and midwifery student population has a comparable burden. The Ghana study also found that university level (i.e., higher years of study) was significantly associated with obesity (9). This aligns with your finding that Level 400 students had higher odds (AOR=2.338) of overweight/obesity compared to Level 200.

Another Ghana-based study of student nurses and midwives in the Western Region found much higher obesity: among 209 students, 13.88% overweight, 17.7% obese class I, 7.18% obese class II, and 31.1% obese class III — meaning over 50% were in obese classes (37). That prevalence is markedly higher than 5.1% obesity figure (and 30.6% overweight/obesity combined) observed in the current study. The discrepancy suggests substantial variability. Possible reasons include differences in study populations (current study limited to nursing and midwifery students in Tamale vs the Western Region study across multiple training colleges), differences in measurement (the Ghana study used BMI classification including multiple obese classes), and perhaps differences in lifestyle, socioeconomic status, and regional food/physical activity patterns.

Regarding age, the present study showed that students aged 31–35 years were 1.9 times more likely, and 36–40 years were 3.9 times more likely, to develop overweight/obesity compared to students less or equal to 25 years, resonates with the broader observation that older students/adults face greater risk due to cumulative exposure to sedentary behaviours, changes in metabolism, and lifestyle shifts. The Ghana undergraduate study similarly found increasing university-level (which correlates with age) was a risk factor (9). Thus, the similarity supports the argument that even within student populations, older age groups carry heavier risk (38).

The current study showed that students in rural areas reportedly had higher normal weight and overweight proportions, whereas urban dwellers had higher obesity — can be partially explained by Ghanaian patterns where urbanisation is frequently associated with increased sedentary lifestyles and greater access to energy-dense foods. In fact, though the Ghana studies on students are limited, a school-aged children study found higher overweight/obesity in more urbanised settings (39). The rural higher overweight (26.3%) revealed in the current study is somewhat unexpected perhaps reflecting the nutrition transition and rural access to processed foods; or sample-specific features (perhaps the rural students commute from urbanised fringes). The difference may stem from local context in Tamale where “rural” may still have relatively urban characteristics, or perhaps the students residing in “rural” areas may have different living conditions.

The present study revealed that married students were 2.0 times more likely to develop overweight/obesity compared to singles students. While Ghanaian student-based studies seldom examine marital status, broader Ghanaian adult studies show marital status is a risk factor for overweight/obesity (married people often have more stable incomes, regular meals, less physical activity etc.). The alignment suggests the finding of the current study draws on a recognised social determinant of weight status. The difference could lie in the student context: married students may have additional responsibilities (household, children) or less time for physical activity, which heightens risk (40).

Overall, this study found that nearly 70% of the nursing/midwifery students in the sample were of normal weight, while the remaining 30% were considered overweight or obese. The proportions are significant yet potentially not as high as some studies involving Ghanaian student-nurses that found 50%+ obesity rates, but substantially higher than other Ghanaian undergraduate student populations that found 17%. The differences likely reflect sample considerations (nursing/midwifery student vs general undergraduate sample), geographic considerations (northern Ghana vs other regions), temporal considerations (earlier studies compared to the current study might represent earlier stages of the nutrition transitions), and considerations about measurements and definitions (BMI cut-off points and definitions of overweight and obesity). For example, the previous Ghanaian undergraduate study's combined overweight and obesity proportions were reported to be 17% for males and 33.8% for females, whereas the current study's 30.6% total overweight/obesity finding lands between the two proportions but above the male finding. The high proportions of overweight/obesity found among nursing/midwifery students may reflect high levels of student-stress, including but not limited to, exhaustion and sleep deprivation from shifts, limited-to-no time for meals, high academic load, and fewer opportunities for regular exercise.

Strength and limitations of the study

The study has been able to determine the prevalence of overweight and obesity among nursing and midwifery students in Tamale. Moreover, the large and diverse sample enhanced the representativeness of the findings within the study setting. However, the study was limited due to the cross-sectional design adopted. It could assess only association but did not establish causality. Meanwhile, the study was further limited to one municipality, which constrain the application of the findings to nursing and midwifery students in all of Ghana and so future studies should use longitudinal designs and multiple study sites to verify these findings and expand on the results..

Conclusion

The study revealed that nearly a third (30.6%) of the nursing and midwifery students in Tamale were reported to be overweight or obese, representing an increasing worry of excess body weight amongst future healthcare providers. Age, level of study and marital status were associated as being overweight or obese, with older, married and high-level students being at an increased likelihood of being overweight or obese. The finding indicated that students were likely to be overweight and/or obese as they aged and advanced through their studies and that intersecting issues of aging, decreased physical activity and academic workload contributed to increases in overweight and obesity. Based on these findings, there is a critical need for health promotion and prevention in nursing and midwifery educational institutions.

List of abbreviations

AOR	:	Adjusted Odd Ratio
CI	:	Confidence Interval
CVDs	:	Cardiovascular Diseases
DALYs	:	Disability-Adjusted Life Years

TCH	:	Tamale Central Hospital
TTH	:	Tamale Teaching Hospital
TWH	:	Tamale West Hospital
UDS	:	University For Development Studies
USA	:	United State of America

Declarations**Ethical approval and consent to participate**

The study has been approved by KNUST Ethical Review Board (CHRPE/AP/019/22) and all respondents provided verbal informed consent to participate.

Consent for publication

Not application

Availability of data materials

The datasets from the current research are available from the corresponding author on reasonable request.

Competing interests

Not applicable

Clinical trial number

Not applicable

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Authors' contributions

The study's design, data collection, analysis, interpretation, and manuscript writing were all aided by EA, LMAB, and MR. KB, FMD, and YDT helped write the manuscript, interpret the data, and design the study. The final manuscript has been read and approved by all authors.

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