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Original Research Article

Exploring the prevalence and predictors of overweight and obesity in second cycle schools in Ghana

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ABSTRACT

Background: Overweight and obesity have become pressing global public health concerns, with their prevalence steadily increasing in many countries, including Ghana. The burden of these conditions is not limited to adults. Second-cycle schools play a crucial role in shaping the physical and mental well-being of students, making it imperative to understand the prevalence and predictors of overweight and obesity in this specific demographic. This study, therefore, seeks to estimate the prevalence of overweight and obesity and the predicting factors in students in second-cycle schools in Ghana.
Methods: A cross-sectional survey was conducted in selected second-cycle schools in the Eastern, Ashanti, and Brong Ahafo Regions of Ghana from January 31st, 2019 to December 20th, 2021. The sample was determined using an assumed minimum sample of 206 people with an overweight or obesity prevalence of 15%. Two schools were picked by lottery from the list of the three districts that were selected from each region. This investigation comprised six (6) second-cycle institutions.
Results: Overall, 1086 students participated in this study. 43.74% and 56.26% females. The prevalence of obesity and overweight was 28.17%. Overweight (24.95%) and obesity (3.1%). 16.20% (female) and 11.97% (male). BMI (female-gender) and type of food (cooked at home) are predictive factors.
Conclusions: Predictive factors included BMI, gender (female), and homemade foods. Educating students and the general public on the risks of obesity and helping curb the misconception of overweight and obesity as a sign of 'good living' and beauty within Ghanaian communities is recommended.

Keywords: Obesity, Ghana, Overweight, Second cycle schools

INTRODUCTION

A popular definition of obesity is the state of abnormal or excessive fat buildup in adipose tissue to the point of harm to one's health.[1] Though the 'ailment process' of obesity entails intervention, there is a controversy in defining obesity as a disease.[2] The American Medical Associations however, have professed obesity as a chronic medical disease.[3] Nevertheless, both overweight and obesity are considered as the buildup of excess fat which increases the risk to health regionally and globally.[4,5] Being overweight is seen as a major public health issue that raises the risk of developing a number of chronic, avoidable diseases, including diabetes,

hypertension, heart disease, stroke, various malignancies, osteoarthritis, and reproductive disorders.[1] Over the years, there have been an epidemiological change in the trends of both overweight and obesity. For example, the percentage of persons with a body mass index (BMI) of 25 kg/m^2 increased from 28.8% to 36.9% for men and, from 29.8% to 38.0% for women globally between 1980 and 2013. In 2014, 17.9% of Brazilians were obese and 52.5% were overweight.[6] According to the World Health Organization, over 1.9 billion persons aged 18years and older were overweight and 650 million of these people were obese in 2016.[7] Globally, the prevalence of obesity is almost triplicated since 1975 with 39% overweight and 13% obese in grownups (>18 years) in 2016 comprising 39% females and 40% males.[8] Additional 340 million and over children and adolescents aged 5-19 years were either overweight or obese, and 38 million of children under age 5 were also either overweight or obese in 2019.[8] The rates of overweight and obesity increase in both advanced and emerging countries are alarming.[9] For Instance, the United States of America has witnessed an increasing linear trend in overweight and obesity within its population. The trend in adult ranges from 30.5% in 1999-2000 through to 39.6% in 2015-2016, while the trend in the youth is from 13.9% in 1999-2000 through to 18.5% in 2015-2016.[4] In U.K, 28.7% of the adult population in England are obese with further 35.6% as overweight. Males are more likely to be overweight or obese than females (67.2% of male, 61.5% of female. 20.1% of children aged 10-11years are obese while 14.2% are overweight in England.[10] A study of 21 European countries also revealed the range of 1.0% to 5.5% prevalence of severe obesity among children in primary schools.[11]

The majority of people on the globe reside in nations where being overweight or obese kills more people than being underweight. In 2020, there were 39 million under-fives who were overweight or obese. Approximately, 340 million overweight or obese kids and teenagers are between the ages of 5 and 19 years.[5] This is a major Public Health challenge and Africa is no exception when it comes to the burden of overweight and obesity. In the ten high-burden countries in Africa, the prevalence of obesity among adults currently ranges from 13.6% to 31%, while that of children and adolescents ranges from 5% to 16.5%. Africa was home to 24% of the world's overweight children who were aged under 5 years in 2019.[12] Across 15 countries in Africa, there is a 10.5% prevalence of obesity and a 6.1% of overweight as per the WHO categorization in Africa.[13] By February 2021, the worldwide death of Covid-19 was 2.5 million and 2.2 million were people who died to Covid-19 were people who were from countries where half of the population are classified as overweight.[14] Ten (10) high-burden African countries are projected to have one in five adults and one in 10 youngsters and adolescents to be obese by December 2023 if robust interventions are not taken. [12] Overweight and obesity have become pressing global public health concerns, with their prevalence steadily increasing in many countries, including Ghana.[1,15,16] The burden of these conditions is not limited to adults; it has extended to the adolescent population, particularly within the second-cycle schools. Second-cycle schools play a crucial role in shaping the physical and mental well-being of students, making it imperative to understand the prevalence and predictors of overweight and obesity in this specific demographic.[17]

In Ghana, study on overweight and obesity are still ongoing. Studies such as, have been conducted on the prevalence of overweight and obesity.[13,15,16,18–21] Despite these, limited original studies, however, have been conducted to assess the predictors/indicators of both overweight and obesity in Second cycle schools in Ghana. The few that have been done assessed it from the adulthood while fewer original studies done also focused on children. For example, data drawn to assessing overweight from WHO SAGE 2007/08 found a 19.6% prevalence of adults over the age of 50 years as overweight and 10.2% obese. This was increased in 2014/15 where overweight was 24.5% and obese was 15.0% with females having a 55% higher obesity than males by comparing the two data's.[15] Again, a cross-sectional study also found a 16.4% prevalence of overweight/obesity in children aged 8 to 11 years. Ghana, like many developing nations, has experienced a rapid epidemiological transition marked by shifts in lifestyle, dietary habits, and physical activity levels.[22–24] These changes, coupled with the increasing availability of high-calorie foods and sedentary lifestyles, contribute significantly to the rise in overweight and obesity among adolescents.[25] The consequences of these conditions are far-reaching, affecting not only the immediate health of the students but also their long-term well-being as they transition into adulthood.

Despite the growing recognition of the issue, there is a notable gap in research specifically focused on second-cycle schools in Ghana. This study aims to bridge this gap by systematically exploring the prevalence of overweight and obesity and identifying the potential predictors within this educational setting. Understanding the unique factors contributing to the prevalence of these conditions among students in second-cycle schools is essential for designing targeted interventions and preventive strategies.

While a number of separate studies such as those above have been conducted, data on overweight and obesity to demonstrate the prevalence and associated factors among second-cycle Institutions is deficient. This group to be assessed is vital in today's public health, as they are in the process of still growing and learning and highlighting these predictors among them is a step forward to its prevention. Obesity imposes significant social and economic cost on families, communities, and societies in general.[26] An understanding of the determinants of obesity among young adults could lead to the formulation of policies aimed at preventing or controlling obesity at later stages of life. This study therefore, seeks to estimate

the prevalence of overweight and obesity among the students in the second-cycle schools, highlight the predictors and propose interventional measures to the highlighted indicators in students at second cycle institutions in Ghana.

METHODS

Study design and setting

A cross-sectional survey was conducted in selected second cycle institutions at the Eastern, Ashanti and Brong Ahafo regions of Ghana from 31st January 2019 to 20th December 2021. The Ghana Statistical Service's 2010 national census of Ghana's population served as the basis for the random sample system that was used.[27,28] Eastern, Brong Ahafo, and Ashanti were the regions chosen.[29] The sample of this study was calculated based on overweight/obesity prevalence of an estimated minimum sample of 206 from a 15% prevalence. Using the formula of prevalence studies on multi-staging, the design effect was multiplied by two (2) with a nonresponse rate of 20%. An estimated 494 respondents were expected from each district that was randomly selected to partake in this study. Three (3) districts were selected from each region. The lottery method was then used to choose two (2) schools from the list of the three (3) districts that were selected from each region. Six (6) Second-cycle schools were included in this study. A minimum of 984 participants was expected to complete this study. A proportion of 146 was allocated to the six chosen schools. However, this was exceeded by 102 participants who willfully decided to partake in the study. The Three (3) chosen regions were the Ashanti, Brong Ahafo and the Eastern regions of Ghana.

Study setting and participants

The Ashanti region, which is located in the central part of Ghana and is known for its rich cultural heritage and historical significance, was chosen for the study in order to provide a comprehensive representation of diverse socio-cultural and environmental factors that may influence the prevalence and predictors of overweight and obesity among second cycle school students.[30] The Ashanti region's capital, Kumasi, is the second-largest city in the country and serves as an educational hub. The Ashanti region is characterized by a mix of urban and rural areas, providing a varied landscape for the research.[30]

The inclusion of the Brong Ahafo region aims to capture unique factors that may contribute to the prevalence of overweight and obesity in different contexts. The Eastern region, located in the southeastern part of Ghana, is known for its picturesque landscapes and agricultural activities. The Eastern region provides an additional layer of diversity to the study, encompassing both urban and rural environments. The Brong Ahafo region is situated in the middle belt of Ghana and is renowned for its agricultural activities and cultural diversity. The regional capital, Sunyani, is a bustling city with a blend of urban and peri-urban settings.[30] The regions are home to significant educational institutions, making them ideal settings for studying adolescent health within the school context. The selected regions represent a diverse range of cultural, economic, and environmental contexts, allowing for a more comprehensive understanding of the factors influencing overweight and obesity among second cycle school students. This geographical diversity improves the external validity and generalizability of the study findings. It also provides a comprehensive view of the complex interplay of factors influencing the health status of second cycle school students in Ghana.

Socio-demographic data

Structured pre-tested questionnaire was used in collecting data such as age, gender, family history, exercise, and type of food frequently eaten by skilled research aides. Anthropometric indices such as height, weight and, waist circumference (WC), were measured by trained nurses, while the BMI was calculated accordingly.

Anthropometry

The body weight was measured with the Detecto Stainless Steel 437. It was set to the nearest 0.1 kilograms. Height was taken with a Stadiometer and was set to the nearest 0.5cm. Shoes of participants were removed with heads of participants in upright position before recording their body weight and height. We calculated the Body Mass Index (BMI) by dividing the weight (kg) by the height in meters squared, and measured the waist circumference with a tape measure.

Statistical analysis

All gathered data was imputed into an excel sheet and later imported to SPSS version 25 for analysis. A p-value of ≤ 0.001 was set as significant with a Confidence Interval at 95%. Descriptive analysis is expressed as percentages. Associations are tested and expressed in chi-squares and p values. Multinomial regression was however, used to test for true associations and the odds of chances and likelihoods.

RESULTS

Background characteristics

This analysis involves data from 1,086 second cycle students from the three selected regions. The socio-demographic characteristics and behavioral characteristics of students are presented in Table 1.

The mean age of students who participated in the study was 17.3±1.5 years with the majority being females (56.26%). The mean body mass index (BMI) of the student was 23.2±3.6kg/m^2. Out of the total population of

females (619), about 85% had high waist circumference. The homemade food intake was high (57.09%). The majority of the students (45.58%) engaged in one to two times of physical activity a week with a few (5.80%) not participating in physical activity at all.

Table 1: Sociodemographic characteristics of respondents.

Variable	Frequency (n=1086)	Percentage (%)
Age	17.3±1.5	
Less than 15 years	22	2.03
15-17 years	605	55.71
18-21 years	459	42.27
Gender		
Male	475	43.74
Female	611	56.26
Body mass index	23.2±3.6	
Waist circumference (women)	619	
High	519	84.94
Low	92	15.06
Waist circumference (men)	485	
High	393	82.74
Low	82	17.26
Family history of hypertension	585	
Grandparent	340	58.12
Parent	177	30.26
Sibling	68	11.62
How often exercise is done		
Sometimes	194	17.86
One to two times	495	45.58
More than three times	334	30.76
Not at all	63	5.80
Type of food		
Home made	620	57.09
Fast food	182	16.76
Both	284	26.15

Prevalence of overweight and obesity

The overall prevalence (overweight and obesity) was 28.17%, with 16.20% being females and 11.97% being males. With regard to the BMI status, 6.26% of the children were underweight, 65.56% were normal weight, 24.95% overweight, and 3.22% obese (Table 2).

More females (57.20%) and (60.00%) than males (42.80%) and (40.00%) were overweight and obese, respectively. Nonetheless, the observed difference was not significant (p=0.587). A significantly higher proportion of students' had the family history of either been overweight or Obese (54.08%).

Table 2: BMI status of respondents.

BMI	Overall	Gender		P value	Family history of overweight/ obesity status		P value
		Female (n=611)	**Male (n=475)**	**0.587**	**Yes (n=98)**	**Yes (n=988)**	
Underweight	68 (6.26)	33 (48.53)	35 (51.47)		4 (4.08)	64 (6.48)	0.001*
Normal	712 (65.56)	402 (56.46)	310 (43.54)		37(37.76)	675(68.32)	
Overweight	271 (24.95)	155 (57.20)	116 (42.80)		53(54.08)	218(22.06)	
Obese	35 (3.122)	21 (60.00)	14 (40.00)		4 (4.08)	31 (3.14)	

*significant at alpha 0.05

Factors/predictors associated with overweight and obesity

Table 3 shows the regression models of factors that are associated with overweight and obesity. The associated factors included are gender (males/females), family history of overweight/obesity, exercise, and the type of foods eaten.

Table 3: Factors/predictors associated with overweight or obesity.

Variable	Odd ratios	95% CI	P value	Adjusted odd ratios	95% CI	P value
Age group						
Less than 15 years	Referent					
15 – 17 years	1.49	0.49-4.49	0.472	0.97	0.25-3.814	0.973
18-21 years	2.20	0.73 -6.63	0.159	1.49	0.37-5.99	0.569
Gender						
Male	Referent					
Female	1.07	0.82-1.40	0.602	1.65	1.10-2.47	0.014*
Family history of overweight/obesity						
Siblings	Referent					
Parent	2.52	1.23-5.17	0.011*	2.61	1.23-5.53	0.012*
Grandparents	2.18	1.10-4.34	0.025*	2.52	1.23-5.15	0.011*
Exercise						
Sometimes	Referent					
One to two times	1.02	0.71-1.48	0.888	1.33	0.73-2.45	0.344
More than three times	0.90	0.60-1.34	0.618	1.24	0.66-2.31	0.489
Not at all	1.17	0.63-2.17	0.607	1.63	0.60-4.38	0.333
Type of food						
Both food	Referent					
Fast food	0.83	0.55-1.25	0.384	0.75	0.40-1.39	0.371
Home made	0.73	0.54-1.00	0.052*	0.88	0.59-1.32	0.559

*significant at alpha 0.05

Age group

The logistic regression model showed individuals within the age bracket of 15-17 years [(OR 1.49, 95% CI 0.49 to-4.49), (AOR 0.97, 95% CI 0.25 to -3.814)] and 18-21 years [(OR 2.20 95% CI 0.73-6.63), (AOR 1.49 95% CI 0.37-5.99)] are associated with increased odds of overweight or obesity as compared to those <15 years although no statistical significance was observed.

Gender

The multivariate logistic regression model was statistically significant for the female gender association with overweight or obesity. The model demonstrated that females are 65% more likely to be overweight or obese compared to their male counterparts (AOR 1.65, 95% CI 1.10 -2.47).

Family history of overweight/obesity

The bivariate and multivariate regression models showed a statistically significant association between a familial history of overweight or obesity. Additionally, the models explained an increased risk of overweight or obesity for those whose parents [(OR 2.52, 95% CI 1.23 to -5.17), (AOR 2.61, 95% CI 1.23-5.53)] or grandparents [(OR 2.18 95% CI 1.10-4.34), (AOR 2.52 95% CI 1.23-5.15)] are either overweight /Obese by more than two-folds when compared to their siblings.

Exercise

The association between an exercise regimen and overweight or obesity was not statistically significant in the bivariate model. However, when compared with those who sometimes exercise, a regimen of more than three times had reduced odds of overweight or obesity by 10% (OR 0.9, 95% CI 0.60 to -1.34) whereas those who exercise one to two times or none demonstrated an increased likelihood of 2% (OR 1.02 95% CI 0.71-1.48) and 17% (OR 1.17 95% CI 0.63-2.17) respectively.

The association between an exercise regimen and overweight or obesity did not reach statistical significance in the multivariate analysis. Nevertheless, an exercise regimen of one to two times, more than three times, and none increases the likelihood of overweight or obesity by 33% (AOR 1.33, 95% CI 0.73 to -2.45), 24% (AOR 1.24 95% CI 0.66-2.31) and 63% (AOR 1.63 95% CI 0.60-4.38) respectively, when compared with those who sometimes undergo an exercise regimen.

Type of food

The foods were categorized into either fast food (bought from outside) or homemade (served from the school's canteen or eaten from home). The odds of students' consumption of fast foods was 0.83 with an adjusted odds ratio of 0.75, while the odds ratio of consuming homemade foods was 0.73 with an adjusted odds ratio of 0.88. A P value of 0.052 was found with the consumption of homemade foods.

DISCUSSION

A total of 1086 was included in the analysis of this study. This study reveals an overall concerning prevalence of overweight and obesity among the total respondents was 28.17%, out of which 16.20% were females and 11.97% were males. The prevalence of overweight and obesity among this study participants is among the highest within the studied group as compared to other past studies.[13,31-33] The overall prevalence of 28.17% underscores the significance of addressing weight-related issues within this demographic. Notably, the prevalence differs between genders, (with 16.20% of females and 11.97% of males). These results shed light on the need for gender-specific interventions and underscore the importance of understanding and addressing the unique factors influencing weight status in both male and female students. With the female gender exhibiting a higher prevalence of overweight and obesity compared to their male counterparts, this aligns with existing literature that often highlights gender-based differences in lifestyle, dietary choices, and physical activity patterns.[34] The gender-specific nature of these findings underscores the necessity of tailoring interventions that consider the distinct needs and challenges faced by male and female students.

The high prevalence within this group of students warrants attention due to the causal role of obesity in diabetes, heart ailment, stroke, and some cancers.[35] The high prevalence of overweight and obesity in Ghanaian adults is a known fact, and the escalating prevalence among the youth demands intervention because; chronic conditions at the youthful ages are mostly undiagnosed among a large percentage of obese adolescents.[18,35] Associated factors or predictors to this were realized as age within the brackets (15-17 years) and (18-21 years), gender (female), family history, and home-made foods. The age ranges of 15-21 with the increased odds of overweight or obesity as per this study, suggests that overweight and obesity can be challenging during these years in the life cycle and demands attention especially at the Second-cycle level of education where most growth processes are taking place. One noteworthy aspect is the association between age and overweight/obesity. Students within the age brackets of 15-17 years and 18-21 years demonstrated higher prevalence rates, suggesting that adolescence and the transitional phase to young adulthood are critical periods for implementing targeted interventions. The identification of these age brackets as significant predictors emphasizes the importance of timely interventions during these developmental stages to prevent the establishment of unhealthy weight patterns that may persist into adulthood. The logistic regression confirms the association of female gender and overweight and obesity. It demonstrates that females are 65% more likely to be overweight or obese. This may conform to the notion of perception on beauty and 'good living' on the part of the Ghanaian where body fat is mostly associated with beauty and good living especially among women.[32] Though this study highlights the link of the female gender and obesity and overweight, this may be attributed to genetic causes, and the fact of misconception on overweight and obesity as healthy living by most Ghanaian adolescents.[36]

This study found no significant association between exercise and been overweight or obese. Though it reveals 10% decrease of overweight or obesity when compared with those who sometimes exercise. It affirms that reduction in daily energy outflow is not the prime source of obesity, however, the role of physical exercise in managing weight cannot be ruled out.[37]

Unlike the multivariate model, no statistically significant association was found between the type of food consumed and overweight or obesity. In the bivariate analysis, however, the consumption pattern of homemade food demonstrated a statistically significant relationship with overweight or obesity. Even so, the unique consumption of fast and homemade foods reduced the odds of overweight or obesity by 17% (OR 0.83, 95% CI 0.55 to -1.25) and 27% (OR 0.73 95% CI 0.54 to -1.00) respectively, when compared with the consumption of both foods. Though studies may affirm the relationship between fast foods and overweight and obesity, this study, however, is proving otherwise. This indicates that the relations of fast foods and overweight and obesity may be subjected to other factors such as the environment where the crop was grown, and the kinds of foods served/sold and the ingredients used in the preparation of those foods that are sold outside as fast foods.

By comparing the association of overweight and obesity with family history within the studied population, the logistic regression model showed a highly statistically significant association. Family history emerged as a notable predictor, indicating a potential genetic and environmental component in the development of overweight and obesity among students. This finding emphasizes the importance of a holistic approach that involves families in interventions, aiming to promote healthier lifestyles collectively. By understanding the influence of family history, interventions can be designed to target both individual behaviors and familial environments, fostering a supportive context for healthy living. The association between overweight/obesity and the consumption of home-made foods is a noteworthy aspect of this study. It suggests that dietary choices, even

within the home environment (i. e. school canteen), play a significant role in the weight status of students. Exploring the composition and nutritional value of home-made foods could provide valuable insights for crafting dietary interventions that address cultural preferences while promoting healthier eating habits. This study is particularly important since it highlights the importance of controlling the prevalence of overweight and obesity in students at the second cycle institutions who are young adults. It reveals the risks of the Ghanaian developing other Non-Communicable Diseases (NCD's) such as hypertension at this early stage in their lifecycle which may lead to atherosclerotic cardiovascular disease (ASCVD) within the group later in their lives. This study serves as a baseline for future studies on obesity and overweight within second cycle students in other parts of Ghana and in Africa at large. The need for Health education in second cycle schools cannot be over looked. The collaboration of the Ghana education Services and the Ghana Public Health Association in the merging of health topics in students curricular at this level as a general course is an excellent way forward in the achievement of a healthier population in country. The awareness of students on the Body Mass Index categorization, causes of overweight and obesity as well as their risks and effects will aid students to make conscious efforts in managing their weights/health. Sensitization programs within communities and schools on proper weight management to curb the misconceptions of the ordinary Ghanaian on being overweight and obese as a sign of beauty and "good living' will also be helpful. Similar education is needed for the National Association of Domestic Bursars and Matrons of the Ghana Education Services who are in charge of feeding these students to assist in the cooking and service of foods that are reduced in trans- fats and saturated oils. This study was dynamic, new, and remarkable due to the comparability of its study sample of second-cycle students. Given that the participants in this study are exposed to comparable circumstances on all campuses in Ghana, generalizability is expected.

One of the study's drawbacks was that it only included students who were available at the time the study was conducted. This is because the SHS in Ghana operates on a shift system, therefore those who participated in this study were those who were in school at the time.

CONCLUSION

In the population assessed for this study, the prevalence of overweight and obesity was 28.17%, with 16.20% being females and 11.97% being males. With regard to the BMI status, 6.26% of the students were underweight, 65.56% were normal weight, 24.95% overweight, and 3.22% obese. The predicting factors included BMI, gender (female), and homemade foods. Educating students and the general public on risks of obesity and helping curb the misconception of overweight and obesity as a sign of 'good living' and beauty within the Ghanaian communities is recommended. The Matrons who serve foods (home-made) to students in second cycle schools in Ghana need to be educated on overweight and obesity and their risks to enhance their knowledge on the cooking and serving of dishes to these students. In conclusion, the results of this study provide a comprehensive understanding of the prevalence and predictors of overweight and obesity among students in second-cycle schools in Ghana. The gender-specific differences, the influence of age brackets, the role of family history, and the impact of home-made foods highlight the multifaceted nature of this issue. These findings serve as a foundation for developing targeted interventions as mentioned above to address the unique factors contributing to overweight and obesity within this specific educational context. Moving forward, the implementation of these evidence-based strategies is essential to mitigate the current prevalence and prevent future health complications among Ghanaian adolescents in second-cycle schools.

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REFERENCES

1. El Kishawi RR, Soo KL, Abed YA, Muda WA. Prevalence and predictors of overweight and obesity among women in the Gaza strip-Palestine: a cross-sectional study. BMC Publ Heal. 2020;20:1-8.
2. Müller MJ, Geisler C. Defining obesity as a disease. Europ J Clin Nutrit. 2017;71(11):1256-8.
3. Kyle TK, Dhurandhar EJ, Allison DB. Regarding obesity as a disease: evolving policies and their implications. Endocrinol Metabol Cli North Am. 2016 Sep;45(3):511.
4. Purnell JQ. Definitions, Classification, and Epidemiology of Obesity. Endotext (MDText.com, Inc., 2000.
5. Chooi YC, Ding C, Magkos F. The epidemiology of obesity, Metabolism. 2019;92(9):6-10.
6. Souza LG, Jardim TV, Rezende AC, Sousa AL, Moreira HG, Perillo NB, et al. Predictors of overweight/obesity in a Brazilian cohort after 13 years of follow-up. Nutri J. 2018;17:1-9.
7. Ahmed B, Konje JC. The epidemiology of obesity in reproduction. Best Pract Res Clin Obstet Gynaecol. 2023:102342.
8. World Health Organization. Obesity and overweight. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

9. Elessi K, Albaraqouni L. Prevalence of obesity and overweight in Palestine: a systematic review. Lancet. 2019;393:S20.
10. Baker C. Obesity Statistics. Available at: https://commonslibrary.parliament.uk/research-briefings/sn03336/. Accessed on 01 March 2024.
11. Spinelli A, Buoncristiano M, Kovacs VA, Yngve A, Spiroski I, Obreja G, et al. Prevalence of severe obesity among primary school children in 21 European countries. Obesity Fact. 2019;12(2):244-58.
12. World Health Organization. Obesity rising in Africa, WHO analysis finds. Available at: https://www.afro.who.int/news/obesity-rising-africa-who-analysis-finds. Accessed on 01 March 2024.
13. Adom T, Kengne AP, De Villiers A, Puoane T. Prevalence of overweight and obesity among African primary school learners: a systematic review and meta-analysis. Obes Sci Pract. 2019;5(5):487-502.
14. Oshakbayev K, Zhankalova Z, Gazaliyeva M, Mustafin K, Bedelbayeva G, Dukenbayeva B, et al. Association between COVID-19 morbidity, mortality, and gross domestic product, overweight/obesity, non-communicable diseases, vaccination rate: A cross-sectional study. J Infect Publ Heal. 2022;15(2):255-60.
15. Lartey ST, Magnussen CG, Si L, Boateng GO, de Graaff B, Biritwum RB, et al. Rapidly increasing prevalence of overweight and obesity in older Ghanaian adults from 2007-2015: Evidence from WHO-SAGE Waves 1 & 2. PloS one. 2019;14(8):e0215045.
16. Akowuah PK, Kobia-Acquah E. Childhood obesity and overweight in Ghana: a systematic review and meta-analysis. Journal of Nutrition and Metabolism. 2020;2020.
17. Wiedermann CJ, Barbieri V, Plagg B, Marino P, Piccoliori G, Engl A. Fortifying the foundations: a comprehensive approach to enhancing mental health support in educational policies amidst crises. InHealthcare. 2023;11(10):1423.
18. Ofori-Asenso R, Agyeman AA, Laar A, Boateng D. Overweight and obesity epidemic in Ghana-a systematic review and meta-analysis. BMC Publ Heal. 2016;16:1-8.
19. Mohammed H, Vuvor F. Prevalence of childhood overweight/obesity in basic school in Accra. Ghana Med J. 2012;46(3):124.
20. Annan-Asare J, Asante M, Amoah AG. Obesity and its correlates among junior high school children in the Accra metropolis. J Nutrit Heal Sci. 2017;4(2):1-0.
21. Amidu N, Owiredu WK, Saaka M, Quaye L, Wanwan M, Kumibea PD, et al. Determinants of childhood obesity among basic school children aged 6-12 years in Tamale Metropolis. J Med Biomed Sci. 2013;2(3):26-34.
22. Konkor I, Kuuire VZ. Epidemiologic transition and the double burden of disease in Ghana: What do we know at the neighborhood level?. Plos one. 2023;18(2):e0281639.
23. Boakye H, Atabila A, Hinneh T, Ackah M, Ojo-Benys F, Bello AI. The prevalence and determinants of non-communicable diseases among Ghanaian adults: A survey at a secondary healthcare level. Plos one. 2023;18(2):e0281310.
24. Agyei-Mensah S, de-Graft Aikins A. Epidemiological transition and the double burden of disease in Accra, Ghana. J Urb Heal. 2010;87:879-97.
25. Vasile CM, Padovani P, Rujinski SD, Nicolosu D, Toma C, Turcu AA, et al. The increase in childhood obesity and its association with hypertension during pandemics. J Clin Medi. 2023;12(18):5909.
26. Tremmel M, Gerdtham UG, Nilsson PM, Saha S. Economic burden of obesity: a systematic literature review. Int J Environm Res Publ Heal. 2017;14(4):435.
27. Ghana. Statistical Service. 2010 Population and Housing Census: Post Enumeration Survey Report. Ghana Statistical Service; 2012:1-11.
28. Ghana-Population and Housing Census 2010. Available at: https://catalog.ihsn.org/index.php/catalog/3780. Accessed on 19 May 2024..
29. Amponsem-Boateng C, Oppong TB, Zhang W, Boakye-Yiadom J, Wang L, Acheampong K, et al Screening of hypertension, risks, knowledge/awareness in second-cycle schools in Ghana. A national cross-sectional study among students aged 12–22. J Human Hypert. 2022;36(4):405-15.
30. Regions in Ghana - Ghana High Commission - Canberra Australia. Available at: https://ghanahighcom.org.au/site/regions-in-ghana. Accessed 01 March 2024.
31. Aryeetey R, Lartey A, Marquis GS, Nti H, Colecraft E, Brown P. Prevalence and predictors of overweight and obesity among school-aged children in urban Ghana. BMC obesity. 2017;4:1-8.
32. Ganle JK, Boakye PP, Baatiema L. Childhood obesity in urban Ghana: evidence from a cross-sectional survey of in-school children aged 5-16 years. BMC Publ Heal. 2019;19:1-2.
33. Moreno G, Johnson-Shelton D, Boles S. Prevalence and prediction of overweight and obesity among elementary school students. J Sch Heal. 2013;83(3):157-63.
34. Jacob JS, Panwar N. Effect of age and gender on dietary patterns, mindful eating, body image and confidence. BMC Psychol. 2023;11(1):264.
35. Bruce SG, Riediger ND, Zacharias JM, Kue Young T. Obesity and obesity-related comorbidities in a Canadian First Nation population. Prev Chronic Dis. 2011;8:A03.
36. Thaker VV. Genetic and epigenetic causes of obesity. Adolescent medicine: state of the art reviews. 2017;28(2):379.

37. Wiklund P. The role of physical activity and exercise in obesity and weight management: Time for critical appraisal. J Spo Heal Sci. 2016;5(2):151-4.

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