Original

Obesity and other Modifiable Cardiometabolic Risk Factors in Adolescents in Lagos, Nigeria

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Article history: Received 2 September 2023, Reviewed 7 September 2023, Accepted for publication 13 June 2024

Abstract

Background: The true burden of non-communicable diseases and their risk factors among adolescents in developing countries is unknown. The objective was to assess the prevalence of obesity and other modifiable cardio-metabolic risk factors among adolescents in Lagos State, Nigeria.

Method: A cross-sectional study design was used. Five hundred and six in-school adolescents were recruited through a multistage sampling technique. Data was collected using a questionnaire adapted from the WHO STEPS chronic disease surveillance tool. Anthropometric measurements were also taken. Respondents were classified as having either low or high metabolic risk based on computed risk scores. Logistic regression was used to determine the predictors of high metabolic risk. The level of significance was set at $p<0.05$. Ethical approval was obtained from the Health Research and Ethics Committee of the Lagos State University Teaching Hospital.

Result: The overall prevalence of overweight/obesity was 7.7%. Ten percent of adolescents had poor physical activity levels, unhealthy dietary practices such as frequent intake of sugary snacks (20%), inadequate consumption of fruits (98%) and vegetables (99%,) and elevated blood pressure readings (5%). Five percent of respondents had a high total metabolic risk score. The predictors of high metabolic risk were BMI (OR: 18.72, 95%CI: 7.1-47.3), alcohol consumption (OR: 6.2, 95%CI: 1.9-20.8) and soft drink consumption (OR: 2.9, 95%CI: 0.8-3.4).

Conclusion: Adolescents had modifiable risk factors for chronic diseases. Healthy food and physical activities should be available and made compulsory in schools to encourage health-promoting behaviours that will potentially help in the prevention of chronic cardio-metabolic conditions.

Keywords: Overweight, school-age children, risk factors, non-communicable diseases.

How to cite this article:

Salisu-Olatunji SO, Odugbemi BA, Adejumo OA, Mohammed AS, Alakija W. Obesity and other Modifiable Cardiometabolic Risk Factors in Adolescents in Lagos, Nigeria. The Nigerian Health Journal 2024; 24(2):1368-1377.
https://doi.org/10.60787/tnhj.v24i3.703

Introduction

Among children and adolescents, the risk factors for non-communicable diseases like hypertension and diabetes are similar, with overweight/ obesity being the most important single risk factor.[1] Obesity has become a major public health challenge and is increasingly worrisome among children and adolescents as progressive childhood obesity has been linked to increased risk of Type 2 diabetes and related cardio-metabolic conditions in adulthood.[2] The ease of availability of affordable, energy-dense foods and declining level of physical activity among young ones occasioned by long hours on numerous electronic devices are major contributors to this growing obesity dilemma.[3-4] This is found particularly in families from higher socio-economic status in developing countries undergoing nutritional transitions.[5-7] The rising prevalence of obesity globally shows patterns by socio-economic classes, local economy, gender and age amongst other factors, making it a major unmet public health problem requiring urgent attention.[8]

Numerous studies such as the Muscatine, Cardiovascular risk in Young Finns and the Bogalusa Heart Studies have revealed that overweight and obesity during adolescence is a determinant of several cardiovascular disease (CVD) risk factors in adulthood.[9–14] Persistent obesity has been linked to the development of metabolic syndrome with severe adverse effects on processes controlling blood glucose, blood pressure, and blood lipid levels and primary prevention of risk factors has been emphasised.[11, 15-17]

Adolescence is generally characterized by an increased desire for independence and strong peer influence in lifestyle choices. This is often accompanied by low self-perception of risk and therefore an increase in risk-taking behaviours. In addition there is targeted marketing of unhealthy products and lifestyles at this age group.[18] However, peer influence can be used positively to encourage healthy behaviours and lifestyle choices, hence the opportunity for positive interventions during this life stage should not be missed.[19]

Young people under 24 years constitute over 60% of Nigeria's population with the median age of the population being 17.9 years.[20] It is vital to reach this continuously increasing population with appropriate information and encourage practices which will build positive health habits and limit damaging ones.

The aim of the study was to determine the prevalence of overweight/obesity and other modifiable cardiometabolic risk factors among adolescents in Lagos. It also set out to highlight associations between modifiable cardio-metabolic risk factors and cardio-metabolic risk categories.

Method

Study Design

This was a cross-sectional study carried out in selected secondary schools in Lagos State. The study population included in-school adolescents aged between 10-19 years. A minimum sample size of 187 was calculated using the Cochrane's formula and based on a prevalence of overweight/obesity of 14.2% from a previous study and a p of 0.05.[21] However, all students in selected classes were included giving a final sample size of 580. Using a multi-stage sampling technique, one urban and one rural local government area (LGA) were selected by simple random sampling by balloting at the first stage. At the second stage, three schools were selected within each LGA by simple random sampling by balloting. At the third stage, each school was stratified by class and then one arm from each class was selected by simple random sampling by balloting. Eligible respondents were adolescents aged 10 to 19 years registered in the selected schools. Adolescents who had chronic diseases and those who were absent from school on the day of data collection were excluded. Five hundred and six students completed the questionnaire, and their results were analysed.

Study data collection

Data was collected by trained research assistants with an interviewer-administered, paper-based questionnaire. The data collection tool was a modified WHO STEPS questionnaire[22] with sections for information on socio-demographic characteristics, self-reported dietary habits and physical activity levels, cigarette smoking and alcohol consumption. Anthropometric measurements and blood pressure readings were also taken by the research assistants and the average of two readings was recorded. Selected participants with the required consent forms completed were interviewed in groups as arranged in collaboration with the school to ensure minimal disruption to their classes. The Body Mass Index (BMI) classification was based on the CDC BMI for age categories.[23]

Definition of modifiable risk factors

- Physical activity: measured as Metabolic Equivalent Task values following WHO guidelines. MET min/week >3000 = low risk, 600-3000MET min/week = moderate and <600 MET min/week = high risk
- Fruit and vegetable: Adequate = intake of fruits and vegetables < 5 servings per day on <3 days per week
- Sugar and snacks: Consumption of sugar sweetened foods, pastries and sweets > thrice a week was classified as high risk, 2-3 days/week= moderate; <2 days/week = low risk
- Waist circumference: measured in cm. WC >75th percentile for age and sex was graded as high risk

Print ISSN: 0189-9287 Online ISSN: 2992-345X

- Waist-Hip-ratio: ≥ 0.85 in females and 0.9 in males was classified as high risk
- Blood pressure: Systolic/Diastolic BP > 130/85mmHg = High risk
- BMI: > 85th percentile for age and sex = high risk
- Smoking: Non-smokers were classified as low risk and those who had ever smoked or exposed to indoor smokers (passive smokers) were classified as high risk.
- Alcohol: Non-drinkers were classified as low risk and ever/current drinkers as high risk

Primary outcome measure

The primary outcome measure was total metabolic risk. For each respondent, scores were assigned to represent each category of the risk factors present. Total scores assigned for risk categories were computed. The mean total risk score was then calculated for each respondent. Total risk scores were classified as high risk and low risk using the mean risk score of all respondents (18.6) as the cut off.

The independent variables were age in years, sex recorded as male or female and the socioeconomic status of the respondents. Socioeconomic class was assigned using the method (modified) recommended by Oyedeji.[24] To assign socio economic classes, the occupation of the parents and their highest educational qualification were scored. The occupation was scored based on the social classification by occupation proposed by Akanmu et al which groups occupations into six classes as unskilled, semi-skilled and skilled workers, semi-professional, junior and senior professionals.[25] The level of education was assigned scores from 1 (lowest) to 5 (highest) based on the levels of education as follows: none, primary, secondary, tertiary and postgraduate education. The mean score for both parents gave a social class falling within the 1-11 range. Those with a mean score of ≤ 4 were reclassified as low social class, those with a mean score between 5 and 7 were classified as middle class, while those with mean score of > 8 were reclassified as high social class.[24]

For tobacco use, respondents were classified as Non-smoker, Ever/current smoker, Passive smoker.[26-28] Non-smokers were respondents who had never smoked and were classified as low risk and scored 0. Those who have ever smoked previously and those who had smoked at least once in the month preceding the study were grouped together as ever smokers/ current smokers and were classified as high risk.[26,28] Passive smokers are those exposed to smokers at home for > 30 minutes per day for most days of the week and were classified as high risk.[27] Ever/current smokers and passive smokers were scored 1 each. Alcohol intake was categorized as non-drinkers, for respondents who had never taken alcohol and ever/ current drinkers for those who had ever taken alcohol or had taken > 30mls of an alcoholic drink in the month preceding the study.[28] Non-drinkers were classified as low risk and scored 0 while ever/current drinkers were classified as high risk and scored 1.

Dietary factors by categorizing fruit and vegetable servings taken per day as poor if < 5 servings are taken per day for < 3 days per week and good if > 5 servings were taken on at least 3 days a week.[28] Poor intake was categorized as high risk and scored 1 while good fruit/ vegetable intake was categorized as low risk and graded 0 points. Taking fast foods or snacks between meals for >3 days per week was categorized as high risk and scored 1 while <3 days per week was categorized as low risk and scored zero.[28] Respondents were also classified into two groups on intake of soft/sweetened drinks. Taking soft drinks <3 days per week was classified as low risk and scored 0 and those taking >3 days per week were classified as high risk and scored 1.[29] Frequency of consumption of foods high in saturated fats, sugars and added salt were also graded. Low risk was assigned to consumption less than twice in a week and scored 0, moderate risk for consumption 2-3 times in a week was scored 1 and high risk was assigned to consumption more than thrice a week and scored 2.

For estimation of physical activity, the hours of moderate and vigorous physical activity were weighed by their metabolic equivalent task values (MET values) provided in the WHO guidelines.[30] Moderate activity was assigned a MET of 4 while vigorous activity was assigned a MET of 8.[30] The total MET minutes per week was calculated. Less than 600 MET min/week was categorized as low-level physical activity (high metabolic risk, and scored 2), 600-2999 was assigned moderate level of physical activity (moderate risk, scored 1) and greater than/ equal to 3000 MET min/week was categorized as high level of physical activity (low risk, scored 0).[31]

For STEP 2 measures, i.e. anthropometric measures, the variables were graded as follows: central obesity was defined as waist circumference greater than 75th waist circumference percentile for age and sex.[32-34] Adolescents with WC greater than the 75th percentile were graded as high risk while those with WC less than 75th percentile were graded as low risk and scored 1 and 0 respectively. Waist Height Ratio < 0.5 was assigned no risk (scored 0), 0.5 – 0.64 was assigned medium risk category (scored 1) and > 0.65 indicated high cardio metabolic risk (scored 2).[35-37] Waist-hip ratio was assigned sex specific cut off marks. WHpR > 0.85 in females was classified as high risk (and scored 1) and <0.85 as low risk (and scored 0), while WHpR > 0.9 and <0.9 in males were classified as high and low risk and scored 1 and 0 respectively.[38] Participants with BMI category > 85th percentile for age (i.e. overweight and obese) were classified as high

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risk (and scored 1) while those with BMI <85th percentile were classified as low risk (and scored 0).

STEP 3 measures were the biochemical variables. For the physical and biochemical measurements, the level of risk was categorized into low and high cardio metabolic risk based on the IDF (2007) guidelines.[32] Any participant with central adiposity (≥90th waist circumference percentile) plus at least two of the following criteria: (i) triglycerides ≥150 mg/dl (1.7 mmol/l), (ii) HDL cholesterol <40 mg/dl (1.03 mmol/l), (iii) systolic blood pressure ≥130 mmHg or diastolic blood pressure ≥85 mmHg, (iv) fasting plasma glucose ≥100 mg/dl (5.6 mmol/l) was classified as high risk. Those with < two risk factors were classified as low risk.

Statistical analysis

Data was entered and analysed using SPSS Version 20. Categorical variables were compared using contingency tables. Chi squared test was used to compare the different weight classes and to determine associations between groups. Logistic regression was used to identify predictors of the outcome of high total metabolic risk. Statistical significance was set at $p<0.05$.

Ethical requirements

Ethical approval was obtained from the Health Research Ethics Committee of Lagos State University Teaching Hospital (LASUTH, Ikeja). Approvals were also obtained from the Lagos State Ministry of Education and the relevant Education Districts in charge of the selected schools. Written voluntary consent was obtained from both participants and their parents/guardians before they commenced the study.

Results

The mean age of respondents was 13.56 years (±1.92). The majority (70%) were early adolescents between 10 and 14 years of age. There were more females (61.9%) compared to males (38.1%). More (74.1%) of the respondents belonged to the middle socioeconomic class, while 6.3% were of low socioeconomic class. (Table 1)

Table 1: Sociodemographic characteristics of respondents

Variable	Frequency N = 506 (100)	Percent (%)
AGE (years)		
10-14	357	70.6
15-19	149	29.4
Sex		
Male	193	38.1
Female	313	61.9
SEC		
Low	32	6.3
Middle	375	74.1
High	99	19.6
Residence		
Urban	254	50.2
Rural	252	49.8
School type		
Public	340	67.2
Private	166	32.8

Table 2: Categorization of respondents by weight class

Weight class	Frequency n=506	Percent (%)
Underweight	259	51.2
Normal	208	41.1
Overweight	32	6.3
Obese	7	1.4

Table 3: Association between sociodemographic characteristics of adolescents and weight class

Variable	Underweight Frequency (%)	Normal Frequency (%)	Overweight Frequency (%)	Obese Frequency (%)	Chi^2	p-value
AGE (years)	n = 259 (51.2)	n = 208 (41.1)	n = 32 (6.3)	n = 7 (1.4)		
10-14	209 (80.7)	119(57.2)	24 (75.0)	5 (71.4)	30.9	**<0.001**
15-19	50 (19.3)	89 (42.8)	8 (25.0)	2 (28.6)		
Sex						
Male	110 (42.5)	81 (38.9)	1 (3.1)	1 (14.3)	20.4	**<0.001**
Female	149 (57.5)	127(61.1)	31 (96.9)	6 (85.7)		
SEC						
Low	19 (7.3)	12 (5.8)	1 (3.1)	0 (0.0)	70.4	**<0.001**
Middle	218 (84.2)	141(67.8)	16 (50.0)	0 (0.0)		
High	22 (8.5)	55 (26.4)	15 (46.9)	7 (100)		
Residence						
Urban	88 (34.0)	132(63.5)	28 (87.5)	6 (85.7)	63.2	**<0.001**
Rural	171 (66.0)	76 (36.5)	4 (12.5)	1 (14.3)		
School type						

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Variable	Underweight Frequency (%)	Normal Frequency (%)	Overweight Frequency (%)	Obese Frequency (%)	Chi²	p-value
Public	182 (70.3)	143(68.8)	14 (43.8)	1 (14.3)	18.2	**<0.001**
Private	77 (29.7)	65(31.2)	18 (56.2)	6 (85.7)		

The prevalence of overweight was 6.3% while obesity was 1.4%. (Table 2) Most adolescents reported an inadequate intake of less than five servings of fruits (98%) and vegetables (99%) every week. One in five (22%) reported eating sugary snacks more than three times in a week. Considering physical activity levels, 10% reported low levels of physical activity every week (Table 3). 29 (5.7%) and 20 (4%) of adolescents had elevated systolic and diastolic blood pressure readings respectively. Overall, 27 (5.3%) of respondents had high total cardio-metabolic risk scores.

Table 4: Association between anthropometry and blood pressure categories of adolescents and weight classes

WC	Underweight n = 259	Normal n = 208	Overweight n = 32	Obese n = 7	Total N = 506	Chi²	p value
<75th percentile	257 (99.2)	133 (63.9)	0 (0.0)	0 (0.0)	390 (77.1)	223.4	**<0.001**
≥75thpercentile	2 (0.8)	75 (36.1)	32 (100)	7 (100)	116 (22.9)		
WHpR							
M<0.9 F<0.85	229 (88.4)	191 (91.8)	25 (78.1)	3 (42.9)	448 (88.5)	20.0	**<0.001**
M≥0.9 F≥0.85	30 (11.6)	17 (8.2)	7 (21.9)	4 (57.1)	58 (11.5)		
SBP							
Normal	253 (97.7)	196 (94.2)	28 (87.5)	0 (0.0)	477 (94.3)	123.4	**<0.001**
High	6 (2.3)	12 (5.8)	4 (12.5)	7 (100)	29 (5.7)		
DBP							
Normal	245 (94.6)	204 (98.1)	30 (93.8)	7 (100)	486 (96.0)	4.43	0.219
High	14 (5.4)	4 (1.9)	2 (6.2)	0 (0.0)	20 (4.0)		

WC= Waist circumference; WHpR= Waist-hip ratio; SBP= Systolic Blood Pressure; DBP= Diastolic Blood Pressure

With regards to sociodemographic characteristics of participants, younger age group, female gender, high socioeconomic class, urban residence and attending a private school were all significantly associated with obesity ($p<0.05$). Central obesity (high waist circumference- WC and waist-hip ratio- WHpR) and higher systolic blood pressure which are known markers for cardiovascular disease risk were significantly associated with obesity ($p<0.05$). (Table 2) In addition, adolescents who reported high consumption of sugar and snacks per week made up higher proportions of those found to have higher total metabolic risk scores ($p<0.05$) (Table 3).

While almost half (48%) of adolescents with high metabolic risk score were overweight/obese, only 5% of those with low total metabolic risk were overweight/obese ($p<0.05$). The proportion of adolescents with high total risk score (TRS) who were less physically (18.5%) was almost twice the proportion of those with low total risk score who were less active (9.8%) ($p<0.05$). All the adolescents who were found to have high TRS reported inadequate consumption of fruits and vegetables. High TRS was found only among high consumers of snacks (high in refined sugars and unhealthy fats) High TRS was also associated with higher sugar intake ($p<0.000$).

Table 5: Association between Modifiable Cardio-metabolic risk factors and Total Risk Score

Variable categories	Total Risk Grade		Chi square		Binary logistic regression	
	Low risk n= 479 (94.7)	High risk n = 27 (5.3)	Chi²	p-value	OR	(95%CI)
Physical activity level						
Low PA <600METmin/wk	47 (9.8)	5 (18.5)	10.33	**0.006**	1.681	(0.830-3.406)
Mod/High PA >600METmin/wk	432 (90.2)	22 (81.5)				
BMI						
Overweight/Obese	26 (5.4)	13(48.1)	65.57	0.000	18.272	(7.062 – 47.34)
Underweight/ Normal	453 (94.6)	14 (51.9)				

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Variable categories	Total Risk Grade		Chi square		Binary logistic regression	
	Low risk n= 479 (94.7)	High risk n = 27 (5.3)	Chi²	p-value	OR	(95%CI)
Snacking						
Low intake	66 (13.8)	0 (0.0)	4.28	**0.039**	1.760	(0.321-9.661)
High intake	413 (86.2)	27 (100)				
Soft drink intake						
High intake	96 (20.0)	16(59.3)	23.06	**0.000**	2.943	(1.130-7.661)
Moderate intake	220 (45.9)	10 (37.0)				
Low intake	163 (34.0)	1 (3.7)				
Alcohol						
High risk	19 (4.0)	6 (22.2)	18.14	0.000	6.247	(1.874-20.819)
Low risk	460 (96.0)	21 (77.8)				
Smoking						
High risk	32 (6.7)	2 (7.4)	0.02	0.883	1.169	(0.203-6.720)
Low risk	447 (93.3)	25 (92.6)				
Fruit intake						
Adequate	10 (2.1)	0 (0)	0.58	1.000	0.280	(0.062-1.613)
Inadequate	469 (97.9)	27 (100)				
Vegetable intake						
Adequate – Q2	4 (0.8)	0 (0)	0.23	1.000	0.029	(0.004-0.193)
Inadequate	475 (99.2)	27 (100)				

This logistic regression model correctly classifies 95.3% of the predictor variables in the model. The amount of variation in the dependent variable (total risk score TRS) explained by the model is high (between 65.8% and 87.7%), hence the model is useful in correctly explaining the variability in the total risk scores. The BMI has the highest odd's ratio in this model, and this strongly suggests that BMI has the highest impact on total risk score (TRS) among the modifiable risk factors included in the regression model. Adolescents with high BMI (overweight and obese) are 18 times more likely to have high TRS compared to those with normal weight or underweight. Similarly, adolescents who consume alcohol more frequently were 6 times more likely to have high TRS [O.R. 6.25 (95%CI 1.8 – 20.8)]. Those who were more frequent consumers of soft drinks also had almost thrice the risk of having high TRS compared to those who had soft drinks less often [O.R. 2.94 (95%CI 1.1 – 7.6)]. With respect to vegetable intake, there's lower likelihood of high total risk score among high consumers of vegetables [O.R. 0.031 (95%CI 0.004 – 0.193)].

Discussion

This study was carried out to assess the prevalence of obesity and other modifiable cardiometabolic risk factors among adolescents aged 10 -19 years in secondary schools in Lagos State, Nigeria. The focus on the adolescent age group was because of the potential to discover these risks early and the opportunities to hopefully make necessary behavioural changes early in life to prevent or at the very least delay the onset of these protracted health conditions.

The prevalence of overweight/obesity in this study was lower than the findings from a similar study among Nigerian school aged children and adolescents in 2012 which found a prevalence of overweight and obesity of 11.4% and 2.8% respectively.[21] This could be a reflection of the higher prevalence of overweight and obesity among urban dwelling adolescents among whom the study was carried out, compared to the index study which consisted of rural and urban adolescents.

This study found that younger age group, female gender, high socioeconomic class, and urban residence were all significantly associated with overweight and obesity ($p<0.05$). The association of socioeconomic class (SEC) to overweight was increased in middle and high SEC compared to low SEC. (50% and 46.9% compared to 3.1%). Remarkably, all the obese students were classified as belonging to the high SEC. Gender associations with overweight and obesity reflect varying prevalence. Some studies showed higher prevalence among females than males.[22,39-41] Overweight and obesity were more prevalent among females in our study. This was different from findings in a study of Chinese adolescents which found higher prevalence of overweight and obesity among males.[42]

Dietary patterns also present associations with higher total metabolic risk among the adolescents. A study conducted among US adolescents reported that added sugar was associated with higher risk and metabolic syndrome among those studied.[42] Similarly, this study found that adolescents with a higher intake of sugary drinks made up a higher proportion of respondents with high total metabolic risk (Table 4). In addition, all

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the adolescents in the group with high total metabolic risk score reported inadequate consumption of fruits and vegetables, further linking unhealthy dietary patterns to adverse cardiometabolic risk. (Table 5)

A study of adolescents in Nigeria found there was a positive correlation between being overweight and regular consumption of snacks and soft drinks, physical inactivity and family history of obesity.[44] Likewise, all the adolescents with high total metabolic risk reported high weekly intake of snacks in this study. A similarly high level of snack consumption was found among adolescents in another study with high consumption of pastries, sugary snacks and sweetened soft drinks as in this study, thus highlighting the potential for dietary education interventions for adolescents.[45] Lower levels of physical activity, overweight/obesity, higher snack and soft drink intake and use of alcohol, were all significantly associated with higher total metabolic risk among the adolescents. ($p<0.05$) (Table 5).

The key role of obesity in cardio metabolic risk has been identified, as it impacts all major organ systems of the body and is associated with significant morbidity and mortality.[46-47] Adverse anthropometric measurements which are associated with high cardiovascular risk like higher waist circumference and high waist-hip-ratio were more prevalent among overweight and obese adolescents (Table 4). This was further highlighted with the finding that overweight/obese adolescents were much more likely to have high total cardiometabolic risk.

This study adds to the body of knowledge on the burden of obesity and cardiometabolic risk factors among secondary school children in Lagos State, Nigeria. Limitations of the study include the relatively small sample size of the study. In addition, the self-reported measures for diet and physical activity could result in recall bias. Finally, the use of the mean cardiometabolic score to categorize the respondents as having high cardiometabolic risk or not may have affected the burden of cardiometabolic risk among this population. Future studies could use more objective measures to increase the validity of the study and larger studies involving more schools or even all schools in the state will be beneficial.

Conclusion

Overweight and obesity was significantly more prevalent among urban-dwelling adolescents of higher socioeconomic status attending private schools in this study. A strong association was found between modifiable risk factors (unhealthy diets and inadequate physical activity) and high total risk score among adolescents. This highlights the burden of obesity and its associated modifiable risk factors among adolescents in Lagos State and brings to the fore the need to address this problem through primary preventive public health interventions. Health education on the risk factors for chronic non-communicable conditions like hypertension and diabetes must be a standard inclusion in the school curriculum irrespective of the location of the schools to provide a basic minimum level of knowledge for adolescents as a population. This information must be reinforced with a positive health promoting environment to facilitate adoption of healthy lifestyle choices with regards to diet, snacking and physical activity among adolescents. Further research may focus on exploring avenues to improve access to and promote taste for healthy foods, especially fruits and vegetables within this age group both in and out of the school environment. This could include peer/social advocacy groups among adolescents promoting healthy dietary choices as part of school-based or community clubs.

Print ISSN: 0189-9287 Online ISSN: 2992-345X

Declarations

Ethical Consideration: Ethical approval was obtained from the Health Research Ethics Committee of Lagos State University Teaching Hospital (LASUTH, Ikeja). Approvals were also obtained from the Lagos State Ministry of Education and the relevant Education Districts in charge of the selected schools. Written voluntary consent was obtained from both participants and their parents/guardians before they commenced the study.

Authors' Contribution: SOSO, WA – conceived the study. SOSO- prepared the proposal obtained ethical approvals and supervised data collection. SOSO, OAA, ASM, - carried out the data management and analysis SOSO and BAO – interpreted the results and prepared the manuscript. WA supervised the study. All authors approved the final manuscript.

Conflict of interest: None to declare

Funding: This study was self-funded

Acknowledgment: The authors are grateful to the staff and students at the participating schools in Surulere and Ikorodu LGAs.

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