

CHILDHOOD OBESITY, PARENTS KNOWLEDGE AND PRACTICE IN PUBLIC AND PRIVATE PRIMARY SCHOOLS IN RIVERS STATE NIGERIA

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Abstract: A comparative cross-sectional study design was conducted among pupils of public and private primary schools in Port Harcourt using a multistage sampling method. A total of 600 completed questionnaires were retrieved from parents of school children aged 5-13 years and anthropometrics were taken from the pupils. Results showed there was a 7.2% (43/600) overall prevalence of obesity among the pupils, while the difference in the distribution of obesity in private schools was 10% and the prevalence in public schools was 4.3% which was statistically significant ($p=0.0007$). Females in private schools had increased likelihood for been obese (OR = 2.41; 95 % CI= 1.1–5.2; $p = 0.035$). The socioeconomic status of parents has a statistically significant relationship with the presence of obesity in pupils in private schools ($p<0.001$) but none in public schools ($p=0.821$). The majority of the parents 279 (93.0%) in private schools knew that childhood obesity is preventable and 245 (81.7%) in public schools also agreed to this statement (chi-square =17.42, p -value = 0.001). Up to 168 (56%) parents in public schools knew that obesity may cause diabetes, so also did 136 (45.3%) of the parents in private schools (chi square= 6.82, $p= 0.009$). There were also significant differences ($p < 0.05$) in the practice of prevention of obesity between parents of public and private school pupils. Undernutrition was common among the pupils in public schools but obesity was seen majorly in pupils in private schools and appeared largely driven by the Socioeconomic status of the parents. Parents play an important role in shaping their children's lifestyle; therefore, interventions should focus on providing them with information to help them maintain a healthy weight.

Keywords: Obesity, Children, Parents, Knowledge, Practice.

1. INTRODUCTION

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health [1]. It is also recognized as one of the leading preventable causes of death worldwide with increasing prevalence in both adults and children[2]. It is recognized internationally as a serious public health problem that requires urgent action. Childhood obesity is a disease process associated with the development of serious medical complications and increased mortality in adulthood[3]. The increasing incidence of obesity among children has been associated with a rise in cases of type 2 diabetes in adolescence and adulthood[4]. The Westernized lifestyle recently being adopted by developing countries is leading to an increasingly sedentary lifestyle and more intake of fatty foods[5]. Obesity is invariably causing an increase in the prevalence of chronic and non-communicable disease and this will escalate much more rapidly in developing countries [4]. According to the World Health Organization, by the year 2020, non-communicable diseases will account for approximately three-quarters of all deaths in the developing world[6]. Childhood obesity is associated with a higher chance of obesity in adulthood, premature death, and non-communicable diseases, but in addition to all of these,

there are also increased risks of chronic diseases in adulthood [7][8]. Obese children may experience breathing difficulties, increased risk of fractures, hypertension, and early markers of cardiovascular disease, insulin resistance, and psychosocial effects such as low self-esteem[3].

Many low and middle-income countries are now facing a double burden of diseases, while they continue to deal with the problems of undernutrition and infectious diseases, there is a rapid upsurge in non-communicable disease risk factors such as obesity and overweight especially in urban settings [3,9]. It is not uncommon to find undernutrition and obesity existing side by side within the same community and same household[7]. Children in developing countries are more vulnerable to inadequate prenatal, infant, and young child nutrition, they are also exposed to a high fat, high sugar, energy-dense, micronutrient poor foods, which tend to be lower in cost but also lower in nutrient quality[10]. These dietary patterns in addition to lower levels of physical activity increase the prevalence of childhood obesity while the problem of undernutrition remains in the background [11][12]. Family environment and parental knowledge are directly related to obesity occurring in children, therefore parents recognition of overweight or obesity in their children is very important for a successful intervention[13]. Parents are an important influence on child development in many ways, including physical health and weight[14]. Parents create environments for children that may foster the development of healthy eating habits and weight, or promote weight gain and other aspects of disordered eating[14]. Globally the number of obese children is estimated to be over 42 million, close to 31 million of these are believed to be living in developing countries especially in urban settings[7]. The prevalence of obesity has more than doubled between 1980 and 2014 [10]. In the United States, the percentage of children aged 6-11 who were obese increased from 7% in 1980 to 18% in 2012 [9]. The average prevalence of obesity in school-age children in sub-Saharan Africa was found to be 2.5%[15]. The incidence of obesity among schoolchildren has more than tripled since the 1970s globally, and in developing countries including Nigeria, an increase in the prevalence of obesity has been observed[2],[16].

The incidence of obesity and its adverse health consequences are on the rise in Nigeria [17]. Early data in the middle and later part of the last century suggested a low prevalence in Nigeria, but recent reports from various studies indicated an increasing prevalence [18,19]. The essential key to a child's behaviour is parenting. Parents start the child off with good habits and devise ways to make the habits stay throughout adulthood. Parents shape their children's lives in various ways. Therefore, parents knowledge about nutrition, influence over food selection, meal structure, home eating patterns, healthful eating practices, levels of physical activity, knowledge of sedentary habits such as television viewing[20][20], as all of these influence children's development of lifelong habits that contribute to normal weight or obesity [21]. It can be concluded that maintaining and sustaining normal weight depends largely on active family support[22]. Understanding the knowledge of parents and their practices about obesity are important for planning appropriately and to help towards controlling their children's weight. It is reasonable therefore to increase our knowledge about the prevalence of childhood obesity and parental knowledge about obesity in developing countries; motivated by the fact that the public health effects of under-nutrition and micronutrient deficiencies are a major concern. The current study assessed the prevalence of childhood obesity, the associated parental knowledge, and preventive practices among pupils attending public and private primary schools in Port Harcourt, Rivers State, Nigeria.

2. METHOD

Study Area

The study was conducted in Port-Harcourt, Rivers State, known as the treasure base of the nation. Rivers state is one of the 36 states of the Federal Republic of Nigeria with Port Harcourt as the capital city. Port Harcourt is located in the South-South region of the country and Rivers state is bounded on the South by the Atlantic Ocean, to the North by Imo, Abia and Anambra States, to the East by Akwa Ibom State and to the West by Bayelsa and Delta states. Rivers state has a population of 6,144,673, estimated population projection (Source: National Bureau of Statistics, Nigeria).

Study Design

This is a comparative cross-sectional study that compared the prevalence of obesity among pupils of public and private primary schools.

Ethical Consideration

Ethical approval to carry out the study was obtained from the Ethics committee of the Rivers state health care management board. Permission was also obtained from the Ministry of Education/Local Government Authority for public primary schools and proprietors of private primary schools selected for the study. Parents-Teachers Associations of the selected primary schools were informed to get the optimum co-operation of the parents. Parents/guardians of selected pupils were required to complete the informed consent form on behalf of themselves and their wards.

Study Population

The study population consisted of pupils attending public and private primary schools in Port Harcourt city, Rivers State, Nigeria. Pupils whose parents/guardians gave informed consent were selected for the study.

Sample and Sampling

The formula for calculating sample size to determine a difference between two proportions was employed as follows (23):

$$n = \frac{\{u \sqrt{[\pi_1 (1 - \pi_1) + \pi_0 (1 - \pi_0)]} + v \sqrt{[2 \pi (1 - \pi)]}\}^2}{(\pi_0 - \pi_1)^2}$$

Where

n= minimum required sample size

u = One-sided percentage point of the normal distribution corresponding to 100% minus the power. Thus, at power of 80%, u = 0.84 (Type 2 error). The power is the probability of finding a significant result; for example, if v = Percentage point of the normal distribution corresponding to the two-sided significance level. Thus at 5% significance level, v = 1.96 (Type 1 error).

The prevalence of obesity as reported in a study done in an urban city Nairobi, Kenya comparing overweight and obesity among students of public and private primary school pupils(24) was used in calculating the minimum required sample size. Nairobi is a rapidly growing and industrialized urban city in one of the developing African countries as Nigeria.

π_1 = prevalence of obesity in Private schools= 10.9%

π_0 = prevalence of obesity in Public schools = 2.2%

$$\begin{aligned} n &= \frac{\{u \sqrt{[\pi_1 (1 - \pi_1) + \pi_0 (1 - \pi_0)]} + v \sqrt{[2 \pi (1 - \pi)]}\}^2}{(\pi_0 - \pi_1)^2} \\ &= 140 \text{ students in each study arm} \end{aligned}$$

Total = 280 Primary school children

With a 10% non-response rate = 280 + 28 = 308 = 308 Primary school children

To increase the validity of the study, a total sample size of 600 was used, 300 students from private and public schools respectively. Systematic random sampling was used to select the students from the schools after a stratified sampling of the schools to be selected for the study.

Data collection

Data was collected with the aid of a semi-structured, self-administered questionnaire focusing on socio-demographic characteristics and socioeconomic status of the parents as adapted from a previous study [22]. Questionnaires were properly sealed in an envelope and giving to each child whose parents have given consent to deliver to them at home and return after completion. The pupil's anthropometric measurements were taken after they return completed questionnaires and results recorded on the same questionnaire. The parent's belief, knowledge, diet, practice, and related factors were also evaluated using the same questionnaire.

Data Analysis

Data were checked for completeness and accuracy, and coded data were entered into the computer and analyzed using SPSS version 21 software. WHO AnthroPlus software was used to calculate Z scores of Weight for age (WA), Height for age (HA), and Body Mass Index for age (BMIA). General characteristics were described with descriptive statistics, as data were summarized using means and standard deviation. The percentage was used to estimate the prevalence of obesity. The frequency distribution of all the relevant variables was measured. The chi-squared statistic was used to test for differences in proportion. A bivariate logistic regression was used to measure the association between the presence of obesity and independent variables, while the multivariate logistic regression was used to test for confounding issues. A p-value less than or equal to 0.05 ($p \leq 0.05$) was regarded as statistically significant.

3. RESULTS

Table 1: Socio-demographic characteristics of pupils in public and private primary schools

Variable	Public (n=300)		Private (n=300)		χ^2 , df (p-value)
	n	%	n	%	
Age group (years)					
5 – 7	73	(24.3)	182	(60.7)	81.03,1 (< 0.001)
8 – 10	143	(47.7)	111	(37.0)	6.991,1(0.008)
11 – 13	84	(26.3)	7	(1.7)	76.802, 1 (< 0.001)
Mean age \pm SD (years)	9.1 \pm 2.2		7.7 \pm 1.6		8.677*,1(< 0.001)
Sex of child					
Male	150	(50.0)	156	(52.0)	0.240, 1(0.624)
Female	150	(50.0)	144	(48.0)	
Family structure					
Monogamy	274	(91.3)	277	(92.3)	0.200, 1 (0.655)
Polygamy	24	(8.0)	14	(4.7)	2.810, 1 (0.094)
Others	2	(0.7)	9	(3.0)	4.538, 1 (0.033)
Occupational group					
Professional	69	(23.0)	235	(78.3)	183.739,1 (< 0.001)
Skilled	115	(38.3)	50	(16.7)	35.319, 1 (< 0.001)
Unskilled	116	(38.7)	15	(5.0)	99.621, 1 (< 0.001)
Socioeconomic class					
Upper	92	(30.7)	187	(62.3)	60.463, 1 (< 0.001)
Middle	81	(27.0)	89	(29.7)	0.525, 1 (0.469)
Lower	127	(42.3)	24	(8.0)	93.886, 1 (< 0.001)

* t statistic

Table 1 shows the sociodemographic distribution of the student’s sampled for the study. In public schools 73 (24.3%) of respondents were in the age group 5-7years, and 182 (60.7%) were in this age group in private schools, and this difference is statistically significant ($\chi^2=81.030$; p-value <0.001). Almost half of the pupils in public schools were within the age group 8-10 years 143 (43.7%). Eighty-four (26.3%) of the pupils were in the age group 11-13 years and 7 (1.7%) in the same age group in private schools, and the difference was statistically significant ($\chi^2=76.80$; p-value <0.001). Mean age was compared using the student's t statistic and this difference is statistically significant (t=8.677; p-value <0.001). In both groups, males and females were almost equal, as there was no statistically significant difference in the sex of the children ($\chi^2=0.240$; p value=0.624). Differences in the education of parents were statistically significant amongst those that have had no formal education (p=0.001), Secondary education (p=0.01), and Tertiary education (p<0.001). Occupation of the parent was statistically significantly different in both groups (p-value <0.001), likewise a statistically significant difference in those with an upper (p<0.001) and Lower (p<0.001) socioeconomic status in both groups.

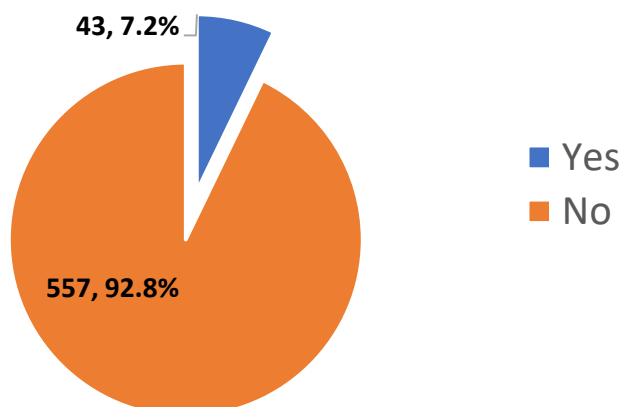


Figure 1: Prevalence of Obesity

Figure 1: Shows a 7.2% (43/600) prevalence of obesity among the pupils sampled.

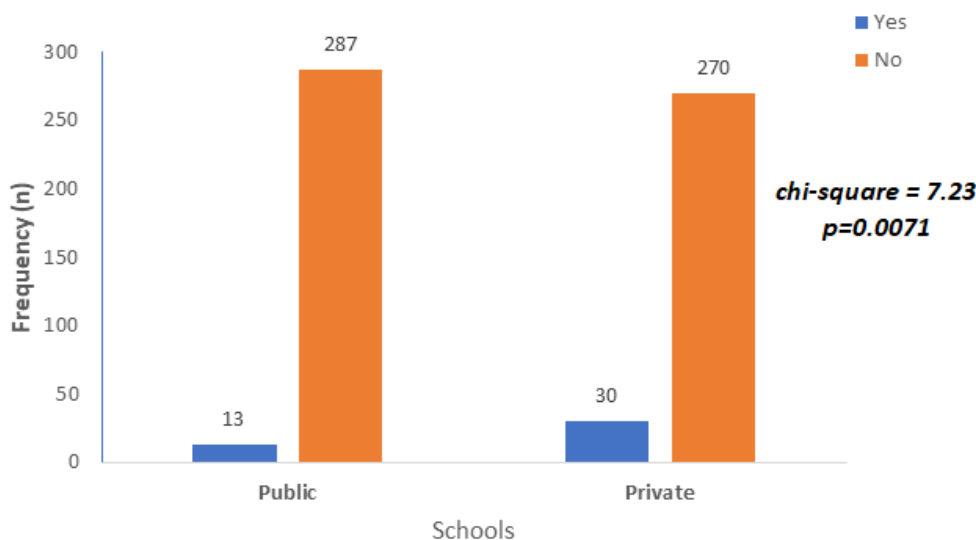


Figure 2: Distribution of Obesity in type of schools

Figure 2 shows the distribution of obesity in the pupils by the type of schools. In public schools, 13 (4.3%) pupils had obesity and in private schools, 30 (10.0%) had obesity. The distribution of obesity in both types of schools was statistically significant (chi-square = 7.23, p=0.0071).

Table 2: Knowledge of obesity among parents of pupils in public and private schools

Variable	Frequency (%)		χ^2 p-value
	Public n=300	Private n=300	
Knows obesity is a disease	233 (77.7)	237 (79.0)	21.04, (< 0.001)
Childhood obesity is preventable	245 (81.7)	279 (93.0)	17.42, (< 0.001)
Obese children are healthier than normal weight children	51 (17.0)	48 (16.0)	0.11, (0.741)
Knows that it is possible to be obese at any age	260 (86.7)	260 (86.7)	0.00, (1.000)
Knows that eating too much fast food will lead to obesity in children	235 (78.3)	250 (83.3)	2.42, (0.120)
Knows there are health risks in obesity	227 (75.7)	246 (82.0)	3.61, (0.058)
Knows diabetes is a health risk of obesity	168 (56.0)	136 (45.3)	6.83, (0.009)
Knows obesity can cause heart disease	198 (66.0)	197 (65.7)	0.01, (0.931)

The difference in the response to the question of obesity is a disease is statistically significant using a test of significance for chi-square 21.04 (p-value <0.001). The difference between parents' of public and private primary schools pupils in this study was at p-value less than 0.001, majority of the respondents in private schools 279 (93.0%) knew that childhood obesity is preventable and 245 (81.7%) in public schools also agreed to this statement, the difference in this proportion is statistically significant chi-square 17.42 (p-value <0.001). Up to 168 (56%) knew that obesity may cause diabetes in public schools and 136 (45.3%) in private schools agree in the affirmative, the difference in proportion is statistically significant, chi 6.828 (p-value 0.009) as shown in Table 2.

Table 3: Association between parental knowledge of obesity and the presence of obesity in children in public and private schools

Variable	Public Schools		Private Schools		MH χ^2 (p-value)
	Present n = 13	Absent n = 287	Present n = 30	Absent n = 270	
Parental knowledge					
Good	12 (92.31)	247 (86.06)	29 (96.67)	235 (87.04)	2.631 (0.104)
Poor	1 (7.69)	40 (13.94)	1 (3.33)	35 (12.96)	
χ^2 (p-value)	0.411 (0.521)		2.371 (0.124)		

Table 3 shows the relationship between parental knowledge of obesity and the presence of obesity in the children of public and private schools, using chi-square as the test of significance, there was no statistically significant relationship in the difference in both groups.

Table 4: Practice of prevention measures against obesity among parents in public and private primary schools

Variable	Frequency (%)		χ^2 p-value
	Public n=300	Private n=300	
Arrange sporting activities for family			
Always	28 (9.3)	35 (11.7)	0.87,(0.351)
Sometimes	181 (60.3)	228 (76.0)	16.97,< 0.001)
Not at all	91 (30.3)	37 (12.3)	28.96, (< 0.001)
Restrict time child watch TV/play computer game			
Always	86 (28.7)	74 (24.7)	1.23, (0.268)
Sometimes	167 (55.7)	199 (66.3)	7.17, (0.007)
Not at all	47 (15.7)	27 (9.0)	6.17, (0.013)
Restrict the amount of chocolates child eats			
Always	127 (42.3)	131 (43.7)	3.31, (0.069)
Sometimes	120 (40.0)	130 (43.3)	0.69, (0.408)
Not at all	53 (17.7)	39 (13.0)	2.52, (0.113)
Encourage child to do household chores			
Always	188 (62.7)	206 (68.7)	2.40, (0.122)
Sometimes	76 (25.3)	62 (20.7)	1.85, (0.174)
Not at all	36 (12.0)	32 (10.7)	0.27, (0.606)
Restrict child in engaging in outdoor play			
Always	39 (13.0)	30 (10.0)	1.33, (0.249)
Sometimes	177 (59.0)	199 (66.3)	3.45, (0.063)
Not at all	84 (28.0)	71 (23.7)	1.47, (0.225)

Table 4 shows responses to the questions on the practice of selected prevention measures against childhood obesity, 181(60.3%) in public schools sometimes arrange sporting activities and 228 (76%) in private school. This difference is statistically significant between the two groups using the chi-square test of significance for 16.966 (p value<0.001), 167(55.7%) of parents in public school sometimes restrict the time child watch TV/play computer games and 199 (66.3%) of parents in private school, this is statistically significant chi-square 7.174 (p-value 0.007). Less than half of the parents 127 (43%) always restricts chocolate and sweet eating among the children in public school and almost the same number of parents 131 (43.7%) restricts this in private school. This difference is not statistically significant.

Table 5: Comparing parent's practice of prevention measures and the presence of obesity in children

Variable	Public Schools		Private Schools		MH χ^2 (p-value)
	Obesity Present n = 13	Absent n = 287	Obesity Present n = 30	Absent n = 270	
Practice of prevention					
Good	10 (76.92)	226 (78.75)	27 (90.0)	226 (83.70)	0.383 (0.536)
Poor	3 (23.08)	61 (21.25)	3 (10.0)	44 (16.30)	
χ^2 (p-value)	0.025 (0.875)		0.810 (0.368)		

Table 5 shows that the aggregate scores of parent's practice of prevention measures for obesity were compared with the presence of obesity in the children using chi-square test of proportion to test for significance and the difference in both groups was not statistically significant; chi-square 0.025 (p-value: 0.875) and 0.810 (p-value: 0.368).

Table 6: Bivariate logistic regression of the presence of obesity in school children and socio-demographic characteristics

Variable	Public school			p-value	Private school			p-value
	Odds ratio	95% CI Lower Upper			Odds ratio	95% CI Lower Upper		
Age of Child (years) (10-13/5-9)	1.67	0.59	4.75	0.411	2.39	0.79	6.95	0.08
Sex of child (Female/Male)	0.17	0.04	0.78	0.023*	2.41	1.1	5.2	0.035*
Family structure (Monogamy/Polygamy)	2.0	0.27	11.31	0.428	1.50	0.19	18.91	0.571

*Statistically significant (p<0.05)

Table 6 shows that there was no association between age and obesity in either public (OR=1.67, p=0.411, 95% CI =0.59-4.75) or private school (OR=2.39, p=0.08, 95% CI =0.79-6.95). There was also no association between if pupils were from a monogamous or a polygamous family structure and obesity in either public (OR=2.0, p=0.428, 95% CI =0.27-11.31) or private school (OR=1.50, p=0.571, 95% CI =0.19-18.91). There was a statistically significant association between sex of child and obesity, as female children in the private school were 2.41 times more at odds of been obese than male children (OR=2.41, p=0.035, 95% CI =1.1-5.2); while in the public school, female children were less likely to be obese (OR=0.17, p=0.023, 95% CI =0.04-0.78).

Table 7: Bivariate logistic regression of the presence of obesity and socio-demographics of the parent of pupils

Variable	Public school			p-value	Private school			p-value
	Odds ratio	95% CI Lower Upper			Odds ratio	95% CI Lower Upper		
Age of parent (years) (≤40y/>40y)	0.88	0.31	2.49	0.989	0.41	0.17	0.98	0.05*
Sex of parent (Male/Female)	0.51	0.14	1.90	0.318	2.27	1.05	4.92	0.037*
Occupation of parent (Unskilled, Skilled, Professional)	1.31	0.64	2.68	0.455	0.51	0.29	0.88	0.017*
Education of parent (≥Secondary/≤Primary)	1.97	0.41	8.25	0.255	0.73	0.23	2.13	0.705
SEC of parent (Lower, Middle, Upper)	1.18	0.62	2.27	0.612	0.65	0.38	1.11	0.114

*Statistically significant SEC = Socio-economic class

In table 7 shown above, the variables were entered into a bivariate logistic regression model to assess obesity in school children and socio-demographic characteristics of parents. There was no association between socio-economic class of parent and obesity in either child in a public (OR=1.18, p=0.612, 95% CI =0.62-2.27) or private school (OR=0.65, p=0.114, 95% CI =0.38-1.11). There was a statistically significant association between the age of parents in pupils of private school and obesity, as parents that were ≤ 40 years were less likely to have children that were obese (OR=0.41, p=0.05, 95% CI =0.17-0.98). There was no statistically significant association between education of parent in public (OR=1.97, p=0.255, 95% CI =0.41-8.25) and in private school (OR=0.73, p=0.705, 95% CI =0.23-2.13) and obesity of child. There was a statistically significant association between sex of parent (OR=2.27, p=0.037, 95% CI =1.05-4.92), occupation of parent of child in private school (OR=0.51, p=0.017, 95% CI =0.29-0.88) and obesity.

4. DISCUSSION

The prevalence of childhood obesity in a previous study done in Port Harcourt [25] among pupils of primary schools, using multistage sampling methods is slightly higher but comparable to the prevalence in public schools in the index study. This prevalence if compared to the prevalence in private schools is lower. The study did not stratify the schools into public and private schools as was done in this index study. The results of the index study are lower than the estimated prevalence in Africa as of 2010 but are comparable to the projected estimated increase by 2020. The prevalence in private schools is comparable to some developed countries like Canada's national prevalence estimates; yet lower than the average prevalence among school-age children in USA. This could be because the urban cities are tending towards westernized lifestyles as obtained in the developed nations. The study also showed a rise in the prevalence of obesity in males in public schools and this is consistent with studies from South Africa [26]. Previous studies also had similar findings in female students having a higher prevalence of obesity than males. In the present study, the prevalence was higher in girls in private schools, which agrees to a study done in southwest Nigeria where the prevalence was higher in girls with increasing age than their male counterparts[9].

Studies in developing countries have revealed the higher prevalence of obesity among girls compared to boys due to several factors which may include biology, as the energy needs differ for boys and girls and in relation to rate of growth, as boys are generally more physically active compared to girls [27]. Also, concerns about body image, which may lead to problematic irregular eating behaviors that may result in weight gain, likewise instances in many developing countries where girls stay at home for a long time and their movement from place to place is much restricted due to cultural influence, resulting in physical inactivity leading to obesity [27,28].

Nairobi is also an urban population similar to Port Harcourt but in the same study the prevalence was lower in public schools than in the index study, factors that can mediate this difference could be that students in public schools in Port Harcourt have more access to energy-dense foods than their counterparts in the Nairobi study. It could also be that the activity level of public-school students in Nairobi, Kenya is more than in Port Harcourt [24]. Some studies have identified low levels of physical activities among residents of urban areas [29]. Childhood obesity rates in this study are comparable to that of some other countries in Africa [3].

The mean age of parents in the study was higher in private schools than public schools, probably because most working parents tend to marry in later years after taking the time to study and prepare for working life in the early years. Also, female parents are usually more around the children and have a great deal in determining the food choices the entire family makes. Parents in private schools were mainly professionals who are working and can afford to pay school fees and also maintain the feeding style of the westernized world that is increasingly being seen in our society. This is encouraged most especially by the high influx of fast food companies. The majority of the parents in private schools belong to the upper socioeconomic class where the prevalence of obesity is high among the children. Most parents in both groups of schools recognized obesity as a disease state. About half of parents in public school still held on to the belief that an obese child is healthier than the normal weight child.

The majority of the respondents in public schools are also aware of some of the health implications of obesity, although in this study less than half of the respondents agreed that it can lead to diabetes. This finding is not different from the Ibadan study on perception of childhood obesity among elites where the majority of the respondents are also aware of the

negative implications of the disease[30]. This finding gives credence to the fact that some of the factors associated with childhood obesity are well known by the public. Majority of the parents in both groups of schools also agreed that obesity is preventable and this is a positive finding since studies have proved that improvement in nutrition knowledge can bring about change in dietary behaviour that can prevent excess weight, and agreeing that it can be prevented can lead to parents embracing interventions that can lead to the change [31,32]. This is also in agreement with a study done among elites in Ibadan where a greater percentage of the parents agreed that child obesity can be prevented[32]. Most of the parents in public and private schools in Port Harcourt also know that there are health risks associated with obesity. This finding can further motivate them to reduce the prevalence of childhood obesity. In the Ibadan study, the majority of the parents believed obesity can shorten a child's lifespan [30]. A greater percentage of parents of pupils in private schools compared to the parents of pupils in public schools knew that eating too much of what is termed "fast food" can cause childhood obesity and despite this knowledge, obesity prevalence is still higher among students in private schools than public schools; thus bringing to a conclusion that parents of pupils in both public and private schools in this study have good knowledge about obesity.

It has been reported that accurate nutrition knowledge can be an important tool for good dietary practice which should lead to a healthy weight for the whole family[31]. This finding brings to view the assertion that although there is good knowledge about nutrition and obesity, this information has not been utilized enough to make healthy food choices for the children and the entire household in order to prevent childhood obesity. Knowledge of a problem is usually assumed as a catalyst towards preventive efforts to minimize the problem [31]. In this study parents in public and private schools had good knowledge about obesity. This goes to highlight the fact that knowledge alone is not enough in effecting a meaningful change in preventing childhood obesity but the knowledge should be translated into daily practice [33]. Assessing knowledge of parents may be a good starting point to combat the increasing trend of childhood obesity but the encouragement of an obesogenic environment through the role of the media should not be overlooked. Peer pressure is also another influence as found in a study done in Canada [34]. Despite a good knowledge score of parents on nutrition and obesity-related issues, the prevalence of childhood obesity has continued to rise to show it is not only parents that influence the behaviour of these children [33-34].

A study done in USA on nutrition knowledge and practice revealed that most African American women have good nutrition knowledge, although eating healthy food was difficult for them [31 -33]. Various reasons proffered include the time needed to prepare a healthy meal as well as the cost of the food. Most readily available energy-dense foods in our environment have become staple foods because they are cheap and convenient; an example is an instant noodle which is fast becoming a staple food in this country. Some other reasons include the fact that parents hardly have time to stay in the house to prepare healthy meals because of the attendant effects of urbanization, increasing the number of women in the labour market causing a shift in family eating patterns.

More than half of parents in public schools and about three-quarters of parents in private schools sometimes arrange sporting activities for their children, and also more than a quarter of the parents in public schools do not do so at all. The influence of parents in encouraging the children to participate in sports and also serving as a role model could go a long way in developing a lifetime of regular activity in the children thereby preventing childhood obesity. The majority of the respondents in both groups responded that they sometimes restricted the time their children watched television or play the video game. Almost half of the parents in public schools reported that they did not restrict their children's time either watching Television or playing computer/video games. Studies have shown a positive association between long hours of watching television and the presence of obesity in children, which is most likely because television viewing requires little energy beyond the resting metabolic rate thereby replacing the time to be spent in more vigorous activities [35].

The American Academy of Pediatrics recommends less than two hours of television viewing, computer, or video viewing [screen time] for children aged 2-18years/day and that television should be removed from children's bedrooms[35]. A greater percentage of the parents in both groups sometimes restrict outdoor play for their children, outdoor play used to be a norm in African settings but parents are getting more careful because of the increasing trend in kidnappings especially in Niger Delta area of Nigeria, a region where Port Harcourt the study site is located [36]. More than half of the parents do not always or sometimes restrict the number of chocolates the children take; sometimes parents

use sweets and chocolates as gratification for the children. It is intended to motivate the children to change behaviour to what the motivation is for but on the contrary it is building a lifelong pattern of unhealthy diet in them. This is in line with a study done earlier in Port Harcourt where it was found out that the prevalence of obesity is associated with intake of sweetened beverages [34]. A greater percentage of the parents in the study reported that they do not give pastries [meat pies, doughnut] as snacks to their children during snack break, however almost all the parents in both groups of schools give biscuits regularly to their children, but on the contrary about half of them reported giving fruits to the children and almost all the parents give fruit drinks to the children not caring to know if a difference actually existed between fruit drinks and fruit. This calls for nutrition education for parents to actually know the nutritive value of what they give the children to consume.

The occurrence of obesity among the students in this study was associated with high socioeconomic status. This is in line with a study done previously in Port-Harcourt by Adesina et al [38] among adolescents where the prevalence of obesity is associated with a high socioeconomic group, regular ingestion of snacks and high maternal education, although the study was done among adolescents rather than among primary school children used in this study. The study is in agreement with another study done in Edo state Nigeria comparing obesity between students of private and public secondary schools in Benin, using a cross-sectional study design and multistage sampling.

Socioeconomic status affects access to good quality food. The prevalence of obesity in this study has a direct relationship with the socioeconomic status of children in private schools as compared to the socioeconomic status of children in public schools where there is no relationship. There is growing evidence that the higher the socioeconomic status the higher the risk of obesity in the children especially in urban areas of developing countries [34], largely because of increased adoption of the western lifestyle. Nonetheless, studies have further demonstrated that as the GNP [Gross national product] of the countries increases, obesity tends to shift towards lower socio-economic groups [39]. Economic growth affects different socioeconomic groups differently. Poverty usually results in hunger leading to under-nutrition but it is now replaced with a different form of malnutrition occasioned by improved socioeconomic status where there is adequate food but a nutritional imbalance. Available and widely promoted foods are energy-dense but nutrient-poor, overconsumption of which can result in obesity [40]. Although parents exert a great influence on their child's diet, expensive marketing strategies by food and beverage companies can directly undermine parent's efforts. New digital marketing through social networks can give these companies access to children without the consent of parents. Children's diets may be influenced by parents, peers, school, and media. Parents' influence is believed to be strongest especially in younger age groups when parents act principally as providers, enforcers, and finally role models for these children [34 – 37].

5. CONCLUSION

This study has established that in Nigeria obesity has become a public health problem, and was found to be subject to socio-demographic and socioeconomic factors. The prevalence of obesity among Nigerian children from the two different settings was observed, as pupils in private schools were more obese compared to pupils in public schools; while thinness appeared to be the problem of children in public schools. These findings have serious implications for policy and planning of nutrition intervention programs for school-aged children in Nigeria; which also tends to support the finding that the developing world, including Nigeria is not excluded from the global rising epidemic of childhood obesity. The majority of parents whose children are in both public and private schools know that childhood obesity is preventable but their practice of prevention measures is negligible, including the poor habits of not giving adequate fruits to their children. Despite a good knowledge score on obesity and obesity-related matters, the prevalence of childhood obesity has continued to rise, indicating that level of knowledge and parental practice are not enough to minimize the problem. The socio-economic status of parents also contributed to the prevalence of obesity as children whose parents have an upper socio-economic class in private schools were more obese. Parents need to be encouraged to inculcate in their children the need to be more physically active. It can, therefore, be concluded that obesity and its attendant health implications will be reduced to the barest minimum if intervention starts from childhood, before eating and physical activity behaviour patterns are fully formed. Other determinants of the obesogenic environment, such as improvements in technology, have contributed in so many ways to increase the sedentary lifestyle in children and this is a continuous process. Parents need to be enlightened on the appropriate methods for implementing preventive measures for the occurrence of obesity among these pupils.

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International Journal of Novel Research in Healthcare and Nursing

Vol. 8, Issue 3, pp: (291-303), Month: September - December 2021, Available at: www.noveltyjournals.com

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