Determinants of Childhood Obesity in Urban Ghana: A Basis for Health Promotion

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Abstract

Background: Childhood obesity has been recognized as a global health challenge since it predisposes children to various health conditions. Factors such as high-calorie diets, physical inactivity, and genetics have been implicated in the onset of childhood obesity. This study aimed to assess the influence of dietary factors on childhood obesity in school children aged 5 to 17 in the Ga-South Municipal Assembly, Ghana.

Method: This was a cross-sectional study, with a purposive sample of 401. Data were collected using questionnaires and analyzed descriptively and inferentially with STATA statistical software.

Result: Findings showed that the proportion of obese children in private schools was more (58.6%) than in public schools (41.4%), with the majority being females (63%). Dietary factors that included parental/ caregiver's nutritional knowledge and children's dietary patterns significantly predicted childhood obesity (p-value = 0.00). An increase in age weakened the relationship between dietary factors and BMI while being a female strengthened it. However, the socio-economic characteristics of parents/ caregivers did not significantly moderate the relationship between dietary factors and BMI.

Conclusion: Further research is recommended to replicate this study in other parts of the country. The research has given substantial insights into the factors that predispose children in the Ga South Municipality and by extension Ghana as a whole, to childhood obesity. Based on the findings of this study, education on better dietary habits should be stepped up in schools.

Keywords: Childhood Obesity, Urban Ghana, Ga-South Municipal Assembly, School Children, Caregivers.

Introduction

The prevalence of childhood obesity is on the ascendancy. Engin (2017) states that the "increase in the prevalence of obesity has become a major worldwide health problem in adults, as well as among children and adolescents" (p. 1). It has been recognized by the World Health Organization (WHO) as a challenge of the twenty-first century, and is also considered to be one of the most serious conditions due to its far-reaching impacts (WHO, 2016; Caballero et al., 2017). The WHO defines "overweight and obesity as abnormal or excessive fat accumulation that may impair health" (WHO, 2020a, para. 1). In other words, it occurs when the number of calories taken into the body exceeds the amount expended. In children and adolescents whose ages fall between 5 and 19, overweight and obesity are defined as BMI-for-age greater than 1 standard deviation above the WHO Growth Reference median and greater than 2 standard deviations above the WHO Growth Reference median respectively (WHO, 2020a).

The incidence of obesity has risen sharply since the 1980s and more than half of the world's population are in countries where mortalities from being obese are higher than that of being underweight (Fox et al., 2019). In 2016, over 1.9 billion people of age 18 and over, across the world were overweight. Of this number, more than 650 million were obese. Statistics from the same year show that 39% of adults who were 18

years and older (39% of men and 40% of women) were overweight. Putting all together, nearly 13% of the adult population on the globe in 2016 (11% of men and 15% of women) were obese (WHO, 2020b).

However, the problem of obesity and its effects have not been an entirely adult challenge. The proportion of children who fall within the category of obesity has been rising at an alarming rate. According to the WHO, "while just under 1% of children and adolescents aged 5-19 were obese in 1975, more than 124 million children and adolescents (6% of girls and 8% of boys) were obese in 2016. Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016. The prevalence of overweight and obesity among children and adolescents aged 5-19 has risen dramatically from just 4% in 1975 to over 18% in 2016" (WHO, 2020b, Key Facts section). Several pieces of research have shown that children who are obese are predisposed to diabetes, cardiovascular diseases, cancers, respiratory diseases, and psychological disorders such as depression, anxiety, low self-esteem, and emotional and behavioral disorders (Di Cesare et al., 2021; Ganle et al., 2019; Sanyaolu et al., 2019). Ghana is one of the countries in the sub-Saharan region of Africa that has quite a high prevalence of childhood obesity (Akowuah & Kobia-Acquah, 2020) and according to the WHO (2020b), most children who are obese have a higher risk of becoming obese in their adult lives.

A recent study conducted among Ghanaian children aged 5 to 14 showed that 17.4% were obese (Ganle et al., 2019). Therefore, there is a need to curtail this trend in Ghana, to avoid complications associated with childhood obesity in the future. However, little research has been conducted in the context of urban Ghana regarding the influence of parental/caregiver nutritional knowledge on childhood obesity. The purpose of this study, therefore, was to examine whether parental/caregiver nutritional knowledge and children's dietary patterns were contributory factors to obesity in children of school-going age in Ghana.

Dietary Factors

Nutritional knowledge of parents/ caregivers: Accurate and adequate information about nutrition is essential to the proper management of weight in children (Lipowska et al., 2018). The development of eating behaviors in children are also influenced by parents' attitudes towards nutrition and how knowledgeable they are on the subject. Therefore, accurate nutritional knowledge is required to ensure the proper growth of the child. The nutritional habits of children, as impacted by the nutritional knowledge of their parents were assessed by Lipowska et al. (2018) in Poland. Findings revealed that maternal weight did not affect the weight of children in any way. The children's weights were rather affected by how they were supervised in eating. Children who were properly supervised during feeding were hardly obese (Lipowska et al., 2018).

Dietary patterns of children: The eating habits of children, as well as the kinds of foods consumed, have been recognized to be part of the predictors of childhood obesity. In combination with an inactive lifestyle, foods loaded with fats and sugars often lead to weight gain. Generally, such diets are low in micronutrients and hence, do not give the body the required minimum levels of nutrients for healthy growth (WHO, 2020c). A study was conducted by Flynn et al. (2020) in New Zealand to investigate the factors that could be changed to bring down the prevalence of childhood obesity and consequently, its effects on glucose metabolism among five and six-year-olds. A food frequency questionnaire was used to collect data about the dietary patterns of 1142 children as well as their BMIs. Analysis of data showed that children who ate healthy diets, with bigger portions consisting of fruits and vegetables had a lower likelihood of becoming obese when compared to those who mostly consumed sweets and pastries.

Demographic Factors: Body-Mass Index which is a predictor of childhood obesity is age and gender-specific. In a study conducted by Ajejas Bazán et al. (2018) in Spain to examine the risk factors related to obesity in children, gender was found to be a key factor. The study was cross-sectional and involved 3,752 children whose ages ranged from 2 to 15 years. Findings

showed that male children were more obese than their female counterparts.

Findings from another cross-sectional study conducted in Ghana by Ganle et al. (2019) gave a contrary result regarding gender. The study aimed to evaluate the prevalence of childhood obesity and its predisposing factors among children aged 5 to 16 years. Results showed that prevalence was higher in females (27.2%) than in males (19%). Also, children aged 11 to 16 had higher odds of being obese (adjusted odds ratio = 6.07) as compared to those who were 5 to 10 years. A systematic review and meta-analysis were conducted by Akowuah and Kobia – Acquah in 2020 to estimate childhood prevalence in Ghana. They did this by examining public articles which had been written on childhood obesity and overweight spanning a period of 18 years (2001 to 2019). Findings revealed that a higher proportion of females (4.6%) were obese as compared to males (2.6%).

Socio-economic Factors

Educational level: The educational level of parents influences the rate of weight gain in their children (Lauria et al., 2019; Ogden et al., 2018; Williams et al., 2018). In Italy, Lauria et al. (2019) inspected surveillance data to come up with an analysis of childhood obesity. After analyzing the demographic data of 45,000 children after every two years (from 2002 to 2016), it came out that the majority of children who were obese had mothers whose highest attained educational level was very low. Divergent results were recorded when a sample of school children aged 5 to 16 was evaluated in Ghana to come up with an estimation of obesity among them. One of the reasons cited for prevalence was a high parental educational level (Ganle et al., 2019). Another study in the same country yielded an analogous result. In this study, high educational attainment by mothers was linearly related to high obesity prevalence in children (Lartey et al., 2018).

Employment status: Parental/caregivers' employment status and the kind of employment are critical elements underlying the menace of childhood obesity (Milovanska-Farrington, 2020). In a study in the UK in which Fitzsimons and Pongilione (2019) investigated the impact of maternal employment on the weight of children; full-time work resulted in higher incidences of childhood obesity. Also, a sample of 701 children aged 12 to 17 was involved in a study undertaken by Okour et al. (2019) to examine the perception of the impact of social and economic factors on childhood obesity. Findings revealed higher obesity values in children of working mothers.

Average monthly income: The nutritional status of children can be influenced by the family's average income. A study in Malaysia by Ahmad et al. (2018) to examine the impacts of family income on obesity in children showed a linear relationship between higher incomes and childhood obesity. A similar trend was recorded by Al-Hussaini et al. (2019) who investigated the possible factors that influence children's weight in Saudi Arabia. From this study, findings established that children whose parents were high-income earners (>2500USD) were mostly obese. In a research by Goissis et al. (2019), divergent results were however generated. In their study which was conducted among seven-year-olds in the UK, low-income earning households were rather related to excessive weight gain in children.

Childhood Obesity

Body Mass Index (BMI): Global increases in BMIs have been recorded leading to rises in obesity in children. According to available data, close to 170 million children were either overweight or obese in 2008 (Mazidi et al., 2018). It has therefore been predicted that 30% of the world's population of children could be affected by this menace by the year 2030 (Mazidi et al., 2018). Childhood obesity prevalence in the western world has been forecasted to increase to 20.5 % by this same year while the respective forecasted values for both Eastern and Western Asia were 24.5% and 11.9% (Di Cesare et al., 2019).

Research Questions

The study sought to answer the following research questions:

1. What are the demographic/background information, and anthropometric characteristics of obese basic school children aged 5 to 17, as well as the socio-eco-

nomic characteristics of their parents in the Ga-South Municipality?
2. What are the dietary habits of obese basic school children aged 5 to 17 in the Ga-South Municipality?
3. Which among the following dimensions of dietary factors (nutritional knowledge of parents/caregivers and dietary patterns of respondents) significantly predict childhood obesity in basic school children aged 5 to 17 in the Ga-South Municipality?
4. Which of the following demographic characteristics (age and gender) of obese basic school children aged 5 to 17 in the Ga-South Municipality and the following socio-economic characteristics of their parents/caregivers (educational level, employment status, and monthly average income) significantly moderate the relationship between dietary factors and childhood obesity?

Methodology

Research Design

A descriptive, cross-sectional research design was used to examine the contributing factors which predispose children of school-going age to obesity in the Ga South Municipal Assembly of Ghana. The cross-sectional method was used because the study took place at a single point in time to find relationships and predictions that might exist between the dietary factors of respondents, demographic factors, socioeconomic factors of parents/caregivers, and childhood obesity (Wang & Cheng, 2020).

Research Setting

The research was conducted in the Ga South Municipality of the Greater Accra region of Ghana. It is located in the capital city of Ghana, Accra. The Greater Accra region is in the southernmost part of the country. The Ga South Municipal Assembly is one of the 29 Metropolitan, Municipal, and District Assemblies in the Greater Accra region. According to the 2021 population and housing census, the population in the municipality is 350,121 with 172,492 being males and 177,629 being females (Ga South Municipal, n.d.). The study was conducted in this municipality due to its diversified nature of having both high-income earners and low-income earners living within it. The sample was, therefore, more representative of the population and hence more generalizable.

Sampling

According to the statistics department of the Municipal Education Directorate, the population of children in basic schools in the municipality was approximately 28,000; with girl to boy ratio being 1: 1.02. The target population of the study comprised obese school children whose ages were from 5 to 17 years. Children who were excluded were those in basic schools outside this age range, had a disability that could not allow the determination of their heights and weights accurately, and those whose BMIs fell below the obese cut-off value of the WHO BMI-for-age growth chart.

A sample size of 384 was determined, using Cochran's formula, for a 95% confidence interval and 0.05 margin of error; but the sample became 423 with an attrition of 10%. A multistage sampling technique was used to select participants. In the first stage, the municipal area was divided into five clusters. Basic schools in each cluster were stratified into public and private schools, listed in alphabetical order, and numbered. Simple random sampling was used to select a school from both public and private schools in each cluster (odd number selection meant an inclusion). This led to the selection of 10 schools from the 700 basic schools in the municipality. In the next stage, purposive sampling technique was used to select the 423 children that were categorized as obese (after computing their BMIs) and who fell within the age range of 5 to 17 years in the 10 designated schools.

Data Collection

Data were collected quantitatively by use of a self-designed questionnaire based on related literature, previous studies (Ganle et al., 2019; Adom et al., 2019), and the research questions. Two sets of questionnaires were used to collect data from study participants (school children and parents/caregivers) to address the research questions. Questionnaires were pretested on 15

children aged 5 – 17 in a school that was not part of the study.

After permission was sought from the Municipal Educational dDirectorate and the selected schools that took part in the study, appropriate forms (Informed Consent, Parent/ Guardian Permission Form, and Assent Form) were distributed to children to take home to be signed by their parents/caregivers and themselves (children). Only children who returned signed forms had their height and weight readings taken. Data were collected with assistance from the various class teachers and two trained assistants. Teachers were taken through the questionnaires so that they could further explain the contents to the children. However, for the very young children who had challenges in reading and filling questionnaires, class teachers read questions and translated to them as well as assisted in filling for them. Also, the parents and older siblings of some of the very young children helped them in filling out questionnaires. Anthropometric readings were taken during break hours and free periods. A weighing scale was used to measure the weights in kilograms (kg) to the nearest 0.1 kg and a height rod for taking height measurements which were recorded to the nearest 0.1 centimeter (cm). These readings were used to compute BMIs, and Z-scores. BMI-for-age were used to put children into the categories of underweight, normal weight, overweight and obese. After the measurements, children who fell within the obese category of BMI classification were given the two sets of questionnaires (one for the parent/caregiver and one for the child). Questionnaires (filled or not filled) were collected within 3 to 5 days.

Data Analysis

The completeness and accuracy of the returned questionnaires were checked daily. Uncompleted questionnaires were given back to respondents to be completed and returned. Data were then coded and entered into the database using MS Excel 2016. They were subsequently analyzed descriptively by use of STATA software. Inferential analysis was also done with the same software. Since the outcome variable (BMI) is continuous, linear regression was used inferentially to predict relationships between dietary factors and obesity (BMI).

Ethical Considerations

Approval was taken from the Municipal Education directorate before the commencement of the research. Ethical considerations to protect the rights and maintain the privacy of research participants were adhered to. Since the primary participants of the study were minors (children below 18 years), informed consent and permission were sought from parents/caregivers before enrolling any child into the study. Only children whose parents/caregivers signed and returned the Parent or Guardian Permission Form were enrolled. Again, assent was sought from children (by signing the child assent portion of the Parent or Guardian Permission Form) before their recruitment into the study. All texts and quotes from other authors have been duly acknowledged to ensure the protection of intellectual property rights. The results and analysis of data are based on the actual data collected.

Results

A total of 419 children participated in the research but 401 questionnaires were used in the analysis due to the non-retrieval of 18 questionnaires. As can be seen from Table 1, 166 (41.4%) of the participants attended public schools while 235 (58.6%) attended private schools. Also, the majority of the respondents were females (63%) while close to 37% were males. Again, 43.0% of all respondents' parents/ caregivers had attained education up to the tertiary level. Concerning employment, nearly 93% (92.98%) of respondents' parents/caregivers were employed, with the highest percentage (43.81%) being in the 'professional' category.

Table 1
Demographic Characteristics of Respondents and the Socio-economic Characteristics of their Parents

Variable	Public School		Private School	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender				
Male	51	12.72	97	24.19
Female	115	28.68	138	34.41
Total	**166**	**41.4**	**235**	**58.6**
Age				
5 - 8	4	1	56	13.97
9 - 12	50	12.47	130	32.42
13 - 17	112	27.93	49	12.22
Total	**166**	**41.4**	**235**	**58.6**
Parental Education (n = 400)				
Primary	32	8	5	1.25
JHS/Middle School	72	18	17	4.25
Senior High School (SHS)	24	6	10	2.5
Vocational/Technical	25	6.25	43	10.75
Tertiary	12	3	160	40
Total	**165**	**41.25**	**235**	**58.75**
Parents'/caregivers Employment Status (n = 399)				
Unemployed	14	3.51	14	3.51
Employed	151	37.84	220	55.14
Total	**165**	**41.35**	**234**	**58.65**
Parental/caregivers' Occupation (n = 388)				
Artisan	54	13.92	30	7.73
Trading	70	18.04	30	7.73
Professional	22	5.67	148	38.14
Other	11	2.84	14	3.61
N/A	4	1.03	5	1.29
Total	**161**	**41.5**	**227**	**58.5**
Family's Average Monthly Income(GH₵) (n = 388)				
Less than 500	81	20.87	20	5.15
500 - 1000	58	14.95	59	15.21
1000 - 2000	13	3.5	48	12.37
2000 - 5000	11	2.84	72	18.56
Greater than 5000	0	0	26	6.7
Total	**163**	**42.16**	**225**	**57.99**

Source: Field Survey, 2021

Nutritional Knowledge of Parents/caregivers and Dietary Patterns of Respondents

From Table 2, 60% of parents/caregivers had received some form of education or information about nutrition through books, the Internet, Church, or friends. A whopping number of 304 parents/caregivers knew the benefits of proper nutrition; although only 46.15% were able to implement the knowledge received.

Table 2
Nutritional Knowledge of Parents/Caregivers

Variables	Yes		No		Not sure	
	f	%	*f*	%	*f*	%
Received nutrition-related education	239	60.2	117	29.47	41	10.33
Implementation	174	46.15	88	23.34	89	23.61
Knowledge about the main food groups	348	87.88	16	4.04	32	8.08
Knowledge about proper nutrition to prevent weight gain	304	76.57	42	10.58	51	12.85
Give child food to feel better when upset	276	70.23	54	13.74	63	16.03
Allow child to eat between meals	237	60.15	116	29.44	41	10.41
Cut out fat completely from diets	245	67.31	69	18.96	50	13.74

Source: Field Survey, 2021

A large percentage of 93.02% of respondents consumed snacks as shown in Table 3. Also, 53.30% of respondents consumed sugary, carbonated, and soft drinks three or more times a week.

Table 3
Dietary Habits of Respondents

Variable	Frequency	Percentage (%)
Consumption of snacks (biscuits, sugary drinks, ice -cream etc.)		
Yes	373	93.02
No	28	6.98
Total	**401**	**100**
Daily consumption of snacks		
Once	200	53.62
Twice	105	28.15
3 times	45	12.06
Other	23	6.17
Total	**373**	**100**
Weekly consumption of sugary, carbonated, or soft drinks		
Never	3	0.76
Daily	152	38.58
Once	108	27.41
Twice	73	18.53
3 times	40	10.15
Other	18	4.57
Total	**394**	**100**
Daily bottles of water intake (500mls)		
One	29	7.3
Two	63	15.87
Three	142	35.77
Four	95	23.93
Other	68	17.13
Total	**397**	**100**

Source: Field Survey, 2021

Predictors of Childhood Obesity

A linear regression analysis was used to determine which of the variables significantly predicted childhood obesity as shown in Table 4. All variables, except one, presented in Table 4 significantly predicted childhood obesity (p-values < 0.05).

Table 4
Regression analysis of Dietary Habits on BMI

BMI	Coefficient	Standard Error	t	p-value	95% Confidence Interval	
					Minimum	Maximum
Knowledge implementation	-0.5	0.25	-1.97	0.04	-0.99	0
Know benefits	0.89	0.43	2.05	0.04	0.03	1.75
Give child food when upset	0.82	0.31	2.63	0	0.2	1.43
Cut out fat from meals	-0.98	0.33	-2.91	0	-1.65	-0.32
Supper	0.53	0.23	2.29	0.02	0.07	0.98
Snack Consumption	6.41	1.9	3.37	0	2.65	10.16
Water	-0.54	0.23	-2.27	0.02	-1.01	-0.07

Moderating Effects of Demographic Characteristics of Respondents and Socio-economic Characteristics of their Parents/ Caregivers

Table 5 shows the results of the interaction analysis conducted using linear regression to observe whether the demographic factors of respondents (age and gender) and the socioeconomic factors of their parents/ caregivers positively or negatively moderated the relationship between dietary factors and BMI. Age of respondents negatively moderated (weakened) the relationship between dietary factors and BMI while gender positively moderated (strengthened) it.

Table 5
Moderating Effects of Demographic and Socio-economic Factors on Dietary Factors

	Dietary Factors		
Variable	**Coefficient**	**p-value**	**95% Confidence Interval**
Age	-0.72	0	-1.00 - 0.44
Gender	7.58	0	4.72 - 10.4
Educational Level	-0.65	0.37	-2.11 - 0.79
Employment status	1.45	0.27	-1.17 - 4.08
Average monthly income	-0.13	0.89	-2.12 - 1.86

Discussion

The research sought to bring out possible factors that predicted childhood obesity in 5 to 17-year-old students in the Ga South Municipal Assembly of Ghana. Findings from the study showed a higher obese female proportion (63%) as opposed to males (37%). This indicated that for every 5 respondents, 2 were males while 3 were females. Regarding the socio-economic characteristics of parents/caregivers, the highest proportion of employment was in the 'professional' category (43.81). Children who attended private schools had a majority of their parents/caregivers (38.14%) being professionals (nurses, teachers, bankers etc.). This affirms the previous findings of this study, which

showed that a higher percentage of parents/ caregivers of private school students had attained tertiary level education; leading to jobs that are mostly professional (i.e., engineers, doctors, nurses, teachers etc.) and consequently higher family incomes. This could also mean a high purchasing power of unhealthy foods and snacks for their children which could explain why more obese children were found in private schools.

More than half (53.30%) of respondents consumed sugary, carbonated, and soft drinks three or more times a week. This is quite significant and could explain the high BMI of respondents. Adequate water intake helps reduce the urge to drink sugar-sweetened juices which contain empty calories, thereby reducing the risk of childhood obesity (Rosinger et al., 2019). Table 11 also shows respondents' water intake patterns. Out of 397 children who answered this question, findings from the research revealed that nearly 36% (35.77%) of respondents drank three 500mls bottles/sachets of water a day. However, a substantial proportion of 23.17% drank less than three bottles /sachets (500mls) of water a day. The high intake of sugary drinks by respondents could account for this low intake of water. This corroborates with the findings of Rosinger et al. (2019) which showed that children who were obese drank more sugar-sweetened drinks than water.

Implementation of information received about nutrition by parents/caregivers significantly predicted childhood obesity. Also, knowledge about the benefits of nutrition significantly predicted childhood obesity. This finding is consistent with the findings of Effendy et al. (2020). Again, a significant prediction could be observed about whether parents/caregivers gave their children food to make them feel better when they were upset. This practice has a high likelihood of leading to the accumulation of excess calories (especially if the child is mostly inactive), thereby leading to increased BMIs and consequently obesity. Concerning the dietary patterns of respondents, BMI is significantly predicted by the consumption of snacks. This finding is similar to that of Nisak et al. (2020). However, it is contrary to the results of Poorolajal et al. (2020). A significant predictive relationship could also be observed between water intake and BMI. Supper consumption also significantly predicted BMI. This finding could be attributed to a likely late consumption of supper which could lead to an increase in weight. The finding is however in contrast with the findings of Canuto et al. (2020) in which skipping supper was rather significantly related to an increased BMI.

An interaction analysis conducted by use of linear regression showed a significant moderation by both age and gender of respondents on the relationship between dietary factors and BMI. Furthermore, an increase in age weakened the relationship while being a female however strengthened it. Also, all the indices of socio-economic factors (i.e., educational level, employment status and average monthly income) did not significantly moderate the relationship between dietary factors and BMI. This indicates that the relationship between dietary habits and BMI of respondents is not significantly affected in any way by the socio-economic factors of their parents/caregivers.

Conclusion

The research has given substantial insights into the factors that predispose children in the Ga South Municipality and by extension Ghana as a whole, to childhood obesity. Based on the findings of this study, education on better dietary habits should be stepped up in schools. Also, since the implementation of nutritional education received was low, simple ways that could help improve the rate of implementation of nutritional knowledge could be explored. Finally, this study should be replicated in other regions of the country to get the whole picture of childhood obesity in Ghana to help direct policies on child health, with regards to childhood obesity.

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Declaration of interest

Conflicts of interest: none

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