

Healthiness of processed foods and beverages sold in basic schools: A cross-sectional study of Basic Schools in the Cape Coast Metropolis

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Abstract

Background

Given the growing awareness of juvenile obesity and malnutrition in Ghana, schools are increasingly recognized as critical environments where children make dietary decisions that can significantly influence their health. It has become necessary to assess the types of food choices available in schools, as these can either promote healthy eating habits or contribute to poor nutrition and health outcomes. This study aimed to investigate the availability and nutritional healthiness of processed foods and beverages sold in basic schools, as well as identify the factors contributing to the sale of unhealthy foods

Methods

A cross-sectional study was conducted over six weeks in eight basic schools selected by convenience sampling. Data on packaged processed foods and beverages were collected using a semi-structured questionnaire developed in KoboCollect and assessed using the WHO Afro Nutrient Profiling Model. Frequencies and proportions were summarized, and associations were tested using chi-square and Fisher's exact tests.

Results

243 processed food products were analyzed using the WHO Afro NPM. The majority (48.56%) of the food products were unhealthy for marketing to children, and 37.45% of the food products had no nutritional information on the front-of-pack label. The majority (54.2%) of vendors had little knowledge of policies governing the marketing of processed foods and beverages in Basic schools. The majority (87.5%) of the students mostly purchase biscuits and sugar-sweetened beverages (70%).

Conclusion

Basic schools in the Cape Coast Metropolis have an unhealthy food environment, and some policy actions are required.

BACKGROUND

Globally, there has been a notable rise in the consumption of industrially processed foods, which are often characterised by excessive amounts of added sugars, unhealthy fats, and sodium ⁽¹⁾. These products tend to be energy-dense yet deficient in essential nutrients, including vital vitamins and minerals ⁽¹⁾. The significance of nutrition for children's health and development cannot be overstated. Non-communicable diseases (NCDs), such as obesity, diabetes, and stroke, have become increasingly prevalent worldwide, with Ghana being no exception ⁽²⁾. Early intervention is imperative, as dietary behaviours established during childhood frequently persist into adulthood ⁽³⁾.

Processed meals, such as sugary drinks, chips, candies, and baked goods, have taken over many school environments in the WHO African Region. Processed foods and beverages are readily available in school settings, which may result in high-calorie intake with little nutritional value ⁽⁴⁾. The increasing availability of these items, poor regulation, and a lack of knowledge about their negative health effects encourage unhealthy eating habits ⁽⁵⁾.

Many detrimental effects on children's health have been linked to the intake of processed meals and drinks ⁽⁶⁾. Diets heavy in unhealthy fats, added sugars, and sodium raise the risk of metabolic diseases like type 2 diabetes, obesity, and dental issues⁽⁷⁾. These foods frequently replace more nutrient-dense options, resulting in shortages of vital elements like fiber, vitamins, and minerals necessary for normal growth and development.

Children are especially susceptible to the promotion and availability of unhealthy foods and beverages. They are more likely to select unhealthy foods over healthier ones when they are easily accessible, particularly if they are reasonably priced and well-marketed ⁽⁸⁾.

Since schools are places where kids spend a large amount of their time, they greatly impact how they eat. It is critical to evaluate and enhance the nutritional quality of the food and drink options provided in school settings since they have the potential to either encourage healthy choices or contribute to inadequate nutrition. In emerging nations like Africa, where the consumption of processed foods is rising quickly in tandem with rising rates of childhood obesity⁽¹⁾, this trend is especially worrisome.

Poor childhood nutrition has lasting impacts that reach far beyond immediate health concerns. Studies show that children consuming diets rich in processed foods are more likely to carry unhealthy eating habits into adulthood, raising their risk of obesity, heart disease, and other non-communicable diseases ⁽⁹⁾. Additionally, inadequate nutrition can hinder cognitive development and academic performance, reducing a child's chances of thriving both at school and later in life ⁽⁸⁾.

To address global nutrition challenges, the World Health Organization (WHO) developed the Afro Nutrient Profiling Model (NPM) specifically for Africa. This model aims to help countries manage environments that encourage obesity and promote healthier diets by focusing on nutrients of public health concerns, such as sugar, saturated fats, and sodium. Its core mission is to shield children from marketing tactics for unhealthy foods and beverages ⁽⁵⁾. The WHO Afro NPM evaluates food groups based on their nutritional makeup and is particularly relevant for schools, where it can guide policymakers in shaping healthy school environments. By using this methodology, schools and lawmakers can review the nutritional value of processed foods sold on campus and make informed decisions to improve what students eat.

Although the model was designed for Africa, research applying the WHO Afro NPM to assess processed foods' healthiness in Ghana and other African regions is limited. In Ghana, existing studies primarily examine aspects like the Ghana School Feeding Program, sanitation, prevalent food types in schools,

and students' daily calorie intake^(10, 11, 12, and 13). However, there is a notable lack of research targeting the healthiness of pre-packaged processed foods marketed to children in basic schools. One Cape Coast study investigated processed foods in major supermarkets, revealing that over half were unsuitable for marketing to children⁽¹⁴⁾. Despite policies restricting sales of sugary products in schools, compliance remains problematic. This study addresses the gap by offering firsthand evidence on compliance, challenges faced, and the nutritional quality of products sold, using established benchmarks like the WHO Afro Nutrient Profiling Model. The study aimed to evaluate the healthiness of processed foods and drinks available in Ghanaian basic school environments with the WHO Afro NPM.

METHODOLOGY

Study site

This study was carried out in the Cape Coast Metropolitan Area in the central region of Ghana. The Metropolis covers an area of 122 square kilometers and is the smallest metropolis in the country. It is located on longitude 1° 15'W and latitude 5°06'N. It occupies an Area of approximately 124 square kilometres. The municipality is divided into two key constituencies for electoral purposes, namely Cape Coast North and South. Cape Coast municipality, known as the citadel of education, was selected due to the mix of public and private basic schools that serve students from a range of socioeconomic backgrounds. The city has a total of 573 basic schools made up of 116 Creches / Nurseries (4 public and 112 private), 175 kindergartens (66 public and 109 private), 162 primary (70 public and 92 private) and 120 junior high schools (63 public and 57 private). Together, the basic schools have total enrolment of 49,935 with gender parity ratio of 1.03 and 0.99 for public and private schools respectively (15). This diversity allows for a more representative understanding of the types of processed foods and beverages available across various school settings. Also, Cape Coast Metropolitan is accessible in terms of transportation, security, and infrastructure, making it feasible for researchers to carry out fieldwork, visit multiple schools, and engage with food vendors efficiently.

Study Design

A cross-sectional approach was used in this study to examine the kinds of processed foods and drinks sold in the basic schools in the Cape Coast metropolis over a period of 6 weeks.

Population

The target population was processed food vendors within the school facility and those within fifty meters (50m) radius of the school facility, and students of selected basic schools. Previous reviews have estimated between 150 to 5000 meters although there are no specified buffers for proximity of food sale outlets to schools⁽¹⁶⁾. Our choice of 50 meters was based on the ease of reach by students during their short breaks.

Sampling

School Selection: Eight basic schools, comprising 5 public and 3 private schools, were selected by convenience sampling from the two municipal zones, Cape Coast North and South.

Vendor Selection: The study included all processed food vendors or canteen operators inside each chosen school. Both formal (those conducting business on school property) and informal (those selling food just outside school gates and within a 50m radius from the school premises) vendors were included in the study.

Food and Beverage Sampling: The survey covered every packaged processed food and beverage that the sampled vendors sell. This guaranteed that the sample includes every product found in and around the school setting

Student selection: Ten students were randomly selected by ballot from each selected school.

Sample size

Data was collected from eight (8) basic schools, as done in a study conducted by Reynolds and colleagues ⁽¹⁷⁾

A total of 24 processed food vendors and 80 students across the 8 basic schools were sampled for the study. It included students from the lower primary, upper primary, and JHS levels.

Data Collection Instruments

The study employed several data collection instruments, including a semi-structured questionnaire digitally developed on kobocollect data management software (v2025.3.3), a phone for capturing pictures of nutritional facts on front-of-pack labels and data entry, and a checklist to guide systematic observation.

Data collection procedure

Data was collected from two key groups of participants, the vendors and pupils of the basic schools. The data collected from vendors included what vendors sell, what students mostly purchase, vendor awareness of food environment policies in the basic schools, vendors consideration of product information before advertising to students, vendors perspective on students' willingness to pay higher prices for healthy products and suggestions to improve the school food environment.

The students were also engaged to assess the frequency of purchasing prepackaged processed foods and beverages in the basic school environment, factors that influence their choices of these processed foods and beverages, and their awareness of the healthiness of these foods.

The data collection procedure involved first seeking permission from the Ghana Education Service and the authorities of the selected schools. Participants were then provided with sufficient information about the study, after which they signed a consent form and completed a semi-structured questionnaire. Additionally, nutritional information of each packaged processed food product was obtained from the food labels by taking pictures of the nutrition panel of the food items.

Products included in this research were mainly packaged processed foods with food labels that each vendor in and around the various schools advertises to the students of that particular school. The products were then grouped according to the food groupings found in the WHO Afro Nutrient Profiling Model ⁽⁴⁾.

For the processed foods, they were grouped as: ready-to-eat snacks, cakes, sweet biscuits and pastries, bread and bread products, breakfast cereals, processed nuts and edible seeds, chocolate and sugar-based products, processed fruits, vegetables and legumes, butter and fats and oils, cheese and analogues. For the beverages, they were grouped as: tea and/or herbal infusions, juices, water-based flavored and unflavored drinks, milk and/or dairy-based beverages, and coffee and/or coffee substitutes.

The WHO Afro Nutrient Profiling Model ⁽⁵⁾ was used to evaluate each food and beverage's nutritional value, which was found on the food label. Based on its nutritional value, each product was categorized as either "healthy for advertisement" or "unhealthy for advertisement" in educational settings.

The food composition data required for categorizing the processed food as healthy for marketing to children were the energy density in kilocalories per hundred grams of the processed food or hundred milliliters of the processed beverage (kcal/100g, kcal/100ml), total sugar content in grams per hundred grams of the processed food or hundred milliliters of the processed beverage (g/100g, g/100ml), sodium content in grams per hundred grams of the processed food or hundred milliliters of the processed beverage (g/100g, g/100ml), total fats in grams per hundred grams of the processed food or hundred milliliters of the processed beverage (g/100g, g/100ml), saturated fats in grams per hundred grams of the processed food or hundred milliliters of the processed beverage (g/100g, g/100ml), and added sugars in grams per hundred grams of the processed food or hundred milliliters of the processed beverage (g/100g, g/100ml). The nutritional content was not available on some of the processed foods and beverages, but was still included in the study and tagged as "no nutrient facts".

Tables were design on the number of processed foods and beverages being sold in and around the basic school environments, the specific type of processed food or beverage that is being purchased the most, the nutritional profile of these processed foods and beverages and whether they meet the WHO Afro Nutrient Profiling Model criteria for marketing to children or not, and the factors that drives sale of processed foods and beverages in the basic school environment.

Processed foods or beverages with their nutritional content meeting the WHO Afro Nutrient Profiling Model were tagged as "healthy for advertisement" while those not meeting the criteria were tagged as

“unhealthy for advertisement”. Processed foods or beverages without the nutritional content on the front of pack labeling were tagged as “no nutrient facts”.

To ensure confidentiality the participants names were replaced by identifiers and the schools labelled with the letters of the alphabet (A to H)

Data Analysis

Descriptive frequencies and percentages were generated from the data using IBM SPSS Statistics 27.0.1 IF026. The association between vendors' location and awareness of policy, type of school, and healthiness of processed foods sold, and the location of vendors and the healthiness of food and beverage sold, respectively, was tested using Fisher's test at p-value of 0.05

RESULTS

Healthiness of prepackaged processed foods sold at basic schools

Schools included in the research were public and private schools found within the Cape Coast Metropolitan Area and are registered under the Ghana Education Service. A total of eight schools out of a total of one hundred and forty-two registered basic schools were included in the research, and the participants from the various schools consisted of a total of 24 processed food vendors in and around the basic schools and 80 students across all schools.

A total of twenty-four (24) processed food vendors were interviewed across the eight schools (school A up to school H). A total of two hundred and forty-three (243) packaged processed foods and beverages sold by the vendors were recorded.

Information obtained from vendors about processed foods

Eight (8) schools with a total of 24 vendors, of which 17 were outside and 7 within the school premises, were recorded in the study (Table 1). Out of the 18 from the public schools, 13 were vendors operating outside the school environment, which is quite worrisome because they are not regulated in what they market to school children (Table 1).

Table 1 Type of basic school and location of vendors			
Within School Facility	Public School	Private School	Total
	5	2	7
Outside School Facility	13	4	17
Total	18	6	24

The most commonly purchased processed foods (33%) by students are a combination of sugar-sweetened beverages, biscuits, and sweets (Table 2)

Table 2
Vendor's perception of the processed foods mostly purchased at schools

The type of processed food being purchased the most	Number of schools	Percentage (%)
SSBs	3	12.5
SSBs, Biscuits	9	37.5
SSBs, Sweets	3	12.5
SSBs, Biscuits, Sweets	8	33.3
Sweets, Biscuits	1	4.2
Total	24	100

Table 3 categorizes the 243 processed food and beverage items using the WHO Afro NPM. The majority of processed foods, 48.6% (118 items), were found to be unhealthy for marketing to children, 37.5% (91 items) had no nutritional information on the pack labeling, and only 14.0% (34 items) were found healthy for marketing in the basic schools. It is worrying that close to 50% of prepackaged processed foods sold to children in basic schools are unhealthy for marketing to children; however, it is more disturbing to find that close to 40% lack nutritional information. Policies on school food environment should be broadened to prohibit the cover improperly labeled prepackaged foods and beverages sold in basic schools.

The healthiness of food sold per vendor location showed 35.3% of processed food products sold by vendors within the school premises were considered healthy for advertising, whereas 33.1% were not. For vendors outside the school, 67.0% of their food products were unhealthy for advertising to students, and only 25.0% of their products were healthy. However, no significant association was found between the vendors' location and the healthiness of products sold (χ^2 , $p = 0.94$) (Table 3).

Table 3
Analysis of processed foods and beverages sold using the WHO Afro Nutrient Profile Model

	Location of Vendor		Total (%)	Chi square, P value
	Within the school (%)	Outside the school (%)		
Healthy for advertisement	12 (35.3%)	22 (64.7%)	34 (14.0)	X = 1.73, P = 0.94
Unhealthy for advertising	39 (33.1%)	79 (67.0%)	118 (48.6)	
No nutrient Facts	32 (35.2%)	59 (64.8%)	91 (37.5)	
Total	83 (34.2%)	160 (65.8%)	243	
Type of basic school and the healthiness of processed foods being marketed to students.				
	Public School (%)	Private School (%)	Total	
Healthy for advertisement	29 (15.6%)	5 (8.8%)	34	X=, P = 0.42
Unhealthy for advertisement	88 (47.3%)	30 (52.6)	118	
No nutrient facts	69 (37.1%)	22 (38.6%)	91	
Total	186 (100%)	57(100%)	243	

The sale of processed, pre-packaged foods was common to both public and private schools.. 52.6% of processed foods advertised in private schools were unhealthy, 38.6% had no nutritional information, and only 8.8% of the food products were healthy. Likewise, 47.3% of processed foods advertised in public schools were unhealthy, 37.1% had no nutritional information, and only 15.6% of them were healthy for advertising to students. There was no significant association between the type of school and healthiness of products sold to children in and around the school environment (x, p = 0.42) (Table 3).

A significant association was found between the vendor's location and awareness of policy governing marketing of processed foods and beverages in the school environment (Fisher's exact test < 0.001). All the vendors in the school premises were aware of some policies, whereas 76.5% of vendors outside the immediate environs of the school were not aware (Table 4).

Table 4

Location of food vendors and whether they are aware of any policy governing the sale of food in the basic school environment

Knowledge of any food policy	Location of Vendor		Total (%)	Fisher's exact test
	Within the school facility	Outside the school facility		
YES	7	4	11 (45.8%)	< 0.001
NO	0	13	13 (54.2%)	
Total	7	17	24	

The majority (79.2%) of processed food vendors in the basic schools rarely consider the nutritional contents of food products before selling to students, and 8.3% of vendors do not consider it at all (Table 5).

Table 5 lists the challenges vendors face when trying to offer healthier food options. The vendors (70.8%) indicated that higher prices for healthier food products hamper their ability to sell healthier food options. Another important issue that is not a challenge but a driver worth noting, as unanimously (100%) echoed by vendors, was that basic school children do not demand healthier foods.

About 66.7% of vendors believe students would not be willing to pay more for healthier foods, while 33.3% of vendors are not sure whether students will be willing to pay more for healthy foods and beverages or not (Table 5).

Table 5
Challenges associated with the marketing of healthy processed foods in basic schools

How frequent vendors check nutritional components of processed foods before advertising to students		
Frequency of checking	Number of Vendors	Percentage of total (%)
Yes, I always check it	0	0%
Sometimes	3	12.5
Rarely	19	79.2
No, I do not check it	2	8.3
Total	24	100
Challenges faced by processed food vendors in offering healthier food options		
Challenges Faced	Number of vendors	Percentage of total (%)
Higher cost of healthy foods	17	70.8
Lack of demand from students	24	100
Storage problems for healthy foods	1	4.2
Lack of knowledge on healthy options	3	12.5
Vendor's perspective on students' willingness to pay more for healthier foods		
Will students pay more for healthy foods	Number of vendors	Percentage of total (%)
Yes	0	0
No	16	66.7
Not sure	8	33.3

However, the vendors had some suggestions for improving the school food environment. The majority (41.7%) did recommend health education for vendors and students, while 16.8% advocated for lowering the cost of healthful foods (Table 6).

Table 6

Suggestions from processed food vendors on what can be done to make the school food environment healthy

Suggestions	Number of vendors	Percentage of total (%)
Health education to students and vendors	10	41.7
Limiting social media advertisements of unhealthy foods	1	4.17
Healthy foods should be affordable	4	16.7
Companies should manufacture healthy foods	1	4.2
No suggestions	8	33.3
Total	24	100

Information obtained from students

Table 7 presents the association between school type and students' awareness of the healthiness of foods they purchase, as well as the frequency of purchasing processed foods. More than half of the respondents (70%) were not sure whether the foods they purchase were healthy or unhealthy. 21.3% indicated that the foods they purchase were unhealthy, while only 8.8% believed their food choices were healthy. A statistically significant association was observed between school type and students' awareness of the healthiness of the foods they purchase ($\chi^2 = 9.32$, $p = 0.009$). Students from private schools were more aware of the healthiness or unhealthiness of their food choices compared to students from public schools, who were mainly not sure of the healthiness or unhealthiness of their food choices (Table 7).

Table 7

Students' awareness of the healthiness of processed foods purchased and frequency of purchasing processed foods

Students' awareness the healthiness of processed foods	Private School (%)	Public School (%)	Total (%)	X, P-value
Aware	7	0	7 (8.8)	X = 9.32, P = 0.009
Not aware	10	7	17 (21.2)	
Not Sure	23	33	56 (70)	
Total	40	40	80	
How often do you buy processed foods				
Everyday	37	40	77 (96.3)	X = 3.12, P = 0.21
2–3 times a week	2	0	2 (2.5)	
Never	1	0	1 (1.3)	

Regarding the frequency of purchasing processed foods, the majority of respondents (96.3%) reported buying processed foods every day. Only 2.5% purchased processed foods two to three times per week, while 1.3% reported never buying processed foods. There was no statistically significant association between school type and frequency of purchasing processed foods ($\chi^2 = 3.12$, $p = 0.21$), suggesting that students from both public and private schools had similar patterns of purchase of processed foods (Table 7).

Unhealthy food choices are common among basic school children. A multiple response assessment of food mostly purchased showed 87.5% of student respondents mostly purchase biscuits, 70% mostly purchase sugar-sweetened beverages, and 41.2% mostly purchase sweets. Also, food choices are influenced by varied factors among the students of the basic schools, 87.5% of students make their choice based on the low pricing of processed foods, and 83.8% also consider the sweetness of products before purchasing them. A good number of them (61.3%) also make choices based on what their peers purchase, highlighting the importance of peer influence among basic school children (Table 8).

Table 8
Types of foods frequently purchased and factors informing their choice of purchase

Type of food often purchased	Number of Students	Percentage (%)
Biscuits	70	87.5
Sugar sweetened Beverages	56	70
Sweets	33	41.3
Fried snacks	13	16.3
Local snacks	5	6.3
Fresh fruits	5	6.3
Homemade drinks	3	3.8
Fruit Juice	0	0
Factors that affect choice of food to purchase		
Cheap price	70	87.5
Tastes good	67	83.8
Friends are buying it	49	61.3
It is popular/advertised	22	27.5
It is healthy	2	2.5

DISCUSSION

The school food environment has been largely looked at within the confines of the school, but it has become evident that the environment extends beyond the school premises. The larger number of vendors outside the immediate premises of the school is of concern, as what they offer is less regulated by the policies of the school. The vendors outside the school environment have few to no restrictions on what they market to students, unlike vendors within the school premises, who are, to some extent, controlled by the school management. Ruggles et al. (2024) study on the marketing of sugar-sweetened beverages and caffeinated drinks found the majority of the vendors were outside the school premises⁽¹⁸⁾. The continuous vending of unhealthy products in proximity outside the school premises has implications for the enforcement of healthy school environment policies if policies are not extended beyond the premises of the schools, which mostly have no barriers. Broadening policy actions to ensure a healthier school food environment would require broader awareness creation in and outside the immediate environs of basic schools.

The preference of most respondents for biscuits, sweets, and sugar-sweetened beverages is a cause for concern, considering the rising prevalence of obesity and diet-related non-communicable diseases

among school-aged children. According to Malik and Hu, sugar-sweetened beverages and sweets are a major source of added sugars in the diet ⁽¹⁹⁾. Sugar-sweetened beverages are a clear target for policy and regulatory activities. Habitual consumption of sugar-sweetened beverages has been associated with weight gain and an increased risk (compared with occasional consumption of sugar-sweetened beverages) of type 2 diabetes mellitus, cardiovascular illnesses, and certain malignancies ⁽¹⁹⁾. This raises a significant policy issue for the introduction of nutrition into early child education curriculum and the enforcement of school nutrition policies in protecting children from unhealthy marketing, considering their vulnerability.

A greater majority of the prepackaged foods in and around the immediate environment of the schools were deemed unhealthy for marketing to basic school students. This aligns with a study by Amevinya et al, who found that the majority of foods marketed in basic schools are unhealthy foods, most commonly, sugar-sweetened beverages ⁽²⁰⁾. These foods are known for several attributes, such as, for example, hyper flavor, which compromises satiety and controls appetite, favoring involuntary consumption, and increasing the risk of obesity ⁽³⁾. Therefore, their sale represents a challenge for the promotion of healthy eating habits and requires the development of public policies that regulate the food supply and promote environments conducive to healthier choice options, especially for developing children ⁽²¹⁾. Additionally, a lack of transparency in food marketing is indicated by the fact that 37.45% of items lack nutritional labeling, which may make it challenging for consumers, in this case, students, to make informed food choices. Consumers need product labels to make healthy choices, and labeling is an indispensable part of advancing the healthy food environment policy ⁽²²⁾.

Schools are generally surrounded by canteens, grocery stores, restaurants, fast food, snack bars, and thus influence the consumer choices of target customers ⁽¹⁶⁾. Public and private school equally faces common challenges as far as the marketing of prepackaged processed foods and beverages is concerned. No significant association was found between the type of school and the healthiness of products sold to children in and around the school environment. A study conducted by Henriques et al found no significant difference between the type of food sold in public and private schools ⁽²³⁾. Both categories of schools had a significant number of trade outlets that sold, predominantly, foods of low nutritional value, with high levels of critical nutrients and additives in their composition.

Vendors, especially those outside the school, lack awareness of the school food marketing policy and thus the adherence to policies governing the school food environment. The poor adherence of food vendors to current food safety rules, policies, and regulations is apparent, mostly as a result of either a lack of awareness of their existence or a lack of understanding of how to put them into practice ⁽²⁴⁾. This could be attributed to the lack of training or education of vendors on nutrition. A survey conducted in Ghana showed that the majority of food vendors in the rural areas had no form of training or any idea of how to create a healthy school food environment ⁽²⁴⁾. To improve the school food environment, interventions should target educating and training food vendors in and around the schools on policies

governing the sale of processed foods and beverages in and around basic schools, and also the health benefits associated with their adherence⁽²⁵⁾.

Offering healthier meal options according to the vendors is much dependent on cost and the students' demand for healthy food. Many students might favor processed foods that are more affordable and readily available. Healthy foods are on a higher trophic level and require more resources to produce, and hence are generally expensive⁽²⁶⁾. Students prefer to consume healthy foods but are not willing to pay a high price for them⁽²⁵⁾. This has limited the food choices of students to more affordable options, which are often not healthy. The cost of healthier food options is an issue of concern when it comes to consumer choices of healthier options. This brings up the policy conversation of government subsidizing the price of healthier foods and, more so, price control when it comes to the sale of food in the basic schools. Addressing this challenge would require a multipronged approach of policy review, legislation, school nutrition programs, subsidies for healthier food production, and the integration of healthy nutrition into basic education.

The high consumption of biscuits and sugar-sweetened beverages suggests that energy-dense, nutrient-poor foods are widely accessible and preferred among schoolchildren. A study revealed that if the quality of marketed products for adolescents is unhealthy foods and beverages, it will affect their food and drink choices, which may lead to many health complications in their later life⁽²⁷⁾. Students spend a long time of their day at school, and hence, the food being advertised in schools can greatly affect their health and eating habits⁽²⁷⁾. Findings have been reported in several low- and middle-income countries where processed snack foods and sugary drinks constitute a substantial proportion of children's diets due to their affordability, availability, and palatability⁽²⁸⁾. In Ghana, increasing urbanization and the expansion of the processed food industry have contributed to greater exposure of children to unhealthy food environments, especially around schools⁽²⁹⁾. Frequent consumption of such foods is associated with increased risks of childhood overweight, obesity, dental caries, and other diet-related non-communicable diseases⁽²⁷⁾.

The daily purchase of prepackaged processed foods and beverages by students further demonstrates the normalization of unhealthy dietary habits among basic school children. This frequency of consumption is concerning because regular intake of ultra-processed foods has been linked to poor dietary quality and adverse health outcomes in children and adolescents⁽³⁰⁾. The school food environment may be contributing significantly to this pattern, as children are often exposed to vendors selling inexpensive processed foods within and around school premises⁽³¹⁾. Similar studies conducted in Ghana reported that school children commonly consume unhealthy snacks daily because they are readily available and very affordable⁽³²⁾. The low proportion of students who never purchased processed foods and beverages suggests that healthier food alternatives may either be inaccessible or less appealing to children.

The findings further revealed inadequate knowledge and awareness regarding healthy and unhealthy foods among the students. Many of the respondents were uncertain about the healthiness of their processed food choices, while only a few actively made healthy food choices. This suggests poor nutrition literacy among the children, which may contribute significantly to unhealthy eating behaviors. Nutrition knowledge plays an essential role in shaping dietary choices, and children with limited understanding of healthy nutrition are more likely to consume unhealthy foods frequently ⁽³³⁾. The low level of awareness observed in this study may reflect inadequate nutrition education both at school and at home. Similar findings have been reported in studies among school children in developing countries, where limited nutrition education contributed to poor food selection practices and increased consumption of unhealthy processed foods ⁽²⁸⁾.

There is broad agreement that a major component of the solution should be health education on how to identify healthy and unhealthy foods, and also making healthy foods affordable. Education is a fundamental social determinant of health. Basic educational expertise and skills, including fundamental knowledge, reasoning ability, emotional self-regulation, and interactional abilities, are critical components of health ⁽³⁴⁾. School health has been identified as a neglected aspect of primary health care in Ghana, leading to unhealthy choices which originates from a lack of proper health education to both students and vendors. Barriers hindering the implementation of school-based health programs include resource constraints, inadequate parental and community participation, lack of adequate collaboration between stakeholders, management and leadership, governance, and political issues ⁽³⁵⁾. Interventions should be aimed at the aforementioned issues in addition to the cost of healthy foods.

LIMITATIONS OF THE STUDY

The study relied on front-of-pack labelling, which was not available for 36.6% of products. Also, the cross-sectional design only records one point in time, making it impossible to evaluate seasonal or temporal changes in the school food environment. Lastly, due to resource and time limitations to complete the research, schools sampled were those within the vicinity of the University of Cape Coast.

CONCLUSION

It is evident in this study that unhealthy processed foods, according to the WHO Afro NPM, dominate the basic school environment, and it is mainly being advertised by vendors outside the school premises.

There's awareness of some policies governing the school food environment among vendors within the school facility, but the majority of vendors outside the school are not aware of any policy governing the advertisement of unhealthy foods to basic school children, and this could be a contributing factor to the high prevalence of unhealthy food sales among vendors outside the school premises.

Low nutritional awareness is exhibited by both vendors within and outside the school, and food choices are significantly influenced by demand from students and affordability.

The advertisement of mainly unhealthy food products in the basic school environment underscores the urgent need for educational and mandatory regulatory solutions, not only in Ghana but globally.

SUGGESTIONS FOR FUTURE RESEARCH

Future studies, with funding, can focus on the healthiness of the basic school environment on the national level. Also, future studies can focus on the association between unhealthy food choices among basic school students and the incidence of childhood non-communicable diseases.

DECLARATIONS

Ethical Approval and Consent to Participate

This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving research study participants were submitted to the Institutional Review Board of the University of Cape Coast. However, the Institutional Review Board are yet to get their reviewers feedback in about a year of submission. Considering the limited period required by the student to graduate, the work was reviewed at the departmental level and an introductory letter was issued for participating schools to grant permission for the study. Permission to conduct the study in respective schools were sought from the heads of the school. Verbal informed consent was obtained from all participants. Verbal consent was witnessed by a third party and formally recorded. Student participants were given an informed consent form which was signed by their parents or guardians.

Consent for Publication

Not applicable

Competing Interest

The authors declare no competing interest

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No funding was secured for this study

Author Contribution

FBA and PKKA contributed to the conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology development, project administration, resources, development of digital tools for data collection visualisation, writing original draft. CA, IFD, and HOC contributed to the writing of

original draft and review and editing of the manuscriptHOA contributed to the formal analysis, writing original draft and review and editing of the manuscript

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Data Availability

The survey data that support the findings of this study are available from the Authors at the Department of Community Medicine, School of Medical Sciences (<https://kf.kobotoolbox.org/#/forms/afJxRhEfLgdy44jPpVG3bi/data/table>), but restrictions apply to the availability of these data, and so they are not publicly available in strict adherence to data confidentiality. The data are, however, available upon request.

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