

Food Environment Facing the School Children in Public Primary Schools in Morogoro Municipality

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Abstract

Introduction: The study focused on examining the overall food environment influencing the dietary choices of school children in public primary schools in Morogoro Municipality. Four primary schools—Magadu, SUA, Mlimani, and Kikundi—were purposively sampled to represent the broader school landscape in the municipality. SUA and Mlimani were in urban and peri-urban areas, Magadu represented peri-urban settings, and Kikundi was in the town center. Data collection involved administering a structured questionnaire to 97 school children selected through convenient sampling based on their availability on the day of data collection.

Results showed that most children were aware of healthy foods (62.9%) but demonstrated lower awareness of unhealthy foods (52.6%). Only 52% of children brought food from home, while the majority purchased items from vendors around the school premises. The most consumed junk foods included biscuits (83.5%), chips (75.3%), chocolates (74.2%), and fried buns (72.2%). Notably, school regulations or bylaws governing the sale of food to children were absent.

Discussion: The findings suggested that children were more conscious of healthy foods than unhealthy options, possibly leading them to consume the latter unknowingly. The study emphasized the prevalence of unhealthy food consumption among school children and highlighted the absence of regulatory measures in place. Addressing these issues could promote healthier dietary habits among school children in Morogoro Municipality.

Keywords- Food, environment, children, regulations, choice

Introduction

The food environment refers to locational access to food in a community, a person's proximity to food store locations, consumer choices inside food outlets, distribution of food stores, food service, and any physical entity by which food may be obtained (Rideout et al., 2015). The school food environment involves all the spaces, infrastructure, and conditions within and beyond the school premises where food is available, obtained or purchased and consumed (roadside shops, kiosks, canteens, food vendors, packed food from home) and the composition of those foods (FAO (2019)). It also involves the information available about food and nutrition and the promotion and pricing of foods and food products (marketing, advertisements, branding, food labels, packages, and promotions).

The food environment shapes how accessible, affordable, desirable, and convenient a specific food is. All these aspects are taken into consideration in mapping the school food environment. The food environment has been a primary global concern that exposes people to unhealthy foods due to globalisation and the advancement of technologies, which have made the foods convenient to access and consume (UNICEF, 2019).

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Food choice refers to the selection and consumption of various kinds of foods and beverages as well as other aspects of food and eating behaviours (Shepherd & Raats, 2006). The food choice is contributed by the environment in which food is obtained, thus leading to unhealthy eating behaviours, which the school children much postulate. The food environment is essential because it creates and facilitates the continuation of food systems or chains from the producer or supplier to the final consumer. It also plays a crucial role in symbolic and social functions in society, which can be linked to their influence on food selection (Shepherd & Raats, 2006).

According to UNICEF (2019), the trends of technological advancements in the world have been shaping the food options of people, particularly children, and about 77% of processed foods have been on sale thus contributing to poor health options. Unhealthy food choices have been associated with the development of a triple burden of malnutrition. UNICEF (2019) noted that children who are not consuming healthy diets are associated with poor cognition and poor performance at school. Governments, therefore, must play an essential role in ensuring the provision and supply of healthy foods in school environments and discourage the marketing of unhealthy foods, including sugar-sweetened beverages, to improve the wise choice of foods (UNICEF, 2019). Many children in the world, especially those from low social profiles, suffer from malnutrition (whether underweight or overweight) because of the few options of not being able to access healthy foods (UNSCN, 2017). The school environment can influence healthy food options by building a good foundation for the children to change themselves and their homes (UNSCN, 2017).

Problem Statement

The food environment surrounding the school children is a potential problem contributing to poor children's growth and development due to what the children consume while at school. A study by Villiers and Faber (2015) postulates that the current food environment can exploit a child's biological, psychological, social and economic vulnerabilities, making it easier to eat unhealthy food. Also, a study by Wongboonsin et al. (2018) reported that the primary determinant of food choice is mostly the taste followed by the cost of the food. The tastier the food is, the more likely it will be chosen. The child chooses the food depending on what is available on the school premises (Villiers & Faber, 2015). Poor food environment can influence a child's poor food selections. In that respect, fatty or sweet foods are more likely to be chosen by children because such foods are usually tastier (Werle et al., 2013). This study intended to assess the food environment in school children towards poor choices of food items found in school as a significant contributing factor to such choices.

Methodology

Description of the Study Area

The study was conducted in Morogoro Municipality, the urban part of the Morogoro District where most administrative activities are implemented. The main economic activities include industries, subsistence and commercial farming, small-scale enterprises, and trade (Ernest et al., 2017). Administratively, Morogoro Municipality has one division, 29 Wards and 272 streets, popularly known as "*Mitaa*", with a population estimate of 387 945 people (MMC, 2012). Morogoro Municipality has various road networks; some are trunk and feeder roads, and some are tarmacked (URT, 1997). A central railway line passes through Morogoro town, connecting Dodoma with Dar es Salaam (URT, 1997). There is also the Standard Gauge Railway (SGR) project, which is in progress. It contributes to the improvement of the socioeconomic profile of the municipality. The project focuses on building the railway line described as "*mwendo-kasi*" (literally speed train). The social services provided in Morogoro Municipality include health, education, policy research and food supply services. Morogoro Municipality is surrounded by various primary schools that educate the children. The study involved four selected primary schools located in Morogoro Municipality.

Study Design and Study Population

This study used a cross-sectional design involving a one-point collection of primary data. The participants of this study were children from four primary schools and the food providers who supply food items for these children while at school. The sampling frame included children in four primary schools: Mlimani, SUA, Magadu, and Kikundi.

Sampling Procedure and Sample Size

Four primary schools (Mlimani, SUA, Magadu and Kikundi) were purposively selected to represent the other public schools in Morogoro Municipality. Magadu Primary School was selected to represent the peri-urban part of the Morogoro, while Kikundi Primary School was in the town centre. On the other hand, SUA and Mlimani schools involved families from low, middle, and high-income levels. Then within each of the selected schools, only children from standards 5, 6 and 7 were involved in the study. Using experience in public schools in Tanzania, as well as after consulting the teachers, it was noted that children in the lower classes (i.e., from standards 1 to 4) may need help understanding and answering the questions in the interview questionnaire. Each child in standards 5, 6 and 7 who was in school on the interview day, was included in the study.

According to the school education guidelines for Tanzania, each classroom is supposed to consist of at most 35 children. In that respect, the sample size for the proposed study was expected to include about 280 children (i.e. 35 x 2 x 4 schools) but only 97 children were recruited for this study. On the other hand, convenient sampling was also used to obtain a sample of individuals involved in selling or providing different food items to the children within the selected schools. The logic was followed to obtain at least one individual for each type of food item or seller involved.

Methods of Data Collection

The primary school children of the selected schools were provided with a questionnaire that contained a list of questions; some were open-ended, and some were close-ended. Open-ended questions allowed the children to explain themselves in detail to quench the demands of that particular question. The questionnaire was developed in English but translated into Kiswahili to better understand the respondents. A list of healthy and junk foods was developed which was included in the questionnaire. The list was validated by sharing the information with the nutrition experts, members of staff and fellow nutrition students. On the other hand, food vendors (and food providers) were interviewed face-to-face using semi-structured open-ended questions.

Data Analysis

Data collected from the respondents was entered and analysed by SPSS (Statistical Package for the Social Sciences version 20). Descriptive analysis was performed using frequencies and percentages where categorical variables were involved, while mean and standard deviations were computed for continuous variables. The results were presented using tables.

Ethical Consideration

Permission to conduct this research was obtained from the Sokoine University of Agriculture and the authority in Morogoro Municipality. The participants were asked to give verbal consent to participate in this study. The participants were informed about the benefits of this study. The participants were allowed to withdraw at any time during the study if they wished to do so. The confidentiality of the data collected was considered.

Results

About three-quarters of all surveyed school children (73.2%) were going to school on foot (Table 3), while the rest of the school children were using bicycles (17.5%) and the least used motorcycles (9.3%) (Table 3).

Socio-demographic Characteristics of the Surveyed Respondents

School children and their parents or caregivers in Morogoro Municipality were the targets of this study. Their socio-demographic characteristics included age, sex, class level and means of transport used by the child to reach school, as well as marital status, sex and occupation of the parent or caregiver.

Table 1: Distribution of the surveyed school children according to their sex and age***

| Age category | Sex of the child | | Total (N = 97) (%) |
|----------------|----------------------|-----------------------|-----------------------|
| | Boys (n = 42) (%) | Girls (n = 55) (%) | |
| 10 – 13 years | 64.3 | 81.8 | 74.2 |
| Above 13 years | 35.7 | 18.2 | 25.8 |
| Total | 100.0 | 100.0 | 100.0 |

*** Mean Age (12.8±1.15)

Age, sex and class level of school children

The average age of the surveyed school children was 12.8 years (12.8±1.15) as shown in Table 1. About three-quarters of all surveyed children were between 10 and 13 (Table 1). The sample included 42 boys and 55 girls. In terms of class grade, more than 60% (Table 2) were in standard seven, followed by standard six, who were about 30%, while standard five was the least (7.2%).

Table 2: Distribution of the surveyed school children according to their sex and class grade

| Class grade | Sex of the child | | Total (N = 97) (%) |
|-------------|-------------------|--------------------|-----------------------|
| | Boys (n = 42) (%) | Girls (n = 55) (%) | |
| 5 | 7.1 | 7.4 | 7.2 |
| 6 | 35.7 | 25.5 | 29.9 |
| 7 | 57.1 | 67.3 | 62.9 |
| Total | 100.0 | 100.0 | 100.0 |

Means of transport used by children.

About three-quarters of all surveyed school children (73.2%) were going to school on foot (Table 3), while the rest of the school children were using bicycles (17.5%) and the least used motorcycles (9.3%) (Table 3).

Table 3: Distribution of the surveyed school children according to their sex and means of transport used to go to school

| Means of transport used to go to school | Sex of the child | | Total (N = 97) (%) |
|---|-------------------|--------------------|-----------------------|
| | Boys (n = 42) (%) | Girls (n = 55) (%) | |
| On foot | 69.0 | 76.4 | 73.2 |
| By bicycle | 26.2 | 10.9 | 17.5 |
| Motorcycle or vehicle | 4.8 | 12.7 | 9.3 |
| Total | 100.0 | 100.0 | 100.0 |

Parental, marital status and occupation of parents or caregivers

Most surveyed schoolchildren stayed with their parents (87.6%), and few stayed with their guardians (Table 4). Almost all the parents of the surveyed schoolchildren were married (95.9%), while few reported being single. On the other hand, more than thirty per cent of the parents (38.1%) were businessmen and women followed by farmers (29.9%), employed in the informal sector (18.6%) and formal sector (13.4%).

Table 4: Demographic Characteristics of the surveyed parents

| Variables | N | % |
|---|----|------|
| Status of caregivers | | |
| Parents | 85 | 87.6 |
| Guardian | 12 | 12.4 |
| Marital status of the parents of the pupils | | |
| Single | 4 | 4.1 |
| Married | 93 | 95.9 |
| Occupation of parents or guardians | | |
| Business | 37 | 38.1 |
| Farmer | 29 | 29.9 |
| Employed in the formal sector | 13 | 13.4 |
| Employed in the informal sector | 18 | 18.6 |

Participation in school lunch programs

About sixty-two per cent (61.9%) of the surveyed children reported being involved in a school lunch program while 38.1% were not (Table 5).

Table 5: Participation in school lunch programs

| Participation of children in the school lunch program | N | % |
|---|----|------|
| Yes | 60 | 61.9 |
| No | 37 | 38.1 |

Awareness of Healthy and Unhealthy Foods

The awareness of healthy and unhealthy foods was assessed by scoring the number of correct answers given by a respondent (school children). The highest score was 6 (mentioned all correct answers) and the lowest was 0 (for not getting any correct answers). To assess excellent and poor performance in awareness, scores ranging from 0 – 3 were categorized as ‘poor’ while 4 – 6 were categorized as ‘good’. Two tests were used to assess the awareness of the school children about healthy and unhealthy foods. The tests were the Chi-square test and the T-test. The results of each test are reported below.

Differences in awareness concerning sex and age category

Chi-square was used to test for differences in awareness among the sampled school children concerning their sex and age category. Results are summarized in Table 6. More than sixty per cent (62.9%) of all the surveyed children had high awareness scores on healthy foods whereas few children had low awareness. According to the results, no statistically significant difference in the awareness of healthy foods between boys and girls ($P \leq 0.05$). On the other hand, more than half (52.6%) of the surveyed school children had low awareness about unhealthy foods (Table 7) whereby, again, there is no significant difference between girls and boys at $P \leq 0.05$.

Results for the tests of the relationship between awareness about healthy foods and age categories of school children are shown in Table 8. Accordingly, there is no significant difference among the included age categories at $P \leq 0.05$. However, results for the tests of awareness about unhealthy foods (Table 9) are different whereby there is a significant difference between girls and boys ($P \leq 0.024$). It appears that girls performed poorly compared to boys. While more than half of the boys (54.2%) were in the high-awareness category, this was achieved by only 28% of the girls.

Table 6: Chi-square test results for the relationship between categories of awareness about healthy foods and the sex of a child

| Awareness of healthy foods (scoring category) | Sex of the child | | Total (N = 97) (%) |
|---|----------------------|-----------------------|-----------------------|
| | Boys (n = 42) (%) | Girls (n = 55) (%) | |
| High awareness of healthy foods score | 52.4 | 70.9 | 62.9 |
| Low awareness of healthy foods score | 47.6 | 29.1 | 37.1 |
| Total | 100.0 | 100.0 | 100.0 |

Pearson Chi-square = 3.503; d.f = 1; Asymp. Sig. (2-sided) = .061

Table 7: Chi-square test results for the relationship between categories of awareness about unhealthy foods and the sex of a child

| Awareness of unhealthy foods (scoring category) | Sex of the child | | Total (N = 97) (%) |
|---|----------------------|-----------------------|-----------------------|
| | Boys (n = 42) (%) | Girls (n = 55) (%) | |
| High awareness of unhealthy foods score | 50.0 | 45.5 | 47.4 |
| Low awareness of unhealthy foods score | 50.0 | 54.5 | 52.6 |
| Total | 100.0 | 100.0 | 100.0 |

Pearson Chi-square = .197; d.f = 1; Asymp. Sig. (2-sided) = .657

Table 8: Chi-square test results for the relationship between categories of awareness about healthy foods and age category of a child

| Awareness of healthy foods (scoring category) | Age of the child | | Total (N = 97) (%) |
|---|-----------------------------|--------------------------------|-----------------------|
| | 10-13 years (n = 72) (%) | Above 13 years (n = 25) (%) | |
| High awareness of unhealthy foods score | 59.7 | 72.0 | 62.9 |
| Low awareness of unhealthy foods score | 40.3 | 28.0 | 37.1 |
| Total | 100.0 | 100.0 | 100.0 |

Pearson Chi-square = 1.199; d.f = 1; Asymp. Sig. (2-sided) = .274

Table 9: Chi-square test results for the relationship between categories of awareness about unhealthy foods and age category of a child

| Awareness of unhealthy foods (scoring category) | Age of the child | | Total (N = 97) (%) |
|---|----------------------|-----------------------|-----------------------|
| | Boys (n = 72) (%) | Girls (n = 25) (%) | |
| | 10-13 years | Above 13 years | |
| High awareness of unhealthy foods score | 54.2 | 28.0 | 47.4 |
| Low awareness of unhealthy foods score | 45.8 | 72.0 | 52.6 |
| Total | 100.0 | 100.0 | 100.0 |

Pearson Chi-square value = 5.096; df = 1; Asymp. Sig. (2-sided) = .024

T-testing for differences in awareness of healthy and unhealthy foods

T-testing was used to compare awareness mean scores on the healthy and unhealthy foods for school children from class five to seven. P-values of equal or less than 0.05 were used to imply a statistically significant difference in the awareness levels. Summarized results of the T-test of the surveyed school children are given in Table 10. Accordingly, there is no statistically significant difference in awareness about healthy foods between class 5 and class 7 children. Similarly, in Table 11, the results show no statistically significant difference in the awareness of unhealthy foods between these two groups of school children.

Table 10: T-test results for comparison of mean scores of awareness on healthy foods between class 5 and class 7 children

| Class grade | N | Mean score |
|-------------|----|------------|
| Class 5 | 7 | 3.1429 |
| Class 7 | 61 | 4.2295 |

T-value= -1.101; Sig (2-tailed) = .275

Table 11: T-test results for comparison of mean scores of awareness on unhealthy foods between class 5 and class 7 children

| Class grade | N | Mean |
|-------------|----|--------|
| Class 5 | 7 | 1.2857 |
| Class 7 | 61 | 2.3770 |

T-value= -1.205; Sig (2-tailed) = .232

Summarised results of the T-test of the surveyed school children are given in Table 12. Accordingly, there is no statistically significant difference in awareness about healthy foods between class 6 and class 7 children. Similarly, in Table 13, the results show no statistically significant difference in the awareness of unhealthy foods between these two groups of school children.

Table 12: T-test results for comparison of mean scores of awareness on healthy foods between class 6 and class 7 children

| Class grade | N | Mean |
|-------------|----|--------|
| 6 | 29 | 4.1034 |
| 7 | 61 | 4.2295 |

T-value= -.22; Sig (2-tailed) = .823

Table 13: T-test results for comparison of mean scores of awareness on unhealthy foods between class 6 and class 7 children

| Class grade | N | Mean |
|-------------|----|--------|
| 6 | 29 | 1.4483 |
| 7 | 61 | 2.3770 |

T-value= -1.88; Sig (2-tailed) = .063

Summarized results of the T-test of the surveyed school children are given in Table 14. Accordingly, no statistically significant difference exists in awareness about healthy foods between children of class

and class 6. Similarly, in Table 15, the results show no statistically significant difference in the awareness of unhealthy foods between these two groups of school children.

Table 14: T-test results for comparison of mean scores of awareness on healthy foods between class 5 and class 6 children

| Class grade | N | Mean |
|-------------|----|--------|
| 6 | 29 | 4.1034 |
| 5 | 7 | 3.1429 |

T-value= .845; Sig (2-tailed) =.404

Table 15: T-test results for comparison of mean scores of awareness on unhealthy foods between class 5 and class 6 children

| Class grade | N | Mean |
|-------------|----|--------|
| 6 | 29 | 1.4483 |
| 5 | 7 | 1.2857 |

T-value= .845; Sig (2-tailed) =.855

Standard Junk or Un-Healthy Foods Mostly Consumed by School Children

The junk foods consumed by the school children were identified by asking the children to mention the foods or snacks they commonly consume while at school. The criteria used to categorize the food items or drinks as junk or unhealthy foods include food items that are deep fried such as rice buns, white buns, chips, samosa, and crisps. Also included are food items which contain high amounts of salt and/or sugar such as biscuits, chocolate, crisps, sausages, sweets, lollies, and ice cream.

More than eighty per cent of the surveyed girls were reported to consume biscuits (85.5%) compared to 81% of the boys (Table 16). Chocolate was also reported to be consumed more by the surveyed school children after biscuits, where the proportion of boys and girls who consumed chocolate was 71.4% and 76.4%, respectively, followed by white buns. The least consumed food items were *Kalimat* and sausages (Table 16).

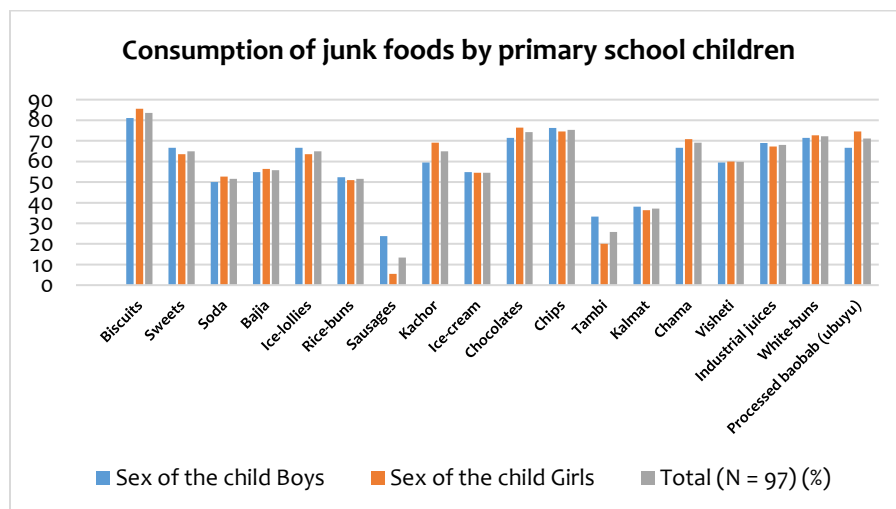


Fig 1. Reported junk foods or drinks consumed by the schoolchildren

Discussion

Common Junk Foods Consumed by the Primary School Children at School

Three criteria were used to identify junk or unhealthy foods namely, those food items that contained much sugar, those that contained much salt and those which were deep fried. The results showed that many of these school children consumed junk foods as part of their daily consumption, whereas biscuits ranked with the most significant percentage (83.5%), followed by chips, chocolates, and buns (more than 70%). A study conducted in Ohio, USA, reported similar results on school children's consumption of junk foods. In contrast, children could come with their packed lunch from home, which is healthy but could still buy the energy-dense foods found at the school compound (Neely, 2011). It appeared that the availability of competitive foods in the school environment was what the children kept on choosing rather than fruits and vegetables. The reasons why school children would consume unhealthy foods, mainly when they are at school, could be that junk foods are readily available and sold at the lowest price around the school premises, they are also tastier as compared to the healthy ones' example, sweets which most children prefer (Neely, 2011).

Awareness of Children about Healthy and Unhealthy Foods

Most of the schoolchildren were aware of healthy foods but not of unhealthy foods. There was also no statistically significant difference in awareness of healthy and unhealthy foods between girls and boys of various age groups. The poor awareness about unhealthy foods was likely because most children might consume junk foods without knowing if they are unhealthy. On the other hand, awareness of healthy foods was high probably due to the common foods that are consumed at home and thus most children are aware of. Food habits are usually shaped during the early years of a child's schooling and form the basis of future eating habits (Sultana, 2017). This central role is played by the parents or the guardians who live with the children. From the reports of the surveyed children, most of them live with their parents who are legally married. Also, the parents are used to instructing their children on what to buy or eat. For this to be effective, parents must be aware of healthy foods to guide their children appropriately (Sultana, 2017). Primary school children observe and look at what their parents do and imitate; with that respect, they can learn and adopt good dietary habits.

The Food Access Environment Where School Children Get the Foods They Consume at School

In assessing the food access environment where school children get their food, several issues were considered namely, the source of the foods, school regulations about the selling of foods in school compounds and conditions in which the foods are sold or consumed.

Source of the foods that school children consume.

Accessibility to food would mean the ability of an individual or a household to purchase food, i.e. the purchasing power of an individual or a household (Napoli, 2011). At times, the food can be accessed because of the purchasing power one has, but the surrounding food or the available food may not be favouring (that is not healthy). Unhealthy foods surround the food access environment of most of the school children. Also, the amount of money which these school children are given by their parents can only be sufficient to access junk foods. The average amount of money which the surveyed school children reported being given by their parents was about 800Tsh/= (Villiers & Faber, 2015) suggesting that the food environment presently has influenced the school children to eat unhealthy foods where they would opt to consume foods of poor nutritional quality for the food environment that surrounds them is dominated by nutrient-poor and energy-dense foods, ultra-processed, large portion sized with attractive packaging.

School regulations about the selling of food in school compounds

The availability of nutrition guidelines and standards in schools can help to ensure the adequacy and quality of the meals provided at school that align with the school children's nutritional requirements (FAO, 2019). From the surveyed schools, there were no problematic regulations against food items sold around the school, for some items were sold by the teachers. The concern of how the foods were prepared and served to the children could have been more pleasing as hygiene behind the preparation of the foods was not observed. Food items like chips were served in plastic bags while hot which is dangerous to the health of the school children.

Conditions in which the foods are sold or consumed

The consumption of unsafe foods and subsequent food-borne illness or food poisoning poses significant threats to nutrition and health status, especially for vulnerable populations such as school children (FAO, 2019). This, in turn, affects the child's learning process since the child cannot concentrate while sick. The food sellers could have adequate knowledge of how to prepare the foods hygienically, but their negligence can pose the children at a higher risk (Losasso et al., 2012). The children also rarely wash their hands before eating the food items they buy, which can increase their risk of developing food-borne diseases.

The junk foods that children consume most of the time at school are not hygienically prepared, therefore putting their health at risk. Food items that are deep fried, such as chips, crisps, buns and others, could compromise the health status of children, for most food sellers usually use the cooking oil many times to the extent that cooking oil loses its quality (becomes rancid). The health concern about using rancid oil is that it could cause cancer later in the day, and it could affect many processes in body metabolism, which in turn affects the health status of school children (Farrokhzadeh et al., 2013).

Study Limitations

The coronavirus pandemic (COVID-19) in 2020 delayed data collection because the Government restricted all unnecessary movements and crowd gatherings. This led to the closure of all schools and universities in Tanzania, which caused difficulty in finding the children for data collection. Because of this, the proposed sample size of 280 respondents could not be reached. Thus, only 97 respondents were included in this study.

Conclusion and recommendations

From the findings, it can be concluded that school children were more aware of healthy foods than unhealthy foods, which could be due to unknowingly consuming these food items. Unhealthy foods were more available on the school premises which contributed to influencing children to consume them. The study also revealed that the common source of the food items consumed by the school children was purchased from food sellers because their parents or guardians gave them some money to spend at school.

The study recommends that The Government of Tanzania enact food safety laws which would protect the health of these children by enforcing that only healthy and safe foods should be available and accessible in schools. All school levels should consider having a school lunch program for children to eat healthy meals and avoid eating unhealthy foods because of hunger.

There should be policies to discourage unhealthy foods, such as special taxation, which will raise the prices of such foods.

Data availability

Data is available upon reasonable request from the authors.

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Conflict of interest

The authors declare that they have no conflict of interest.

Authors' contributions

Anna Peter Mamiro: Conceptualization, Writing – original draft. John MSUYA: Conceptualization, Formal Analysis, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing.

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