Tuck-shop purchasing practices of Grade 4 learners in Pietermaritzburg and childhood overweight and obesity

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Abstract

Objectives: To determine the anthropometric characteristics of Grade 4 learners in relation to their tuck-shop purchasing practices.

Design: A cross-sectional research design using a questionnaire that was administered to Grade 4 learners.

Setting and subjects: Four well-resourced primary schools in Pietermaritzburg. The study included 311 Grade 4 learners.

Outcome measures: Body mass index interpreted in relation to tuck-shop purchasing practices.

Results: Fifty-six per cent of the sample were female (n = 173) and 44% were male (n = 138) learners. Twenty-seven per cent of the study sample was overweight (n = 83) and 27% was obese (n = 85). Eighty-six per cent of the learners (n = 266) made purchases from their school tuck shop. Twenty-two per cent did so at least three times per week (n = 58). Learners who bought from the tuck shop had a significantly higher body mass index compared to those who did not (p-value < 0.020). Learners who purchased from the tuck shop spent an average of R8.38 per day, a minimum of R1 and a maximum of R40 (± R5.39). The most popular reasons for visiting the tuck shop included: "This is my favourite thing to eat or drink" (66.5%, n = 177), and "I only have enough money to buy this item" (47%, n = 125).

Conclusion: Poor tuck-shop purchasing practices may contribute to the development of childhood overweight and obesity in learners. Successful preventative strategies should focus on restricting the amount of unhealthy items that are available for sale, imposing spending limits and motivating learners to prioritise healthy food and beverage purchases.

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Introduction

Currently, South Africa has a population of approximately 50-million people, 10% of whom are aged 5-9 years.[1] These children, who originate from households across the living standards measure segments, may be at risk of becoming either underweight or overweight and obese.[2,3,4] The International Association for the Study of Obesity (IASO) estimates that more than 200 million children who attend school are overweight.[5] The consequences of the current childhood obesity "epidemic" continue through to adulthood and require lifelong medical treatment.[6] The IASO further reports that "this generation of obese children will have a shorter lifespan than their parents". This may be further exacerbated in developing countries which may not be able to afford the extensive healthcare expense, and this would then result in an even further reduction in lifespan.[6]

The development of overweight and obesity is an enormous challenge that faces children today. While the prevalence has increased more rapidly in developed countries, children who live in developing countries are not immune.[7] While undernutrition is prevalent in South Africa, overnutrition occurs in the population at the same time.[4] Therefore, it is important to understand the prevalence of childhood overweight and obesity in South Africa.

Although the causes of childhood obesity are of a multifactorial nature, some schools make food and beverage items available for learners to purchase which could promote the development of childhood obesity.[6] Therefore, it is important to determine the food and beverages that are available and consumed at school.[8] The availability of unhealthy, energy-dense food choices may tempt learners to make unhealthy purchases. An excess energy intake of these items could then result in weight gain which could ultimately lead to childhood overweight and obesity.[9,10] Understanding the factors that influence a child's eating behaviour is imperative. Compared to previous generations, children are faced with purchasing decisions from an early age,[11] and are able to exercise a greater variety of choice with regard to portion size or the quantity of the food and beverages that they purchase.[12]

Many of these purchasing and eating decisions take place without parental supervision. It is important that the ability to make a healthy purchase is well established because poor grounding could lead to poor purchasing decisions in adulthood, which in turn, may be passed onto their offspring.[11]

Currently, there is a paucity of studies on the tuck-shop purchasing practices of learners in South Africa. The purpose of this study was to determine the anthropometric characteristics of learners, their tuck-shop purchasing habits and factors that influence their decision to buy tuck-shop items. The reported research in this article formed part of a comprehensive study. Previous research from this study on the nutritional quality of tuck-shop items has already been reported.[13]

Method

Subjects

Four quintile 5, mixed race, well-resourced schools from the original sample of 11 mentioned in the tuck-shop study,[13] were identified as having the greatest variety of healthy and unhealthy tuck shop items available for purchase. Requests for informed consent and assent were distributed among 403 Grade 4 learners and their parents or guardians. From this sample, 311 learners agreed to participate in this study. Grade 4 learners were chosen, as previous researchers have found this age group (9-10 years) to be representative of primary school-aged children.[14] Learners from this age group are able to interpret questions and concentrate for a minimum of half an hour.[15] Ethics approval was obtained from the University of KwaZulu-Natal (HSS/0981/09D) and permission to use the schools was obtained from the Department of Education's Superintendent General, Dr Cassius Lubisi.

Data collection

A four-part questionnaire was administered to Grade 4 learners. Questions were developed based on a literature review that was conducted for the comprehensive study. Primary school teachers were consulted to ensure that the wording of the questions was at an appropriate level of interpretation for Grade 4 learners. The first part of the questionnaire obtained anthropometric data (weight and height) measurements, the second section collected socio-demographic information (resources in the learner's household), the third information on tuck-shop purchasing practices, and the fourth tested the learner's knowledge of nutrition. For the purpose of brevity, only the first and third parts of the questionnaire will be discussed in this article. Results from the second part of the questionnaire had no impact on the results from this article. The questionnaire was administered by Grade 4 teachers, while four final-year BSc Human Nutrition students obtained the anthropometric measurements. The researcher conducted training sessions with the teachers and fieldworkers to ensure that the data were collected in a standardised, reliable manner. A pilot study was conducted in a school that did not participate in the main study. No changes were made to the final questionnaire.

Data analysis

Results were analysed using PASW Statistics 18®, an updated version of SPSS® 15 (SPSS, Chicago, Illinois, USA). Pearson correlation analysis and chi-square tests were performed. Significance was measured at the 0.05 level (two-tailed).

Results

Anthropometric characteristics

The sample comprised 56% females (n = 173) and 44% males (n = 138). The anthropometric characteristics of the subject group are presented in Table I. The mean age of the learners was 9.85 (± 0.5) years, with a mean body mass index (BMI) of 20.3 (± 4.6) kg/m^2 for females and 19.8 (± 4.9) kg/m^2 for males. An analysis of the BMI results revealed that neither of the gender groups was distributed normally. The BMI results have been further categorised

Table I: Anthropometric characteristics of the study population as a whole (n = 311)

Characteristics	Mean	Median	WHO z-score median	+1 SD	Minimum	Maximum	SD
Age (years) combined	9.9	10			9	11	0.54
Females (n = 173)	9.8*	10			9	11	0.54
Males (n = 138)	9.9**	10			9	11	0.54
Weight (kg) combined	39.9	37.1			21.9	90	11.4
Females	40.6	38.2	31.2	37.4	21.9	86.1	11.5
Males	39.3	36.6	30.9	36.7	21.9	90	11.3
Height (m) combined	1.41	1.40			1.20	1.64	6.7
Females	1.41	1.40	1.38	1.44	1.26	1.64	6.9
Males	1.40	1.40	1.37	1.44	1.20	1.59	6.3
Body mass index (kg/m^2) combined	20.1	19.0			13.5	40.3	4.7
Females	20.3	19.4	16.5	18.9	13.7	40.3	4.6
Males	19.8	18.5	16.4	18.4	13.5	40.3	4.9

SD: standard deviation, WHO: World Health Organization
* 9 years 10 months, **: 9 years 11 months

(Table II) to represent the distribution of male and female learners based on the World Health Organization (WHO) z-score, as normal, overweight or obese. No learners were identified with a BMI in the thin [< -2 standard deviation (SD)] or severely thin categories (< -3 SD).[16] Male subjects were predominantly overweight with a BMI > +1 SD from the mean, whereas female subjects were more prone to obesity (BMI > +2 SD from the mean). Additional analyses showed that the BMI of the learners who reported buying from the tuck shop frequently (at least three times per week) (e-mail communication with Finch M, Program Manager and Public Health Nutritionist; 2010) had a tendency to be higher than the BMI of the learners who did so less frequently (20.5 ± 5.3 kg/m^2 and 20.0 ± 4.8 kg/m^2 respectively).

Table II: Classification of study population based on the World Health Organization z-score categories

Characteristics	Female (n = 173)		Male (n = 138)		Total (n = 311)	
	n	%	n	%	n	%
Normal	79	45.7	64	46.4	143	46
Overweight > +1 SD	43	24.9	40	29	83	26.7
Obese > +2 SD	51	29.5	34	24.6	85	27.3

SD: standard deviation

Tuck-shop purchasing practices

Eighty-six per cent of all the learners (n = 266) reported buying from their school tuck shop. Only these learners completed the third part of the questionnaire which investigated their tuck-shop purchasing practices. More than half of the learners who used the tuck shop indicated that they visited it at least once a week (54.5%, n = 145). The second most popular visiting frequency was twice a week (13.9%, n = 37), followed by every day (12%, n = 32). Twenty-two per cent of the learners (n = 58) in this study reported that they were frequent tuck-shop purchasers (three or more times per week).

The BMI classification of the frequent versus nonfrequent purchasers is presented in Table III. Sixty per cent of male and female learners who purchased items frequently from the tuck shop were at least overweight. Learners who bought from the tuck shop had a significantly higher BMI than those who did not (p-value < 0.020). Yet, within the group of learners who frequented the tuck shop, no significant association existed between the BMI and how often they purchased from the tuck shop.

All the school tuck shops in this sample were open during the first and second breaks. The most popular period in which to make tuck-shop purchases was the second break (64.3%, n = 171), followed by both breaks (22.6%, n = 60) and then the first break (12.4%, n = 33). The characteristics of frequent versus nonfrequent tuck-shop purchasers are presented in Table IV. Although no statistically significant differences existed, learners who purchased from the tuck shop frequently were more likely to purchase items at both breaks, obtain their spending money from their parents, bring a packed lunch from home and consume breakfast before school.

Table III: Body mass index classification of learners who made frequent and nonfrequent tuck-shop purchases

Classification		Normal		Overweight > +1 SD		Obese > + 2 SD		Total	
		%	n	%	n	%	n	%*	
Females	Nonfrequent	47	44.8	26	24.8	32	30.5	105	39.5
	Frequent	13	40.6	7	21.9	12	37.5	32	12
	Non-users	10	47.6	4	19	7	33.3	21	46.7
Males	Nonfrequent	32	42.1	23	30.3	21	27.6	76	28.6
	Frequent	10	38.5	11	42.3	5	19.2	26	9.8
	Non-users	13	54.2	5	20.8	6	25	24	53.3
Total	Users	102	42.7	67	28	70	29.3	239	84.2
	Non-users	23	51.1	9	20	13	28.9	45	15.8

* Calculated from the total number of learners in each category who responded to the frequency question
SD: standard deviation

Table IV: Characteristics of frequent versus nonfrequent tuck-shop purchasers

Questions	Frequent purchases		Nonfrequent purchasers	
	n	%	n	%
When are items purchased?				
At first break	7	21.2	23	69.7
At second break	21	12.3	131	76.7
At both breaks	30	50	27	45
Where does spending money come from?				
Parents or guardians	32	25.4	86	68.3
Learner's pocket money	2	11.1	14	77.8
Borrowed from a friend	0	0	1	100
Parents and own	17	16.8	70	69.3
Parents, learners, borrowed	2	50	1	25
Parents and borrowed	3	27.3	8	72.7
Is a packed lunch brought from home?				
Yes	48	19	174	69
No	10	58.8	7	41.2
Is breakfast consumed before school?				
Yes	50	17.5	166	58.2
No	8	30.8	15	57.7

This table only includes responses from learners who indicated their tuck-shop purchasing frequency.

Learners who purchased from the tuck shop spent an average of R8.38 per day, a minimum of R1 and a maximum of R40 (standard deviation of 5.39). Learners who purchased from the tuck shop frequently spent slightly more money per day compared to those who purchased infrequently (R9.24 vs. R8.19). No correlation was found between BMI, frequency of purchases and how much was spent per day, nor whether items were bought at first or second break. No correlation was found between bringing lunch and what was spent each day or which items were bought.

The most common source of tuck shop spending money was the parents or guardians (47.4%, n = 126), followed by parents' and

Table V: Percentage of learners who purchased popular items at each break

Description	First break		Second break	
	n	%	n	%
Beverages				
Carbonated	31	11.7	75	28.2
Fruit blend	41	15.4	39	14.7
Frozen popsicle	55	20.7	108	40.6
Sweets and chocolates				
Loose sweets	46	17.3	84	31.6
Packet of sweets	38	14.3	95	35.7
Chocolate	29	10.9	41	15.4
Snack or lunch item				
"Unhealthy"				
Cheap crisps	40	15	67	25.2
Corn crisps	42	15.8	68	25.6
Potato crisps	40	15	75	28.2
Popcorn*	56	21.1	127	47.7
Pies	41	15.4	46	17.3
Hot dog	46	17.3	44	16.5
Hot chips	58	21.8	65	24.4
"Healthy"				
Banana	14	5.3	7	2.6
Fruit salad	14	5.3	8	3
Yoghurt	15	5.6	11	4.1
Salad rolls	16	6	17	6.4
Salads	7	2.6	19	7.1

Items in bold represent the most popular food or beverage item for each category.
*: Prepared using oil

learner's own pocket money combined (37.9%, n = 101), and then the learner's pocket money (6.8%, n = 18).

What learners purchased

Learners were most likely to purchase multiple items during second break (56.8%, n = 151), whereas multiple items that were bought at first break were limited (22.9%, n = 61). Table V presents the most popular items that were purchased in each of the beverage, sweets and chocolates, and snack or lunch categories. It should be noted that the schools stocked different items, so the popularity of these items may appear to be "diluted".

Why learners made purchases from their tuck shop

Learners were asked to rank the statements in Table VI according to the degree to which the statement motivated their decision to purchase items from the school tuck shop. In the original question, learners were presented with a five-point Likert scale, including the options "strongly agree", "agree", "neutral", "disagree" and "strongly disagree". During the questionnaire training with the Grade 4 teachers, the researcher emphasised that the teachers should clarify what these options meant so that the learners could distinguish between a "strong" opinion, a "normal" opinion and a neutral opinion. Despite this training, these questions were not answered well. For the purpose of these results, all positive opinions were conflated into "agree" and negative opinions into "disagree", while neutral opinions remain unchanged. The results show that the most popular statements that the learners agreed with were: "This is my favourite thing to eat or drink" (66.5%, n = 177), and "I only have enough money to buy this" (47.0%, n = 125). Learners felt most strongly about the statements "I don't like what I brought from home" (66.9%, n = 178), and "I am not allowed to have this at home".

When asked to rank the top three statements that influenced tuck-shop purchases, learners rated: "This is my favourite thing to eat or drink" as the most influential statement (24.1%, n = 75). "This is my favourite thing to eat or drink" was also rated together with "I only have enough money to buy this item" (9.6%, n = 30) as the second most influential statement, while "My friends buy this item" was rated as the third most important reason to purchase from the tuck shop (11.6%, n = 36).

Discussion

The purpose of this study was to investigate whether the tuck-shop purchasing practices of Grade 4 learners who attended four well-resourced schools in Pietermaritzburg contributed towards the development of childhood overweight and obesity.

Anthropometric data

More than half of the learners in this sample were overweight or obese (54.0%). Just over a quarter were classified as obese (27.3%).

Table VI: Reasons why learners purchase specific tuck-shop items

Statement	Agree		Disagree		Neutral		Not answered	
	n	%	n	%	n	%	n	%
This item is my favourite thing to eat or drink	177	66.5	36	13.5	27	10.2	26	9.8
I only have enough money to buy this item/these items	125	47	71	26.7	44	16.5	26	9.8
The person looking after me has told me that I am only allowed to buy this item/these items	70	26.3	122	45.9	54	20.3	20	7.5
My friends buy this item	64	24.1	146	54.9	35	13.2	21	7.9
I think this item will help keep my body healthy	66	24.8	122	45.9	49	18.4	29	10.9
I don't like what I brought from home for lunch	30	11.3	178	66.9	30	11.3	28	10.5
I am not allowed to eat or drink this item at home	53	19.9	173	65	16	6	24	9

Of the learners who bought from the tuck shop frequently, 60% of male and female learners had BMIs above what is considered to be healthy. These findings suggest that frequent purchases from a school tuck shop may contribute to overweight and obesity in Grade 4 learners at well-resourced schools in Pietermaritzburg in KwaZulu-Natal.

In comparison to other nonrelated South African studies on learners, Oldewage-Theron and Egal reported that at least 17% of their sample of rural children (aged 9-13 years) were overweight and that 4% of them were obese.[17] The HealthKick survey among disadvantaged Grade 4 learners revealed that 14% of the learners were overweight and 7% obese.[2] However, it is difficult to compare the population from this study with studies on children from low socio-economic population groups. Few South African researchers have previously investigated the anthropometrics of learners from well-resourced schools. In the Health of the Nation Study, conducted between 2001 and 2004, Armstrong et al investigated 10 195 learners aged 6-13 years from mixed socio-economic levels, and expressed concern at the levels of overweight and obesity that were found.[18] These rates (10.9% overweight and 2.4% obesity among males, and 17.5% overweight and 4.8% obesity among females) were much lower than those reported in this study. While the levels found by Armstrong et al are most likely to be lower because of the range of socio-economic levels that were investigated, the high levels of overweight and obesity that were found in this sample raise concern and perhaps require investigation in a larger, more representative sample.

Tuck-shop purchasing practices

More than 80% of the learners brought food from home to eat at school. Yet, most of these learners also made use of the tuck shop, indicating that they did not do so to obtain their main meal, but rather to supplement what they had brought from home. Learners were most likely to purchase items during the second break, possibly because they had consumed all the items that were brought from home during the first.

Two South African studies which investigated adolescents also found high percentages of tuck-shop use: 85% in the Soweto-Johannesburg Birth to Twenty cohort[19] and 69% in a Cape Town study.[20]Australian researchers found much lower levels of tuck-shop purchasing among primary school-aged children. Only 13.1% of the children purchased at least three times per week. More learners from this sample purchased from the tuck shop every day (12%) compared to those in the Australian study (1.7%).[21]

In this study, learners who visited the tuck shop had higher BMIs than those who did not, confirming that school tuck shops may play a contributing role in the development of childhood overweight and obesity. This can either be caused by the poor nutritional quality of the items that the learners consistently bought, possibly in excessive amounts, or because they didn't choose the healthiest possible option when making tuck-shop purchases. Frequent buyers indicated that they purchased at both breaks, whereas nonfrequent purchasers preferred to do so during the second break. Lobstein et al have suggested that "increasing the frequency of purchasing opportunities" might contribute to childhood overweight and obesity.[6]

Parents were the most likely source of spending money, either on their own, or as a supplement to the learner's own money. This confirms that they play an active role in supporting their child's tuck-shop purchasing habits. Considering that most learners bring food to school, schools should encourage monetary restrictions to ensure that the children are restricted in terms of what they are able to purchase to supplement food from home, especially if that amount is adequate to meet the learner's nutritional needs. The tuck-shop survey referred to earlier[13] which included schools from this study confirmed that over 80% of the schools imposed neither monetary nor food-item restrictions at their tuck shops.

The popularity of certain items among learners was consistent with the tuck-shop survey results that were previously reported. These items included frozen popsicles, carbonated beverages and packets of sweets and popcorn. Interestingly, salads and salad rolls, as well as hot chips, appeared to be more popular among the learners than the tuck-shop managers had reported during the tuck-shop survey.

Motivating reasons for purchasing items

Learners indicated that they purchased food from the tuck shop because they liked the items on sale and could afford it. They were satisfied with their home-packed lunch and reported that they were not "defying" instructions from their caregivers as the item had not been "banned" at home. This indicates that Grade 4 learners in this study exercised personal choices that were not fuelled by their parent's advice or the nutrition education that they had received at school. This places great emphasis on the need to encourage children to broaden their preferences and on finding ways to make healthier food more appealing to tuck-shop purchasers. On the other hand, the simpler option would be to limit the availability of unhealthy food items, leaving learners with no choice but to purchase healthy tuck-shop items. However, this strategy could have multiple implications. The learner might seek alternative, perhaps illicit, vending options to obtain his or her favourite tuck-shop item. Some of the schools in this study reported that certain learners brought large quantities of unhealthy, but popular, items to school to sell to their peers. However, as the children were funded by their parents, it is likely that they would make tuck-shop purchases regardless of what was available. If all unhealthy items were removed, and provided that there was no other source of illicit tuck-shop items, learners would probably continue to make tuck-shop purchases. This was reflected in the findings of the intervention study conducted by Naidoo et al, in which the gradual removal of unhealthy tuck-shop products did not have a negative influence on tuck-shop sales.[22]

Peers had a less likely influence. However they were voted as the third highest influential factor regarding tuck-shop purchases. These findings are similar to those obtained by English researchers who found that pre-adolescent peers were less likely to influence dietary intake, while more likely to influence physical activity.[23]

Conclusion

The present study indicates a potentially alarming prevalence of overweight and obesity among Grade 4 learners compared to previous South African findings, regardless of the fact that the present study was confined to a specific geographical location. Learners who are overweight or obese make frequent purchases from their school tuck shop. They purchase items based on preference, not according to its health status. Therefore, school tuck shops may contribute to childhood overweight and obesity.

Based on these findings, successful preventative strategies should focus on the following:

- Restricting the number of unhealthy items that are available for purchase at the tuck shop and the amount of money that learners may spend each day.
- Educating parents on the promotion of a healthy lifestyle at home, as well as encouraging them to restrict the amount of money given to learners to make tuck-shop purchases, especially when the food that is brought from home to eat at school is adequate.

Recommendations

The influence of socio-economic status on the development of obesity should be investigated in more depth. Childhood overweight and obesity are not limited to well-resourced schools, and so there is a need for further study to investigate schools from more poorly-resourced areas, where both underweight and overweight may exist. Further limitations of this study were that only Grade 4 learners were included. It would also be relevant to make use of a larger representative sample of learners from multiple grades to ensure a more accurate reflection of all primary school learners' tuck-shop purchasing practices. Nutrition education intervention programmes could be run to determine whether a specific improvement in nutrition education would impact on both nutrition knowledge and the nutritional quality of tuck-shop items that are frequently purchased. In addition, it would be important to investigate whether the contents of lunch boxes that are brought to school by learners influence tuck-shop purchases and how this relates to the learner's BMI. This would show the extent to which intervention strategies could be successful.

Conflict of interest

No conflict of interest is declared.

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