The variety, popularity and nutritional quality of tuck shop items available for sale to primary school learners in Pietermaritzburg, South Africa

[a] **Wiles NL**, MSc(Dietetics)
[b]**Green JM**, PhD(Educational Administration)
[a]**Veldman FJ**, PhD(Nutrition)
[a]Discipline of Dietetics and Human Nutrition and [b]Discipline of Rural Resource Management School of Agricultural Sciences and Agribusiness, Faculty of Science and Agriculture, University of KwaZulu-Natal
Correspondence to: Nicky Wiles, email: wilesn@ukzn.ac.za
Keywords: school feeding, tuck shop, Pietermaritzburg, South Africa

Abstract

Objectives: To determine the variety, popularity and nutritional quality of the food and beverages sold to primary school pupils.

Method: A cross-sectional tuck shop survey. Nutritional analyses were conducted using the South African Medical Research Council Foodfinder 3 for Windows® software. Eleven mixed-race, well-resourced, government primary schools were studied in Pietermaritzburg, South Africa. Subjects included tuck shop managers from each school.

Results: Savoury pies were the most popular lunch item for all learners for both breaks (n = 5, 45%, and n = 3, 27.3%), selling the most number of units (43) per day at eight schools (72.7%). Iced popsicles were sold at almost every school, ranked as the cheapest beverage, and also sold the most number of units (40.7). Healthy beverages sold included canned fruit juice and water, while healthy snacks consisted of dried fruit, fruit salad, bananas, yoghurt and health muffins. The average healthy snack contained almost half the kilojoules of the unhealthy counterpart (465 kJ vs. 806 kJ). Nutritional analyses of the healthy lunch options revealed total fat contents that exceeded the Dietary Reference Intake and South African recommended limits. Perceived barriers to stocking healthy items included cost and refrigeration restrictions.

Conclusion: School tucks shops are selling products that encourage an unhealthy lifestyle, thereby promoting the obesity epidemic. Extensive consultation is required among dietitians, school principals and privatised tuck shop managers to overcome barriers to stocking healthy food in tuck shops.

Ⓟ **Peer reviewed. (Submitted: 2011-03-29 Accepted: 2011-07-17). © SAJCN** **S Afr J Clin Nutr 2011;24(3):129-135**

Introduction

The World Health Organization (WHO) considers childhood obesity to be "one of the most serious public health challenges of the 21st century."[1] International figures from 2010 approximate that over 42 million children under the age of five are overweight. Almost 35 million of these children reside in developing countries.[1] In South Africa, the 2005 National Food Consumption Survey revealed that 10% of South African children aged one to nine years were overweight, while four per cent were obese.[2] Both overweight and obese children have an increased risk of developing so-called lifestyle diseases at a young age.[1] Preventing childhood obesity, therefore, is extremely important. Along with encouraging physical activity, it is recommended that children increase their dietary intake of fruit and vegetables, legumes, whole grains and nuts, and restrict their intake of sugar and fat, especially saturated fat.[1] This also requires addressing attitudes and beliefs surrounding food in young children.

A child's attitudes and beliefs surrounding food is greatly shaped by two influences: the home and school environments.[3] In the early stages of childhood, a parent has the greatest influence and responsibility in establishing these attitudes and beliefs.[4,5] However, as the child grows, this influence is soon replaced by the media and peers, as well as the quality of the nutrition education received at school.[4] Children spend a substantial amount of time at school. The classroom, therefore, is considered to be an appropriate environment where one may influence knowledge about nutrition and thereby equip children with the skills necessary to maintain a healthy lifestyle.[1,3,6] In South Africa, at the time of this study, nutrition education formed part of the Life Orientation curriculum for General Education Training (GET) pupils, from grades R (pre-grade 1) to 9; and the Life Science curriculum for Further Education Training (FET) learners in grades 10 to 12. However, it should be acknowledged that even though children could possess adequate knowledge to assist them with making healthy food choices, the variety of food at their disposal could, in the long run, remain a limiting factor in exercising this choice.

Resource-rich schools have a designated tuck shop where pupils are likely to purchase either a "complete" lunch option, or food and

beverage items to supplement what was brought from home. Some schools provide learners daily with two opportunities – during their first and second break – to purchase food and beverages. While some tuck shops are used as a fundraising opportunity, others may be outsourced to "for-profit" private individuals. A poor food choice of one meal during the day may not necessarily lead towards childhood obesity. Yet, it is important to acknowledge that most children buy from tuck shops almost daily. It is therefore important to identify the food that these children purchase, as well as the nutritional quality of the food and beverages at their disposal.[3] Understanding the food choices that learners make is important because it is one of the few opportunities where pupils are able to exercise their own choice of food and beverages, assuming they are not preparing their own food at home. Those who are frequent customers, with at least three visits to the tuck shop per week (personal e-mail communication from M Finch, programme manager and public health nutritionist, University of Newcastle, Australia, 2010 Feb 2), and make poor food and beverage choices may be at risk of becoming overweight. There is currently great concern among health professionals, public health advocates, educators and politicians regarding the food and beverages obtainable at schools.[6] Along with providing adequate nutrition education, WHO recommends that schools serve food that meets specified nutrient standards and includes healthy choices such as water, milk, juice, fruit and vegetables, sandwiches and low-fat snacks.[1] South African researchers investigating food items consumed by adolescents defined "unhealthy foods" as those containing an elevated fat, sugar and sodium content, poor nutrient density and low amounts of dietary fibre.[7]

There is a paucity of knowledge regarding primary school tuck shop utilisation in South Africa. The purpose of this study, therefore, was to determine school recommendations regarding the utilisation and management of the tuck shop, the variety of food and beverage items that were sold to learners, the items that were popular among learners and the nutritional quality of both "healthy" and "unhealthy" items sold at the tuck shop. The research reported in this article formed part of a comprehensive study investigating the tuck shop purchasing practices, eating habits and nutrition status of grade 4 pupils.

Method

Subjects

This study took place at 11 government primary school tuck shops in various suburban areas of Pietermaritzburg. These schools were chosen because they had learners from all race groups (black, coloured, Indian and white) and were classified as quintile 5, meaning the bulk of the school's funding was generated from school fees, as opposed to a quintile 1 school which received all of its funding from the government. The researcher chose quintile 5 schools, expecting that they had greater access to resources and, as a result, their tuck shops would accommodate a greater variety of stock, including "healthy" and "unhealthy" food items. It was also expected that the learners at these schools would have more money to spend. From the 33 quintile 5 primary schools in Pietermaritzburg, only 11 had learners of all race groups.

Ethics approval

Ethics approval was obtained from the University of KwaZulu-Natal (HSS/0981/09D). Permission to work in the schools was obtained from the Department of Education, while written consent and permission to be interviewed was obtained from both the principal and tuck shop manager of the selected schools.

Data collection

A survey questionnaire was used to interview the tuck shop managers on site. The first part of the questionnaire addressed the tuck shop manager's awareness of official school recommendations on tuck shop use, the second part obtained information regarding the variety of food and beverages available for sale, while the third part addressed the popularity of these items. Measuring cups and spoons were used to quantify the measurement of ingredients used for items made on site. The same researcher completed all 11 interviews. The questionnaire was standardised using one of the participating schools.

Data analysis

All items available at tuck shops were categorised as beverages, snack items, sweets and chocolates or lunch. It should be noted that while "lunch" was intended to refer to what the pupil would have regarded as a main meal option, many of the items listed in the lunch category were available for learners to purchase during both school breaks. The nutritional analyses of tuck shop items were conducted using the South African Medical Research Council (MRC) Foodfinder 3 for Windows® software, and where specific items such as beverages were not found, the nutrition information on the food label of the product was used. Descriptive analyses were carried out using the statistical package SPSS® version 15.0 (SPSS® Inc, Chicago IL, United States of America).

Results

All 11 qualifying schools agreed to participate in this study. The most common period of the day that the tuck shops were open were during the first and second breaks only (n = 5, 45.5%), followed by both breaks and after school (n = 2,18.2%). Ten of the schools (90.9%) ran their tuck shops from Monday to Friday. The remaining tuck shop was only open once a week, on a Friday, and for one break only because the school closed early. This particular tuck shop was managed by school staff and only stocked sweets, crisps and carbonated beverages. Overall, the most popular day of the week for tuck shop purchases was Friday (n = 6, 54.5%), followed by the parents' payday (n = 3, 27.3%), and then Monday (n = 2, 18.2%).

School recommendations regarding tuck shop stock and use by pupils

The persons managing the tuck shop and the amount of input the tuck shop manager had regarding the type of products that were stocked, is presented in Table I. Nine of the 11 tuck shops (81.8%) were privately managed. One of the schools that had no input regarding what was stocked had been restricted to selling "sweets and treats" only on Friday mornings. One tuck shop manager had to have all of her food and beverage choices approved by the school's occupational therapist. This tuck shop manager had also been instructed to cut down on the amount of loose sweets and limit crisps to lightly salted varieties. Another was permitted to stock any item provided it came with a label that included nutrition information.

Table I: Management of the tuck shop and amount of input tuck shop managers had regarding the products that were stocked (n = 11)

	Management		Manager's input regarding products that were stocked					
			Full		Partial		School input only	
	n	%	n	%	n	%	n	%
Privately managed	9	81.8	5	45.5	1	9.1	3	27.3
School managed	2	18.2	0	0	0	0	2	18.2

Two of the 11 schools (18.2%) had recommendations regarding the maximum amount of money that pupils were allowed to spend during each visit to the tuck shop. One of the schools had a R10 limit, while the second school restricted their junior primary learners to spending a maximum of R5 on their "sweets and treats" day. Six (54.5%) of the schools restricted the breaks within which specific grades of learners could purchase tuck shop items. Most of the break restrictions pertained to junior primary members and included either limiting their tuck shop purchasing to once a week (18.2%, n = 2), or prohibiting them from purchasing any sweets, chips and fizzy drinks (18.2%, n = 2).

Variety items available for sale

The variety of tuck shop items, along with the average number of units sold per day, price range and average price per item, are presented in Table II. This information was based on each tuck shop manager's estimation. Only those items that were stocked by at least two schools (n = 18.2%) are shown in this table. It can be seen that frozen popsicles were sold at almost every school, were the cheapest beverage with an average cost of R1.55, and sold the most number of units (40.7 units per day) when compared to all other available beverages. Flavoured milks, at an average cost of R6.50, sold the least number of units per day (1.5). Among the snack items, the small packets of corn crisps were the cheapest at an average cost of R1.19, and sold the most number of units per day (68.8 units per day). Although reasonably priced compared to other snack items at R1.75, bananas were only stocked by two schools (18.2%) and sold the least number of units per day (2.5). Regarding lunch items, savoury pies had the most number of units (43) sold per day by eight of the schools (72.7%), while salads were the most expensive lunch item at an average cost of R10.75 per day and selling an average of three units a day by only two schools (18.2%).

Popularity of tuck shop items

All tuck shop managers confirmed that the bulk of their customers purchased tuck shop items frequently, i.e. they made purchases at least three times a week. Tuck shop managers were asked whether the learners were purchasing single items or meal combinations, for example a beverage and something to eat. Seven (63.6%) tuck shop managers thought that their customers were purchasing meal combinations, while three (27.3%) thought that the pupils purchased single items, and one (9.1%) felt that half the learners purchased single items and half purchased meal combinations. Grade 7 pupils were the most popular customers for five (45.5%) tuck shop managers, while senior primary learners (grade 4 to 6) were the most popular customers for two tuck shop managers (18.2%). The mean amount spent at first break was R7.09 while at second break it was R9.14.

Savoury pies were the most popular among all learners for both first and second break (n = 5, 45% and n = 3, 27.3%). Savoury pies ranked as the most popular item bought during the first break. Yet, for those who chose another option as most popular, pies, once again, were selected as the third most popular item. The most popular beverage among learners was Coca-Cola (n = 5, 45.5%), followed by assorted cans (n = 6, 54.5%) and Fanta (n = 3, 27.3%).

Nutritional quality of tuck shop items

Items from Table II were further categorised based on what Temple et al classified as unhealthy[7] (Table III). These categories, which focus on the total and saturated fat contents of a food item, are also in line with the South African recommended dietary goals for fat.[8] If one were to compare likely meal combinations from the tuck shop stock, a "healthy" combination consisting of a health muffin, yoghurt, fruit and canned fruit beverage would provide 2 073 kJ of energy, 5.7 g of total fat and 8.3 g of added sugar. An "unhealthy" combination, on the other hand, of a savoury pie and canned beverage would provide 2 715 kJ of energy, 31.5 g of total fat and 34 g of added sugar. The two items from the "unhealthy" option would cost R14.51 while the four items from the "healthy" option would cost R14.25.

The average healthy snack contained just under half the kilojoules of its unhealthy counterpart (465 kJ vs. 806 kJ), had only 1.2 g of total fat compared to 10.2 g and had just over double the dietary fibre content (3 g vs. 1.4 g). While the average healthy beverage is lower in kilojoules (350 kJ vs. 448 kJ), it did not contain any added sugar or cholesterol, compared to the average unhealthy beverage that contained an average 12.6 g of added sugar and 3.7 g of cholesterol.

The homemade salad rolls and salads had nutritional contents that prevented them from being categorised as healthy items. On average the salad roll's saturated fat content just exceeded

Table II: The variety of tuck shop items with number of items sold and prices

Tuck shop categories		Serving size	No of tuck shops that stocked these items	%	Average no units sold per day*	Price range of item	Average price per item
Beverages	Frozen popsicles	70 g	10	90.9	40.7	R1.00–R2.50	R1.55
	Assorted cans	330 ml	10	90.9	15.7	R6.00–R8.00	R6.45
	Powerade	500 ml	9	81.8	4.8	R7.00–R9.00	R8.00
	Still water	500 ml	8	72.7	4.4	R4.00–R6.00	R5.07
	Flavoured water	500 ml	8	72.7	11.4	R6.00–R7.00	R6.36
	Sugar-free cans	330 ml	8	72.7	4.3	R5.50–R8.00	R6.50
	Canned fruit juice	330 ml	6	54.5	3.5	R6.00–R7.00	R6.50
	Mixed fruit blends	250 ml	4	36.4	12.7	R2.50–R7.50	R4.83
	Flavoured milk	275 ml	2	18.2	1.5	R6.00–R7.00	R6.50
Snack items	Potato crisps	30 g	10	90.9	18.8	R2.50–R4.00	R3.30
	Popcorn	500 ml	9	81.8	30.2	R2.00–R7.00	R3.50
	Small corn crisps	20 g	8	72.7	68.8	R0.50–R2.50	R1.19
	Samosas	75 g	4	36.4	46.5	R2.00–R3.00	R2.75
	Peanuts and raisins	32 g	5	45.5	4.3	R2.00–R3.00	R2.50
	Doughnuts	45 g	3	27.3	38.7	R3.00–R4.00	R3.33
	Corn crisps	30 g	3	27.3	12.7	R2.00–R4.00	R3.00
	Peanuts	32 g	3	27.3	5.0	R2.00	R2.00
	Chocolate muffins	48 g	2	18.2	22.0	R2.00–R4.50	R3.25
	Packets of biscuits	33 g	2	18.2	11.0	R2.50–R4.50	R3.50
	Dried fruit stick	25 g	2	18.2	8.0	R2.50	R2.50
	Homemade crunchies	25 g	2	18.2	4.0	R4.00	R4.00
	Health muffins	48 g	2	18.2	18.0	R3.00–R4.00	R3.50
	Pretzels	25 g	2	18.2	12.5	R1.00–R1.50	R1.25
	Bananas	75 g	2	18.2	2.5	R1.50–R2.00	R1.75
	Fruit salad	375 ml	2	18.2	3.5	R5.00–R600	R5.75
	Jelly and custard	250 ml	2	18.2	12.5	R4.00–R6.00	R5.00
	Yoghurt	100 g	2	18.2	3.5	R2.50	R2.50
Sweets and chocolates	Packets of sweets	75 g	9	81.8	23.8	R1.50–R4.50	R3.31
	Chocolates (mini size)	23 g	7	63.6	27.2	R2.50–R3.50	R3.07
	Chocolates (normal)	48 g	7	63.6	7.0	R3.50–R7.00	R6.00
	Lollipops	13 g	6	54.5	15.0	R0.50–R1.50	R1.00
	Muesli energy bars	45 g	6	54.5	6.0	R4.00–R6.00	R5.33
Lunch items	Pies	170 g	8	72.7	43.0	R7.00–R10.00	R8.06
	Hot dogs	1 each	7	63.6	22.4	R5.00–R8.00	R5.71
	Assorted salad rolls	1 each	5	45.5	11.0	R6.00–R10.00	R9.00
	Toasted sandwiches	1 each	5	45.5	17.4	R6.00–R11.00	R7.90
	Pizzas	80 g	5	45.5	6.3	R7.50–R8.00	R7.83
	Beef burgers	1 each	4	36.4	15.4	R7.00–R12.00	R9.40
	Hot chips	250 g	4	36.4	22.5	R4.00	R4.00
	Sausage rolls	165 g	3	27.3	26.0	R4.50–R9.00	R7.17
	Salads	1 each	2	18.2	3.0	R6.50–R15.00	R10.75

*Only the schools that stocked these items were included in the calculation to determine the average units sold per day

Table III: The nutritional value of "unhealthy" items based on Temple et al[7] classification[#]

Tuck shop items	Serving size	Average kilojoules per serving	Protein (g)	Total fat (g)	Saturated fat (g)	Dietary fibre (g)	Cholesterol (mg)	Added sugar (g)	Sodium (mg)
Beverages									
Assorted cans	330 ml	577	0	0	0	0	0	34.0	23
Sugar-free cans	330 ml	3.5	0	0	*	0	0	0	39
Frozen popsicles	70 g	83	0	0	0	0	0	4.5	4
Flavoured milk	275 ml	827	8.8	4.7	2.91	0	22	13.2	195
Mixed fruit blends	250 ml	550	2.0	0.3	0.10	5.0	0	24.0	10
Powerade	500 ml	645	0	0	*	0	*	*	120
Snack items									
Small corn crisps	20 g	411	0.8	4.5	0	0.3	0	0	200
Corn crisps	30 g	698	1.9	10.4	3.85	0.5	0	0	320
Potato crisps	30 g	695	2.0	10.8	2.77	1.2	0	0	300
Doughnuts	45 g	780.5	2.5	8.9	1.38	1.3	9.5	7.9	91
Chocolate muffins	48 g	710	2.5	5.9	1.36	0.5	28	15.3	116
Packets of biscuits	33 g	672	1.6	6.2	3.47	0.4	17	13.7	74
Samosas	75 g	1 694	3.1	36.8	4.76	1.6	9	0.6	87.5
Popcorn	500 ml	633	3.1	7.0	1.05	3.8	0	0	621
Peanuts	32 g	830	8.5	15.8	2.19	2.8	0	0	139
Peanuts and raisins	32 g	635	4.7	8.0	1.13	2.1	0	0	72
Homemade crunchies	25 g	519	1.1	6.5	4.00	1.0	12	8.1	48
Pretzels	25 g	416	2.7	3.9	1.1	2.37	*	*	*
Jelly and custard	500 ml	1 786	14.45	8.25	3.625	0	200	62.65	150
Sweets and chocolates									
Packets of sweets	75 g	1 202	0	0.6	0.53	0	0	69.1	17
Lollipops	13 g	512	0	0.3	0.22	0	0	29.4	7
Chocolates (normal size)	48 g	1 006	3.0	12.1	7.70	0	11	26.8	73
Chocolates (mini size)	23 g	513	1.7	6.5	3.97	0	6	12.8	31
Lunch items									
Muesli energy bars	45 g	912	3	11.6	*	1.8	*	*	112
Pies	170 g	2 138	15.1	31.5	13.09	2.5	60	0	757
Sausage rolls	165 g	2 739	16.2	48.3	17.99	2.3	96	0	1 205
Toasted cheese	1 each	1 808	19.1	25.4	11.7	2.95	65	0	671
Toasted cheese and tomato	1 each	1 476	14	18.6	7.9	3.5	41	0	565
Toasted ham and cheese	1 each	1 083	12.1	8.9	3.7	3.6	25	0	608
Toasted chicken mayo	1 each	1 516	24.4	14.6	2.4	2.6	40.7	1.2	468
Hot dogs	1 each	805	7.9	8.8	0.35	0.9	0	0	756
Hot chips	250 g	3 193	10.8	37.0	4.7	8.8	0	0	495
Beef burgers	1 each	1 917	26.9	21.4	7.9	2.5	83	0.5	517
Pizzas	80 g	1 226	13.8	15.74	*	0.1	*	66.8	*
Salad rolls, chicken	1 each	2 339	18.5	43.3	2.8	3.8	41	2.1	456
Salad rolls, cheese	1 each	986	9.4	13.6	5.7	2.7	28	0	341
Salad rolls, ham	1 each	1 264	12.1	15.6	4.4	3.3	26	0.6	775
Salads	245 g	679	5.5	10.8	3.4	3.4	12	0.1	286

#Nutrient analyses were obtained from Foodfinder 3 for Windows® and where specific items were not found, the nutrition information label was used
*Not specified on product label

the recommended limit of 10% (containing 11%). However, their combined total fat average provided 60% of the total energy content. This is quite alarming considering that an average pie, which is an "unhealthy" choice, has a total fat content of 56%. The homemade salads, which contained either feta cheese or pecan nuts, also had a total fat content of 60%. Flavoured milk, while low in total fat (22% of total energy), had a saturated fat content that just exceeded the recommended limit of 10% (13%).

Discussion

The purpose of this study was to investigate the variety, popularity and nutritional quality of the food and beverages available for sale to primary school pupils, as well as school recommendations regarding tuck shop use and management.

School recommendations regarding tuck shops

Over 80% of the schools did not impose monetary restrictions at the tuck shop. It is therefore interesting to note that learners spent on average R5 during each break. A lack of restriction could have given free reign to learners to spend large amounts of money on multiple unhealthy choices. Schools could implement restrictions with regard to the total amount of money a learner spends during a single visit to the tuck shop. Otherwise, tuck shops should be encouraged to restrict the number of unhealthy items available for sale.

Variety and popularity of food and beverages

Iced popsicles were popular among pupils. An inexpensive product, these popsicles sold the most number of units each day. In contrast, flavoured milk, containing a greater nutrient value, sold the least number of units. Many of the tuck shop managers who chose not to stock flavoured milk did so because when they had stocked these items, they were not popular with their customers and expired before being purchased. It should be noted that Amalgamated Beverage Industries Ltd, distributer of Coca-Cola products, make a special display fridge available to schools on condition that only these products are displayed. Coca-Cola do not sell flavoured milks and so the two schools that stocked these items required an additional second fridge, which was placed at the back of the tuck shop. This lack of visibility may also have contributed towards the poor sales of these items. Tuck shop managers should be provided an opportunity to improve the display and promotion of additional food items, especially when these are healthier.

Portion size was not monitored by any of the participating schools. Two schools stocked not only the standard 330 ml can of carbonated beverage, but also a 500 ml and even a 1 litre option. The fact that some tuck shops keep stock of these large volume items is a reason for concern. It is highly likely that youngsters could consume the entire product and not have the necessary knowledge or "discipline" to limit their consumption to a normal portion size. Tuck shop managers reported that because the small packet size of corn crisps was so inexpensive, learners would often buy more than one packet at a time.

The cheapest "healthy" snack in this study was bananas, which was not popular among learners at all. Some of the tuck shop managers of the schools who chose not to stock fruit explained that, when they had stocked fruit, it sat on the shelf and went off. It was also mentioned that many learners already brought fruit to school and therefore were not likely to purchase it from the tuck shop. Other researchers have found that fruit sells poorly in schools for similar reasons.[9,10] Neumark-Sztainer et al found that learners are least likely to choose fruit compared to "unhealthy" items, because it is less practical to eat and deemed unpopular by peers.[10]

Nutritional quality of tuck shop food and beverages

The apparently "healthier" food items, for example salad rolls and salads, were high in both total and saturated fat. These items were also more expensive and if pupils would rather prioritise value for money over health benefits, they are unlikely to purchase these items. One would need to examine the contents, portion sizes and nutritional quality of the ingredients used in the salads and salad rolls and educate tuck shop managers about healthier modifications. For example, the manager could reduce the portion size of pecan nuts and use a lower-fat version of cheese. Some tuck shop managers chose not to make homemade items and rather purchased readymade items such as pies and pizzas from outsourced bakeries. Along with education on improving the nutritional quality of homemade items, these tuck shop managers would require extra motivation from the school principal regarding the necessity of preparing and stocking healthier products for sale.

Considering that only small numbers of these items were purchased each day, to make the homemade "healthy" items worthwhile for the tuck shop managers, it is also important that the learners are encouraged to choose the lower-fat options over the high-fat food. This could be done by emphasising the importance of a healthy lifestyle through nutrition education promotions. In the USA, French et al found that increasing the availability of low-fat items in combination with learner-based promotions resulted in increased sales of these items.[11] This could provide extra motivation for the tuck shop managers relying on profit for their income.

The American researcher Story estimates that a child's lunch meal should comprise 33% of his or her total energy intake, with breakfast and supper comprising 25% and 33% respectively.[3] The remaining 9% is what is termed "discretionary calories" to be used throughout the day. The last School Nutrition and Dietary Assessment Study (SNDA-III) conducted in the United States between 2004 and 2005 revealed that students participating in the National School Lunch Program consumed more than 35% of their total daily intake from items consumed at school.[3] In the United Kingdom a School Food Trust was established in 2005 to implement 14 nutrient-based standards, derived from UK dietary reference values, on which all

food sold at schools was to be based.[12] Minimum requirements were established for energy, protein, carbohydrates, iron, zinc, calcium, folate, vitamins A and C, and fibre, while maximum levels were set for total fat, saturated fat, non-milk extrinsic sugars (added sugar) as well as sodium. Compared to the USA, the British are slightly more conservative with their energy estimates and stipulate that an average primary school lunch should provide 30% of the total daily energy requirement. This is on average around 2 215 kJ for primary school-aged children. The School Food Trust further stipulates that not more than 11% (15.5 g) of the total energy should come from added sugars, 35% (20.6 g) from total fat and 11% from saturated fat (6.5 g). The Food-Based Dietary Guidelines and dietary goals in South Africa do not specify "meal values", but if one compared the meal combinations in this study to the energy stipulated in both the UK and USA, the unhealthy meal example of a pie and canned beverage combination exceeded all amounts, while the healthy meal example of the muffin, yoghurt, fruit and canned juice is lower in all categories.

Barriers to stocking "healthy" items

The tuck shop manager who was limited to selling "sweets and treats" only on Fridays was fairly despondent regarding her profits. She perceived the restriction as a limitation to her business. She reasoned that she lost business because learners were already bringing "healthy" food from home during the week. In addition, many tuck shop managers perceive that it is more costly to sell healthier items. Just over half the schools were stocking canned fruit beverages, while the remaining tuck shop managers complained that purchasing canned fruit beverages was more costly than purchasing regular carbonated cans. Interestingly, one tuck shop manager refused to stock bottled water because learners could obtain water for free from the school tap. Tuck shop facilities may play an additional important role in what is available for sale to the learners. In the case of beverages, because of the ABI restriction, it is necessary for schools to invest in alternative refrigeration units to ensure that a variety of healthier beverages may be made available to learners.

Conclusion

The present study indicates that school tuck shops in Pietermaritzburg sell products to children that encourage an unhealthy lifestyle and may therefore be playing a role in promoting an early onset of obesity. Based on these findings, successful preventative strategies should focus on the following:

- Restricting the amount of unhealthy items available for purchase and improving the display and marketing of healthy items.
- Educating tuck shop managers regarding the appropriate quality and quantity of ingredients used in the preparation of homemade tuck shop items.
- Increasing the promotion of a healthy lifestyle among school children, thereby emphasising the importance of purchasing healthier tuck shop items.
- Overcoming any negative attitudes and barriers that prevent tuck shop managers from making and selling healthy items, especially in the case of those who have full control over what is sold.

Acknowledgements

The authors acknowledge the tuck shop managers that gave of their time to participate in this study.

Declarations

This research was funded by a competitive research grant from the University of KwaZulu-Natal.

The authors declare no personal or financial conflict of interest that would have inappropriately influenced them in conducting this study.

References

1. Childhood overweight and obesity. World Health Organization [homepage on the Internet]. No date [cited 2010 Jan 18]. Available from: www.who.int/dietphysicalactivity/childhood/en/
2. Labadarios D. National Food Consumption Survey-Fortification Baseline (NFCS-FB-I): South Africa, 2005. S Afr J Clin Nutr. 2008; 21 Suppl 2:247-300.
3. Story M. The third school nutrition dietary assessment study: Findings and policy implications for improving the health of US children. J Am Diet Assoc. 2009; 109 Suppl 1:S7-13.
4. Lissau I, Poulsen J. Nutrition policy, food and drinks at school and after school care. Int J Obes. 2005;29:S58-61.
5. Owen S, Schickler P, Davies J. Food choice: how to assess attitudes of pre-adolescent children. Nutrition and Food Science 1997;1:5-11.
6. Kubik MY, Lytle LA, Hanan PJ, et al. The association of the school food environment with dietary behaviours of young adolescents. Am J Public Health. 2003; 93:1168-1173.
7. Temple NJ, Steyn NP, Myburgh NG, Nel JH. Food items consumed by students attending schools in different socioeconomic areas in Cape Town, South Africa. Nutrition 2006;22:252-258.
8. International Union of Nutritional Sciences and World Heart Federation, Cape Town, South Africa. International Expert Meeting. Adapted summary statement of the International Expert Meeting: health significance of fat quality of the diet [document online]. c2009. Available from: www.iuns.org/features/IUNS%20and%20Unilever/Complete%20Summary%20Statement%20of%20IEM.pdf
9. Vereecken CA, Bobelijn K, Maes L. School food policy at primary and secondary schools in Belgium-Flanders: does it influence young people's food habits? Eur J Clin Nutr. 2005;59:271-277.
10. Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors influencing food choices of adolescents: Findings from focus-group discussions with adolescents. J Am Diet Assoc. 1999;99:929-937.
11. French SA, Story M, Fulkerson JA, Hannan P. An environmental intervention to promote lower-fat food choices in secondary schools: outcomes of the TACOS study. Am J Public Health. 2004; 94:1507-1512.
12. School Food Trust: Eat better do better [homepage on the Internet]. No date [cited 2010 July 11]. Available from: www.schoolfoodtrust.org.uk