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Consumption of takeaway and fast food in a deprived inner London Borough: are they associated with childhood obesity?

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ABSTRACT

Objective: A major concern is the ubiquitous presence of fast food and takeaway outlets within easy walking distance of schools, particularly in the light of the increasing burden of childhood obesity. Here, the associations between the schoolchildren's weights, their consumption of fast food and takeaway outlets were examined in a deprived inner London Borough.

Design: This is a cross-sectional study.

Participants: 193 schoolchildren (aged between 11 and 14 years old) participated in this study.

Main outcome measures: Body mass index (BMI) percentiles specific for age and gender were obtained. Frequency of food and drinks purchased from fast food outlets and takeaway outlets over a weekly period and preferred types of drinks and food products usually consumed were measured.

Results: More than 50% of the children in our survey purchased food or drinks from fast food or takeaway outlets twice or more a week, with about 10% consuming fast food or drinks from these outlets daily. About 70% of these children from Black ethnic groups and 54% of Asians purchased fast food more than twice a week. BMI has a significantly inverse relationship to fast food consumption. However, when age and gender are accounted, the BMI age–gender percentile is no longer significantly related to fast food consumption.

Conclusions: This study revealed a very high frequency of fast food consumption among the schoolchildren. Taste, quick access and peer influence were major contributing factors. These schoolchildren are exposed to an obesogenic environment, and it is not surprising that in this situation, many of these children are already overweight and will likely become obese as adults.

ARTICLE SUMMARY

Article focus

- To investigate the use of fast food and takeaway outlets among schoolchildren in an inner London Borough, which has a high concentration of these outlets and a higher regional level of obesity levels among the children as compared with national levels.
- To examine the relationship between the schoolchildren's weight status and the various characteristics related to use of fast food outlets.

Key messages

- More than half of the children in our survey purchased food or drinks from fast food or takeaway outlets twice or more a week, with one in 10 of them consuming fast food or drinks from these outlets everyday.
- 70% of the children also preferred to buy sweetened soft drinks over other drinks when purchasing fast food.
- Prompt actions need to be taken to either limit the ability of these children to access fast food outlets or to change the foods or beverages they purchased at these outlets.

Strengths and limitations of this study

- The BMI age–gender percentiles of the children and fast food consumption was measured in a deprived area of inner London borough.
- Further studies with larger sample sizes are needed to further elucidate the relationship between the weight status, fast food consumption and the various socioeconomic factors influencing these children's purchase patterns.

Overweight children have increased risks of becoming obese adults and developing other chronic disease.[1] National statistics reveal that obesity levels among 11–15-year-old boys and girls are 19.7% and 15.4%, respectively.[2] Access to energy-dense high-fat and salty foods accompanied by sweetened soft drinks on school campuses, at home and fast food outlets markedly increases children's energy intake that can lead to obesity. Findings have suggested that young people of adolescent age form a large percentage of consumers that use fast food outlets.[3 4] Children ate three times more food from restaurant and fast food outlets now as compared with 30 years ago.[5] This may be due to the relatively cheap, accessible fast food, food advertising and with both parents working so less time to cook for family.

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The fast food and takeaway market in UK is estimated to worth £8.9 billion in 2005 with predictions of 5% annual increments.[6] Therefore, a major concern is the number of these outlets within easy walking distance of schools, particularly in the light of the increasing burden of childhood obesity.[7] Though increased consumption of takeaway and fast food has been suggested to be responsible for the obesity epidemic,[7] evidence for this linkage has been conflicting.[8 9] Additionally, there is limited published literature that is available reporting the use of fast food by children or adolescents within UK and the role it may play in contributing to childhood obesity.

A recent review[9] reported that most of these studies were undertaken in the USA and only three studies were done in UK. Of these three studies, one was a study in Glasgow,[10] while the other two were ecological studies.[11 12] Fraser and colleagues[9] concluded from their review although there is a positive association between availability of fast food outlets and increasing deprivation, the association between availability of fast food outlets or the consumption of fast food and overweight/obesity status is less conclusive. However, findings from a recent study carried out on 3600 adolescents in UK suggested that those adolescents who ate at fast food outlets tend to consume more unhealthy foods and were likely to have higher weight status than those adolescents who did not consume fast food frequently.[13]

Therefore, the use of fast food outlets among schoolchildren in an inner London Borough, the relationship between their weight status and the various characteristics related to use of fast food outlets were examined. The survey was conducted in the inner London Borough of Tower Hamlets that has a high concentration of fast food outlets as well as a higher regional level of obesity levels among the children as compared with national levels.[14]

METHODS

Participants

Health coordinators in 11 state schools in Tower Hamlets, an inner London Borough, were invited via email and/or in person to take part in this study. Letters explaining the aims, objectives and details of the study were also provided to each school. Two schools agreed to participate in the study. Both schools operate an open gate policy during the lunch break. A total of 193 pupils (females n=75, males n=108, gender not specified n=10) aged between 11 and 14 years were recruited. All the names of the participants were kept anonymous and were identified by assigned numbers (on the questionnaires). Data stored were anonymised, and participants were only identified by the assigned numbers. Ethical approval was obtained from London Metropolitan University Research Ethics Review Panel, London, UK.

Questionnaire

Construction of the questionnaire involved adapting questions from a review of existing literature that had looked at the reasons behind children's purchases from fast food takeaway outlets.[3 4 15 16] Participants were asked to self-report their gender, age, date of birth and ethnicity. Ethnicity was based on a modified list from the Office for National Statistics 2001 census group classification of ethnicity.[17] Free school meal entitlement was used as a proxy measure of deprivation in our survey, and it is also commonly used to investigate schoolchildren families' income level.[3 18] Participants were also asked how often they would purchase food/drinks from fast food takeaway outlet over a week period. Previous studies have also used this type of question to define frequency of fast food consumption.[3 4] Participants were asked to indicate what portion size of chips they would normally purchase. Participants were asked to rank their three most popular types of beverages they would normally purchase. Participants were also asked to report their average level of physical activity during weekends and weekdays on the same questionnaire. Response options include from <2 h, 2–5 h and 5 h or more per day.

A pilot study of the questionnaire was done with a small sample of pupils (n=30) aged 12–13 years. Suggestions from the pilot study included rewording the questions to be better understood and to restrict the number of open-ended questions. The questionnaire was distributed in both schools between February 2010 and March 2010 and was completed by 193 pupils. The questionnaire was designed to be self-administered. Trained research assistants were available to help students who needed help with understanding or reading the questions.

Anthropometry

Anthropometric measurements were collected by trained research assistants. Height was measured to the nearest millimetre using SECA Leicester portable height measure (stadiometer). All participants were instructed to remove their shoes before their height was taken and to align their head in the Frankfurt plane.[19] Weight was measured to the nearest 0.1 kg using calibrated Weight Watchers Easy Read Precision electronic scales (model: 8961U). Participants were instructed to remove their shoes and outerwear, that is, outdoor jacket, and remain in their uniform before they were weighed. Self-reported measurements were excluded from the study data set as they were believed to be unreliable. Body mass index (BMI) was obtained from measured height and weight of the pupils and calculated using the following formulae: BMI kg/m^2 = weight (kg)/height^2 (metres). BMI percentile for age and gender based on the validated UK 1990 reference data charts was calculated, taking into account date of birth and date of measurement.[20–23] Percentile between 85th and 95th percentile was defined as overweight and ≥95th percentile was defined as obese.[24 25] One hundred and twenty-one schoolchildren had completed data for calculation of BMI percentile for age and gender.

Statistical analysis

Data were analysed using SPSS V.18.02 (SPSS Inc.). Results shown are either presented as means ± SD, median (range) or frequencies (percentages). Statistical significance was taken when the p value was ≤0.05. Categorical variables were compared using the χ^2 test and continuous variables using the Kruskal–Wallis test.

RESULTS

The mean respondent age was 12.8 (range 11–14) years old and 56% of the respondents were male (table 1). The ethnic background of the study population was mainly Asians (48.3%) and Black/African-Carribeans (19.4%), reflecting the sampling region. Majority of the sampled population (61%) was entitled to free school meals. About one in three respondents (30.6%) was classified as being overweight or obese. Thirty-two per cent of the males were classified as being overweight or obese as compared with 29% of the females. About half of the sampled population (54%) reported that they usually purchased food or drinks from fast food or takeaway outlets more than two to three times a week. About half of the schoolchildren (48%) would spend <£2 per visit.

Although frequency of fast food consumption was not significantly related to gender, age or deprivation (proxy indicator used is the entitlement to free school meals), we observed that there is a trend that more males have fast food more often (>2–3/times/week) than the females. There were no observable differences between those who are entitled to free school meal vouchers and their frequency of consumption of fast food. We observed that the schoolchildren from the Asian and Black ethnic groups appeared to be more frequent consumers of fast food as compared with other ethnic groups. Up to almost 70% of the children from the Black ethnic groups and 54% of Asian youth purchased fast food more than twice a week. Table 2 shows that BMI has a significant inverse relationship to fast food consumption. However, when age and gender are accounted, the BMI age–gender percentile is no longer significantly related to fast food consumption. Based on our observations, it appears that those who have higher BMIs are less likely to consume fast food as often. Choice of the portion of chips usually purchased is significantly larger among those who consumed fast food more than four times per week (table 2). There is also a significant interaction between the choice of beverage and the frequency of fast food consumption. With greater frequency of consumption of fast food, more would choose a sweetened fizzy drink apart from the daily consumers of fast food who appeared to prefer diet or unsweetened drinks. Additionally, it was observed that a majority (about 70%) when asked to rate which type of beverages would they normally purchased reported fizzy sweetened drinks as their first choice.

Figure 1 shows the plot of percentage of respondents agreeing or disagreeing with reasons for why they have decided to buy food/drinks from the fast food and takeaway outlets against the frequency of consumption per week. Of the four statements, the only significant

Table 1 Demographics and characteristics of the surveyed population (n=193)

	Mean or %	SD	Minimum	Maximum
Age (years) (n=189)	12.8	0.8	11	14
Male (%) (n=183)	56			
Ethnicity (%) (n=187)				
White	21.1			
Asian (excluding Chinese)	48.3			
Black/African–Carribean	19.4			
Others	11.1			
BMI (kg/m^2) (n=121)	20.8	4.2	14.0	36.4
BMI for age percentile				
Male (n=72)	61.9	31.5	1	100
Female (n=49)	64.0	27.3	1	100
% Overweight (by BMI for age specific for gender) (n=121)	9.1			
% Obese (by BMI for age specific for gender) (n=121)	21.5			
Entitlement to free school meals (%) (n=183)	61			
Weekly purchases at fast food outlets (%) (n=183)				
Everyday	9.8			
4–6 times	9.8			
2–3 times	34.4			
Once a week	27.9			
Less than once a week	18.1			
Amount spent per visit (%) (n=184)				
Less than £2	47.8			
£2–£3	25.5			
More than £3	26.6			

BMI, body mass index.

Table 2 Characteristics associated with fast food use categorised by frequency of fast food consumption

	Everyday	4–6 times per week	2–3 times per week	Once a week	Less than once a week	Significance
Gender (%)						
Male	11	12	40	25	12	0.15
Female	8.2	6.8	28.8	34.2	21.9	
Age	12.5 (12–14)	13 (11–14)	13 (11–14)	12 (11–14)	13 (12–14)	0.51
BMI	17.8 (14–23)	18.3 (15–22)	19.6 (15–34)	20.3 (14–36)	21.4 (17–29)	0.01
BMI for age–gender percentile	41 (1–96)	55 (8–85)	62.5 (3–100)	76 (1–100)	74.5 (27–100)	0.15
Entitlement to free school meals (%)						
Yes	9.6	7.8	35.7	27.8	19.1	0.74
No	9.4	14.1	32.8	28.1	15.6	
Ethnicity (%)						
White	5.3	0	34.2	34.2	26.3	
Asian	12.6	11.5	29.9	26.4	19.5	0.28*
Black/African–Carribeans	8.6	14.3	45.7	25.7	5.7	
Others	5	15	35	30	15	
Level of physical activity (%)						
During weekdays						
<2 h	53.3	52.9	39.3	40.8	35.5	0.68
2–5 h	26.7	17.6	41.1	42.9	38.7	
>5 h	20.0	29.4	19.6	16.3	25.8	
During weekends						
<2 h	50.0	53.3	35.7	41.3	25.0	0.30*
2–5 h	21.4	6.7	33.9	30.4	46.9	
>5 h	28.6	40	30.4	28.3	28.1	
Choice of portion of chips						
% Of children choosing large portion	19.6	14.3	28.6	21.4	16.1	0.017
% Of children choosing small portion	5.8	6.7	36.7	32.5	18.3	
First choice of beverage						
% Of children choosing fizzy sweetened	44.4	88.9	73	68.6	51.5	0.007
% Of children choosing not sweetened	55.6	11.1	27	31.4	48.5	

*The χ^2 test result is not valid here because more than 20% of the squares have expected value less than 5 counts. Figures in parentheses denote the IQR.
BMI, body mass index.

relationship was found between the frequency of consumption and the percentage of respondents agreeing with the reason that they bought food or drinks as they wanted to join their friends. The biggest difference was observed among those who consumed fast food or drinks from the outlets two to three times per week. More than two-thirds of them agreed that they consumed these foods because of their peers. Interestingly, taste of the food was the most popular reason given by all respondents. Around 92% of the respondents agreed that they liked the taste of the food sold in fast food/takeaway outlets. Even for those who consumed fast food less than once a week, all of them agreed with this reason. It appears that those respondents who eat fast food everyday are less convinced about taste than the other frequency of consumption groups. It is possible that this particular group of respondents might feel less inclined to report their true attitudes towards their purchase of fast food patterns. Additionally, those respondents who consume fast food everyday tend to be less influenced by the reasons (figure 1) as compared with the other groups.

The second most popular reason was the fact that they could purchase this food or beverages quickly. The schoolchildren, when asked to choose the factors which would motivate them to choose healthier food products at fast food and takeaway outlets, the most popular factor was to have better choice of products, followed by cheaper prices and chances to win prizes and to have a wider and better range of fruit (figure 2).

Levels of physical activity both during the weekdays and the weekend were not significantly related to fast food consumption. It was observed that among those children who consumed fast food more than four times per week, one in two spent <2 h doing physical activities both during the weekdays and weekends as compared with the other children who consumed fast food less frequently. Again, this trend was reflected in the level of physical activity assessed during the weekend. Those who consumed fast food at least once a week were less active than those who consumed fast food less than once a week.

Gender differences

It was observed that there were significant differences between gender and practices related to fast food consumption. For example, there were significantly more females who would buy chips alone at fast food outlets as compared with males (figure 3). There is also a significant relationship between gender and the portion of chips normally bought at the fast food outlets. More males bought large portion of chips as compared with the females (figure 3). Although it appeared that there was a trend which showed that more males preferred to have fizzy sweetened drinks as compared with females, this does not reach statistical significance. There are more males than females who were classified as overweight or obese but this difference is not significant. There were significantly more females who tend to think a lot about being slimmer as compared with the males (figure 3).

DISCUSSION

More than half of the children in our survey purchased food or drinks from fast food or takeaway outlets twice or more a week, with one in 10 of them consuming fast food or drinks from these outlets everyday. A previous study has shown that there are more than 40 fast food outlets in close proximity to each school in Tower Hamlets.[14] Furthermore, 97% of residents in the borough of Tower Hamlets were found to live within 10 min of a fast food outlet.[26] It is likely that such easy access could influence the schoolchildren's fast food consumption, in addition to the low cost of this type of food (average amount spent by each child is £2 per visit).

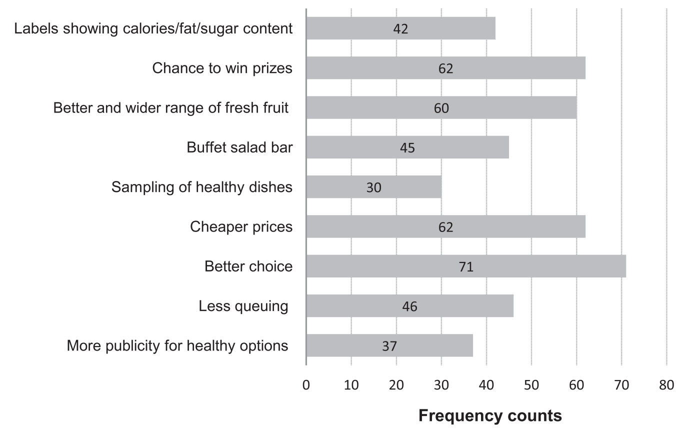

Figure 2 Factors that motivate young children to choose healthy foods at fast food/takeaway outlets.

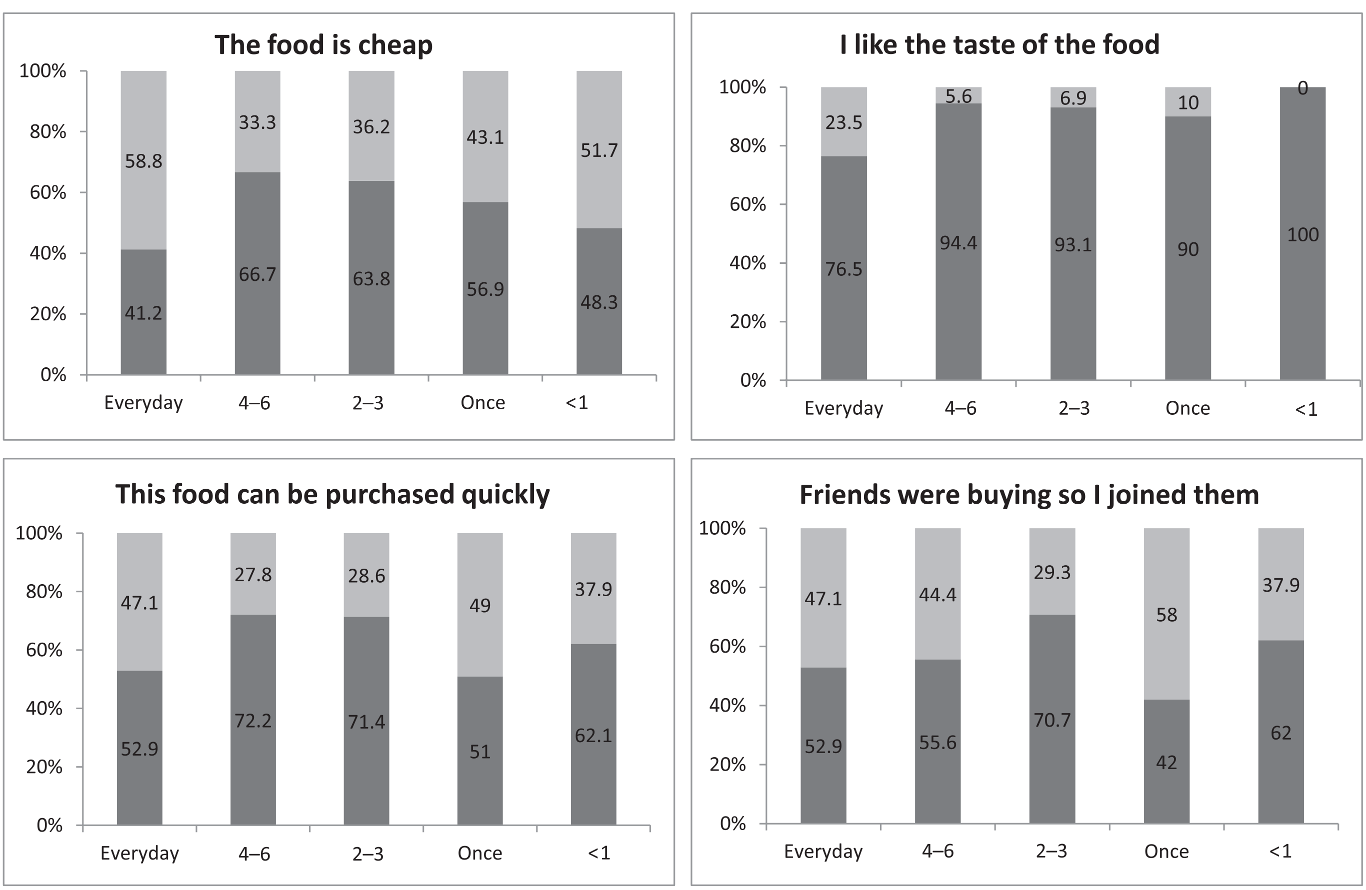

Figure 1 Plot of percentage of children agreeing (dark columns) and disagreeing (pale columns) with the statements providing reasons for why they have decided to buy food/drinks from the fast food and takeaway outlets against the frequency of consumption per week.

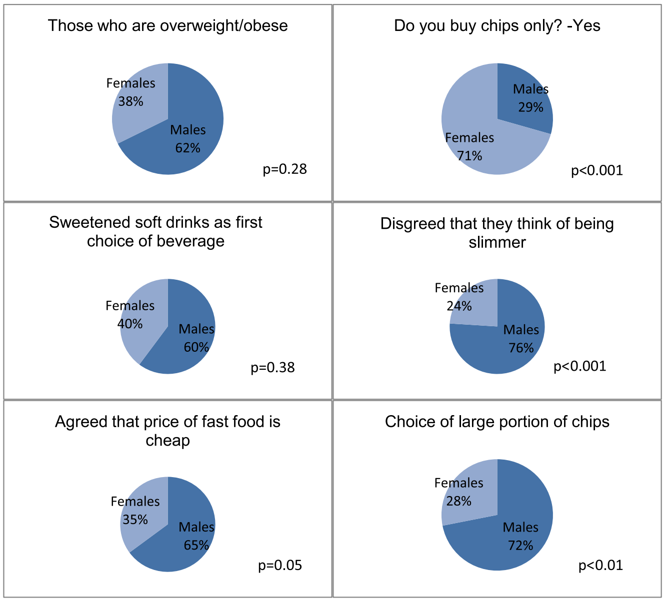

Figure 3 A comparison between genders with characteristics associated with fast food consumption.

Our results showed that chips were frequently purchased either on their own or purchased with other fried items like fried chicken or pizzas. In addition, a majority of these children (70%) also preferred sweetened soft drinks over other drinks when purchasing fast food. These products that are purchased are calorie dense, high in sugar, salt and fat as well as saturated fat (and probably trans fat). These products give no feeling of satiation, and their high salt content makes children thirsty and resulting in the children consuming more sweetened soft drinks. It is perhaps not surprising that many of these children were already overweight and will become obese as adults. About one in three of our sampled population was overweight or obese. Local statistics[27] have shown that obesity levels among 10–11 years old in Tower Hamlets are around 26% as compared with England's average of 19% in 2011.

In addition, these children surveyed in this study did little exercise, and there was a non-significant trend of increased fast food consumption with lower physical activity levels. It was observed that those children who consumed fast food more than four times per week preferred larger portions of chips, resulting in greater calorie intake that could subsequently lead to further weight gain.

In spite of the above findings, there was no significant association between increasing takeaway and fast food consumption and obesity as measured by BMI corrected for age and gender. This is not a new finding. For example, French and colleagues[3] found no significant relationship between frequent consumption of fast food and being overweight in their analysis of a cohort of 11–18-year-old boys and girls. Similarly, Simmons *et al*[8] found no correlation between increasing takeaway consumption and obesity measured by either BMI or waist circumference.

Interestingly, it was observed that there was a significant trend that those who with greater BMIs reported purchasing fast food less often. However, this observation did not reach statistical significance when we corrected for age and gender. One possible explanation maybe that our respondents were under-reporting the amount of times they consumed fast food particularly if they were already overweight or obese. On the other hand, those who were already overweight could be trying to cut back on fast food consumption in order to lose weight. In support of this possible explanation, we observed that those who purchased fast food daily also preferred to purchase diet drinks over sweetened drinks and this might highlight the children's motivation to cut back on calories in order to lose weight.

Livingstone *et al*[28] also reported that those who are overweight or obese may decide not to frequent fast food outlets as often. Others have also reported similar observations among adolescents.[29 30] Laska *et al*[30] found that BMI Z-score or percentage body fat was significantly lower among those who were closest to fast food outlets (within 800 m of their school).

As can be seen from table 2, it was observed that there was a non-significant trend that schoolchildren from the two ethnic groups—Blacks and Asians—tend to have higher consumption of fast food. This could be of potential importance to public health, especially as these two ethnic groups have higher risks of developing cardiovascular disease and diabetes as adults.

As adolescents have increased independence over dietary choices and how to spend their money, it was of some interest to look at possible underlying reasons for why they purchased food or drinks from fast food or takeaway outlets. Our data suggest that peer influence is a significant and potentially important factor that influenced the frequency of consumption. Taste and quick access were the other two most popular cited reasons. A previous report also found that consumers of fast food reported that they enjoyed the taste of fast food.[31] Taste may be related to the high-fat and salt content of these fast food products.

Males were less concerned about their weight and they would usually buy greater portions of chips and sweetened beverages as compared with the females. Significantly, more males agreed (62%) that they bought food from the takeaway/fast food outlets because they felt that the food was cheap as compared with the females (47%). The fact that females were more likely to buy chips only from takeaway/fast food outlets may also be due to the same perception over the pricing of fast food.

Strengths of the current study included the measurement of the BMI age–gender percentiles of the children and use of an ethnically diverse population representative of the resident population in a deprived area of inner London borough. A limitation of the study was the use of self-reporting of fast food consumption and physical activity level in this population. While this approach has also been used in other studies,[4] it is possible that peer influence or under-reporting information may add to challenges of accurately assessing fast food intake in children. One other possible limitation was that some of those children who declined to be weighed might have been heavier than those children who agreed to take part in the study.

In summary, our study revealed that there was a very high frequency of fast food consumption for the majority of schoolchildren in Tower Hamlets. Frequent consumers preferred to buy sweetened soft drinks (not diet versions). This means that they are consuming a very high level of calorie intake with little or no feeling of satiation. Taste, quick access and peer influence were major contributing factors to them visiting fast food and takeaway outlets. Another worrying observation is that the majority of these frequent consumers were from ethnic backgrounds that are genetically predisposed to higher level of cardiovascular disease and diabetes. These schoolchildren are exposed to an environment that is likely to cause obesity, and it is not surprising that in this situation, many of these children are already overweight or obese and will likely become obese as adults. Clearly, actions need to be taken to either limit the ability of these children to access fast food outlets or to change the foods they purchased at these outlets (eg, less calorie dense, with more fruit and vegetables, with less fat and salt) and to have a ban on the sale of sweetened soft drinks at these outlets. Indeed, these schoolchildren were positive to modifications and may well choose healthier options if they were made easily available.

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Contributors At the time of the data collection, all authors were with London Metropolitan University. M-YC conceived and designed the study. RP and AR recruited the sample and collected the data. All authors analysed and interpreted the data. RP and M-YC wrote the manuscript, edited and approved the final version for submission.

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4 & 5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	2, 6-8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-8
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	6-7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Not Applicable
		(*e*) Describe any sensitivity analyses	Not Applicable
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6-8
		(b) Give reasons for non-participation at each stage	6-8
		(c) Consider use of a flow diagram	Not Applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9 & Table 1 (Pg20)
		(b) Indicate number of participants with missing data for each variable of interest	Table 1 (Pg 20)
Outcome data	15*	Report numbers of outcome events or summary measures	Pg 20 & 21
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9-12, 20 & 21
		(*b*) Report category boundaries when continuous variables were categorized	9-12, 20 &21
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not Applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-12
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13-16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-16
Generalisability	21	Discuss the generalisability (external validity) of the study results	13-16
Other information			13-16
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.