

Free school meals and children's social and nutritional status in Trinidad and Tobago

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Abstract

Objective: To evaluate the provision of free school meals in Trinidad and Tobago in relation to children's social and nutritional status.

Design and methods: Cross-sectional survey of a nationally representative sample of 66 government schools, including children in the admissions classes (aged 4 to 7 years) and classes for 'rising nines' (aged 7–10 years). Data included questionnaire details of free school meals and children's social background, and measurements of children's heights, weights and skinfold thicknesses.

Results: Of 6731 eligible children, data were analysed for 5688 (85%). There were 2386 (42%) children receiving free meals provided at school. At different schools the proportion of all children receiving free meals ranged from 20% to 100%, $P < 0.001$. Receipt of free meals was associated with larger family size (one child, 32% received free meals; ≥ 6 children, 63%), lower paternal educational attainment (primary, 52% free; university, 30%), father's employment (employed, 39% free meals; unemployed >12 months, 59%) as well as maternal education and employment and household amenities. After adjusting for age, sex and ethnic group, children who received free meals were shorter (mean difference in height standard deviation score (SDS) -0.12 , 95% confidence interval (CI) -0.17 to -0.06), lighter (body mass index SDS -0.21 , -0.28 to -0.14) and thinner (subscapular skinfold SDS -0.13 , -0.18 to -0.09).

Conclusions: Free school meals were widely available, with some targeting of provision to children with less favourable social and nutritional status. Greater universality would reduce inequity, but more stringent targeting and reduction of school-level variation would increase efficiency.

Keywords
Children
Nutritional status
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Unemployment
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In the Caribbean, there has been a long-standing concern with the nutritional status of children. Sinha reviewed evidence from different English-speaking countries and reported that nutritional conditions had greatly improved over time¹. Nevertheless, concerns continue to be expressed about undernutrition in socially disadvantaged sections of the population, particularly during periods of economic recession². In response to these concerns, the government in Trinidad and Tobago has extended the coverage of free school meals in recent years. The programme covers all government and government-assisted (denominational) schools but not private schools. In total about 85 000 students receive meals in primary, secondary and pre-school classes. The programme is evolving and the ultimate intention is to reach all students. Meals provided by the school nutrition programme are free of charge, and are supplied daily. In primary schools, teachers select children for free meals using guidelines provided by the Ministry of Education. Selection is based on the employment status of the parents, the number of

children in the family, and whether the child has a specific medical condition. In this report we aimed to evaluate the extent of provision of free school meals to different groups of children in relation to their social and nutritional status. The data were collected through a survey of a nationally representative sample of government schools carried out by the Nutrition Division of the Ministry of Health during 1999.

Methods

Subjects

The methods and main results of the study have been reported in detail elsewhere³. There are 468 government primary schools in Trinidad and Tobago, 433 in Trinidad and 35 in Tobago. The sample of 66 schools was drawn by stratifying the country into health administrative areas and randomly selecting schools with probability proportional to size. The sample of schools was drawn by the Central Statistical Office for an earlier survey carried out in 1989.

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The same sample was used for this survey because the geographical distribution of children in that survey corresponded closely to the distribution observed in the 1990 census. Fieldwork was carried out in the first six months of 1999. Within each school we measured all children in the first-year classes and in the classes for children aged 8 to 9 years.

Measurements

Measurements were made of children's heights, weights, and triceps and subscapular skinfold thicknesses. Height was measured on a Holtain stadiometer using the method described by Cameron⁴. Height was measured to the last 0.1 cm and 0.05 cm was added to correct the bias. Children were weighed in underpants with weight recorded to the last complete 100 g using electronic digital scales. Triceps skinfold thickness was measured as recommended by Tanner and Whitehouse⁵ but with the measuring point marked instead with the arm hanging straight and not bent. Fieldwork was carried out by the nutritionists and food demonstrators from the Nutrition Division of the Ministry of Health. Staff were trained in measurement techniques before the start of the study.

Questionnaires

The parents of each child were asked to complete a questionnaire. Where necessary the questionnaire was interview-administered by a class teacher or a fieldworker.

The questionnaire included questions concerning whether the child usually ate 'breakfast', 'lunch' or any 'other food' (e.g. snacks) at school and, for each item, whether the food was provided free of charge. For analysis we combined responses to these items in order to determine whether each child received any free food at school or not. All meals provided by the government School Nutrition Programme are provided free of charge. Other meals would have been either brought to school or purchased from vendors near to the school. Children receiving no food at school were presumed to go home for lunch but we did not collect this specific information, nor did we collect information about the children receiving drink but not food at school.

The child's ethnic group was classified into the categories 'African', 'Indian', 'White', 'Chinese', 'Mixed', 'Other' or 'Not known', based on parental reports. This represents a shortened form of the categorisation used in the national census⁶. For analysis the categories were further reduced to 'Afro-Trinidadian', 'Indo-Trinidadian', 'Mixed' and 'Other and Not known'. The number of children in the family was included in analyses as a categorical variable. The questionnaire also included items concerning the educational attainment and employment status of the child's parents, the type of water supply available in the home and the number of persons per room

as an index of overcrowding. For analysis, these variables were reduced to the categories shown in the tables.

Analysis

A standard deviation score (SDS) was calculated for measurements of height, weight, body mass index (BMI) and skinfold thicknesses. The SDS is given by the difference between the child's measurement and the mean for a child of the same age and gender from a reference population divided by the standard deviation for that age and sex in the reference population. Data from British children were used for reference. The height and weight SDSs⁷ and BMI SDS⁸ were calculated from the British 1990 growth references as recommended. Data for white children from the 1990 survey of the National Study of Health and Growth (NSHG) constituted the majority of the data for ages 5 to 11 years, and data from other surveys were adjusted to that of the NSHG English data⁸. No concurrent UK reference curves for skinfold thickness were produced because of the lack of data from studies other than the NSHG. SDSs have therefore been calculated directly from NSHG 1990 data for English white children. Reference curves for triceps and subscapular skinfold thickness were obtained using the method of Cole⁹. By definition, each SDS had normal distribution mean of 0.0 and standard deviation of 1.0 for the English white 1990 population. In boys, one weight SDS is equivalent to about 1.9 kg at 5 years and 4.5 kg at 11 years. Eight outlying items of data were excluded because they appeared impossible (greater than 10 SDS or less than -10 SDS). The age distribution of the sample was clearly bimodal with a trough at 7 years. Children were therefore divided into two age groups – less than 7 years and 7 years or more – in order to examine the hypotheses in relation to age. School class ('admissions' or 'rising nines') was not entered on to computer, but would generally be consistent with age group.

There was appreciable school-level variation, so random effects logistic regression models were fitted using the 'xtlogit' command in Stata¹⁰. Random effects regression models (with school as the random effect) were used to estimate associations between height, body mass index or subscapular skinfold thickness and explanatory variables¹⁰.

Results

There were 6731 eligible subjects in the sample. Measurements were obtained for 6405 (95%) children, while both questionnaires and measurements were obtained for 5688 (85%). After adjusting for age group, sex and observer-assessed ethnicity, there was only weak evidence that children who provided measurements but not questionnaire responses were slightly shorter (mean difference in height SDS -0.06, 95% confidence interval

Table 1 Proportion of children having meals at school and whether they were free of charge. Figures are frequencies (% of column total)

	All children (5688)		<7 years (2608)		≥7 years (3080)	
	Received	Free	Received	Free	Received	Free
Breakfast	287 (5)	179 (3)	119 (5)	71 (3)	168 (5)	108 (4)
Lunch	3721 (65)	2146 (38)	1672 (64)	886 (34)	2049 (67)	1260 (41)
Other food	1294 (23)	460 (8)	609 (23)	224 (9)	685 (22)	236 (8)
Any food	4166 (73)	2386 (42)	1875 (72)	1011 (39)	2291 (74)	1375 (45)

(CI) -0.15 to 0.03 , $P = 0.171$) and lighter (mean difference in BMI SDS -0.06 , -0.17 to 0.05 , $P = 0.279$) than children who provided both measurements and questionnaire responses. The remaining analyses were confined to the 5688 children who contributed both measurements and questionnaire responses. Parentally assigned ethnic group was used for analysis. In the younger age group, the median age (range) was 5.7 (4.4 to 6.9) years. In the older age group, the median age (range) was 8.6 (7.0 to 10.4) years.

Table 1 shows the proportion of children eating food in school, and whether they were receiving free meals. Overall, 4166 (73%) children ate food at school, and lunch accounted for 3721 (89%) meals in school. Free meals were received by 2386 (42%) children, and lunch was provided in 2146 (90%) cases. The level of provision was slightly higher in the older age group than in the younger. There was significant variation in the provision of free school meals among schools, with the proportion of all children receiving free meals ranging from 20% to 100% at different schools. The intra-class correlation coefficient for school-level variation (by analysis of variance, without adjustment for covariates) was 0.08 (95% CI 0.05 to 0.11). This variation was partly explained on a geographical basis, with schools in Tobago (74%) having a higher level of provision than those in Trinidad (41%).

Table 2 shows the distribution of free meals according to children's social characteristics. Figures are frequencies (% of row total) and odds ratios (95% CI) from a logistic regression model adjusted for each of the variables shown. There was evidence that older, rather than younger children, and boys rather than girls more often received free meals in school, but the absolute differences between groups were small. There were no differences in the receipt of free meals in relation to ethnicity. There was a strong association between the number of children in the family and receipt of free meals, with a two-fold increase between one-child families and those with six or more children. Receipt of free meals was also associated with lower educational attainment in the father or mother, with long-term unemployment of the father, with absence of a pipe-borne water supply in the home, and with household overcrowding. There was only weak evidence for an association with maternal employment status. There was evidence of school-level variation ($P < 0.001$) even after

allowing for variation in children's social characteristics between schools, and whether the school was in Tobago.

Table 3 shows the mean difference (95% CI) for anthropometric indicators between those who received free meals and those who did not. In these analyses, which were adjusted for age group, sex and ethnic group, children who received free meals were slightly shorter, thinner and lighter than those who did not. Comparing children who ate food at school that was not free with children who did not eat at school, there were no differences in mean height SDS (-0.02 , 95% CI -0.09 to 0.05), BMI SDS (-0.02 , -0.11 to 0.07), triceps skinfold thickness SDS (0.01 , -0.07 to 0.08) or subscapular skinfold thickness SDS (0.01 , -0.05 to 0.07).

Discussion

Main findings

A high proportion of primary school children in Trinidad and Tobago received free school meals. Receipt of free school meals was associated with the child being from a larger family, with lower educational attainment of either the mother or the father, with long-term unemployment of the father, and with fewer household amenities in terms of water supply and household overcrowding. Children who received school meals were slightly shorter, lighter and thinner than children who did not receive school meals. There was evidence of variation in provision among schools, even after allowing for differences in children's characteristics between schools. There also appeared to be different levels of provision of free meals in Trinidad as compared with Tobago.

Limitations of the study

Our study had several limitations. We studied a large nationally representative sample of children, and the overall response rate was good. However, there is a concern that non-responding children may represent a particularly vulnerable group, especially as we did not trace children who were not registered in school. However, the proportion of children not enrolled in school would be a very small minority in Trinidad and Tobago. As the survey had a broad perspective, we only included a few simple questions about the meals taken at school. Future studies might usefully evaluate the food

Table 2 Proportion of children receiving free food in relation to social factors. Figures are frequencies (% of row total) and odds ratios (95% CI) adjusted for each of the variables shown

		Free meals/total (%)	Odds ratio (95% CI)
Age-group	<7 years	10112608 (39)	–
	≥7 years	13753080 (45)	1.18 (1.05 to 1.33)
Sex	Male	12102737 (44)	–
	Female	11762951 (40)	0.81 (0.71 to 0.91)
Ethnic group	Afro-Trinidadian	8261934 (43)	–
	Indo-Trinidadian	7271689 (43)	0.91 (0.75 to 1.11)
	Mixed	7731794 (43)	1.19 (1.03 to 1.38)
	Other and Not known	60271 (22)	0.57 (0.38 to 0.84)
Number of children in family	1	241760 (32)	–
	2	5771661 (35)	1.09 (0.90 to 1.33)
	3	5161204 (43)	1.27 (1.03 to 1.56)
	4	396833 (48)	1.48 (1.18 to 1.85)
	5	266456 (58)	2.01 (1.54 to 2.63)
	≥6	328522 (63)	2.11 (1.61 to 2.75)
	Not known	62252 (25)	0.79 (0.53 to 1.18)
Mother's education	Primary	8311513 (55)	–
	Secondary	10232587 (40)	0.80 (0.69 to 0.93)
	Technical	3701056 (35)	0.77 (0.64 to 0.93)
	University	63224 (28)	0.73 (0.51 to 1.05)
	Not known	99308 (32)	0.81 (0.57 to 1.15)
Father's education	Primary	9171751 (52)	–
	Secondary	8402144 (39)	0.86 (0.74 to 1.00)
	Technical	303932 (33)	0.72 (0.59 to 0.87)
	University	79265 (30)	0.78 (0.57 to 1.08)
	Not known	247596 (41)	0.99 (0.78 to 1.25)
Mother's employment	Housewife/not employed	13622891 (47)	–
	In paid employment	7412071 (36)	0.91 (0.79 to 1.04)
	Not known	283726 (39)	0.98 (0.79 to 1.21)
Father's employment	Employed	15653966 (39)	–
	Unemployed	234456 (51)	1.18 (0.95 to 1.45)
	Unemployed >12 months	207352 (59)	1.58 (1.24 to 2.01)
	Not known	380914 (42)	1.24 (1.02 to 1.49)
Water supply	Piped supply in house	12453457 (36)	–
	No piped supply in house	10171842 (55)	1.58 (1.38 to 1.81)
	Not known	124389 (32)	0.94 (0.71 to 1.26)
Overcrowding (persons/room)	≤1.0	4821529 (32)	–
	>1.0 to ≤1.5	5301357 (39)	1.07 (0.91 to 1.27)
	>1.5 to ≤2.0	6251321 (47)	1.31 (1.10 to 1.56)
	>2.0	6721176 (57)	1.46 (1.21 to 1.77)
	Not known	77305 (25)	0.77 (0.54 to 1.10)
Island	Trinidad	22845551 (41)	–
	Tobago	10237 (74)	3.73 (1.68 to 8.30)

intakes of children who do not receive meals through the school feeding programme, or who do not eat at school.

Comparison with other work

Meals are provided for children in school at reduced or no cost in many countries, with the intention of improving children's dietary intakes and ultimately their nutritional

status or educational performance¹¹. Effects of school meal provision on dietary intakes have been demonstrated¹², but studies in Britain since the 1980s have generally shown that free meals or milk in school have a negligible effect on children's growth^{13,14}. In Jamaica, however, receipt of meals in school was associated with greater increases in children's height and weight over a 12-month period¹⁵. Provision of meals in school was also associated with better educational outcomes, including improved attendance at school¹⁵, and some evidence of better attention and cognitive functioning in class^{11,15,16}. These nutritional and educational benefits were particularly important for poorly nourished children from low-income families^{11,15}.

Evidence for the differential effectiveness of school meals in children who are less well nourished provides support for a policy of targeting this provision to poorer families¹⁵. However, when viewed as a social welfare measure, providing meals in schools acts as a transfer to

Table 3 Mean difference (95% CI) in anthropometric measures between children receiving free meals and those not

Measure	Mean difference (95% CI) SDS ^{a,b}	P-value
Height SDS	–0.12 (–0.17 to –0.06)	<0.001
BMI SDS	–0.21 (–0.28 to –0.14)	<0.001
Triceps skinfold SDS	–0.19 (–0.26 to –0.13)	<0.001
Subscapular skinfold SDS	–0.13 (–0.18 to –0.09)	<0.001

^a Adjusted for age, sex and ethnic group.

^b Negative value indicates lower measurement in those receiving free meals.

families with children¹⁷. Here, the high degree of political acceptability of a benefit received directly by children may be as important as the immediate nutritional or educational consequences¹¹. Targeting this form of provision has the apparent advantage of increasing the amount of benefit available to the poorest groups in society. A universal programme may be excessively costly. However, it is recognised that there are several disadvantages in targeting benefits in this way. Firstly, it may be difficult to implement a process of targeting efficiently, and it may be possible for the targeting to be subverted by the interests of particular groups¹⁸. Secondly, there may be a stigma associated with the receipt of targeted benefits, which may limit uptake among those who are eligible^{19,20}. A policy of self-selection for school meals has been explored in some countries but this may increase inequity²¹. In Jamaica a policy of self-selection led poorer children to choose the less costly meal, while children who had money to spend on food were able to choose the more costly cooked meal²². Thirdly, programmes that are aimed at the poor tend to attract few resources, or – as it is sometimes expressed – ‘programmes for the poor are poor programmes’¹⁸.

In Trinidad and Tobago, the provision of free school meals was widespread but not universal. Although the basic policy is similar in the two islands, coverage tended to be more universal in Tobago (population approximately 50 000), but more selective in Trinidad (population approximately 1.2 million). There was some evidence of targeting at poorer children but, judged according to seven indicators of socio-economic status, this was incomplete and there were only small differences in anthropometric measures between those who received benefits and those who did not. There was also wide variation in the level of provision among schools, even after adjusting for the characteristics of children attending them.

Finally, it may be noted that at the present level of economic development there is little evidence of widespread undernutrition among children in Trinidad and Tobago. There is probably no excess of children with height less than –2 SDS but the prevalence of underweight is high especially in Indo-Trinidadian children³. In data from the survey reported here, 8.5% of children were overweight and 2.4% were obese³ according to the international standard for obesity in children²³. Current global trends are towards increasing obesity. In this context, schools have a potential role in encouraging healthy eating and exercise habits²⁴. School meals often have a high fat content²⁵ but data reported to us by the School Nutrition Programme in Trinidad and Tobago suggest that their meals contain about 20% fat and 65–70% carbohydrate.

Implications for policy

The results of our survey raise questions about the objectives and implementation of the school feeding programme in Trinidad and Tobago. The original aim of

the programme was to address undernutrition but a broader focus on promoting health may now be more appropriate. The current pattern of provision illustrates some of the documented tensions between differing policy objectives in school meals provision²⁶. Greater equity could be achieved by making provision more universal as this would result in a higher proportion of children who need school meals actually receiving them. However, this would reduce efficiency, as more children who do not need free meals would then receive them. Greater efficiency would be achieved by making the criteria for accepting children for free school meals more stringent, and by reducing variation in provision between schools. The present pattern of provision may to some extent represent a pragmatic compromise between these conflicting objectives.

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