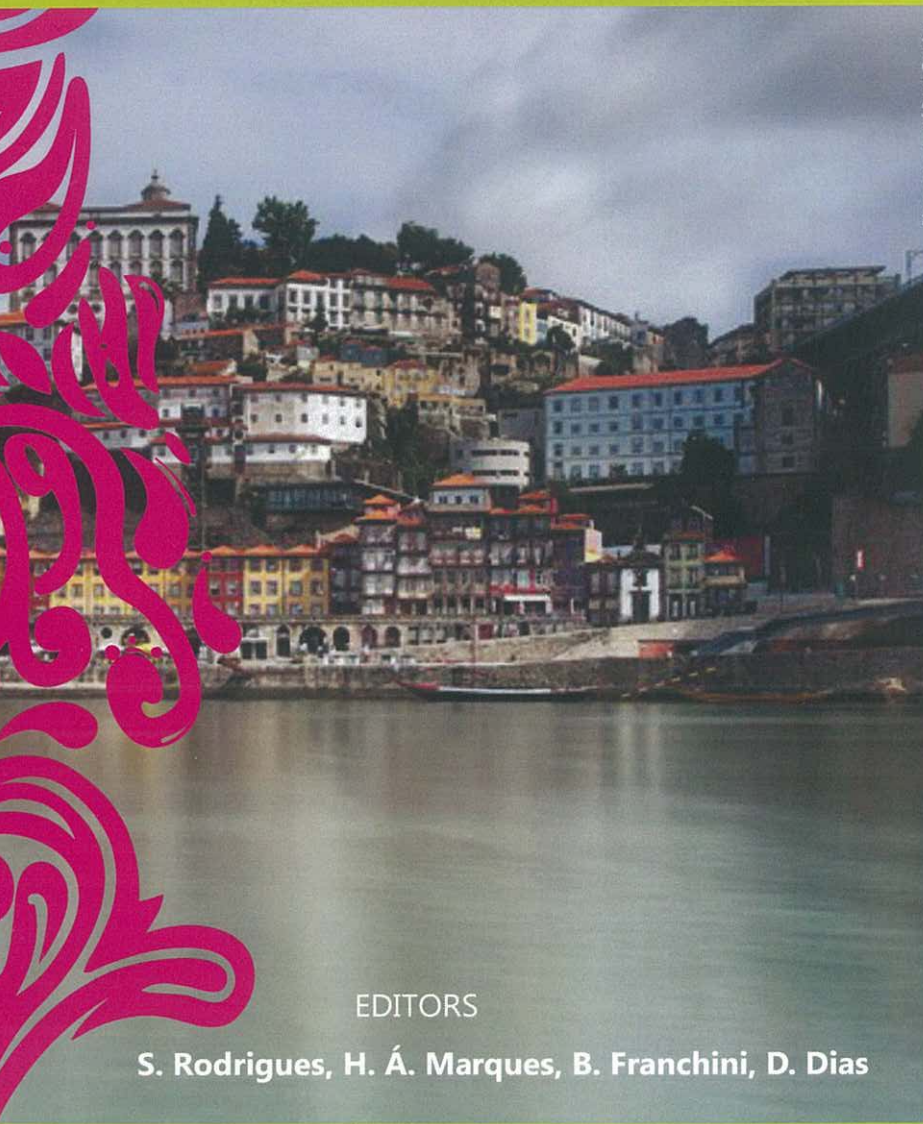


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*global, local
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Children's satisfaction with school lunch in public primary schools

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Abstract

The present study aims to evaluate children's satisfaction regarding lunch sensory characteristics at primary schools.

A stratified clustered sample of 463 fourth-grade children, aged 9 to 10 years old, drawn from 20 public primary schools at a Portuguese municipality. Satisfaction with school lunch in relation to overall sensory characteristics: taste; smell; appearance and temperature of the meal, was determined using a 4-point scale, ranging from "dislike" to "like a lot".

Positive results for children's satisfaction with sensory characteristics were found for all meal components. In general, derived overall satisfaction with different meal components yielded that the fruit is the most preferred component, followed by the main dish, with soup being the least preferred ($p < 0.05$). This being true across every sub-group under analysis. The least appreciated sensory characteristics of school lunch were the smell and the appearance of soup and the appearance of the main dish. Boys were significantly more pleased than girls with taste, appearance and smell of main dish. Children having local cooked meals were on overall more satisfied with these sensory characteristics than children attending schools with transported meals, with significant differences for taste, appearance and smell of main dish.

Appearance and smell of both main dish and soup served at primary schools were the less appreciated characteristics, suggesting an effort should be made to improve appearance of served meals and to produce more flavoursome meals.

Introduction

Due to the large number of school meals served and the considerable contribution of school meals to children's dietary intake, it is essential to guarantee that children are satisfied with them ⁽¹⁾. Standards for school meals are well established, and it is generally assumed that all foods served are consumed. Nevertheless, this may not be true if children do not fully eat them due to meal dissatisfaction. Pupils might benefit if additional focus were given to the quality and sensory attributes of school meals ⁽²⁾.

Satisfaction with school meals depend on this quality, diversity of food, food hygiene and environment ⁽³⁾ and has been identified as an important factor affecting food consumption and consequently plate waste ⁽⁴⁾.

Different studies have shown an influence of taste, smell ⁽⁵⁾, appearance ⁽⁶⁾ and temperature ⁽⁷⁾ of different meal components on children's food choice acceptability

and intake. Such meal sensory characteristics can affect food consumption by primary school children ⁽⁵⁾.

The objective of the present study was to evaluate children's satisfaction with sensory characteristics of lunch components at primary schools, namely soup, main dish and fruit.

Methods

The study was conducted at a Portuguese municipality during May and June 2012. A stratified clustered sample of 463 fourth-grade children, aged 9 to 10 years old, chosen from 20 public primary schools were evaluated. All fourth-grade children having daily lunch at school were involved, after obtaining informed written consents from the Portuguese Ministry of Education, the Municipality, the School Councils and the children's parents.

A questionnaire was developed to collect sociodemographic data and information about satisfaction with school lunch overall sensory characteristics: taste; smell; appearance; and meal temperature. These items were evaluated using a 4-point scale, ranging from "dislike" to "like a lot".

Data was analysed with IBM SPSS for Windows (v. 20.0) ⁽⁸⁾. Descriptive analysis was performed. For each component (soup, main dish and fruit) an index of overall satisfaction was derived as the average evaluation of each of the attributes. Internal consistency was assessed by Cronbach's alpha and its unidimensionality confirmed by principal component analysis ⁽⁸⁾. The effects of sex, financial support and place of cooking on school lunch satisfaction were tested with non-parametric Kruskal-Wallis and Mann-Whitney tests for more than two and for two independent groups, respectively. Additionally, comparison of the overall satisfaction with different meal components was tested with the Friedman test, followed by the Wilcoxon test, for each pair of dependent groups. Confidence level was set at 95%, except where expressed otherwise.

Results

This study included 463 children (49.7% female), with an average age of 9.5 ± 0.6 years. Concerning social support 28.9% had free school lunch, 20.2% had partial financial support and 50.9% had no financial support for school lunch.

Before evaluation of children's satisfaction with school lunch sensory characteristics, children were asked about favourite place for having lunch. The majority of children expressed that they preferred to have lunch at home (78.6%), mainly due to the quality and sensory characteristics of meals.

Positive results for children's satisfaction with sensory characteristics were found for all meal components (Table 1).

In general, derived overall satisfaction with different meal components yielded that the fruit is the most preferred component, followed by the main dish, with soup being the least preferred ($p < 0.05$). This being true across every sub-group under analysis.

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The least appreciated sensory characteristics of school lunch were: smell and appearance of soup and appearance of main dish. Boys were significantly more pleased than girls with taste, appearance and smell of main dish (Table 1).

Table 1. Satisfaction of children with school lunch components by gender (4 point scale: 1- Dislike ; 4 - Like a lot)

Meal component	Sensory characteristics	Total (n= 463) Mean (\pm SD)	Male (n= 233) Mean (\pm SD)	Female (n= 230) Mean (\pm SD)	p-value
Soup	Taste	2.60 (\pm 0.85)	2.64 (\pm 0.84)	2.56 (\pm 0.86)	0.296
	Appearance	2.47 (\pm 0.92)	2.50 (\pm 0.93)	2.44 (\pm 0.91)	0.384
	Smell	2.52 (\pm 0.86)	2.58 (\pm 0.85)	2.47 (\pm 0.86)	0.213
	Temperature	2.70 (\pm 0.80)	2.70 (\pm 0.81)	2.70 (\pm 0.79)	0.985
	Overall satisfaction ($\alpha = 0.741$) ¹	2.57 ^A (\pm 0.64)	2.60 (\pm 0.63)	2.54 (\pm 0.66)	0.081*
Main dish	Taste	2.82 (\pm 0.81)	2.88 (\pm 0.86)	2.77 (\pm 0.76)	0.094*
	Appearance	2.75 (\pm 0.80)	2.80 (\pm 0.82)	2.69 (\pm 0.77)	0.094*
	Smell	2.74 (\pm 0.80)	2.79 (\pm 0.79)	2.68 (\pm 0.80)	0.071*
	Temperature	2.81 (\pm 0.73)	2.81 (\pm 0.73)	2.80 (\pm 0.73)	0.787
	Overall satisfaction ($\alpha = 0.733$) ¹	2.78 ^B (\pm 0.58)	2.82 (\pm 0.59)	2.73 (\pm 0.58)	0.034
Fruit	Taste	3.23 (\pm 0.63)	3.20 (\pm 0.68)	3.26 (\pm 0.57)	0.564
	Appearance	3.05 (\pm 0.78)	2.98 (\pm 0.85)	3.11 (\pm 0.71)	0.218
	Overall satisfaction ($\alpha = 0.725$) ¹	3.14 ^C (\pm 0.63)	3.10 (\pm 0.69)	3.18 (\pm 0.56)	0.457

p-values according to non-parametric Mann-Whitney test significant at 95% confidence level;

* significant at 90% confidence level; ¹ Cronbach's alpha;

A, B, C – homogeneous groups according with the non-parametric Wilcoxon test at 95% confidence level

Children having free school meals tended to be more satisfied with school lunch sensory characteristics than other children. Although, no significant differences were identified, exception made for the evaluation of the smell of the soup (Table 2).

Table 2. Satisfaction of children with school lunch by financial support for school meals (4 point scale: 1- Dislike ; 4 - Like a lot)

Meal component	Sensory characteristics	Free school lunch (n= 134) Mean (\pm SD)	Partial financial support (n= 94) Mean (\pm SD)	No financial support (n= 235) Mean (\pm SD)	p-value
Soup	Taste	2.70 (\pm 0.81)	2.56 (\pm 0.86)	2.56 (\pm 0.87)	0.353
	Appearance	2.57 (\pm 0.94)	2.38 (\pm 0.97)	2.45 (\pm 0.89)	0.276
	Smell	2.70 (\pm 0.79) ^a	2.53 (\pm 0.90) ^{a,b}	2.42 (\pm 0.86) ^b	0.014
	Temperature	2.71 (\pm 0.76)	2.69 (\pm 0.79)	2.70 (\pm 0.83)	0.993
	Overall satisfaction	2.67 (\pm 0.56)	2.54 (\pm 0.67)	2.53 (\pm 0.67)	0.384
Main dish	Taste	2.90 (\pm 0.80)	2.83 (\pm 0.80)	2.77 (\pm 0.82)	0.457

Meal component	Sensory characteristics	Free school lunch (n= 134) Mean (\pm SD)	Partial financial support (n= 94) Mean (\pm SD)	No financial support (n= 235) Mean (\pm SD)	p-value
	Appearance	2.75 (\pm 0.84)	2.86 (\pm 0.71)	2.70 (\pm 0.81)	0.219
	Smell	2.83 (\pm 0.70)	2.80 (\pm 0.87)	2.66 (\pm 0.81)	0.129
	Temperature	2.86 (\pm 0.71)	2.72 (\pm 0.68)	2.81 (\pm 0.76)	0.197
	Overall satisfaction	2.83 (\pm 0.53)	2.80 (\pm 0.60)	2.73 (\pm 0.61)	0.344
	Taste	3.22 (\pm 0.66)	3.27 (\pm 0.64)	3.23 (\pm 0.60)	0.809
	Appearance	3.08 (\pm 0.76)	3.02 (\pm 0.80)	3.03 (\pm 0.79)	0.804
Fruit	Overall satisfaction	3.15 (\pm 0.64)	3.14 (\pm 0.60)	3.13 (\pm 0.63)	0.893

p-values according to non-parametric Kruskal-Wallis test at 95% confidence level.

Children from schools with local cooking were more satisfied with main dish sensory characteristics than children attending schools with transported meals (Table 3).

Table 3. Satisfaction of children with school lunch by place of cooking (4 point scale: 1- Dislike; 4 - Like a lot)

Meal component	Sensory characteristics	Local cooking meals (n= 111) Mean (\pm SD)	Non local cooking meals (n= 352) Mean (\pm SD)	p-value
Soup	Taste	2.71 (\pm 0.78)	2.57 (\pm 0.87)	0.127
	Appearance	2.56 (\pm 0.88)	2.44 (\pm 0.93)	0.321
	Smell	2.64 (\pm 0.83)	2.49 (\pm 0.86)	0.088*
	Temperature	2.77 (\pm 0.70)	2.68 (\pm 0.83)	0.365
	Overall satisfaction	2.67 (\pm 0.58)	2.54 (\pm 0.66)	0.083*
Main dish	Taste	2.95 (\pm 0.65)	2.78 (\pm 0.85)	0.086*
	Appearance	2.92 (\pm 0.71)	2.69 (\pm 0.82)	0.012
	Smell	2.86 (\pm 0.77)	2.70 (\pm 0.80)	0.066*
	Temperature	2.89 (\pm 0.66)	2.78 (\pm 0.75)	0.168
	Overall satisfaction	2.90 (\pm 0.53)	2.74 (\pm 0.60)	0.006
Fruit	Taste	3.24 (\pm 0.58)	3.23 (\pm 0.64)	0.962
	Appearance	3.04 (\pm 0.69)	3.05 (\pm 0.81)	0.576
	Overall satisfaction	3.14 (\pm 0.56)	3.14 (\pm 0.65)	0.780

p-values according to non-parametric Mann-Whitney test significant at 95% confidence level;

* significant at 90% confidence level.

Discussion

Overall satisfaction was significantly higher for fruit, followed by main dish, and lower for soup. Generally, appearance and smell were the characteristics with lower scores attributed by children, with these results in line with previous studies^(5,6). According to Risvas et al. taste and smell are referred by children as factors that influence their food intake⁽⁵⁾. Other researchers observed a higher food intake by children when food was more appealing⁽⁶⁾. The impact of food appearance on children food preferences was evaluated by Zampollo et al., showing that children prefer colourful meals⁽⁹⁾. In line with other study, boys were, on overall, significantly more satisfied with main dish sensory characteristics⁽³⁾. It was observed that satisfaction with school lunch sensory characteristics tended to be higher for students from low-income families.

Although not a significant difference, according with informal conversation with participants, it could be due to the fact that probably school lunch may be the only hot meal and main source of nutrients for these children and there is no warrant of a nutritionally balanced diet being taken at home ⁽¹⁰⁾. It should be noted that school meals are seen as a way of addressing dietary disparities between children of different socio-economic backgrounds ⁽¹¹⁾.

As expected, local cooking meals were more appreciated by children, particularly the appearance and overall evaluation of the main dish. This can be explained for losses in sensory characteristics of foods, namely in appearance, texture and smell, since meals are transported, kept closed into containers for several hours and suffer several handling steps ⁽¹²⁾. It is known that food served at proper temperature and with attractive colour, texture and flavour will be consumed better by children ⁽¹³⁾. Baxter et al., concluded that intake at school lunch was higher for children that reported higher satisfaction with meal components ⁽¹⁴⁾. Food items more appreciated by children at school lunch were more consumed and the less appreciated showed higher rejection values ^(14, 15). Schools evaluated operate a menu cycle that offers daily meat or fish alternatively. An increase in sensory characteristics of school meals would be expected if foodservice staff increase the daily variety of dishes available for lunch and offer more appealing preparations. Within a nutritionally balanced choice, children's food preferences and satisfaction should be considered when planning school menus ⁽¹⁶⁾. Children satisfaction with meals is affected by several factors such as the familiarity with available foods ⁽¹⁶⁾, the availability of food at home made meals ⁽¹⁷⁾ and the sensory characteristics of served meals ⁽¹⁶⁾, which also anticipates some level of intervention with them to improve meal acceptability.

Conclusions

Children seems to be satisfied with sensory characteristics of meals served at school canteens. Appearance and smell of both main dish and soup served at primary schools were the less appreciated characteristics, suggesting an effort should be made to improve appearance of served meals and to produce more flavoursome meals.

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