

First Law regulating school canteens in Brazil: evaluation after seven years of implementation

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SUMMARY. The high prevalence of overweight and obesity among schoolchildren in Brazil and worldwide has shown that strategies to promote healthy eating habits are needed. Santa Catarina was the first Brazilian State to promulgate specific legislation to regulate the food commercialized in schools (Law nº 12.061/2001). The objective was to assess the functioning of school canteens in eight key municipalities of Santa Catarina, investigating whether the foods sold were in accordance with the Law. A questionnaire was completed by the principals and those responsible for the canteens. Item Response Theory was used to examine the levels of compliance with the Law. In all 345 schools took part. Of these, 156 (45%) had a canteen. The presence of a canteen was significantly higher in the private sector ($p<0.001$). The majority of the canteens ($n=105$; 68.2%) did not sell fried snacks, soft drinks, industrialised popcorn, hard candies, lollipops and chewing gum and industrialised packaged snacks. The items which were least likely to comply with the Law were juices and the daily availability of fruits. The notice board on diet was present in only 7.1% of the establishments. Many canteens offered items of low nutritional value. The inspection of these establishments is necessary, together with educational actions targeting the proprietors of the canteens as well as the schools themselves. Training for the canteen's proprietors may constitute a strategy that will guarantee the economic viability of these establishments and the possibility of them being transforming into places of health promotion.

Key words: School canteen, strategies, food habits, law enforcement.

RESUMEN. Primera ley de regulación de las cantinas escolares en Brasil: evaluación después de siete años de aplicación. Las elevadas tasas de sobrepeso y obesidad en los escolares han planteado la necesidad de aplicar estrategias para promover la alimentación saludable en esta población. Santa Catarina fue el primer estado brasileño a crear legislación para regular los alimentos vendidos en las cantinas escolares (Ley nº 12.061/2001). El objetivo fue realizar un diagnóstico sobre el funcionamiento de las cantinas en ocho municipios polos de Santa Catarina, comprobando si los alimentos vendidos están de conformidad con la Ley. Se aplicó un cuestionario a los directores y responsables de las cantinas. Se usó la Teoría de la Respuesta al Ítem para comprobar los niveles de adecuación a la Ley. Los participantes del estudio fueron 345 escuelas. De éstas, 156 (45%) tienen cantina. La presencia de la cantina fue estadísticamente mayor en la red privada ($p<0.001$). La mayoría de las cantinas ($n=105$; 68,2%) no vende snacks fritos, refrescos, palomitas de maíz industrializadas, caramelos, chicles o bocadillos industrializados. Los puntos con mayor dificultad de adecuación a la Ley fueron los jugos no naturales y la disponibilidad diaria de frutas. Sólo 7,1% de las cantinas tenían mural sobre alimentación. Muchas cantinas venden alimentos de bajo valor nutricional. La vigilancia de estos establecimientos es necesaria, junto con acciones educativas destinadas a los propietarios de las cantinas y a los estudiantes. La formación de los propietarios de las cantinas será la estrategia para garantizar la viabilidad económica y la posibilidad concreta de la cantina convertirse a su vez en una zona de promoción de la salud. **Palabras clave:** Cantinas escolares, estrategias, hábitos alimentarios, aplicabilidad de la ley.

INTRODUCTION

The "Health Promoting Schools", initiative launched officially by the Pan-American Health Organisation and the World Health Organisation (PHO/WHO) in Latin America, in 1995, aims to strengthen and broaden partnerships between the sectors of health and education in the practice of health promotion in schools, including giving support to parents, teachers, managers and other actors in the school community (1-3).

At the 57th. World Health Assembly (2004) the WHO approved the "Global Strategy on Healthy Eating, Physical Activity and Health" (4). Regarding the education of children

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and adolescents, this lays out regulatory, fiscal and legislative actions concerning the school environment, with the aim of enabling healthy dietary choices (5).

Numerous countries are seeking to intervene in the elevated prevalences of overweight/obesity that have arisen among school-age students in recent years (6).

Following this line of reasoning, municipal Law n° 5.853 was approved in Florianópolis, in the state of Santa Catarina (SC), south of Brazil, in June 2001, affecting public and private educational institutions that provided basic education. This legislation was unprecedented in Brazil and lays down criteria for the provision of snacks and drinks services in educational institutions (7).

After receiving widespread coverage in the national media, this legislation was extended to the rest of the state of SC in December 2001 (Law n° 12.061) (8). Similar strategies have been observed in other municipalities and Brazilian states (9,10).

On the other hand, the lack of information that would enable an evaluation of Law n° 12.061/2001 (8) has raised questions among researchers and public policy planners in the health area. It is clear that approximately seven years after its implementation, effective compliance needs to be analysed and monitored.

This article is the result of a more wide ranging study, the purpose of which was to analyse the existence and functioning of school canteens in eight key municipalities in the state of SC, and to determine whether the foods and drinks sold by the establishments conformed to the relevant legislation contained in Law n° 12.061/2001(8).

MATERIALS AND METHODS

This was a transverse study, with data being collected from July of 2007 to April of 2008. The study was carried out in eight key municipalities in the state of SC (Blumenau, Chapecó, Criciúma, Jaraguá do Sul, Joaçaba, Joinville, Florianópolis and Lages), deliberately chosen as they had a greater number of schools and enrolled students in the 1st. to the 5th. years of primary education.

As a criterion for definition of the sample, we chose to investigate schools with at least 50 students, grouped in two strata of administrative dependency (public and private). The presence or not of a school canteen also was considered.

The number of schools was calculated in order to guarantee a sampling error of no more than 6 percentage points, plus or minus, for each of the strata of interest, assuming that the proportions to be estimated were less than or equal to 0.30 or greater than or equal to 0.70. The final sample comprised 347 schools (266 public and 81 private).

A structured questionnaire concerning the existence and functioning of the school canteen was completed by the

principal or other individual responsible for coordination of the school, besides the person responsible for the canteen, where present. The questionnaire was based on the material used in the Project “The School Promoting Healthy Dietary Habits”, by the Universidade de Brasília (UNB) (11), and adapted for the present study.

The team responsible for data collection consisted of eight nutritionists and two students from the Post-Graduate Programme in Nutrition at Universidade Federal de Santa Catarina (UFSC). The team was trained after having carried out a pilot test in two schools.

The variables investigated were: current and previous existence of a canteen; reasons for the lack of a canteen; type of administration; products commercialised; suggestions or restrictions from the school management regarding the products; activities developed for the promotion of healthy snacks; nutritional education developed in the canteens; promotion of the canteen space with educational materials concerning diet; the presence of a notice board related to diet in the canteen; opinion of those responsible for the canteens concerning their establishments and the difficulties encountered in implementing a healthy canteen.

The questionnaire contained a broad range of foods and drinks (check list), in order to identify exactly what was sold in the canteens, since Law n° 12.061/2001 (8) mentions only those foods that are prohibited. The check list comprised 52 items, subdivided in groups of foods (containing a separate list for sweet foods) and drinks. In the analysis, some items were regrouped according to the frequencies found. The frequency distribution presented refers only to the data given, cases where no information was obtained being excluded.

The variables used to determine the levels of compliance with Law n° 12.061/2001(8) were those relating to Articles 2 and 4. Article 2 states that the sale of alcoholic drinks; hard candies, lollipops and chewing gum; soft drinks and juices; industrialised packaged snacks; fried snacks and industrialised popcorn is prohibited. Moreover, in this article, Paragraph 1 requires the establishment to provide two kinds of seasonal fruits (8). Article 4 refers to the presence of a notice board, which should be fixed to the wall in the food-serving establishment, to provide information about diet (8).

In order to examine the level of compliance with Law n° 12.061 (8), Item Response Theory (IRT) (12,13) was used. In the last few decades, IRT has become the predominant technique in the field of tests and in the construction of scales of latent measures (constructs) in numerous countries, standing out as a non-arbitrary method that considers each item individually (14). In the present study, the desirable measure is the level of compliance with the legislation and this manifests itself by means of the variables contained in the legislation. The IRT model considered was the logistic unidimensional model of two parameters, showing itself to

be an appropriate alternative to achieve the proposed objective, by avoiding the simple aggregation of the different indicators of the level of compliance with the Law (12,13). As the considered model fitted well to the data, we assume that the level of compliance with the Law is an unidimensional latent trace and, according to Embretson (13) the local independence assumption, required by the estimation process, is satisfied.

Based on the IRT, an instrument was created to examine the level of compliance with the legislation. The items used to obtain the results were: hard candies, lollipops and chewing gum (considered as a group of items); soft drinks; juices; industrialised packaged snacks; fried snacks; industrialised popcorn and the presence of two or more fruits *in natura* in the canteen. Each one of these seven items measures a particular aspect of the construct of interest. From a technical point of view, the items consist of responses given according to the reality in each canteen. When the canteen complied with the determined item of the Law it received a score of one; when it did not comply it received a score of zero (dichotomic response) (14).

The findings concerning the notice board on diet were removed from the IRT analysis as they presented contradictory results, that is, the schools that had a notice board were precisely those with the lowest level of compliance with the Law. Alcoholic drinks were also removed, since they were not sold in any of the schools.

As a criterion for inclusion of the canteens in the analysis of the IRT, it was decided that the canteens should have responded to at least six of the seven items of interest.

Due to specific characteristics of the school canteens (municipal, state and private) it was decided to construct a customised scale, and consequently classification. Since the data consisted of quantitative measures an arbitrary scale was employed, with a mean of 50 ± 10 . The scale was interpreted based on the position of the items in levels, with the items being positioned according to the probability of them being sold in the canteens. This probability is given by the IRT model, which is used to model the frequency with which the products appear in the canteens.

According to the level, the canteens were categorised in six classes of compliance with the Law, with this classification seeking to take into consideration possible measurement errors. Class 1: canteens below level 17.5; Class 2: = level 17.5 and below level 37.5; Class 3: = level 37.5 and below level 47.5; Class 4: = level 47.5 and below level 67.5; Class 5: = level 67.5 and below 77.5, and Class 6: = 77.5.

The canteens placed below level 20 (in Class 1) sold all of the items prohibited by the legislation; the canteens placed at level 20 (Class 2) did not sell fried snacks; at level 40 (Class 3) they did not sell the items of level 20, nor soft drinks and industrialised popcorn; at level 50 (Class 4) they did not sell

the items of levels 20 and 40, nor hard candies, lollipops, chewing gum and industrialised packaged snacks; at level 70 (Class 5) they did not sell the items of levels 20, 40 and 50, nor juices; and, at level 80 (Class 6) they did not sell the items of levels 20, 40, 50 and 70, and offered at least two fruits per day. It should be noted that levels 30 and 60 were not interpreted because there were no items present in them, with the information obtained in this study being sufficient to interpret only the levels referred to above.

The data were processed and analysed by employing specific programmes (*EpiData* 3.1 and *SPSS* 15.0). After the data had been entered they were double-checked against all the questionnaires. The program *BILOG-MG* (15) was used specifically to analyse the IRT.

A descriptive and inferential analysis of the variables was performed, beginning with the calculation of the proportions and construction of 95% confidence intervals (CI). In order to investigate the association between the variables and the educational sector, Pearson's chi-squared test was used, and when a significant difference was found, the Odds Ratio (OR), the 95% CI and the respective *p* value were calculated, to determine between which sectors this difference existed. Analysis of variance (ANOVA) was used to compare the average performance of the canteens in the three sectors in relation to the level of compliance with the Law on the scale created. In this case, the latent variable whose values were obtained from the application of IRT follows, at least approximately, a normal distribution. The level of significance for the tests was 5%.

The study protocol was approved by the Committee for Ethics in Research with Humans from UFSC, according to the guidelines established in Resolution 196/96 from the National Health Council (project n°031/06).

RESULTS

General characteristics

Of the 347 schools selected, 345 (99.4%) participated in the investigation, with the two losses being private institutions.

Of the 345 participant schools, 189 (54.8%) did not have a canteen. A significant difference was found between the existence of canteens in the different sectors ($p < 0.001$). The private sector institutions were 2.02 (95% CI=1.03-3.97; $p=0.039$) times more likely to have a canteen, when compared to the state sector, and 14.53 (95% CI=7.48-28.20; $p < 0.001$) times more likely when compared to the municipal sector. Among the public institutions, the state schools presented a 7.16 (95% CI=4.10-12.48; $p < 0.001$) times greater chance of having an establishment, compared to the municipal schools (Table 1).

TABLE 1
Characterisation of the participating schools according to the presence or absence of a canteen, according to educational sector and odds ratio (OR) among the sectors. Santa Catarina, December 2007

Sector	Canteen		Total schools
	Yes n (%)	No n (%)	
Municipal	32 (19.3)	134 (80.7)	166 (100.0)
State	65 (63.1)	38 (36.9)	103 (100.0)
Private	59 (77.6)	17 (22.4)	76 (100.0)
Total	156 (45.2)	189 (54.8)	345 (100.0)
Existence of a canteen	Private x State OR (95% CI) <i>p</i> Value	Private x Municipal OR (95% CI) <i>p</i> Value	State x Municipal OR (95% CI) <i>p</i> Value
	2.02 (1.03-3.97) 0.039	14.53 (7.48-28.20) <0.001	7.16 (4.10-12.48) <0.001

p= Pearson's chi-squared test

Among the 189 schools without a canteen, 22.8% (n=43) reported the previous existence of such an establishment. The reasons given for the absence of a canteen were: the provision of free meals in public schools, through the National School Meals Programme (*Programa Nacional de Alimentação Escolar*, PNAE) (n=94; 49.7%); implications and difficulties brought about by the introduction of Law n° 12.061/2001 (8) (n=43; 22.7%); financial reasons (n=23; 12.2%); guidance from the Municipal Secretaries for Education, with the encouragement of the PNAE, to the detriment of canteens (n=16; 8.5%) and the fact that the school had a majority of students from low-income families (n= 13; 6.9 %).

With regard to the administration of the canteens, it was found that among the 156 establishments identified, corresponding to 45.2% of the sample, 83 (53.2%) were the responsibility of the school itself, with the remaining canteens being tendered services.

Schools with canteens: products sold

Table 2 characterises the items sold in the canteens, according to educational sector. A high percentage of response was found for each item in Table 2, with the lowest percentage being 96.8%.

Without separating by sector, it can be seen from Table 2 that more than half of the canteens provided baked goods (n=130; 83.9%), pizzas (n=113; 72.9%), cakes and gateaux (n=101; 65.2%), plain crackers/biscuits (n=95; 61.3%) and hot dogs (n=88; 56.8%). In relation to sweets, chocolates (n=78; 50.6%) and others desserts (e.g.: puddings, mousses)

(n=72; 48.0%) were the items that exhibited the highest total frequency (Table 2). With regard to drinks, it was noted that more than half of the canteens sold milk chocolate (n=117; 76.5%), juices (n=102; 66.7%) and mineral water (n=95; 61.3%) (Table 2). There was a significant difference among the sectors in the sale of the majority of foods, that is, 22 of the 38 items listed in Table 2 presented a *p*<0.05.

Table 3 lists only those items from Table 2 with a significant difference among the sectors, and demonstrates that the canteens of private schools stood out in relation to the public state and municipal schools with the sale of cereal bars, cakes and gateaux, cheese bread, fruit salads, puff pastries, sandwiches in general and sachets of industrialised sauces (*p*<0.05 for all items).

With regard to sweets, the canteens in the private institutions differed from the municipal schools in the sale of sweetened nuts (*p*=0.022) and chocolates (*p*=0.014). Compared to the state schools, the private establishments more often sold jelly (*p*<0.001). Concerning the public institutions, the state school canteens stood out through the sale of chocolates (*p*=0.002), while the municipal schools were notable for the more frequent sale of jelly (*p*=0.005) (Table 3).

In relation to drinks, the canteens of the private schools also distinguished themselves from the public state and municipal schools through the offer of mineral water; coconut water; soy drinks; yogurt, milk and/or smoothies; as well as 100% fruit juice and pulp (*p*<0.05 for all items) (Table 3).

TABLE 2
 Characterisation of the foods and drinks sold in the schools, according to educational sector. Santa Catarina,
 December 2007

Sector	Municipal n* (%)	State n* (%)	Private n* (%)	Total n* (%)	p Value
Foods					
Salted nuts	7 (21.9)	15 (23.1)	20 (35.1)	42 (27.3)	0.246
Cereal bars	9 (28.1)	15 (23.1)	39 (67.2)	63 (40.6)	<0.001
Plain crackers/biscuits	20 (62.5)	37 (56.9)	38 (65.5)	95 (61.3)	0.613
Filled cookies	9 (28.1)	31 (47.7)	24 (41.4)	64 (41.3)	0.184
Cakes and gateaux	15 (46.9)	35 (53.8)	51 (87.9)	101 (65.2)	<0.001
Hot dog	11 (34.4)	40 (61.5)	37 (63.8)	88 (56.8)	0.016
Fruits	-	2 (3.1)	24 (42.1)	26 (16.9)	-‡
Hamburger	9 (28.1)	6 (9.2)	20 (34.5)	35 (22.6)	0.003
Cheese bread	8 (25.0)	12 (18.5)	52 (89.7)	72 (46.5)	<0.001
Industrialised sweet popcorn	4 (12.5)	17 (26.6)	7 (12.1)	28 (18.2)	0.075
Pizza	23 (71.9)	44 (67.7)	46 (79.3)	113 (72.9)	0.347
Baked doughnuts	9 (28.1)	5 (7.7)	3 (5.1)	17 (10.9)	-‡
Fruit salad	1 (3.1)	4 (6.3)	28 (48.3)	33 (21.4)	<0.001
Packaged snacks (chips)	7 (21.9)	23 (35.9)	11 (19.0)	41 (26.6)	0.084
Puff pastry savouries (e.g.: croissants)	11 (34.4)	13 (20.6)	33 (56.9)	57 (37.3)	<0.001
Fried snacks	-	3 (4.8)	6 (10.5)	9 (5.9)	-‡
Baked goods	23 (71.9)	53 (81.5)	54 (93.1)	130 (83.9)	0.026
Wholegrain sandwich	2 (6.3)	3 (4.6)	22 (37.9)	27 (17.4)	<0.001
Sandwiches/toasted sandwiches	6 (18.8)	21 (32.3)	46 (79.3)	73 (47.1)	<0.001
Sachets (ketchup, mustard, mayonnaise)	1 (3.1)	7 (10.8)	18 (31.0)	26 (16.8)	0.001
Sweets					
Sweetened nuts	2 (6.5)	11 (16.9)	17 (29.3)	30 (19.5)	0.027
Hard candies, lollipops and chewing gum	5 (16.1)	20 (31.3)	14 (24.1)	39 (25.5)	0.272
Chocolates	8 (25.8)	39 (60.0)	31 (53.4)	78 (50.6)	0.006
Desserts (e.g.: puddings, mousses)	13 (41.9)	30 (48.4)	29 (50.9)	72 (48.0)	0.723
Ice cream, ice pops or ice lollies	14 (43.8)	22 (33.8)	19 (32.8)	55 (35.5)	0.544
Jelly	9 (29.0)	4 (6.2)	21 (36.8)	34 (22.2)	<0.001
Drinks					
Mineral water	15 (46.9)	34 (52.3)	46 (79.3)	95 (61.3)	0.002
Coconut water (fresh and UHT)	2 (6.3)	6 (9.5)	32 (55.2)	40 (26.1)	<0.001
Milk chocolate	24 (77.4)	41 (64.1)	52 (89.7)	117 (76.5)	0.004
Soy drinks	2 (6.3)	1 (1.6)	21 (36.2)	24 (15.7)	<0.001
Coffee	-	4 (6.3)	13 (22.4)	17 (11.0)	-‡
Yogurt, milk and/or smoothies	2 (6.3)	5 (7.8)	32 (55.2)	39 (25.3)	<0.001
Isotonic drinks (e.g.: Gatorade or similar)	2 (6.3)	1 (1.6)	14 (24.1)	17 (11.0)	-‡
Mate or iced tea or natural guaraná	11 (34.4)	12 (18.8)	29 (50.0)	52 (33.8)	0.001
Soft drinks	2 (6.3)	6 (9.4)	8 (13.8)	16 (10.4)	-‡
Juices (squash, powdered juice)	22 (68.8)	39 (60.0)	41 (73.2)	102 (66.7)	0.295
100% fruit juice	1 (3.1)	10 (15.4)	25 (43.9)	36 (23.4)	<0.001
Processed fruit juices (bottle/carton/can)	7 (21.9)	16 (25.4)	35 (60.3)	58 (37.9)	<0.001

*n= number of schools selling the sweets and/or drinks

‡= p value could not be calculated, since the number of schools that sold these items was small, reducing the reliability of the statistical test

p= Pearson's chi-squared test

TABLE 3

Foods and drinks that presented a significant difference among the educational sectors. Santa Catarina, December 2007

Sector	Private x State <i>OR</i> (95%CI) <i>p</i> Value	Private x Municipal <i>OR</i> (95%CI) <i>p</i> Value	State x Municipal <i>OR</i> (95%CI) <i>p</i> Value
Food			
Cereal bars	6.84 (3.08-15.16) <0.001	5.24 (2.03-13.50) 0.001	0.76 (0.29-2.00) 0.589
Cakes and gateaux	6.24 (2.46-15.80) <0.001	8.25 (2.88-23.63) <0.001	1.32 (0.56-3.08) 0.519
Hot dog	1.10 (0.52-2.29) 0.796	3.36 (1.36-8.31) 0.009	3.05 (1.26-7.39) 0.013
Hamburger	5.17 (1.90-14.05) 0.001	1.34 (0.52-3.44) 0.537	0.26 (0.08-0.81) 0.020
Cheese bread	38.27 (13.36-109.60) <0.001	26.00 (8.12-83.25) <0.001	0.67 (0.24-1.87) 0.456
Fruit salad	14.00 (4.49-43.58) <0.001	28.93 (3.69-226.29) 0.001	2.06 (0.22-19.29) 0.524
Puff pastry savouries (e.g.: croissants)	5.07 (2.27-11.31) <0.001	2.52 (1.02-6.17) 0.043	0.49 (0.19-1.28) 0.149
Baked goods	3.05 (0.92-10.08) 0.066	5.28 (1.47-18.90) 0.011	1.72 (0.64-4.66) 0.280
Wholegrain sandwich	12.63 (3.53-45.16) <0.001	9.16 (1.99-42.18) 0.004	0.72 (0.11-4.57) 0.733
Sandwiches/toasted sandwiches	8.03 (3.53-18.25) <0.001	16.61 (5.57-49.48) <0.001	2.06 (0.73-5.78) 0.166
Sachets (ketchup, mustard, mayonnaise)	3.72 (1.42-9.75) 0.007	13.95 (1.76-110.28) 0.012	3.74 (0.44-31.80) 0.227
Sweets			
Sweetened nuts	2.03 (0.86-4.81) 0.105	6.01 (1.28-28.05) 0.022	2.95 (0.61-14.23) 0.177
Chocolates	0.76 (0.37-1.56) 0.464	3.30 (1.26-8.58) 0.014	4.31 (1.67-11.09) 0.002
Jelly	8.89 (2.82-27.97) <0.001	1.42 (0.55-3.66) 0.461	0.16 (0.04-0.57) 0.005
Drinks			
Mineral water	3.49 (1.57-7.78) 0.002	4.34 (1.69-11.13) 0.002	1.24 (0.53-2.90) 0.615
Coconut water (fresh and UHT)	11.69 (4.35-31.39) <0.001	18.46 (4.03-84.58) <0.001	1.57 (0.30-8.30) 0.590
Milk chocolate	4.86 (1.81-13.04) 0.002	2.52 (0.76-8.33) 0.128	0.52 (0.19-1.39) 0.193
Soy drinks	35.18 (4.54-272.52) 0.001	8.51 (1.84-39.24) 0.006	0.24 (0.02-2.77) 0.254
Yogurt, milk and/or smoothies	14.52 (5.08-41.47) <0.001	18.46 (4.03-84.58) <0.001	1.27 (0.23-6.94) 0.782
Mate or iced tea or fresh guaraná	4.33 (1.92-9.75) <0.001	1.90 (0.78-4.66) 0.156	0.44 (0.16-1.15) 0.095
100% fruit juice	4.29 (1.83-10.08) 0.001	24.21 (3.09-189.81) 0.002	5.63 (0.68-46.13) 0.107
Processed fruit juices (bottle/carton/can)	4.47 (2.06-9.69) <0.001	5.43 (2.02-14.62) 0.001	1.21 (0.44-3.34) 0.705

p= Pearson's chi-squared test*OR*= Odds Ratio

Examination of compliance with State Law 12.061 in the school canteens based on Item Response Theory (IRT)

Two school canteens were excluded from the IRT analysis for not responding to at least six of the seven items of interest. Consequently, 154 canteens were analysed.

In Table 4 the canteens are distributed according to the classes of compliance with Law n° 12.061/2001 (8), constructed based on IRT. It can be seen that no canteen was found to be in Class 1 of IRT, meaning that all of the canteens analysed were above level 20 on the scale constructed; in other words, none of the canteens sold fried snacks.

Among the canteens, it was found that 9.1% (n=14) were in Class 2, that is, they were at level 20 on the scale. These canteens complied with the Law only with regard to the sale of fried snacks. Class 3 (level 40 on the scale) can be seen to contain 22.7% of the canteens (n=35). It should be recalled that these establishments, besides fried snacks, also did not sell soft drinks and industrialised popcorn (Table 4).

TABLE 4

Distribution of school canteens as regards the level of compliance with State Law 12.061/2001, using Item response theory (IRT)*. Santa Catarina, December 2007

Sector	Municipal	State	Private	Total
Class of compliance	n‡ (%)	n‡ (%)	n‡ (%)	n‡ (%)
Class 1	0	0	0	0
Class 2	3 (9.4)	7 (10.9)	4 (6.9)	14 (9.1)
Class 3	4 (12.5)	22 (34.4)	9 (15.5)	35 (22.7)
Class 4	25 (78.1)	35 (54.7)	45 (77.6)	105 (68.2)
Class 5	0	0	0	0
Class 6	0	0	0	0
Total	32 (100.0)	64 (100.0)	58 (100.0)	154 (100.0)

* class 1 represents the lowest level of compliance with the Law and class 6 the highest

‡ n= number of canteens in the classes, by educational sector and in total

The majority of the canteens (n=105; 68.2%) were found to be in Class 4 (level 50 on the scale), meaning that they complied with the Law in relation to not selling the previous items, besides hard candies, lollipops and chewing gum, and packaged snacks (Table 4).

In order to comply with the Law on the previous items, as well as on the items referring to juices and the daily availability of two fruits, canteens should present a level of compliance of at least 70 (Class 5: in addition to not selling the previous items they also should not sell juices), and level 80 (Class 6: besides not selling the previous items and juices, they should provide fruits on a daily basis). It is notable that no

establishment reached these levels of compliance with the Law (Table 4).

The mean value of compliance with the Law was not significantly different among the sectors (municipal: 51.05; state: 48.26 and private: 51.30) (ANOVA=0.059).

Involvement of the school management and of those responsible for the canteens in promoting a healthy school snack

Table 5 shows some of the actions carried out to promote healthy school snacks. The response rate for the following questions was = 95.0%, with the frequencies relative to the data also given.

The majority of those responsible for the canteens (n=119; 81.5%) reported that the school management suggested or limited some of the products sold, with a difference existing between sectors ($p=0.037$). In the private school sector management was 3.22 (95%CI=1.16-8.92; $p=0.024$) times more likely to do this compared to the state sector (Table 5). The majority of those interviewed referred to items prohibited under Law n° 12.061/2001 (8) (n=203; 77.8%) as foods and/or drinks limited or prohibited by the management. Chocolates and sweets in general appeared next (n=30; 11.5%).

Among those responsible for the canteens, 15.8% (n=24) reported that the school carried out nutritional education activities in the canteen and 28.7% (n=43) stated that they had developed some kind of activity with the school to promote healthy snacks, with no significant difference among the different sectors ($p=0.105$) (Table 5). Moreover, 14.7% (n=22) of those responsible reported promoting the canteen with educational materials about healthy eating (Table 5), and the presence of a notice board on diet having been observed next to the canteen in 7.1% (n=11) of the establishments.

The majority of those responsible for the canteens considered their establishment “healthy” (n=95; 60.9%), followed by the option “canteen in the process of becoming healthy” (n=47; 30.1%), with no significant difference existing between the judgement of the respondents from the different sectors ($p=0.194$).

In relation to the difficulties that those responsible for the canteens encountered in implementing a healthy canteen, the following distribution was observed: financial difficulties (n=53; 34.0%); lack of support from the school community (n=27; 17.3%); low acceptance by the students (n=18; 11.5%); free school meals offered in the public schools (n=15; 9.6%); lack of infrastructure, of time and of staff (n=15; 9.6%); lack of training of those involved in food preparation (n=10; 6.4%) and, less cited, a lack of healthy dietary options (n=6; 3.8%).

TABLE 5
Involvement of the school management and of those responsible for the canteen in the promotion of healthy school snacks, by educational sector. Santa Catarina, December 2007

Actions	Municipal n* (%)	State n* (%)	Private n* (%)	Total n* (%)	p Value
Management suggest/limits some types of products in the canteen	27 (87.1)	43 (71.7) ^a	49 (89.1) ^a	119 (81.5)	<i>p</i> =0.037
The school carries out nutritional education activities in the canteen	1 (3.2)	10 (15.9)	13 (22.4)	24 (15.8)	-‡
The person responsible for the canteen develops some type of activity with the school to promote healthy snacks	13 (41.9)	13 (21.0)	17 (29.8)	43 (28.7)	<i>p</i> =0.105
The person responsible for the canteen promotes the establishment with educational materials about diet	4 (12.9)	8 (12.7)	10 (17.9)	22 (14.7)	-‡

*n= number of people responsible for the canteens who referred to the action as positive

‡the *p* value could not be calculated, since the number of positive responses was small, reducing the reliability of the statistical test

p= Pearson's chi-squared test

^apresented a significant difference. *OR*= 3.22; 95%*CI*= 1.16-8.92; *p*=0.024

DISCUSSION

Positive factors were revealed in relation to the sale of foods in the canteens. For example, it is noteworthy that the greater part of the establishments offered baked savouries goods, which are options recommended for healthy canteens (9,10,16).

Based on the examination of the group of items analysed by IRT, it can be seen that the majority of canteens (68.2%) did not sell fried snacks, soft drinks, industrialised popcorn, hard candies, lollipops and chewing gum, and industrialised packaged snacks. The items that were found to present the greatest difficulty in being aligned with the Law were artificial juices and the daily sale of two seasonal fruits.

While the average level of compliance with the Law was lower in the canteens in state schools, no difference was found in the ANOVA. This result may indicate a marginal effect, which could be significant if the sample and/or the number of items were larger.

Attention should be drawn to the fact that many canteens offered items considered to be of low nutritional value, such as filled biscuits, puff pastry savouries, industrialised sauces and sweets in general. Foods and drinks considered healthy, such as fruits, wholegrain sandwiches, yogurt and 100% fruit juice appeared less often in the canteens of the public schools.

In general, the canteens of the private schools presented a greater variety of items sold. However, the most noteworthy feature of these canteens was not just the sale of foods considered healthy. Items such as puff pastry savouries and industrialised sauces were also more frequently found in these institutions.

The "Ten Steps to the Promotion of a Healthy Diet in Schools" (16), proposed by the Ministry of Health, states that foods considered unhealthy include hard candies; lollipops; chewing gum; biscuits, especially filled; soft drinks; juices or squashes; fried foods; mayonnaise; savouries with sausages and ham/pressed ham; savoury snacks in packets; industrialised popcorn and others with the profile described above. It can be seen that the foods prohibited by Law n° 12.061/2001 (8) corroborate those listed in the "Ten Steps" (16).

The foods sold are not always appropriate for the school students, and can interfere in the consumption of meals provided by the PNAE (17). In addition, the substitution of calories obtained from traditional foods by products of low nutritional value and high caloric content may be contributing to the development of overweight and obesity (18).

Internationally, research has repeatedly shown that state and federal regulation of the foods sold in schools, as well as

the inspection of these remains minimal, showing the need for intervention measures and well-structured local, public school policies (19,20).

A systematic review of school food policies reported that there was very little evidence and a lack of consistent findings for the effectiveness of regulating food and beverage availability, as well as little evaluation of their impact on body mass index (BMI). Since schools have been proposed worldwide as a major setting for tackling childhood obesity, it is vital that future policy evaluations measure the long term effectiveness of school food policies in tackling both dietary intake and overweight and obesity. Few school food policies on a national or large scale have been introduced and assessed around the world, and all feature studies performed in the United States and Europe (21).

A study in the United States with 1088 school students showed that in schools which have strategies related to healthy school diets, the students reported buying snacks on average 0.5 days/week, *versus* 0.9 days/week in institutions without these actions ($p < 0.001$) (22). A study of school canteens in 200 institutions in New Zealand highlighted the fact that 16.5% of schools had strategies for the promotion of healthy school eating. The foods most frequently found in canteens were gateaux (79.0%) and sausage rolls (54.5%) (23). In Australia, research on canteens found that special days with the offer of a greater variety of foods, special offers and marketing were successful strategies for driving sales, while the sale of fruits and salads were unsuccessful strategies (24).

It is vital to recall that the educational role of the school and other members of the school community places this institution in a position of fundamental relevance in terms of dealing with the construction and consolidation of healthy eating practices (2,25). The WHO considers the due care of nutrition in schools to be an effective investment for future generations (25), and that school canteen owners should be made aware of this context (6).

According to the Ministry of Health, the support of those responsible for canteens is fundamental, as the training of such staff can constitute a strategy that will guarantee the economic viability of these establishments and the possibility of them being transforming into spaces for the promotion of health (6). In this study, it was found that a small number of those responsible for canteens developed educational activities to promote healthy eating habits.

The notice board on diet was present in only 7.1% of the establishments, despite this being required under Law n° 12.061/2001 (8). On the other hand, according to the IRT assessment, schools with a lower level of compliance with the Law were precisely those which had a notice board. Such a finding should lead to a reflection on the real aim of this, which goes beyond the mere legal requirement of displaying the notice board near the canteen. It can be seen that there is a need for training and

raised awareness in those involved in the canteen, so that this educational instrument can actually become an ally in the process of promoting healthy eating in schools.

The project “The School Promoting Healthy Dietary Habits”, by the UNB, includes training for owners of school canteens. In the results for the assessment of the implantation of a healthy canteen, the authors observed more positive behaviour on the part of the proprietor only in aspects directly related to the canteen, such as the promotion of/special offers on healthy snacks, indicating that the owners need external support in order to implement and sustain the proposal (11).

While the training of educators and owners of canteens is necessary (11,26), the development of other strategies that guarantee the sustainability of a healthy school environment is also essential (27). In 2007 the Ministry of Health released an official document that detailed the Brazilian experience of healthy eating regulations in the school environment (6). While the initiatives and legislative measures in the state and municipal sectors are laudable, it is necessary to approach this question on the national stage. Interministerial Decree n° 1.010, dated 8th of May 2006 (28), may be the first step towards the development of actions in this sense.

It is important to emphasise the primordial role of nutritionists and health professionals in the encouragement and implementation of measures to promote healthy diets in schools, providing subsidies for school food policies. Moreover, the inspection of these establishments is necessary, together with educational actions and strategies to improve the dietary habits of those within the school environment.

This study did not investigate the foods sold by street vendors close to schools, nor other forms of informal commerce. It is important to determine if these items comply with Law, since students, even during school hours, can have access to inappropriate foods through this route.

CONCLUSIONS

The application of IRT in this study proved to be particularly interesting. The intention was, firstly, to guide and publicise the production of this kind of indicator in the field of assessment of public policies and other intervention measures. The execution of this methodology opens the way for other studies to be carried out, with different actions, in different locations, in order to obtain a standardised measure for similar macroassessments. Ideally the IRT would be reapplied, with a greater number of items, enabling a better use of the information given and, consequently, greater precision in the estimates of the indexes calculated.

Although the greater part of the canteens did not sell the majority of items prohibited under the state legislation of Santa Catarina, many establishments still offered items considered to be of low nutritional value.

The Law under investigation here is recognised as a strategy to improve the food provided in schools, with the objective of helping schools to develop healthy eating habits and prevent CNTDs. On the other hand, it is acknowledged that the problem of school-age obesity will not be resolved by merely prohibiting caloric foods in schools or by restricting their advertising. The combined action of parents, teachers, health professionals, owners of school canteens, legislators and advertising agencies, among others, is necessary to promote environments and strategies that enable healthy eating habits and that also encourage the practice of physical exercise among students.

Finally, this work underlines the need for further investigation on the theme of diet in schools, considering the scarcity of studies identified in the literature investigated.

COLLABORATORS

C.G. Gabriel, F.A.G Vasconcelos, D.F. Andrade and B.A.S. Schmitz participated in the development of the research. C.G. Gabriel was responsible for processing and analysing the data, and for preparation of the manuscript. F.A.G. Vasconcelos and D.F. Andrade oversaw the methodological design and revised the manuscript. D.F. Andrade contributed to data analysis. B.A.S. Schmitz participated in discussion and final revision of the paper.

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