



Implementation of a regulatory food policy to reduce availability of energy-dense foods in Costa Rican high schools

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Abstract

Objective: To assess the extent to which mandatory Guidelines to improve the school food environment were being implemented in Costa Rican high schools and to explore the perspectives of key policy actors towards the Guidelines.

Design: Semi-structured interviews and site observations. Interviews were recorded, transcribed verbatim and imported to NVivo 12 for analysis. Inductive and deductive themes were identified, and elements of the RE-AIM framework and the social process framework were used when classifying these themes.

Setting: Sixteen public high schools in San José, Costa Rica.

Participants: High school principal and kiosk concessionaires

Results: Products that did not adhere to the Guidelines were still widely available in schools, and amongst the most prevalent challenges to implementation that emerged from our interviews, were a lack of understanding of the policy content, a lack of monitoring and accountability, and competing values amongst actors which affected their views on the role that the school must have in offering a healthy food environment.

Conclusion: Most products offered in high schools did not meet the criteria required by the mandatory Guidelines, and several contextual factors were found to influence implementation. Strengthening the implementation of the Costa Rican Guidelines will require further actions at the governmental and school levels.

Keywords

School environment
Adolescent health
School food policy
School wellness

Globally and in Latin America, childhood overweight and obesity is a public health concern⁽¹⁾. Adolescence is an important growth and developmental period in which dietary quality has been found to be lower than during other stages such as early childhood or adulthood⁽²⁾. Adolescents' diets in Costa Rica are low fruits and vegetables (~125 g/d), and their intake of added sugars at ~20 % of total energy intake⁽³⁾ is two to four times WHO's recommendations (5 to 10 % of total energy intake)⁽⁴⁾.

Food policies can affect diet, among other mechanisms, by providing an enabling environment for healthy preferences, encouraging the reassessment of unhealthy preferences, and stimulating a food system response⁽⁵⁾. Due to the large amount of time that adolescents spend at school, the availability of healthy foods and beverages in this setting is important for the promotion of health and well-being^(6,7).

The implementation of school food environment policies has been associated with reduced availability of foods that are high in fat, added sugars, Na, and total energy, and increased availability of healthier options^(8,9). Reviews also suggest improvements in dietary intake^(10,11) and weight status⁽¹¹⁾.

The passing of a school food policy at the local or national level, however, does not necessarily mean it will be successfully implemented, and that its intent will be achieved. A growing body of literature has examined the factors that influence implementation, including enablers and barriers to compliance^(12,13). Policy implementation might be hindered by a variety of financial, physical and social factors, whereas adequate funding, positive stakeholders' attitudes and good policy communication have been found to promote better implementation⁽¹³⁾. Despite this

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evidence, research on school food policy implementation in the context of low- and middle-income countries is limited and much needed.

In 2012, the Costa Rican government approved an executive mandatory decree (No36910-MEP-S, hereafter referred to as the 'Guidelines') which was required to be implemented with the start of the school year (February 2012) in all primary and secondary public schools. The intent of the Guidelines was to improve the school food environment and to safeguard students' well-being, by restricting products and preparations which are high in fat, total sugars, and Na, among others. To date, the implementation of this policy has not been evaluated with the exception of a report in 2014 that documented the processes of policy development and initial adoption⁽¹⁴⁾.

Understanding how and why policies aiming to improve the school food environment is successfully implemented once enacted is important to increase the likelihood of achieving the policy aim. The objectives of this study were therefore: (i) to assess the extent to which the Guidelines were being implemented in Costa Rican high schools and (ii) to explore the perspectives of key policy actors towards the Guidelines, including the contextual factors that might influence their implementation.

Methods

Study setting

The education system in Costa Rica is organised into *regional directions* and *circuits*. Each of the 27 regional directions nationwide comprises a number of circuits, and each circuit comprises several public and private, urban and rural schools⁽¹⁵⁾. Elementary schools in Costa Rica include grades 1–6, whereas high schools include grades 7–11 (in some cases, e.g. technical high schools – grade 12 is also required). Most public elementary and high schools offer breakfast and lunch meals to students, with funding from the *Programa Nacional de Alimentación Escolar* (PANEA). This programme is universal in elementary schools, but targets adolescents with economic, nutritional or psychosocial risk that qualify to receive the benefit in high schools⁽¹⁶⁾. Meals are served in a school cafeteria (*comedor*), and although there are differences within schools and regions, these have typically consisted of rice and beans (or an alternative grain and/or legume) with sides including a source of animal protein and fruits or vegetables. Each school has a School Board (*Junta de Educación o Administrativa*), which is the main entity responsible for spending the funds received from PANEA, both for food acquisition and hiring personnel. Schools additionally have a Health and Nutrition Committee, which in coordination with the School Board monitor the policies related to the provision of the school meals.

In addition to the meals provided by PANEA, students can purchase foods inside the school through small food

kiosks (*sodas escolares*). Most commonly, the kiosk offers a variety of snack foods and beverages, although depending on the size of the kiosk and the cooking equipment within, some might also offer hot meals for purchase. These school kiosks are administered by private entities or individuals (hereafter, 'concessionaire') who must compete in an annual public bidding process managed by the School Board. The School Board can allocate the funds collected as rent from the kiosk as they consider most appropriate for the school needs. In the past, school food kiosks were not subject to regulation regarding the nutritional quality of foods and beverages sold to students. As a result of a process that started in 2006⁽¹⁴⁾, in May 2011, the Guidelines were published in *La Gaceta*, the official diary of the government of Costa Rica, for public comments. In January 2012, revised Guidelines were published as an executive mandatory decree, with support from the Ministry of Public Education (MPE) and the Ministry of Health (MH), and the implementation date was defined for February 2012.

As shown in Table 1, the Guidelines comprise several articles which establish, among other dispositions, nutrition criteria that products sold in the kiosk must abide to both for products prepared on site and to pre-packaged products. For pre-packaged products, the criteria specified required specific nutrient cut points per 100 g or ml, which should be verified on the nutrition facts panel (NFP) of products offered.

From the information that is publicly available, schools were for the most part expected to implement the Guidelines without much support provided by MPE and the MH. Some of the key difficulties that were evident in the initial adoption stage of the decree were⁽¹⁴⁾ (1) a lack of information in schools about the Guidelines; (2) a lack of skills to interpret NFP information; (3) a lack of resources to hire professionals to provide technical support in this matter and (4) finally a lack of didactic materials or tools to facilitate interpretation of the Guidelines. Several actions were taken in response, which included uploading the Guidelines to the website of MPE, printing hard copies of the Guidelines and sending to schools, creating an inspection form to be used by the MH and MPE when assessing compliance and creating a digital tool to help assess products NFP, among others⁽¹⁴⁾.

Recruitment and study sample

Sixteen high schools were initially contacted (nine urban and seven rural), all located in the province of San José, Costa Rica. These schools were selected with probability proportional to size⁽³⁾. Because the Guidelines are not mandatory in private schools, only public schools were included. Furthermore, since this project was part of a larger initiative examining adolescent diet⁽³⁾, by design our sample was restricted to high schools, even though the Guidelines apply to both elementary schools and high schools.

**Table 1** Summary of the guidelines*

Section	Description
Chapter I. Overview	
Articles 1–3	Includes the general objective of the guidelines, as well as the definitions of key concepts used throughout the document.
Chapter II. Administration of the school kiosk	
Articles 4–12	Includes administrative details regarding the functioning of the school kiosk including: <ul style="list-style-type: none"> • Process for granting a food kiosk concession • Concessionaire's rights and responsibilities • School Board responsibility • Food and beverage marketing restriction • Appropriate use of funds generated by the school store
Chapter III. Foods offered at the school kiosk	
Article 13	<ul style="list-style-type: none"> • Foods sold must promote and enable healthy eating. • Fruits and vegetables should be offered daily. • All foods should hold the registration with the Ministry of Health.
Article 14	<p>About foods and beverages prepared on site:</p> <ul style="list-style-type: none"> • A maximum of 10 g of sugar, per 250 ml glass of any beverage is allowed. • Deep-fried cooking method is prohibited. • A maximum of two teaspoons (10 g) of oil, mayonnaise, cream cheese, sour cream or ketchup per serving is allowed. • A maximum of one teaspoon (5 g) of margarine or butter per serving is allowed. • Spreading fats should be free of trans fatty acids. • Processed meats used for preparations should contain less than 25 g of fat per 100 g product.
Article 15	<p>The following pre-packaged foods are prohibited:</p> <ul style="list-style-type: none"> • Beverages and snacks (...) in which the first ingredient is sugar or fat (and alternate names for these products). • Beverages (...) that contain more than 15 g of sugar per 250 ml serving. • Carbonated beverages, including those designated as 'light', and energy drinks. • Sausages not designated as 'light' • Foods prepared with lard, oils or margarines that contain trans fatty acids. • Pre-packaged food product (...) containing more than 12 g of fat, 6 g of saturated fat, 20 g of sugar, 400 mg of Na or 1674 kJ (400 kcal) in a portion of 100 g of the product. • Pre-packaged non-dairy beverage product (...) containing more than 2 g of fat, 1 g of saturated fat, 6 g of sugar, 50 mg of Na or more than 251 kJ (60 kcal) in a portion of 100 ml of product. • Pre-packaged dairy beverage product (...) containing more than 2 g of fat, 1.3 g of saturated fat, 6 g of sugar, 70 mg of Na or more than 293 kJ (70 kcal) in a portion of 100 ml of product. • Beverages that do not contain added sugars or non-nutritive sweeteners are excluded.
Article 16–19	<ul style="list-style-type: none"> • Service offered by the school kiosk requires control by the Ministry of Health, as well as by the Ministry of Public Education through the school principal, the Supervisor of Schools, the Health and Nutrition Committee†, and the School Administrative Board. • More details for monitoring and control mechanisms are included.
Chapter IV. Final dispositions	
Articles 20–23	• Chapter includes several transitory articles, which indicate details such as more stringent cut points in 2013 and 2014 for the pre-packaged foods and beverages (Article 15).

*Source: Executive Decree 36 910-MEP-S, latest version 2 July 2013⁽⁵³⁾

†Integrated at least by a teacher designated by the school principal, a member of the Parents Association, a member of the Student Government, and a community member.

Each high school was first sent a letter addressed to the school principal explaining that they had been selected to participate in the study. To avoid reactivity bias during data collection, the Guidelines were not mentioned when describing the objective of the study. A week after sending the letter, we contacted schools by telephone to schedule interviews with school principal and kiosk concessionaire, who were considered important policy actors, due to their role in the implementation of the Guidelines. Of the sixteen schools initially contacted, twelve agreed to participate. The remaining four schools cited either having no time or interest in participating in the study (see online Supplemental Table 1). School principals and kiosk concessionaires did not receive any incentives for their participation in the study.

Instrument development

Two semi-structured interview guides, one for each type of actor (principal and concessionaire), were developed based on previous literature^(17,18), the study's objectives, and elements of the RE-AIM^(19,20) and social process⁽²¹⁾ frameworks. Supplemental Tables 2 and 3 display the interview guide for school principals and kiosk concessionaires, respectively. Both guides were comprised of main questions and probes, the first eliciting opinions about students' health and the role of the school in relation to students' health, and later about food availability, changes in recent years (if any), and reasons for these changes at the school level. To gauge the awareness of participants regarding the existence of the Guidelines, these were not mentioned at the beginning of the interview. Later, questions focused



more on the Guidelines themselves, including knowledge about them, perceived reactions from different actors and perceived level of implementation, among others.

In addition to interview guides, a checklist was developed to assess the availability of foods and beverages prepared in the kiosk, e.g. *frescos* (traditional beverage made by blending fruits, sugar and water), pastries and sandwiches. The items included in this checklist were based on previous research conducted in Costa Rican school kiosks^(22,23). At the end of the checklist, we asked ten close-ended questions to concessionaires about topics covered in the Guidelines, including amounts and types of fats used when preparing foods, presence of food advertising, and availability of drinking tap water for students, among others. Instruments were pilot tested in two schools that were not part of our sample, and minor changes were made to improve the clarity of questions and flow of the visit.

Data collection

The first author visited all high schools to conduct site observations and interviews. The school visit included (i) the interview with the school principal, (ii) the interview with the school kiosk concessionaire and (iii) the site observation. Interviews were audio-recorded, and each took 40–60 min to complete. The duration of the site observation varied depending on the number of products available, between 30 and 90 min. For the observation, the checklist was used to assess the foods and beverages available to students prepared on-site, whereas for packaged foods, the observation involved taking photographs of the front-of-package label of all items available on the day of the visit. The photographs enabled us to document details of products, such as brands and flavours, which might vary in their nutrition content.

A total of 23 people participated, 12 principals and 11 school kiosk concessionaires. One concessionaire declined participation. Data collection took place from August 2015 to June 2016. The study protocol was reviewed and approved by the Bioethics Committee of the University of Costa Rica, and all participants signed an informed consent prior to being interviewed.

Data analysis

For the site observation, information from all photographed packaged foods was entered into a spreadsheet that contained product name, brand and flavour. If a product was offered in more than one size, it was only recorded once since nutrition profile per 100 g or 100 ml does not differ by product package sizes. The nutrition information of products was retrieved from an online database that stores NFP data of packaged foods (<http://www.infonutcr.com/>). When a product was not available in this database, the information was searched online on the food company's website. Using this information, we then classified each product as

adhering or not adhering to the Guidelines. An adhering product met thresholds for nutrients of concern (energy, fat, saturated fat, sugar and Na) and did not list sugar or fat as the first ingredient in the list reported on label (which is also stipulated in the Guidelines). Information from foods prepared on-site (i.e. the checklist) was also entered into the spread sheet. Since Guidelines are specific and different for packaged *v.* non-packaged products, we assessed and report on the availability of these separately.

All interviews were transcribed verbatim ($n = 23$) in Spanish. A subset comprising a third of the schools ($n = 8$, from 4 schools) of these was first analysed using line-by-line open coding to assess emergent themes⁽²⁴⁾ by two independent analysts, one of which had conducted all interviews. This first subset that was analysed was selected attempting to capture breadth in content and diversity in themes. Both analysts were native Spanish speakers, proficient in English and with experience in qualitative research methods. Based on these emergent inductive themes, as well as deductive themes that were added from the interview guide, a preliminary codebook was developed, and themes were grouped into categories and sub-categories providing insight into the study's main study objectives. The sample size was sufficiently large to reach data saturation.

When grouping themes into categories, elements of the RE-AIM^(20,25) and the social process frameworks⁽²¹⁾ were used (Table 2). The RE-AIM framework includes five dimensions which are important to consider when evaluating public health initiatives: reach, effectiveness, adoption, implementation and maintenance⁽¹⁹⁾. Given the qualitative nature of this study, the latter three of these dimensions were of interest during analysis. The social process framework recognises the importance of values – things and events in life for which people desire and aim. Power, enlightenment, wealth, wellbeing, skill, affection, respect and rectitude are the core values per this framework⁽²¹⁾. In that sense, understanding how these values are present when people work towards achieving their goals can shed light on reasons underlying their motivation and commitment towards a specific policy. The use of these frameworks was helpful both in the development of the interview guides and during the identification and coding of themes from the interviews.

Following the identification of these themes, the rest of the interviews were coded, four schools ($n = 8$) by one analyst and four schools ($n = 7$) by the other analyst. A summary matrix was created for each school by the analyst coding the interview to enable discussion on findings and comparisons between schools and actors. Data were stored and organised for analyses using QSR NVivo 12 (QSR International, Melbourne, Australia). Quotes were translated into English after completing the data analysis.

Results

Principals were 32 to 60 years of age, and concessionaires were from 22 to 72 years of age (Table 3). Education level

Table 2 Key concepts and definitions from the RE-AIM and social process frameworks

Concept	Definition	Framework	Sample theme from interviews
Adoption	Organisations, institutions or governing bodies that pass or decide to implement a policy and includes the allocation of resources for enforcement, if applicable ⁽¹⁹⁾ .	RE-AIM	Difficulty in understanding the Guidelines Changes in response to Guidelines
Implementation	Applying the policy as planned, adequately enforcing it, and ensuring ongoing and consistent compliance with the core components of the policy ⁽¹⁹⁾ .	RE-AIM	Monitoring and accountability Outside vendors Kiosk profitability
Maintenance	Long-term assessment of policy reinvention and variations in policy interpretation and impact. Evaluated at two levels: the target population reached and the organisations or legislative bodies that enacted or adopted the policy ⁽¹⁹⁾ .	RE-AIM	Monitoring and accountability Role of home
Values	Medium of exchange in human interactions. A desired object or situation – things and events in life that people desire and aim for ⁽²¹⁾ .	Social process	Kiosk profitability – value of wealth Students purchasing capacity – value of well-being

Table 3 Sociodemographic characteristics of study participants

Study participants	Principals (n 12)	Concessionaires (n 11)
Sex		
Male	8	4
Female	4	7
Age		
20–29	0	1
30–39	2	4
40–49	5	1
50–59	4	4
60 or more	1	1
Education level		
Less than high school	–	4
High school complete	–	2
More than high school	12	2
Number of students in school		
<500	2	
500–999	3	
1000 or more	7	

was lower for school concessionaires compared to principals. Enrolment in high schools ranged from 222 to 1800 students. Four principals and four concessionaires had been at the visited high school for the period of time since the Guidelines came into effect.

What were school food kiosks selling?

A total of 587 unique *packaged items* were offered in the schools; availability per school ranged from 20 to 155 products. Candy/chocolates, savoury snacks, sweet snacks and sweetened non-dairy drinks were the most common items (22.3 %, 21.1 %, 16.0 % and 14.0 %, respectively), available in all schools. We could not determine adherence to the Guidelines of 47.5 % of these products (*n* 279), either because they were not available in the dataset from which NFP information was retrieved or because they lacked the NFP altogether, given that reporting this information is not mandatory in Costa Rica for all food products. The majority of the products for which adherence was not possible to determine were from food categories that are high in sugar,

fats or sugar: candy/chocolates (32.3 %), salty snacks (22.6 %), frozen treats (20.8 %) and sweet snacks (9.7 %).

Of the 308 items that were assessed, 76.6 % did not meet the nutrition criteria required by the Guidelines. The lowest adherence was with the energy, sugar and fat recommendations, for which 54.2 %, 49.4 % and 47.7 % of products did not meet the Guidelines, respectively. None of the sweet and savoury snacks, breakfast cereals, or chocolates available met the Guidelines because they exceeded one or more of the thresholds for the nutrients of concern included in the regulation (Table 4).

Regarding *non-packaged products* (i.e. prepared at the kiosk), natural fruit-based drinks (i.e. *frescos naturales*) and coffee were the most commonly available beverages. Kiosk concessionaires reported not being able to determine the amount of sugar added to prepared drinks. All schools reported having access to drinking water (from tap) for student's consumption. Every school offered some on-site prepared food; hamburgers, sandwiches and fruits were the most common (Table 5). Most school kiosks reported following the Guidelines regarding food preparation. The majority did not sell deep-fried preparations (*n* 8), abided by the amount of added fat per portion permitted (*n* 9), used oils free of trans-fat for cooking (*n* 8), or used spreads and dressings free of trans-fat (*n* 7). Only two schools reported adhering to the processed meat Guideline, while half exclusively used products with a nutrition fact label. Of ten schools, eight reported following the food marketing Guidelines, which prohibits any type of food marketing inside the school property (Table 6).

Perspectives of policy actors

Changes in response to the Guidelines

In five of the twelve schools at least one of the interviewees had experienced the period when the Guidelines came into effect (February 2012) at the school that was visited, either in the role of school principal or kiosk concessionaire. Actors became aware of the regulations mainly via the publication of the decree in the national newspaper (*La Gaceta*),

Table 4 Availability of packaged foods sold in school kiosks, according to the guidelines

Food product	No. schools*	Products sold†		Adherence		Non-adherence		Adherence criteria that product does not meet‡					
		n	%	n	%	n	%	High in energy	High in fat	High in saturated fat	High in sugar	High in Na	First ingredient
Total	11	308	100	72	23.4	236 (76.6)	76.6	167	147	121	152	66	35
Beverages													
Non-dairy drink	11	58	18.8	29	50.0	29	50.0	1	0	1	29	0	0
Dairy drink	9	30	9.7	11	36.7	19	63.3	12	9	4	12	1	0
Bottled water	7	4	1.3	4	100	0	0	0	0	0	0	0	0
Carbonated drinks§	2	2	0.6	0	0	2	100	0	0	0	1	0	0
Foods													
Candy	11	16	5.2	6	37.5	10	62.5	3	0	0	9	0	7
Sweet snack	11	67	21.8	0	0	67	100	54	51	47	58	10	13
Savoury snack	11	61	19.8	0	0	61	100	59	57	42	2	51	1
Frozen treats	10	20	6.5	17	85.0	3	15.0	0	3	3	1	0	0
Cereal bar	8	14	4.5	5	35.7	9	64.3	3	3	2	7	0	0
Chocolate	8	25	8.1	0	0	25	100	25	23	22	22	0	14
Breakfast cereal	7	11	3.6	0	0	11	100	10	1	0	11	4	0

*Number of schools offering each type of product.

†Only the products with enough information to be classified according to the Guidelines at the time of the analysis.

‡Number of products in each category not adhering to different criteria of the Guidelines.

§All carbonated beverages, regardless of their nutritional composition, are prohibited.

Table 5 Availability of non-packaged products sold

Product	Schools (n 10)*
Beverages	
Natural fruit-based 'fresco'	8
Coffee	8
Artificially flavoured, with sugar (Tang®, Zuko®)	6
Tea	6
Concentrate fruit-based 'fresco'	2
Foods	
Sandwiches	9
Hamburgers	8
Fruit, whole or cut	8
Vegetable-based salads	7
Burritos	6
Savoury baked goods	6
Fruit salads	6
Empanadas	4
Hotdogs	4
Tortillas	4
Frozen treats	3
Gelatin dessert	2
Nachos, tacos or quesadillas	2
Pizza	2
Preparations with fruit (other than salad)	2
Preparations with vegetables (other than salads)	2
Rice, beans and egg	2
Baked goods, sweet	1

*Two schools declined participation in Kiosk visit.

as well as through media coverage in the press, letters sent to the school by the Ministry of Education and formal announcements during regional principal meetings.

When referring to changes that were implemented following the issuance of the Guidelines, all five schools mentioned stopping the sales of carbonated drinks – in one school they had already banned them prior to the Guidelines – and four out of five schools additionally mentioned banning the sales of deep-fried foods, such as *empanadas* (deep-fried corn dough turnover filled with meat, chopped potato, mashed beans or cheese), French fries and fried chicken. As expressed by some:

'Ever since the Guidelines they've had to adjust to no sugar (...) drinks used to have more sugar, now they don't. Now chewing gum is not sold, candies nor chocolates are sold, there are a bunch of things that cannot be sold' (Principal 01).

'Soft drinks were a huge change. It has always been one of the largest selling items (...) Coca Cola sales came down' (Concessionaire 06)

Other changes that were mentioned to a lesser extent were decreasing the amount of sugar in drinks they prepared on site, using less sauces (i.e. ketchup and mayonnaise) in sandwiches and preparations, replacing fried packaged chips and snacks with baked ones, and preparing more foods on site instead of selling packaged products. One school mentioned making changes to the advertising displayed in the kiosk following the Guidelines: 'We got rid

**Table 6** Level of adherence to the Guidelines criteria for non-packaged products

Criteria*	Schools (n 10)			
	Always adheres	Sometimes adheres	Never adheres	Cannot determine
Sugar per 250 ml beverage not exceeding 10 g	1	0	0	9
Deep-fried cooking method is prohibited	8	2	0	0
Amount of added fat per portion served (oil, mayonnaise, cream cheese, sour cream or sauces)	9	1	0	0
Amount of added butter or margarine	9	1	0	0
Use only trans fatty acid free oils	8	0	2	0
Use only trans fatty acid free spread fats or dressings	7	1	2	0
Only use low-fat processed meat	2	4	1	3
All pre-packaged products used must have a nutrition facts panel label	5	3	2	0
Presence of food advertising†	8	2	0	0
Access to drinking water (from tap) for student's consumption	10	0	0	0

*Adherence level referred by each kiosk concessionaire during observation visit, via ten close-ended questions.

†This criterion was assessed by observing kiosk building and surroundings.

of all the Coke posters and replaced them with fruits and vegetables' (Principal 03).

Kiosk profitability

Both principals and concessionaires perceived the kiosk as a business that is intended to be profitable. Even though in more than half the schools (seven of twelve) participants were not directly involved in the initial adoption of the Guidelines, in all except for one school, participants considered that adhering to the Guidelines implied a reduction in kiosk profitability. This was due to the decrease in revenue of sales from popular products such as carbonated drinks, iced tea and other sweetened beverages, packaged snacks and cookies, chocolates and deep-fried foods such as French fries and *empanadas*. One school principal said 'sales collapsed' and as a result, they had to reduce the amount that the concessionaire paid in rent to the school (Principal 06), two additional school principals also mentioned having to decrease the cost of rent for the kiosk concessionaire. Others explained

'We have to be realistic, they'd go bankrupt if they only sell fruits and vegetables. (...) with the change it was not going to be enough for electricity, water, employees (...) All the kiosks at the national level deal with supply and demand, that is the problem we have' (Principal 04)

'We have to be honest, it is not to our best interest economically to subject yourself to the restrictions [of the Guidelines], because the business will not produce enough for the expenses. One has to go a little out of it to cover expenses' (Concessionaire 08)

'If they take away more of the products I sell, having a kiosk would become non-profitable' (Concessionaire 11)

A few concessionaires explained their concern of low profitability, including 'It's not business', in reference to new

sandwiches and smoothies she made in compliance with the Guidelines which were not well received (Concessionaire 02), 'it's unfair for me as a worker', who considered that she should be able to sell a little bit more (Concessionaire 10) and 'If I have a business, call it a "pulperia" [small food store typical in Costa Rica], a kiosk, or a hardware store, I want to have it full of everything people want, and whatever people want that I do not have, I would find a way to have it' (Concessionaire 06).

In two of the schools, the concessionaire had resigned given the new regulations and the implications for profit.

Whether there was a loss of profitability, however, also depended on whether the Guidelines were enforced at the school. One concessionaire, for example, mentioned that her grandmother, a concessionaire at a different school, had lost business after the enactment of the Guidelines, but this was not a problem for her, as she had 'permission from the principal to sell [any type of food]' (Concessionaire 04). Some referred to strategies to mitigate loss of revenue or lessons learned with time. For example, one concessionaire reflected on the relative benefit of selling packaged products *v.* preparing her own food to sell:

'We are talking of a utility margin of 14 colones [national currency] per package (...) take rent out, electricity, water, employees, income tax (...) you realize that you ended up working for them [for the food industry company] (...) with prepared foods the utility margin is higher' (Concessionaire 05).

Given that some schools used the kiosk's rental income to complement the funding of the government-subsidised school meal programme, the perception of reduced profitability could result in compromised motivation for both the kiosk concessionaire and the principal to implement the Guidelines.

'The resources for the school meals come from two sources: PANEA's budget and the school kiosk rent (...) if something is lacking we have to cover it from



our own budget or sometimes organize Bingos [popular fundraising activity in Costa Rica] (Principal 06)

'(...) the School Board doesn't have enough to pay another cook [for the school meal program] (...) if I wanted to provide lunch for 600 students, I have to pay another cook (...) the subsidy we receive from the Ministry of Education is only enough for one' (Principal 01)

One school principal explained the economic trade-offs between having a kiosk that sold more per month *v.* one that sold less: the more a kiosk sells per month, the more it is willing to pay in rent, benefiting therefore the School Board and the school itself:

'It's not the same to have a kiosk that sells one million colones per month, than one that sells 3 million. The school board could award the kiosk for one million if it will sell 3 million, but if it only sells 500 000, it can award it at the most for 100 000 or such' (Principal 10)

This trade-off was also expressed by concessionaires; one said that *'it's good for the high school to have a kiosk, because rent is paid, and its money that is used for infrastructure or whatever'* (Concessionaire 06).

Outside vendors

Overwhelmingly, both school principals and concessionaires referred to the limitation of not being able to influence food choices outside of schools, as students could purchase unhealthy foods from nearby informal street vendors, small food stores (*pulperías*) and restaurants before, after and sometimes even during schooltime. This limitation influenced their motivation and commitment to implement the Guidelines – if students were able to purchase and bring unhealthy foods to schools, the Guidelines' purpose of restricting consumption of unhealthy foods at school was not met. Participants described this situation:

'Sometimes they [students] will request permission to go to the pulpería, and all the little packages, they will bring them in' (Principal 07)

'But if I am a student, and I like eating sweets and I cannot get them at the kiosk anymore, its better if I buy them outside because there is no restriction there [reflecting on how students think]' (Principal 10)

'I used to sell pizza, and then I stopped (...), but the kids, for example, get organized and order a pizza and soda, and all that' (Concessionaire 08)

'You see them [the students] sometimes, with a Coke in their hands, but they brought it in their backpacks' (Concessionaire 12)

Role of home

More than half of the interviewed principals and concessionaires highlighted the role of parents as main responsible for

promoting the adoption and practice of healthy eating habits in youth. When parents are unable or unwilling to establish these habits at home, schools are incapable of instilling them on their own. Schools can only play a supporting role in the promotion of healthy eating by providing education and offering a healthy food environment to students.

'It's complicated and I understand the policy when Garnier [the Minister of Education at the time] was there, and the regulations, and the kids' diet, and their health (...) but it has to go further, to the family, its more cultural, from home (...)' (Principal 12)

'The Minister makes its rules with the school kiosks, but the battle itself is more so educational, the habits that come from home are essential (...) both adults have to speak the same language, parents and teachers, the institution.' (Principal 04)

'[The school] can try to educate kids in their studies, rules, and habits, but the kid has bad habits from home. They are thinking Coca Cola because at home they give them lunch with Coca Cola, dinner with Coca Cola (...)' (Concessionaire 06)

'Teaching kids how to eat is not at elementary school or high school, we can help (...), but I feel that comes from home' (Concessionaire 12)

Difficulty in understanding technical Guidelines

The Guidelines specify nutrient cut points for 100 g or ml of product (Table 1). Neither the principals nor the concessionaires had a basic understanding of the Guidelines' criteria used to determine the food items or products restricted or allowed for sales in school food kiosks. Slightly over half (7 of 12) principals mentioned that carbonated beverages and deep-fried foods were non-permitted according to the Guidelines; other than this knowledge, which is correct, understanding of products regulation status varied widely across the interviews. Only one of all interviewees explained that the Guidelines stipulate cut points per product weight, which made it difficult for her to implement.

'No one has given me a list of things I can sell (...) neither the Board, nor the Ministry (...) they have told me some of the products that can't be sold, but not those that I can' (Concessionaire 08)

In addition, participants held several misconceptions of the Guidelines. A few mentioned that baked packaged chips, as opposed to fried, were allowed for sale. The Guidelines, however, stipulate limits on fat content for packaged foods, regardless of whether these are baked. Another misconception was that some small-sized chocolate candies were allowed for sale by the Guidelines. As the Guidelines stipulate that the first product ingredient must not be sugar, and because nutrient cut points are based on 100 g and not on package size, most chocolate candies are non-adherent, regardless of its size.

*Monitoring and accountability*

All of the schools reported having an active Health and Nutrition Committee that is formed at the beginning of every school year. Despite the existence of the committee, the activities that school principals described as the committee's responsibility pertained more so to ensure adequate functioning of the school cafeteria, as opposed to monitoring the school kiosk. Furthermore, there was a lack of clarity regarding who was responsible for monitoring the implementation of the Guidelines.

In most schools, monitoring of food availability from the principal was sporadic and informal. For example, one principal said *'what we do is every once in a while we will send someone to buy something'* (Principal 01), alluding to how they go about checking what is available at the school kiosk. Another principal expressed frustration with having to monitor the Guidelines, by explaining that they were enacted abruptly as opposed to a guided process: *'They throw the regulation at us, and there you go, you figure out how you can set this in place'* (Principal 03). Other principals described their procedures:

'The regulations are established, and its where we go into negotiations (...) they [concessionaire] tell us, "if I stick to this, it won't work for me", so we [school administration] try to have some flexibility' (Principal 07)

'Periodically, we make visits and observations. In fact, in these days a colleague is helping us with a questionnaire and he is applying it to students in each classroom (...). A small survey where we ask about the quality of the service, prices, variety, it's about 5 items about the service they receive' (Principal 09)

'For example, I try to go once a week, I'll swing by, take a look, and interview students so they can tell me' (Principal 04)

'I don't know right now how the kiosk is looking... the lady should adhere to the regulations... but you probably go up there [to the kiosk] and you might even be able to buy a coke' (Principal 11)

Kiosk concessionaires experiences seemed to reflect the informality and lack of consistency in the monitoring:

'They [School Board] have never told us 'look, don't sell this, don't sell that' (...) all they did was talk to us about the deep-fried stuff of the regulations, washing, hygiene stuff, freezing' (Concessionaire 07)

'I've reintroduced products because they don't control it (...) he [principal] walks by, takes a look, but that's it' (Concessionaire 08)

Site visits by the Ministry of Health to monitor the implementation of the Guidelines were mentioned in four out of the twelve schools. One concessionaire said that *'they have visited several times [the Ministry]. They check the oil, whether we are wearing earrings, those kinds of things (...)'* (Concessionaire 06), while adding that during a recent visit they also checked which foods were being sold.

Students' purchasing capacity

Some principals considered it was necessary to offer low-cost products to satisfy students' hunger and provide satiety. These products, such as packaged chips, were deemed to be non-adherent to the Guidelines. Furthermore, principals and concessionaires considered that foods that met the Guidelines were in general more expensive and less filling. The high cost of prepared foods and products to meet the Guidelines caused concern to principals of schools in low-income areas, where students' purchasing capacity was limited:

'Products have to have a moderate price accessible to students, this is a rural area, lots of the kids are from farmers (...) and they don't have great purchasing power (...) lots of them have scholarships and they come to school with very little money, so the person at the kiosk has to have products accessible for students' (Principal 09)

'What they [students] like most are the packages that are sold at 100 [colones], plantain, yucca and potato chips, because, you know, there are people that are very poor here, and they come with little money and that's what they buy' (Concessionaire 11)

Adolescents food preferences

A salient theme throughout the interviews was that adolescents prefer what principals and concessionaires consider unhealthier foods and beverages. Given their food preferences, principals and concessionaires expressed that adolescents are not willing to purchase healthier products that have been offered to adhere to the Guidelines, such as fruits and fruit smoothies:

'I feel that because they are young, they probably don't pay attention to their health as much because they trust that they feel healthy, they feel strong' (Principal 09)

'If you make a kid choose between an apple and a Picaritas package, for sure they will go with the Picaritas' (Principal 11)

'Kids will sometimes tell us 'oh, can you please buy this cookie, it's so tasty' so we try to get it, so that they can buy it'' (Concessionaire 07)

'We bring fruits and they all go bad, because it's hard. I think there are 1400 students in the school, and perhaps 5 will come in a day to buy fruit. And most of them are teachers' (Concessionaire 04).



Discussion

This study highlights the challenges for public high schools to implement a set of mandatory Guidelines that sought to restrict the sale of unhealthy foods and beverages in Costa Rican kiosks and the contextual factors that were influencing this implementation from perspectives of implementing actors. Unhealthy products were still widely available in schools, and amongst the most prevalent challenges to implementation that emerged from our interviews, were a lack of understanding of the policy content, a lack of monitoring and accountability, and competing values amongst actors which affected their views on the role that the school must have in offering a healthy food environment.

Both principals and concessionaires had insufficient knowledge regarding the content of the Guidelines. The Guidelines provide cut points for nutrients of concern (fat, saturated fat, sugar and Na) that are given per 100 g or 100 ml of products. NFP labels in Costa Rica typically report nutrients per serving, however, making it difficult to determine quickly if a product would be considered prohibited for school sales. This is in contrast, for example, to Chile, in which legislation required products exceeding thresholds to carry a front-of-package warning label⁽²⁶⁾. With such labels, the process of determining whether a product can be sold is straightforward. Poor knowledge and understanding of a policy has been found to inhibit effective implementation in other settings as well⁽¹³⁾, including Canada^(17,27), Australia⁽²⁸⁾, South Korea⁽²⁹⁾ and Mexico⁽³⁰⁾.

Monitoring and accountability for successful policy implementation are important⁽³¹⁾. A study conducted in the USA found that having a strong policy requiring evaluation was associated with use of reporting, monitoring and evaluation activities⁽³²⁾. According to the Guidelines, it is the school principal's responsibility to report irregularities or non-adherence to required duties of the concessionaire to the School Board, who is deemed responsible for the adequate functioning of the kiosk. The school principal can act on his own behalf or through the school's Health and Nutrition Committee⁽³³⁾. If there is a lack of understanding of the Guidelines to begin with, however, monitoring of its implementation at the school level becomes nearly impossible.

Our key findings regarding the factors influencing implementation echo those summarised in a recent review⁽¹³⁾ which included studies conducted in the USA, the UK, Canada and Australia, among other countries. This review highlighted the importance of good communication strategies as well as social and financial support prior to food policy implementation. Furthermore, it recognised the importance of policy implementation research in low- and middle-income countries, which is limited.

Various countries in Latin America have implemented similar policies restricting the sale of unhealthy foods in school^(34,35) particularly in the past 10 years, including

Mexico⁽³⁶⁾, Chile⁽²⁶⁾, Ecuador, Paraguay, Peru⁽³⁷⁾ and Uruguay⁽³⁸⁾. In Chile, the availability of products that exceeded recommended nutrient thresholds was reduced substantially after policy implementation⁽³⁹⁾. On the other hand, in Mexico, similar to our study, non-permitted energy-dense foods (per country's regulation) in school food establishments were found during the two school years following the implementation of the Guidelines⁽⁴⁰⁾. The need of support for stakeholders responsible for policy implementation as well as the importance of measurable goals and objectives were some of the key lessons learned from the process in Mexico⁽³⁰⁾.

Adolescents' food preferences are important to consider in the context of school food policies. Indeed, a key barrier to nutrition promotion in secondary schools is the perception by parents and teachers that adolescents have a strong preference for energy-dense, nutrient-poor foods⁽⁴¹⁾, which might reinforce a cycle in which a profit-driven kiosk within the school will seek to offer foods that they believe teenagers are willing to buy. One study in the UK reported the emergence of 'black markets' in the context of a nutrition policy: students were found to be selling confectionary, energy drinks and other foods in secondary schools⁽⁴²⁾. In our study, this only emerged during two interviews. Students purchasing items prohibited from sales in school kiosks, however, was a prevalent theme, which also speaks to the challenges of promoting healthy eating habits. In that sense, the role of the home in shaping adolescents' food preferences is important, as it includes a variety of psychological, social and environmental factors that mediate the relationship between nutrition knowledge and diet quality in adolescents⁽⁴³⁾. One study found, that for example, home accessibility of energy-dense snacks was negatively associated with frequency of fruit consumption in adolescents, whereas home availability and accessibility of fruits and vegetables were positively associated with their consumption⁽⁴⁴⁾. During our interviews, both principals and concessionaires expressed that it was important for parents to forge healthy eating habits at home, and they strongly believed that there was only so much that the school could do to promote good nutrition. In that sense, policies that restrict the sale of unhealthy foods are not a solution that will work in isolation. Effective food policies are implemented as part of a combination of mutually reinforcing actions^(5,45), which in the longer term can help shift food environments and preferences. Healthy school food policies should be paired with policies targeting other elements of the food environment that also affect food preferences, such as the marketing of unhealthy foods, the retail setting, food labelling and food prices, among others.

Since our interviews and site visits were conducted, a development has occurred in Costa Rica's PANEA, the programme providing breakfast and lunch meals to students. Specifically, in 2017, the MPE and the School of Nutrition of the University of Costa Rica launched new Guidelines and menus to be implemented at the start of the 2018



school year⁽⁴⁶⁾. The implementation of these is expected to occur in stages, with adoption by all ~5000 schools nationwide planned for 2022⁽⁴⁷⁾. The changes were prompted, among other factors, by the release of the National Weight and Height School Census⁽⁴⁸⁾ which raised awareness regarding the increased prevalence of overweight and obesity among Costa Rican children. The new Guidelines only apply to meals provided by schools (not food sold in kiosks). Future research should assess whether and how the quality of products available for kiosks changes in the context of this governmental initiative.

Study limitations

We were unable to capture perspectives of other policy actors involved in the implementation of the Guidelines, such as members of the schools' health and nutrition committees, members of the boards of education, and students. Furthermore, governmental staff could have provided additional insights regarding the process of monitoring and accountability of the policy. Because our main aim was to learn what was happening regarding implementation in the schools and why, we prioritised speaking with principals and school kiosk concessionaires. Interviews and site visits were done 3 years after enactment of the Guidelines, providing assessment of implementation in the medium term; implementation of the policy might have been higher in the year after the Guidelines were enacted. In some schools, neither the principal nor the concessionaire had been at the school during implementation of the Guidelines in 2012, and therefore could not describe the process of change in the context of the Guidelines (if any). In addition, our study design captured only secondary public schools (i.e. high schools), and therefore we are unable to speak to the reality of elementary schools. It is possible that implementation was higher in the latter, given that younger students attend and there might be a belief that the rights of younger children should be protected, including the right to healthy food. A final limitation was that our study examined only schools located in San José. We included both rural and urban schools, and the human development indices of the counties in which schools were located were classified as 'high' or 'very high', as are 97.5% of counties nationwide⁽⁴⁹⁾. There might be, however, differences in how policy actors responded to the Guidelines across different contexts, in particular for schools located in coastal provinces (such as Puntarenas, Guanacaste and Limón), as well as indigenous communities and counties located on the Northern border, which have socio-economic disadvantages compared to the rest of the country.

Policy implications and future research

The Costa Rican government took an important step with the enactment of the Guidelines in 2012, but achieving the short- and long-term intended effects requires that

those interested in improving the health and well-being of children and adolescents be proactive in ensuring adequate implementation. To promote implementation, the Guidelines should be easier to understand and the current technical language should be translated into practical information. A multi-institutional and interdisciplinary team could develop a plan for adequate adoption, implementation and monitoring of the Guidelines.

First, the assessment of the current food supply in Costa Rica could be done to identify foods and beverages that meet the Guidelines. Second, a communication strategy could be developed so that concessionaires can easily identify these products that meet the Guidelines, prepare foods that are in line with the Guidelines and liked by students, and implement strategies that can improve kiosk profitability. Third, the plan could describe how periodic monitoring of the implementation of Guidelines in schools will be done, including resources and entities responsible for such monitoring. Fourth, the plan could describe the mechanisms by which students could be involved in improving the implementation of the Guidelines, for example, by providing them with spaces to share their opinions and concerns regarding the foods they can access within the school.

Once some of these steps are taken, future research could assess to what extent key actors in schools are aware of the Guidelines and have the necessary skills and resources to enforce adherence to these. This information is necessary for primary and secondary schools from a large nationwide sample; therefore, relying on methods such as a telephone⁽²⁷⁾ or internet survey⁽⁵⁰⁾ could be helpful. Future research could also assess changes in dietary intake over time, including where food and beverages are purchased and consumed by children and adolescents.

Conclusion

Most foods and beverages offered in high schools did not meet the nutrition criteria required by the mandatory Guidelines. Policy implementation was hindered by an inadequate understanding of the policy content, a lack of monitoring and accountability, and competing values amongst policy actors. Strengthening the implementation of the Costa Rican Guidelines will require actions to address these constraints.

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Supplementary material

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