

Research Article

Caloric Contribution of Snack Purchases from Street Vendors to the Diets of Elementary School Children in a Low-Income, Urban, Latino Neighborhood

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Abstract

Objective: The purpose of this study was to quantify the number of street vendors around schools and to measure the snacks purchased, snacking habits, and the Body Mass Index (BMI) of the children purchasing snacks from street vendors in one urban, Latino neighborhood.

Methods: Participants were: 78 boys, 64 girls, and 1 unknown from 5–12 years of age ($M=8.12 \pm 2.52$) whose Latino parents/guardians completed a 24 question survey about their snack purchasing habits.

Results: There were 64 vendors at the 17 schools surveyed (average 3.76 vendors:1 school). Shaved ice and ice cream were purchased most often (54.7% of the time), followed by chips (19.3%) and fried foods (8.7%). An average of \$1.03 +/- 0.52 was spent. Individual snack purchases ranged from 46-1790 kcal, with an average of 367.43 +/- 197.96. There was no significant difference in the calories purchased by boys or girls ($p>0.05$). An estimated 39% of the children were overweight (12.4%) or obese (26.9%) and there was no significant relationship in BMI weight categories by gender ($p>0.05$).

Conclusion: Snacks purchased from street vendors were calorie dense and nutrient poor. Street vendors, who are a significant part of many communities, could be valuable partners to increase the sale of healthy, affordable snacks to children after school.

Keywords: Street vendors; Children; Snacks; Latinos

Introduction

Within the last three decades, obesity rates in the United States have skyrocketed and are recognized as one of the nation's leading public health concerns [1]. In 2009-2010, an estimated 16.9% of children and adolescents in the United States were obese; among Hispanic children and adolescents, the rate was significantly higher at 24.3% [2]. These 12.5 million children and adolescents are at increased risk for metabolic issues, asthma, dental problems, and psychosocial problems [3]. Obesity in children often persists into adulthood [4].

A likely contributor to the epidemic is the obesogenic environment, whereby the environment itself contributes to the likelihood of an individual becoming obese [5]. The role of the food environment in personal health and healthy eating behaviors can be explained through social cognitive theory [6]. A key component of the theory is reciprocal determinism which occurs when a person's environment interacts with personal beliefs to influence individual action. According to this model, food environments that are lacking in affordable and nutritious foods while abundant in high energy dense and nutrient poor foods may influence personal behavior and decision making. These residents purchase the available unhealthy choices for a variety of reasons including tradition, taste, convenience, and affordability, and this in turn, encourages and promotes their availability. Residents in urban areas have easy access to a wide variety of energy-dense foods relative to healthy options, producing

a food environment that is conducive to the promotion of childhood obesity. People in these neighborhoods are said to be "swamped" with unhealthy options [7].

The food environment surrounding schools may be contributing to unhealthy food choices, especially when it comes to snacking. Snacking currently contributes to roughly 27% of a child's daily caloric intake with desserts, sweetened beverages, candy, and salty snacks being selected most frequently [8]. Low-income 4th-6th graders purchasing snacks from corner markets within walking distance of their schools most often purchase energy dense foods such as chips, candy, and sugar-sweetened beverages, and averaged roughly 356 calories per transaction [9]. In one surveyed low-income, Latino neighborhood, there was a high prevalence of fast food establishments in close proximity to schools, poor availability of fresh, high quality fruits and vegetables in stores near schools, and little accessibility or use of local parks [10]. In another study, low-income Latinos students were asked about their after-school snacking purchases, and they reported purchasing chips most frequently, followed by ice cream and candy; 41% said they buy two items per transaction, and 20% reported purchasing three items [11]. Vendors have rarely been studied but one study noted that their role is important to consider in the after-school food environment [12].

Urban areas have all of the challenges of a "food swamp" community but in many Latino neighborhoods there is the added

presence of street or mobile vending. The role of food vendors within the food landscape needs to be understood as part of the overall cultural and economic environment of the Hispanic/Latino community [13]. Street vending within low-income areas is a known informal economy that exists when food and other goods are lacking or are more expensive [14]. There is a strict licensing process to legally sell goods as a street vendor in Los Angeles [15]. Because of the cost and other barriers to be legally licensed, Los Angeles County is believed to have an estimated 15,000 illegal street vendors [13]. Further, it is illegal in the City of Los Angeles to sell within 500 feet around the property of any school before, during, and after school [16]. In many neighborhoods, this is rarely enforced by school officials or police officers likely due to the excessive number of street vendors compared to the minimal number of enforcement staff [15].

While vendors may provide quick and convenient food items, especially in neighborhoods where walking is a common form of transportation, the number of street vendors surrounding schools and the caloric contribution of what they sell has not been investigated. The objective of this study was to quantify the caloric contribution of purchases from street vendors on the diets of elementary school children in a low-income, urban, Latino neighborhood. The research aims of this study were to determine: 1) the number of vendors found around the schools surveyed; 2) the type, cost and caloric value of snacks purchased for the children; 3) the snack purchasing behaviors of the parents/guardians for their children and; 4) the Body Mass Index (BMI) of the children.

Methods

Determination of survey sites

Eligibility criteria for schools were all kindergarten through eighth grade schools, both public and private, within a selected zip code in East Los Angeles or within one block beyond the border of the zip code. Within a two weeks time period in April, 2013, each of the 24 schools was visited during after-school hours and street vendors within a 1-2 block radius of the school were counted. The schools with the highest student enrollment and the highest vendor to student ratio were prioritized for inclusion in the survey. Schools with no vendors in the vicinity were not included further in the survey. Of the 17 schools included in the study, 13 were public and 4 were private, which account for roughly 8502 elementary students in this East Los Angeles neighborhood. The public schools had a high percentages of Latino students (n=7736), ranging from 96.8-100% of the total number of enrolled students [17]. The students attending these schools were mostly low-income as evidenced by the high percentages of students eligible for free or reduced cost lunches; eligibility ranged from 91.7-97.4% of students [17]. No data were available for the 776 students attending the private elementary schools other than total enrollment, which was obtained through phone calls to the schools.

Participants

The study was approved by the California State University, Los Angeles Institutional Review Board. Participants for this study were the 5-12 year old children from the selected schools whose parents/guardians had just purchased a snack from a street vendor outside of their school. Verbal consent was obtained prior to the interview as this was an anonymous intercept study and no identifying information was collected.

Data collection

The second step, the intercept surveys of parents/guardians, was conducted at 13 schools, 11 public and 2 private, during the months of May and June, 2013. The data collection team went out in groups of 2-5 and collected data from the parents/guardians purchasing food from vendors around 13 of the 17 schools who had at least one vendor present after the initial count.

A total of 143 surveys were administered in either English or Spanish, depending on the language of choice of the parent/guardian. The survey began immediately after the purchase was made and lasted approximately 5-10 minutes. The survey team began by establishing eligibility, which included being the parent/guardian of the child and being over 18 years of age. Next, the parent/guardian was asked what they had purchased for themselves and their child. Data collectors asked to see the purchases and recorded the size and cost of each item. Questions were asked about the snacking habits of the child, including frequency of snack purchases and reasons for the purchases. The height and weight of the children were collected. If the height of the child was unknown, team members used a portable tape to measure the height. Demographic information about the adult was collected at the end of the survey, including: birth place, number of years in the U.S, educational level, family income, and ethnicity. Parents/guardians were given a portable hand sanitizer and a tape measure as a gratuity for participating.

Calculation of the caloric content of the snacks

The calories for each snack item purchased were recorded or calculated. The nutritional labels, when available, were utilized to record the calories of the samples. If a food did not have a nutrition label but was manufactured, the manufacturer website was used to determine the calories listed. Those foods which did not have a food label included: fresh fruit (n=9) corn (n=3), all fried foods (n=14), pizza (n=2) and some ice cream (23 out of 32 samples). Calories of the unlabeled food products were estimated based on typical sizes as determined by Diet Analysis (Version 9.0, Wadsworth Cengage). The most popular snack purchased (n=56), and one which did not have nutrition information available, was shaved ice, also called a *raspado*. *Raspados* are made by shaving ice, putting it in plastic bags or cups, and then pouring over it either a commercial or home-made syrup using blended fresh fruit or vanilla flavoring combined with sugar. To determine the calories, five samples of different types of *raspados* were purchased, weighed, and their recipes were analyzed. Ice samples were weighed prior to and after the addition of syrup. Four of the syrups used by the vendors had nutrition fact labels. One sample was homemade, and after the recipe was given by the vendor, Diet Analysis was used to calculate the total calories for that sample. The five samples were averaged. Due to time and cost limitations, and less variability in snack types, the other home-made samples were not analyzed.

Statistical analysis

A t-test for two independent samples was conducted to see whether there was a difference between calories consumed from snacks purchased between boys and girls. The effect of gender on BMI was tested using a chi-square test. Both tests were run using SAS 9.3 (SAS, Cary, USA) software. A significance level (α) of 0.05 was used for the comparisons.

Results

Research was conducted initially around 24 elementary schools, 16 public and 8 private. Seven schools had zero vendors, 4 of those being private and 3 being public schools. A total of 64 vendors were present after school around 17 campuses, with the number of vendors ranging from 1-7, with an average of 3.76 vendors/campus. The highest ratio of vendors to students was 1:33, the lowest was 1:464, and the average was 1:133.

Participant characteristics

Data were collected from the parents/guardians of a total of 143 Latino students; 78 were boys, 63 were girls, and 1 not recorded. The average age was 8.1+/- 2.52 years. The BMI-for-age of the children along with their calculated weight status category is as follows: underweight (18 or 16.7%), normal weight (48 or 45.4%), overweight (13 or 12.4%), and obese (29 or 26.9%) [18]. See Table 1 for detailed information about BMI. The analysis of the results showed that there was no significant difference between gender and BMI categories ($p>0.05$). Although the race/ethnicity of the children was not collected, when the parents/guardians were asked about their origin, all reported being Latino or of Hispanic origin.

Snack purchase characteristics

A total of 163 items were purchased by the parents of the children during the survey period. Of the purchased items, 107 (74%) were not packaged but were prepared in some way by the vendors. The number of foods per transaction per child from the vendors was as follows: one item purchased for 128 children (89.5%), two items purchased for 12 children (8.4%), three items purchased for 1 child (0.7%), and four items purchased for 2 children (2.1%). Foods that

Table 1: BMI-for-age of Children.

| BMI (kg/m ²) | Weight Status Category | n = 108* (%) |
|---|------------------------|--------------|
| Less than the 5th percentile | Underweight | 18 (16.7%) |
| 5th percentile to less than the 85th percentile | Healthy Weight | 48 (45.4%) |
| 85th to less than the 95th percentile | Overweight | 13 (12.4%) |
| Equal to or greater than the 95th percentile | Obese | 29 (26.9%) |

*Note: Percent calculated from 108. Missing data (35) due to parent not knowing height and refusal to be measured (2); weight unknown (31); no gender recorded (1); and BMI calculation yielded an impossible number (1).

Weight calculated using CDC Calculator. <http://apps.nccd.cdc.gov/dnpabmi/>

Table 2: Cost and calories of snack purchases.

| Food Category | Items (%) | Cost Range (\$) | Average Cost (\$ +/- SD) | Calorie Range (kcal) | Calories (kcal +/- SD) |
|--|------------|-----------------|--------------------------|----------------------|------------------------|
| Raspado/shaved ice | 56 (34.8%) | 0.75-1.00 | .98 +/- 0.07 | 451 | 451.00 |
| Ice cream (packaged) | 32 (19.9%) | 1.00-3.50 | 1.15 +/- 0.52 | 61-699 | 338.28 +/- 186.19 |
| Chips and other packaged snack foods | 31 (19.3%) | .50-1.25 | 1.01 +/- 0.23 | 150-1790 | 394.53 +/- 300.53 |
| Fried goods (chicharrones de harina, nachos, churros, chips if cheese was added) | 14 (8.7%) | 1.00-1.25 | 1.02 +/- 0.06 | 116-648 | 499.3 +/- 179.40 |
| Fresh fruit | 9 (5.6%) | 1.00-3.00 | 1.56 +/- 0.83 | 46-147 | 118.00 +/- 36.15 |
| Beverages (soda, juice, sports drinks) | 8 (5.0%) | .50-1.00 | .88 +/- 0.22 | 60-175 | 131.88 +/- 33.35 |
| Candy, cotton candy | 6 (3.7%) | .25-1.00 | .70 +/- 0.30 | 80-211 | 133.34 +/- 52.42 |
| Elotes, roast corn | 3 (1.9%) | 1.00-1.50 | 1.25 +/- 0.20 | 238-277 | 251.00 +/- 18.38 |
| Pizza (packaged) | 2 (1.2%) | 1.00 | 1.00 | 290 | 290 +/- 0 |
| Total: | 161 | .25-3.00 | 1.03 +/- 0.52 | 46-1790 | 367.43 +/- 197.96 |

were similar were grouped together to allow for comparisons. The items purchased, in order by popularity were: *raspados* (n = 56), ice cream (n=32), chips and other packaged snack foods (n=31), fried goods (n=14), fresh fruit (n=9), beverages (n=8), candy/cotton candy (n=6), roasted corn (n=3), and pizza (n=2) (see Table 2). The cost of the purchased items ranged from \$0.25-3.00 with an average cost per transaction of \$1.03 +/- 0.52. The average calories per snack purchased was 367.43 +/- 197.96.

Parents were asked the frequency of their snack purchases for their children and numbers that were similar were grouped together to allow for comparisons. The reported frequency of snack purchases are as follows: 76 (53%) purchased 1-2 snacks per week, 52 (36%) purchased 3-5 times per week, and 13 (10%) reported one to two or even fewer times per month, one did not know, and one said never. Over half, or 60% (n=86) of the parents/guardians reported that this was a typical snack for their child while 40% (n=57) said it was not a typical snack.

Reasons for snack purchases

Ninety percent of the parents/guardians purchased what their child requested while 10% of the parents/guardians did not. The most common reasons for snacks being purchased were: it's what the child wanted or asked for (n=27), it was hot (n=18), they behaved well (n=8), because someone, including the child, had money (n=4), and various other reasons listed in Table 3. Those parents/guardians who did not buy what their children wanted were then asked if nutrition or money was the reason for not buying the snack. The parents/guardians gave the following reasons: money was the reason (n=4), nutrition was the reason (n=11), and both money and nutrition were the reason (n=1).

Calorie contribution from snack purchase

Total calories consumed from the purchased snacks were calculated as mentioned before. The results are shown in Table 2. There was no significant difference ($p>0.05$) between the calories consumed by girls and boys.

Discussion

The purpose of this study was to investigate the number of street vendors around schools, and snack choices, habits, and BMI of low-income, Latino elementary school children within the theoretical framework of reciprocal determinism whereby the food environment,

Table 3: Reasons Given for Buying a Particular Snack.

| Reasons | n = 68 (%) |
|------------------------------------|------------|
| It's what they wanted or asked for | 27 (39.7) |
| It was hot | 18 (26.5) |
| They behaved well | 8 (11.8) |
| Because I (or child) had money | 4 (5.9) |
| Because it's Friday | 2 (2.9) |
| They were hungry | 2 (2.9) |
| They were thirsty | 2 (2.9) |
| We always buy one/it's our custom | 2 (2.9) |
| No reason | 2 (2.9) |
| To make them happy | 1 (1.5) |

namely street vendors, plays a role in the children's snack choices. Parents/guardians and their children also reciprocate and likely encourage the vendors to sell specific items, namely high-sugar, high-fat items, because they are purchasing them. There was an average of one street vendor for every 133 students in this East Los Angeles neighborhood in the time frame of this study.

The students purchased ice cream and *raspados* from vendors in East LA about 50% of the time with the next most popular items being chips and other fried foods. This differs slightly from a prior vendor study in Los Angeles with a similar demographic, which showed that students reported purchasing chips most often, followed by ice cream and candy, although actual purchases were not recorded [11]. One reason, which may account for this difference, is that the current study was conducted during the hottest months of the school year, from May-June and the type of vendors present and purchases made may have reflected the weather. Parents/guardians actually reported that the heat was the reason for the snack purchase more than a quarter of the time. It is possible that other types of vendors are present during the colder months, for example, those vendors who sell roasted corn. However, few of these vendors were observed during this study period. When the popular roasted corn is available, it is typically covered in butter, mayonnaise, and cheese and may not represent a healthier option. Fruit was rarely purchased for the children. This differs somewhat from a prior study which found that 40% of fruits and vegetables purchased from street vendors were consumed by children [12]. Over half of the purchased snacks were home-made, the most significant being the shaved ice.

The average calories being consumed for a snack were about 367 kcals per child. This is very similar to the 356 calories per purchase by 4th-6th grade children at corner markets around schools [9]. Children, at age 8, unless they are very active, typically need roughly 1400-1600 calories a day [19]. In this sample, their after school snack represented more than a quarter of their daily caloric intake. The favored item, a *raspado*, contained anywhere from 280 to 728 calories, and from 16 to over 40 teaspoons of added sugar. Since many popular foods sold by vendors are not labeled, it is likely the public is unaware of the caloric density of this popular after-school snack.

In terms of cost, parents/guardians spent an average of \$1.03 for a snack for their child but the healthier option, fruit, was frequently \$2-\$3 per item. In many cases, parents/guardians had more than one child with them, and these children also received a snack. Nearly

40% of the parents/guardians reported purchasing snacks three or more times per week. This represents a significant amount of money and potentially a large percentage of the food budget being spent on mostly unhealthy snacks. Unfortunately, the healthiest of the options, fruit, was frequently more expensive and potentially cost-prohibitive.

Most parents, 90%, purchased the snacks that their children requested. The reasons given for the snacks being purchased was usually that it was what their child wanted or asked for, because of the heat, or because their child was well-behaved. Our study is consistent with a large body of research which suggests that particular parental feeding behaviors, such as using food as a reward or punishment or feeding a child what they want, may lead to increased body weight among children [20]. Among English-speaking Latina mothers in a study, food was consistently being used as a reward or punishment [21]. For this study, only four times was a snack purchased because the child was hungry or thirsty. For the 15 parents who didn't purchase what their children wanted, two-thirds said it was due to the lack of nutrition of the snacks and three said it was due to lack of money.

With regard to weight status, this study found nearly 40% of the students in this sample were overweight or obese which is less than reported previously. In a study of teens in the same neighborhood, an estimated 50% were found to be overweight [22]. The difference may be explained because the average age of children in this study was younger and the rate of overweight and obesity has been demonstrated to increase with age [4].

There are a number of limitations of the study. It is likely that the number of street vendors varies by location, and the finding of 1 vendor for every 133 students was based on observations over a short time frame. In fact, the same ice cream truck was seen going from school to school, depending on when the students were released, and may have been double-counted. This study also represents only a small number of the children who purchased snacks from the vendors. Typically, with only ten minutes to administer the surveys before the parents/guardians and their children went home, it was difficult to collect more than 1-2 surveys per data collector per occasion. There were many other parents/guardians purchasing food and beverages from the same vendors who were not surveyed. It is possible with more surveys collected additional insights into the foods being purchased could be made.

Another limitation was the inability to accurately weigh the children and calibrate their height. Data collectors were reliant on parent/guardians to recall the children's weight and height and there was no way to verify the information accurately. In addition, some parents provided the height data while for those parents who couldn't remember, researchers measured the height. Data was missing for 35 students, most often because parents/guardians did not know the weight of their child. Finally, there was a lack of nutrition labels on many of the foods purchased. Home-made foods, without a food label, and whose recipes vary, are difficult to quantify. However, utilizing a systematic method of sample collection of the most popular food item, the *raspados*, from various vendors enabled quantification of an estimate of the calories contained. Other food samples, like fruit and corn that did not contain a food label, also necessitated estimations be made. However, they were a very small portion of the sample, and their calories were likely to vary less than the *raspados*.

Buying snacks from street vendors is a culturally acceptable practice in East Los Angeles and other urban areas. This study confirms that the majority of the snacks being bought by parents/guardians of elementary school children from the street vendors are calorically dense and nutrient poor. When healthy options are available, they are typically two to three times as expensive as their nutrient-dense counterparts. From a policy standpoint, New York City has one creative solution. The Green Cart program, which began in 2008, is designating 1000 licenses to street vendors selling only fresh fruits and vegetables [23]. This policy has promising health implications, since the Green Cart program targets neighborhoods with limited access to fruits and vegetables.

There is a current movement in Los Angeles County to help legalize street vending by assisting vendors to purchase carts and to obtain licenses. The goals of the movement organizers are to help support street vendors to earn a living while also encouraging healthy eating [24]. While street vendors are undeniably a part of the food landscape in Los Angeles and in many urban neighborhoods, the results of this study found that the foods being purchased from street vendors around schools are primarily unhealthy.

Conclusion

Policy efforts could be directed at improving what the vendors are selling, especially to children, in addition to educating parents about the caloric and nutrient density of the snacks. It is conceivable that with education, the parents could request healthier foods and the vendors could provide it and conversely, if the vendors primarily offered healthy foods, the parents would be more inclined to purchase it. Future studies should include vendors' perceptions about their role in the food environment and potentially enlist and assist them to provide healthier alternatives that parents and children would purchase.

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