

# Mobile Food Vending and the After-School Food Environment

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**Background:** Low-income and minority children have higher rates of obesity and overweight. Greater understanding of their food access is important. Because of higher rates of walking to school in these populations, these children likely have greater exposure to the food environment immediately around their schools. Mobile food vendors are an understudied aspect of the food environment in U.S. urban areas.

**Purpose:** This study aims to observe the after-school food environment in an urban area where mobile vending is known to occur in order to study the range of vendors encountered near schools and the items sold in the after-school period.

**Methods:** In the spring of 2008, the presence of mobile food vendors after school within ¼ mile of nine public schools was assessed in a predominantly Latino district of Oakland CA. At six schools with regular presence of vendors, observations were made at mobile vendors documenting characteristics of transactions, consumers, and items.

**Results:** During 37 observation-hours across 23 days, there were 1355 items sold to 1195 individuals. Fifty-six percent of the transactions involved children with no adults present. There was a wide range in foods sold, and although there were vendors selling low-nutrient, energy-dense foods, there were also vendors selling whole and processed (precut and bagged) fresh fruits and vegetables. Roughly 40% of these whole fruits and processed fruits and vegetables were consumed by children. On average, children each consumed \$1.54 of foods per transaction.

**Conclusions:** Mobile food vendors in urban areas contribute to after-school snacking among children, and should be considered as a component of the school food environment.

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## Background

In view of the fact that children consume a large proportion of their daily food intake while at school,<sup>1</sup> research about childhood obesity has included a focus on the school food environment. Although much of the literature on the school food environment has examined factors within the school walls, federally subsidized meal programs, à la carte menus, and campus vending machines,<sup>2–6</sup> students are also exposed to the food environment during travel to and from school. Low-income and minority children walk and bike to school more frequently than their more affluent or white counterparts and thus have greater access to fast-food outlets and corner stores.<sup>7,8</sup> The

presence of food outlets near schools<sup>9,10</sup> increases students' access to high-fat foods. Students also purchase high-fat foods at corner stores after school.<sup>11,12</sup>

Although mobile food vendors are a part of the street environment in many large U.S. cities,<sup>13</sup> mobile food vending has not yet been addressed in the literature on school food environment. Some specialized types of vendors, such as ice cream trucks, are specifically geared toward children as consumers. As foods typically sold by mobile food vendors are often high in fat,<sup>13</sup> mobile food vending to children may contribute to unhealthy dietary intake. This study observed the after-school food environment in an urban area where mobile vending is known to occur in order to study the range of vendors encountered near schools and the items sold in the after-school period.

## Methods

### Study Design and Setting

In the spring of 2008, observations of mobile food vending activities were conducted near public elementary and mid-

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dle schools in Oakland CA. The city district with the largest area of permitted mobile food vending was identified,<sup>14</sup> and scans were made for vendors around all six public elementary and three middle schools using a ¼-mile network buffer around each school (Arc View, ESRI).

### Assessment of Mobile Food Vendor Presence

To identify the number and type of mobile food vendors within network buffers, driving routes were created, and pairs of observers documented where and when they noted vendors within the network buffer. Observations were conducted during the 30-minute period after the end of the school day for all nine schools over 5 days. If a school had no vendors for 3 consecutive days, observations were terminated. Schools that had mobile vendors present for all 5 days of observation were then selected for transaction observations. Among the six schools chosen (five elementary and one middle school), the racial/ethnic makeup of the students was 70% Hispanic/Latino, 12% African American, 8% Asian, and 1% white, with 82% eligible for free/reduced-price lunch.

### Transaction Observations

Four research assistants observed transactions at mobile food vendors on 23 afternoons of data collection, choosing vendors that were in closest proximity to school exits. They made brief contact with the vendors to assess their race/ethnicity and primary language.

Every individual at a transaction was categorized as being a child or an adult, and observers recorded which individuals paid for food items as well as which individuals appeared to be the intended consumer. Cost of items consumed per person and overall cost per transaction were calculated.

### Analysis

Analysis took place in early 2009 and consisted of determining the mean numbers of vendors present in network buffers, percentages of transactions that were composed of customers of different age and gender groups, and mean values for cost per item and per transaction. To compare gender distribution and cost patterns between children and adults, two-tailed *t* tests of proportions and of means were done, respectively.

## Results

### Mobile Food Vendor Presence

A mean of 5.3 (SD=2.6) vendors were observed within a ¼ mile walk of each of the six schools on any given observation period. The scans documented the presence of *paleteros* (ice cream pushcart vendors), *fruteros* (precut and bagged fruit and vegetable vendors), taco trucks, *raspaderos* (shaved ice vendors), ice cream trucks, hot dog carts, *churro* (fried donut) vendors, fruit stand ven-

dors on sidewalks and in flatbed trucks, and *eloterros* (roasted corn vendors). All vendors were Latino, most with limited English fluency.

### Transactions

There were a total of 979 transactions. Children were present at the majority of transactions, and 56% of transactions were child-only transactions. There were more child-only transactions at ice cream trucks, followed by *paleteros*, shaved ice vendors, whole-fruit vendors, *fruteros*, and taco trucks (Table 1).

### Consumers and Spending

For consumers observed at the mobile food vendors, N=1195. More than half the adult consumers were women (67%,  $p<0.01$ ), but the proportion of girl consumers was not statistically different from 0.5 (52%,  $p=0.31$ ). The total cost of foods consumed per person was \$1.98, and was more for adults (\$2.76) than children (\$1.54,  $p<0.01$ ; Table 1).

### Items and Cost per Item

A total of 1355 items was purchased during data collection. The mean price of items sold was \$1.83. Although ice cream trucks had the highest proportion of items consumed by children (88%), *fruteros* and whole-fruit vendors had a sizeable proportion of their merchandise consumed by children (38% and 41%, respectively; Table 1).

## Discussion

There was a wide range of vendors encountered. Although there were vendors selling calorie-dense and nutrient-poor items such as ice cream and candy, there were also vendors that sold nutritious items. Notably, despite the higher cost of fresh fruit, children still were frequent consumers of whole and processed fruits and vegetables. Future research should explore price sensitivity of nutritious items at vendors.<sup>15</sup> In addition, it would be useful to determine whether availability of foods from nearby mobile vendors contributes to increased consumption of after-school snacks or instead to substitution of snacks that they might otherwise consume elsewhere.

This study in Oakland CA found a wide variety of Latino mobile food vendors in a largely Latino district of the city. In other cities across the U.S., mobile food vending is a common enterprise taken on by recent immigrants, who come from countries where mobile food vending is more common.<sup>16,17</sup> Public health interventions that make use of familiar cultural phenomena such as mobile food vending may have value in immigrant communities.

**Table 1.** Distribution of transactions, consumers, and items by vendor type

	Vendor type						
	Overall	Ice cream truck	Taco truck	Raspadero	Paletero	Frutero cart	Fruit stand/flatbed
Total observation time	36 hours 58 minutes	4 hours 48 minutes	7 hours 43 minutes	2 hours 32 minutes	5 hours 17 minutes	13 hours 1 minute	3 hours 37 minutes
<b>Total transactions</b>	979	211	124	106	198	235	105
Children only	547 (56%)	191	25	67	147	74	43
Children and adults	104 (11%)	11	17	21	27	28	0
Adults only	328 (33%)	9	82	18	24	133	62
<b>Total consumers</b>	1195	247	169	148	261	274	96
<b>AMOUNT CONSUMED PER PERSON (\$)</b>	1.99	1.29	3.92	1.31	1.27	2.26	2.62
<b>Children</b>	754	227	61	106	208	111	249
Girls (%)	391 (52)	102 (45)	39 (64)	59 (56)	119 (57)	49 (44)	142 (57)
Amount consumed per child (\$)	1.54	1.26	2.93	1.29	1.29	1.97	1.72
<b>Adults</b>	441	20	108	42	53	163	55
Women (%)	294 (67)	13 (65)	50 (46)	37 (88)	35 (66)	116 (71)	43 (78)
Amount consumed per adult (\$)	2.76	1.60	4.47	1.37	1.20	2.46	3.32
<b>Items</b>							
<b>Total items sold</b>	1355	290	208	156	277	317	107
Average cost per item (\$)	1.83	1.10	3.22	1.32	1.27	2.12	2.40
Items consumed by children (%)	810 (60)	256 (88)	66 (32)	108 (69)	215 (78)	121 (38)	44 (41)

Note: Total observation time refers to the total number of hours and minutes of observation time at each respective type of vendor. Values are *n* unless otherwise indicated.

Given the large number of vendors typically present in the observation area, as well as the mobile nature of these vendors, it was difficult to collect either an exhaustive or a rigorous random sample of vendors. Because of this limitation, these data are insufficient to infer conclusions about the preferences of customers for competing types of vendors. Because there were no data collected on inter-rater reliability, there may have been some misclassification between adults and adolescents (categorized for this analysis as children), or inconsistent reporting of transaction information. In addition, as this was conducted in a single district of a single city, generalizability to other cities is limited.

Despite these limitations, there are important policy implications from these findings. Fruit vendors are not limited to Oakland, and the authors are aware of the presence of *fruter*os or other vendors selling processed or unprocessed fruit in at least six other cities in the U.S. (unpublished

manuscript). New York City<sup>18</sup> recently created an initiative to increase the numbers of permits for vendors selling whole fruits and vegetables on approved pushcarts in neighborhoods with little access to fresh produce. Similar initiatives with mobile food vending may make positive contributions to the school food environment.

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