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Assessing mobile food vendors (a.k.a. street food vendors)— methods, challenges, and lessons learned for future food- environment research

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Abstract

OBJECTIVES—Mobile food vendors (also known as street food vendors) may be important sources of food, particularly in minority and low-income communities. Unfortunately, there are no good data sources on where, when, or what vendors sell. The lack of a published assessment method may contribute to the relative exclusion of mobile food vendors from existing food-environment research. A goal of this study was to develop, pilot, and troubleshoot a method to assess mobile food vendors.

STUDY DESIGN—Cross-sectional assessment of mobile food vendors through direct observations and brief interviews.

METHODS—Using printed maps, investigators canvassed all streets in Bronx County, NY (excluding highways but including entrance and exit ramps) in 2010, looking for mobile food vendors. For each vendor identified, researchers recorded a unique identifier, the vendor's location, and direct observations. Investigators also recorded vendors answers to where, when, and what they sold.

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COMPETING INTERESTS

None declared; all authors deny any conflicts or competing interests of any kind.

ETHICAL APPROVAL

The protocol was approved by the Albert Einstein College of Medicine institutional review board.

RESULTS—Of 372 identified vendors, 38% did not answer brief-interview questions (19% were “in transit”, 15% refused; others were absent from their carts/trucks/stands or with customers). About 7% of vendors who ultimately answered questions were reluctant to engage with researchers. Some vendors expressed concerns about regulatory authority; only 34% of vendors had visible permits or licenses and many vendors had improvised illegitimate-appearing set-ups. The majority of vendors (75% of those responding) felt most comfortable speaking Spanish; 5% preferred other non-English languages. Nearly a third of vendors changed selling locations (streets, neighborhoods, boroughs) day-to-day or even within a given day. There was considerable variability in times (hours, days, months) in which vendors reported doing business; for 86% of vendors, weather was a deciding factor.

CONCLUSIONS—Mobile food vendors have a variable and fluid presence in an urban environment. Variability in hours and locations, having most comfort with languages other than English, and reluctance to interact with individuals gathering data are principal challenges to assessment. Strategies to address assessment challenges that emerged from this project may help make mobile-vendor assessments more routine in food-environment research.

Keywords

Mobile food vendors/ Street vendors/ Street foods/ Food carts; Food environment; Urban/ New York City/ Bronx; Immigrant workers; Measurement/ Assessment

INTRODUCTION

Mobile food vendors, also known as street food vendors (e.g., carts, trucks, and roadside stands selling food), may contribute meaningfully to food environments in both urban and rural settings, and may be particularly important food sources in minority and low-income communities.¹⁻⁴ Unfortunately, possibly due to the logistical challenges of assessing “moving targets”, mobile food vendors have generally been neglected in food-environment research.

Only a few published studies have attempted to assess any aspects of mobile food vending, and have generally done so with limited scope on a limited scale. In developing countries, studies have typically used indirect measures in very select samples, often with a focus on food safety.⁵⁻⁸ There has also been food-safety-related mobile-vendor work in the U.S. (e.g., a 10-cart study in Manhattan).⁹ Other work in the U.S. has had more of a nutritional focus, but has been limited in assessing mobile food vendors indirectly (e.g., through customer surveys, evaluating reported purchasing and consumption practices).^{3,10,11} Direct assessment of mobile food vendors with a nutritional focus in the U.S. has largely been restricted to observed transactions with customers (e.g., on the streets around six⁴ or fewer¹² urban schools) or surveys with vendors (e.g., a sample of 13 vendors in a sample of rural colonies²).

No published studies to date demonstrate a method for conducting a detailed assessment of mobile food vendors for a sample of more than just a few carts. Also, there are no adequate government or private sources for these data, precluding secondary analyses. Still, ignoring mobile food vendors could give an incomplete and inaccurate picture of an overall food environment, leading to erroneous conclusions and misdirected interventions to change food environments.

For the current study, investigators sought to develop a method for assessing mobile food vendors, and to pilot the assessment methodology in an urban setting: Bronx County, NY (the Bronx). The developed method built on important earlier work by others,^{2-7,9-12} and on related work by members of the research team.¹³ The findings presented in this manuscript

detail methods, challenges, and lessons learned. They suggest strategies for others to overcome obstacles and conduct detailed assessments of mobile vendors in future food-environment research.

METHODS

Study design and overview

The Albert Einstein College of Medicine institutional review board approved the study protocol, to conduct a cross-sectional assessment of mobile food vendors in the Bronx using a mixed-methods approach. The method involved canvassing Bronx streets to determine vendor locations, making direct observations of vending vehicles (e.g., carts, trucks, stands), and conducting brief interviews with vendors to determine where, when, and what they sold. Notably, the unit of analysis for this study was the vending vehicle (i.e., the cart, truck, or stand) not the vendor (i.e., the person). Thus, the risks involved for “human subjects” in this assessment were low. Investigators who collected data were all college and pre-professional students; prior work related to food-environment assessments suggests student investigators may encounter fewer barriers to data collection due to their young age and their student status¹⁴ (e.g., less likely to be mistaken for government officials or regulatory authority and more likely to be well-received by vendors).

Developing an assessment tool

The principal investigator (lead author) designed a draft assessment tool based on two days of observing mobile food vendors in familiar Bronx neighborhoods. The tool was meant to capture essential elements of a ‘mobile’ food environment, as distinct from the ‘static’ food environment of restaurants, markets, and other store-front retail. The principal investigator trained a pair of student investigators (who worked in the summer 2010) in use of the draft assessment tool during a one-hour session. Students then practiced assessing several vendors out on the street and based on this experience suggested modifications to the tool. With the revised tool, students and the principal investigator separately conducted subsequent assessments of several more vendors. Agreement was essentially perfect (actual tool available from authors upon request; details of tool below).

A second pair of students (who worked in fall) likewise received a one-hour training from the principal investigator and then conducted practice assessments of several vendors. These students received feedback on their performance and achieved proficiency with assessment after a second practice session (i.e., student assessments agreed with separate assessments done by the principal investigator as a reliability check).

Canvassing streets

Assessments encompassed all publicly accessible roads in the Bronx (approximately 1,000 linear miles over 42 square miles, Figure 1), including highway entrance and exit ramps, but excluded major highways and private roads. Investigators used printed Google maps to plan and record their routes. Assessments occurred during business hours on non-consecutive weekdays, summer through fall in 2010. Two pairs of investigators—one working in the summer, the other in the fall—canvassed Bronx streets. One investigator in each pair drove a private vehicle; the other investigator scanned both sides of each street en route for mobile food vendors. When a vendor was identified, investigators marked the printed map with the location and approached the vendor. Investigators did not approach vendors “in transit” (e.g., ice cream trucks driving through neighborhoods) but recorded where such vendors were when spotted, along with as much information as they could about the vendors based on direct observation.

Direct observation

Items from the assessment tool included direct observations like *unique identifier* (e.g., permit number, license plate, or unique physical characteristics like stickers, signage, damage, or graffiti) and *location* (i.e., nearest street address or nearest street intersection). Investigators noted if vending vehicles were *functionally mobile* (i.e., able to move immediately as needed, like ice cream trucks) or *functionally stationary* (i.e., requiring preparation before moving like vendors selling produce from roadside tables where product had to be boxed up and loaded before moving). Investigators recorded if vendors operated *inside* vehicles (e.g., food trucks) or *outside* vehicles (e.g. push carts). Investigators also recorded if *similar products* might be available from store-front businesses visible from the vendor's location (e.g., if there was an ice-cream store three doors down from an Italian-ice vendor, or if a diner was across the street from a lunch truck). Additionally, investigators recorded specific types and varieties of foods and beverages offered by each vendor (analyzed in a separate manuscript under review: Lucan et al, unpublished data). If there were interesting observations that were not part of the structured assessment tool, investigators recorded these qualitatively (e.g., "The vendor left his truck when he saw us approaching him: located at 4:36pm, ultimately interviewed at 4:50pm").

Brief interviews

The assessment tool also included a few short closed-ended interview questions for vendors: how long the business had been operating, where and when the cart, truck, or stand usually sells (hours, days, months), and if weather is generally a factor for selling (Figure 2). Student investigators wore casual clothes and tried to engage vendors in informal conversation about their vending experience, weaving in the specific, structured, closed-ended interview questions where able.

Based on earlier work by members of the research team¹³ and communication with a Bronx street-vendor association, investigators assumed that most vendors would be Spanish-speaking and that a substantial number would speak Bengali. At least one student in each data-collection pair was bilingual in English and Spanish, and the study interview guide was translated into (and then back-translated from) Spanish and Bengali (Figure 2).

Interviewers only used the written interview guide when necessary (e.g. when vendors only spoke Bengali and had to select from pre-written answers). Otherwise, interviewers recorded oral answers on a separate form after the interview was complete. Interviewers also recorded specific observations on the form: the *language* vendors reported being most comfortable speaking, *reasons for any difficulty* with the interview (e.g., vendor refusal or perceived reluctance to participate) and *qualitative jottings* about any interesting information that emerged in conversations (e.g., "The vendor mentioned that the police continue to harass her even though she has a valid permit").

Data analysis

Investigators analyzed direct observations and vendors' answers to closed-ended interview questions within predefined quantitative and categorical domains. Stata 11 (Statacorp LP, College Station, TX) was used for data exploration and to calculate frequencies. ArcGIS software (version 9.3.1, ESRI, Redlands, CA) was used to map vendor locations. The research team discussed any qualitative jottings from observations and interviews to be sure there was interpretation consensus.¹⁵

RESULTS

Cumulatively, the two pairs of student investigators were able to complete assessment of all Bronx streets over 40 non-consecutive days (roughly 320 person-hours in the field). Data entry and data cleaning (e.g., regular checks for missing observations and out-of-range values) consumed about another 320 person-hours. Thus, total effort was about 0.64 person-hours for each linear mile of roadway covered, or about 15 person hours for each square mile of area covered.

The assessments identified 372 mobile food vendors—nearly nine per square mile on average (Figure 1). More details on types of vendors and the various foods and beverages they offered at different times in different neighborhoods are available elsewhere (Lucan et al, unpublished data, under review).

Table 1 shows descriptive statistics based on researchers' experience assessing mobile food vendors. Select qualitative observations appear in footnotes to the table and also below.

Investigators were unable to conduct full interviews with 38% of identified vendors. In just over half of these cases, vendors were actively "in transit" (e.g., ice-cream trucks driving through neighborhoods trying to attract customers). In other cases, vendors were absent from their cart/truck/stand (some leaving when they saw investigators approaching) or were with customers. In 40% of cases where interviews did not occur, vendors outright refused to speak with student investigators. In other cases, even when there was no outright refusal to speak, vendors sometimes seemed suspicious, guarded, or reluctant to engage with investigators (e.g., taking actions like shutting the truck window when investigators introduced themselves, or packing up to leave as investigators approached). Informal discussions with vendors who did ultimately speak with students revealed that many perceived constant harassment by police and adjacent store-front businesses. More than 20% of vendors were, in fact, selling adjacent to likely store-front competitors and only a minority of vendors (34%) displayed the requisite vending permit or license, with many vendors having informal set-ups (e.g., Spanish foods being sold from a converted shopping cart). Perceived reluctance/nervousness about speaking with investigators (7% of all interviews) was inversely associated with having a visible permit or license (data not shown).

In a few cases, a language barrier prevented or impeded interviews. This did not occur often because vendors most often reported the greatest comfort speaking English or Spanish and members of both investigator pairs were fluent in both of these languages. For >85% of interviews that did occur, vendors were friendly, open, and generally happy to converse—presumably hoping to build their businesses and attract new customers (e.g., offering free water to investigators along with enthusiastic answers to when and where they sell).

A full third of vendors (33%) sold seven days a week; a majority (87%) sold at least five days, most with some week-end and week-day selling. An eight-hour workday from 10am - 6pm defined the median hours of operation, and April to October were the usual vending months. However, there was substantial variation in the hours, days, and months that vendors sold. Nearly 6% of vendors reported an inconsistent or variable pattern in days selling.

Almost a third of vendors (30%) reported selling in areas other than where investigators identified them. In fact, researchers occasionally saw the same carts/trucks/stands they had already assessed in different places at subsequent times. Greater than 70% of vendors had the kinds of set-ups that allowed for easy mobility should they decide to move (e.g., trucks, vans, and push carts as opposed to relatively-fixed tables, stands, or unattached trailers).

More than 20% of vendors had just started their businesses during the assessment year and were not fully confident of when or where they would sell in the future. Among all vendors, less than one quarter reported selling year-round.

Weather was a factor that added to variability to selling times. Seventy-nine percent of vendors had the kind of set-ups that left them exposed to the weather (e.g. open stands and push carts), which was associated with not vending in all weather (data not shown). In fact, for 86% of vendors, weather was a deciding factor in whether they would attempt to conduct business on a given day. Even those protected from the elements sometimes reported that bad weather (e.g., rain) reduced foot traffic and business, and made their coming out not worthwhile. Conversely, favorable weather could extend a planned vending season, with several vendors identified in the fall revealing that they did not usually sell this far into the year but decided to sell for longer given the unusually warm and fair conditions in the Bronx late into 2010.

Table 2 gives greater details on investigators' experience with the assessment, listing assessment considerations, what worked, and what could have worked better in the field. The table provides strategies to inform the work of others and promote the assessment of mobile food vendors in future food-environment research.

DISCUSSION

The pilot assessment in this study indicates that mobile food vendors are indeed “moving targets”, having inconsistent hours and locations that complicate assessment. Investigators' assessment experience suggests strategies to overcome challenges, so that vendor assessment may be suitable for wider implementation in future food-environment research.

Among the most notable assessment challenges encountered were communication issues related to vendors' reluctance to engage with investigators and, to a lesser degree, language preferences. Most vendors had low comfort with English, lacked official vending permits, and often vended from informal setups; all findings that had been reported previously from smaller-scale work in California.⁴ Such findings are not surprising given many vendors are likely recent immigrants,¹⁶ potentially lacking various skills and documentation necessary to obtain formal employment and therefore resorting to informal selling.^{2,17,18} Mobile food vending might be a particularly attractive option for new immigrants. More than 20% of vendors in the current study were new to vending in the past year, not dissimilar from the 46% reported in study of a rural setting.²

In that same rural setting, all mobile vendors reported holding a county vending permit² whereas only a minority of vendors in the current study did. Permits may be an issue for future studies of mobile food vending in urban areas; vendor legitimacy in the current study correlated with vendors' willingness to talk with investigators. Even permitted vendors might be hesitant to talk though; in the current study, even a few legitimate vendors reported harassment by police and adjacent store-front competitors and were wary of those asking questions because of it. Investigators conducting future work should be sensitive to this reality, and perhaps broach the subject in their introductions (e.g., “We want to assure you that we have no intention of harming your business in any way”). Additionally, other researchers have used *promotoras* (health workers from within the community), community residents, and even other vendors to broker interactions between investigators and mobile food vendors.² Such facilitators may provide an effective way to establish rapport, remove barriers for interaction, reduce vendor uneasiness about questioning, and increase participation by vendors.

Another potential way to further increase vendor participation may be to have a good understanding of the times vendors are likely to work (e.g., hours, days, and months). Prior studies have provided few details in this regard. A rural study noted that 84.6% of vendors characterized their work as full time, with 100% working Saturday and 0% working Sunday.² That study also noted that nearly 70% of mobile vendors did not sell in the fall and winter (a number roughly corresponding to the percentage of vendors exposed to the weather—e.g., selling from push carts or bicycles as opposed to covered vehicles).² In comparison, at least 87% of the vendors in the current study worked five or more days per week, with several not working Saturday and more than a third regularly working Sunday. More than 75% of vendors did not sell year round (with a slightly greater percentage exposed to the elements and not selling in all weather). These data underscore that vendors have a variable presence based on day and season, and that weather conditions as well as the type of vending vehicle add additional variability to the times vendors are likely to be present.

The current study had several strengths. Investigators assessed mobile food vendors across a large urban area—all of Bronx county, NY—including greater than 25 times more vendors than any other U.S. studies to date.^{2,4,9,12} The research made strides towards developing a translatable mixed methodology for assessment, which included components of both direct observation and brief interviews for detailed and nuanced understanding. Investigators asked vendors about vending times, locations, and conditions under which they sell—potentially obviating an absolute need for multiple assessments at different times as attempted by others.^{4,5} Nonetheless, such repeat assessments may be essential if the purpose of the research is to provide a precise account of available foods in specific areas at specific times (e.g., the mobile vendors in neighborhoods around elementary schools near the time of school dismissal).⁴

The lack of repeat assessments is the current study's biggest limitation: data came from a single cross-sectional assessment of a shifting target—an assessment that was conducted only on weekdays during business hours and that required several months to complete. Due to the size and scope of the project, investigators were not able to repeat assessments for reliability checking at other times, nor systematically confirm vendors' reports of the other locations and times that they sold. An improvement on the methods would be to perform reliability checks in a sample of areas at different times and under different conditions (e.g., in different weather), having multiple teams in the field simultaneously to speed data acquisition and better approach simultaneity in observation. Another limitation of the current study is that many vendors did not participate in interviews with investigators, with a major reason being refusal. Since refusal was associated with whether or not vendors had a permit, it is likely that those who did not participate differed systematically from those who did. For instance, vendors who lacked permits and refused might have been more likely to stay on the move, deny speaking English (so as to have an excuse to not answer questions), and have more variable, less-consistent hours in a given location. To improve vendor participation in the future and to help address vendor reluctance to participate, several recommendations appear in Table 2 based on the experience in the current study. Finally, given various measurement issues as noted, it is possible that the current study's assessment did not capture all mobile vendors in the Bronx. Unfortunately, there is no valid standard to gauge the completeness of the data. The city holds some records for vending permits, but these generally contain residential addresses only, not vending locations or hours and such records would be limited to only the roughly one third of all vendors on the street that may be licensed and legitimate. It is the lack of adequate pre-existing data on mobile food vendors that necessitates primary data-collection in the first place.

Conclusion

The experience of piloting a mobile-food-vendor assessment in the Bronx suggests it is possible to conduct such work over a sizeable area in an urban setting. Conducting such work is complicated by the fact that mobile vendors are literally moving targets; most have the capacity to move easily and a large majority do. Vendors report varying locations by day, date, time, and weather. Most vendors are not legitimate in terms of licensing, making attempts at assessment through government records futile. Illegitimacy makes primary assessment essential, but also challenges such assessment. Many vendors, feeling harassed by regulatory authority, are reluctant to speak to anyone who is not strictly a customer out of fear of jeopardizing their businesses. To engage with vendors, investigators should empathize with vendors' concerns and be flexible in their approach, avoiding the use of official-looking paperwork and formal procedures when possible. While there may be greater logistical challenges to obtaining complete information on street vendors compared to more-static food sources like stores and restaurants, not to exert the effort neglects a likely important component of the overall food environment. The method presented here may serve as a starting point to encourage the consideration of mobile food vending more routinely in food-environment research.

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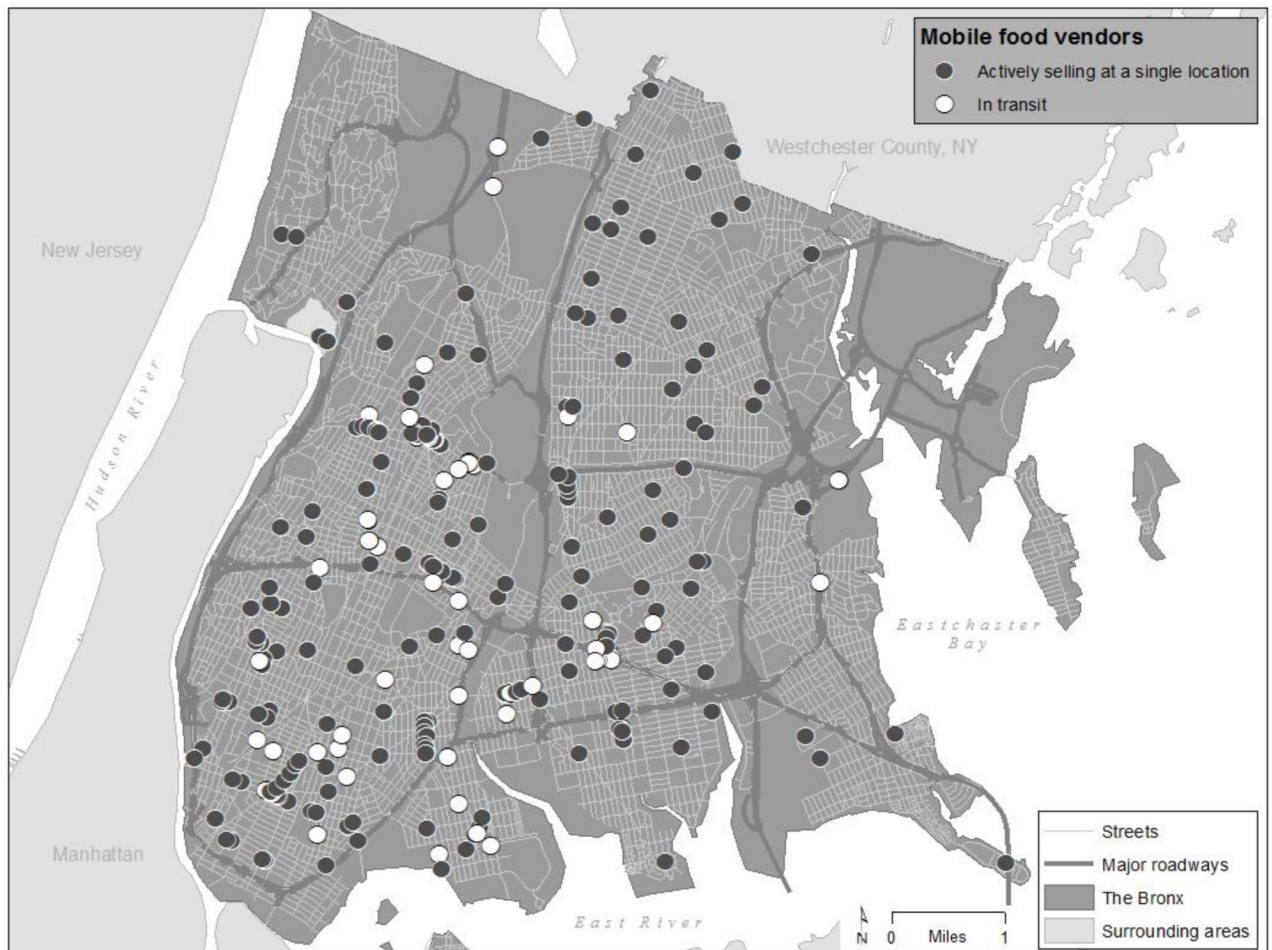


Figure 1. Map of Bronx streets and the location of mobile food vendors

Of the vendors “in transit” ($N = 72$), the vast majority were ice-cream trucks and other frozen-novelty vendors ($N = 51$). These vendors generally do not sell in one place, but rather drive through neighborhoods trying to attract customers, intermittently stopping to make sales and then continuing on. Water vendors ($N = 11$) also do not generally stay in one place but rather often walk up to motorists and pedestrians with bottled water. Other vendors identified “in transit” were not actively selling when identified and included vendors of various prepared foods ($N = 5$), produce ($N = 4$), and nuts ($N = 1$).

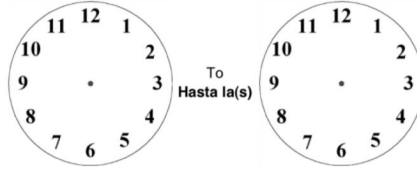
Note: The map above may appear to show fewer than 372 points due to substantial overlap in areas with a high density of mobile food vendors. Investigators focused assessment on the mainland Bronx, not the islands that are also technically part of the borough although not connected to the mainland by roads. The exception was City Island (the island most proximal to the borough’s eastern border), which is connected to the mainland by a road and which investigators did assess.

SPANISH

1. What days is this cart/truck/stand usually here?
 Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
Durante cuales dias de la semana esta este carro/camion/puesto aqui?
Lunes, Martes, Miercoles, Jueves, Viernes, Sabado, Domingo.

2. What hours is this cart/truck/stand usually here?
A que hora esta este carro/camion/puesto aqui usualmente?

12:00 am 12:00 pm
 1:00 am 1:00 pm
 2:00 am 2:00 pm
 3:00 am 3:00 pm
 4:00 am 4:00 pm
 5:00 am 5:00 pm
 6:00 am 6:00 pm
 7:00 am 7:00 pm
 8:00 am 8:00 pm
 9:00 am 9:00 pm
 10:00 am 10:00 pm
 11:00 am 11:00 pm



3. Is the cart/truck/stand ever brought any place else? Yes No
Es el carro/camion/puesto llevado a otro lugar? Si No

If yes, Where?
Si la respuesta es si, donde?

4. What months is this cart/truck/stand usually here?
 January, February, March, April, May, June, July, August, September, October, November, December
Durante cuales meses esta el carro/camion/puesto en este lugar?
 Enero, Febrero, Marzo, Abril, Mayo, Junio, Julio, Agosto, Septiembre, Octubre, Noviembre, Diciembre

5. Is the cart/truck/stand here no matter what the weather? Yes No
El carro/camion/puesto esta aqui sin importar el clima? Si No

6. When did this cart/truck/stand first start coming here? (What date - approximately)
Quando llego este carro/camion/puesto aqui por primera vez? (qual fecha - aproximadamente)

Or Choose month and year: **O señale el mes e año:**
 January, February, March, April, May, June, July, August, September, October, November, December
 Enero, Febrero, Marzo, Abril, Mayo, Junio, Julio, Agosto, Septiembre, Octubre, Noviembre, Diciembre
 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

BENGALI

1. What days is this cart/truck/stand usually here?
 Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
 কোন দিনে সাধারণত খাবার বহনকারী টেলা গাড়ী/ট্রাক এখানে দাঁড়ায়?
 সোমবার, মঙ্গলবার, বুধবার, বৃহস্পতিবার, শুক্রবার, শনিবার, রবিবার

2. What hours is this cart/truck/stand usually here?
 কোন সময় সাধারণত খাবার বহনকারী টেলা গাড়ী/ট্রাক এখানে দাঁড়ায়?

রাতি ১২:০০টা দুপুর ১২:০০টা
 রাতি ০১:০০টা দুপুর ০১:০০টা
 রাতি ০২:০০টা দুপুর ০২:০০টা
 রাতি ০৩:০০টা দুপুর ০৩:০০টা
 রাতি ০৪:০০টা বিকাল০৪:০০টা
 সকাল ০৫:০০টা বিকাল০৫:০০টা
 সকাল ০৬:০০টা সন্ধ্যা০৬:০০টা
 সকাল ০৭:০০টা সন্ধ্যা০৭:০০টা
 সকাল ০৮:০০টা রাতি০৮:০০টা
 সকাল ০৯:০০টা রাতি০৯:০০টা
 সকাল ১০:০০টা রাতি১০:০০টা
 সকাল ১১:০০টা রাতি১১:০০টা



3. Is the cart/truck/stand ever brought any place else? Yes No
 খাবার বহনকারী টেলা গাড়ী/ট্রাক কি আর কোথাও নেওয়া হয়? হ্যাঁ না
 If yes, Where?
 যদি হ্যাঁ হয়, কোথায়?

4. What months is this cart/truck/stand usually here?
 January, February, March, April, May, June, July, August, September, October, November, December
 কোন মাসে সাধারণত খাবার বহনকারী টেলা গাড়ী/ট্রাক এখানে দাঁড়ায়?
 জানুয়ারী, ফেব্রুয়ারী, মার্চ, এপ্রিল, মে, জুন, জুলাই, আগস্ট, সেপ্টেম্বর, অক্টোবর, নভেম্বর, ডিসেম্বর

5. Is the cart/truck/stand here no matter what the weather? Yes No"
 যে কোন আবহাওয়াই কি খাবার বহনকারী টেলা গাড়ী/ট্রাক এখানে দাঁড়ায়? হ্যাঁ না"

6. When did this cart/truck/stand first start coming here? (What date - approximately)
 কখন থেকে খাবার বহনকারী টেলা গাড়ী/ট্রাক প্রথম এখানে দাঁড়াতে শুরু করেছে? (কোন তারিখ - মন্বাব্দ/কাক্ষকাছি)

Or choose month and year অথবা, মাস বা বছর বলুন:
 January, February, March, April, May, June, July, August, September, October, November, December
 জানুয়ারী, ফেব্রুয়ারী, মার্চ, এপ্রিল, মে, জুন, জুলাই, আগস্ট, সেপ্টেম্বর, অক্টোবর, নভেম্বর, ডিসেম্বর
 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010
 ২০০০, ২০০১, ২০০২, ২০০৩, ২০০৪, ২০০৫, ২০০৬, ২০০৭, ২০০৮, ২০০৯, ২০১০

Figure 2. Mobile food vendor interview guide, with translation into Spanish and Bengali

Table 1
Researchers' experience assessing mobile food vendors on Bronx streets and factors potentially complicating future assessments

Assessment experience and potentially complicating factors	N (%) ^a
Assessment experience by interview status	372 (100)
Vendor not interviewed (answered no questions)	141 (37.9)
Vendor actively in transit (e.g., ice-cream trucks en route)	72 (51.1)
Vendor refused ^b	56 (39.7)
Vendor absent from cart, truck, or stand	7 (5.0)
Vendor with long line of customers	5 (3.6)
Language barrier	1 (0.7)
Vendor interviewed (answered at least some questions)	231 (62.1)
No difficulty; vendor cooperative and easily engaged	197 (85.3)
Vendor seemed reluctant, nervous, suspicious ^c	17 (7.4)
Language barrier	12 (5.2)
Vendor not owner; unsure how to answer interview questions	4 (1.7)
Vendor with customers	1 (0.4)
Factors potentially complicating future assessment	
Reporting time vending^d	213 (57.3)
Vendors starting business this year	43 (20.2)
Median time vending: 4 years (range: <1 week to 35 years)	
Language vendor most comfortable speaking^d	225 (60.5)
Spanish	173 (76.9)
English	40 (17.8)
Bengali	7 (3.1)
Arabic	4 (1.8)
Albanian	1 (0.4)
Reporting usual number of days selling^d	227 (61.0)
7 days per week	75 (33.0)
6 days per week	55 (24.2)
5 days per week	68 (30.0)
4 days per week	7 (3.0)
3 days per week	8 (3.5)
2 days per week	2 (0.9)
1 day per week	1 (0.4)
Inconsistent number of days per week	11 (4.9)
Reporting usual pattern of days selling^d	227 (61.0)
Monday-Sunday	75 (33.0)
Monday-Friday and one week-end day	54 (23.8)
Monday-Friday and no week-end days	67 (29.5)

Assessment experience and potentially complicating factors	N (%) ^a
Some days Monday-Friday but no week-end days	13 (5.73)
Both week-end days and any day(s) Monday-Friday	3 (1.3)
One week-end day and any day(s) Monday-Friday	2 (0.9)
Inconsistent pattern of days selling	13 (5.7)
Reporting usual vending hours^d	211 (56.7)
Median start hour: 10 am (range: 3 am - 4 pm)	
Median end hour: 6pm (range: noon - 10pm)	
Reporting usual vending months^d	203 (54.6)
Vendors selling year round (all 12 months)	49 (24.1)
Median start month: April (range: January - September)	
Median end month: October (range: July - December)	
Reporting ever selling elsewhere^{d e}	227 (61.0)
Yes	67 (29.5)
No	160 (70.5)
Having the ability to move elsewhere easily^f	372 (100)
Yes	262 (70.4)
No	110 (29.6)
Vending from inside vending vehicle^g	372 (100)
Yes	78 (21.0)
No	294 (79.0)
Reporting vending irrespective of weather^d	216 (58.1)
Yes	30 (13.9)
No	186 (86.1)
Selling adjacent to store-front competitors^{h, i}	300 (80.6)
Yes	64 (21.3)
No	236 (78.7)
Displaying mandatory vending permit and/or license^h	300 (100)
Yes	102 (34.0)
No	198 (66.0)

^aPercentages within categories may not sum to 100 due to rounding.

^bReasons for refusing to answer questions included: concern that answering would “cause trouble” or adversely affect the vendor’s business; reportedly being “too busy” (even when no customers were in sight); reportedly having “no time”; reportedly having to leave (e.g., to make an appointment elsewhere); reportedly not being the owner and not authorized or informed enough to answer; getting advice from a customer, adjacent vendor, or friend to not communicate with investigators; or unstated

^cVendors often repeatedly asked what interview questions were about and requested to see investigators’ identification (but were seldom reassured by student badges). Some vendors described harassment by adjacent store-front businesses (e.g. verbal threats and threatening notes left on vending vehicles); they worried about getting tickets from police, which reportedly was common. They also worried about health inspectors and being closed down. Even when participating in interviews, some vendors’ answers often tended to be vague and evasive.

^dData available for <100% of total sample if: vendor “in transit”; not at cart, truck, or stand; with customers; unable or unwilling to answer specific question; or not speaking enough English or Spanish to understand inquiry and communicate a response to bilingual investigators.

^e Selling on other streets, in other neighborhoods, or even in other boroughs of the city

^f Some vendors could easily and rapidly change location as needed (e.g., trucks, vans, push carts) whereas others could not (e.g., those selling from stationary tables or stands that would have to be packed up before moving)

^g Whether the vendor was protected inside of the vehicle (e.g., food truck) or not (e.g. push cart) had implications for whether the vendor came out during inclement weather, and also often affected the interview dynamic (e.g., vendors having the ability to abruptly shut vending window and hide inside of the vehicle, claiming to be closed).

^h Data available for <100% of total sample because of vendors “in transit”

ⁱ If similar products might be available from store-front businesses visible from the vendor’s location (e.g., if there was an ice-cream store three doors down from a snow-cone vendor).

Table 2
Lessons Learned: what worked, and what could have worked better for measuring mobile food vendors in an urban environment

Assessment consideration	Experience in current study	Recommendations for future research based on successes in the current study	Potential strategies to improve on the current study's methods
Efficiency in canvassing streets	Investigators required 40 non-consecutive days (roughly 320 person-hours) to cover ~1,000 linear miles of variably-dense residential, commercial, and manufacturing zones by personal vehicle and by foot (including the time required to engage with 300 vendors and conduct 231 interviews).	<ul style="list-style-type: none"> • Avoid driving during high-traffic times (e.g., "rush hour") or in high-traffic areas. • Avoid parking in areas where a car is likely to get blocked in (e.g., by others "double parking"). • Keep record of areas already assessed on a "master" map to prevent unintentional duplication of ground covered. • Be clear on exact boundaries of target areas and plan routes before going out into field. • Break up the larger study area into manageable sections. 	<ul style="list-style-type: none"> • Use real-time traffic-enabled GPS devices or smartphone applications for traffic updates before setting out and en route. • Make use of alerts about road construction (e.g., through Google maps) and plan avoiding areas when they are likely to be congested. • Use multiple pairs of investigators to simultaneously collect data in different areas to limit total data-collection time. • Use elevated trains or subway systems when feasible to bypass high-traffic areas.
Efficiency in data entry	Investigators spent about half of their time (roughly 320 person-hours) on data entry and data cleaning on the 40 non-consecutive days of data collection	<ul style="list-style-type: none"> • Use down time (e.g., high-traffic periods, inclement weather) for data entry and data cleaning. 	<ul style="list-style-type: none"> • Consider handheld data-entry device for real-time data collection as opposed to having to transcribe written records from the field later (be mindful of vendor-nervousness concerns and investigator-safety concerns discussed below—i.e., in some circumstances it may be prudent to avoid using handheld equipment out in the open).
Language preferences and proficiencies	English was the language less than 20% of vendors reported being most comfortable speaking; more than three quarters of vendors were most comfortable speaking Spanish.	<ul style="list-style-type: none"> • Ensure at least one investigator is fluent in language(s) vendors are likely to speak. • Have multiple-choice written questions translated into language(s) vendors are likely to speak. 	<ul style="list-style-type: none"> • Use residents of neighborhoods to collect data • Enlist promotoras, community workers, other community members, or even other vendors to facilitate interactions between investigators and vendors.
Identifying and distinguishing unique vending vehicles (carts, trucks, or stands)	With two thirds of carts lacking permits or licenses, identification by permit or license number was only possible in a minority of cases. In some cases, different vendors operated the same cart, truck, or stand in different locations at different times.	<ul style="list-style-type: none"> • Note unique, relatively immutable characteristics of the cart, truck, or stand (e.g., stickers, signage, dents or damage, graffiti, color/ make/model, license plate, etc.). • Remember that the cart, truck, or stand is the unit of analysis, <i>not</i> the person vending (i.e., the same cart may have a different vendor from one time to the next). 	<ul style="list-style-type: none"> • Ask vendor for permission to take a photograph of the cart, truck, or stand after collecting all other data (using judgment and being mindful of vendor-nervousness concerns and investigator-safety concerns discussed below— inconspicuously taking a photo with a smartphone is probably to be avoided as this could compromise vendor trust, success with other vendors as word spreads, and investigator safety).

Assessment consideration	Experience in current study	Recommendations for future research based on successes in the current study	Potential strategies to improve on the current study's methods
	Often, umbrellas on carts did not match the business type (e.g., Halal food cart having a "Sabrett" hot-dog umbrella).	<ul style="list-style-type: none"> Do not identify carts, trucks or stands based on umbrellas or other accoutrements that may be borrowed, shared, or that may change. 	<ul style="list-style-type: none"> Consider making sketches of the vending vehicle instead. Make images part of database.
Timing of assessment during the day	All assessments occurred during usual business hours on weekdays, which is when most vendors—even with other reported hours of operation—reported conducting most of their business.	<ul style="list-style-type: none"> Focus assessments during business hours on week-days. Ask vendors what other times they sell. 	<ul style="list-style-type: none"> Conduct select additional assessments in the early mornings, in the late evenings, and on week-ends for reliability checks. Ask vendors if they know of other vendors (e.g., friends, relatives) not currently present but selling in the same location at other times.
Determining vendor location	Investigators noted location on pre-printed maps and also recorded address data (i.e., closest address or street intersection).	<ul style="list-style-type: none"> Record nearest street address, intersection, and adjacent landmarks. 	<ul style="list-style-type: none"> Consider additional corroboration with GPS device (using judgment and being mindful of vendor-nervousness concerns and investigator-safety concerns discussed below—i.e., may be prudent to avoid using handheld equipment out in the open).
Accounting for vendors actively "in transit"	Almost 20% of all vendors were "in transit" at the time of identification.	<ul style="list-style-type: none"> Record as much data as possible based on observation about vendors that are in transit, including their location when identified. 	<ul style="list-style-type: none"> Approach vendors in transit when possible (e.g., those pushing carts and moving towards a destination as opposed to those driving trucks and vending en route). Ask them where they are planning to vend and when and then look for them later. Consider purchasing items from those vending en route (e.g., ice-cream trucks) to get them to stop for assessment.
Dealing with absentee vendors	Nearly 2% of vendors were absent from their open carts, trucks, or stands.	<ul style="list-style-type: none"> Wait for the vendor to return when possible. Avoid snooping to closely at an unattended cart, truck, or stand. 	<ul style="list-style-type: none"> Come back to unattended cart, truck, or stand later when possible (as time and logistics allow, understanding that the vendor could relocate before investigators return).
Persons other than the owner vending	In a number of cases, the person selling reported not being the owner, but rather a friend just watching the cart for a few hours or an employee who could not answer the study questions.	<ul style="list-style-type: none"> Get as much information from the person selling as possible. For those just watching carts but knowing little about them, try to determine when the owner may return. 	<ul style="list-style-type: none"> Consider asking the person selling for owner contact information if questions remain.
Consistency in vendor presence and location	Vendors often changed location based on time (e.g., hour, day,	<ul style="list-style-type: none"> Ask vendors about the hours, days, and months selling at location(s); be specific that the questions 	<ul style="list-style-type: none"> Conduct reliability checks during both fair and inclement weather.

Assessment consideration	Experience in current study	Recommendations for future research based on successes in the current study	Potential strategies to improve on the current study's methods
	month), and most reported not vending in certain weather (e.g., rain). Some vending vehicles were identified in different locations on different days.	<ul style="list-style-type: none"> are about the cart, truck, or stand, <i>not</i> the person doing the selling who may change from day to day or even within a day even if the cart, truck, or stand stays in one place. Conduct primary assessments on fair-weather days. Note different location if a given cart, truck, or stand is seen more than once; use the original observation for record keeping, updating any missing fields (do not create a new record, erroneously counting a single vendor in two locations as two separate vendors). 	<ul style="list-style-type: none"> Ask vendor if there are other vendors that usually sell in the immediate area that just happen not to be there that day (discussions with vendors revealed that many vendors knew each other and knew the selling patterns of those typically selling around them). Ask about prolonged planned absences (e.g., vendor returning to country of origin for an extended visit).^a Focus assessments and reassessments (reliability checks) on smaller sub-areas within the larger study area.
Not disrupting vendor's business	In several instances vendors were with long lines of customers and not available for interview.	<ul style="list-style-type: none"> Gather all information possible by direct observation. If feasible, wait to speak to vendor. 	<ul style="list-style-type: none"> Return at a later time to try again.
Investigator comfort/safety	Both members of both teams of student investigators were unfamiliar with most Bronx neighborhoods. A female investigator occasionally felt uncomfortable in neighborhoods where male investigators felt less threatened. There were a few occasions on the street where police activity clearly signaled some immediate threat to personal safety.	<ul style="list-style-type: none"> Always collect data in pairs Make sure any data-collection pair includes at least one male investigator (both for perceived safety reasons and for addressing vendor reluctance to participate as discussed below). Avoid openly using smart phones or other expensive hand-held equipment (both to avoid investigator distraction and to avoid incentivizing theft). 	<ul style="list-style-type: none"> Avoid parking arrangements where one investigator has to stay with the car, effectively separating the team. For data collection, utilize residents of neighborhoods or street-savvy individuals familiar with target communities.
Vendor reluctance to participate	1 in 4 vendors that investigators approached either refused to participate or were reluctant to do so despite assurances that questions were only for a research study about community nutrition. There appeared to be concern about regulatory authority, with many vendors reporting getting expensive tickets from police and one vendor directly asking	<ul style="list-style-type: none"> Have investigators dress in unofficial-looking attire (e.g., jeans, shorts, t-shirts, baseball caps). Avoid clipboards and official looking notebooks; memorize questions and weave them into informal conversation (recording responses in writing on data collection sheets only after the interview is complete). Ensure at least one investigator is fluent in language(s) vendors are likely to be most comfortable speaking. 	<ul style="list-style-type: none"> Utilize residents of neighborhoods to collect data. Make use of younger students (e.g., high-school students) who would unlikely be perceived as agents of regulatory authority. Carry plain-language one-pager on official stationary describing the study (with versions translated into expected languages).

Assessment consideration	Experience in current study	Recommendations for future research based on successes in the current study	Potential strategies to improve on the current study's methods
	investigators if they were going to shut down her business and prevent her from selling food on the street anymore. A female investigator reported several instances where a vendor would not speak with her but would speak to male colleague.	<ul style="list-style-type: none"> • Make sure any data-collection pair includes at least one male investigator. • Empathize with vendors' problems with legal entities and clearly distance the research from any regulatory activities. • Carry identification that clearly confirms no association with regulatory authorities. • Address suspicious stares of onlookers with pre-emptive explanations.^b 	

^a In some cases, vendors discussed selling for many years, with consistency on the street interrupted by prolonged trips back to countries of origin (e.g., Mexico, Dominican Republic, India, Bangladesh)

^b In some cases people on the street openly discouraged vendors from answering questions, warning that investigators could not be trusted and that talking to the research team would have negative repercussions