



The promise and pitfalls of mobile markets: an exploratory survey of mobile food retailers in the United States and Canada

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Abstract

In recent years innovative approaches have emerged across the United States and Canada to improve access to healthful foods. Mobile markets—traveling food retailers that specifically target food deserts—are one such strategy. Given the recent emergence of mobile markets, and their positioning as a solution to disparities in food access, research is needed to understand potentials and limitations of the model. In this article, we report on findings from a survey of mobile market operators in the United States and Canada. Results identify tensions between the intended goals of mobile markets and constraints of the model itself. Further study, including applied research, is needed to better understand potential opportunities to strengthen mobile markets as an intervention strategy.

Keywords Mobile markets · Food deserts · Food disparities · Food access

Introduction

It is widely established that throughout the United States low-income neighborhoods and communities of color have fewer full-service grocery stores and experience disparities in access to healthful food (Larson et al. 2008; Walker et al. 2010). These “food deserts,” as they are known, are often defined by geographical distance to grocery stores (Walker et al. 2010).

The food desert frame increasingly takes into consideration economic and transportation factors, measured by high concentrations of low-income households, and limited access to personal or public transportation that might link people to grocery stores (Dutko et al. 2012). Indeed, the United States Department of Agriculture replaced the “Food Desert Locator” with a “Food Access Research Atlas” to

account for supermarket proximity, socioeconomic indicators, and transportation data (see: <https://www.ers.usda.gov/data-products/food-access-research-atlas/>). Moreover, the USDA now also produces a “Food Environment Atlas” that includes a variety of spatial data to paint a more complete picture of food environments and the relationship between health and place, including data on fast-food outlets, food assistance programs, food prices, health indicators, and other socioeconomic data (see: <https://www.ers.usda.gov/data-products/food-environment-atlas/go-to-the-atlas/>).

In recent years, efforts to improve food access have emerged from both the public and private sector (Walker et al. 2010). One such intervention—mobile markets—are food retailers on wheels, bringing produce and other food staples into neighborhoods, especially those characterized by disparities in food access. Or, rephrased, mobile markets are simply mobile food retailers that explicitly target food deserts (Hsiao et al. 2018, 2019; Sifferlin 2012; Robinson et al. 2016; Widener et al. 2012; Windmoeller 2012; Wishon and Villalobos 2016; Zepeda et al. 2014).

Mobile markets are a more recent food system intervention and are emerging very quickly. First appearing in 2002, by 2016 mobile markets operated in approximately fifty communities throughout the U.S. and Canada.¹ Because

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¹ Internet searches and the USDA Agricultural Marketing Services “National On-Farm Market Directory” (<https://search.ams.usda.gov/OnFarmMarkets/>), found 50 mobile markets in the U.S. in August

of their rapid emergence there is insufficient understanding of mobile markets and their potential to help expand food access in any significant way. There is nascent literature on mobile markets (reviewed below), yet much about mobile markets remains unknown.

Current understandings of mobile markets are based largely on case studies, popular press accounts, or even anecdotal information of market characteristics. This paper reports findings from a survey of mobile markets in the United States and Canada. The primary goal of this research is to understand the feasibility of mobile markets as a model to address disparities in food access. The secondary goal is to develop a baseline understanding of the structure and function of mobile markets and identify areas of future research.

First, we review the existing literature on mobile markets. After a discussion of research methods, we present findings from a survey of mobile market operators, including an overview of mobile markets, such as operational characteristics, populations served, foods distributed, and mobile market finances. Following this overview is a coda, commenting on the viability of mobile market as a model to address disparities in food access and suggestions for a future mobile market research agenda.

Background

Mobile food retailing certainly is not new. Produce and other food vendors have long used mobility as a retailing strategy. Farmers and food vendors historically traveled to population centers to sell products, bringing food from places of production to places of consumption, and the practice remains commonplace throughout the world today. “Mobile markets,” however, are a distinct form of mobile food retailers in that they are an explicit food system intervention deliberately targeting food deserts within North America by aiming to increase the availability, accessibility, and affordability of healthful food, especially fruits and vegetables (Leone et al. 2018; Mari 2017; Robinson et al. 2016; Ylitalo et al. 2019; Zepeda et al. 2014).

Mobile markets first emerged as a food distribution model in 2002 when the People’s Grocery launched its mobile market, which operated for approximately five years in West Oakland, California as a stopgap measure during the development of a full-service food market (People’s Grocery 10

Year Annual Report 2013). The mobile market was used as a temporary tool to address food and health disparities while also building community support for a permanent grocery store.² In short, the founders of People’s Grocery had insufficient capital for a bricks-and-mortar store and thus decided to retrofit an old postal truck into a traveling food market, targeting underserved neighborhoods. A mix of grant dollars, individual donors, product sales, in-kind donations, and membership fees financed the market and food was sourced from various suppliers and urban gardens connected to People’s Grocery (Suutari 2006). This re-purposing of the traditional mobile produce vendor has since spread to other communities throughout the U.S. and Canada.

Mobile markets are championed as a model that can increase availability, accessibility, and consumption of healthful foods in neighborhoods characterized as food deserts. Food Desert Action, operator of the well-publicized Fresh Moves Mobile Market in Chicago, Illinois exemplifies the orientation of the mobile market movement with the stated mission to “end food deserts in Chicago by bringing fresh and affordable produce to these communities and educating residents about healthy eating” (Food Desert Action 2012).

Because mobile markets are an emergent intervention, there are many unanswered questions regarding the role they play in addressing food inequalities and the long-term viability of the mobile market model. Even mobile market operators recognize the limits of the model. As noted by the former Executive Director of FoodShare, a not-for-profit organization in Toronto that runs a mobile market in addition to many other food access programs and projects: “Basically the jury’s still out on how to operationalize [the mobile market model] and make it sustainable, even for a nonprofit that’s subsidized ... I don’t think that it’s actually working for anybody who’s doing it right now.”³ Some scholars and advocates contend that while grassroots programs like mobile markets provide an important public service, access to quality and affordable food is a basic human right (Anderson and Bellows 2012). Despite the many challenges and unknowns, mobile markets are expanding as one tool to address food access disparities by bringing food to communities most in need (Leone et al. 2018; Mari 2017; Robinson et al. 2016; Ylitalo et al. 2019; Zepeda et al. 2014).

Mobile markets are thought to be more nimble, flexible, and less costly than traditional food markets. The assumption

Footnote 1 (continued)

2016, including 5 which were no longer operational. Because some mobile markets might not be found via the internet and because the “National On-Farm Market Directory” relies on self-reporting, the number of mobile markets found is an estimate.

² The Community Food Market opened in West Oakland in spring of 2019 (<https://www.communityfoodsmarket.com/>).

³ Quoted in Adele Peters, “Why Mobile Markets Aren’t Going To Solve The Problem Of Food Deserts,” *Fast Company*, December 3, 2014: <https://www.fastcompany.com/3039061/why-mobile-markets-arent-going-to-solve-the-problem-of-food-deserts>

is that mobile markets can be adaptable enough to serve the changing food requirements of a community, popping up in different neighborhoods as needed. Hypothetically, mobile markets are much less expensive to establish and run than a bricks-and-mortar store because of less overhead costs. Mobile markets can also target people where they are, by traveling to consumers rather than have consumers travel to the store. Thus, mobile markets are said to be able to address food access disparities as a flexible, low-cost model that can simultaneously increase market access for regional farmers from whom produce is sourced (Leone et al. 2018; Mari 2017; Robinson et al. 2016; Zepeda et al. 2014).

Existing research on mobile markets examine the *potential* of mobile markets to fill spatial gaps in food retail access through spatial modeling (Widener et al. 2012). More importantly, mobile markets have been found to be effective at increasing consumption of fruits and vegetables in low-income communities, albeit modestly (Hsiao et al. 2018; Leone et al. 2018; Gorham et al. 2015; Zepeda et al. 2014). Zepeda et al. (2014) find that mobile market shoppers consume more fruits and vegetables than non-shoppers but still do not meet recommended levels of consumption. Their findings confirm that “while providing access is important, there are other constraints preventing people from greater fruit and vegetable consumption” (p. 65).

These studies point to the potential of mobile markets to meet consumer needs without a full accounting of the model itself. In one study, the authors (Gorham et al. 2015) note that mobile markets intend to use higher prices and high-volume sales at some stops to offset lower prices at others. When speculating on the feasibility of the model to be self-sustaining, the authors note: “Although a detailed business plan is beyond the scope of this article, sustainability for Fresh to You [mobile market] is possible through a ‘Robin Hood’ model, whereby the profit from higher sales (and potentially higher prices) at Fresh to You markets at worksites, colleges, and in high-income neighborhoods could help subsidize the cost of bringing markets to low-income neighborhoods” (Gorham et al. 2015, p. 5). Indeed, in another study, researchers note the extensive challenges mobile markets face: “financial viability is a concern, as many of the mobile markets described in the published literature have closed due to issues with the sustainability of the model” (Leone et al. 2018, p. 9).

Recognizing the challenge that economic sustainability presents to mobile markets, Wishon and Villalobos (2016) explain:

In spite of the growing popularity of this retail format, mobile retailers have yet to demonstrate that they can be an effective alleviation technique since they have had minimal success at becoming economically sustainable. Most, if not all, existing mobile retailers receive a sig-

nificant portion of their funding from federal or local grants and even long serving mobile retailers experience difficulties in obtaining sufficient income to offset their operational costs. Such a strategy is clearly unsustainable for any permanent alleviation remedy (p. 154–5).

Existing research indicates that mobile markets are not currently financially viable and operate with support from grant dollars, state programs, and donations. However, as a food desert intervention, mobile markets are nevertheless supported by the belief that the model will eventually become self-sustaining. The hope is that revenue generated by high cost/high volume sales will offset mission-oriented work to addressing disparities in healthful food access. Wishon and Villalobos (2016) thus use extensive computer modeling through “operations research” (OR), to help identify the best amalgam of product sales and market routes to maximize revenue. The authors used OR to illustrate the economic feasibility of mobile markets and concluded that mobile markets can be viable if they increase sales—including sales of “unhealthy” food—and target neighborhoods not identified as food deserts. In other words, mobile markets might be viable if they abandon their core mission altogether.

In a comparative case study, Robinson et al. (2016) found that the operational constraints and political economic context of mobile markets undermine their ability to address food system disparities in any meaningful way. Mobile markets, Robinson et al. (2016) conclude, “are muted by their limited scale and scope ... and by the tension that arises within and between project missions and economic viability” (p. 889). Or, as Mari (2017) notes: “mobile markets are not suited to improve food access conditions in the long run for those who are most vulnerable to food system inequities ... the geographic availability of food does not necessarily improve or lead to improvements in the social conditions that make food access a problem in the first place” (p. 154).

With the exception of the comparative case study (Robinson et al. 2016), no existing research thoroughly examines mobile market characteristics. Given concerns about financial practices, basic operational structure, and the impacts of mobile markets, this gap is notable. Moreover, this gap in our understandings of mobile markets has policy implications and is important for developing interventions both adequate and appropriate for addressing food disparities. The current research begins to address this gap by examining mobile markets themselves, asking: what are the operational characteristics of mobile markets and what might these tell us about the long-term viability of the mobile market model?

Methods

The research was approached as a descriptive study, whereby we used a survey to collect baseline data of mobile markets operating in the United States and Canada. The researchers previously completed an exploratory project (redacted for review) and were thus prepared to conduct more widespread descriptive research. As Miller and Deutsch (2009) note: “Descriptive research, though not able to comment on causality or associations, can be useful in food studies as these types of data can be useful when we are exploring new areas of research” (p. 103). Given the quick emergence of mobile markets and the lack of research that explicitly studies their structure, function, and viability, the goal of this research is to better understand the feasibility of mobile markets as a model to alleviate food system disparities.

Methodologically, a survey provides description of general trends through sampling in a relatively simple and quick manner (Babbie 1990; Creswell 2003). The online survey had a total of 50 questions, including a mix of fixed-response and open-ended questions. Participants took approximately 1/2 h to complete the survey. A project mentor, another mobile market researcher, and a program analyst with the United States Department of Agriculture (USDA) Agricultural Marketing Service reviewed a draft survey. A pilot survey was completed by 5 respondents to test the clarity and usefulness of the questions before wider distribution. Questions covered: (1) market structure and operational practices (e.g., start-ups costs, annual budgets, employees etc.); (2) products sold (types of food, quantity, sources, etc.); (3) customers (demographics of population served); (4) economic/geographic access (prices, forms of payment; stop locations, schedules, etc.); and finally (5) other activities of the market (educational programming, advocacy, etc.).

Potential respondents were identified through Internet searches, referrals, and the USDA Agricultural Marketing Services “National On-Farm Market Directory” (<https://search.ams.usda.gov/OnFarmMarkets/>). In total we found 50 mobile markets in the U.S. and Canada in August 2015, including 5 markets no longer operational. Because some mobile markets might not be found via the Internet and because the “National On-Farm Market Directory” relies on self-reporting, the number of mobile markets found is an estimate.

The survey was constructed using Qualtrics online survey platform (<https://www.qualtrics.com/>) and distributed to all known mobile markets via email. Following Salant and Dillman (1994) we used a four-step process for administering the survey: (1) email announcement; (2) link to actual survey; (3) follow-up email; and (4) phone call follow-up to non-respondents. Email announcements were sent one week before sending the survey link and respondents were

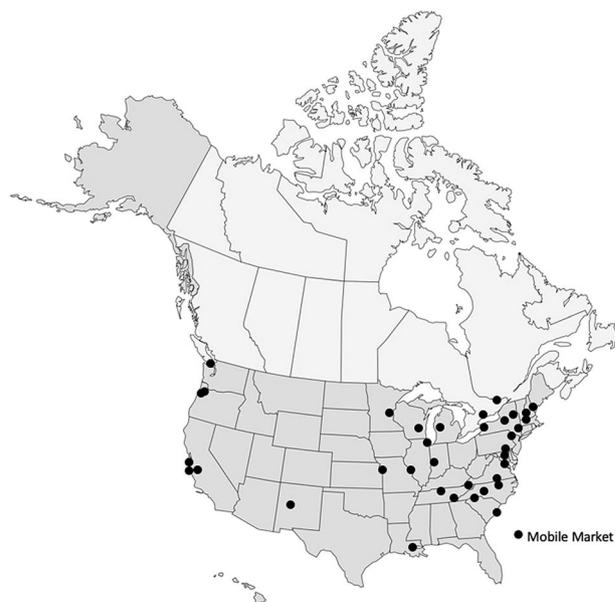


Fig. 1 Mobile market survey respondents

incentivized through a drawing for \$25 gift cards with odds of winning at 50%. Data were collected September 2015–February 2016.

Survey respondents ($n = 36$) come from across the U.S. ($n = 33$), with a few from Canada ($n = 3$) as well, reflecting good geographic diversity (see Fig. 1). With 50 surveys distributed our response rate is 72%. Although we do not know the characteristics of the mobile markets not represented in the responses, a high response rate indicates survey findings are generalizable.

Findings

Mobile market characteristics

As indicated in the literature, in popular press, and through Internet searches, our survey findings confirm that mobile markets—as distinctly focused on targeting food access disparities—are a more recent food system intervention and are emerging very quickly (see Fig. 2). Moreover, mobile markets are also disappearing quickly, with 15% of survey respondents indicating that their market is no longer operating at the time of the survey.⁴ As discussed in more detail

⁴ All known mobile markets were surveyed. In some cases markets no longer operating were surveyed through contact information found online or through contact with connected organizations (e.g., not-for-profit that formerly ran a mobile market).

Fig. 2 Number of surveyed mobile markets in operation by year

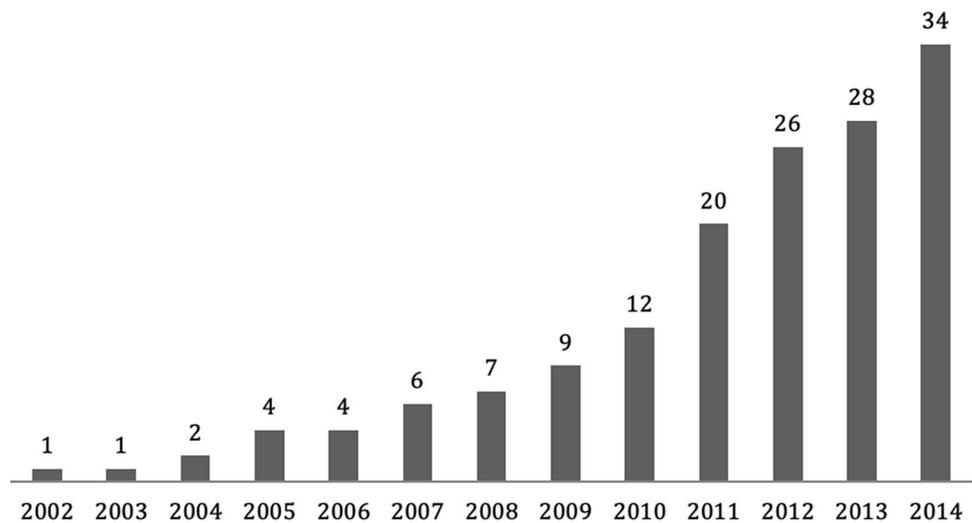
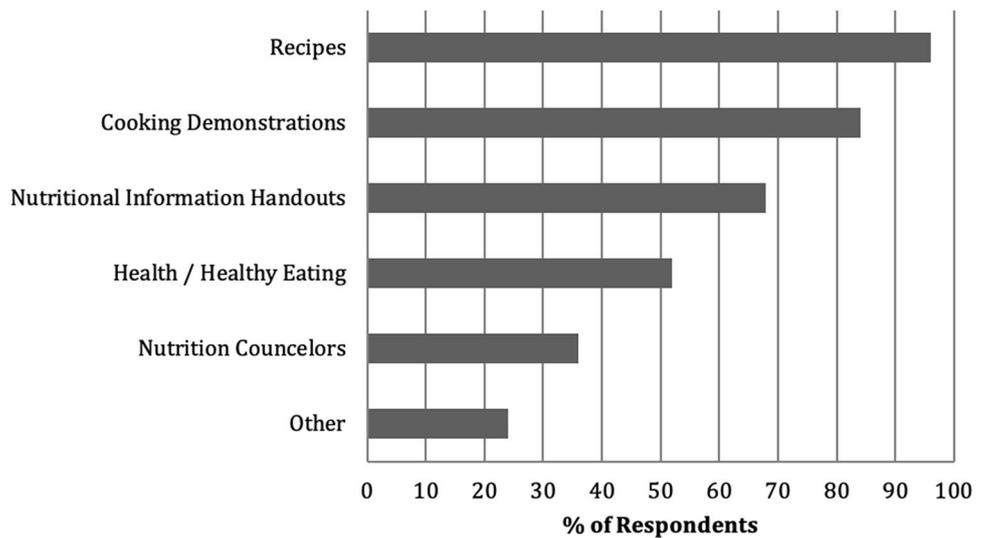


Fig. 3 What type of educational or outreach programming do you offer?



below, all of the mobile markets that have ceased operations identify lack of financial viability as the reason for closing.

Mobile markets are largely not-for-profit (89%) and most operate as projects of parent organizations (83%). These include farmers’ markets (25%), community gardens or urban farms (20%), grocery stores (10%), and food banks, pantries, or soup kitchens (10%), among others such as a health department or university. In line with previous descriptions, mobile markets operate out of trucks (52%) and buses (24%), with vans, trailers, or as pop-up farm stands also serving as mobile markets. Most mobile markets operate as retailers, selling food items (93%). Some mobile markets instead operate like food pantries, always providing food for free (7%). Although no respondent indicated reliance entirely on volunteer staff, approximately half of mobile markets report using volunteer labor with the other half being run by paid staff exclusively.

Mobile markets engage in a wide variety of methods to publicize the market, including social media, newsletters, email, flyers, and radio, television, and newspaper advertisements. And, many mobile markets (83%) offer education and outreach programming, including providing recipes (93%), cooking demonstrations (84%), nutritional information (68%), and nutrition counselors on site (36%) (see Fig. 3). However, when asked specifically “Which marketing tool do you see as the most effective for your mobile market?” every respondent indicated word of mouth was the as the most effective form of advertising. This includes open-ended responses such as “personal referrals” and “person to person” in addition to specifically stating “word of mouth.” This is notable insofar as one identified shortcoming of mobile markets is failure to advertise widely (Robinson et al. 2016).

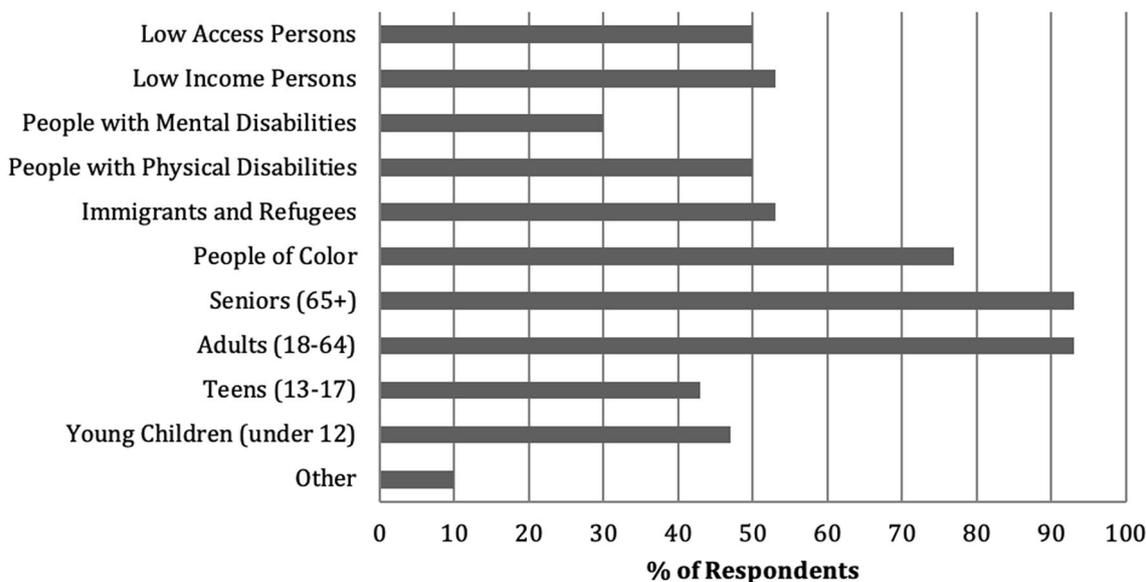


Fig. 4 Which populations does the mobile market target? (Check all that apply)

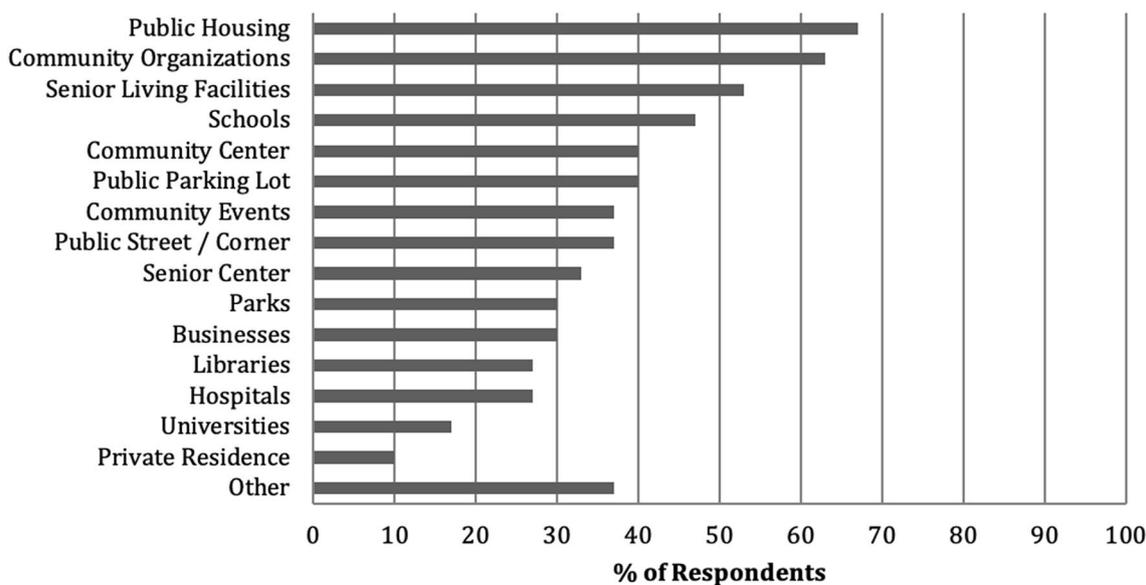


Fig. 5 How would you describe the locations served by the mobile market? (Check all that apply)

Populations served

By definition, mobile markets are mobile food retailers targeting food deserts (Hsiao et al. 2018, 2019; Sifferlin 2012; Robinson et al. 2016; Widener et al. 2012; Windmoeller 2012; Wishon and Villalobos 2016; Zepeda et al. 2014). And, when asked, “approximately what percentage of mobile market stops are in ‘food deserts’” all survey respondents report to explicitly target food deserts and many report exclusive focus on serving food deserts by *only* serving neighborhoods designated as such (30%).

Indeed, mobile markets target a diversity of customers (see Fig. 4) and a range in types of locations served (see Fig. 5). Mobile market operators also report working to improve geographic access as indicated by distance traveled by customers (respondents estimate a total of 86% customers travel 1 mile or less to the market). However, survey data indicate mobile market operators are not necessarily clear on what constitutes a “food desert.” When asked about targeted customer base, mobile market operators do not necessarily focus on “low access” or “low income” populations, but instead view other demographics as the primary target,

Table 1 Market stops by frequency and time

	Minimum	Maximum	Mean	SD
Stops per week	1	30	12	8.5
Hours per Stop	0.5	5	2	1.1

may be simultaneously working to expand market access for producers. Notably, there is no clear geographic distinction evident in seasonality and market schedules. Nevertheless, these findings on mobile market scheduling highlight the challenge of operating a viable mobile market that positively impacts food disparities, as few stops are available to those

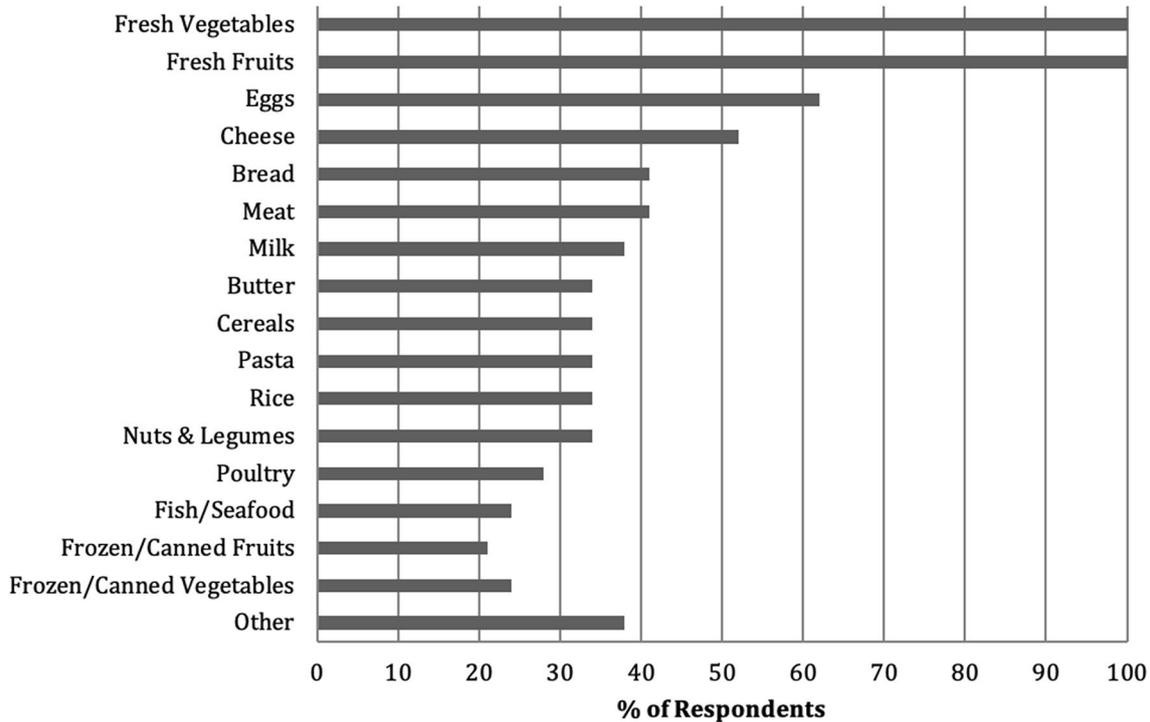


Fig. 6 What food items do you sell? (Check all that apply)

such as senior citizens and/or persons of color (see Fig. 4). This indicates significant discrepancies between common definitions of food deserts and the intended customer base of mobile markets.

Mobile market schedules tend to be limited and thus impact market accessibility. Mobile markets operate most often during normal weekday business hours; only 17% of markets report operating after 5 pm. On the weekends 25% of markets are reported to operate on Saturdays with only 5% running on Sundays. On average, mobile markets make 12 stops per week (albeit with a vast range of 1–30) and market stops are approximately 2 h long (see Table 1). Mobile markets operate few stops for short periods of time with few operating on weekends or after normal work hours.

In addition to schedule limits, mobile markets do not all operate year-round. Although many mobile markets function all year (63%), a full 37% of mobile markets operate during summer months only, June–October. As Robinson et al. (2016) found in a comparative case study, some markets prioritize expanding access to consumers while other markets

working during normal business hours and many markets operate only seasonally.

Food distribution

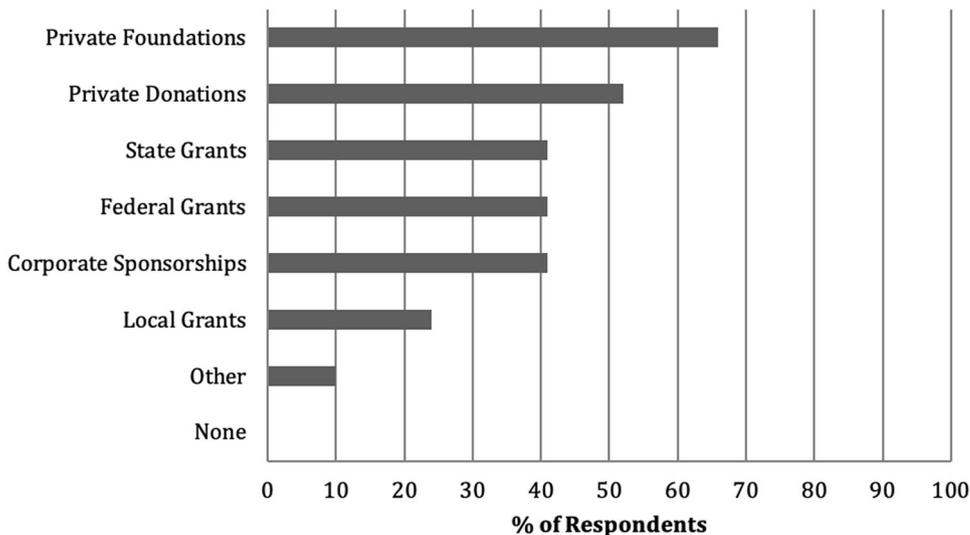
As mobile food retailers, all mobile markets report distributing fresh fruits and vegetables. Additionally, many markets sell eggs (62%), cheese (52%), bread (41%), meat (41%), milk (38%), and other products such as grains, legumes, and frozen or canned produce (see Fig. 6).

All mobile markets sell locally-sourced foods when in season, and some mobile markets (35%) sell only “local” food year-round. This seems to confirm that mobile markets are often working to simultaneously address gaps in food access for consumers and new market opportunities for regional farmers. Organic food sales do not seem to be a top priority for mobile markets: no mobile market sells exclusively organic products and an equal number of mobile markets prioritize organic products as those that carry no

Table 2 Market start-up and operating costs

	Minimum	Maximum	Mean	SD
Start-up costs	\$15,000	\$350,000	\$83,800	\$77,100
Annual operating costs	\$12,000	\$688,100	\$149,900	\$157,202
% of annual budget covered by revenue	0	95	35	29

Fig. 7 What other sources of funding does the mobile market rely on? (Check all that apply)



organic products. Finally, few mobile markets sell prepared food items, such as soups, salads, or sandwiches, as only 10% of markets report always carrying some prepared food items, with 21% indicating they sometimes have prepared foods, and most (69%) never sell prepared foods.

Mobile market financial structure

Insofar as the rationale behind mobile markets is that they are an innovative model for addressing food access disparities thanks to little financial overhead and geographic flexibility, it is imperative to understand mobile markets finances. Notably, there is great variation in reported start-up costs for mobile markets, ranging from a low of \$15,000 to a high of \$350,000, and annual operating costs likewise range greatly, from \$12,200 to \$668,141 (see Table 2). Start-up costs include vehicle purchase and renovations, insurance, tools and supplies, and inventory. Annual operating expenses include staff salaries and benefits, vehicle maintenance, insurance, fuel, and inventory. Revenue generated by mobile markets varies from \$500 to \$200,000 annually, with *not a single mobile market covering operating expenses on revenue alone*. We asked mobile market operators what percentage of the annual mobile market budget is covered by revenue generated by market sales. Only one market came close to economic sustainability with 95% of the budget

covered by market revenue; most mobile markets (71%) report generating approximately ¼ of operating costs or less through sales alone. Mobile markets are reliant on external funding, including private foundations (66%), private donations (52%), and corporate sponsorships (41%) representing the most common forms of funding (see Fig. 7). Mobile markets also receive funding from federal (41%), state (41%), and local (24%) sources.

As the mobile market model itself would indicate, mobile markets deliberately hope to price products below prices found at the nearest grocery store. To be sure, this is reported data and may not be accurate, as Robinson et al. (2016) found no measurable difference between mobile market prices and grocery store prices. Nevertheless, many mobile market operators report prices consistently lower than nearest grocery stores (48%) with only a handful (4%) reporting consistently higher prices (see Fig. 8).

Mobile markets accept many forms of payment, including cash, credit, Supplement Nutrition Assistance Program (SNAP) benefits, Women, Infant and Children (WIC) coupons, Farmers’ Market Nutrition Program (FMNP),⁵ and other local food dollars (see Fig. 9). Of the markets that retail food, cash is the primary form of payment. Two markets report all sales are cash, with very few (17%) reporting less than 25% of sales done in cash. On average, customers spend very little per mobile market trip, with 59% of

⁵ “The WIC FMNP was established by Congress in 1992, to provide fresh, unprepared, locally grown fruits and vegetables to WIC participants, and to expand the awareness, use of, and sales at farmers’ markets” (<https://www.fns.usda.gov/fmnp/wic-farmers-market-nutrition-program-fmnp>).

Fig. 8 How do the prices sold by the mobile market compare to nearest grocery store?

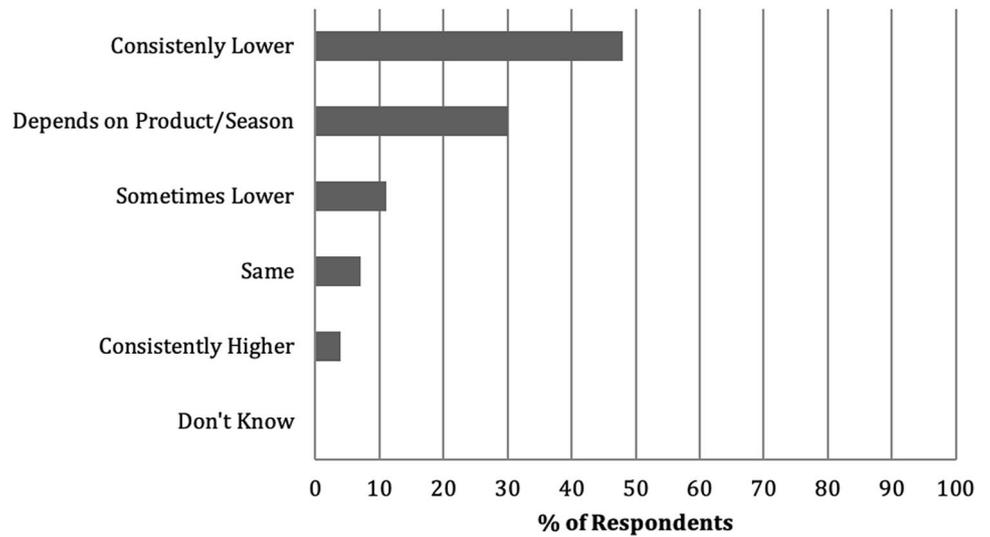


Fig. 9 Which forms of payment does the mobile market accept? (Check all that apply) (Respondents that do not accept any form of payment (i.e., provide food for free) were removed)

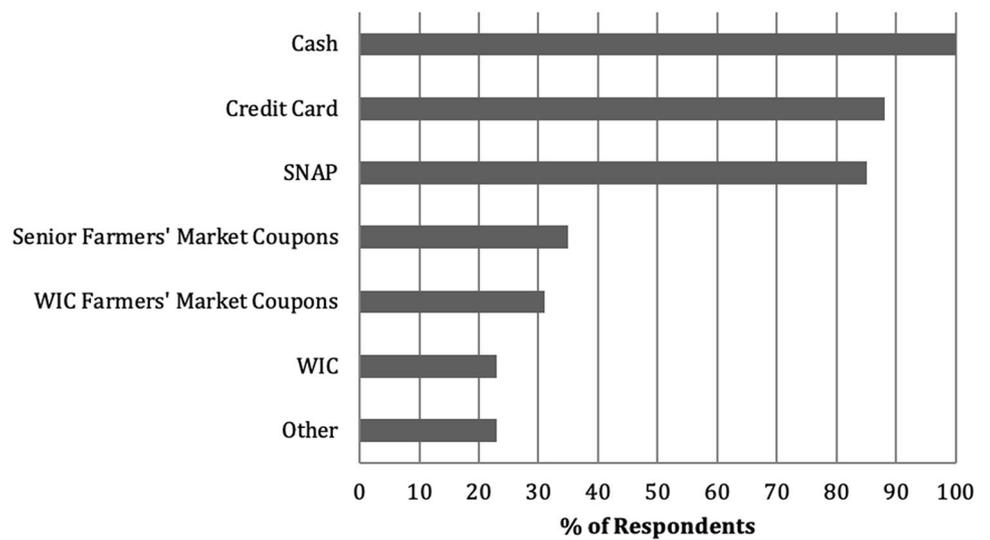
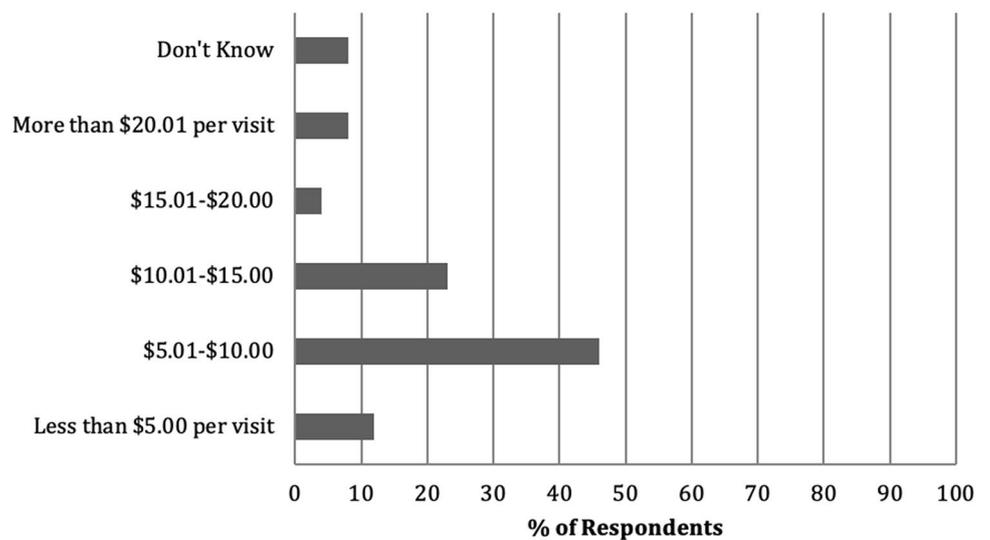


Fig. 10 On average, how much money do customers spend per visit to the mobile market?



customers spending \$10.00 or less per visit and a total of 81% spending \$15.00 or less per visit (see Fig. 10).

Together, these data highlight a limitation in the mobile market model. Mobile markets aim to address disparities in food access and positively impact diet and thus public health. However, our survey findings indicate a reliance on cash sales with some markets not even accept other food dollars utilized by food insecure populations. Mobile market customers are also spending very little per market trip, thus indicating markets are not making a significant contribution to food intake.

Conclusion

With the quick emergence of mobile markets, understanding the feasibility of the model and the role they might play in addressing disparities in healthful food access can help inform food system interventions. As an emergent intervention model, mobile markets are likely tenuous at best. This finding confirms a previous comparative case study that found limitations to the mobile market model (Robinson et al. 2016). Other studies point to multiple barriers to healthful diets and note the inability of mobile markets to be economically sustainable even when championing the so-called Robin Hood model (Hsiao et al. 2018; Leone et al. 2018; Gorham et al. 2015; Zepeda et al. 2014). And the OR perspective used by Wishon and Villalobos (2016) to illustrate the economic feasibility through better site location and increased sales undercuts the model itself by shifting focus away from addressing disparities.

Our survey finds that all mobile markets no longer operating identify lack of financial viability as the reason for closing. When asked why market operations ceased, one respondent noted: the mobile market was “too expensive, unable to sustain itself through sales.” Another market operator explained: the mobile market was “not effective at providing convenient access to a sufficient basket of goods ... [the market] was not financially viable.” This is not surprising given our findings that customers spend very little per trip and mobile markets make few stops, many of which are only available during normal work hours. Moreover, no market yet generates enough revenue to cover expenses, and most are not even close to doing so.

Additionally, survey data indicate mobile market operators are not necessarily clear on what constitutes a “food desert.” When asked about targeted customer base, mobile market operators do not necessarily focus on “low access” or “low income” populations—commonplace understandings of food deserts—but instead view other demographics as the primary target. This indicates that either mobile market operators are misguided in their efforts, or, front-line work to increase food access have

more nuanced understandings of food inequality. Indeed, most understandings of food access—still often designated by the shorthand of “food deserts”—fail to fully consider alternatives to grocery stores or appreciate the complex ways in food inequality is temporally uneven (Widener and Shannon 2014), produced through broader political and economic processes (Shannon 2014), is shaped by social exclusion (Howerton and Trauger 2018), and is defined by a variety of barriers (Robinson et al. 2016).

Our survey results find that although mobile markets might serve an important function for those who use them (Hsiao et al. 2018, 2019; Sifferlin 2012; Robinson et al. 2016; Windmoeller 2012; Zepeda et al. 2014), the model itself, and underlying assumptions driving the trend of mobile markets, is still in need of critical interrogation. Mobile markets are currently unable to substantially address food disparities and do not generate adequate revenue to support operation.

The caution raised by existing research (see: Robinson et al. 2016; Widener et al. 2012; Wishon and Villalobos 2016; Zepeda et al. 2014) is evident in our survey findings: mobile markets are not economically self-sustaining. But they should not need be. Just as the emergency food system is not expected to generate sufficient revenue to fund operations, mobile markets seem best positioned to operate within this framework. Mobile market operators and those who fund them must realize this and then work to establish realistic outcomes and expectations not tied to revenue. In this way, mobile markets could broaden impact and might establish an alternative food intervention established on expanding access to food for consumers and access to markets for producers.

Given that food insecurity remains an intractable problem throughout the United States, and various interventions aim to disrupt food disparities, our survey findings are useful for better understanding shortcomings of these efforts. Despite the shortcomings of the mobile market model, future research might consider the specific dynamics that allow some markets to be more successful, and—most important—by what measures.

Our survey findings indicate mobile market shortcomings but are unable to determine causal relationships. In depth studies of different characteristics could determine if any significant changes might make mobile markets more economically viable. As OR modeling illustrates, mobile markets can conceivably generate revenue to support operation, but not without abandoning mission or at least making certain concessions (e.g., selling junk food). It's important to note that much of the food retail industry—from bodega to gas station to supermarket—generates significant income from processed foods, value added foods (e.g., prepared foods), and non-food items. Thus, research should focus specifically on how mobile markets

might remain true to mission *and* generate sufficient revenue for long-term sustainability.

Determining correlation between economic viability and different mobile market characteristics would be a fruitful area of research. For example, could mobile markets better publicize (rather than rely on word-of-mouth), change schedules (i.e., to better accommodate work schedules), induce customers to spend more, or out compete other retailers on cost? Should mobile markets be more conscious of target audience, and what impacts might this have on both market mission and market viability? Additionally, we could better understand consumer perspectives as a window into the impacts of mobile markets. Future research could also work to understand how geographic context influences market operations. And, research is needed to gain the perspective of funders, to determine how and why there is pressure for market self-sufficiency. Finally, given that all mobile markets sell at least some locally-sourced foods and 35% sell exclusively local foods, understanding the role mobile markets play for providing market access for producers and food system localization and democratization.

We might rightly conclude we need more research on the economic viability of mobile markets. Or, we might conclude that mobile markets are unable to generate sufficient revenue for survival and thus advocate the need for external economic support. Or, maybe we need to ask if mobile markets are an appropriate intervention at all. Conceivably, of course, we might consider mobile markets as a temporary spatial fix and fight more forcefully for food justice, food sovereignty, and a right to food.

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