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Sustaining mobile produce vending in NYC: Evaluating the future of Green Carts

Katherine Tomaino Fraser,[a] * Rositsa T. Ilieva,[b] Jacquelyn Sullivan,[c] Julia Greene,[d] Mukta Mohnani,[e] Craig Willingham,[f] and Nevin Cohen [g]
City University of New York (CUNY)

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Abstract

Consumption of fresh fruits and vegetables is essential for preventing diet-related chronic diseases, yet many low-income residents have inadequate diets because their communities face persistent barriers to supplying healthy food. In New York City (NYC), the Green Carts program is a mobile produce vending initiative to improve fresh food access in underserved neighborhoods while supporting immigrant entrepreneurship. This paper presents the findings of a multi-methods evaluation of the Green Carts program and points to a fundamental tension between the program's public health goals and vendors' financial viability. We

[a] * *Corresponding author:* Katherine Tomaino Fraser, CUNY Urban Food Policy Institute; 55 West 125th Street, Room 603; New York, NY 10027 USA; +1-646-364-9605; katherine.tomaino@sph.cuny.edu; https://orcid.org/0000-0002-0448-7157

[b] Rositsa T. Ilieva, CUNY Urban Food Policy Institute, New York, NY USA; rositsa.ilieva@sph.cuny.edu; https://orcid.org/0000-0001-8183-5445

[c] Jacquelyn Sullivan, CUNY Urban Food Policy Institute, New York, NY USA; jacquelyn.sullivan@sph.cuny.edu

[d] Julia Greene, CUNY Urban Food Policy Institute, New York, NY USA; julia.greene@gmail.com

[e] Mukta Mohnani, CUNY Urban Food Policy Institute. Mukta Mohnani is now at CUNY John Jay College of Criminal Justice, New York, NY USA; imuktamohnani@gmail.com

[f] Craig Willingham, CUNY Urban Food Policy Institute, New York, NY USA; craig.willingham@sph.cuny.edu

[g] Nevin Cohen, CUNY Urban Food Policy Institute, New York, NY USA; and CUNY Graduate School of Public Health and Health Policy, New York, NY USA; nevin.cohen@sph.cuny.edu; https://orcid.org/0000-0003-4961-572X

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found that Green Carts are an important source of produce for the more than half of customers who buy from them multiple times per week, but vendors earn a median annual income of $20,000,[1] substantially below NYC's living wage. Low electronic benefit transfer (EBT)[2] acceptance limited accessibility for Supplemental Nutrition Assistance Program (SNAP) recipients, and more than half of NYC's public housing developments, home to more than 400,000 low income residents, lack convenient access to Green Carts. Mobile produce vending can meaningfully address urban food inequities, but current economic constraints limit the program's sustainability and impact. We suggest several improvements to help realize its potential, including financial support for vendors, expanded EBT access, and location incentives aligned with equity goals. This program evaluation provides practical insights for other cities seeking to implement mobile vending models to improve public health and provide economic opportunities for local vendors.

Keywords
food access, mobile food vending, Green Carts, public health, food policy, New York City

Introduction

Food insecurity, often driven by inadequate access to fresh produce, poses significant public health challenges, particularly for residents of low-income urban communities. In neighborhoods with high concentrations of poverty, the scarcity of retailers selling nutritious foods creates barriers to healthy eating (Walker et al., 2010). Limited access to and consumption of fresh fruits and vegetables contributes directly to health disparities, as diet-related chronic conditions including diabetes, heart disease, and cancer disproportionately affect economically disadvantaged populations (Benavidez et al., 2024; Centers for Disease Control and Prevention [CDC], 2024).

Cities present unique obstacles to food access, as many residents must rely on public transportation to reach grocery stores and transport food home (NY Health Foundation, 2022). New York City exemplifies these challenges. Approximately 14.6% of its residents experience food insecurity, with significantly higher rates in communities of color: borough-level food insecurity estimates range from 18–31% for Black residents and 20–30% for Hispanic residents (NYC Mayor's Office of Food Policy, 2025). Food affordability further compounds the problem, as 79% of New Yorkers report increasing difficulty affording groceries (Lucas, 2024). These intersecting factors—limited geographic access, transportation challenges, and economic constraints—create a complex NYC food environment where nutritional inequities flourish (NYC Mayor's Office of Food Policy, 2022).

To address inequitable access to healthy food shaped by socioeconomic and racial disparities, New York City introduced mobile produce vending as a policy initiative to intervene in the food retail market and expand access in underserved communities (Danielli et al., 2021; Lucan et al., 2011). In 2008, the NYC Department of Health and Mental Hygiene (NYC DOHMH) and the Mayor's Office of Food Policy (MOFP) partnered to launch the NYC Green Carts program, with technical assistance supported by the Tisch Illumination Fund. The program was designed to increase access to fresh, high-quality produce in neighborhoods where availability and consumption were low. Beyond food access, a central goal was to create entrepreneurial opportunities for vendors, positioning Green Carts as both a public health strategy and an economic development initiative (Fuchs et al., 2014; Leggat et al., 2012). The program offers opportunities for residents to pursue low-cost micro-enterprises while providing a community service (Leggat et al., 2012). Compared to brick-and-mortar retail, mobile vending may offer entrepreneurs advantages such as lower start-up costs and greater flexibility (Lucan, 2019).

The city created 1,000 mobile vending permits specifically for Green Cart vendors to sell whole fresh fruits and vegetables. Vendors receive a license for a specific borough and may operate any-

[1] All currency in this report is in US$.
[2] Electronic benefits transfer (EBT) is the electronic system used to accept SNAP payments.

where within designated police precinct zones identified as having limited access to produce (NYC Health, n.d.-a). Initially restricted to whole produce, the program was updated in 2022 to allow the sale of bottled water, plain nuts, and cut fruits and vegetables (NYC Health, n.d.-a; Office of Disease Prevention and Health Promotion, 2019).

Early evaluations confirmed that Green Carts increased the presence of fresh produce in the target areas, offered competitive pricing, and coincided with more neighborhood stores carrying fresh produce (Farley et al., 2015; Fuchs et al., 2014; Kerker et al., 2014; Leggat et al., 2012). Farley et al. documented sustained increases of 50–69% in the number of retailers selling fresh produce in Green Cart neighborhoods over three years, compared to no increase in non–Green Cart neighborhoods. The presence of carts in areas with commercial activity and pedestrian traffic was also shown to lower prices through increased competition (Breck et al., 2017; Li et al., 2014; Lucan et al., 2011, 2019).

Yet, challenges remain. Studies found that vendors tend to cluster in highly trafficked areas rather than the highest-need zones, with only 7% of carts operating in low-access neighborhoods (Li et al., 2014; Lucan et al., 2011). Other barriers include limited uptake by vendors of EBT machines, which is essential for SNAP users, due to high costs (Breck et al., 2015, 2017; Citizen's Committee for Children of New York, Inc [CCC], 2010;; Fuchs et al., 2014). The financial outcomes for vendors have also raised concerns about program sustainability, as long hours, seasonal demand, and costs for storage and transport constrain their earnings (Brinkley et al., 2013; Browne et al., 2011). Complex multi-agency regulations and fines further discourage participation, particularly among immigrant vendors with limited English proficiency (Koch, 2015). Despite these obstacles, previous research found vendor interest in continuing self-employment and optimism that skills gained through vending could translate to future economic opportunities (CCC, 2010; Fuchs et al., 2014).

This evaluation of the Green Carts program addresses critical gaps in the literature by providing updated data on program effectiveness more than a decade after its launch. While earlier studies documented benefits for neighborhood food environments, much of that work is now dated, with the most recent Green Carts literature published in 2017. Our study, supported by the NYC Office of Economic Opportunity and the NYC Department of Health and Mental Hygiene (DOHMH), assesses how the program functions as both a food access intervention and an economic development mechanism for immigrant entrepreneurs. Specifically, we examine how the program has influenced access to fresh produce in underserved neighborhoods, what disparities persist in reach and utilization, what economic outcomes and sustainability prospects exist for vendors, and what factors contribute to declining vendor participation.

We hypothesize that while Green Carts provide an important mechanism for New Yorkers to access fresh produce, the program's impact may be constrained by insufficient vendor earnings and limited economic sustainability. Although this study focuses on New York City, variations on mobile produce vending have been implemented in other U.S. cities, including Chicago, Boston, and Los Angeles, as tools to improve food access and stimulate microenterprise. Lessons from NYC can inform best practices and policy design in similar urban contexts.

Methods

We conducted a multi-methods evaluation of the Green Carts program over the 14-month period of May 2023 to June 2024. This study assesses several dimensions of long-term effectiveness for food access and economic mobility of vendors, including customer perceptions and patterns of engagement with Green Carts and operational constraints faced by vendors. Throughout the study, we adhered to strict ethical standards in line with federal regulations and the Belmont principles of respect, beneficence, and justice (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Study procedures included rigorous protocols for informed consent, confidentiality, and the minimization of risk, and researchers adhered to these requirements to ensure the ethical conduct of research. All research protocols involving human subjects were reviewed and approved by the

CUNY Institutional Review Board to ensure compliance with research ethics standards.

Our approach included surveys of both Green Cart vendors and customers. For vendors, we developed a 42-question survey in English, which was then translated into Spanish, Bengali, and Arabic using AI translation services. The translations were then reviewed and corrected by native speakers to ensure accuracy. The vendor survey was built using the Qualtrics online survey platform. We surveyed a convenience sample of Green Cart vendors across four NYC boroughs over a six-month period. We used previously reported Green Cart location data to seek out vendors during standard business hours. Multilingual research assistants approached vendors at their carts and invited them to participate in the survey. We also recruited vendor survey participation via text message using a contact list of vendors provided by the DOHMH. Trained research assistants administered surveys by phone and in person, or the surveys were self-administered by vendors via mobile devices or paper submissions. To incentivize participation, vendors were compensated with a $50 Visa gift card. After data collection, we exported the data from Qualtrics and conducted analysis using Stata statistical software to prepare descriptive statistics.

For customers, we developed a 25-question survey in English and Spanish. The customer survey was also built using Qualtrics. We surveyed a convenience sample of Green Cart customers at five locations in the Bronx, Brooklyn, and Northern Manhattan over a six-month period. These surveys were researcher-administered in-person using iPads or self-administered via personal mobile devices, with participants receiving a $25 Visa gift card for their time. After data collection, we exported the data from Qualtrics and conducted analysis using Stata statistical software to prepare descriptive statistics.

To gain deeper insights into the program's history and operations, we conducted two sets of interviews. We spoke with key stakeholders who were involved in the initial development and implementation of Green Carts, using a 9-question interview guide. These interviews were conducted in English via Zoom and lasted approximately 60 minutes each. We also interviewed wholesale produce distributors, using a 13-question guide that was piloted before use. These interviews were also conducted in English via Zoom and lasted approximately 30 minutes each. All interviews were audio-recorded, transcribed, and analyzed using standard qualitative methods, including predetermined and emergent coding techniques to identify key themes. Two independent researchers reviewed and systematically coded the transcripts. The coded data were then collaboratively examined to ensure consistency and cohesion, facilitating a detailed thematic analysis.

To complement our primary data collection, we conducted a secondary analysis of historical data. We submitted a Freedom of Information Law (F.O.I.L.) request to the NYC DOHMH for data on Green Carts from 2013 to 2023. The resulting datasets included information on permits, inspections, violations, planned vending locations, and applications. We analyzed this data using SPSS to prepare descriptive statistics and examine historical trends. Additionally, we extracted and compiled relevant data from NYC Food Metrics reports spanning 2012–2022 (NYC Mayor's Office of Food Policy, 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021; 2022). We also conducted geospatial analysis using ArcGIS to examine the distribution of Green Cart locations in relation to public housing developments and other points of interest. This multifaceted methodology allowed us to triangulate findings from various sources, providing a robust evaluation of the Green Carts program from multiple perspectives. This methodological framework could serve as a template for evaluating mobile vending initiatives in other metropolitan areas.

Results

We surveyed 200 Green Cart customers at five locations in three boroughs (Tables 1 and 2). Just over half (51%) reported shopping at Green Carts at least two to three times per week, and 22% had patronized the same cart for more than five years. However, only 15% reported purchasing more than three-quarters of their produce from Green Carts.

Cost and convenience were the primary motivators for shopping at Green Carts, cited by 33%

Table 1. Green Cart Customer Survey Participant Demographics (*N* = 200)

Demographics	Total % (*n*)
Sex	
Male	36 (70)
Female	60 (117)
Non-binary/Third gender	2 (3)
Prefer not to say	3 (6)
Age	
18–24	16 (32)
23–39	33 (65)
40–54	28 (56)
55+	23 (45)
Did not provide	1 (2)
Race/Ethnicity	
Hispanic	74 (144)
Native American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander	7 (13)
Asian	6 (11)
Black or African American	17 (33)
White	19 (37)
Other*	27 (51)
Among other, self-described as Mestizo/a	7 (14)
Prefer not to say	16 (31)
Annual household income (US$)	
Under $20,000	56 (109)
$20,001–$40,000	25 (49)
$40,001–$60,000	9 (18)
$60,001–$80,000	4 (7)
More than $80,000	5 (10)
Number of people at home customer shops for	
0–1 people	12 (23)
2 people	15 (30)
3 people	25 (49)
4 people	27 (53)
5 or more people	19 (38)
Currently receive food assistance such as SNAP or WIC	
No	64 (127)
Yes	27 (54)
Not sure	9 (17)

*22 respondents who selected "other" race identified as Hispanic.

and 20% of customers, respectively. Most purchases were made in cash (90%), while 13% of customers reported using SNAP/EBT. Household income data showed that 80% of respondents earned less than $40,000 annually, and 27% reported receiving food assistance. Knowledge of the Green Carts program varied: 64% correctly identified it as a city initiative to improve produce access, while 36% were aware that carts were limited to designated areas.

Despite offering financial incentives and employing research assistants trained to conduct outreach in three primary vendor languages, we struggled to recruit vendors for this study due to many immigrant entrepreneurs' reluctance to speak

Table 2. Green Cart Customer Shopping Habits and Preferences, Based on Customer Self-Reporting (*N* = 200)

	% (*n*)
Green Cart shopping frequency	
Once per day or more	13 (26)
2–3 times / week	38 (76)
Once per week	24 (47)
2–3 times per month	13 (25)
Once per month or less	13 (26)
Length of time shopping at Green Cart	
Less than 1 year	45 (90)
1–2 years	22 (44)
2–5 years	11 (22)
More than 5 years	22 (44)
Percentage of total fruits and vegetables	
0–25%	28 (56)
16–50%	38 (75)
51–75%	20 (40)
76% or more	15 (29)
Average amount spent at Green Carts each	
$5 or less	13 (25)
$6–10	29 (57)
$11–20	26 (52)
More than $20	33 (66)
Payment method for Green Cart purchases	
Cash	90 (179)
Credit or debit card	14 (28)
SNAP / EBT	13 (26)

with researchers given the current political climate. Surveys were completed with 21 vendors across four boroughs, with the Bronx most heavily represented (67%). We recorded the location of each surveyed vendor during the survey recruitment process. Green Cart locations of surveyed vendors are depicted in Figure 1, overlaid on previously reported planned vending location data obtained from the NYC DOHMH, demonstrating the breadth of reach and representation from diverse Green Cart vending zones. Vendors reported working an average of 44 hours per week across 5.3 days, and 75% had been vending for at least five years. Median annual income from Green Carts was $20,000, representing a range of 67–74% of total household income.

Monthly profits showed clear seasonality (Table 3). Earnings ranged from $921 to $1,823 during peak months between March and September, compared with $631 to $793 during off-peak months. Based on reported hours worked, this translated to average hourly earnings of $6.40 to $10.40 during peak months. Most vendors (57%) purchased produce from Hunts Point Terminal Market, a wholesale food distribution center located in the Bronx that supplies over 60% of NYC's fresh produce, while smaller numbers of vendors sourced from membership stores like Costco or BJ's Wholesale Club (14%) or restaurant suppliers such as Jetro or Restaurant Depot (14%). Fruits were identified as the most popular item sold (95%), followed by fresh vegetables (68%).

When asked about their motivations for vending, 58% of vendors cited autonomy as a business owner, while 21% emphasized control over their schedule. Vendors also described significant barri-

Figure 1. Map of Surveyed Green Cart Vendors [in Yellow], Overlaid on Green Cart Precincts and Markers of Unique Vendor Permit Location Data Obtained from the New York City Department of Health and Mental Hygiene (NYC DOHMH)

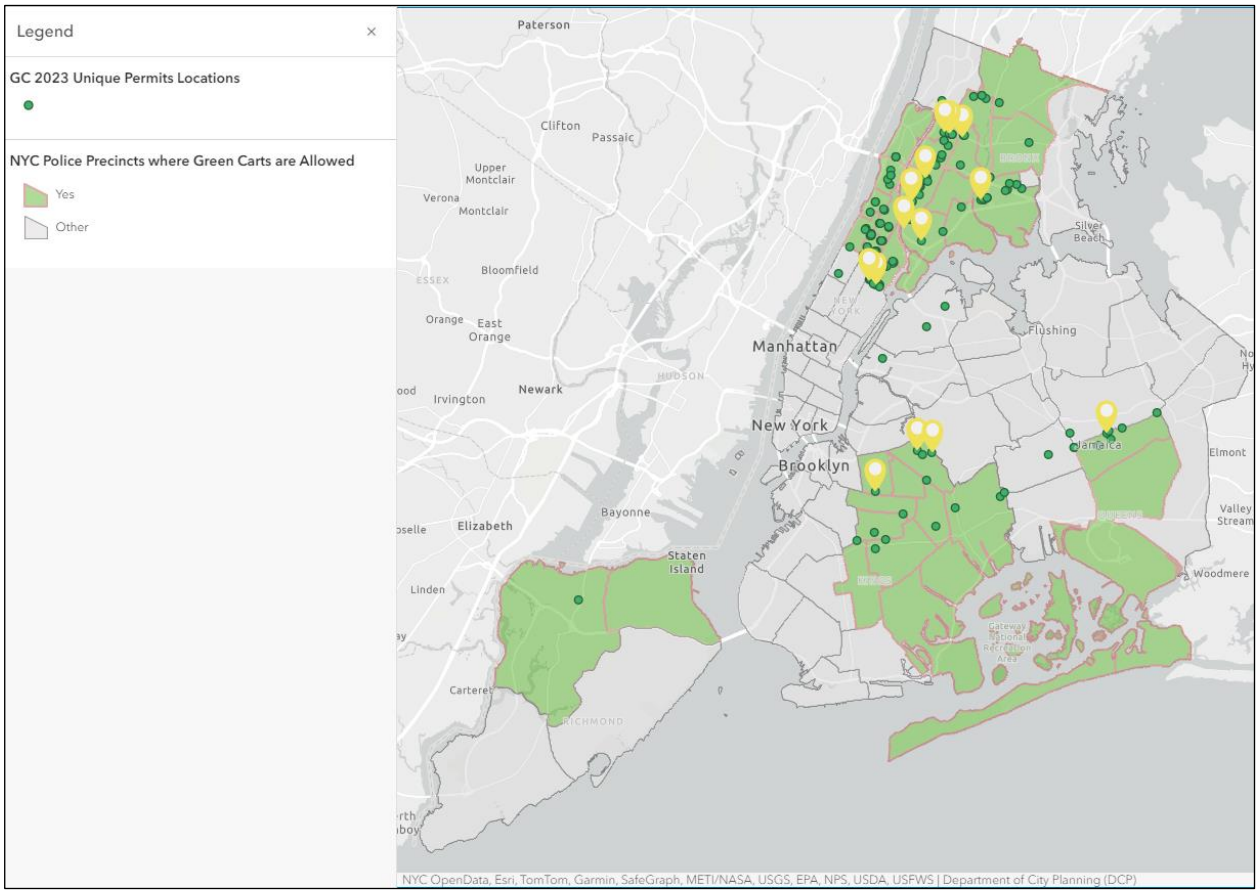


Table 3. Average and Median Monthly Profit Reported by Green Cart Vendors (*N* = 10)

Profit (US$)	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average	631	641	921	1,621	1,812	1,742	1,823	1,123	1,143	793	793	783
Median	650	650	1,000	1,100	1,050	1,000	1,050	900	900	900	800	800

ers. Permit waiting times were reported by 73%, and 36% found the application process confusing. In addition to being asked about the program's design, vendors were asked for feedback about the physical design of the carts, which are guided by specifications created by the city. Vendors were asked to rate various elements of Green Cart design; weather protection was consistently rated as the weakest aspect of cart design, with 68% indicating it was unacceptable or required improvement.

To contextualize our analysis of NYC Health Department data related to the Green Carts program, we first outline the process by which prospective Green Cart vendors apply to participate in the program. They do so by joining a borough-specific waiting list that requires a valid mobile food vending license issued by the NYC Department of Health. Once selected from the wait list, the vendor receives a permit application packet and must submit a completed application within 30–60 days. Required documentation includes a clearance letter from the Office of Administrative Trials and Hearings, certifying that the vendor has no outstanding fines (which can take up to four weeks); a current New York State sales tax certificate; proof of workers compensation or an exemption; and a commissary/storage agreement for the cart (an agreed-upon indoor location where carts can be stored when they are not in active use). After submission, the vendor schedules a cart inspection and must acquire or build a compliant cart, obtain a green cart permit (fee of $75), and maintain a valid mobile vending license (also $75, renewed biennially) The process typically takes several months, often constrained by wait-list delays, document procurement, inspection scheduling, and commissary arrangements (NYC Health, n.d.-a.)

Table 4. New York City Green Cart Active Permit and EBT Acceptance Rates, 2012–2022

Year	No. of Current Active Permits	No. of Active Permit Holders Accepting EBT	% EBT Acceptance
2012	450+	28	~6.2%
2013	490+	90+	~18.4%
2014	450+	110+	~24.4%
2015	364+	112+	~30.8%
2016	320	110	34.4%
2017	315	32	10.2%
2018	286	19	6.6%
2019	266	15	5.6%
2020	248	10	4.0%
2021	243	8	3.3%
2022	196	6	3.1%

EBT = Electronic benefits transfer, the eletronic system used to process payment via SNAP benefits.

Analysis of NYC Department of Health data for 2013–2023 revealed a decline in Green Cart program participation.[3] Active Green Cart permits peaked at more than 490 in 2013 but fell to 196 by 2022 (Table 4 and Figure 2). Trends in payment methods also shifted. EBT acceptance increased to 33.4% of vendors in 2016 but subsequently declined to 3.1% by 2022, a change possibly related to changes in EBT regulation or in EBT terminals, although this study did not explicitly ask vendors about their motivations for accepting or not accepting EBT.

Permit application data showed that most approvals (87.9%) were completed within six months of submission, while 6.4% take between six and 12 months. Data were not available at a

[3] While we acknowledge the potential impact of the COVID-19 pandemic on the Green Carts program and the experience of Green Cart vendors, careful review of the data indicates that 2019–2020 metrics did not deviate substantially from those of earlier and later years of the program.

Figure 2. NYC Green Cart Active Permit and EBT Acceptance Rates, 2012–2022

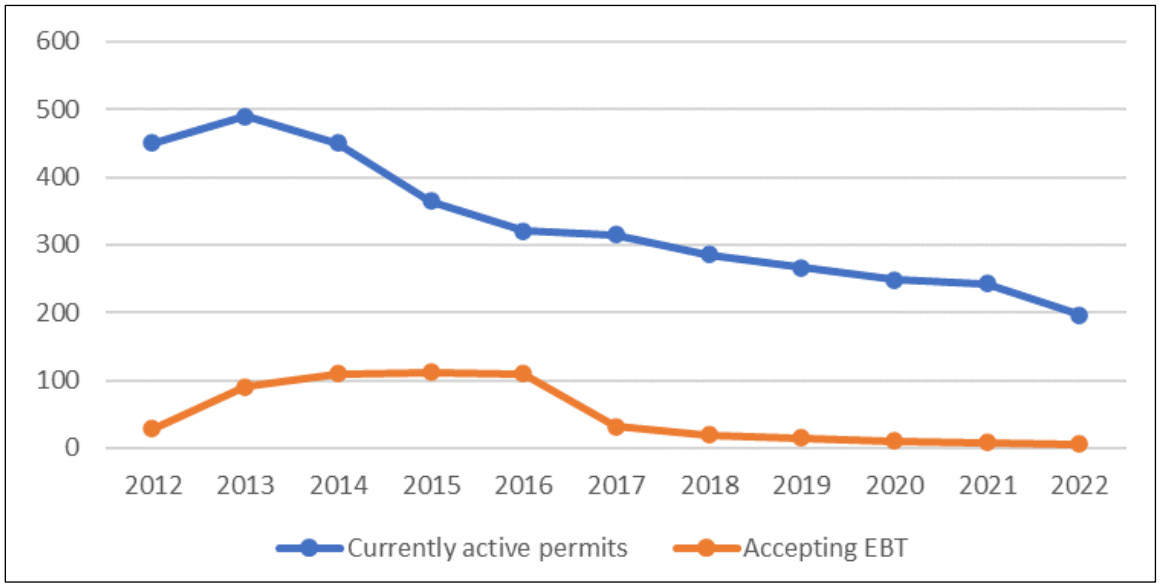


Table 5. Green Cart Violations Paid, Total for All Time (2013–2023) and Most Recent Year (2023)

	2013–2023	2023
Number of violations	3,495	286
Average violation payment (U$)	$100.20	$32.20
Standard deviation in violation payments (U$)	$238.50	$127.90
Range of violation payments (U$)	$0–$2,115	$0–$1,030
Total (U$)	$350,365	$9,210

more granular month-by-month level. Violation records between 2013 and 2023 indicated that only 1.9% of violations were coded as "imminent health hazards," while approximately half were categorized as "miscellaneous." More than one-fifth (20.7%) of all violations were ultimately dismissed or withdrawn. Fines varied widely, ranging from $0 to $2,115, with an average payment of about $100 (Table 5).

Geospatial analysis highlighted differences in cart distribution relative to need. More than half (56%) of New York City public housing developments were located outside a 10-minute walking distance of a Green Cart vendor. Instead, carts were more frequently located near transportation hubs and areas of high pedestrian and commercial activity (Figure 3).

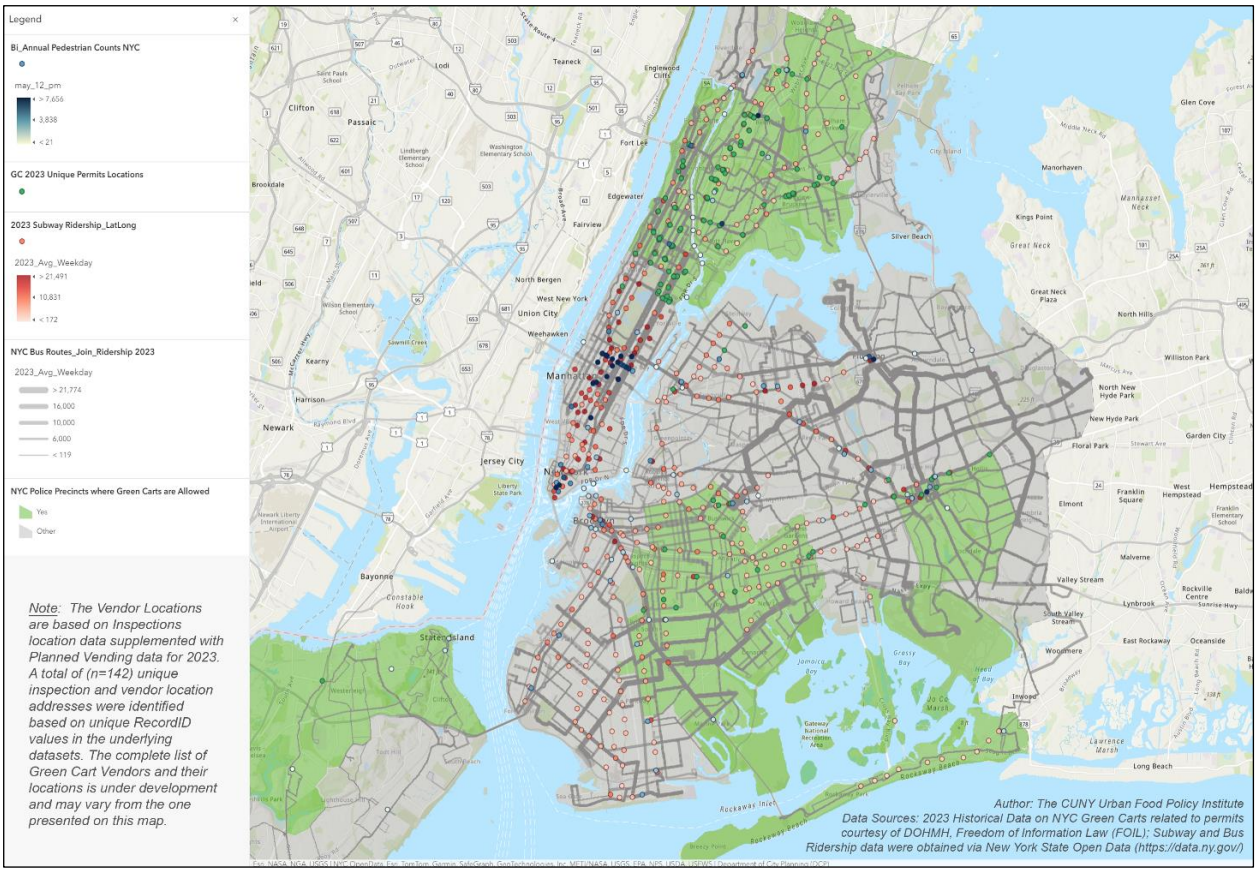
Discussion

Our evaluation of the NYC Green Carts program highlights both its continued relevance in improving fresh produce access in underserved communities and the significant challenges vendors face in pursuing mobile produce vending as a sustaining income source. While findings are specific to NYC, many of the operational and policy challenges, such as regulatory complexity, inconsistent customer demand, and difficulties with EBT adoption, are shared across cities attempting to scale food access through mobile vending. Thus, lessons from NYC may be transferable to other localities with similar structural conditions.

Green Carts in Context

The Green Carts program operates along with other food access initiatives in New York City, joining efforts by organizations such as City Harvest, GrowNYC, United Way NYC, the NYC Department of Health, and others. While Green Carts offer a daily, vendor-based retail model for fresh produce in underserved areas, initiatives like City Harvest's Mobile Markets provide scheduled, free distributions often paired with nutrition educa-

Figure 3. New York City Green Carts (2023), and Pedestrian Traffic, Bus, and Subway Ridership (2023)



tion. Similarly, GrowNYC's Greenmarkets and Fresh Food Box programs expand fresh food availability, while NYC Health Bucks and SNAP/EBT integration efforts along with Groceries2Go and United Way NYC's Connect2Food initiatives support the affordability of fresh produce and purchasing power for low-income residents. These programs complement one another, increasing the visibility and accessibility of healthy foods in low-income neighborhoods. By aligning with these initiatives, Green Carts contribute not only to immediate produce access but also to broader shifts in neighborhood food environments, such as prompting nearby bodegas to stock fresh fruits and vegetables. However, the program's potential remains constrained by declining vendor participation, limited EBT access, limited cart design, lack of technical and administrative support for vendors, and regulatory challenges that may hinder vendors' profitability and long-term sustainability.

Economic Sustainability

The most striking finding is the limited profitability of Green Carts, despite the program's goal of improving economic outcomes for immigrant entrepreneurs, which represents the biggest barrier to program growth and impact. Our study documents that vendors earn far less than NYC's median income of $79,713 (U.S. Census, 2023), indicating that Green Cart vendors support the program's food access goals far more than the program supports immigrants' entrepreneurship and social mobility. Effectively, Green Cart vendors are subsidizing this public health program through below-market earnings for its vendors.

With median vendor earnings significantly below NYC's median household income, financial constraints are likely a key factor in the programs' declining vendor participation. Past research suggests that Green Carts may offer produce at lower prices than alternative local retailers (Fuchs et al.,

2014; Lucan, 2019), and our study confirms that affordability is a primary motivator for customers, supporting the programmatic goal of increasing fresh produce access for low-income New Yorkers. However, despite their competitive pricing, vendors face economic sustainability challenges similar to those documented by Rosales (2013), likely due to inconsistent demand, seasonal fluctuations in sales, and broader economic constraints and administrative barriers.

Declining Program Participation

The number of active Green Cart permits has declined significantly, from over 490 permits in 2013 to just 196 in 2022. While Ali et al. (2021) reported absences, closures, and limited availability among fresh fruit and vegetable vendors, including Green Cart vendors, during the height of the COVID-19 pandemic in 2020, NYC Health Department data did not reflect significant changes in permit trends during this period. This broader contraction threatens the program's ability to maintain consistent food access for residents who rely on Green Carts as a key source of fresh produce. Seasonal variations in earnings, lack of weather protection, and administrative barriers contribute to the declining vendor base, indirectly reducing the program's potential health impact.

EBT Access Barriers

Another concerning trend is the dramatic decline in EBT acceptance among vendors. Previous studies have demonstrated that EBT usage increases customer spending on fresh produce (Breck et al., 2015, 2017), yet our data show that only 3.1% of vendors accepted EBT by 2022. This drop may be due to the complexity or cost of setting up EBT payment systems, advances or changes in EBT technology, transaction fees, lack of technical support for vendors, lack of perceived demand, or a desire by vendors to operate an all-cash business. This is an area that warrants future research.

Given that 80% of customers surveyed for this study reported an annual income under $40,000 and 27% receive food assistance, the low uptake of EBT among Green Cart vendors likely limits the program's potential impact on low-income households' purchase and consumption of fruit and vegetables and general dietary habits. The decline in EBT acceptance since 2016 represents a missed opportunity to enhance food access for SNAP recipients who are vulnerable to chronic diseases. Expanding and simplifying EBT acceptance, as was financially supported in the early days of the program (Breck et al. 2015), could increase vendor revenue while improving food access for low-income residents, dually supporting the program's primary goals. Policy interventions such as technical assistance for EBT registration, reduced transaction fees, or city-sponsored support for card terminals could help address this challenge.

Geographic Coverage and Cart Design

Beyond economic constraints, cart design emerged as a major concern for vendors, particularly with respect to weather protection and display space. These challenges have direct implications for sales, as poor visibility or inadequate shelter may discourage potential customers and may also discourage vendors from selling at all in poor weather. A related issue is the geographic coverage of Green Carts. Prior research has suggested that Green Carts may contribute to broader improvements in the food retail environment by increasing fresh produce availability (Kerker et al., 2014; Leggat et al., 2012). However, our findings indicate that gaps remain in reaching some of NYC's most food-insecure populations, despite vendors being limited to selling in specific Green Cart zones (designated by specific police precinct) that have low access to produce While vendors are limited in their vending location selection by their borough-specific license and the designated Green Cart police precincts, vendors have a high degree of flexibility to vend anywhere within those areas.

Our study and others suggest that vendors prioritize selling in locations with high foot traffic near transportation and areas of commerce rather than in more residential areas farther from public transportation. For example, our spatial analysis revealed that over half of NYC public housing developments are beyond a 10-minute walking distance of a Green Cart, despite many developments being located within "high-need" areas. This suggests the need for targeted expansion efforts, potentially through incentive programs that

encourage vending in underrepresented areas. An increase in available cart storage locations, and transportation support for carts, would also expand the geographic reach of the program.

Regulatory Burden

Additionally, bureaucratic and regulatory barriers appear to strain vendors. While enforcement is necessary to maintain health and safety standards, our analysis shows that fewer than 2% of violations posed an imminent health hazard, half were coded as "miscellaneous," and nearly 21% of historical mobile produce vending violations were dismissed. These data raise concerns about the efficiency, effectiveness, and fairness of regulatory oversight and current enforcement practices. Variability in violation fines may contribute to financial uncertainty for vendors, particularly given their reported low profit margins. Simplifying the permit process (e.g., by increasing locations for cart inspections throughout each borough) and reducing noncritical violations (i.e., violations for failure to comply with regulations that do not pose an imminent health risk) could empower vendors and allow them to focus on growing their businesses.

Recommendations for Program Enhancement

Our findings suggest that revitalizing the Green Carts program will require a multipronged approach that incorporates both public and private channels.

Financial and Technical Support for Vendors

Offering grants or subsidies directly to Green Cart owners for permit fees, start-up capital for new carts, and start-up capital for food purchased could support vendor success. Facilitating wholesale purchasing agreements and providing business training, technical assistance, communication campaigns, and more regular updates from the city on changes in vendor regulations could enhance vendor success. Additionally, interagency support from other NYC agencies could increase cart storage capabilities, business support, or tax incentives.

Expanding EBT Acceptance

Offering grants to cover the start-up costs for expanding EBT accessibility could support broader participation. The city could implement EBT onboarding assistance, offer incentives for vendors who accept EBT, or subsidize the costs of EBT terminals. The city could also offer coupon-style incentive programs (e.g., NYC Health Bucks[4]) to customers to encourage use of EBT at Green Carts.

Strategic Expansion of Green Carts

Targeting vendor placement near public housing developments and other high-need areas through incentive programs could increase food access where it is most needed. Grants to community-based entities could also support personnel to offer assistance for commissary expansion, distribution and transportation, and cart storage for vendors.

Reducing Bureaucratic Burdens

Offering grants to nonprofit and community-based entities to support personnel time for technical and in-person administrative assistance could reduce bureaucratic barriers. This support could include help with applications and ongoing administrative requirements, as well as network support (such as WhatsApp group facilitation) for troubleshooting bureaucratic issues.. At the city level, streamlining the permit application process, reducing noncritical violations, and offering regulatory support for vendors could encourage greater participation. In addition to a more streamlined application process and regularized waitlist schedules, providing vendors with technical assistance on how to navigate the application and renewal process would further strengthen the program and set it for successful continuation and expansion in the coming years. While online portals and forms are available in multiple languages, there may be a gap in the extent to which these vendors, who are often first-generation immigrants, can have reliable access to technology and the resources otherwise made available to the public via the public websites related to the program.

[4] "Health Bucks are $2 coupons that can be used to purchase fresh fruits and vegetables at all NYC farmers markets and farm stands" (NYC Health, n.d.-b, para. 1).

Integrating Green Carts into a Broader Fresh Food Strategy

A "Fresh NYC Initiative" could integrate Green Carts with farmers markets, community supported agriculture (CSA) programs, and other fresh food access strategies, such as those offered by community-based organizations (e.g., City Harvest Mobile Markets, GrowNYC Greenmarkets, NYC Health Bucks and Groceries2Go, United Way's Connect2Food, and others).

Enhancing Consumer Awareness and Demand

To maximize the public health impact of mobile produce vending, demand-side strategies must complement supply-side reforms. Many surveyed customers were unaware of the Green Carts program's purpose or geographic constraints, and SNAP/EBT usage remained low despite high eligibility. A citywide outreach campaign leveraging multilingual advertising, community organizations, and healthcare providers could raise awareness of the program and promote the nutritional and economic benefits of shopping at Green Carts. Public messaging should emphasize SNAP/EBT acceptance (where available), competitive pricing, and the carts' role in supporting immigrant entrepreneurship. Additionally, integrating Green Carts into nutrition incentive programs (e.g., Health Bucks, Double Up Food Bucks) and partnerships with local clinics, WIC centers, and schools could further boost utilization by low-income households. These efforts could be bolstered by distributing culturally relevant recipes, cooking demonstrations, and digital tools (e.g., SMS location alerts or a Green Cart map app). Aligning consumer-facing efforts with vendor support would help drive consistent foot traffic and foster more sustainable demand across neighborhoods.

Study Limitations

While our study offers valuable insights into the Green Carts program, several limitations should be acknowledged. One notable constraint is the sample size and representativeness of our vendor survey, which included only 21 participants. To that end, our findings may not fully capture the experiences of all vendors, particularly given the high level of diversity in this group. Future research should aim to incorporate a broader vendor perspective through a more participatory action research approach that strengthens vendor contribution and engagement to improve generalizability. Another limitation is the cross-sectional nature of our data collection, which provides only a snapshot of Green Cart operations and customer behaviors. As a result, we cannot establish causal relationships between Green Cart access and produce consumption.

Longitudinal research tracking customer dietary habits over time would be beneficial in assessing the program's long-term impact on food choices and nutrition. Additionally, our use of convenience sampling for both customer and vendor surveys may introduce selection bias. While our findings align with prior research, future studies could enhance rigor by employing randomized or stratified sampling approaches to ensure a more representative sample of both vendors and customers. Finally, our study primarily focused on vendor experiences and operational challenges, rather than direct health outcomes associated with Green Cart usage. While access to fresh produce is a key factor in improving dietary health, we did not measure whether Green Cart availability has led to increased fruit and vegetable consumption among customers. Future research should explore these health impacts related to opportunities to increase access to nutritious foods, perhaps through dietary assessments or studies linking Green Cart usage with broader public health indicators.

Conclusion

The Green Carts program remains a small but vital component of NYC's efforts to improve healthy food access in underserved communities; however, financial, logistical, and regulatory challenges may limit its potential impact on access to and consumption of fresh produce, economic mobility, and public health. Addressing these barriers through policy interventions, vendor support, and programmatic improvements could significantly enhance the program's sustainability and impact. By expanding access to fresh produce while ensuring economic viability for vendors, the Green Carts initiative can continue to serve as a model for urban food access programs nationwide.

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References

Ali, S. H., Imbruce, V. M., Russo, R. G., Kaplan, S., Stevenson, K., Mezzacca, T. A., Foster, V., Radee, A., Chong, S., Tsui, F., Kranick, J., & Yi, S. S. (2021). Evaluating closures of fresh fruit and vegetable vendors during the COVID-19 pandemic: Methodology and preliminary results using omnidirectional street view imagery. *JMIR Formative Research*, *5*(2), Article e23870. https://doi.org/10.2196/23870

Benavidez, G. A., Zahnd, W. E., Hung, P., & Eberth, J.M.(2024). Chronic disease prevalence in the US: Sociodemographic and geographic variations by zip code tabulation area. *Preventing Chronic Disease*, *21,* Article E14. https://doi.org/10.5888/pcd21.230267

Breck, A., Kisko, K. M., Abrams, C., & Elbel B. (2015). Spending at mobile fruit and vegetable carts and using SNAP benefits to pay, Bronx, New York, 2013 and 2014. *Preventing Chronic Disease*, *12*, Article 140542. https://doi.org/10.5888/pcd12.140542

Breck, A., Kisko, K., Martinez, O., Abrams, C., & Elbel B. (2017). Could EBT machines increase fruit and vegetable purchases at New York City green carts? *Preventing Chronic Disease*, *14*, Article 170104. https://doi.org/10.5888/pcd14.170104

Brinkley, C., Chrisinger, B., & Hillier, A. (2013). Tradition of healthy food access in low-income neighborhoods: Price and variety of curbside produce vending compared to conventional retailers. *Journal of Agriculture, Food Systems, and Community Development*, *4*(1), 155–169. https://doi.org/10.5304/jafscd.2013.041.011

Browne, R., Joaquin, D., & Chiang, J. (2011). *New York City street vendors* [Unpublished student report]. Columbia University Graduate School of Architecture, Planning and Preservation (GSAPP).

Centers for Disease Control and Prevention. (2024, December 18). *Strategies for fruit and vegetable voucher incentives and produce prescriptions.* https://www.cdc.gov/nutrition/php/public-health-strategy/voucher-incentives-produce-prescriptions.html

Citizens' Committee for Children of New York, Inc. (2010). *Green cart implementation: Year one.* https://s3.amazonaws.com/media.cccnewyork.org/2024/10/Green-Cart-Implementation-Year-1-Sept-2010.pdf

Danielli, S., Coffey, T., Ashrafian, H., & Zarzi, A. (2021). Systematic review into city interventions to address obesity. *eClinicalMedicine*, *32*, Article 100710. https://doi.org/10.1016/j.eclinm.2020.100710

Farley, S. M., Sacks, R., Dannefer, R., Johns, M., Leggat, M., Lim, S., Konty, K., & Nonas, C. (2015). Evaluation of the New York City Green Carts program. *AIMS Public Health*, *2*(4), 906–918. https://doi.org/10.3934/publichealth.2015.4.906

Fuchs, E., Holloway, T., Bayer, K., & Feathers, A. (2014). Innovative partnership for public health: An evaluation of the New York City Green Cart initiative to expand access to healthy produce in low-income neighborhoods. *Columbia University School of International and Public Affairs Case Study Series in Global Public Policy*, *2*(2). https://www.foodpolitics.com/wp-content/uploads/Green-Carts-Report-Final-June-11.pdf

Kerker, B., Farley, S., Johns, M., Leggat, P., Nonas, C., & Parton, H. (2014). *Green Cart evaluation, 2008–2011* (Epi Data Brief No. 48). New York City Department of Health and Mental Hygiene. https://www.nyc.gov/assets/doh/downloads/pdf/epi/databrief48.pdf

Koch, R. (2015). Licensing, popular practices and public spaces: An inquiry via the geographies of street food vending. *International Journal of Urban and Regional Research*, *39*(6), 1231–1250. https://doi.org/10.1111/1468-2427.12316

Leggat, M., Kerker, B., Nonas, C., & Marcus, E. (2012). Pushing produce: The New York City Green Carts initiative. *Journal of Urban Health*, *89*, 937–938. https://doi.org/10.1007/s11524-012-9688-4

Li, K. Y., Cromley, E. K., Fox, A. M., & Horowitz, C. R. (2014). Evaluation of the placement of mobile fruit and vegetable vendors to alleviate food deserts in New York City. *Preventing Chronic Disease*, *11*, Article 140086. https://doi.org/10.5888/pcd11.140086

Lucan, S. C. (2019). Local food sources to promote community nutrition and health: Storefront businesses, farmers' markets, and a case for mobile food vending. *Journal of the Academy of Nutrition and Dietetics*, *119*(1), 39–44. https://doi.org/10.1016/j.jand.2018.09.008

Lucan, S. C., Maroko, A., Shanker, R., & Jordan, W. B. (2011). Green carts (mobile produce vendors) in the Bronx—Optimally positioned to meet neighborhood fruit-and-vegetable needs? *Journal of Urban Health*, *88*, 977–981. https://doi.org/10.1007/s11524-011-9593-2

Lucas, L. (2024, April 22). *New poll: Amid affordability crisis, more New Yorkers struggling with rising food prices and cutting back on healthy foods* [Press release]. No Kid Hungry. https://state.nokidhungry.org/new-york/new-poll-amid-affordability-crisis-more-new-yorkers-struggling-with-rising-food-prices-and-cutting-back-on-healthy-foods

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979). *The Belmont report: Ethical principles and guidelines for the protection of human subjects of research*. U.S. Department of Health, Education, and Welfare. https://web.archive.org/web/20040405065531/http://ohsr.od.nih.gov/guidelines/belmont.html

NYC Health. (n.d.-a). *Green carts*. Retrieved April 2024 from https://www.nyc.gov/site/doh/business/food-operators/green-carts.page

NYC Health. (n.d.-b). *Health Bucks*. Retrieved February 11, 2026, from https://www.nyc.gov/site/doh/health/health-topics/health-bucks.page

NYC Mayor's Office of Food Policy. (2022). *Setting the table: NYC's research framework to enhance food affordability and access*. New York City Government. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/SettingtheTable_ResearchAgenda.pdf

NYC Mayor's Office of Food Policy. (2025, January). *Food by the numbers*. https://www.bers.nyc.gov/assets/foodpolicy/downloads/pdf/NYC-Food-by-the-Numbers-2024.pdf

NYC Mayor's Office of Food Policy. (2012). *New York City food metrics report 2012*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/ll52-food-metrics-report-2012.pdf

NYC Mayor's Office of Food Policy. (2013). *New York City food metrics report 2013*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/ll52-food-metrics-report-2013.pdf

NYC Mayor's Office of Food Policy. (2014). *New York City food metrics report 2014*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/2014-food-metrics-report.pdf

NYC Mayor's Office of Food Policy. (2015). *New York City food metrics report 2015*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/2015-food-metrics-report.pdf

NYC Mayor's Office of Food Policy. (2016). *New York City food metrics report 2016*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/2016-Food-Metrics-Report.pdf

NYC Mayor's Office of Food Policy. (2017). *New York City food metrics report 2017*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/2017-Food-Metrics-Report-Corrected.pdf

NYC Mayor's Office of Food Policy. (2018). *New York City food metrics report 2018*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/2018-Food-Metrics-Report.pdf

NYC Mayor's Office of Food Policy. (2019). *New York City food metrics report 2019*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/Food-Policy-Report-2019.pdf

NYC Mayor's Office of Food Policy. (2020). *New York City food metrics report 2020*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/food_metrics_report_2020-two_page_spread.pdf

NYC Mayor's Office of Food Policy. (2021). *New York City food metrics report 2021*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/Food-Metrics-Report-2021.pdf

NYC Mayor's Office of Food Policy. (2022). *New York City food metrics report 2022*. City of New York. https://www.nyc.gov/assets/foodpolicy/downloads/pdf/Food%20Metrics%20Report%20FY%202022_FINAL.pdf

NY Health Foundation. (2022). *Food insecurity in rural, suburban, and urban New York*. https://nyhealthfoundation.org/wp-content/uploads/2022/11/Food-Insecurity-in-Rural-Suburban-and-Urban-New-York.pdf

Office of Disease Prevention and Health Promotion. (2019, May 2). *Pushing produce in New York City's neighborhoods: The Green Carts initiative*. U.S. Department of Health and Human Services. Retrieved from the Internet Archive: https://web.archive.org/web/20240415000602/https://health.gov/news/201905/pushing-produce-new-york-citys-neighborhoods-green-carts-initiative

Rosales, R. (2013). Survival, economic mobility and community among Los Angeles fruit vendors. *Journal of Ethnic and Migration Studies*, *39*(5), 697–717. https://doi.org/10.1080/1369183X.2013.756659

U.S. Census Bureau. (2023). *American Community Survey 5-year estimates: S1903 Median income in the past 12 months*. Retrieved July 21, 2025, from https://data.census.gov/table/ACSST5Y2023.S1903?t=Income+and+Poverty&g=160XX00US3651000

Walker, R. E., Keane, C. R., & Burke, J. G. (2010). Disparities and access to healthy food in the United States: A review of food deserts literature. *Health & Place, 16*(5), 876–884. https://doi.org/10.1016/j.healthplace.2010.04.013