

Barriers and Facilitators to Implementation of a Child Care Center-Based Produce Delivery Program

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ABSTRACT

Background: Regular consumption of produce is a challenge for families with young children in low food access areas.

Objective: A community partnership formed to evaluate feasibility of and interest in a child care center-based program for produce delivery from an online grocery vendor.

Methods: Surveys were collected from caregivers across three child care centers, including produce program participants. Descriptive statistics summarize household characteristics and participants' experience with the program.

Results: Challenges related to online payment and difficulty planning delivery times led to implementation of a modified intervention. Survey results revealed factors related to food access and storage that may impact interest and feasibility of online grocery in some communities.

Conclusions: Online grocery vendors may increase accessibility to fresh produce for families, but barriers to their use still exist. Trusted community partners such as child care centers may offer some of the resources needed for success.

KEYWORDS: fruits and vegetables, produce, online grocery, food access, child care, community partnership

Background

Low intake of fruit and vegetables (FV) is associated with chronic disease and contributes to morbidity and mortality.¹ Early childhood is a critical time to develop lifelong dietary habits.¹ By four years old, a child's FV consumption falls below recommended dietary guidelines; this decrease persists throughout childhood.² Availability of vegetables in the home is a strong predictor of consumption in children,³ but access may be challenging for families with limited resources.⁴ Food insecurity affects approximately 15% of households with young children in the U.S.,⁵ and is associated with lower vegetable intake.⁶ Food insecurity is an ongoing concern for families living in parts of San Francisco, California, due to limited availability of grocers, high prices, and limited acceptance of Supplemental Nutrition Assistance Program (SNAP) or other food subsidies.⁷

Historically, most families purchase FV at physical locations, such as retail stores or supermarkets,⁸ however accessibility is limited in areas designated by the U.S. Department of Agriculture (USDA) as low food access.⁴ Access may be increased by alternatives, for example direct-to-consumer methods such as farmers' markets.¹ Such models, including cost-offset community-supported agriculture programs (CO-CSA), reduce additional costs of distribution to retail locations.⁹ Many produce prescription programs that provide vouchers to farmers' markets have found transportation to be a barrier.¹⁰ Online purchase of FV has increased in communities with low food access.¹¹ But many families with SNAP report barriers to online grocery shopping, such as higher costs, inexperience, and general distrust of third party vendors.^{12,13} In one study, internet grocery services increased FV consumption for caregivers of young children, however ability to use SNAP or electronic benefit transfer (EBT) heavily influenced acceptability and accessibility.¹⁴ A study of families with low income participating in CO-CSA

programs found that partnerships with farmers' markets increased access to FV, however limited pick-up times and delivery locations presented challenges.¹⁵

Objective

The literature demonstrates that alternative models for grocery shopping may increase access to FV, but present logistical challenges for under-resourced communities. Child care programs provide optimal settings for healthy eating in young children,^{16,17} and can reduce burdens related to delivery by leveraging a location that families already visit.¹⁸ With this in mind, a group of community partners collaborated to evaluate 1) feasibility of, and 2) interest in, a child care center-based program for produce delivery from an online grocery vendor.

Methods

Description of community partnership

Faculty and students. The program was led by a pediatric nurse practitioner (NP) faculty member at the University of California, School of Nursing (UCSF), a public research university with graduate nursing programs. NP students were involved in this pilot as volunteers, or through a course related to project planning for which the NP was a project mentor. As part of a clinical faculty role, the NP was also a practicing pediatric clinician at a local federally-qualified health center (FQHC), in primary care and in a program for childhood obesity management.

Child care centers. Two years prior, the NP attended a meeting led by the health and nutrition manager of a local consortium of Head Start child care centers, who supports health-related services for children enrolled in their 10 sites serving approximately 400 children.¹⁹ At the meeting, the manager requested assistance with nutrition education for their families, and the NP expressed interest in collaboration.

Through this partnership, the NP volunteered to provide free nutrition education for parents and children in the Head Start centers. Workshops were held once a week for four weeks at one of the centers, open to any parents in the consortium. The NP also added a training component for pediatric NP students, who led an interactive nutrition education activity for children while parents attended the workshop. The workshops were repeated every few months, rotating through 5 different centers. The NP and Head Start manager communicated via email every few months over the following two years.

Grocery delivery business. Workshop participants identified fresh food access as a challenge, particularly for FV. The NP and students explored resources to share for food access in the area and an affordable way to have FV available at workshops that participants could take home. They reached out to a social impact and sustainability liaison at Imperfect Produce (now Imperfect Foods), a national grocery delivery business with a local hub, that also donates from their surplus to various organizations in the community.²⁰ Imperfect Foods is a unique organization that purchases and sells produce and packaged groceries in danger of being wasted due to cosmetic imperfections and other market barriers. Each week, they donated several bags of produce that were distributed among participants at the workshop.

Input from child care center families. In addition to donating FV for workshop participants, Imperfect Produce shared information about their “Reduced Cost Box Program,”²¹ through which under-resourced families could order produce at a discount. The NP shared this with participants and asked for informal feedback about online grocery shopping in their community. Several expressed interest in general but presented concerns about delivery fees and having a suitable place for home delivery (many lived in apartments or shared housing without a secure delivery location). Participants noted that getting produce bags at the workshops was convenient.

When asked if purchasing produce online and having it delivered to the child care center would be a helpful alternative to home delivery, they unanimously agreed. They also agreed that the centralized location would cut costs by distributing one delivery fee across multiple families. The feedback inspired the development of this pilot program by the NP, and the Head Start and Imperfect Produce partners enthusiastically agreed to collaborate.

Program design

Program planning occurred in Spring and Summer, 2018. A literature review at the time revealed few online grocery shopping interventions in communities with low food access,^{12,14} and none that involved collaboration with child care organizations. Research related to CO-CSA programs or school-based produce distribution programs showed promise for increasing access to FV among families with low income.^{9,15,22,23} This limited evidence informed the initial program concept, and was integrated with the community partners' input to finalize program design.

The intent was to develop a subsidized pilot, whereby participants would pay a portion of the cost of a box discounted through the Reduced Cost Box Program, and the remainder would be funded through a small grant. Families would order and pay for produce boxes online and with assistance from child care center staff as needed. To address barriers of online ordering for families with SNAP benefits,¹⁴ one of the NP students collaborated with the Imperfect Produce liaison to apply to the USDA Food and Nutrition Service's "SNAP Online Purchasing Pilot (OPP),"²⁴ which had recently expanded to allow more online vendors to accept EBT. Contents of the boxes would be standardized based on seasonal supply to minimize cost. Boxes would be delivered to the child care centers once a week for four weeks, and families would retrieve them during child pick-up or drop-off.

Setting and participants

The intervention sites were three child care centers from the Head Start consortium in the Mission and Bayview districts of San Francisco, CA, identified as large enough to recruit sufficient participants (approximately 100 families total), and in areas with limited fresh food access. Enrollment in these centers comprises majority Spanish-speaking, immigrant, and low-income working families.¹⁹ Families with children ages two through five years were invited by their family service specialist to sign up for the produce program. Sites conducted sign-up processes on a first-come, first-served basis, limited to ten families per site.

Descriptive data collection

There were two data collection periods: two weeks prior to, and two weeks following, the intervention implementation. Data was collected twice at each center during each period – once during a child drop-off time, and again during a child pick-up time. NP students trained in the survey and research protocol performed all data collection. The UCSF Institutional Review Board classified the evaluation study as exempt due to the use of anonymous surveys (IRB #: 18-24657). Data were analyzed using Stata, version 17 statistical software (College Station, TX, USA).

English- or Spanish-speaking caregivers of children ages two through five years, enrolled at one of the centers described above, were invited to respond anonymously to survey questions. Response to surveys was voluntary and separate from the intervention; families were able to participate in the intervention regardless of their decision to respond to the survey. Subjects received a \$5 gift card for each survey.

Measures. Two surveys were administered: one for descriptive information about any of the families enrolled at the three centers, and the second for produce delivery participants to evaluate the program. The descriptive survey contained questions about household demographics, food

access, and food preparation. The survey was administered at both pre- and post-intervention timepoints. Families were instructed to only complete the descriptive survey once, at either timepoint, and personalized numeric codes on surveys were used to avoid duplicate entries. Evaluation surveys included questions related to engagement in the produce delivery program only for those who participated and were only administered in the post-intervention period.

During planning, no standardized tools existed to collect the information of interest, so customized surveys were developed (see Appendix). Questions were custom-written and informed by principles of readability and comprehension found for measures used in similar populations.²⁵⁻²⁷ The number of questions was limited to fewer than ten on each survey, to minimize time for completion. Surveys were written in English and translated into Spanish by the NP and reviewed for accuracy by one of the NP students; both are native Spanish-speakers. A few months prior to the intervention, the NP tested a draft of the surveys in both languages with a focus group of eight participants from one of the previous child care center nutrition workshops. Adjustments were made based on this feedback to ensure clarity and reliability of questions in the final versions.

Results and Lessons Learned

Program implementation

The program launched in late summer 2018. There were two significant barriers that led to changes in implementation of the intervention. The first related to the process for ordering and payment. Unfortunately, the application to the USDA SNAP pilot program was declined, as its expansion was in an early phase and still only open to limited vendors. Around the same time, it was discovered that many families used direct bank transfers for electronic payments, yet this was not an available option for payment to the grocery vendor. There was no mechanism for the

child care center to facilitate cash payments either. Credit cards were left as the only option for payment, yet this was not a viable option for some families who had already signed up for the produce program.

The second challenge to present at the start of program implementation involved the timing for deliveries to the child care centers. The delivery time windows previously available from the vendor had changed, now extending beyond the child care centers' operating hours, and were not customizable. As a result there was no way to guarantee that the orders would be received when staff were present at the centers, and there were no secure locations for the deliveries to be left at other times.

As an alternative, Imperfect Produce offered the opportunity to create produce bags from their surplus stock of FV as done during the previously described nutrition workshops. The advantage of this approach was that there was no cost, which eliminated the barrier of payment mechanism. The disadvantage was that the donation supply was only available in bulk for pick-up at their warehouse, so an alternative plan was needed to retrieve the FV and distribute them into the bags for each participant. This solved the issue of finding a time to deliver during child care center hours, but created a new problem of finding a way to coordinate assembly and delivery. The NP and nursing students volunteered their time each week to create the produce bags at the warehouse and then deliver them to each of the three centers. Bag distribution to enrolled families was then coordinated by each site's family service specialist. Unfortunately these changes meant that only the feasibility of produce access through the child care center could be evaluated, but not ordering and delivery through the vendor.

Of the 100 families with a child who attends one of the three childcare centers, 59 caregivers completed surveys during the intervention period (59%), including those who

participated in the produce delivery program. Characteristics for the sample are presented in Table 1 and compared between those who did and did not participate in the intervention. Of the 30 caregivers who participated in the produce delivery program (10 from each center), 14 completed evaluation surveys (46.7%). In chi square comparisons of those who completed surveys, there were no significant differences in the characteristics between program participants and non-participants ($p > 0.05$). A summary of participants' experiences with the produce delivery program is presented in Table 2.

Barriers and facilitators to interest in online grocery shopping

In addition to challenges related to payment methods and delivery times, the descriptive survey of caregivers in the three child care centers also revealed other characteristics that could be barriers to online grocery utilization (Table 1). Over 64% preferred Spanish, which could present a problem in navigating online grocery platforms available only in English. Language is a critical component of nutrition and digital literacy, and the availability of information in multiple languages is recommended to strengthen equity and inclusion in online grocery platforms.²⁸ An obvious solution to this is for vendors to offer more languages on their websites, but another alternative is to collaborate with community agencies with resource staff for non-English-speaking families (such as child care centers) who can help them place orders, and/or facilitate centralized ordering.

Families in low food access areas often live in rental properties, which are not required to have appliances to be considered habitable.²⁹ While all respondents in the sample had a refrigerator at home, only about half had a freezer, and some did not have access to an oven, microwave, or stove. Reduced access to appliances for food preparation or storage could limit a family's ability to prepare meals in advance, reheat leftovers, or ensure that food does not spoil

before it can be eaten. This could deter families from using online vendors that require the purchase of large quantities of groceries or add additional costs for the customization of produce in an order. Potential solutions are for vendors to offer the option to order small quantities with greater frequency or free customization of orders to select foods with greater spoilage tolerance. Communities with low food access may also benefit from advocacy efforts to expand housing rental policies to require certain appliances that would improve equitable healthy food access.

Fewer than half of all respondents lived within 10 minutes of affordable fresh produce, and almost one-fifth reported needing to commute at least 20 minutes. In a recent study of SNAP-eligible families, lack of neighborhood resources and transportation were reported as significant factors driving inequities in healthy food access.³⁰ The amount of time needed for transit and shopping burdens families, particularly those with young children. Families using public transit may also only buy what they can comfortably carry. Online ordering and delivery to a convenient location provides a solution to these issues and may not only decrease families' stress associated with grocery shopping, but also potentially increase the quantity and diversity of FV purchased and consumed. Recent studies of online grocery programs have found that home delivery is not always preferred or convenient, and that delivery fees are a significant barrier.^{31,32} Delivery to a centralized location such as child care centers may increase access by providing a secure and convenient place to pick up groceries, and address the burden of delivery fees by reducing them through bulk orders.

Experience with produce delivery program

Although the intervention was implemented differently than initially planned, data was still collected to evaluate interest in child care center-based produce delivery (see Table 2). Of the 14 respondents who participated in the produce delivery program, 100% reported that it was

convenient and easy to use and that they were interested in future availability of a similar program. A recent study of online grocery shopping among families enrolled in the Women, Infants, and Children (WIC) program had similar findings, and participants reported benefits of time savings and convenience.⁸

Over 64% reported consuming everything in the bag each week, and the most common reason for not eating everything was unfamiliarity with its preparation. Studies in communities with low income have found that lack of control over food selection is a major barrier to online grocery shopping.^{8,12,13} However most participants in this program reported interest in future participation even if customization was not available, suggesting that unfamiliarity with some foods was not a significant barrier. Cooking classes or recipe exchanges are potential solutions to this latter issue,³³ and can be integrated at the child care center as part of the Head Start goal to provide nutrition education to families.³⁴

Challenges to sustainability

Two significant challenges limit program sustainability beyond the pilot period. The initial aim was to facilitate a program that participants could pay for themselves, to avoid the need for external funding. Participants' ability to order produce online was limited by the fact that over 40% of them did not have a household member with a debit or credit card, and neither cash nor SNAP benefits could be accepted as payment. Although participants were not surveyed about government assistance, many families in this Head Start consortium receive support from WIC or SNAP,¹⁹ as do over half of food insecure households in the U.S.³⁵ The USDA expanded their SNAP OPP to most of the country by mid-2021, but as of this writing it is still limited to major grocers and retailers.³⁶ In 2019 the USDA also launched the pilot "Gus Schumacher Nutrition Incentive Program (GusNIP)," which currently funds and evaluates projects that offer nutrition

incentives (NI) to subsidize the purchase of FV for SNAP participants and help food retailers to accept NI for FV purchases.³⁷ The expansion of these programs to allow local food distributors to participate will be essential to increasing equitable access across all communities.

Participants appreciated the convenience of using the child care center as the food delivery site; not being able to schedule the delivery within center operating hours was an unanticipated barrier. One possible solution to this problem is to expand the program's enrollment to increase the number of centers receiving deliveries, which may help the food distributor arrange a more customized delivery schedule. Another is to partner with delivery services that offer more specific time windows, such as organizations that transport food surplus from retailers to food insecure communities in order to reduce food waste.³⁸

Limitations

The lessons learned must be considered in the context of three limitations. First, the sample size was small and response rates were relatively low, which limits generalizability of results to a wider population. Increasing the number of data collection times after the intervention or using identified surveys may have improved the response rate. Second, validity and reliability of survey responses are limited due to use of a customized survey that has not been tested with a wider population. Third, modification of the intervention prevented evaluation of the feasibility of online ordering and delivery from the vendor, narrowing the context of results.

Conclusions

Interventions that are effective in increasing FV intake in early childhood are multi-pronged, focused specifically on FV consumption, and involve caregivers and nutrition education.¹ The lessons learned from this pilot show promise that online grocery shopping could be a feasible component of such multi-faceted approaches, but more robust studies are needed to investigate

impact on FV consumption or health outcomes.¹ Since implementation of this program, several studies have examined barriers and facilitators to online grocery shopping interventions in communities with low income.³⁹ Current evidence indicates that barriers still exist to make online grocery vendors accessible to populations with limited resources, including payment method and the burden of delivery fees.³⁹ This program remains a unique model for involving trusted community partners such as child care centers to offer some of the resources needed for success; future investigations with larger samples are needed.

Abbreviations:

FV – fruit and vegetables

SNAP - Supplemental Nutrition Assistance Program

USDA – U.S. Department of Agriculture

CO-CSA - cost-offset community-supported agriculture

EBT - electronic benefit transfer

NP – nurse practitioner

UCSF – University of California, San Francisco

FQHC – federally-qualified health center

OPP – online purchasing pilot

WIC - Women, Infants, and Children

GusNIP – Gus Schumacher nutrition incentive program

NI – nutrition incentives

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References

1. Hodder RK, O'Brien KM, Tzelepis F, Wyse RJ, Wolfenden L. Interventions for increasing fruit and vegetable consumption in children aged five years and under. *Cochrane Database of Systematic Reviews*. 2020;Issue 5.
2. Dietary Guidelines Advisory Committee. Scientific Report of the 2020 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Agriculture and the Secretary of Health and Human Services [Internet]. Washington, D.C.: USDA. 2020. [cited 2022 March 3]. Available from: <https://www.dietaryguidelines.gov/2020-advisory-committee-report>.
3. Cook LT, O'Reilly GA, DeRosa CJ, Rohrbach LA, Spruijt-Metz D. Association between home availability and vegetable consumption in youth: a review. *Public health nutrition*. 2015;18(4):640-648.
4. USDA Economic Research Service. Food access research atlas [Internet]. Washington, D.C.: USDA. 2021 November [cited 2022 March 4]. Available from: <https://www.ers.usda.gov/data-products/food-access-research-atlas/>.
5. USDA Economic Research Service. Food security in the U.S.: Key statistics & graphics [Internet]. Washington, D.C.: USDA. 2021 Sept [cited 2022 March 3]. Available from: <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/key-statistics-graphics/#children>.
6. Eicher-Miller HA, Zhao Y. Evidence for the age-specific relationship of food insecurity and key dietary outcomes among US children and adolescents. *Nutrition research reviews*. 2018:1-16.

7. San Francisco Food Security Task Force. 2018 Assessment of food security [Internet]. San Francisco, CA: SFDPH. 2019 [cited 2022 March 3]. Available from: <https://www.sfdph.org/dph/files/mtgsGrps/FoodSecTaskFrc/docs/FSTF-2018-Assessment-Of-FoodSecurity.pdf>.
8. Jilcott Pitts SB, Ng SW, Blitstein JL, et al. Perceived advantages and disadvantages of online grocery shopping among special supplemental nutrition program for Women, Infants, and Children (WIC) participants in Eastern North Carolina. *Curr Dev Nutr*. 2020;4(5):nzaa076.
9. Hanson KL, Kolodinsky J, Wang W, et al. Adults and children in low-income households that participate in cost-offset community supported agriculture have high fruit and vegetable consumption. *Nutrients*. 2017;9(7).
10. Newman T, Lee JS, Thompson JJ, Rajbhandari-Thapa J. Current landscape of produce prescription programs in the US. *J Nutr Educ Behav*. 2022;54(6):575-581.
11. Brandt EJ, Silvestri DM, Mande JR, Holland ML, Ross JS. Availability of grocery delivery to food deserts in states participating in the online purchase pilot. *JAMA Netw Open*. 2019;2(12):e1916444.
12. Martinez O, Tagliaferro B, Rodriguez N, Athens J, Abrams C, Elbel B. EBT payment for online grocery orders: a mixed-methods study to understand its uptake among SNAP Recipients and the barriers to and motivators for its use. *J Nutr Educ Behav*. 2018;50(4):396-402.
13. Rogus S, Guthrie JF, Niculescu M, Mancino L. Online grocery shopping knowledge, attitudes, and behaviors among SNAP participants. *J Nutr Educ Behav*. 2020;52(5):539-545.

14. Appelhans BM, Lynch EB, Martin MA, Nackers LM, Cail V, Woodrick N. Feasibility and acceptability of Internet grocery service in an urban food desert, Chicago, 2011-2012. *Preventing chronic disease*. 2013;10:E67.
15. White MJ, Jilcott Pitts SB, McGuirt JT, et al. The perceived influence of cost-offset community-supported agriculture on food access among low-income families. *Public health nutrition*. 2018;21(15):2866-2874.
16. Meisenheimer M. Food insecurity in early childhood [Internet]. Washington, DC: Center for Study of Social Policy. 2018 [cited 2022 March 3]. Available from: <https://cssp.org/wp-content/uploads/2018/08/Food-Insecurity-Early-Childhood.pdf>.
17. Hendrie GA, Lease HJ, Bowen J, Baird DL, Cox DN. Strategies to increase children's vegetable intake in home and community settings: a systematic review of literature. *Maternal & Child Nutrition*. 2017;13(1):e12276.
18. Kuhns C, Martinchek, K., Gupta, P. Combating food insecurity and supporting child nutrition through the child care sector [Internet]. Washington, DC: Urban Institute. 2021 November [cited 2022 March 4]. Available from: <https://www.urban.org/sites/default/files/publication/105106/combating-food-insecurity-and-supporting-child-nutrition-through-the-child-care-sector.pdf>.
19. Mission Neighborhood Centers, Inc. Annual Report 2018-2019 [Internet]. San Francisco, CA: MNC. 2020 [cited 2022 March 4]. Available from: <https://mnscsf.org/wp-content/uploads/2020/06/Annual-Report-2019.pdf>.
20. Imperfect Foods. How it works [Internet]. San Francisco, CA: Imperfect Foods. 2022 [cited 2022 March 4]. Available from: <https://www.imperfectfoods.com/how-it-works>.

21. Imperfect Foods. What is the reduced cost box program [Internet]? San Francisco, CA: Imperfect Foods. 2021 [cited 2022 March 4]. Available from: <https://help.imperfectfoods.com/hc/en-us/articles/4405750855319-What-is-the-Reduced-Cost-Box-program>.
22. Davis EM, Cullen KW, Watson KB, Konarik M, Radcliffe J. A fresh fruit and vegetable program improves high school students' consumption of fresh produce. *J Am Diet Assoc*. 2009;109(7):1227-31.
23. Jamelske E, Bica LA, McCarty DJ, Meinen A. Preliminary findings from an evaluation of the USDA fresh fruit and vegetable program in Wisconsin schools. *Wmj*. Aug 2008;107(5):225-30.
24. USDA Food and Nutrition Services. USDA seeks retailer volunteers for SNAP Online Purchasing Pilot [Internet]. USDA Economic Research Service. 2016 [cited 2022 Nov 6]. Available from: <https://www.fns.usda.gov/pressrelease/2016/019716>.
25. Leroy JL, Ruel M, Frongillo EA, Harris J, Ballard TJ. Measuring the food access dimension of food security: A critical review and mapping of indicators. *Food Nutr Bull*. 2015;36(2):167-195.
26. Fernandez S, Olendzki B, Rosal MC. A dietary behaviors measure for use with low-income, Spanish-speaking Caribbean Latinos with type 2 diabetes: the Latino Dietary Behaviors Questionnaire. *J Am Diet Assoc*. 2011;111(4):589-99.
27. United States Census Bureau. American community survey: Data profiles [Internet]. Washington, D.C.: U.S. Census Bureau. 2014 [cited 2022 Nov 6]. Available from: <https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2014/>.

28. Consavage Stanley K, Harrigan PB, Serrano EL, Kraak VI. Applying a multi-dimensional digital food and nutrition literacy model to inform research and policies to enable adults in the U.S. Supplemental Nutrition Assistance Program to make healthy purchases in the online food retail ecosystem. *Int J Environ Res Public Health*. 2021;18(16).
29. California Department of Real Estate. California tenants: A guide to residential tenants' and landlords' rights and responsibilities [Internet]. Sacramento, CA: CDRE. 2022 [cited 2022 July 6]. Available from: <https://www.courts.ca.gov/documents/California-Tenants-Guide.pdf>.
30. Vedovato GM, Ali SH, Lowery CM, Trude ACB. Giving families a voice for equitable healthy food access in the wake of online grocery shopping. *Nutrients*. 2022;14(20).
31. Cohen N, Tomaino Fraser K, Arnow C, Mulcahy M, Hille C. Online grocery shopping by NYC public housing residents using Supplemental Nutrition Assistance Program (SNAP) benefits: A service ecosystems perspective. *Sustainability*. 2020;12(11):4694.
32. Jilcott Pitts SB, Ng SW, Blitstein JL, Gustafson A, Niculescu M. Online grocery shopping: promise and pitfalls for healthier food and beverage purchases. *Public health nutrition*. 2018;21(18):3360-3376.
33. Fischer L, Bodrick N, Mackey ER, et al. Feasibility of a home-delivery produce prescription program to address food insecurity and diet quality in adults and children. *Nutrients*. 2022;14(10).
34. Head Start Early Learning & Knowledge Center. Head start program performance standards: Family support services for health, nutrition, and mental health [Internet]. Washington, DC: U.S. Department of Health and Human Services. n.d. [cited 2022 March

- 4]. Available from: <https://eclkc.ohs.acf.hhs.gov/policy/45-cfr-chap-xiii/1302-46-family-support-services-health-nutrition-mental-health>.
35. Coleman-Jensen A, Rabbitt, M.P., Gregory, C.A. & Singh, A. ERR-298: Household food security in the United States in 2020 [Internet]. Washington, DC: USDA ERS. 2021 [cited 2022 March 4]. Available from: <https://www.ers.usda.gov/publications/pub-details/?pubid=102075>.
36. Jones JW. Online supplemental nutrition assistance program (SNAP) purchasing grew substantially in 2020 [Internet]. Washington, DC: USDA ERS. 2021 July [cited 2022 March 4]. Available from: <https://www.ers.usda.gov/amber-waves/2021/july/online-supplemental-nutrition-assistance-program-snap-purchasing-grew-substantially-in-2020/#:~:text=The%20Supplemental%20Nutrition%20Assistance%20Program,online%20from%20authorized%2C%20participating%20retailers>.
37. Leng KH, Yaroch AL, Nugent NB, Stotz SA, Krieger J. How does the Gus Schumacher Nutrition Incentive Program work? A theory of change. *Nutrients*. 2022;14(10).
38. Royte E. Food waste and food insecurity rising amid coronavirus panic [Internet]. *National Geographic*. 2020 March 30 [cited March 4, 2022]. Available from: <https://www.nationalgeographic.com/science/article/food-waste-insecurity-rising-amid-coronavirus-panic>.
39. Trude ACB, Lowery CM, Ali SH, Vedovato GM. An equity-oriented systematic review of online grocery shopping among low-income populations: implications for policy and research. *Nutr Rev*. 2022;80(5):1294-1310.

Table 1. Caregiver and Household Characteristics, by Produce Program Participation

	All (N=59)	Not a Participant (N=45)	Program Participant (N=14)
Caregiver Preferred Language - N (%)			
English	21 (35.59)	18 (40.00)	3 (21.43)
Spanish	38 (64.41)	27 (60.00)	11 (78.57)
Number of Children in Household < Six Years Old - N (%)			
One	18 (30.51)	14 (31.11)	4 (28.57)
Two	23 (38.98)	19 (42.22)	4 (28.57)
Three or more	18 (30.51)	12 (26.67)	6 (42.86)
Major Appliances Available in Home - N (%)			
Refrigerator	59 (100.00)	45 (100.00)	14 (100.00)
Freezer	32 (54.24)	25 (55.56)	7 (50.00)
Stove	51 (86.44)	38 (84.44)	13 (92.86)
Oven	37 (62.71)	28 (62.22)	9 (64.29)
Microwave	44 (74.58)	33 (73.33)	11 (78.57)
Transit Time to Closest Affordable Fresh Produce - N (%)			
Less than 10 minutes	28 (47.46)	22 (48.89)	6 (42.86)
10 to 20 minutes	20 (33.90)	16 (35.56)	4 (28.57)
20 minutes or more	11 (18.64)	7 (15.56)	4 (28.57)
Household Member with Debit/Credit Card - N (%)	41 (69.49)	33 (73.33)	8 (57.14)

Table 2. Participant Experience with Produce Program (N=14)

	N (%)
Program convenience	
Very convenient and easy to use	14 (100)
Quantity of bag contents consumed	
All of it	9 (64.29)
More than half	4 (28.57)
Less than half	1 (7.14)
Reason for not consuming everything	
No one liked food	1 (7.14)
Food spoiled before eating	1 (7.14)
Didn't know how to use/prepare	3 (21.43)
N/A - consumed all of it	9 (64.29)
Interest in future program participation	
Yes, even if no choice of contents	11 (78.57)
Yes, only if choice of contents	3 (21.43)
Amount willing to pay per bag	
Less than \$5	9 (64.29)
\$5-10	5 (35.71)
Desired frequency of delivery	
Once a week	7 (50.00)
Twice a month	6 (42.86)

APPENDIX

**Healthy Start Preschool Produce Program:
Needs Assessment Survey (English)**

Please circle the answer to the following questions about yourself and the family you live with. You may circle more than one answer if needed.

1. What is your relation to the child enrolled in this preschool?
 - a. Parent
 - b. Grandparent
 - c. Other relative
 - d. Non-relative

2. What is your age?
 - a. 18-30 years
 - b. 31-45 years
 - c. 46-60 years
 - d. 61 years or older

3. What is your ethnicity?
 - a. Hispanic/Latino
 - b. Black/African-American
 - c. Asian
 - d. White/Caucasian
 - e. Other

4. Who lives in your home besides you and your child(ren)?
 - a. My spouse/partner
 - b. A relative
 - c. A non-relative
 - d. No one else lives in my home

5. How many children live in your home who are younger than 6 years old?
 - a. 1
 - b. 2
 - c. 3 or more

6. Do you or does someone in your household have a debit or credit card?
 - a. Yes
 - b. No

7. Who does most of the meal preparation in your home?
 - a. Me
 - b. My spouse/partner

- c. Another relative
 - d. A non-relative
8. Which of the following appliances do you have in your home?
- a. Refrigerator
 - b. Freezer
 - c. Stove
 - d. Oven
 - e. Microwave
 - f. I do not have any of the above in my home
9. How long would it take you to get to a place where you can get enough affordable fresh fruits or vegetables for your household? (include total time spent walking, taking a bus or train or driving)
- a. 10 minutes or less
 - b. between 10 to 20 minutes
 - c. between 20 to 30 minutes
 - d. more than 30 minutes

**Healthy Start Preschool Produce Program:
Additional Program Evaluation Survey (English)**

10. Did you or someone from your household order a produce bag to be delivered to this preschool for you during the 4-week Healthy Start program? IF NO, STOP HERE.
 - a. Yes
 - b. No

11. How many produce bags (total) did your family actually get during the Healthy Start program?
 - a. 1
 - b. 2
 - c. 3
 - d. 4

12. Did you find the produce delivery program convenient and easy to use?
 - a. Very convenient and easy
 - b. Somewhat convenient and easy
 - c. Not at all convenient and easy

13. On average, how much of the produce from each bag did your family eat? IF “ALL”, SKIP TO QUESTION 15.
 - a. All of it
 - b. More than half
 - c. Less than half
 - d. None

14. What is the primary reason your family did not eat everything in the bag?
 - a. The bag contained foods that no one liked
 - b. The food spoiled before we could eat it
 - c. We did not know how to use or prepare something in the bag
 - d. There was too much food
 - e. Something else

15. If the produce delivery program continued to be offered at this preschool, would you be interested in ordering a bag in the future? IF NO, STOP HERE.
 - a. Yes, even if I don't get to choose what is in the bag.
 - b. Yes, but only if I get to choose what is in the bag.
 - c. No, I am not interested.

16. How much would you be willing and able to pay for a similar bag from this produce delivery program?
 - a. \$5.00 or less
 - b. Between \$5.00-\$10.00
 - c. Up to \$20.00

- d. More than \$20.00
17. On average, how often do you think you would you order a produce bag?
- a. Once a week
 - b. Twice a month
 - c. Once a month

**Healthy Start Preschool Produce Program:
Needs Assessment Survey (Spanish)**

Por favor marque con un círculo su respuesta a las siguientes preguntas. Las preguntas se tratan de Usted y la familia que vive en su casa. Puede escoger más de una respuesta si es necesario.

1. ¿Cuál es su relación con el/la niño(a) que asiste a esta escolita?
 - a. Padre/Madre
 - b. Abuelo(a)
 - c. Otro familiar
 - d. No soy pariente

2. ¿Cuál es su edad?
 - a. 18-30 años
 - b. 31-45 años
 - c. 46-60 años
 - d. 61 años o mayor

3. ¿Cuál mejor describe su raza o etnicidad?
 - a. Hispano/Latino
 - b. Negro/Afroamericano
 - c. Asiático
 - d. Blanco/Caucásico
 - e. Otro

4. ¿Además de usted y sus hijos, ¿quién más vive en su casa?
 - a. Mi esposo(a)/pareja
 - b. Un familiar
 - c. Alguien que no es familiar
 - d. Nadie mas

5. ¿Cuántos niños(as) que viven en su casa son menor de 6 años?
 - a. 1
 - b. 2
 - c. 3 o mas

6. ¿Usted o alguien más en su casa tiene una tarjeta de débito o crédito?
 - a. Si
 - b. No

7. ¿Quién hace la mayoría de las preparaciones de la comida en su casa?
 - a. Yo
 - b. Mi esposo(a)/pareja
 - c. Otro familiar
 - d. Alguien que no es familiar

8. ¿Cuáles de estos accesorios tiene usted en su casa?
 - a. Refrigerador
 - b. Congelador
 - c. Estufa
 - d. Horno
 - e. Microonda
 - f. No tengo ninguno de estos accesorios en mi casa

9. ¿Cuánto tiempo te tomaría, desde su casa, para llegar a un lugar para comprar verduras y frutas frescas y baratas?
 - a. 10 minutos o menos
 - b. entre 10 a 20 minutos
 - c. entre 20 a 30 minutos
 - d. más de 30 minutos

**Healthy Start Preschool Produce Program:
Additional Program Evaluation Survey (Spanish)**

10. ¿Usted o alguien en su casa se inscribió para recibir las bolsas de comestibles gratis durante las 4 semanas del programa Comienzo Saludable en esta escuela? SI NO, OMITI LAS SIGUIENTES PREGUNTAS.
- Si
 - No
11. ¿Cuántas bolsas de comestibles (total) recibieron usted y su familia durante el programa de Comienzo Saludable?
- 1
 - 2
 - 3
 - 4
12. ¿Fue conveniente y fácil usar este programa de entregamiento de comestibles?
- Muy fácil y conveniente
 - Poco fácil y conveniente
 - No fue nada fácil ni conveniente
13. ¿Mas o menos cuanto de cada bolsa de comestibles se comió su familia? SI “TODA LA CAJA” POR FAVOR OMITI LAS SIGUIENTE PREGUNTA Y SIGUE CON LA PREGUNTA 15.
- Toda la bolsa
 - Mas de la mitad
 - Menos de la mitad
 - Nada
14. ¿Cuál fue la razón principal por no terminar toda la comida en la bolsa?
- La bolsa traía comida que a nadie le gustaba
 - La comida se pudrió antes de poder comerla
 - No sabíamos cómo preparar o usar algo que venía en la bolsa
 - Había demasiada comida
 - Otra razón
15. ¿Si la escuela continua con este programa de comida, usted estaría interesado(a) en ordenar una bolsa en el futuro? SI NO, TERMINE AQUI CON SU CUESTIONARIO.
- Si, aunque no pueda escoger lo que viene en la bolsa
 - Si, pero solo si yo pueda escoger lo que viene en la bolsa
 - No, no estoy interesado(a)
16. ¿Cuánto estarías disponible a pagar para obtener una bolsa similar de la que venía con este programa?
- \$5.00 o menos

- b. Entre \$5.00-\$10.00
 - c. Hasta los \$20.00
 - d. Mas de \$20.00
17. ¿Mas o menos, como cada cuando ordenarías una bolsa de comestibles?
- a. Una vez por semana
 - b. Dos veces al mes
 - c. Una vez al mes

Once a month

1 (7.14)