A photograph of a person in a hospital food pantry. The person is wearing a dark blue shirt and light-colored pants, and is standing in the aisle between metal shelving units filled with boxes and bags of food. There are several rolling carts in the foreground and background, some containing produce and other food items. The lighting is somewhat dim, and the overall scene is a typical hospital food pantry.

The Association Between Hospital-Based Food Pantry Use and Subsequent Emergency Department Utilization Among Medicaid Patients with Diabetes

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Background

- Food insecurity is an important concern for the Medicaid population
 - Food insecurity: limited availability of nutritionally adequate and safe food or the ability to acquire such food
 - Nearly a quarter of Medicaid beneficiaries reported not having enough to eat at the start of Covid-19 (Hall et al., 2020)
- Having unmet basic needs – such as food insecurity – associated with adverse diabetes-related clinical outcomes and poorer access to and quality of care (Berkowitz et al., 2015; Cole & Nguyen, 2020)
- Individuals with food insecurity are significantly more likely to have frequent emergency department (ED) utilization than individuals who are food-secure (Estrella et al., 2021)

Background

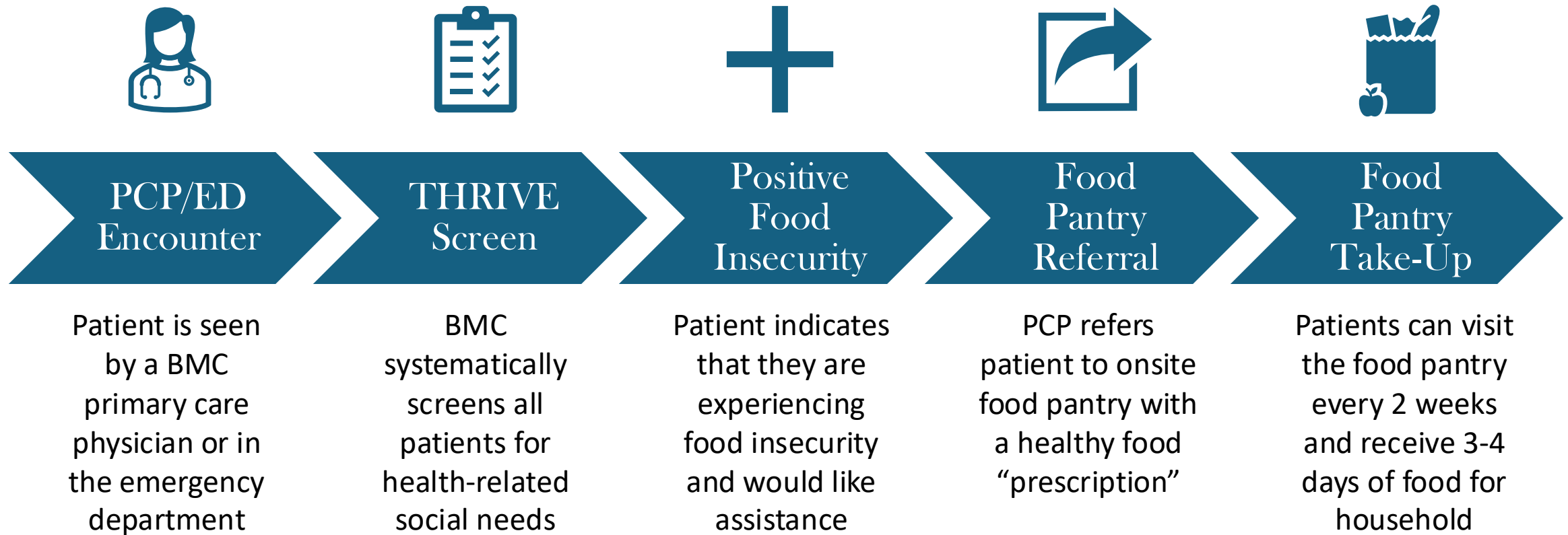
- Food pantries have been shown to improve patient access to healthy foods, stabilize blood glucose levels, and help patients maintain a healthy weight (Bertmann et al., 2021; Eichen-Miller, 2020)
- Despite their efficacy, food pantries are underutilized due to patients' lack of information and awareness
 - E.g., uncertainty about location, whether they qualify, etc
 - 67% of food-insecure households do not use them (Fong et al., 2016)
- Thus, improving access to food pantries may be one way to mitigate the impact of food insecurity on suboptimal care outcomes for patients with diabetes

Overview of Boston Medical Center (BMC)

- BMC provides health care for predominantly low-income and under-resourced populations, serving as the largest safety-net hospital in New England
- In 2001, BMC opened the first hospital-based food pantry in the US to address nutrition-related illness and undernutrition for low-income patients



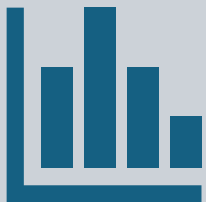
BMC Food Pantry Pathway



Evidence Gap and Motivation



Despite evidence suggesting that food pantry use improves health outcomes, there are few quasi-experimental studies that explore how food pantries influence health care utilization, such as ED visits



Our paper helps fill this evidence gap by evaluating the association between food pantry use and subsequent ED utilization for low-income patients with diabetes, using unique panel data and a quasi-experimental approach

Methods

- Data source
 - BMC Clinical Data Warehouse data:
 - Patient characteristics (age, gender, race, insurance type)
 - Health care utilization (ED and primary care visits)
 - Clinical indicators (diabetes, blood pressure)
 - Visits to BMC food pantry
 - Data organized at patient-quarter level from July 2015-December 2019
- Study population
 - Enrolled in Medicaid
 - Aged 18 and older
 - Received primary care services within BMC health system
 - Were at risk of or had diabetes (i.e., hemoglobin A1c of 5.7% or greater)
 - Visited onsite food pantry at least one time from July 2015 to December 2019

Methods

Analytic Design

- Staggered difference-in-differences approach (Calloway and Sant'Anna, 2021)
- Compared ED utilization of individuals who visited food pantry in specific quarter with those who were treated in a later quarter
- Exposure: first time patient visits food pantry

Model Estimation

- Linear probability models estimate changes in probability of future ED utilization:
 - Across entire post-intervention period
 - For each quarter (using event study specification)
- Propensity score weights and controls based on age, gender, and race/ethnicity

Sensitivity Analyses and Robustness Checks

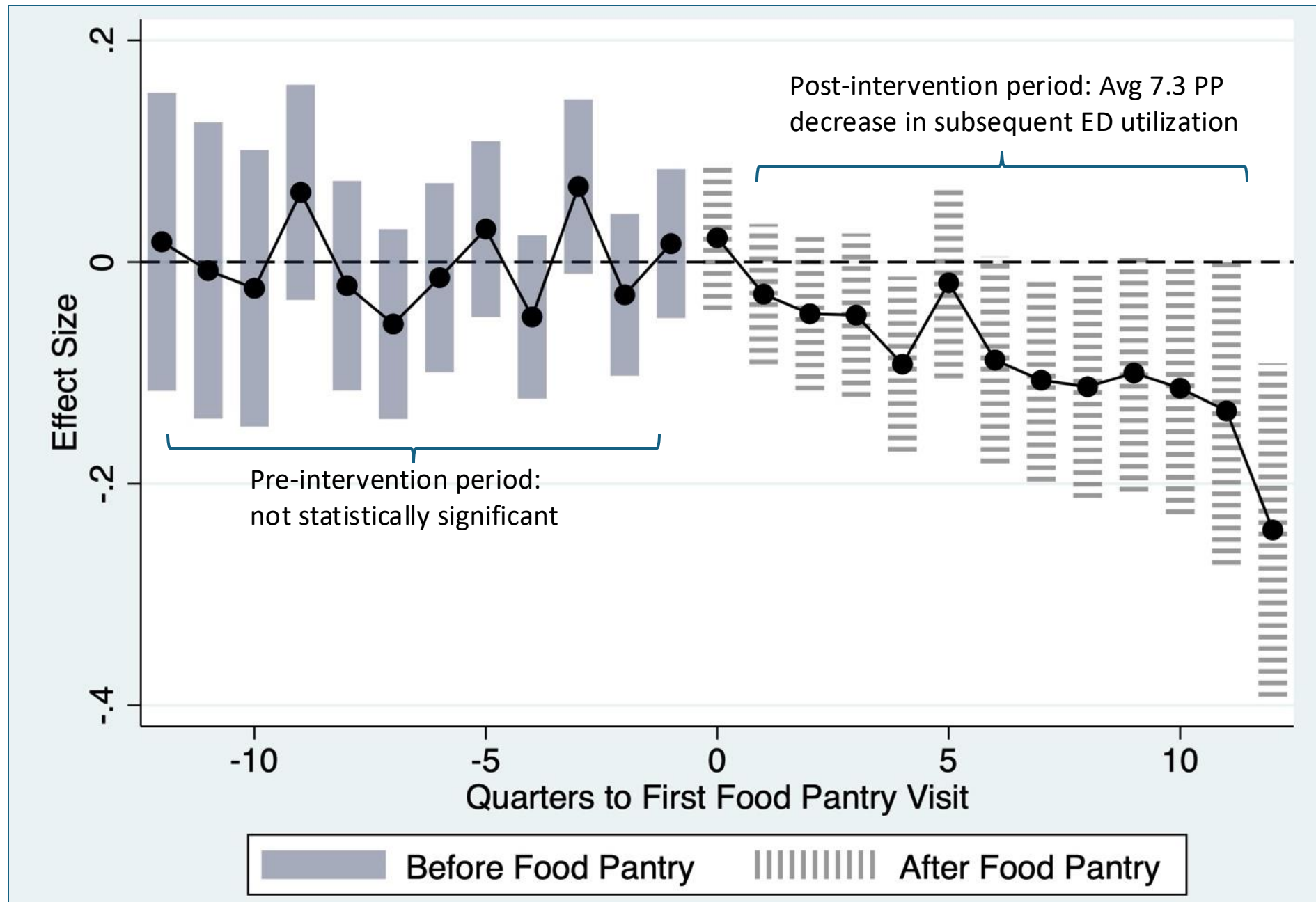
- Parallel trends assumption
- Intensity of food pantry use (i.e., 1-5 visits vs. 6+ visits)
 - Median FP visits was 5
- Other insurance types (e.g., Medicare, commercial)
- With and without propensity score weights

Results

- Food pantry sample was predominantly **female, Black or African American** and had a mean age of 51.3
 - Averaged 13.4 total food pantry visits and 6.6 ED visits across the study period
- On average, higher food pantry intensity group was **older**, more likely to be **female** and **Black or African American**, and had **lower mean A1c and blood pressure levels and ED visits**, compared to the lower-intensity group

	Total Food Pantry Visit Group	Lower Intensity (1-5 Food Pantry Visits)	Higher Intensity (6+ Food Pantry Visits)	P-Value of Difference Between Lower-Intensity vs Higher-Intensity Groups	No Food Pantry Visit Group
Number of unique patients	600	277	323		2780
Number of patient quarters	10 800	4986	5814		50 040
Demographic characteristics					
Age, mean (SD)	51.3 (8.5)	49.6 (9.0)	52.8 (7.8)	<.001	50.3 (9.3)
Gender, %				<.001	
Male	29.2	33.2	25.7		49.1
Female	70.8	66.8	74.3		51.9
Race/Ethnicity, %				<.001	
American Indian/Native American	0.2	0.0	0.3		0.6
Asian	0.8	0.7	0.9		4.0
Black or African American	66.7	65.7	67.5		61.9
Hispanic or Latino	9.0	9.0	9.0		5.6
White	7.2	9.7	5.0		10.1
Missing	16.2	14.8	17.3		17.5
% enrolled in Medicaid	100	100	100		100
Clinical characteristics, mean (SD)					
Hemoglobin A1c level	7.9 (2.2)	8.0 (2.2)	7.8 (2.2)	.005	7.7 (2.1)
Highest systolic BP	138.1 (20.7)	138.9 (21.0)	137.4 (20.5)	.005	140.0 (19.8)
Highest diastolic BP	83.3 (10.9)	84.1 (11.4)	82.8 (10.4)	<.001	84.3 (10.9)
Main variables, mean (SD)					
Total food pantry visits	13.4 (16.9)	2.2 (1.3)	22.9 (18.2)	<.001	0.0 (0.0)
Total ED visits	6.6 (9.9)	7.2 (11.1)	6.2 (8.7)	<.001	3.7 (7.6)

Figure 1. Probability of ED Visit after Food Pantry Use, Full Medicaid Sample



Results – Main Analysis



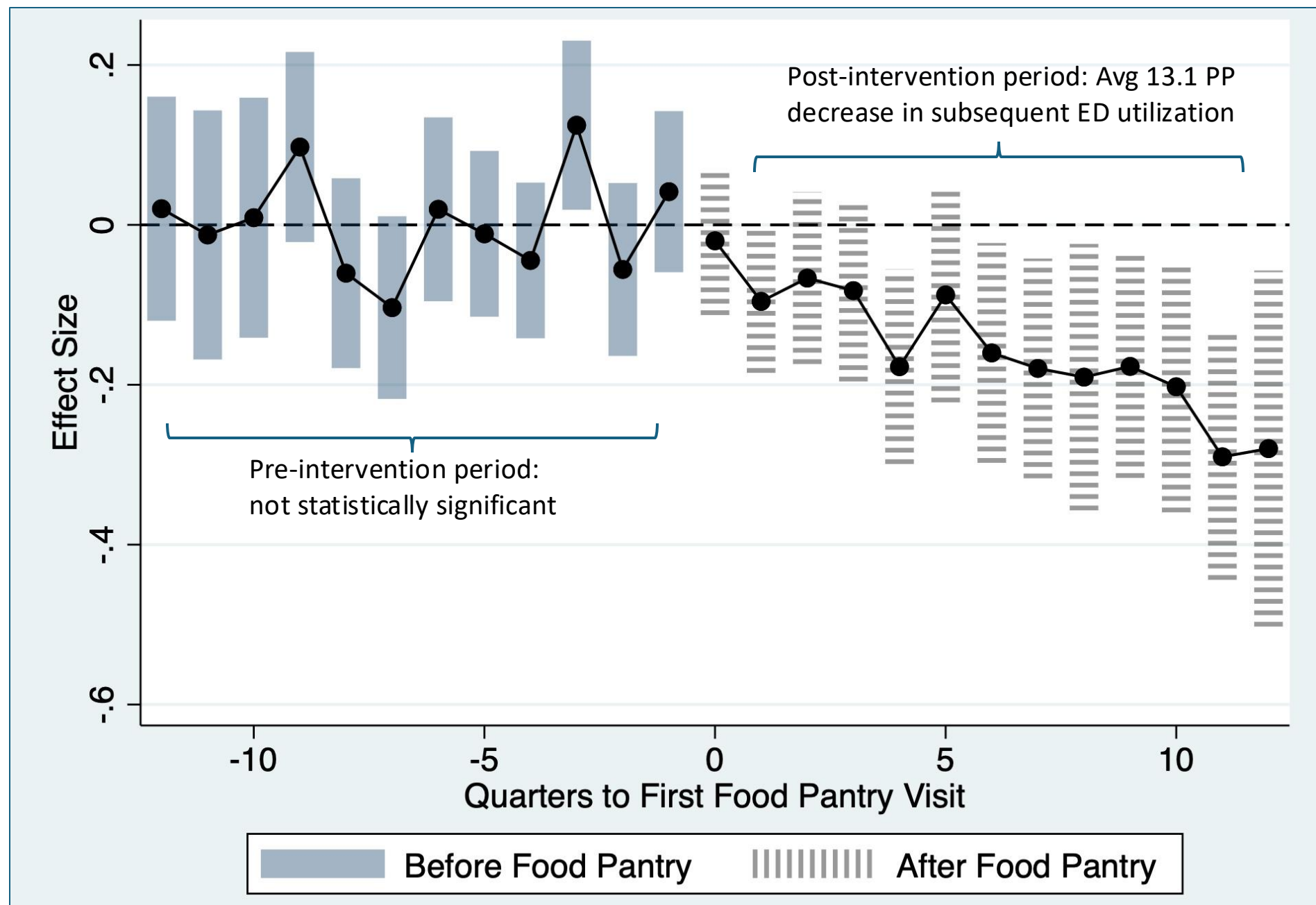
Across entire post-intervention period, using the food pantry was associated with a **7.3 PP** (95% CI, –13.8 to –0.8; $P = .03$) **decrease** per patient per quarter in probability of utilizing the ED after the first visit to the food pantry, relative to the not-yet-treated comparison group.



Accessing the food pantry was also associated with a **9.2 PP** (95% CI, –17.1 to –1.3; $P = .02$), **10.7 PP** (95% CI, –19.8 to –1.5; $P = .02$), and **11.3 PP** (95% CI, –21.3 to –1.2; $P = .03$) decrease in the probability of ED utilization 4, 7, and 8 quarters later, respectively.

Abbreviations: PP, percentage point; CI, confidence interval

Figure 2. Probability of ED Visit after Food Pantry Use, Medicaid Patients with Low-Intensity Food Pantry Utilization (1-5 Visits)



Results - Intensity of Food Pantry Use



For the low-intensity group (n = 277), food pantry use was associated with a **13.1 PP (95% CI, -21.9 to -4.3) decrease** per patient per quarter in the probability of subsequent ED utilization over the post-intervention period ($P = .004$) relative to the comparison group.

- Using food pantry was also associated with significant decreases in ED utilization 1, 4, 6, 7, 8, and 9 quarters later



For the high-intensity group (n = 323), accessing the food pantry was not associated with statistically significant decreases in the probability of ED utilization across the postintervention period and only in 1 specific quarter.

Abbreviations: PP, percentage point; CI, confidence interval

Discussion

- Food pantries likely improved food security and provided patients with certain non-health benefits, which then influenced avoidable ED utilization
 - Food insecurity could lead to disease progression or worsening of one's conditions that require emergency care, which may be a key reason why individuals with food insecurity have more frequent ED utilization than those without
 - Receiving food through the onsite food pantry may, in part, offset other household costs and mitigate other cost-related barriers to care (e.g., medication adherence)
- Difference in food pantry intensity results
 - Lower-intensity group had higher baseline A1c levels, blood pressure levels, and rates of ED visits
 - There was more opportunity for change in this group – reflects a cohort selection effect rather than a food pantry intensity effect

Discussion

- Hospital-based food pantries may be one way to address some issues associated with current approaches to addressing patients' unmet needs
 - Many providers are often unable to immediately address the reported needs of their patients due to various barriers, such as a lack of funding, resources, or partnerships with community organizations (Kostelanetz et al., 2022; Sokol et al., 2021)
 - Long wait times at community food pantries and inadequate food supply during COVID-19 pandemic (Madrigal & Pelit, 2023)
- Policy implications
 - As some states, such as Massachusetts and Oregon, have received Medicaid 1115 approval to use Medicaid funds to pay for food programs, efforts such as hospital-based food pantries could be explored as potential distribution mechanisms
 - States might consider using Medicaid funds to distribute medically tailored meals and other food prescriptions in a clinical setting, reducing patient burden

Limitations

- Endogeneity concerns limit ability to interpret results as causal
 - Other contemporaneous clinical and social interventions that could have affected their ED utilization (e.g., other food pantries, BMC interventions, social safety-net programs)
 - May have visited PCP in conjunction with food pantry use
- Study focused on one major health system and Medicaid patients with diabetes, limiting sample size, precision, and generalizability
- Unable to identify which specific elements of the BMC food pantry program (e.g., specific foods, nutritional counseling) could have facilitated lower ED utilization among the patients who sought assistance

Conclusion



Despite research on the impact of food pantries on health outcomes, less is known about how they influence the health care system.



We found that using the hospital-based food pantry was associated with a decrease in the probability of subsequent ED utilization.



Co-locating food pantries in health systems that screen for food insecurity could be a mechanism for reducing avoidable ED use among patients with diabetes.



Medicaid programs could consider hospital-based food pantries as a strategy for distributing medically-tailored meals and other nutrition-based services.

References

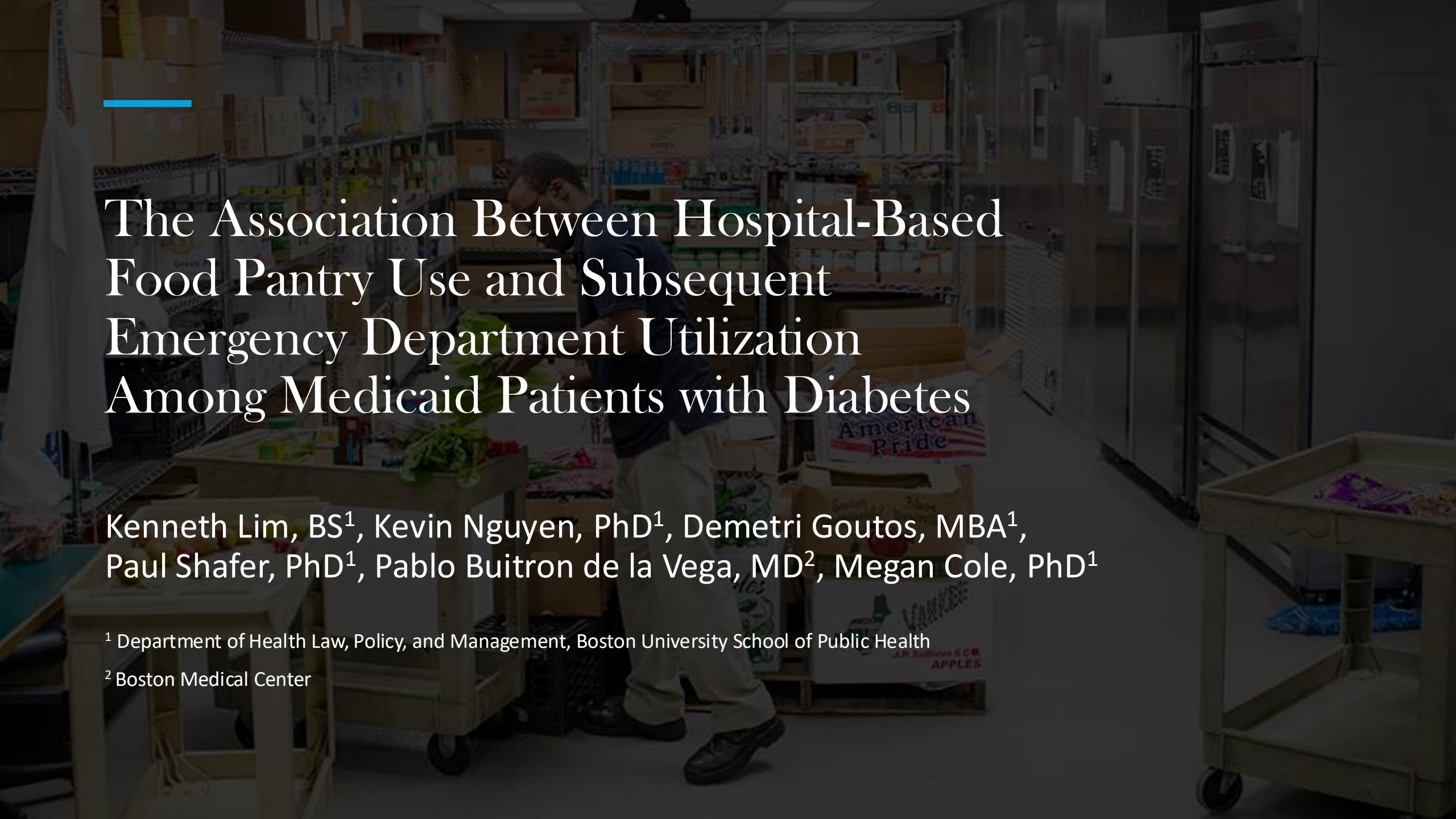
- Berkowitz, S. A., Meigs, J. B., DeWalt, D., Seligman, H. K., Barnard, L. S., Bright, O.-J. M.,... Wexler, D. J. (2015). Material need insecurities, control of diabetes mellitus, and use of health care resources: results of the measuring economic insecurity in diabetes study. *JAMA Internal Medicine*, 175(2), 257–265. doi:10.1001/jamainternmed.2014.6888
- Bertmann, F., Rogomentich, K., Belarmino, E. H., & Niles, M. T. (2021). The food bank and food pantries help food insecure participants maintain fruit and vegetable intake during COVID-19. *Frontiers in Nutrition*, 8. doi:10.3389/fnut.2021.673158
- Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, 225(2), 200–230. doi:10.1016/j.jecnom.2020.12.001
- Cole, M. B., & Nguyen, K. H. (2020). Unmet social needs among low-income adults in the United States: Associations with health care access and quality. *Health Services Research*, 55(S2), 873–882. doi:10.1111/1475-6773.13555
- Eicher-Miller, H. A. (2020). A review of the food security, diet and health outcomes of food pantry clients and the potential for their improvement through food pantry interventions in the United States. *Physiology and Behavior*, 220, 112871. doi:10.1016/j.physbeh.2020.112871
- Estrella, A., Scheidell, J., Khan, M., Castelblanco, D., Mijanovich, T., Lee, D. C., . . . Doran, K. M. (2021). cross-sectional analysis of food insecurity and frequent emergency department use. *Western Journal of Emergency Medicine*, 22(4), 911–918. doi:10.5811/westjem.2021.3.50981
- Fong, K., Wright, R. A., & Wimer, C. (2016). The cost of free assistance: Why low-income individuals do not access food pantries. *The Journal of Sociology Social Welfare*, 43(1), 71–94. doi:10.15453/0191-5096.3999
- Kostelanetz, S., Pettapiece-Phillips, M., Weems, J., Spalding, T., Roumie, C., Wilkins, C. H., . . . Kripalani, S. (2022). Health care professionals' perspectives on universal screening of social determinants of health: a mixed-methods study. *Population Health Management*, 25(3), 367–374. doi:10.1089/pop.2021.0176
- Madrigal, A., & Pelit, A. (2023, January 11). Food Banks Struggle to Serve Communities Amid Inflation, COVID and Cost of Living. KQED. <https://www.kqed.org/news/11937317/food-banks-struggle-to-serve-communities-amid-inflation-covid-and-cost-of-living>
- Sokol, R. L., Ammer, J., Stein, S. F., Trout, P., Mohammed, L., & Miller, A. L. (2021). Provider perspectives on screening for social determinants of health in pediatric settings: A qualitative study. *Journal of Pediatric Health Care: Official Publication of National Association of Pediatric Nurse Associates Practitioners*, 35(6), 577–586. doi:10.1016/j.pedhc.2021.08.004

Thank you!

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Published in Journal of Ambulatory Care Management's special issue on the role of health systems in addressing patients' unmet health-related social needs (Lim et al., 2024)

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Appendix A. Association Between Food Pantry Use and ED Utilization in Medicaid Patients With Diabetes: DID Results

Time Period	DID Estimate	95% CI
Average over quarters before food pantry	-0.05	(-0.90 to 0.80)
Average over quarters after food pantry	-7.26 ^b	(-13.76 to -0.77)
1 Quarter after food pantry	-2.90	(-9.22 to 3.42)
2 Quarters after food pantry	-4.67	(-11.58 to 2.25)
3 Quarters after food pantry	-4.79	(-12.16 to 2.57)
4 Quarters after food pantry	-9.22 ^b	(-17.11 to -1.32)
5 Quarters after food pantry	-1.88	(-10.49 to 6.74)
6 Quarters after food pantry	-8.84 ^a	(-18.16 to 0.47)
7 Quarters after food pantry	-10.67 ^b	(-19.81 to -1.53)
8 Quarters after food pantry	-11.25 ^b	(-21.30 to -1.21)
9 Quarters after food pantry	-10.01 ^a	(-20.72 to 0.70)
10 Quarters after food pantry	-11.39 ^b	(-22.75 to -0.03)
11 Quarters after food pantry	-13.44 ^a	(-27.32 to 0.45)
12 Quarters after food pantry	-24.18 ^c	(-39.22 to -9.13)
No. of patient quarter observations		6426

Appendix B. Association Between Food Pantry Use and ED Utilization in Medicaid Patients With Diabetes
(Low-Food Pantry Intensity: 1-5 Visits): DID Results

Time Period	DID Estimate	95% CI
Average over quarters before food pantry	0.20	(-0.94 to 1.33)
Average over quarters after food pantry	-13.06 ^c	(-21.85 to -4.28)
1 Quarter after food pantry	-9.57 ^b	(-18.51 to -0.63)
2 Quarters after food pantry	-6.65	(-17.40 to 4.10)
3 Quarters after food pantry	-8.23	(-19.58 to 3.13)
4 Quarters after food pantry	-17.74 ^c	(-29.91 to -5.56)
5 Quarters after food pantry	-8.76	(-22.20 to 4.68)
6 Quarters after food pantry	-16.02 ^b	(-29.76 to -2.27)
7 Quarters after food pantry	-17.95 ^b	(-31.70 to -4.21)
8 Quarters after food pantry	-19.04 ^b	(-35.71 to -2.38)
9 Quarters after food pantry	-17.70 ^b	(-31.65 to -3.75)
10 Quarters after food pantry	-20.25 ^b	(-35.96 to -4.53)
11 Quarters after food pantry	-29.01 ^c	(-44.40 to -13.62)
12 Quarters after food pantry	-27.98 ^b	(-50.25 to -5.71)
No. of patient quarter observations		3621