

CURRICULUM VITAE

ELLEN K. BARNIDGE, PhD, MPH

Office Address: College for Public Health and Social Justice
Department of Behavioral Science and Health Education
Saint Louis University
3545 Lafayette Avenue
St. Louis, MO 63104

Phone: 314-977-9425 (office)
Email: ellen.barnidge@slu.edu (office)

I. EDUCATION

PhD	Public Health Studies, Behavioral Science School of Public Health Saint Louis University, St. Louis, MO	2008
MPH	Behavioral Science/Health Education and Epidemiology School of Public Health Saint Louis University, St. Louis, MO	2005
BA	Psychology College of the Holy Cross, Worcester, MA	2000

II. PROFESSIONAL EXPERIENCE

2022-	Interim Dean, College <i>for</i> Public Health and Social Justice, Saint Louis University, St. Louis, MO
2016-	Associate Professor with tenure, Department of Behavioral Science and Health Education, College <i>for</i> Public Health and Social Justice, Saint Louis University, St. Louis, MO
2019 – 2020	Fellow, Focus Impact Fellows Program Focus St. Louis, St. Louis, MO
2015-2019	Co-lead, National Obesity Policy Research and Evaluation Network (NOPREN), Food Safety Net Clinical Linkages Working Group

2011-2016	Assistant Professor, tenure track, Department of Behavioral Science and Health Education, College for Public Health and Social Justice, Saint Louis University, St. Louis, MO
2010-2011	Research Assistant Professor, Department of Behavioral Science and Health Education, School of Public Health, Saint Louis University, St. Louis, MO
2008-2010	Project Director, Men on the Move Growing Communities, School of Public Health, Saint Louis University, St. Louis, MO
2007-2010	Consultant, Diabetes Initiative, School of Medicine, Washington University, St. Louis, MO
2008-2016	Member, Core Leadership Team, Prevention Research Center in St. Louis, St. Louis, MO
2005-2008	Project Coordinator, Men on the Move, School of Public Health, Saint Louis University, St. Louis, MO
2005	Graduate Intern, Prevention Institute, Oakland, CA
2002-2005	Graduate Research Assistant, School of Public Health, Saint Louis University School, St. Louis, MO
2003-2005	Project Assistant, Transtria, LLC, St. Louis, MO

III. RESEARCH FUNDING

Current research

Title: Assessing the capacity needed to scale up local food access interventions

Responsibilities: Co-Principal Investigator

Funding: Saint Louis University Applied Health Sciences Grant

Overall goals: To explore the role of local farmers and food entrepreneurs, particularly St. Louis City residents of color, in strengthening the local food system

Funding cycle: 2022-2023

Title: Closing the Gap with Social Determinants of Health Accelerator Plan

Responsibilities: Subaward Co-Investigator

Funding: Centers for Disease Control and Prevention

Overall goals: To assess St. Louis City's community capacity to alter the food system

Funding cycle: 2022

Title: Missouri Medicaid expansion: will low-income Missourians still need to choose between food and health care?

Responsibilities: Co-Principal Investigator

Funding: Missouri Foundation for Health

Overall goals: To understand the relationship between Medicaid expansion and food insecurity in Missouri

Funding cycle: 2021-2024

Title: HealthSPAN

Responsibilities: Co-Investigator

Funding: Office of the Vice President for Research Saint Louis University

Overall goals: To develop a cross-disciplinary network of health policy researchers at Saint Louis University

Funding cycle: 2021-2022

Title: Innovative State and Local Public Health Agencies to Prevent and Manage Diabetes and Heart Disease

Responsibilities: Evaluation Team Co-Investigator

Funding: Centers for Disease Control

Overall goals: To evaluate an innovation grant to increase participation in diabetes self-management programs.

Funding cycle: 2019-2024

Completed Research

Title: SLU-MRCC Missouri Farmer Insurance Survey and Focus Groups

Responsibilities: Consultant

Funding: Missouri Foundation for Health

Overall goals: To assess health insurance access and usage for Missouri farmers.

Funding cycle: March 2018 – December 2019

Title: Promoting Child Health Equity by Addressing Resource Insecurities in Pediatric Clinical Settings

Responsibilities: Principal Investigator

Funding: Missouri Foundation for Health

Overall goals: To design, implement, and evaluate a clinic to community intervention to address social determinants of health in a pediatric clinical setting.

Funding cycle: November 2017 – October 2021

Title: Food Matters STL

Responsibilities: Principal Investigator

Funding: Saint Louis University College for Public Health Dean's Fund

Overall goals: To assess capacity to provide resources and infrastructure needed to develop a health care intervention to address household food insecurity.

Funding cycle: July 2016 – August 2017

Title: Food insecurity screening in pediatric clinical settings: a caregivers' perspective

Responsibilities: Principal Investigator

Funding: Saint Louis University Health Sciences Small Grant

Overall goals: To assess barriers caregivers face in disclosing food insecurity in a pediatric settings

Funding cycle: February 2016 – May 2017

Title: Prevention Research Center in St. Louis

Responsibilities: Co-Investigator

Funding: HHS/CDC

Overall Goals: The major goals of this project were to develop chronic disease prevention interventions that are appropriate for high-risk rural areas.

Funding cycle: September 2009 – September 2014

Title: Men on the Move: Growing Communities

Responsibilities: Co-Investigator

Funding: NIH

Overall Goals: The project goals were to reduce environmental risk factors associated with cardiovascular disease by increasing access to fruits and vegetables and developing culturally appropriate activities for African Americans in rural southeast Missouri.

Funding cycle: July 2008 – March 2014

Title: Men on the Move

Responsibilities: Project Coordinator

Funding: NIH

Overall Goals: The major goals of this project were to examine the individual and social factors that affect African American men's health in rural southeast Missouri. Funding cycle: July 2005 – March 2008

IV. PEER REVIEWED PUBLICATIONS

(*denotes a publication with a community partner co-author, # denotes a publication with a student co-author, ^denotes publication with clinical partner)

1. Krupsky K, Silwa S, Seligman H, Brown A, Liese A, Demissie Z, **Barnidge E**. Adolescent Health Risk Behaviors, Adverse Experiences, and Self-reported Hunger: Analysis of 10 States from the 2019 Youth Risk Behavior Surveys. *Journal of Hunger & Environmental Nutrition*. 2022. <https://doi.org/10.1080/19320248.2022.2088263>.[#]
2. Brown A, Seligman H, Silwa S, **Barnidge E**, Krupsky K, Demissie Z, Liese A. Food Insecurity and Suicidal Behaviors Among US High School Students. *Journal of School Health*. 2022. <https://doi.org/10.1111/josh.13199>.[#]
3. Jaegers LA, Vaughn MG, Werth P, Matthieu MM, Ahmad SO, **Barnidge E**. Work-Family Conflict, Depression, and Burnout Among Jail Correctional Officers: A 1-Year Prospective Study. *Safety and Health at Work*. 12(2):167-173, 2021.
4. **Barnidge E**, Stenmark S, DeBor M, Seligman H. The right to food: building upon “food is medicine”. *American Journal of Preventive Medicine*. 59(4): 611-614, 2020.[^]
5. Jaegers L, Ahmad S, Scheetz G, Bixler E, Nadimpalli S, **Barnidge E**, Katz I, Vaughn M, Matthieu M. Total Worker Health® Needs Assessment to Identify Workplace Mental Health Interventions in Rural and Urban Jails. *American Journal of Occupational Therapy*. 74(3): 1-12, 2020.
6. Landfried L, Pithua P, Lewis R, Rigdon S, Jacoby J, King C, **Barnidge E**, Baskin C. Antibiotic use in goats: role of experience and education of Missouri veterinarians. *Veterinary Record*. 186(11):349, 2020. [#]
7. **Barnidge E**, Krupsky K, LaBarge G, Arthur J. Food insecurity screening in pediatric clinical settings: a caregivers' perspective. *Maternal and Child Health Journal*. 24(1):101-109, 2020.^{#,^}

8. Jaeger L A, Matthieu M., Werth P, Ahmad SO, **Barnidge E**, Vaughn, M. Stressed out: Predictors of depression among jail officers and deputies. *The Prison Journal*. 100(2):240-261, 2019.
9. Chapnick M, **Barnidge E**, Sawicki M, Elliott M. Healthy Options in Food Pantries - A Qualitative Analysis of Factors Affecting the Provision of Healthy Food Items in St. Louis, Missouri. *Journal of Hunger and Environmental Nutrition*. 14(1-2): 262-280, 2019.[#]
10. Green J, Boakye E, **Barnidge E**, Vaughn M. Armed Conflict in Central America and Immigrant Food Insecurity in the United States. *Journal of Epidemiology and Global Health*. 8(1-2): 59-64, 2018.
11. Lanfried L, **Barnidge E**, Pithua P, Lewis R, Jacoby J, King C, Baskin C. Antibiotic Use On Goat Farms: An Investigation Of Knowledge, Attitudes, And Behaviors Of Missouri Goat Farmers. *Animals*. 8(11): 198, 2018.[#]
12. Scharff D, Jupka K, Gulley L, **Barnidge E**. An unexpected, yet welcomed outcome of the St. Louis Healthy Start Program. *Maternal and Child Health Journal*. 22(12):1693-1697, 2018.*
13. Shacham E, Loux T, **Barnidge E**, Lew D, Pappaterra L. Determinants of Organ Donation Registration, *American Journal of Transplantation*. 1–6, 2018.[#]
14. McMillin SE, **Barnidge E**, Spratt BG, Arden RC. Impact of tax innovations on families with young children. *American Journal of Public Health*. 108(2): 192-193, 2018.[#]
15. Baker EA, Elliott M, **Barnidge E**, Milne A, Estlund A, Brownson R, Motton-Kershaw F, Hashimoto D. Implementing and evaluating environmental and policy interventions for promoting physical activity: A mixed-methods study in rural schools. *Journal of School Health*. 87(7): 538-545, 2017. ^{**}
16. Dale A, Jaegers L, Welch L, **Barnidge E**, Weaver N, Evanoff B. Facilitators & Barriers to the Adoption of Ergonomic Solutions in Construction. *American Journal of Industrial Medicine*. 60(3):295-305, 2017.[#]
17. **Barnidge E**, Stenmark S, Seligman H. Clinic to Community Models to Address Food Insecurity. *JAMA Pediatrics*. 171(6): 507-508, 2017.[^]
18. Devia C, Baker EA, Sanchez-Youngman S, **Barnidge E**, Golub M, Motton F, Muhammad M, Ruddock C, Vicua B, Wallerstein N. Advancing system and policy changes for social and racial justice: comparing a Rural and Urban Community-based Participatory Research Partnership in the US. *International Journal for Equity*. 16:17-30, 2017.*
19. **Barnidge E**, Chapnick M, Baker EA, Sawicki M, Huang J. Food insecurity in the summer: A rural-urban comparison of African American households with children. *Journal of Hunger and Environmental Nutrition*. 12(2): 221-236, 2017. [#]

20. **Barnidge E**, LaBarge G, Krupsky K, Arthur J. Screening for Food Insecurity in Pediatric Clinical Settings: Opportunities and Barriers. *J Community Health*. 42(1):51-57, 2017. [#]
21. Baker EA, **Barnidge E**, Schootman M, Sawicki M, Motton-Kershaw F. Adaptation of the DASH diet to a rural African American community setting. *American Journal of Preventive Medicine* 51(6):967-974, 2016. *
22. Kim Y, Huang J, **Barnidge E**. Seasonal Difference in the Participation of the National School Lunch Program and its Impacts on Household Food Security. *Health and Social Work* 41(4):235-243. 2016.
23. Huang J, **Barnidge E**. Low-income Children's Participation in the National School Lunch Program and Household Food Insufficiency. *Social Science & Medicine* 150:8-14, 2016.
24. Huang J, **Barnidge E**, Kim Y. Children receiving free or reduced-price lunch have higher insufficiency rates in summer. *Journal of Nutrition* 145(9):2161-8, 2015.
25. **Barnidge E**, Baker EA, Schootman M, Motton F, Sawicki M, Rose F. The effect of nutrition education plus fruit and vegetable access on fruit and vegetable consumption in a community-based nutrition intervention in a rural African American community. *Health Education Research*, 30(5): 773-785, 2015. *
26. **Barnidge E**, Baker EA, Estlund A, Motton F, Hipp P, Brownson R. A participatory regional partnership approach to promote environmental and policy change to promote nutrition and physical activity in rural Missouri. *Preventing Chronic Disease* 12:E92, June 2015.*
27. Leeman J, Calancie L, Jilcott Pitts S, Evenson K, Schreiner B, Fleischhacker S, Byker C, Owens, McGuirt J, **Barnidge E**, Dean W, Johnson DB, Kolodinsky J, Piltch E, Pinard CA, Quinn E, Whetstone LM, Kettel-Khan L, Ammerman A. Nutrition-related policy and environmental strategies to prevent obesity in rural communities: A systematic review of the literature, 2002-2013. *Preventing Chronic Disease*. 12:E57, 2015.
28. Elder K, Wang J, Wiltshire J, Gilbert K, Shacham E, Meret-Hanke L, **Barnidge E**, Ahuja D, Baker EA. How do African American men rate their healthcare: An analysis of the Consumer Assessment of Health Plans 2003-2006. *American Journal of Men's Health*. 9(3): 178-185, 2015.[#]
29. Harris J, Baker EA, Radvanyi C, **Barnidge E**, Motton F, Rose F. Employment networks in a high unemployment rural area. *Connections*. 34(1&2), 2014.*[#]
30. **Barnidge E**, Hipp PR, Estlund E, Duggan K, Barnhart K, Brownson R. Association between community garden participation and fruit and vegetable consumption in rural Missouri. *International Journal of Behavioral Nutrition and Physical Activity*. 10:128, 2013.[#]
31. Baker EA, **Barnidge E**, Langston M, Schootman M, Motton F, Rose F. Leadership and Job Readiness: Addressing social determinants of health among rural African American Men. *International Journal of Men's Health*. 12(3): 245-259, 2013.*[#]

32. Elder K, Meret-Hanke L, Dean C, Wiltshire J, Gilbert K, Wang J, Shacham E, **Barnidge E**, Mooradian A, Baker EA, Wray R, Moore T. Men's Health: Disparities in Confidence to Manage Health. *International Journal of Men's Health*. 12(3):260-275, 2013.[#]
33. **Barnidge E**, Radvanyi C, Duggan K, Motton F, Wiggs I, Baker EA, Brownson RC. Understanding and Addressing Barriers to Implementation of Environmental and Policy Interventions to Support Physical Activity and Healthy Eating in Rural Communities. *Journal of Rural Health*. 29: 97-105, 2013.*
34. **Barnidge E**, Baker EA, Motton F, Rose F, Fitzgerald T. Exploring community health through the Sustainable Livelihoods Framework. *Health Education and Behavior*. 38(1):80-90, 2011*
35. **Barnidge E**, Baker EA, Motton F, Rose F, Fitzgerald T. A participatory method to identify root determinants of health: the heart of the matter. *Progress in Community Health Partnership*. 4:55- 63, 2010.*
36. **Barnidge E**, Brownson C, Baker EA, Shetty G. Tools for building clinic-community partnerships to support chronic disease control and prevention. *The Diabetes Educator*. 36(2):190-201, 2010.
37. Baker EA, Schootman M, Kelly C, **Barnidge E**. Do recreational resources contribute to physical activity? *Journal of Physical Activity and Health*. 5:252-261, 2008.
38. Kelly C, Schootman M, Baker EA, **Barnidge E**, Lemes M. The association of sidewalk walkability and physical disorder with area-level race and poverty. *Journal of Epidemiology and Community Health*, 61:978-983, 2007.
39. Brennan Ramirez L, Bender JM, **Barnidge E**, Baker EA, Land G. Evaluating an evidence-based physical activity intervention website. *Evaluation and Program Planning*, 29:269-279, 2006.
40. Baker EA, Schootman M, **Barnidge E**, Kelly C. The role of race and poverty in access to foods that enable individuals to adhere to dietary guidelines. *Preventing Chronic Disease*, 3:1-11, 2006.
41. Baker EA, Kelly C, **Barnidge E**, Strayhorn J, Schootman M, Struthers J, Griffith D. The Garden of Eden: Acknowledging the impact of race and class in our efforts to decrease rates of obesity. *American Journal of Public Health*, 96:1170-4, 2006.*

V. PUBLICATIONS UNDER REVIEW

1. **Barnidge E**, LaBarge G, Arthur J, Siegler A. Critical consciousness development among medical students: A qualitative evaluation of a social care intervention. Under review at BMC.

VI. BOOK CHAPTERS AND REPORTS

1. Baker EA, Motton F, **Barnidge E**, Rose F. Collaborative Data Collection, Interpretation and Action Planning in a Rural African American Community– Men on the Move. In Israel BA, Eng E, Schulz A, Parker E (eds.) *Multiple Methods for Conducting Community-based Participatory Research for Health*, 2nd edition. Jossey, Bass.*
2. Focus Impact Fellows. Just Talent Playbook. (2020) Available at https://firebasestorage.googleapis.com/v0/b/second-chance-slu.appspot.com/o/docs%2FSLU_Just_Talent_Web.pdf?alt=media&token=f6fa68cf-4e34-41f5-9263-95d820d8767e.
3. Watson S, Buchanan P, van der Zalm D, **Barnidge E**, Perry R. Health Care in the Heartland: Results of a survey, focus groups, and interviews of Missouri farmers and ranchers in 2017 & 2018. (2020).*

VII. REFEREED AND INVITED PRESENTATIONS

1. **Barnidge E**. Results of a Missouri Poll Assessing Child Weight Gain during Covid-19. SOPHE Annual Conference. Virtual. March 2020.
2. **Barnidge E**, LaBarge G, Arthur J, Brown K. Developing Critical Consciousness: health professional students' role in a pediatric social needs intervention. SOPHE Annual Conference. Virtual. March 2020.
3. **Barnidge E**, LaBarge G, Arthur J, Brown K, Bobo B, Siegler A. Evaluation of Promoting Health and Social Equity (PHASE): a social needs intervention in a pediatric clinical setting. Annual Conference of the American Public Health Association. Virtual. October 2020.
4. **Barnidge E**, LaBarge G, Arthur J, Brown K, Bobo B, Siegler A. A community-based participatory approach to screen and address social needs in a pediatric population. Annual Conference of the American Public Health Association. Philadelphia, PA. November 2019.
5. Weaver, T. L., Kutz, T., **Barnidge, E.**, Bruce, M., Kelton, K., Copeland, M. & McPherson, T. *Professional Perpetrators: How the Tactics of a Serial Perpetrator of Medically-Related Sexual Abuse Can Inform Prevention Policies*. Invited panel presentation at the 34th annual International Society for Traumatic Stress Studies. Washington, DC. November 2019
6. **Barnidge E**. Five points of poverty among families with children. Missouri Opportunity Incubator Convening Panel. St. Louis, MO. March 2019.
7. **Barnidge E**. Innovated, multidisciplinary, community-based participatory research to improve infant and child outcomes. City Match Conference. Portland, OR. September 2018.
8. **Barnidge E**. The Three A's of Food Justice: Access, Availability and Affordability. The Food Summit. Saint Louis University. St. Louis, MO. October 2017.
9. **Barnidge E**. Emerging Clinic to Community Partnerships to Address Food Insecurity. Panel Discussion. 9th Biennial Childhood Obesity Conference. San Diego, CA. June 2017.

10. **Barnidge E**, Krupsky K, LaBarge G, Arthur J. Inclusive development of a clinic to community model to identify and address food insecurity within a pediatric clinical setting. Association of Maternal & Child Health Programs. Kansas City, MO. March 2017.
11. Krupsky K, **Barnidge E**, LaBarge G, Arthur J. Can we talk about food insecurity? The effect of household food insecurity on comfort in talking to health care providers about household food needs. Poster presented at the APHA Annual Meeting, Denver, CO. October 2016.
12. Krupsky K, LaBarge G, Arthur J, **Barnidge E**. Food Security Screening in Pediatric Clinical Settings: A Caregivers' Perspective. Poster presented at the American Pediatric Association Region 6 Fall Meeting, Saint Louis, MO. September 2016.
13. **Barnidge E**, Chapnick M, Baker EA, Sawicki M. *A participatory research project to understand food insecurity among African American children during the summer*. American Public Health Association Annual Meeting. Chicago, IL. October 2015.
14. **Barnidge E**, Baker EA, Gilbert K, Langston M, Buckner Petty S. *Role of resilience in addressing rural community health: identify individual and community sources of stress and support*. American Public Health Association Annual Meeting. Chicago, IL. October 2015.
15. Huang J, **Barnidge E**. *The National School Lunch Program: Seasonal Difference in Program Participation and Its Impacts on Food Insufficiency and Food Insecurity*. Annual Conference of the Society for Social Work and Research. New Orleans, LA. January 2015.
16. Chapnick M, **Barnidge E**, Baker EA, Sawicki M, Motton F. *Understanding food insecurity in the summer among African American children in rural Missouri*. American Public Health Association Annual Meeting. New Orleans, LA. November 2014.
17. **Barnidge E**. Invited Presentation: *The Roots and the fruits: Social Determinants of Health*. Association of Healthcare Journalists Health Reporting Bootcamp. St. Louis, MO. August 2013.
18. Baker EA, **Barnidge E**, Sawicki M, Motton F, Rose F, Shackelford K, Schootman M, Kusner D. *Men on the Move: Growing Communities*. Science of Eliminating Health Disparities Summit. Washington, DC. December 2012.
19. Estlund A, **Barnidge E**, Radvanyi C, Duggan K, Motton F, Wiggs I, Baker EA, Brownson RC. Understanding and Addressing Barriers to implementation of environmental and policy interventions to support physical activity and healthy eating in rural communities. American Public Health Association Annual Meeting. San Francisco, CA. October 2012.
20. **Barnidge E**, Brownson RC, Hipp P, Estlund A, Duggan K, Motton F, Wiggs I, Baker EA. Building the Evidence Base for Community Gardens as an Environmental Strategy to Promote Consumption of Fruits and Vegetables. American Public Health Association Annual Meeting. San Francisco, CA. October 2012.
21. Baker EA, **Barnidge E**, Sawicki M, Motton F, Rose F, McGee L, Shackelford K, Kusner J. Men on the Move: A Participatory Approach to Enhancing Nutrition Access and Information within a Rural African American Community. American Public Health Association Annual Meeting. San Francisco, CA. October 2012.

22. Elder K, Wang J, Wiltshire J, Gilbert K, Shacham E, Meret-Hanke L, **Barnidge E**, Ahuja D, Baker EA. Men's Health: Health Information Seeking and Its Impact on Health Care Visits. American Public Health Association Annual Meeting. San Francisco, CA. October 2012.
23. Elder K, Wang J, Wiltshire J, Gilbert K, Shacham E, Meret-Hanke L, **Barnidge E**, Mooradian A, Baker EA. Men's Health: Disparities in Confidence to Manage Health. American Public Health Association Annual Meeting. San Francisco, CA. October 2012.
24. Radvanyi C, **Barnidge E**, Duggan K, Motton F, Wiggs I, Baker EA, Brownson RC. Understanding and Addressing Barriers to implementation of environmental and policy interventions to support physical activity and healthy eating in rural communities. Society of Public Health Education Mid-year Conference. Nashville, TN. April 2012.
25. **Barnidge E**. Invited Presentation: *Addressing health disparities in rural Missouri*. Association of Healthcare Journalists. St. Louis, MO. June 2011.
26. **Barnidge E**, Estlund A. Invited Presentation: *Implementing Physical Activity and Healthy Eating Interventions in Rural Areas*. Missouri Foundation for Health Healthy and Active Communities Grantee Summit. Columbia, MO. July 2011.
27. **Barnidge E**, Baker EA, Motton F, Rose F, Fitzgerald T. *The distribution of root determinants of community health: One community's story*. Community Campus Partnership for Health Meeting. Portland, OR. May 2010.
28. **Barnidge E**, Baker EA, Lessons learned from dissemination of a youth empowerment program using a CBPR approach. Joint Conference of the Society for Public Health Education and CDC Prevention Research Centers. Atlanta, GA. April 2010.
29. Rose F, Fitzgerald T, Motton F, Baker EA, **Barnidge E**. Men on the Move. The Think Tank on African American Progress. Memphis, TN. October 2009.
30. **Barnidge E**, Motton F. *Partnering for Sustainability*. Missouri Foundation for Health Healthy and Active Grantee Training. Ozark, MO. July 2009.
31. Rose F, **Barnidge E**, Baker EA, Fitzgerald T, Motton F. *Men on the Move: From categorical disease to root causes*. CDC Prevention Research Centers. Washington, DC. February 2009.
32. Motton F, **Barnidge E**, Baker EA. Untangling the web: engaging communities to adapt evidence-based interventions. National Institutes of Health Center for Minority Health and Health Disparities Summit. Washington, DC. December 2008.
33. Fitzgerald T, Motton F, **Barnidge E**, Rose F, Baker EA. *Improving the economic and social determinants of health in our community through development of community gardens*. CU Expo. Victoria, Canada. May 2008.
34. **Barnidge E**, Brownson C, Shetti G, Baker EA. *Clinic-community partnerships: A tool to maximize their impact*. Diabetes Translation Conference. Orlando, FL. May 2008.

VIII. TEACHING

Classes taught

Primary Instructor and Developer, BSHE-5450 Introduction to Qualitative Methods, Saint Louis University College for Public Health and Social Justice, spring 2018, 2019, 2021.

Primary Instructor and Developer, PUBH-4960 Capstone in Public Health, Saint Louis University College for Public Health and Social Justice, spring 2017, 2018.

Teaching Mentor, Certificate in University Teaching Skills (CUTS), Saint Louis University, spring 2017.

Primary Instructor and Developer, PUBH-5400/6400, Assessment, Implementation Development, and Evaluation (AIDE), Saint Louis University College for Public Health and Social Justice, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021.

Primary Instructor, CMH-365, Public Health and Social Justice, Saint Louis University College for Public Health and Social Justice, 2010, 2011, 2012, 2013, 2014, 2015.

Co-Instructor, PUBH-6100, Doctoral Seminar in Public Health Studies, Saint Louis University College for Public Health and Social Justice, 2011, 2012, 2013, 2014, 2015, 2016, 2017.

Co-Instructor, Data Management, Saint Louis University College for Public Health and Social Justice, 2011, 2012, 2013, 2014, 2015, 2016, 2017.

Doctoral Dissertation committees

Meghan Taylor, chair, in progress

Alayna Patrick, chair, in progress

Melody Schaefer, committee member, in progress

Lauren Landfried, committee member, graduated 2018

Lisa Jaegers, committee member. graduated 2014

Katie Shoff, committee member, graduated 2014

IX. HONORS AND AWARDS

Saint Louis University College for Public Health and Social Justice Annual Research Award, Associate Professor, 2017-2018.

The Dr. Terry Leet Award for Teaching Excellence. College for Public Health and Social Justice, Saint Louis University, 2014-2015.

Graduate Student Fellowship Award, School of Public Health, Saint Louis University, 2003 – 2006.

Delta Omega Honor Society, School of Public Health, Saint Louis University, 2005.

Presidential Service Award for Outstanding Service to Community, College of the Holy Cross, 2000.

X. PROFESSIONAL AND COMMUNITY SERVICE

University Community

Co-Chair, Provost's Task Force on Student Well-being, 2021-2022
President, College for Public Health and Social Justice Faculty Assembly, 2020-2022
Member, University Workload Policy Committee, 2021
Member, Applied Health Sciences Research Committee, 2018-2020
Member, Academic Integrity Committee, 2018 - 2019
Member, Core Curriculum Committee, 2018
Member, Applied Practice Experience, MPH Reinvention, 2017-2018
Member, Promotion and Tenure Committee, 2016 - 2019
Faculty Adviser, Applied Practice Experience for Behavioral Science and Health Education, 2014 - 2021
Member, Saint Louis University Women and Gender Studies Advisory Board, 2015-2017
Member, Global and Local Social Justice Program Advisory Board, Fall 2011 - 2017
Member, Sharing Responsibility Improving Community Health Advisory Board, August 2009 - December 2010

Peer review

Health Education and Behavior
Preventing Chronic Disease
Journal of Rural Health
Health Education Research
Pediatrics
Progress in Community Health Partnerships

Other reviews

SOPHE and Prevention Research Centers joint conference abstract reviewer, 2010
American Public Health Association abstract reviewer, 2012 - 2017

Community service

Vice Chair, Mid-America Transplant Services Foundation Board, 2020 -
Member, Mid-America Transplant Services Foundation Board, 2018 - 2020
Chair, Mid-America Transplant Services Foundation, Grants Committee, 2018-
Member, Invest Health Community Advisory Board, 2017-2018
Member, Mid-America Transplant Services Foundation, Grants Committee, 2016-2017
Member, Loyola Academy Junior Board, 2006 - 2011
PHEBBE, Doctoral Student Association, Vice President, 2007-2008
PHEBBE, Doctoral Student Association, Doctoral Seminar Series Coordinator, 2006-2007



Low-income Children's participation in the National School Lunch Program and household food insufficiency

Jin Huang^{*}, Ellen Barnidge

College for Public Health & Social Justice, Saint Louis University, St. Louis, MO, USA



ARTICLE INFO

Article history:

Received 5 June 2015

Received in revised form

7 December 2015

Accepted 13 December 2015

Available online 15 December 2015

Keywords:

School lunch

Food assistance

Food insufficiency

Food insecurity

ABSTRACT

Assessing the impact of the National School Lunch Program (NSLP) on household food insufficiency is critical to improve the implementation of public food assistance and to improve the nutrition intake of low-income children and their families. To examine the association of receiving free/reduced-price lunch from the NSLP with household food insufficiency among low-income children and their families in the United States, the study used data from four longitudinal panels of the Survey of Income and Program Participation (SIPP; 1996, 2001, 2004, and 2008), which collected information on household food insufficiency covering both summer and non-summer months. The sample included 15,241 households with at least one child (aged 5–18) receiving free/reduced-price lunch from the NSLP. A dichotomous measure describes whether households have sufficient food to eat in the observed months. Fixed-effects regression analysis suggests that the food insufficiency rate is .7 (95%CI: .1, 1.2) percentage points higher in summer months among NSLP recipients. Since low-income families cannot participate in the NSLP in summer when the school is not in session, the result indicates the NSLP participation is associated with a reduction of food insufficiency risk by nearly 14%. The NSLP plays a significant role to protect low-income children and their families from food insufficiency. It is important to increase access to school meal programs among children at risk of food insufficiency in order to ensure adequate nutrition and to mitigate the health problems associated with malnourishment among children.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

A growing number of children and their families in the United States face the risk of food insufficiency, an important indicator of household food hardship (Alaimo et al., 2001) measuring whether families can get enough food for their members. Food insufficiency was the most commonly used indicator of household food hardship before the standardized Food Insecurity Scale (FIS) was developed by the US Department of Agriculture in the late 1990s. The measure of food insufficiency is closest to the most severe form of food insecurity (very low food security) measured by the FIS (Nam et al., 2015). In 2013, nearly 20% of households with children reported food insecurity (including both low and very low food security) at some time during the year (Coleman-Jensen et al., 2014). Extensive literature has shown adverse impacts of inadequate food on

children's nutritional, psychological, and educational outcomes (Alaimo et al., 2001; Gundersen & Ziliak, 2014; Kleinman et al., 1998; Rose-Jacobs et al., 2008; Roustin et al., 2012; Weinreb et al., 2002; Whitaker et al., 2006).

To ensure adequate nutrition among low-income, school-aged children, several federally-funded food assistance programs target this vulnerable population, including the Supplemental Nutrition Assistance Program (SNAP), the NSLP, the School Breakfast Program (SBP), and the Summer Food Service Program (SFSP). The present study specifically focuses on the NSLP and examines its association with household food insufficiency. As one of the largest nutrition assistance programs for school-aged children in the United States, the NSLP operates in public schools, nonprofit private schools, and residential child care institutions. The NSLP costs roughly \$11.6 billion a year and provides nutritional and low-cost or free lunches to more than 31 million children (USDA Food and Nutrition Service, 2012). Children from families with income at or below 130% of the US federal poverty level are eligible for free meals; those from families with income between 130% and 185% of the poverty level are eligible for reduced-price meals at a rate of less than 40 cents

^{*} Corresponding author. School of Social Work, College for Public Health & Social Justice, Saint Louis University, 3550 Lindell Blvd., Tegeler Hall Room 211, St. Louis, MO 63103, USA.

E-mail address: jhuang5@slu.edu (J. Huang).

(USDA Food and Nutrition Service, 2012). In the 2002–2003 school year, nearly three quarters of eligible children received the benefits of free/reduced-price lunch (Dahl & Scholz, 2011). It is estimated that more than 21 million, or 39% of all school-age children, receive a free/reduced-price lunch from the NSLP (Bartfeld, 2013).

Limited studies examined the extent to which school meal programs, such as the NSLP, affect households' food insecurity or insufficiency (Arteaga & Heflin, 2014; Bartfeld & Dunifon, 2006; Bartfeld et al., 2009; Bartfeld & Ryu, 2011; Gao et al., 2012; Gundersen et al., 2012; Kabbani & Kmeid, 2005). If the program reduces low-income caregivers' expenditure on children's food consumption, it may lower the risk of food insufficiency for the household through transfer of resources to other members' food consumption. The empirical literature has suggested the NSLP participation is associated with higher odds of having adequate food among school-age children (Arteaga & Heflin, 2014; Gundersen et al., 2012; Kabbani & Kmeid, 2005), with some inconsistent findings from other research (Gao et al., 2012). Gundersen et al. (2012) found that NSLP participation was associated with a reduction of 6 percentage points in low household food security. Using the kindergarten cut-off age as an instrumental variable, Arteaga and Heflin (2014) suggested that children who received free/reduced-price lunch through the NSLP had a much lower probability of food insecurity compared to households whose children paid for their own lunch. A third study (Kabbani & Kmeid, 2005) showed that the NSLP may provide a greater protection to those receiving a free lunch than to those receiving a reduced price lunch. Another one (Gao et al., 2012) instead used whether students had enough time to eat school lunch or not as an instrumental variable but did not find a significant association between the NSLP and food insecurity.

One common challenge to assess the impact of food assistance programs on food insufficiency is a potential selection bias that households without enough food are more likely to participate in these programs (Nord & Golla, 2009). In general regression analyses, the program participation variable often is positively associated with food insufficiency due to this bias (Nord & Golla, 2009). The NSLP provides services during the school year but not summer months when school is not in session. The unavailability of the NSLP program in summer is not caused by parents' self-selection. The seasonal pattern of the NSLP participation is not correlated with parents' self-selection, and, therefore, is useful to address the selection bias in nutrition assistance program evaluation. If the NSLP participation reduces the risk of food insufficiency, households eligible for the NSLP benefits are more likely to experience food insufficiency in the summer when the NSLP is not available.

There are two potential limitations of this strategy due to confounding factors. The seasonal difference in the NSLP participation may be confounded with other seasonal trends, such as child care arrangement and employment status in summer (Brady et al., 2002; Capizzano, 2002). A second potential confounder is the Summer Food Service Program (SFSP) and related Seamless Summer Option (SSO) which are entitlement programs offering free meals and snacks to low-income children in the summer when school is not in session (USDA Food and Nutrition Service, 2015). These summer meal programs are small relative to the NSLP. In fiscal year 2014, an average of 2.5 million children participated in the SFSP daily, with a total federal cost of \$464 million (USDA Food and Nutrition Service, 2015). Some NSLP recipients may utilize summer meal programs and reduce their risk of food insufficiency in summer.

Despite these limitations, the seasonal difference in the NSLP participation seems a promising strategy to identify program impacts. Few studies have taken advantage of this feature on program participation to assess the NSLP impacts on food insecurity or

insufficiency. Based on a cross-sectional design, Nord and Roming (2006) defined September as the summer month and found a lower level of food security in summer for households with children than those without a child. The study only used September as the summer month because data in other summer months were not available. Another study (Huang et al., 2015) applied growth-curve analyses to describe trajectories of food insufficiency over time for both the NSLP recipients and eligible nonrecipients. It suggested an increase of food insufficiency rate in summer for the NSLP recipients but not for eligible nonrecipients. Based on previous literature, we test the association between the seasonal variation in the NSLP participation and food insufficiency among those receiving free/reduced-price lunches. Our study defines summer months as June, July, and August and uses individual households' longitudinal data over four calendar months. We apply a fixed-effects model on longitudinal household data to control for the unobserved selection bias.

2. Methods

2.1. Data and sample

We used data from four panels (1996, 2001, 2004, and 2008) of the SIPP, a longitudinal and nationally representative household survey operated by the U.S. Census Bureau with sample size ranging from about 37,000 to 52,000 households (US Census Bureau, 2001). The detailed information of the SIPP can be found at the webpage of <http://www.census.gov/sipp/>. In each panel, the SIPP followed the same households in multiple waves of interviews. There were 12 waves for the 1996 and 2004 panels, 9 waves for the 2001 panel, and 16 panels for the 2008 panel. The time interval between each pair of waves was four months, and each interview then collected information in the last four months (i.e., the reference period of each wave). In order to ease the data collection process and spread the work evenly, the SIPP sample was randomly divided into four rotation groups with nearly equal size. Each rotation group was interviewed in a separate month, and the same wave of interviews thus was conducted in four consecutive calendar months for these rotation groups, respectively. The reference period of each wave covered different calendar months for four rotation groups. For instance, the 1996 SIPP panel has 12 waves of interviews conducted from April 1996 to March 2000. As shown in Table 1, the wave 8 interview of the 1996 panel was conducted in August 1998 for the first rotation group to collect information from April to July. The same interview was conducted instead in November 1998 for the fourth rotation group to collect information from July to October.

Since the 1996 panel, the SIPP included a household food insufficiency question in at least one wave of interviews (see Table 1). Given the survey feature that four rotation groups had different calendar months as the reference period, the SIPP thus collected the information on food insufficiency across seven calendar months for four groups together. If summer months were defined as June, July, and August (months 6–8 in Table 1), the first rotation group of the 1996 panel had the information on food insufficiency from April to July, including two summer months, while the second group had the information from May to August with three summer months.

We created a sample including households with children aged 5–18 years and with at least one child receiving free/reduced-price lunch from the NSLP one wave before the information of food insufficiency was collected. We did so because the number of summer months in the wave when the information of food insufficiency was collected may affect children's NSLP participation status and household food insufficiency simultaneously in that wave, and becomes a confounding factor for evaluating the NSLP

Table 1
Calendar months for the SIPP wave with food insufficiency information.

Panel	Wave	Interview year	Rotation group	Calendar Month										Number of summer Months	Number of households	Number of observations
				1	2	3	4	5	6	7	8 ^a	9	10			
1996	8	1998	1				3.17	3.56	4.00	5.34	4.74		2	654	2608	
			2					3.47	3.44	3.79	3.42		3	594	2370	
			3						3.96	4.06	4.10	3.92		3	578	2311
			4									4.74	4.92	4.79	4.70	2
2001	8	2003	1		4.71	3.36	3.77	4.38					0	571	2280	
			2			3.83	4.36	3.74		3.93				1	562	2238
			3				2.50	2.50	6.57	6.63				2	561	2231
			4					3.37	2.62	3.49	2.05			3	554	2213
2004	5	2005	1		2.82	3.08	3.25	2.80					0	886	3528	
			2			2.19	3.03	2.84		2.77				1	886	3536
			3				3.61	3.01		4.04	4.32			2	906	3599
			4					3.53		3.97	5.09	5.20		3	892	3561
2008	6	2010	1	2.79	2.49	3.04	2.99						0	888	3537	
			2		2.82	2.78	2.80	2.74					0	896	3574	
			3			3.72	4.04	4.53		4.08			1	948	3778	
			4				3.34	2.81		3.84	4.41		2	863	3450	
2008	9	2011	1	4.34	3.43	4.19	4.38						0	864	3451	
			2		4.05	4.58	3.96	4.74					0	846	3371	
			3			5.00	4.39	5.10		5.77			1	849	3385	
			4				3.77	3.56		5.23	4.66		2	822	3277	

^a Summer Months are defined as from June to August.

^b The shaded areas in each row show the reference period for each rotation group in the wave when food insufficiency information is collected.

^c Monthly food insufficiency rate in the reference period for each rotation group is reported.

impact. For example, the information of food insufficiency was collected in wave 8 of the 1996 panel, and we used the information in wave 7 to select recipients of free/reduced-price lunch. A household with a child receiving free/reduced-price lunch from the NSLP in wave 7 may have reported nonparticipation if its reference period for wave 8 includes multiple summer months (e.g., the third rotation group in the 1996 panel). Therefore, the sample selection based on the NSLP participation status in the wave when food insufficiency information was collected may exclude recipient households. The exclusion of these recipient household is likely to generate underestimated effects of the NLSLP participation on food insufficiency.

Combining four SIPP panels, the final sample included 15,241 households, referred to as recipients of free/reduced-price lunch below. Using the 1996 panel as an example, there were 28,168 households interviewed in wave 7 and 2592 having at least one child receiving free/reduced-price lunch. Among these recipients, 145 (5.6%) had no valid information in wave 8. The final sample for this panel is 2447 households with children. Similarly, only a small proportion of recipients of free/reduced-price lunch in other panels were excluded due to missing values. The last two columns of Table 1 report the number of households and number of monthly observations for each rotation group in four SIPP panels.

2.2. Measures

Outcome Measure. To collect information on household food insufficiency, the SIPP asked respondents to choose the statement best describing the food eaten in the household in the last four months: “enough of the kinds of food we want”, “enough but not always the kinds of food we want”, “sometimes not enough to eat”, and “often not enough to eat”. Households reporting “sometimes” or “often” not enough to eat were coded as “1” on a dichotomous indicator of the four-month food insufficiency, and others are coded as “0”. For those with responses that indicate food insufficiency in the last four months (i.e., households with the value “1” on the four-month food insufficiency indicator), the SIPP further asked respondents in which month during the reference period they experienced food insufficiency, and thus provides monthly

information about food insufficiency in four consecutive calendar months for each household. A dichotomous indicator of household monthly food insufficiency (Yes = 1 and No = 0) was generated. For example, each household has four data observations for the wave of interview, one for each calendar month in the reference period. If the household suffered from food insufficiency in the first calendar month only, the household had a positive response on the monthly food insufficiency indicator in the first observation, but not the other three. At the same time, this household had a positive response on the four-month food insufficiency indicator in all four observations.

Independent Variable. A dichotomous measure of summer month (Yes = 1 and No = 0) was created for each calendar month in the reference period. The calendar month between June and August was considered summer months, and others were defined as non-summer months.

Covariates. The study included characteristics of households and household heads as control variables in different analyses. Household characteristics were household size, household monthly income, metro status (living in metro areas or not), the participation of Supplemental Nutrition Assistance Program (SNAP), and public housing status (whether receiving public housing benefits or not). Household head's characteristics included age, gender, race (White, Black, and others), marital status (married or not), education (below high school, high school, some college, and bachelor and above), employment status (employed or not). In some analyses, we also controlled for the order of the reference month (i.e., the first, second, third, or fourth month in the reference period), indicators of states, and indicators of interview years. All analysis variables were drawn from the wave when household food insufficiency information was collected.

2.3. Statistical analysis

Since the SIPP data had the longitudinal information of food insufficiency in four months, the association between the NSLP participation and food insufficiency was estimated by a fixed-effects OLS regression model:

$$Y_{it} = \alpha_i + \beta s_{it} + \gamma m_{it} + X_{it}\delta + \varepsilon_{it} \text{ for } t = 1, \dots, 4 \text{ and } i = 1, \dots, N(1)$$

where Y_{it} is the monthly food insufficiency indicator for household i at month t ; α_i is the unobserved time-invariant individual effect; s_{it} is a dichotomous summer month indicator for household i at month t ; m_{it} is the order of the reference month (first, second, third, or fourth) for household i at month t ; X_{it} is time-variant control variables, including demographic and socioeconomic characteristics; and ε_{it} is the error term. We controlled for the order of the reference month, because participants reported monthly food insufficiency status for four previous months at the interview time and may have more accurate information on food insufficiency for the month closer to the interview. Most covariates on characteristics of households and household heads remained the same in the short observation period of four months; the number of time-variant control variables included in fixed-effects analyses thus was relatively small.

The parameter of interest is the regression coefficient of the summer month indicator, β , which indicates the average change in the probability of food insufficiency from non-summer months to summer months for a household with a recipient of free/reduced-price lunch. If the NSLP reduces food insufficiency, β will be statistically significant and positive: Recipients and their households are more likely to be food insufficient in summer months when the program is not available.

We conducted four sensitivity tests. First, we used a different definition of summer months and considered July as the only summer month in the reference period, because children in some states may not be completely out of school session in the calendar months of June and August. Second, we reran the analysis to a smaller sample, recipients with household income lower than 130% of the poverty line and examined the association between the NSLP participation and food insufficiency among those eligible for free lunch. The impact of the NSLP participation may vary by whether children received free or reduced-price lunch. Third, assuming that the NSLP participation may have various impacts for children with different ages, we tested the model on two separate samples—households with at least one child aged 5–11 and those with at least one child aged 12–18. Finally, disregarding the longitudinal nature of the data, we used pooled cross-sectional analyses in OLS and Logit regressions to include time-invariant covariates. Results from these sensitivity tests are similar to those from main analyses. All analyses were adjusted with the sampling weight variable generated by the SIPP for the households in the wave when food insufficiency information was collected.

3. Results

3.1. Sample characteristics

Table 2 reports weighted characteristics of sample households. In the observation period of four months, nearly 7% of recipient households suffer from food insufficiency; in any given month during this four-month period, the food insufficiency rate is 3.9%. Food insufficiency rates by calendar month and rotation group are reported in Table 1. For example, the mean food insufficiency rate is 5.34% (SE = .009) for the first rotation group of the 1996 panel and 3.79% (SE = .007) for the second rotation group increases to 4.00% and 5.34% in August 1998, respectively. While there are some discrepancies on monthly food insufficiency rates in summer months across rotation groups, the inter-rotation group difference generally is not statistically significant in our sample.

Also reported in Table 2, aggregated over four panels, the mean age of household heads is about 40, and nearly two-thirds of heads are female, white, and employed. About half of household heads are

Table 2

Weighted sample characteristics of households receiving free/reduced-price lunch (N = 15,241).

Variables	Mean or %
<i>Dependent Variables</i>	
Four-month food insufficiency rate	6.91
Monthly food insufficiency rate	3.86
<i>Independent Variable</i>	
Number of summer months	
0	32.99
1	21.26
2	29.10
3	16.64
<i>Covariates</i>	
<i>Household head's characteristics</i>	
Age (mean)	40.71
Gender (female)	64.33
Race	
White	66.42
Black	26.75
Others	6.84
Married (Yes)	50.49
Education	
Below high school	28.48
High school	31.04
Some college	32.85
Bachelor and above	7.63
Employed	68.53
<i>Household characteristics</i>	
Household size (mean)	4.31
Metro areas	77.35
Monthly income (mean, by thousand)	2.85
Public housing (Yes)	9.76
SNAP participation	38.01

married, and less than 10% have a college degree. On average, the household size is 4.3. Nearly three quarters of households live in metro areas, and average monthly household income is \$2800. Less than 40% of households receive SNAP benefits, and less than 10% participate in public housing programs.

3.2. Food insufficiency across calendar months

Fig. 1 presents food insufficiency rates among recipient households from January to October aggregated over four SIPP panels. As shown in the solid line, the average monthly food insufficiency rate stays at about 3.5% from January to May, and increases in summer months—4.3% in June, 4.6% in July, and 3.9% in August. However, different from our hypothesis, the food insufficiency rate continues to increase after summer months—4.6% in September and 5.0% in October. One possible explanation is that only the 1996 panel, which has a higher food insufficiency rate than recent panels, includes September and October in the reference period. Table 1 shows that the fourth rotation group in the 1996 panel includes both September and October in its reference period and the third rotation group in the 1996 panel includes September in the reference period. We further present food insufficiency rates excluding these two rotation groups in the dotted line, which has a pattern of food insufficiency consistent with our hypothesis.

3.3. Results of regression analyses

Results of fixed-effects analyses on recipients of free/reduced lunch are presented in Table 3. As shown in the first column, the dichotomous indicator of summer months is positively related to the probability of food insufficiency ($b = .007$; 95%CI: .001, .012), statistically significant at the .01 level. The result suggests that the monthly food insufficiency rate is .7 percentage points higher in

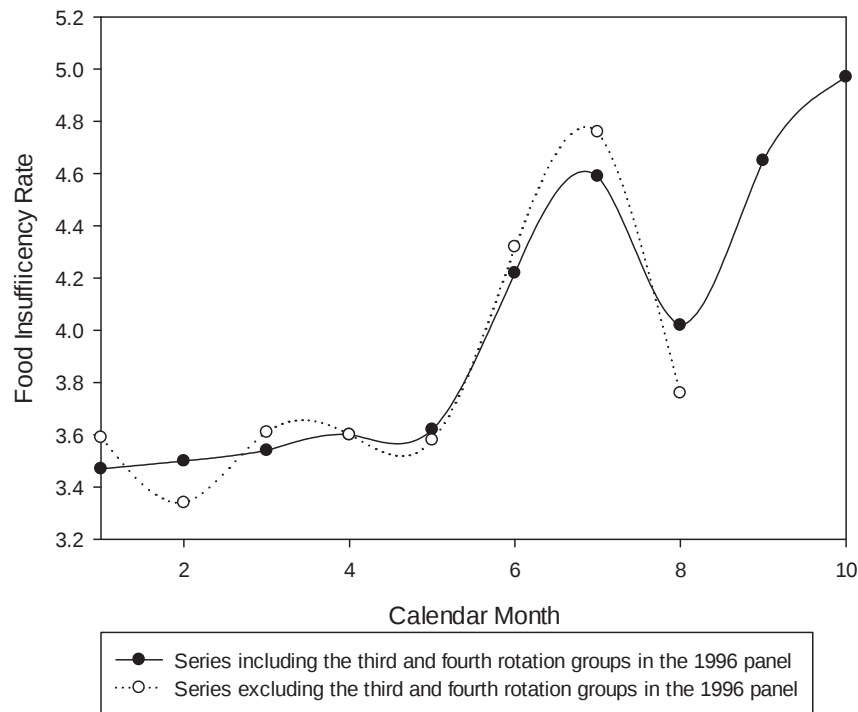


Fig. 1. Food insufficiency among households receiving free/reduced-price lunch.

summer months for households with children receiving free/reduced-price lunch. This model only includes the order of four reference months as a control variable, and does not adjust demographic and socioeconomic covariates. We add several time-variant control variables in the second column, including household heads' employment and marital status and monthly household income. Since the reference period covers a short period of time (four months), many variables the SIPP collects do not change within the household unit during these four consecutive calendar months, and cannot be included in the fixed-effect analysis. Result in the second column ($b = .007$; 95%CI: .001, .012; $p < .01$) is consistent with that in the first one.

Four sensitivity tests obtain consistent results on the association between the NSLP participation and household food insufficiency. If we define July as the only summer month, the monthly food insufficiency rate is .7 percentage points higher in July than other non-summer months (the third column of Table 3; $b = .007$; 95%CI: .001, .012; $p < .01$). The magnitude of the regression coefficient on the summer month indicator becomes slightly smaller ($b = .005$; 95%CI: .000, .010; $p < .05$) when the model is tested only on households eligible for free lunch (the fourth column of Table 3). Similarly, the regression coefficient of the summer month indicator is positive and statistically significant for the sub-sample of households with children aged 5–11 or those with children aged 12–18.

The pooled OLS analysis, reported in the seventh column, controls for both time-variant and time-invariant characteristics of households and household heads. It has similar results ($b = .007$; 95%CI: .002, .012; $p < .01$) to those of fixed-effect OLS analyses, probably because the summer month indicator is not related to any demographic and socioeconomic characteristics, and recipients of free/reduced-price lunch are relatively homogenous. The pooled OLS analysis in Table 3 does not adjust for households' SNAP participation status as it is likely to carry the selection bias demonstrated in previous studies. If we do add it in the analysis, the

indicator of SNAP participation is positively associated with food insufficiency ($b = .007$; 95%CI: .002, .012; $p < .01$) but does not change the result on the summer month indicator. Another sensitivity test, the logit analysis in the eighth column, shows higher odds of food insufficiency in summer months (OR = 1.21; 95%CI: 1.07, 1.37; $p < .01$) for recipients of free/reduce-price lunch.

4. Discussion

To assess the association of the NSLP participation and household food insufficiency, the study uses the seasonal difference in the NSLP participation to address the potential selection bias. Fixed-effect analyses do not show a positive association between household food insufficiency and receiving free/reduced-price lunch from the NSLP, which implies that the seasonal difference in the NSLP participation is a valid identification strategy to control for the potential selection bias. Results reported in Table 3 suggest that regression coefficients of the summer month indicator in general are similar across fixed-effects and other sensitivity analyses and are similar across models control and do not control for demographic and socioeconomic characteristics. This demonstrates that the indicator of summer months is not associated with individual behaviors and, therefore, is not affected by households' self-selection into the NSLP. The study finds that the NSLP reduces food insufficiency among low-income households with children. In summer months when the NSLP is not available, the food insufficiency rate among recipients is about .7 percentage points higher than that in non-summer months. Since the average monthly food insufficiency rate is 3.9% in the sample, our finding indicates that the NSLP participation is associated with a 14% reduction in the risk of experiencing food insufficiency.

Several limitations of this study should be noted. First, as mentioned above, the summer month variable may be confounded by other seasonal trends. Food insufficiency may occur less frequently if caregivers are more likely to have a job or food prices

Table 3

Food insufficiency among households receiving free/reduced-price lunch (N = 15,241).

Variables	Col 1: Fixed-effects ^a	Col 2: Fixed-effects ^a	Col 3: Fixed-effects ^{a,b}	Col 4: Fixed-effects ^{a,c}	Col 5: Fixed-effects ^{a,d}	Col 6: Fixed-effects ^{a,e}	Col 7: Pooled OLS ^{a,f}	Col 8: Logit ^{f,g}
<i>Independent Variable</i>								
Indicator of summer months (1 = Yes)	.007** [.01, .12]	.007** [.01, .12]	.007** [.003, .012]	.005* [.000, .010]	.007* [.000, .014]	.005* [.000, .009]	.007** [.002, .012]	1.21** [1.07, 1.37]
<i>Control Variables</i>								
Order of the reference month	.001 [−.000, .002]	.001 [−.000, .002]	.002** [.001, .003]	.002* [.000, .003]	.002** [.000, .003]	.001 [−.001, .002]	.001 [−.001, .003]	1.03 [1.07, 1.37]
Household income (\$, by thousand)		−.002* [−.004, −.000]	−.002** [−.004, −.000]	−.002 [−.007, −.000]	−.002 [−.004, .000]	−.001 [−.003, .001]	−.004*** [−.004, −.003]	.82*** [.99, 1.08]
Household head's employment (1 = Yes)		−.006 [−.018, .006]	−.006 [−.018, .006]	−.003 [−.017, .010]	.000 [−.013, .015]	−.006 [−.020, .007]	−.016*** [−.021, −.12]	.76*** [.68, .86]
Household head's marital status (1 = Yes)		.026* [.002, .051]	.026* [.002, .051]	.023 [−.012, .058]	.031* [.005, .057]	.021 [−.008, .050]	−.005 [−.009, .000]	.93 [.81, 1.07]
Household head's age							.000 [−.000, .000]	1.00 [1.00, 1.01]
Household head's gender (1 = Female)							.008*** [.004, .012]	1.30*** [1.15, 1.48]
Household head's race (reference group: White)								
Black							−.000 [−.005, .005]	.97 [.85, 1.10]
Others							.000 [−.007, .007]	.99 [.82, 1.20]
Household head's education (reference group: below high school)								
High school							−.007*** [−.012, −.003]	.84** [.74, .94]
Some college							−.004 [−.008, .001]	.94 [.83, 1.06]
Bachelor and above							−.017*** [−.022, −.011]	.54*** [.41, .69]
Household size							.002** [.001, .003]	1.07*** [1.03, 1.11]
Metro areas (1 = Yes)							.007* [.001, .012]	1.21* [1.04, 1.41]
Public housing (1 = Yes)							−.000 [−.007, .006]	.94 [.81, 1.09]
Calendar years (reference group: 1998)								
2003							.001 [−.007, .009]	1.03 [.83, 1.27]
2005							−.003 [−.008, .003]	.94 [.81, 1.10]
2010							−.003 [−.008, .003]	.94 [.80, 1.10]
2011							.009** [.003, .015]	1.29*** [1.10, 1.50]
Number of Observations	60,776	60,776	60,776	30,757	42,699	36,453	60,776	60,776
Number of Households	15,241	15,241	15,241	7712	10,708	9143	15,241	15,241

*p < .05, **p < .01, ***p < .001.

^a Regression coefficient and 95% confidence interval are reported for fixed-effects analyses and pooled OLS analysis.^b This sensitivity test defined July as the only summer month.^c This sensitivity test only included households with income not greater than 130% of the poverty line.^d This sensitivity test included households with at least one child aged 5–11.^e This sensitivity test included households with at least one child aged 12–18.^f The analysis controls for indicators of states as well. Results on indicators of states are not reported in Table.^g Odds ratio and 95% confidence interval are reported for the logit analysis.

are lower in summer. Food insufficiency in summer months may be associated with household expenditures when school is out of session. Families may have different child care costs or utility bills because people are in the home more often. For example, it has been found that, relying more on relative care, low-income families spend less on child care during the summer compared to the school year (Capizzano, 2002). In agricultural counties and rural areas, low-income families' participation in welfare programs increases dramatically from summer to winter (Brady et al., 2002); there are more seasonal jobs available for low-income families in summer, and it may protect them from food hardship as well. Nonetheless,

one recent study (Huang et al., 2015) provided indirect evidence that the association between the NSLP participation and food insufficiency may not be affected by those confounders mentioned above. Using a growth-curve analysis to describe the seasonal trends of food insufficiency for both the NSLP recipients and eligible nonrecipients, the study suggested that eligible nonrecipients did not experience an increase in food insufficiency in summer. It further compared the differences in food insufficiency between summer and non-summer months for both groups and found a greater risk of food insufficiency in summer for the NSLP recipients. Second, our result may overestimate the NSLP impact if it also

carries the impact of other school meal programs such as the School Breakfast Program. Alternatively, it may underestimate the NSLP impact as well since we do not control for participation in summer meal programs. Third, reporting accuracy of program participation in the SIPP data is difficult to assess. Parents may overreport their children's participation in school meal programs, in particular for the School Breakfast Program (Bartfeld, 2013). Another data issue shown in Table 1 is the inter-rotation group difference in monthly food insufficiency rates, and should be explored in future research as well.

Nonetheless, a 14% reduction in the risk of household food insufficiency seems substantial, in particular, given that the program targets children only. The findings suggest that the NSLP plays a significant role in protecting low-income families from food insufficiency. Yet, there is opportunity to further increase access to school meal programs among risky children (Frentz & Neuberger, 2012). Our analysis of the SIPP data suggests that nearly 70% of children eligible for free/reduced-price lunch received such benefits in the 2008 SIPP panel. Although one study (USDA Food and Nutrition Service, 2009) shows that states are not enrolling many income-eligible children into the NSLP, implementation of new policy tools in recent years suggests progress (USDA Food and Nutrition Service, 2013). Categorical eligibility allows children to receive free school meals if they are in foster care, Head Start, homeless, or living in a household receiving TANF benefits. Direct certification requires schools operating the NSLP to directly certify children for free meals if their families receive SNAP benefits. Among children eligible for the direct certification process, the certification rate increased from 68% in the school year 2007–2008 to 89% in the school year 2012–2013. As a new policy option in the 2013–2014 school year, community eligibility allows schools to provide free meals to all students if schools have 40% or more students directly certified for the program. Community eligibility eliminates the need for individual enrollment and increases access to school lunch for all children.

The higher food insufficient rate in summer months among recipients of free/reduced-price lunch also suggests that it is important to provide nutrition assistance to low-income children in summer when school is not in session. Both the Summer Food Service Program (SFSP) and the Seamless Summer Option (SSO) were established by the US Department of Agriculture to continue the provisions of nutrition assistance to low-income children in the summer. Currently, participation in the SFSP and the SSO is much lower than participation in the NSLP and the SBR; therefore, these programs should be expanded and applied to all children at risk of food insufficiency.

Acknowledgments

The authors are grateful for support from the U.S. Department of Agriculture Research Innovation and Development Grants in Economics (RIDGE) through the Institute for Research on Poverty at University of Wisconsin-Madison (Grant Number: 471K516) and Saint Louis University President Research Fund and Faculty Leave Program. The content is solely the responsibility of the authors.

References

- Alaimo, K., Olson, C.M., Frongillo, E.A., 2001. Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics* 108 (1), 44–53.
- Arteaga, I., Heflin, C., 2014. Participation in the National School Lunch Program and food security: an analysis of transitions into kindergarten. *Child. Youth Serv. Rev.* 47, 224–230.

- Bartfeld, J., 2013. SNAP and the School Meal Programs. University of Kentucky Center for Poverty Research Discussion Paper Series, DP2013–08. Center for Poverty Research, University of Kentucky, Lexington, KY.
- Bartfeld, J., Dunifon, R., 2006. State-level predictors of food insecurity and hunger among households with children. *J. Policy Analysis Manag.* 25 (4), 921–941.
- Bartfeld, J., Kim, M., Ryu, J., Ahn, H., 2009. The School Breakfast Program: Participation and Impacts. ERS Contractor and Cooperator Report No. 54. US Department of Agriculture, Washington, D.C.
- Bartfeld, J.S., Ryu, J.H., 2011. The School Breakfast Program and breakfast-skipping among Wisconsin elementary school children. *Soc. Serv. Rev.* 85 (4), 619–634.
- Brady, H., Sprague, M., Gey, F.C., Wiseman, M., 2002. Seasonal employment dynamics and welfare use in agricultural and rural California counties. In: Weber, B.A., Duncan, G.J., Whitener, L.A. (Eds.), *Rural Dimensions of Welfare Reform*. W.E. Upjohn Institute for Employment Research, Kalamazoo, Michigan, pp. 147–176.
- Capizzano, J., 2002. What Happens when the School Year Is over?: The Use and Costs of Child Care for School-age Children during the Summer Months. Urban Institute, Washington, D.C.
- Coleman-Jensen, A., Gregory, C., Singh, A., 2014. Household food security in the United States in 2013. U.S. Dept. of Agriculture, Economic Research Service, Washington, D.C.
- Dahl, M.W., Scholz, J.K., 2011. The National School Lunch Program and School Breakfast Program: Evidence on Participation and Noncompliance. Institute for Research on Poverty, University of Wisconsin-Madison, Madison, WI.
- Frentz, N., Neuberger, Z., 2012. Key steps to improve access to free and reduced-price school meals. Center on Budget and Policy Priorities, Washington, D.C.
- Gundersen, C., Kreider, B., Pepper, J., 2012. The impact of the National School Lunch Program on child health: a nonparametric bounds analysis. *J. Econ.* 166 (1), 79–91.
- Gao, X., Ishdorj, A., Higgins, L., 2012. Impact of the National School Lunch Program on Children's Food Security. Texas A&M University, Department of Agricultural Economics, College Station, TX.
- Gundersen, C., Ziliak, J.P., 2014. Childhood Food Insecurity in the US: Trends, Causes, and Policy Options. The Research Report of Future of Children. Princeton University, Princeton, NJ.
- Huang, J., Barnidge, E., Kim, Y., 2015. Children receiving free or Reduced-Price school lunch have higher food insufficiency rates in summer. *J. Nutr.* 145 (9), 2161–2168.
- Kabbani, N.S., Kmeid, M.Y., 2005. The role of food assistance in helping food insecure households escape hunger. *Appl. Econ. Perspect. Policy* 27 (3), 439–445.
- Kleinman, R.E., Murphy, J.M., Little, M., Pagano, M., Wehler, C.A., Regal, K., Jellinek, M.S., 1998. Hunger in children in the United States: potential behavioral and emotional correlates. *Pediatrics* 101 (1), e3.
- Nam, Y., Huang, J., Heflin, C., Sherraden, M., 2015. Racial and ethnic disparities in food insufficiency: evidence from a statewide probability sample. *J. Soc. Soc. Work Res.* 6 (2), 201–228.
- Nord, M., Golla, A.M., 2009. Does SNAP Decrease Food Insecurity? Untangling the Self-selection Effect. ERS Economic Research Report no.85. U.S. Department of Agriculture, Washington, D.C.
- Nord, M., Roming, K., 2006. Hunger in the summer. *J. Child. Poverty* 12 (2), 141–158.
- Rose-Jacobs, R., Black, M.M., Casey, P.H., Cook, J.T., Cutts, D.B., Chilton, M., Frank, D.A., 2008. Household food insecurity: Associations with at-risk infant and toddler development. *Pediatrics* 121 (1), 65–72.
- Roustie, C., Hamelin, A.M., Grillo, F., Martin, J., Chauvin, P., 2012. Food insecurity: could school food supplementation help break cycles of intergenerational transmission of social inequalities? *Pediatrics* 126 (6), 1174–1181.
- US Census Bureau, 2001. Survey of Income and Program Participation User's Guide, third ed. U.S. Census Bureau, Washington, D.C.
- USDA Food and Nutrition Service, 2009. Direct Certification in the National School Lunch Program: State Implementation Progress: Report to Congress. US Department of Agriculture, Food and Nutrition Service, Alexandria, VA.
- USDA Food and Nutrition Service, 2012. National School Lunch Annual Survey: Updated August 2012. US Department of Agriculture, Food and Nutrition Service, Alexandria, VA.
- USDA Food and Nutrition Service, 2013. Direct Certification in the National School Lunch Program: State Implementation Progress, School Year 2012–2013: Report to Congress. US Department of Agriculture, Food and Nutrition Service, Alexandria, VA.
- USDA Food and Nutrition Service, 2015. Program Information Report (Keydata) U.S. Summary, FY 2014–FY 2015. US Department of Agriculture, Food and Nutrition Service, Alexandria, VA. <http://www.fns.usda.gov/sites/default/files/datastatistics/Keydata-January-2015.pdf> (accessed May 2015).
- Weinreb, L., Wehler, C., Perloff, J., Scott, R., Hosmer, D., Sagor, L., Gundersen, C., 2002. Hunger: Its impact on children's health and mental health. *Pediatrics* 110 (4), e41.
- Whitaker, R.C., Phillips, S.M., Orzol, S.M., 2006. Food insecurity and the risks of depression and anxiety in mothers and behavior problems in their preschool-aged children. *Pediatrics* 118 (3), e859–e868.

Screening for Food Insecurity in Pediatric Clinical Settings: Opportunities and Barriers

Ellen Barnidge¹ · Gene LaBarge² · Kathryn Krupsky¹ · Joshua Arthur²

Published online: 4 August 2016
© Springer Science+Business Media New York 2016

Abstract Food insecurity is a serious health concern among children in the United States with 15.3 million children living in food insecure households. The American Academy of Pediatrics recommends that pediatricians screen for food insecurity at health maintenance visits as identifying children at risk is a crucial step in the amelioration of food insecurity. Two surveys were administered in a Midwest pediatric clinic. A cross-sectional survey was electronically distributed to pediatric providers to assess perceptions of food insecurity among patients, provider readiness to conduct food security screenings, and barriers to conducting those screenings. A cross-sectional caregiver survey was administered to assess demographics, household food security status, participation in nutrition assistance programs, and barriers to getting enough food to eat. Descriptive statistics and odds ratios were calculated. Eighty-eight percent of physicians believe that food insecurity is a challenge for some of their patients. Only 15 % of providers reported screening for food insecurity, while 80 % were willing to screen. Physicians were most concerned with knowing how to handle a positive screen. Among caregivers, 57 % screened positive for food insecurity. Those experiencing food insecurity were more likely to be non-white, participate in SNAP and to feel discomfort towards the idea of talking to a doctor or nurse about food needs. Caregivers reporting food insecurity

were significantly less likely to have a personal vehicle. Effective food insecurity screening requires addressing caregiver and health provider barriers in order to increase the likelihood of identifying households most at risk.

Keywords Food insecurity · Food insecurity screening · Pediatrics

Introduction

Food insecurity is being increasingly recognized as a health crisis in the United States. The USDA defines a food insecure household as one that is “uncertain of having, or unable to acquire, enough food to meet the needs of all their members because they had insufficient money or other resources for food [1].” In 2014, 43 million Americans lived in food insecure households, over 15 million of whom were children. Greater than one in five households with children experience food insecurity [2]. Food insecurity is highest among households with children as well as single parent households, African American households, Hispanic households, households at or below the poverty level, and households in urban or rural areas [1, 2].

Food insecurity has serious immediate and long term consequences for children. Children living in food insecure households have more cognitive, emotional, and physical health challenges throughout their lives [1, 3–5]. Children experiencing food insecurity tend to eat few fruits and vegetables, putting them at increased risk of chronic disease [6] and obesity [7]. To minimize the health impacts of food insecurity, the American Academy of Pediatrics recommends screening for household food insecurity at pediatric health maintenance visits [8].

✉ Ellen Barnidge
Barnidge@slu.edu

¹ Saint Louis University College for Public Health and Social Justice, 3545 Lafayette Ave, St. Louis, MO 63104, USA

² Department of Pediatrics, Saint Louis University School of Medicine, SSM Health Cardinal Glennon Children’s Hospital, St. Louis, MO, USA

In 2012, 17 % of Missouri's households were food insecure, ranking Missouri sixth highest for household food insecurity in the United States [9]. Household food insecurity in the city of St. Louis far outpaces that of the state, with 26 % of St. Louis city households considered food insecure. The Danis Pediatric Center (DPC) at SSM Health Cardinal Glennon Children's Hospital serves a racially and economically diverse pediatric patient population in St. Louis. Danis Pediatrics providers serve approximately 8000 patients in the St. Louis metropolitan area with 19,500 patient visits each year. Medicaid covered 80 % of DPC patients in 2015. The majority of DPC patients identify as Black (89 %), while 3.2 % identified as Hispanic/Latino and 7.8 % identify as white.

Saint Louis University researchers and clinicians conducted an assessment of DPC pediatric health care providers and caregivers. The objectives of this study were to (1) identify physician readiness to screen caregivers and the physician's perceived barriers to conducting a food insecurity screening and (2) assess the prevalence of food insecurity among patients' households, the perceived food environment and the barriers to getting enough food to eat.

Methods

Patients and Methods

This study was approved by the Saint Louis University Institutional Review Board and SSM Research Business Review.

A survey was developed to assess health care providers' perceptions of food insecurity among their pediatric patients and households, their readiness to conduct food insecurity screening, and their perceived barriers to conducting food insecurity screening. An email was sent to all physicians from the Saint Louis University Department of Pediatrics including DPC providers. To be eligible for participation the physician had to be part of the Department of Pediatrics, regardless of specialty. The email introduced the study and asked providers to complete a brief survey administered through Qualtrics. A follow-up email was sent to all providers 1 week later. Descriptive analysis was used to analyze the data.

A caregiver survey was developed to assess demographics, including caregiver education level, household income, caregiver's gender and race/ethnicity, number of children in the household, and zip code. The survey also assessed household food security status, participation in nutrition assistance programs including Women Infants and Children (WIC), Supplemental Nutrition Assistance Program (SNAP), the National School Lunch Program (NSLP), and food pantries, perception of the neighborhood

food environment, and barriers to getting enough food to eat (e.g., transportation). Household food insecurity was measured using the first two questions from the 18-item U.S. Household Food Security Survey. This two-item screen was validated by Hager et al., who reported a sensitivity of 97 % and specificity of 83 % for identifying an affirmative response to questions one and/or two [10].

The research team recruited caregiver participants in the DPC waiting room. Research team members approached caregivers, explained the purpose of the survey, and asked them to participate. Pen and paper surveys were administered in the waiting room. Caregivers were eligible to participate if they had a child greater than 1 year of age in their care and the child was a DPC patient. Caregivers with a child less than 1 year of age were excluded due to a second study focusing on the first year of care simultaneously being conducted. The research team conducted surveys Monday through Friday between 8:30 a.m. and 12 p.m. from July 7, 2015–July 23, 2015. Caregiver survey data was entered into SPSS for data analysis. Descriptive statistics were generated and odds ratios were calculated.

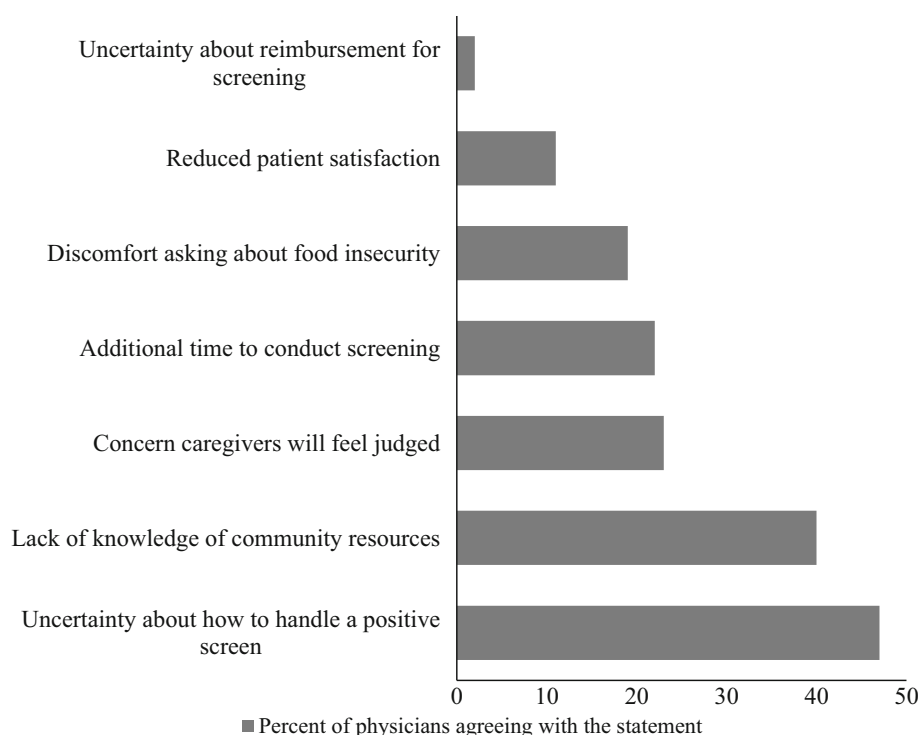
Results

Physicians

Sixty-seven physicians completed the Qualtrics survey, resulting in a 54 % response rate. The majority of physicians were in general pediatrics (20 %), emergency medicine (14 %), cardiology (9 %), neonatology (9 %), or pediatric intensive care (8 %). The majority of physicians (88 %) believe that food insecurity is a challenge for some of their patients with most physicians estimating that between 10 and 40 % of patients' households experience food insecurity. Fifteen percent of pediatricians said that they currently screen patients for food insecurity while 80 % responded that they would be willing to screen patients.

Physicians reported being most concerned about how to handle a positive screen for household food insecurity and a lack of knowledge about community resources to help children and families experiencing food insecurity. See Fig. 1. Another concern expressed by participants was that screening for food insecurity is not an appropriate use of time during emergency or specialty evaluations; those providers felt both ill equipped to "ask about something I don't know much about how to help them with" and concerned that the questioning might open "Pandora's box about their lack of other things." Others noted this type of screening would be best done by primary care providers or a registered nurse. Two participants noted that there are not enough supportive resources to be able to react to a positive

Fig. 1 Physicians concerns about screening for household food insecurity



screen. One physician noted, “we are tremendously understaffed in terms of social services. We have one social worker for a clinic that has ~15,000 visits per year. This fact seems overlooked.”

Caregiver Demographics

Two hundred twelve caregivers completed the survey. Forty-six caregivers refused to participate and nine did not complete the entire survey. The median caregiver age was 31 years of age. See Table 1. The majority of caregivers were female (90 %), employed (49.5 %), and had some college (44.3 %). There was a wide household income range with nearly a quarter of household’s reporting income less than \$10,000. One-fifth of incomes were greater than \$35,000. Half of caregivers reported participating in WIC and half reported participating in SNAP. One-third of caregivers received SNAP benefits in at least ten of the past twelve months.

Household Food Security Status

A two item validated screener was used to assess household food security [10]. The first item asked, “over the last 12 months did you worry there would not be enough food and there was no money to buy more?” Nearly one-fifth (17.5 %) of caregivers reported this was often true while 37.3 % reported this as sometimes true.

The second question asked, “over the last 12 months, did food run out and you did not have money to buy more?” Fifteen percent of caregivers reported this was often true and 30 % reported this was sometimes true. Considering affirmative responses to one or both questions (response of often true or sometimes true), 57.1 % of the sample reported some level of food insecurity. Table 2 presents the determinants associated with food insecurity. Compared to caregivers considered food secure, the odds of being non-white (OR 3.54; 95 % CI 1.70, 7.40) and the odds of receiving SNAP benefits (OR 3.20; 95 % CI 1.79, 5.64) were significantly greater among caregivers experiencing food insecurity.

Nearly two-thirds of caregivers said they would be comfortable talking with their doctor about food needs while 17.9 % reported they would be somewhat or very uncomfortable talking to a doctor about food needs. When asked about speaking to a nurse about food needs, 18.9 % of caregivers said they would feel somewhat or very uncomfortable. Compared to food secure caregivers, the odds of being uncomfortable talking with a doctor about food needs was 2.72 times greater (95 % CI 1.20, 6.15) among caregivers with food insecurity. Similarly, the odds of experiencing some level of discomfort towards the idea of speaking with a nurse about household food needs was 3.99 times greater (95 % CI 1.65, 9.61) among caregivers reporting household food insecurity compared to caregivers who were food secure.

Table 1 Pediatric caregiver demographic characteristics

	Count (n = 212)	Percent
<i>Gender</i>		
Female	191	90.1
Male	20	9.4
<i>Median age</i>	31	–
<i>Race</i>		
White	40	18.9
Black or African American	160	75.5
Asian	5	2.4
Native Hawaiian or Pacific Islander	1	0.5
Hispanic	3	1.4
Other	2	0.9
<i>Employment status</i>		
Employed for wages	105	49.5
Self-employed	8	3.8
Stay at home parent	35	16.5
Unable to work	14	6.6
Unemployed	23	10.8
Retired	3	1.4
Student	23	10.8
<i>Food assistance participation</i>		
WIC	104	49.7
SNAP	109	51.4
School breakfast	42	19.8
School lunch	51	24.1
Head start	20	9.4
Food pantry or ministry	22	10.4
<i>Food security status</i>		
Food secure	88	42.1
Food insecure	121	57.9
<i>Household income</i>		
0–9999	56	26.4
10,000–14,999	19	8.9
15,000–19,999	23	10.8
20,000–24,999	18	8.5
25,000–34,999	22	10.4
≥35,000	45	21.2
Do not know	29	13.7
<i>Education level</i>		
Less than high school	22	10.4
High school diploma or GED	53	25
Some college	94	44.3
College graduate	40	18.9

Reasons Caregivers Report not Having the Kinds of Food They Want to Eat

Caregivers were also asked why they do not have the foods they would like to eat. Approximately 40 % reported that

they do not have enough money to buy the food they want to eat. In addition to the reasons listed in Fig. 2, transportation was listed as a key barrier to not having the types of food they want to eat. Seventy-five percent of caregivers reported a major mode of transportation was their own car. Other prominent modes of transportation included use of someone else's car (6.6 %), someone else drives them (18.9 %), they walk (10.4 %), or they take the bus (17.5 %). Listing a personal vehicle as the primary mode of transportation was also related to food security status. Compared to caregivers who were food secure, the odds of not listing a personal vehicle as the primary form of transportation was 3.25 times greater among caregivers experiencing food insecurity (OR 3.25, 95 % CI 1.59, 6.64).

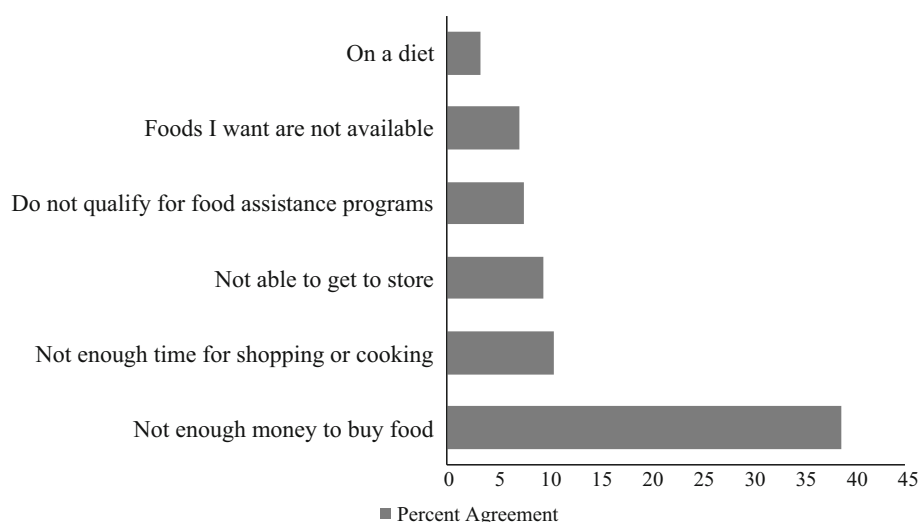
Discussion

Our results show that food insecurity within the DPC patient population is a serious concern. More than one in two DPC caregivers surveyed reported living in a food insecure household. Saint Louis University pediatric physicians are aware that food insecurity is a challenge for their patients and many are willing to screen for household food insecurity. Still, challenges exist in identifying and addressing food insecurity in pediatric clinical settings.

Barriers to systematic screening of food insecurity in clinical settings are products of caregiver, physician, and regional food safety net infrastructure. Success for screening programs in pediatric settings relies heavily on caregiver participation. Our data indicate that some caregivers experiencing household food insecurity are less comfortable discussing food needs with a health care provider. However, little is known about the reasons for caregiver discomfort with food insecurity disclosure in clinical settings. There has been extensive study of patient disclosure for other sensitive topics such as intimate partner violence (IPV) which have identified stigma and patient-provider trust as factors affecting disclosure [11, 12]. Based on these findings, it is possible that caregivers are uncomfortable discussing food insecurity with healthcare providers due to a fear of stigmatization or concern about having their children removed from their care as a consequence of their disclosing food insecurity [13]. Another factor may be that caregivers do not view pediatricians as resources for addressing food insecurity because they do not view it as a medical problem that their doctor could address. In another study examining IPV disclosure, women felt either as though they could deal with the problem themselves or that their doctors would not be able to help [14]. Finally, if caregivers perceive struggling to feed their family as a personal obligation, they may

Table 2 Associations between caregiver characteristics and food insecurity status

	OR	CI (95 %)	p
<i>Race (non-white)</i>			
White	1.00 (ref)	–	–
Non-white	3.54	1.70–7.40	0.001
<i>SNAP participant</i>			
No	1.00 (ref)	–	–
Yes	3.18	1.79–5.64	<0.001
<i>Uncomfortable talking to doctor about food needs</i>			
No	1.00 (ref)	–	–
Yes	2.72	1.20–6.15	0.017
<i>Uncomfortable talking to nurse about food needs</i>			
No	1.00 (ref)	–	–
Yes	3.99	1.65–9.61	0.002
<i>Primary transportation is a personal vehicle</i>			
Yes	1.00 (ref)	–	–
No	3.25	1.59–6.64	0.001

Fig. 2 Caregivers' reasons for not having the kinds of foods the household wants to eat

not think to ask pediatricians for assistance [14]. In light of these potential barriers, safe spaces for caregivers to disclose can be created through use of thoughtful screening techniques. In the context of IPV, patient comfort improves with repeated screening over time by responsive health care providers [11]. Likewise, routine screening for food insecurity and the subsequent normalization of this process may present opportunities for changing patients' expectations of healthcare providers and systems.

Health care providers on the forefront of food insecurity screening in the clinical setting identified provider training as critical to physician buy-in [15, 16]. As noted, providers surveyed for our study expressed discomfort discussing food insecurity with caregivers often due to uncertainty regarding local food safety net resources. The Oregon Health and Science University and the Oregon Childhood Hunger Initiative developed a continuing education

training course [17] that consists of six training modules that cover food insecurity measurement and predictors, food access, relationship between food insecurity and child health, food insecurity screening, and potential intervention strategies. Additionally, the Child Hunger Coalition developed a screening algorithm that guides providers from a positive food insecurity screen to helping patients identify community resources [18]. Training and algorithm tools have increased the effectiveness of food insecurity screening [19] and have the potential to increase provider self-efficacy to screen; thereby normalizing food insecurity screening for providers and caregivers.

Although our study did not look at regional infrastructure to address food insecurity, households receiving SNAP were more likely to be food insecure and 10 % of households used food pantry services. Regional infrastructure influences the implementation of effective screening

programs. In 2011, Kaiser Permanente of Colorado piloted a program in partnership with Colorado's statewide hunger advocacy group, Hunger Free Colorado. Patients with a positive food insecurity screening were referred to Hunger Free Colorado personnel who determined eligibility for food assistance programs, assisted with applications for federal nutrition programs, and provided education on resources in the community [17]. Similarly, Cincinnati Children's Hospital Medical Center (CCHMC) and Freestore Foodbank of Southwest Ohio partnered for the Keeping Infants Nourished and Developing (KIND) program. The partnership used pediatric well-visits to identify food insecure patients then referred those who screened positive to Freestore Foodbank [15]. These two examples highlight the importance of strong local or regional food safety net infrastructure. Future studies should consider how the regional food safety net infrastructure affects the effectiveness of food insecurity screening programs in clinical settings.

Our study raises important concerns about food insecurity screening in pediatric clinical settings. Our study does have limitations. Assessment data was collected from a convenience sample of caregivers during July. It is possible that those who chose not to participate in the survey were different from those who chose to participate. For example, 57 % of caregivers surveyed reported household food insecurity which is higher than St. Louis City's food insecurity rate. It could be that those experiencing food insecurity were more likely to participate in the survey than those who were not experiencing food insecurity. Household food insecurity for households with children increases during the summer months. Because we collected data during the summer, our data may reflect an elevated rate of food insecurity because children do not participate in school meals programs at the same frequency as they would during the school year. On the other hand, caregivers with infants were excluded from our assessment due to a co-occurring study. It is possible that food insecurity among DPC households is greater when households with infants are considered.

Conclusion

The 2015 recommendation by the American Academy of Pediatrics to conduct food insecurity screening in pediatric clinical visits is an important step in identifying children at-risk of food insecurity. Effective food insecurity screening requires addressing caregiver and healthcare provider barriers in order to increase the likelihood of identifying the households that are most at risk.

Acknowledgments The work presented was completed with in-kind support from Saint Louis University College for Public Health and Social Justice. The authors would like to acknowledge Neil Ghanti, MPH who assisted with data entry and initial data analysis.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Nord, M. (2009). *Food insecurity in households with children: Prevalence, severity, and household characteristics*. Economic Information Bulletin Number 56, US Department of Agriculture.
2. Coleman-Jensen, A., Gregory, C., & Singh, A. (2015). *Household food security in the United States in 2014*. USDA-ERS Economic Research Report.
3. Kleinman, R. E., Murphy, J. M., Little, M., et al. (1998). Hunger in children in the United States: Potential behavioral and emotional correlates. *Pediatrics*, 101(1), e3.
4. Alaimo, K., Olson, C. M., & Frongillo, E. A. (2001). Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics*, 108(1), 44–53.
5. Jyoti, D. F., Frongillo, E. A., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *The Journal of Nutrition*, 135(12), 2831–2839.
6. Hamm, M., & Bellows, A. (2002). Community food security: Background and future directions. *Journal of Nutrition Education and Behavior*, 35(1), 37–43.
7. Eisenmann, J. C., Gundersen, C., Lohman, B. J., Garasky, S., & Stewart, S. D. (2001). Is food insecurity related to overweight and obesity in children and adolescents? A summary of studies, 1995–2009. *Obesity Reviews*, 12(5), e73–e83.
8. Schwarzenberg, S. A., Kuo, A. A., Linton, J. M., & Flanagan, P. (2015). Promoting food security for all children. *Pediatrics*, 136(5), e1431–e1438.
9. Calendar, C. (2015). *Food insecurity*. St. Louis: Missouri Foundation for Health.
10. Hager, E. R., Quigg, A. M., Black, M. M., et al. (2010). Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*, 126(1), e26–e32.
11. Feder, G. S., Hutson, M., Ramsay, J., & Taket, A. R. (2006). Women exposed to intimate partner violence: Expectations and experiences when they encounter health care professionals: A meta-analysis of qualitative studies. *Archives of Internal Medicine*, 166(1), 22–37.
12. Lutenbacher, M., Cohen, A., & Mitzel, J. (2003). Do we really help? Perspectives of abused women. *Public Health Nursing*, 20(1), 56–64.
13. López, A., & Seligman, H. K. (2012). Clinical management of food-insecure individuals with diabetes. *Diabetes Spectrum*, 25(1), 14–18.
14. Hegarty, K. L., & Taft, A. J. (2001). Overcoming the barriers to disclosure and inquiry of partner abuse for women attending general practice. *Australian and New Zealand Journal of Public Health*, 25(5), 433–437.
15. Beck, A., Henize, A., Kahn, R., & Klein, M. (2015). *Curtailling food insecurity with clinical-community collaboration*. Health affairs. The People-to-People Health Foundation, Inc.

16. O'Malley, J. A., Beck, A. F., Peltier, C. B., & Klein, M. D. (2013). Revealing hidden hunger. *Contemporary Pediatrics*, 30, 10–20.
17. Stenmark, S., Solomon, L., Allen-Davis, J., & Brozena, C. (2015). *Linking the clinical experience to community resources to address hunger in Colorado*. *Health affairs*. The People-to-People Health Foundation, Inc.
18. Green, S. H., & Glanz, K. (2015). Development of the perceived nutrition environment measures survey. *American Journal of Preventive Medicine*, 49(1), 50–61.
19. Burkhardt, M. C., Beck, A. F., Conway, P. H., Kahn, R. S., & Klein, M. D. (2012). Enhancing accurate identification of food insecurity using quality-improvement techniques. *Pediatrics*, 129(2), e504–e510.

The Right to Food: Building Upon “Food Is Medicine”

Ellen K. Barnidge, PhD,¹ Sandra H. Stenmark, MD,² Marydale DeBor, JD,^{3,4}
Hilary K. Seligman, MD^{5,6,7}



INTRODUCTION

During the past decade, the “food is medicine” movement has captured momentum and successfully acted upon evidence that a nutritionally adequate diet supports better health outcomes. Despite progress being made in integrating provision of food into healthcare services, there are on the ground limitations of “food is medicine” interventions that need to be acknowledged as barriers to creating lasting change. Goals must now expand beyond remediating the physiologic impacts of a poor diet and reducing associated healthcare costs and evolve toward the larger goal of promoting health over the long term. To do so, the authors advocate for adoption of a framework of thinking and action based upon the concept of the right to food,¹ a concept embodied in international law and undergirded by rich philosophical and moral traditions. The healthcare sector can help lead change toward the recognition of food as a human right upheld by systems-level protections. Although the healthcare sector alone is not responsible for this needed paradigm change, it can help to inspire it, especially in light of the COVID-19 pandemic and resulting economic fallout.

CONTRIBUTIONS AND LIMITATIONS OF “FOOD IS MEDICINE” INITIATIVES

In 2018, an estimated 11.1% of U.S. households were food insecure.² Food insecurity and poor diet quality result in higher prevalence and poorer management of chronic diseases, accounting for billions of dollars in annual medical costs.³ This recognition has catalyzed the health sector’s interest in “food is medicine” interventions. Some of these interventions focus on efforts to prescribe food or meals as part of health care for patients with complex illnesses who have special dietary needs, such as those with diabetes or congestive heart failure. The prescription of food in these contexts may improve self-management, reduce hospital admissions, and lower healthcare costs.⁴ Other “food is medicine” interventions focus more broadly on lower-income patients. These interventions include

screening patients for food insecurity during well visits, tracking food insecurity as a risk factor for poor outcomes in the electronic health record, and referring food-insecure patients to community resources or federal nutrition programs.

Although numerous “food is medicine” interventions are being tested, some with success, there are practical limitations that threaten their long-term impact. First, many are funded by short-term grants. The energy required to sustain patchwork funding is substantial and threatens the long-term viability of many programs. Second, many are implemented with a goal of demonstrating a return on investment. This focus has resulted in the concentration of resources to meet immediate food needs on a relatively small, already chronically ill population among whom a return on investment may be quickly observable. Yet, systems-level interventions will likely generate a much larger, albeit slower, return on investment. For example, Supplemental Nutrition Assistance Program (SNAP) and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) enrollment early in life is likely to have an enormous return on investment over a lengthy time horizon, given strong evidence that this intervention improves health, reduces metabolic syndrome, and improves economic self-sufficiency decades later.⁵ Third, the duration of time in which many people exposed to “food is medicine” interventions receive services is inadequate to generate lasting impacts. Prescription produce programs are now widespread and can provide healthy food to meet

From the ¹College for Public Health and Social Justice, Saint Louis University, St. Louis, Missouri; ²School of Medicine, University of Colorado, Denver, Colorado; ³Fresh Advantage LLC, Cambridge, Massachusetts; ⁴Department of Psychiatry, Yale School of Medicine, New Haven, Connecticut; ⁵Department of Medicine, University of California San Francisco, San Francisco, California; ⁶Department of Epidemiology and Biostatistics, University of California San Francisco, San Francisco, California; and ⁷UCSF Center for Vulnerable Populations, San Francisco, California

Address correspondence to: Ellen Barnidge, PhD, College for Public Health and Social Justice, Saint Louis University, 3545 Lafayette Avenue, St. Louis MO 63104. E-mail: ellen.barnidge@slu.edu.

0749-3797/\$36.00

<https://doi.org/10.1016/j.amepre.2020.04.011>

immediate needs. However, such programs generally offer support for a small number of weeks or months and lack infrastructure to connect individuals to safety net programs that may stabilize household food security in the long term.

Finally, even when infrastructure to connect patients to safety net programs does exist, efforts frequently still fail because they are designed with the assumption of individual agency within a resource-constrained environment. For example, many “food is medicine” interventions facilitate patient enrollment into SNAP or other community programs. However, the approach is deeply limited by fragmentation and inadequate funding of the social safety net, failure to address patient-identified barriers to engaging with available resources, and limited provision of reciprocal support for community organizations (such as food banks or home-delivered meals programs) that generally provide the food in these interventions.⁶

Although “food is medicine” efforts are well intentioned and recognize the important contribution of food to health, they are fundamentally flawed by their failure to address structural determinants of food insecurity, including limited educational opportunities, unemployment, lack of a living wage, structural racism, and an inequitable food system. Thus, when these studies, pilots, and programs end, they rarely have lasting impact for individuals or communities. Meanwhile, concentrating more resources in the healthcare system rather than systems better oriented toward population health (e.g., public health, education, and a social safety net) may ultimately do more harm than good.

Therefore, one must ask some difficult questions: How can the healthcare sector fully recognize what has been learned from the “food is medicine” movement while simultaneously pushing for long-term, structural change? How can this sector lead the movement toward systems-level changes that support adequate nutrition at all stages of health?

MOVING TOWARD FOOD AS A HUMAN RIGHT

Despite societal acknowledgment of the special importance of food to health, the U.S. does not officially recognize food as a universal human right nor support systems ensuring universal access to adequate nutrition. However, there is strong precedent for this approach. The recognition of food as a human right was codified in international law, together with the right to health and other rights, by the United Nation’s Universal Declaration of Human Rights (1948), specifically the International

Covenant on Economic, Social, and Cultural Rights (1966).

The philosophical foundations of these documents offer a structure for understanding food as both a legal and moral right. The legal right to food is based on the philosophical tradition of moral universalism. Moral universalism posits that there are universal truths on which all people, regardless of nationality, can agree.⁷ This tradition informs and justifies individual and collective action to secure the necessary conditions for a minimally good life, which are agreed to be universal moral norms. Such conditions include, for example, freedom from torture, access to health care, and access to nutritionally adequate food.

Applying a human rights approach to food facilitates engagement and alignment of multiple sectors in a change process that can enable all people to meet their need for nutritious food across the life course.¹ This approach does not respond to people in need of food out of generosity, with a limited focus on autonomy or dignity. Instead, a rights-based approach elevates systems, supported by society at large, that create conditions whereby individuals can provide for themselves. It would require the healthcare sector to adjust its thinking within and then beyond its own domain, identify its strengths, and then collaborate with other sectors to enact practices and policies that remove the social, economic, agricultural, and educational barriers impeding the right to food.

The Office of the High Commissioner for Human Rights identifies 5 tenets of a right to food approach. Although the intended audience is government bodies, they suggest responsibilities that the healthcare sector can uphold to move the “food is medicine” movement toward a human rights approach¹:

1. facilitating social and economic environments that support human development;
2. strengthening people’s access to adequate nutritious food through activities that enable them to ensure their own livelihood;
3. respecting access to adequate food and preventing barriers that impede peoples’ ability to acquire food;
4. providing nutritious food (or money for food) directly, in situations where individuals and communities are unable to provide for themselves; and
5. protecting individuals from interference by third parties in actions to meet their need for adequate nutritious food.

A WAY FORWARD

The healthcare sector is responding to significant patient need through “food is medicine” interventions (Tenet

4). Yet, on the ground lessons demonstrate that it must move beyond screen and intervene and prescription models that meet the immediate needs of some patients and are limited in their provision of long-term solutions for a broader patient population. Tremendous economic power and influence lie within the healthcare sector. A rights-based shift that is championed by health care and influential in healthcare sector operations and policies can set a powerful example.

Although this work will be complex, proceed slowly, and rely on leadership and generation of trusting relationships, there are immediate steps the healthcare sector can take to align its actions with the right to food approach. First, healthcare systems have invested in patient navigation systems to connect patients to community-based resources. To facilitate environments that support human development as outlined in Tenet 1, healthcare systems can follow the examples of hospitals in San Francisco, Boston, and Detroit that identify as anchor institutions, seeking out employees from low-income neighborhoods and providing a living wage, stable hours, and opportunities for training and advancement.⁸ These activities break down barriers to employment and advancement, strengthening the capacity of community members to ensure their livelihood and thus provide food for their household (Tenet 2).

Second, federal law requires nonprofit healthcare systems to address community needs as a condition of tax exemption. The law sets forth a rational, realistic framework for conducting a sound multisectoral needs assessment (community health needs assessment [CHNA]).⁹ The CHNA process is an opportunity to engage multisector partners and identify social and economic patterns that contribute to poor health outcomes in a local community. A rights-based approach would emphasize Tenets 1 and 2 through the following actions in the CHNA process:

1. conducting research on federal, state, and regional social and economic conditions that create and sustain environments conducive to enabling all people to feed themselves;
2. training healthcare sector staff conducting CHNAs in health equity to minimize unintended consequences that increase health disparities; and
3. meaningfully investing in identified systems gaps in partnership with other sectors and community partners.

Third, healthcare systems can adopt policies and practices that further promote a sustainable food system (Tenet 3).¹⁰ For example, hospital food procurement policies should encourage purchasing of food from

vendors that prioritize the purchase of regionally grown food and minimize food waste. These policies should require food service management contractors to adhere to the same guidelines.

Fourth, healthcare systems should inform and promote local, state, and federal government policies that protect people in need of food in an emergency, or in circumstances when self-provision is beyond their ability, in a way that strengthens the food system and reduces poverty and structural racism (Tenets 4 and 5). For example, healthcare leaders should voice the deleterious health (and nonhealth) effects of failing to provide nutritious school meals to food-insecure children, limiting eligibility for SNAP benefits, and shortening recertification periods for seniors on SNAP. They should also voice the deleterious effects of policies that entrench poverty and structural racism (Tenet 5), the root causes of food insecurity. Such activities will require deep personal investment and training.

Finally, healthcare leaders can support strategies and partnerships that result in enrollment of Medicaid beneficiaries into federal nutrition programs (i.e., SNAP and WIC) that are proven to support health and well-being (Tenet 3). These policies may be implemented more efficiently by supporting streamlined enrollment into multiple safety net programs instead of a component of screen and intervene programs. The healthcare sector can learn from the example of Children's Hospital of Denver: 85% of their primary care clinic families were insured by Medicaid, yet most were not enrolled in SNAP or WIC. In response, they hired a human service enrollment specialist to enroll families in all eligible federal benefits. Leveraging Medicaid expansion infrastructure to enroll patients based on eligibility would improve well-being, food security, and economic security without overburdening the clinical delivery systems.

CONCLUSIONS

The internationally recognized right to food⁶ offers a framework for a paradigm shift that builds on the successes of the “food is medicine” movement while acknowledging the movements’ limitations. The approach transcends fragmented and short-term responses to food insecurity that are now too narrowly defined. A rights-based approach allows for recognition of the principles of self-determination, sustainability, and human dignity to drive long-term solutions for a more just society.

ACKNOWLEDGMENTS

The authors of this publication are members of the Nutrition and Obesity Policy Research and Evaluation Network Food

Security working group. The Nutrition and Obesity Policy Research and Evaluation Network is supported by Cooperative Agreement Number 5U48DP00498-05 from the Centers for Disease Control and Prevention, Prevention Research Centers Program. The findings in this report are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

All authors contributed to the conceptualization, writing, and review of the article.

No financial disclosures were reported by the authors of this paper.

REFERENCES

1. United Nations Human Rights. Office of the High Commissioner for Human Rights. The right to adequate food. Geneva, Switzerland: Office of the United Nations High Commissioner for Human Rights, United Nations Office at Geneva; 2010. www.ohchr.org/Documents/Publications/FactSheet34en.pdf. Accessed May 1, 2019.
2. Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. *Household food security in the United States in 2018*. Washington, DC: U.S. Department of Agriculture, Economic Research Service; 2019. www.ers.usda.gov/publications/pub-details/?pubid=94848. Published September 4, Accessed April 21, 2020.
3. Berkowitz SA, Seligman HK, Rigdon J, Meigs JB, Basu S. Supplemental Nutrition Assistance Program (SNAP) participation and health care expenditures among low-income adults. *JAMA Intern Med*. 2017;177(11):1642–1649. <https://doi.org/10.1001/jamainternmed.2017.4841>.
4. Berkowitz SA, Terranova J, Hill C, et al. Meal delivery programs reduce the use of costly health care in dually eligible Medicare and Medicaid beneficiaries. *Health Aff (Millwood)*. 2018;37(4):535–542. <https://doi.org/10.1377/hlthaff.2017.0999>.
5. Hoynes H, Schanzenbach DW, Almond D. Long-run impacts of childhood access to the safety net. *Am Econ Rev*. 2016;106(4):903–934. <https://doi.org/10.1257/aer.20130375>.
6. Stenmark SH, Steiner JF, Marpadga S, Debor M, Underhill K, Seligman H. Lessons learned from implementation of the food insecurity screening and referral program at Kaiser Permanente Colorado. *Perm J*. 2018;22:18–093. <https://doi.org/10.7812/TPP/18-093>.
7. Fagan A. Human Rights. Internet Encyclopedia of Philosophy. www.iep.utm.edu/hum-rts/. Accessed February 1, 2020.
8. Anchor institutions. Democracy Collaborative. <https://community-wealth.org/strategies/panel/anchors/index.html>. Accessed February 14, 2020.
9. Young GJ, Chou CH, Alexander J, Lee SY, Raver E. Provision of community benefits by tax exempt U.S. hospitals. *N Engl J Med*. 2013;368(16):1519–1527. <https://doi.org/10.1056/NEJMsa1210239>.
10. Good Food purchasing program overview. Center for Good Food Purchasing. <https://goodfoodpurchasing.org/portfolio-items/good-food-purchasing-program-overview/?portfolioCats=68%2C66%2C67%2C69>. Accessed May 5, 2019.

Healthy Options in Food Pantries—A Qualitative Analysis of Factors Affecting the Provision of Healthy Food Items in St. Louis, Missouri

Melissa Chapnick ^a, Ellen Barnidge^a, Marjorie Sawicki^b, and Michael Elliott^c

^aBehavioral Science and Health Education, Saint Louis University College for Public Health and Social Justice, Saint Louis, Missouri, USA; ^bNutrition and Dietetics, Saint Louis University, Saint Louis, Missouri, USA; ^cDepartment of Biostatistics, Saint Louis University College for Public Health and Social Justice, Saint Louis, Missouri, USA

ABSTRACT

In 2015, 15.8 million households experienced food insecurity at some point during the year. One out of every 8 American households utilizes a food bank or food pantry to meet their food needs during the year. Understanding the factors that influence whether food pantries provide healthy options to clients can lead to opportunities to improve the health of food insecure individuals. Telephone interviews were conducted with food pantry staff ($n = 12$) in the greater St. Louis area. Using focused coding, interviews were analyzed for factors that facilitate or hinder increasing access to healthy options in food pantries. Pantry staff described barriers (e.g., perishable food storage) and facilitators (e.g., donor relationships) that affected their ability to provide clients with healthy food options. The results of this study will inform interventions aimed at improving the delivery of healthy food options to food pantry clients.

KEYWORDS

Food security; food assistance; emergency food

Introduction

The US Department of Agriculture (USDA) defines *food insecurity* as “a household-level economic and social condition of limited or uncertain access to adequate food.”¹ This means that food insecure households do not have “access by all people at all times to enough food for an active, healthy life.”^{2(p2)} In 2015, the USDA reported 1 out of 8 American households as food insecure.² Approximately 1 in 5 children lives in a food insecure household.² After the economic downturn in 2008, the number of food insecure households increased from 11% to 14%.³ This number was essentially unchanged until 2015 when the USDA reported a 1.3% decrease in the number of food insecure households.² Despite this modest improvement, 12.7% of US households remain food insecure.² In St. Louis County, 10% of households are food insecure, with the rate being twice that in St. Louis City at 20% of households.⁴

CONTACT Melissa Chapnick  mchapni1@gmail.com  Behavioral Science and Health Education, Saint Louis University College for Public Health and Social Justice, 3545 Lafayette Ave., Saint Louis, MO 63104, USA.

© 2017 Taylor & Francis Group, LLC

Food insecurity is an independent risk factor for poor health outcomes throughout the life span. In children and adolescents, food insecurity is associated with obesity, anxiety, depression, and poor school performance.⁵⁻⁸ In adults, food insecurity is associated with depression, metabolic syndrome, obesity, cardiovascular disease, and diabetes.⁹⁻¹³ Food insecurity is linked to poor dietary quality, specifically low intakes of nutrient-dense fruits, vegetables, and dairy products.^{14,15} Diets low in fruits, vegetables, whole grains, etc., have also been independently linked to risk of chronic disease.¹⁶

The US government addresses food insecurity through a set of programs that may miss individuals or leave individuals underserved. These programs include the Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants, and Children, the National School Lunch Program, and National School Breakfast Program.¹⁷ Food assistance programs are intended to be supplemental and do not meet all food needs of households.¹⁷ In 2014, Feeding America reported that 86% of SNAP benefits were expended within 3 weeks of administration, leaving participants without assistance for the remainder of the month.¹⁷ In addition, 27% of food insecure households do not meet income guidelines for participation in public programs.¹⁷ Food banks and food pantries exist to help meet the needs of those for whom federal assistance is inaccessible or insufficient. For some, food banks and food pantries are the main source of food assistance. For others, food from these sources complements federally funded food assistance. Among food pantry participants, a little more than half (55%) receive SNAP benefits.¹⁷ The remaining 45% do not receive benefits for various reasons, including ineligibility, perceived ineligibility, personal reasons, and complicated SNAP applications processes.¹⁷

The St. Louis metropolitan area is served by 2 major food banks that together provide food for an average of 223 000 people each month.^{18,19} Food banks typically support food pantries through redistribution of large food donations. Food banks receive these donations from food manufacturers, suppliers, and retailers. Food banks also acquire commodity food products through the federally funded Emergency Food Assistance Program.¹⁷ Commodity foods are those purchased by the USDA and made available to state agencies for distribution.²⁰ The food bank offers these commodity food items to food pantries for a small per pound maintenance fee¹⁷ that is significantly less than the retail cost of the food items. Items offered depend upon state preferences and agricultural conditions but may include canned fruits and vegetables, fruit juice, meat/poultry/fish, dried beans, pasta, etc.²⁰

Often, food items provided by the USDA are intentionally packaged to be lower in fat, sodium, and sugar.²¹ In 2014, commodities distributed to food banks by the USDA scored an 85.3 out of 100 on the healthy eating index.²² The healthy eating index compares the nutrient and food group content of

foods to the dietary standards. A score of 85.3 is considerably higher than that of the average American diet at 59.0.²² Though the USDA commodity foods do have a relatively high healthy eating score, typically they make up only about 20% of the foods sourced by food pantries.¹⁷ In addition to USDA commodities, pantries receive donations from food manufacturers, suppliers, and retailers that often do not have the same high nutritional value as USDA commodity foods.²³

Typically food pantries are affiliated with a religious or community organization. Once food pantries acquire food from the food bank, it is distributed to the organization's clients. In addition to receiving food from food banks, it is not unusual for food pantries to directly receive both food and monetary donations from individuals or businesses. Food donations are distributed directly to clients. The monetary donations may be used to pay the maintenance fee at the food bank, purchase foods in short supply, purchase non-food hygiene items for clients, or go toward the pantry staff wages and overhead costs.¹⁷

As previously mentioned, nutrient-dense food items such as fruits and vegetables, whole grains, lean meats, and dairy products are associated with reduced risk of chronic disease.¹⁶ Historically, food pantries received donations of food items that were damaged, nearing expiration, or deemed unsaleable.²³ As the food industry has improved manufacturing, the number of unsaleable products has reduced, resulting in fewer donations to pantries. In response, food pantries have shifted toward a model of using monetary donations to purchase food items from retailers.²³ Typically, the focus when selecting food has been on feeding the greatest number of clients with little attention paid to the nutritional value of foods.²³ Furthermore, these purchases are made within a national food environment with ample products high in calories but low in nutrient density. Often the food items available to pantry clients contain significant amounts of refined carbohydrate, sodium, and sugar.^{24–27} Limited access to nutrient-dense items and products designed to be lower in added sodium and sugars in food pantries is important because clients often have other risk factors associated with chronic disease, such as poverty and poor diet quality.^{13,28,29}

There is a growing trend among food pantries to initiate programs such as gleaning, gardening, and farming aimed at increasing offerings of fruits and vegetables.³⁰ In 2015, Feeding American food banks increased the amount of produce donated to food banks by 13%. Still, fresh produce contributed to less than half of the pounds of food sourced by Feeding America food banks during the year.³¹ Some pantries have been successful in achieving fruit and vegetable donations whose combined weight contributes to greater than 50% of total inventory.³² Though this progress is significant, it is important to consider that fruit and vegetable donations may weigh more than snack foods and sugar-sweetened beverages and may not offset the substantial

amount of calories contributed by these items.³² These discrepancies call for additional improvement in the food offerings at food pantries.

Though food banks and food pantries were originally intended to serve as temporary sources of food, clients became increasingly reliant on pantries over longer periods of time.³³ Long-term reliance on food pantries has been perpetuated by an economic climate with high unemployment and insufficient wages that do not allow food pantry clients to meet their basic household needs.³³ The sustained demand for food assistance makes the nutritive value of food pantry foods especially important. Reliance on food pantry foods compounded with the independent risk factors associated with food insecurity makes providing nutrient-dense food options an important priority for preventing chronic disease among the already vulnerable food insecure population.

Currently there is little research investigating the factors associated with providing healthy food options in food pantries. For the purposes of this investigation, *healthy* refers to foods associated with the prevention of chronic disease, including fruits and vegetables, whole grain items, and items intentionally packaged to be low in fat, sugar, and salt. Understanding the factors that affect the provision of healthy food items is critical in order to develop interventions aimed at improving the nutritive value of food pantry foods. The purpose of this study is to investigate factors that facilitate or hinder the provision of healthy food options, specifically fruits and vegetables, whole grains, and lower sodium and lower sugar options. In addition, the study aims to identify opportunities to improve the provision of healthy food items to food pantry clients.

Methods

The study protocol was approved by the Saint Louis University Institutional Review Board.

Participants and recruitment

Food pantries in St. Louis County and St. Louis City were identified through food pantry directories provided by the United Way and St. Louis Food Bank Association and verified by phone calls to each food pantry. A total of 101 food pantries (54 in St. Louis City and 47 in St. Louis County) were identified.

A stratified sample of pantries was selected for interview based on income and racial composition of the ZIP code. Table 1 describes the number of pantries that exist in each sampling framework category. Income was defined as the median household income based on the 2010 US Census data³⁴ for the ZIP codes in each of the sites. Less than \$30 000 was considered low, \$30

Table 1. Existing pantries in St. Louis City and county ZIP codes.

	Total	Number of existing pantries by income ^a and racial composition ^b					
		High		Medium		Low	
		Black	White	Black	White	Black	White
City	54	0	6	4	10	34	0
County	47	4	25	14	2	2	0
Total	101	4	31	18	12	36	0

^aIncome based on ZIP code median household income from 2010 US Census data. Low = <\$30 000, Medium = \$30 000–\$39 999, High = > \$40 000.

^bRacial composition based on 2010 US Census Data. By ZIP code, 50+% of the population one race (black or white) was considered a majority; 49% or less of one race was considered a minority.

000–\$39 999 was considered medium, and >\$40 000 was considered high (based on the distribution of the data). Racial composition was based on 2010 US Census Data. If 50% or more of the population was one race (black or white) it was considered the majority, and 49% or less of one race was the minority. Food pantry size, religious affiliation, or other pantry characteristics were not considered.

A convenience sample of 10% of the pantries in each category was selected where pantries existed. At least one pantry was selected for interview in each category to account for census tracts with fewer than 10 pantries. In total, 12 pantries were included in the study. There were no identified pantries located in low-income white neighborhoods in the city or the county, nor were pantries located in high-income black neighborhoods in the city. [Table 2](#) describes the sampling framework used for food pantry interviews.

Interview procedures

Facilitated interviewing was used for this study because it elicited in-depth information not addressed by other methods. Pantry staff were contacted by phone and asked about their willingness to participate. Interviews were scheduled with pantry staff and conducted by phone between June 2013 and September 2013. A team of researchers developed the interview protocol

Table 2. Distribution of food pantry interviews.

	Total	Number of existing pantries by income ^a and racial composition ^b					
		High		Medium		Low	
		Black	White	Black	White	Black	White
City	54	0	1	1	1	3	0
County	47	1	3	1	0 ^c	1	0
Total	101	1	4	2	1	4	0

^aIncome based on ZIP code median household income from 2010 US Census data. Low = <\$30 000, Medium = \$30 000–\$39 999, High = > \$40 000.

^bRacial composition based on 2010 US Census Data. By ZIP code, 50+% of the population one race (black or white) was considered a majority; 49% or less of one race was considered a minority.

^cRepeated attempts were made to contact both pantries but were unsuccessful.

to assess how food pantries operate and the priority placed on healthy food options. A food bank administrator reviewed the interview protocol for appropriateness. Participants were asked descriptive questions about their organization such as the number of individuals served per month as well as questions exploring policies related to donations and healthy food items. Interviews lasted between 30 to 60 min and were recorded upon permission from the interviewee.

Data analysis procedures

Interview recordings were transcribed verbatim. Transcription documents were uploaded into Atlas TI software (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) for coding. An initial code list with code definitions was created based on the interview questions. A team of 3 researchers with training in qualitative methodology conducted first-round coding. Code definitions were modified based on researchers' understanding of the codes and their relationship to the data. Second-round coding was conducted by a single researcher, and chunk checking was conducted by a third researcher to identify miscoded data.³⁵ Changes throughout the coding process were documented. Summaries of each code were written and used for analysis.

Results

Descriptives

Interviews were conducted with the food pantry managers at 12 food pantries in the St. Louis region. The interviews revealed several areas that facilitate or hinder the provision of healthy food items to food pantry clients in St. Louis, Missouri. Interviews with pantry staff revealed that more than half (58%) of the food pantries served between 500 and 1000 clients per month. Nine of the 12 pantries were affiliated with faith-based organizations. In addition to food assistance, many food pantry staff mentioned other services offered to clients including providing hygiene items, utility assistance, and referrals to other social services. [Table 3](#) shows examples of participant quotes describing the barriers and facilitators affecting the provision of healthy options in food pantries.

Barriers

The participants were asked, "What are the barriers your organization encounters as you try to provide healthy food options?" Participants identified several barriers to providing healthy food options to clients, including receiving foods through donation, lack of adequate storage space, limited budget, and client preferences.

Table 3. Examples of barriers and facilitators affecting the provision of healthy options in food pantries.

Category	Theme	Participant Quote
Barriers	Receiving foods through donation	"We have to give what we have, and, you know, a lot of the stuff we have probably isn't healthy ... well not probably, it isn't healthy. But it's food." "It is a concern, but a bigger concern is just making sure that the shelves stay full. Because, you know, when you start giving 50 000 meals a month away there's a large turnover in items. So, unfortunately, it's probably not as much of a concern as it should be. But, once the shelves are stocked, then we kind of look for those healthier options as well."
	Lack of adequate storage space	"We buy cases of cabbage that need to be refrigerated, oranges need to be refrigerated. So, yeah, having adequate refrigeration space. Assuming there was the money to buy more fresh produce, we would then need more refrigeration space."
	Limited budget	"We have to watch our budget and some of the healthier foods may not be within our reach."
	Client preferences	"There's a lot of resistance anytime we get new produce that people may not understand what it is. We had rutabagas at one point, we've had spaghetti squash just last week. So, they're not familiar with it. They don't know how to prepare it." "We give out milk and eggs and produce and fruit and things along that line. So we purchase those through a restaurant supplier and people donate money to contribute to those fresh things that we purchase and offer our clients."
Facilitators	Donor relationships	"All produce comes to us [from the food bank] free of charge. Fifty pound bags of potatoes, carrots, corn. Whatever's in season, whatever they get in terms of donated produce ... and they get tons and tons of it. Comes in one day and goes out the same day. We can just take our truck on there on our allocated day of the month and pick up all that we want." "We're open to any donation. I mean I know we're covered by the Bill Emerson Good Samaritan law." "They get a tax write-off and we also get the donation."
	Policies encouraging donors	
	Nutrition education	"Operation Food Search, in their nutrition program, will actually come out and do cooking demonstrations with the items that are being given away that week, and so that's a great resource for people to actually see practically how to utilize that fresh food in a healthy way." "We found some recipes that used prunes and we tried to get them ... we tried to encourage them to use these items that they're just not used to. You know, they're just not used to it."
	Pantry priorities	"Healthy food choices are something that we are concerned about. We don't wanna just give people bread and cakes and all canned goods." "You know [providing healthy options] is a priority because we have diabetics coming in; we have people who have high cholesterol. People who can't have sugar or need low sodium. So we actually have people who donate for that purpose."

Receiving foods through donation

All participants stocked their shelves in part via donations and many viewed this model as a barrier to providing healthy options to clients. Participants felt that their ability to offer healthy options was limited based on the types of

foods they received through donation. One participant stated, “We have to give what we have, and, you know, a lot of the stuff we have probably isn’t healthy . . . well not probably, it isn’t healthy. But it’s food.” Another stated, “Such a big part of food banks and food pantry [donations] are canned goods. So they’re generally just really full of sodium.”

A few participants noted that the cost of healthy food items may influence what donors choose to provide as donations. One participant explained,

A good portion of what we get is from donations, that means that whoever’s doing the donating, isn’t going to want to spend that type of money to give to us . . . you know they are just raiding their pantries and giving stuff they don’t want.

Another described how cost may impact commodity food donations:

We have to accept what we receive. The US Department of Agriculture provides, what’s referred to as commodity foods. And again, they try to do some healthy stuff, but again it’s what they can afford to purchase from the farmers.

Maintaining adequate inventory to serve clients was another barrier expressed. Several participants stated that having enough food at the pantry took priority over providing healthy options. When asked whether providing healthy food options was a priority for the pantry, one participant stated,

It is a concern, but a bigger concern is just making sure that the shelves stay full. Because, you know, when you start giving 50,000 meals a month away there’s a large turnover in items. So, unfortunately, it’s probably not as much of a concern as it should be. But, once the shelves are stocked, then we kind of look for those healthier options as well.

Lack of adequate storage space

Several participants noted lacking enough space to accommodate inventory as a barrier to providing healthy options. Participants specifically discussed both dry storage and refrigeration space. One participant illustrated how a lack of dry storage impacts the pantry’s ability to accept donations.

In the past we’ve had some catering companies that were generous enough to donate to us, but the size that we are we can’t handle an amount of food that’s just too large. That even happened at the St. Louis Area Food Bank, they had tons of potatoes and onions and sweet potatoes, you know really useful and healthy things, but you were required to get 50, 50lb bags. We just simply can’t store or manage that amount of food, so those are the few instances where we might, you know, respectfully decline something.

Another participant described the impact of a lack of refrigeration” “We buy cases of cabbage that need to be refrigerated, oranges need to be refrigerated. So, yeah, having adequate refrigeration space. Assuming there was the money to buy more fresh produce, we would then need more refrigeration space.”

Limited budget

Though all pantries received food donations, some pantries received monetary donations that could be used to purchase food from the food bank at a reduced price or the grocery store. Several participants able to purchase food expressed that the cost of healthy food items was a barrier. As one participant stated, “We have to watch our budget and some of the healthier foods may not be within our reach.” However, another explained that providing healthy options to clients is important to donors. The participant stated, “I guess it’s just resources. If we have enough money to purchase the fresh things, you know, it’s important to our donors to provide our clients with this fresh stuff.”

Client preferences

Participants discussed client preferences and resources as a barrier to providing healthy food options. Several participants expressed challenges related to clients accepting food items that they were unfamiliar with or were unsure of how to prepare. As one participant explained,

There’s a lot of resistance anytime we get new produce that people may not understand what it is. We had rutabagas at one point, we’ve had spaghetti squash just last week. So, they’re not familiar with it. They don’t know how to prepare it.

Another participant stated, “The USDA commodities are packaged to be lower in sodium and sugar; however, people typically don’t think the USDA commodities taste very good.”

Two participants expressed challenges specifically with clients accepting whole grain bread products. One stated, “We get [whole grain breads] sometimes in our donations. They’re wonderful, but they tend to go stale a lot faster because there are less preservatives, and our clients tend to steer away from them.” Another explained,

Sometimes we will have more wheat. Naturally then a lot of them just prefer the white. But you know, we will always say, “Why don’t you take a loaf of wheat and try it?” Or you know, “This is really a good bread. Just try it if you don’t like it, at least try it.”

One participant illustrated how a client’s living environment may impact his or her willingness to accept some healthier food items.

I mean in years past I know, for example, they did dry beans along with bags of rice, because dried beans are very nutritious and cheap. But we ran into, you know, issues with that. A lot of men did not want to bother to cook them. You have to, you know, rinse them or soak them the night before, and then cook them. It assumes that you have a kitchen and some of our people don’t have kitchens. And so, what we found is that the stuff was being given out and then they would either say, “Oh I’m not going to use these” and turn back or, you know, throw them in the trash.

Facilitators

Participants identified several factors that facilitated providing healthy food options to clients, including donor relationships, policies that encourage donors, nutrition education, and pantry priorities.

Donor relationships

Participants described the importance of relationships with donors and organizations such as the food bank that allow pantries to secure healthy donations. One participant described the manner in which monetary donations were used to purchase healthy options.

We give out milk and eggs and produce and fruit and things along that line. So we purchase those through a restaurant supplier and people donate money to contribute to those fresh things that we purchase and offer our clients.

Another participant described a relationship with a community garden that provided them with produce. “We’ve even gotten fresh things from a community garden out here. We’ve got some cucumbers that were freshly picked, and we’ve gotten some lettuce and things like that.”

One participant described a program at the food bank that offers produce to pantries free of charge.

All produce comes to us [from the food bank] free of charge. Fifty pound bags of potatoes, carrots, corn. Whatever’s in season, whatever they get in terms of donated produce ... and they get tons and tons of it. Comes in one day and goes out the same day. We can just take our truck on there on our allocated day of the month and pick up all that we want.

Several participants discussed the importance of maintaining relationships with area agencies that help pantries maintain inventory by connecting them to food donations. One participant described a food bank, stating,

Without them, the smaller pantries like us wouldn’t be around. It seems like it’d be very difficult to get enough food donated without the help of some group that coordinates that. Because, you know we have three grocery stores, and we’re not the only pantry that goes there, but without someone kind of mitigating that process, you know, people might be there every day, seeing if there’s anything left, and the whole system ... so the food bank does a pretty good job of striking that balance, where we’re not a nuisance to the stores or to the donor, and then there’s enough to go around for the pantries that need it.

Policies encouraging donors

Several participants identified local and federal policies that encourage donors to donate. One participant discussed the Bill Emerson Good Samaritan Law, a federal policy in place that protects donors from civil and

criminal liability should food products donated in good faith later cause harm to the recipient.^{36,37} One participant stated, “We’re open to any donation. I mean I know we’re covered by the Bill Emerson Good Samaritan law.” Many participants referenced federal policies, such as section 170 of the IRS code, which allows tax deductions for corporations donating surplus food products to organizations eligible for tax deductions.³⁸ Similar codes exist for individuals as well as individuals and corporations that make monetary donations. One participant explained, “They get a tax write-off and we also get the donation.”

Nutrition education

Many participants described the integration of nutrition education activities into their services in an effort to address the barrier of client acceptance of healthier food items. Several participants identified a service offered by one of the local food banks. As the participant explained,

[The food bank] in their nutrition program, will actually come out and do cooking demonstrations with the items that are being given away that week, and so that’s a great resource for people to actually see practically how to utilize that fresh food in a healthy way.

One participant described a wellness program offered through the pantry.

People signed up and they taught them how to read nutrition labels and you know, what means what, and things like that. And then know how to cook their food. And on top of that, for a while we also brought in [the food bank], they would come and do cooking demonstrations during the days, you know, and cook [for people].

Several participants also identified efforts to provide clients with recipes highlighting the types of foods provided at the pantry. One participant stated, “My wife is really good at printing up different recipes that we can give out to folks, so that they can see how to utilize it”; another stated, “We found some recipes that used prunes and we tried to get them . . . we tried to encourage them to use these items that they’re just not used to. You know, they’re just not used to it.”

Pantry priorities

Several pantry staff explicitly identified providing healthy options to clients as a priority. As one participant explained, “Healthy food choices are something that we are concerned about. We don’t wanna just give people bread and cakes and all canned goods.” When asked whether healthy food options were a priority when selecting food from the food bank, one participant responded,

No, we actually buy as it is available. And we also fill the shelves by what we receive. And so we definitely try to look for the healthy options. Fruits and

vegetables are the main ... you know, those are biggies ... because really the food in the can is not that healthy.

Another participant described healthy options as a priority due to the health needs of their clients.

You know [providing healthy options] is a priority because we have diabetics coming in; we have people who have high cholesterol. People who can't have sugar or need low sodium. So we actually have people who donate for that purpose.

Discussion

When all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life, they are food secure.³⁹ The 3 main components of food security are (1) economic and physical access to food, (2) physical availability of food, and (3) food utilization, which includes food feeding practices, food preparation, and diet diversity.⁴⁰ In order for food security to be achieved, all 3 components must be realized simultaneously and consistently over time.⁴⁰

Food pantries exist to help meet the needs of people experiencing food insecurity, mainly by addressing economic and physical access to food. Food pantries provide a location where the food insecure can obtain food items at no monetary cost. With regard to healthy options, the results of this study show that 2 components, physical availability and food utilization, remain to be sufficiently addressed by food pantries. Using this framework, we see that pantries faced challenges addressing the physical availability of healthy options in food pantries. These included barriers related to donations, adequate storage, and budget. These barriers are similar to those identified in the *Healthy Shelves* report published by the University of Missouri Interdisciplinary Center for Food Security.⁴¹ Conversely, the facilitators identified in this study were those that addressed the availability of healthy food items in food pantries (donor relationships, policies encouraging donors) and improved food utilization (nutrition education) among clients.

An important finding in this study was the common feeling of tension among food pantry staff between the desire to offer healthy options to clients and the need to maintain an inventory of food items that would allow them to feed the largest number of people possible. This finding is consistent with a well-documented concern about compromising the quantity of food provided through food banks and food pantries.²³ Pantry staff often felt that improving the quality of the foods served diminished the quantity of clients that could be served due to factors such as cost and rapid spoilage of fresh foods. Pantry staff that identified this barrier expressed a reduced likelihood of selecting healthy food items from the food bank or purchasing healthy

food items with monetary donations. One respondent stated that they felt that the USDA was limited by “what they could afford to purchase from the farmers,” which ultimately impacted the availability of healthier food items in the pantry. Though this may have been the perception of the pantry staff member and may not actually reflect USDA budget constraints, the tension between quantity and quality is an important consideration to address during the development of intervention activities aimed at improving the availability of healthy food options in food pantries. Pantries need to be able to maintain a level of inventory that can meet their clients’ needs, while simultaneously having the ability to offer healthier items.

Pantry staff often expressed being limited by the types of foods donated to them. The fact that they can only serve what they are donated was a commonly expressed barrier to offering healthy options to clients. In response to this commonly expressed barrier, a few programs have developed around the country that improve pantry access to donations of healthy food items. One such program run by the Kentucky Association of Food Banks allows farmers to sell surplus and Number 2 grade produce directly to the association, which then redistributes the produce to food pantries.⁴² In 2014, this program received over 3 000 000 pounds of produce from farmers.⁴² Though relatively new and unstudied, these “farm to food bank” programs appear to be a win–win for pantries and farmers alike. Farmers are able to receive payment for product that would have otherwise gone to waste, and pantries receive donations of fruits and vegetables ultimately directly addressing the availability of healthy food items.⁴²

During facilitated interviews with pantry staff, it was noted that pantry staff nutrition knowledge was often incorrect or incomplete. Pantry staff had an inconsistent view of *healthy*, occasionally including food items high in sodium, sugar, and fat in their description of healthy food items stocked by the pantry. Conversely, some food items such as canned goods were viewed negatively despite the fact that they are shelf-stable and can be packaged to have an appropriate nutrient profile.²¹ Though pantry staff nutrition knowledge was not directly assessed in this study, it became clear that the food pantry leadership may benefit from nutrition education that could ultimately allow them to make better choices when selecting food for the food pantry and to better serve pantry clients. A recommendation from the *Healthy Shelves* report suggests designing a policy that sets standards for donated foods and food purchases (i.e., no sugary drinks, only purchasing whole grain bread products) as a means of aiding food pantry leadership in making decisions about food options.⁴¹ A study published in 2013 by Campbell et al. found that of the 137 food banks interviewed in the study, only 54 had any type of nutrition related policy in place,⁴³ indicating that this strategy is feasible yet underutilized. A nutrition policy may be of particular importance for pantries with a more limited capacity because it will help

promote the use of scarce resources (i.e., budget, space, etc.) to provide foods with maximum health benefits.

The Choose Healthy Options Program Ranking System is another tool capable of aiding pantry staff in selecting healthier options for distribution in the food pantry. Developed by the Greater Pittsburgh Community Food Bank in 2004, the system ranks foods into categories (choose frequently, choose moderately, choose sparingly) based on their nutritional value.⁴⁴ This system guides food procurement staff as they select food for the pantry and monitors choices over time to track and achieve goals related to the amount of healthier food items offered.⁴⁴ Putting policies and decision aids in place at the organizational level may be a means of establishing social norms within an organization related to the types of foods that are acceptable for distribution to clients. Another way to address social norms may be to tap into the religious affiliation of many food pantries, providing food pantry staff and clients with religious scripture aligning health with the mission of the pantry.

The third pillar of food security, food utilization, refers to the body being able to benefit from the use of nutrients available in food. Some factors that affect food utilization include feeding practices, food preparation, and dietary diversity. In our study, food pantry staff described barriers related to food utilization, which included client preferences whereby pantry staff perceive that clients lack skills and knowledge needed to prepare healthy food items and often resisted integration of novel food items that would lead to a more diverse and nutritious diet. Though several have addressed the need for nutrition education interventions for food pantry clients,^{41,45} a unique finding of this study is the need to directly address preferences (i.e., wheat bread instead of white) and cultural food practices in addition to basic nutrition information. One of St. Louis's 2 food banks, Operation Food Search, was identified repeatedly by participants who described cooking demonstration and nutrition education services offered by the organization. These services are performed at the food pantry during client service times. The demonstrations and educations utilize food items received by clients at the pantry and show how to use the ingredients to prepare healthy meals.⁴⁶ These types of activities are aimed at improving the food utilization component of food security for food pantry clients and can be successful in improving the overall diet quality of participants.⁴⁷

Our findings regarding acceptance of healthier food items differ from those of Campbell et al., which suggest that food pantry clients prefer and accept donations of vegetables, fruit, and lean meat over less nutrient-dense options.⁴⁸ It is possible that the difference in findings is rooted in population-level variations in food preferences. More specifically, food preferences vary by region, and these cultural influences may also impact food pantry users' desires for particular food items. The discrepancy suggests the need for further research that explores staff perceptions of client preferences versus

what clients actually accept at pantries as well as regional variations in food pantry client preferences.

Others also recognize that targeting food availability is only one part of the equation and that food utilization must also be addressed with food pantry clients. Vitiello et al. challenge the current charitable food system altogether, suggesting that it perpetuates the “ironies and inequities of the emergency food system.”^{31(p420)} The authors suggest that even when food banks and food pantries form strong relationships with entities that can provide donations of produce and healthy food items, this system simply changes the types of foods offered and continues to perpetuate clients’ reliance on middle-class volunteers and donations. Instead, the authors argue that interventions aimed at involving food insecure clients in activities such as gardening, farming, and food preparation build community capacity and may be sustainable ways of establishing community food security.³¹

In addition to addressing the 3 main components of food security, others call for a “rights-based approach” to food whereby food and freedom from hunger are treated as a basic human right.⁴⁹ Chilton and Rose specifically address the misconception that charity is the proper vehicle for addressing food insecurity and instead suggest that we create supportive program and policy environments that promote self-sufficiency in food procurement.⁴⁹ These environments focus on improving food utilization but also ensure that all people have access to education, health care, and a living wage.⁴⁹ Using a rights-based approach to address food insecurity directly targets upstream causes and has the potential to significantly decrease sustained pressure on food pantries and other food assistance programs.

Using the “teach a man to fish” metaphor, food pantries feed a man a fish day after day. By addressing availability of healthy options alone, we may just be changing the type of fish we are feeding rather than teaching and providing opportunities for the man to fish for himself. This concept is consistent with what participants in our study illustrated—modifying the types of foods offered in food pantries is only half of the challenge. Instead, we should build the capacity of pantry clients so that they can use the items received in a way that provides the highest benefit to their health. We should also seek opportunities to directly involve food pantry clients in the selection and preparation of food items. For example, a study conducted by Caspi et al. found that a 6-session cooking and nutrition education intervention was successful at improving the nutritional quality of food consumed by participants who were food insecure.⁴⁷ This type of involvement directly addresses the food utilization component of food security. Furthermore, approaching the issue of food insecurity through a rights-based⁴⁹ lens that includes creating and advocating for supportive programs and policies is critical to addressing and preventing its underlying causes.

This study was strengthened by its sampling method because the pantries selected for interview represented those in areas of various income levels and

demographic compositions. The use of qualitative interviews allowed for in-depth discussion of factors facilitating or hindering the food pantry's ability to offer healthy food items. The study was limited in that it was conducted in one geographic area and may not capture all factors experienced by pantries in other areas. In addition, this study only includes the views of food pantry staff and does not account for views held by food pantry clients.

Conclusion

Ultimately, food pantry clients represent one of the most vulnerable segments of the population. Individuals experiencing food insecurity are independently at risk for developing chronic disease and are those most likely to be under the care of federal health care programs.¹² The findings of this study illuminate targets for local policy and programs aimed at reducing barriers and enhancing facilitators to providing healthy food options to food pantry clients. This study also exposes opportunities to work with food pantry clients through smaller scale programs and pantry-level policies that will empower pantry clients to generate, utilize, and benefit from the healthier options available to them. Future research should explore factors in other components of the supply chain (i.e., from the client perspective, retail donor perspective, etc.) as well as additional geographic areas, including both rural and urban, and whether pantries located in neighborhoods of varying socioeconomic conditions experience barriers more severely than other neighborhoods. Additional research should also explore mechanisms that can mitigate upstream factors leading to food insecurity over the long term,⁴⁹ while continuing to meet the immediate needs of the food insecure.

ORCID

Melissa Chapnick  <http://orcid.org/0000-0003-4674-7727>

References

1. Coleman-Jensen A, Gregory C. Definitions of food security. Available at: <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx>. Accessed October 2, 2015.
2. Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. *Household Food Security in the United States in 2015*, ERR-215. US Department of Agriculture, Economic Research Service; September 2016.
3. Coleman-Jensen A, Rabbitt MP, Gregory C, Singh A. *Household Food Security in the United States in 2014*, ERR-194. US Department of Agriculture, Economic Research Service; September 2015.
4. Cafer A, Dawdy J, Foulkes M, et al. *Missouri Hunger Atlas*. Columbia, MO: University of Missouri; 2013.

5. Cook J, Jeng K. *Child Food Insecurity: The Economic Impact on Our Nation—A Report on Research on the Impact of Food Insecurity and Hunger on Child Health, Growth, and Development Commissioned by Feeding America and the ConAgra Foods Foundation*. Chicago, IL: Feeding America; 2009.
6. Kaur J, Lamb MM, Ogden CL. The association between food insecurity and obesity in children—the National Health and Nutrition Examination Survey. *J Acad Nutr Diet*. 2015;115:751–758.
7. Weinreb L, Wehler C, Perloff J, et al. Hunger: its impact on children's health and mental health. *Pediatrics*. 2002;110(4):1–9.
8. McLaughlin KA, Green JG, Alegria M, et al. Food insecurity and mental disorders in a national sample of US adolescents. *J Am Acad Child Adolesc Psychiatry*. 2012;51:1293–1303.
9. Ford ES. Food security and cardiovascular disease risk among adults in the United States: findings from the National Health and Nutrition Examination Survey, 2003–2008. *Prev Chronic Dis*. 2013;10:1–10.
10. Laraia BA. Food insecurity and chronic disease. *Adv Nutr*. 2013;4:203–212.
11. Leung CW, Epel ES, Willett WC, Rimm EB, Laraia BA. Household food insecurity is positively associated with depression among low-income supplemental nutrition assistance program participants and income-eligible nonparticipants. *J Nutr*. 2015;145:622–627.
12. Parker ED, Widome R, Nettleton JA, Pereira MA. Food security and metabolic syndrome in US adults and adolescents: findings from the National Health and Nutrition Examination Survey, 1999–2006. *Ann Epidemiol*. 2010;20:364–370.
13. Seligman HK, Laraia BA, Kushel MB. Food insecurity is associated with chronic disease among low-income NHANES participants. *J Nutr*. 2010;140:304–310.
14. Hanson KL, Connor LM. Food insecurity and dietary quality in US adults and children: a systematic review. *Am J Clin Nutr*. 2014;100:684–692.
15. Robaina KA, Martin KS. Food insecurity, poor diet quality, and obesity among food pantry participants in Hartford, CT. *J Nutr Educ Behav*. 2013;45(2):159–164.
16. Dietary Guidelines Advisory Committee. *Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010, to the Secretary of Agriculture and the Secretary of Health and Human Services*. Washington, DC: Agricultural Research Service; 2010.
17. Weinfeld N, Mills G, Borger C, et al. *Hunger in America 2014*. Chicago, IL: Feeding America; 2014.
18. Operation Food Search. Who we serve. Available at: <http://www.operationfoodsearch.org/serve/>. Accessed April 30, 2016.
19. St. Louis Area Foodbank. *Hunger Close to Home 2014 Annual Report*. St. Louis, MO: St. Louis Area Foodbank; 2014.
20. US Department of Agriculture Food and Nutrition Service. Commodity Supplemental Food Program. Available at: <http://www.fns.usda.gov/csfp/frequently-asked-questions>. Accessed March 21, 2015.
21. US Department of Agriculture, Food and Nutrition Service. *White Paper on the Emergency Food Assistance Program (TEFAP)*. Alexandria VA: Office of Policy Support; 2013.
22. Zimmerman TP, Sun B, Dixit-Joshi S. *Nutrient and Food Group Analysis of USDA Foods in Five of Its Food and Nutrition Programs—2014*. Rockville, MD: Food and Nutrition Service; 2016.
23. Campbell E, Webb K, Ross M, Crawford P, Hudson H, Hecht K. *Nutrition Focused Food Banking*. Washington, DC: Institute of Medicine; 2015.

24. Companion M. Constriction in the variety of urban food pantry donations by private individuals. *J Urban Aff.* 2010;32:633–646.
25. Hoisington A, Manore MM, Raab C. Nutritional quality of emergency foods. *J Am Diet Assoc.* 2011;111:573–576.
26. Gany F, Bari S, Crist M, Moran A, Rastogi N, Leng J. Food insecurity: limitations of emergency food resources for our patients. *J Urban Health.* 2013;90:552–558.
27. Seidel M, Laquatra I, Woods M, Sharrard J. Applying a nutrient-rich foods index algorithm to address nutrient content of food bank food. *J Acad Nutr Diet.* 115:695–700.
28. Dowd JB, Albright J, Raghunathan TE, Schoeni RF, Leclerc F, Kaplan GA. Deeper and wider: income and mortality in the USA over three decades. *Int J Epidemiol.* 2011;40:183–188.
29. Leung CW, Epel ES, Ritchie LD, Crawford PB, Laraia BA. Food insecurity is inversely associated with diet quality of lower-income adults. *J Acad Nutr Diet.* 2014;114:1943–U1329.
30. Vitiello D, Grisso JA, Whiteside KL, Fischman R. From commodity surplus to food justice: food banks and local agriculture in the United States. *Agric Human Values.* 2015;32:419–430.
31. Feeding America. *Feeding Families, Feeding Hope. 2015 Annual Report.* Chicago, IL: Feeding America; 2015.
32. Ross M, Campbell EC, Webb KL. Recent trends in the nutritional quality of food banks' food and beverage inventory: case studies of six California food banks. *J Hunger Environ Nutr.* 2013;8:294–309.
33. Echevarria S, Santos R, Waxman E, Engelhard E, Del Vecchio T. *Food Banks: Hunger's New Staple.* Chicago, IL: Feeding America; 2011.
34. U.S. Census Bureau. *2006–2010 American Community Survey Demographic and Housing Estimates.* Washington DC: U.S. Census Bureau; 2010.
35. Miles M, Huberman M, Saldaña J. *Qualitative Data Analysis.* 3rd ed. Thousand Oaks, CA: SAGE Publications; 2013.
36. Clinton W, Gingrich N, Thurmond S. The Bill Emerson Good Samaritan Food Donation Act. 1996.
37. Feeding America. Protecting our Food Partners 2015. Available at: <http://www.feedingamerica.org/ways-to-give/give-food/become-a-product-partner/protecting-our-food-partners.html?referrer=https://www.google.com/>. Accessed December 11, 2015.
38. Osborne ML, Kassell S. *Charitable, etc., Contributions and Gifts.* Washington DC: Internal Revenue Service; 2001. Available at: <https://www.gpo.gov/fdsys/granule/CFR-2001-title26-vol3/CFR-2001-title26-vol3-sec1-170-1/content-detail.html>
39. World Food Summit. *Rome Declaration on World Food Security.* Rome, Italy: Food and Agriculture Organization of the United Nations; 1996.
40. Food and Agriculture Organization of the United Nations. *An Introduction to the Basic Concepts of Food Security.* EC-FAO Food Security Programme; 2008.
41. McKelvey B, Schnell J, Foulkes M, et al. *Healthy Shelves—Promoting and Enhancing Good Nutrition in Food Pantries.* University of Missouri Interdisciplinary Center for Food Security; 2014.
42. Kentucky Association of Food Banks. *How Farms to Food Banks Works.* Available at: <http://www.kafb.org/farmstofoodbanks/program-overview/>. Accessed December 11, 2015.
43. Campbell EC, Ross M, Webb KL. Improving the nutritional quality of emergency food: a study of food bank organizational culture, capacity, and practices. *J Hunger Environ Nutr.* 2013;8:261–280.

44. Greater Pittsburgh Community Food Bank. What is CHOP? Available at: <http://www.cloudnutrition.net/what-is-chop/>. Accessed December 11, 2015.
45. Hale RN, Chhabra S, Zipfel A, et al. Food insecurity, nutrition knowledge, and cooking skills are barriers to healthy eating among food pantry users. *FASEB J*. 2012;26: supplement 631.1.
46. Operation Food Search. Cooking demonstrations. Available at: <http://www.operationfoodsearch.org/programs/nutrition-education/cooking-demonstrations/>. Accessed December 11, 2015.
47. Caspi CE, Davey C, Friebur R, Nanney MS. Results of a pilot intervention in food shelves to improve healthy eating and cooking skills among adults experiencing food insecurity. *J Hunger Environ Nutr*. 2016;77–88.
48. Campbell E, Hudson H, Webb K, Crawford PB. Food preferences of users of the emergency food system. *J Hunger Environ Nutr*. 2011;6(2):179–187.
49. Chilton M, Rose D. A rights-based approach to food insecurity in the United States. *Am J Public Health*. 2009;99:1203–1211.

Copyright of Journal of Hunger & Environmental Nutrition is the property of Taylor & Francis Ltd and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.