Food Security, Access, and Health Outcomes in Rural America: Challenges and Policy

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About me – Krystal Hodge

About me

- At University of Illinois Urbana Champaign since 2023
- Assistant Professor in Food Science and Human Nutrition
- PhD 2015 from Johns Hopkins University
- Research interests are in behavioral science of behavior change, the impact of the food environment on food choice, and community nutrition programs

About me – Bhagyashree Katare

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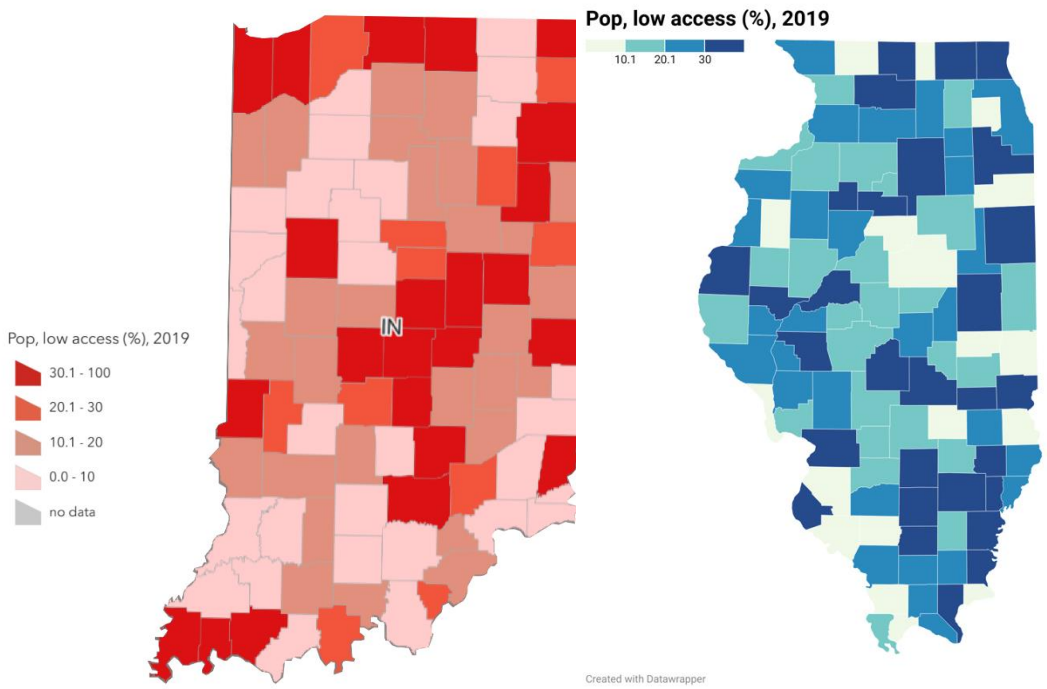
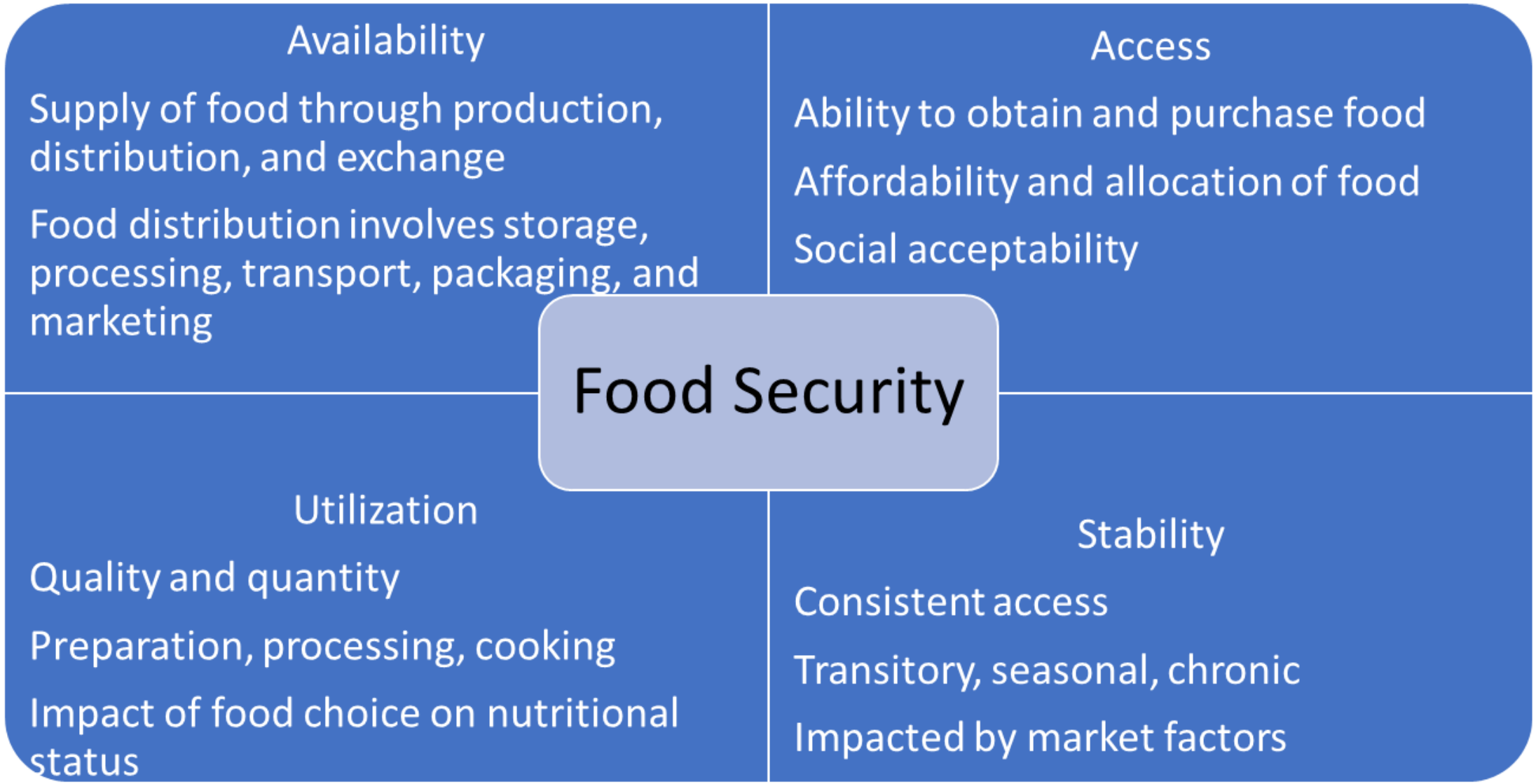
- At Purdue since 2015
- Associate Professor in Agricultural Economics
- PhD 2015 from the University of Minnesota
- Research interests are in the economics of food, health, and nutrition.

Why Food Access in Rural Areas Matters

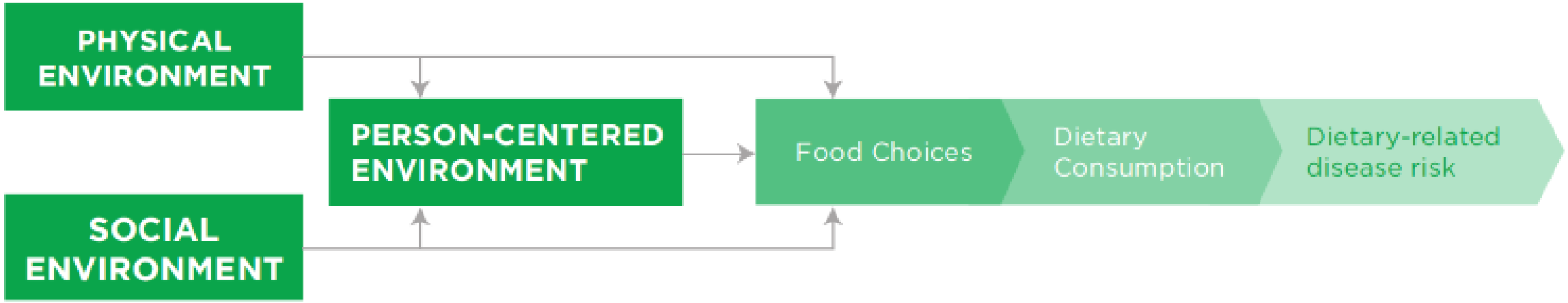


Food access map of IL and IL and IN (USDA Food Access Atlas)

- Ensuring access to nutritious food is essential for reducing food insecurity and chronic disease risks
- Rural populations often face limited food retail options and longer travel distances
- Expanding access through digital and online food resources offers new opportunities.


Availability
Supply of food through production, distribution, and exchange
Food distribution involves storage, processing, transport, packaging, and marketing
Access
Ability to obtain and purchase food
Affordability and allocation of food
Social acceptability
Food Security
Utilization
Quality and quantity
Preparation, processing, cooking
Impact of food choice on nutritional status
Stability
Consistent access
Transitory, seasonal, chronic
Impacted by market factors

Conceptual Model of Environment Factors Related to Dietary Disease Risk



Lytle, L. Myers, A. Measures Registry User Guide: Food Environment. Washington (DC): National Collaborative on Childhood Obesity Research, January 2017. http://nccor.org/tools-mruserguides/wp-content/uploads/2017/NCCOR_MR_User_Guide_Food_Environment-FINAL.pdf.

Roadmap

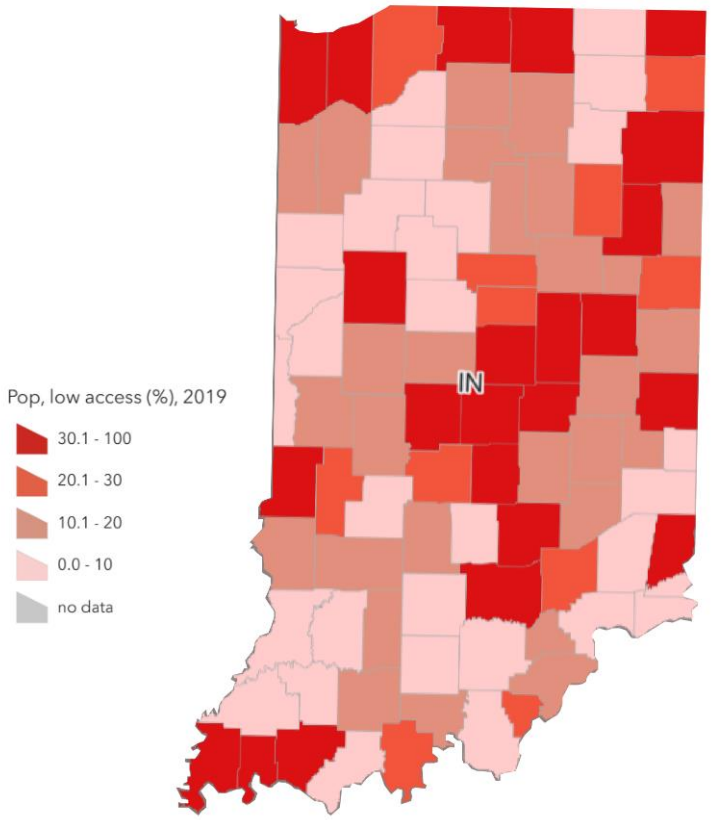
- Barriers and facilitators of improving food access in rural areas
- How community partners can help in improving food access
- Interventions/policies to improve dietary outcomes in rural areas

Barriers and Facilitators to improve food access in rural areas

Funded by: AgHHS One Health Collaborative, Center of Rural and Migrant Health

Food access issues

- Lack of access to affordable, fresh, and healthy food
- Food insecurity rates are high
  - 13.9% in IN, 2022
  - 13.5% in US, 2023
- Can lead to a higher prevalence of diet-related diseases



Food access map of IN (USDA Food Access Atlas)

Using technology to improve food access

Online shopping is now integrated with federal assistance programs (SNAP Online Purchasing Pilot(OPP))

Online SNAP benefit redemption is only 9% of the entire SNAP benefits (USDA-ERS 2024)

Why are SNAP participants not using SNAP OPP?

Beyond Access: Understanding Behavioral and Perceptual Barriers

- Limited digital literacy and confidence (Trude et al., 2024)
- Concerns about product quality and affordability (Gillespie et al., 2022)
- Low awareness of available services
- Trust and usability issues
- This creates a situation where access exists in theory but not in practice for many households that could benefit the most

Using technology to improve food access

SNAP participation is higher in rural areas (16% of the households) (DeWitt 2020)

Needs assessment survey of rural low-income households (Indiana):

- 74% have never shopped online
- Only 21% of SNAP participants have used SNAP benefits online

Understand the barriers and facilitators to use of online shopping

Work with community stakeholders (food pantry directors, healthcare providers) and government officials for environmental assessment

Work with extension educators (EFNEP)

1) develop awareness/educate about privacy/security measures
2) Use of online shopping for healthy foods.

Using technology to improve food access

SNAP participation is higher in rural areas (16% of the households) (DeWitt 2020)

Needs assessment survey of rural low-income households (Indiana):

- 87% internet access
- 94% cellphone
- 85% familiarity with computers
- 60% considered technology is unsafe (security/privacy)

Understand the barriers and facilitators to use of online shopping

Work with community stakeholders (food pantry directors, healthcare providers) and government officials for environmental assessment

Work with extension educators (EFNEP)

1) develop awareness/educate about privacy/security measures
2) Use of online shopping for healthy foods.

National Survey on Technology and Food Acquisition

- Participants: Older adults living in rural counties across the U.S.
- Focus areas:
    - Attitudes/Perceptions toward online grocery shopping
    - Confidence in using digital tools
    - Awareness of online food resources

Issues faced

- Transportation barriers
- Overcome dependency on caregivers
- Can help with specific diet requirements

National survey of older adults

- 61% never purchased groceries online
- 53% of SNAP participants have never used their benefits online

Work with community stakeholders (food pantry directors, healthcare providers) and government officials for environmental assessment

Understand the barriers and facilitators to use of online shopping

Work with extension educators (EFNEP) and community stakeholders

1) develop awareness/educate about privacy/security measures
2) Use of online shopping to meet their nutrition needs

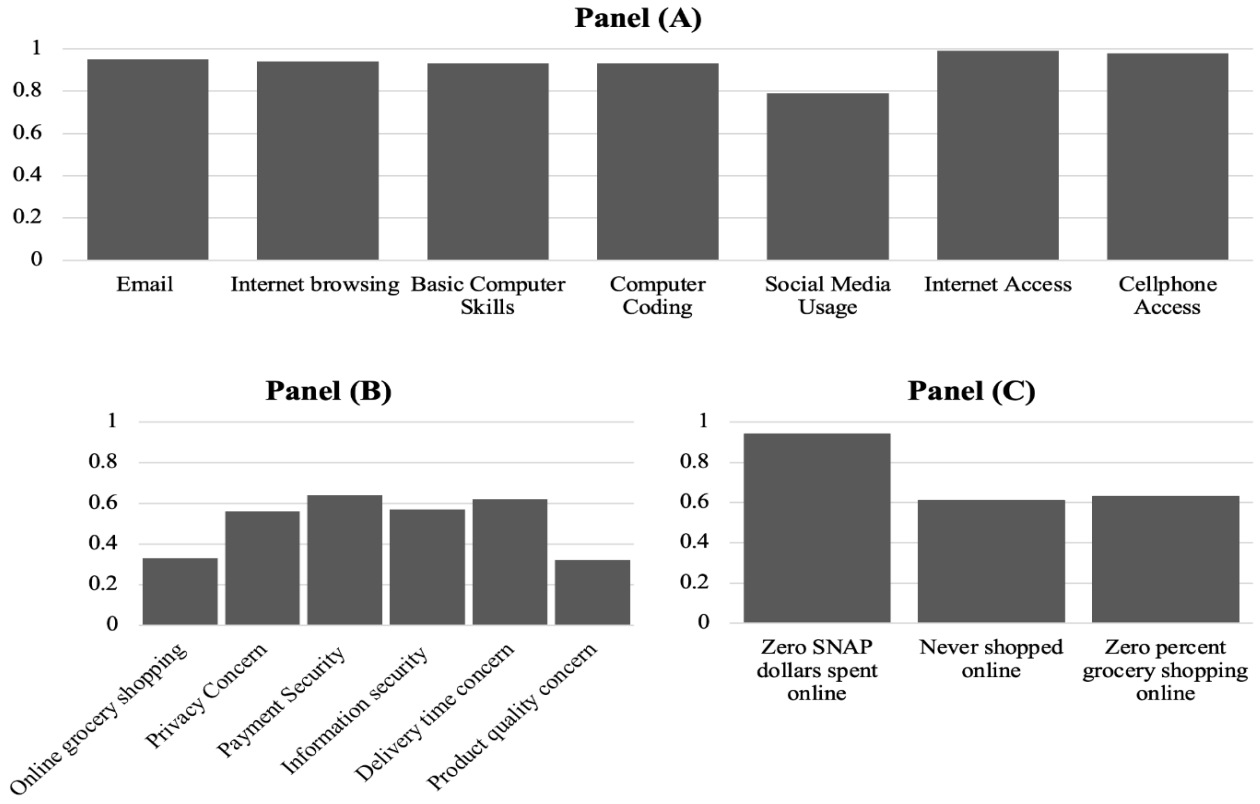


Figure: Rural older adults' knowledge, perception, and attitude toward online food access

Online Food Access Project

- Goal: Identify barriers and facilitators to online grocery shopping among low-income rural residents.
- Study Areas: Indiana, Illinois, and Texas.

- Improving access to food and nutrition in the rural low-income population
    - Working with Nutrition Education Program educators and community stakeholders
    - Conduct food and retail environment assessment in rural counties in Indiana, Illinois, and Texas (e.g., type of stores, services provided, % SNAP-authorized)
    - Working with food pantries, churches, and other charitable organizations to provide nutrition education programming

The Need to Understand Behavioral Determinants

- Existing research focuses mainly on physical and logistical barriers.
- Less attention on perceptions, attitudes, and user experiences.
- Digital innovations can only succeed if behavioral barriers are addressed.

Partners in Produce Project

Research is funded by NCRCRD

Partners in Produce Project

- Partnership between Illinois Supplemental Nutrition Assistance Program- Education (SNAP-Ed), the Arthur Produce Auction, Feeding Illinois, and food pantries in Moultrie, Douglass, Coles, Cumberland, and Shelby counties

- Process:
  - Produce is purchased at a reduced cost or donated
  - Food is distributed to food pantries in East Central Illinois

- Initial Impact:
  - In 2019, 25,285 pounds of produce was distributed; 24,000 pounds in 2020
  - Eastern Illinois University joined these efforts in 2021 to identify opportunities to expand the reach of this programs

Partners in Produce Project- Opportunities to Expand Reach

2020-2023

1. Distribution of Produce
2. Development of Marketing Materials
3. Data Tracking and Collection

2024-2025

4. Coalition Building
5. Sustainability Planning

Partners in Produce Project- Funding Sources

- Illinois Innovation Network
- Lumpkin Foundation
- Feeding Illinois (Central and Eastern IL Food Banks) – for donations to member pantries
- Illinois Farm Bureau
- Purdue North Central Region Center for Rural Development
- Local community members

Partners in Produce Project- Distribution Expansion

Expanded Food Distribution

- 64,000 pounds of produce was distributed in 2021 to 40+ food pantries and service organizations
- 54,990 pounds of produce was distributed in 2022 to 34 food pantries and service organizations
  - 27.5% donated by vendors
- 100,000 pounds of produce distributed in 2023 to 40 organizations
- 122,000 pounds of produce distributed in 2024 to 40 organizations
  - 13.5% donated by vendors
- 59,500 pounds of produce distributed in 2025

Partners in Produce Project- Sustainability Plan

1. Development of a food pantry coalition

2. Produce pick-up and distribution plan

3. Data tracking procedures

4. Process evaluation of sustainability plan implementation

Partners in Produce Project

Left: Susan Stoddard and Mary Beth Massey of Illinois Extension at the Arthur Produce Auction. Right: People waiting to bid on produce at the Arthur Produce Auction.

Nutrition Information and Food Choices Among Food Pantry Clients

Katare, B., Echols, B., Plakias, Z., Nayaga Jr., Rodolfo M., **Hodge, K.L.**.(2025). A Food Pantry Nutrition Education Program RCT: Food Choices and Diet-Quality. *American Journal of Health Promotion*, Jan 27:8901171251316370. doi: 10.1177/08901171251316370

Consumer Education

Knowledge about the nutritional content of food products can be an important factor in the promotion of healthy diets (Rustad and Smith 2013; Brown et al. 2014).

Point-of-purchase labels, which provide product nutrition information to consumers, are often implemented in nutrition programs as a strategy to improve public health (Zhen and Zheng 2019).

Rating Systems

Rating systems provide a visual to quickly inform consumers about the packaged food products

Guiding Star Rating System: uses 0, 1, 2, and 3 stars to indicate the nutritional value of food items

Evidence is mixed on the effects of these on consumer food choices

Methods

- Randomized nutrition education intervention was conducted over six weeks in a food pantry

- All adults were eligible

- In the waiting area, informed consent was conducted, and clients were randomized to either the intervention or control group

- Measures: Proportion of 0, 1, 2, and 3-star items selected; adapted Health Index measure to estimate nutritional quality; participant demographics

Partners in Produce Project- Analysis

- $y\_i=\beta\_0+\beta\_1\ Treatment\_i+\boldsymbol{B\_2\ X\_i}+u\_i$

- $\boldsymbol{y\_i}$= proportion of 0, 1, 2, or 3-star items selected.

- Treatment: Intervention or control

- $\boldsymbol{X\_i}$ = demographic control variables (age, race, gender, employment status, marital status, number of children, number of adults in the household, fixed day effect for conditions that affect all food pantry clients on a given day e.g. long wait times).

Participant Characteristics	All	Treatment	Control
Female	0.60	0.61	0.58
	(0.49)	(0.48)	(0.049)
Age	42.66	42.88	42.45
	(13.37)	(13.98)	(12.78)
Married or in a relationship	0.25	0.25	0.26
	(0.44)	(0.43)	(0.44)
Education less than high school	0.55	0.57	0.54
	(0.50)	(0.49)	(0.49)
Number of adults in the household	2.28	2.32	2.24
	(1.21)	(1.20)	(1.22)
Number of children in the household	1.18	1.26	1.11
	(1.47)	(1.63)	(1.30)
Employed	0.42	0.41	0.42
	(0.49)	(0.49)	(0.49)
Race = White	0.61	0.60	0.63
	(0.48)	(0.48)	(0.48)
Race = Black	0.17	0.19	0.15
	(0.37)	(0.39)	(0.36)
Race = Others	0.20	0.19	0.21
	(0.40)	(0.39)	(0.41)
N	**613**	**302**	**311**

Note: Mean proportions (SD) presented for each characteristic. No significant differences were noted between treatment and control groups.

Effect of Information on Food Choice

	Zero-Star Items	One-Star Items	Two-Star Items	Three-Star Items
All N=613				
Treatment	-0.021**	-0.001	0.014	0.008
	(0.010)	(0.006)	(0.010)	(0.010)
Female N=366				
Treatment	-0.012	-0.006	0.014	0.003
	(0.013)	(0.008)	(0.013)	(0.014)
Male N=247				
Treatment	-0.034**	0.003	0.010	0.019
	(0.016)	(0.009)	(0.016)	(0.018)

Notes: Models adjusted for participant demographics and site conditions. Standard errors in parentheses are corrected for heteroscedasticity. *p<0.10.**p<0.05.***p<0.01.

Food Pantry: Discussion

- This paper investigates the effectiveness of a low-cost nutrition information treatment in a food pantry environment.
- Results suggest that an information-based intervention alone is unlikely to change the consumer preferences, but it might have greater impact in subsegments of the population
- There was a small decrease in the purchase of lower nutrition-rated food items and a small increase in higher nutrition-rated food items.
- Limitations include assumptions that the information provided was considered during product selection, lack of generalizability of results, potential internal threats to validity

Advancing Food Access Through Collaborative, Structural Solutions

- Food access barriers are multifaceted. Beyond educational gaps, challenges may include
  - Technological limitations
  - Financial constraints
  - Logistical barriers limiting access to online food resources

- Commitment to collaborative approaches. We are working with community stakeholders and Extension to develop comprehensive, holistic strategies to improve food access.

Advancing Food Access Through Collaborative, Structural Solutions

- Long-term goal: Co-create tailored, multi-faceted interventions that reduce structural and socioeconomic barriers to online grocery shopping.
  - Example: The Southern Illinois Food Access Advisory Board is exploring opportunities such as
    - Expanding a distribution warehouse
    - Facilitating online grocery delivery
    - Reducing costs for local stores

Thank you.