

The Effects of a Community- and Clinical-Based Fruit and Vegetable Prescription Program (FVRx)[®] with Expanded Nutrition Education for Low-income Individuals

Nicholas Slagel, PhD¹; Taylor Newman, PhD¹, RDN; Laurel Sanville, MS, RDN¹; Jackie Dallas MEd²; Edda Cotto-Rivera, MPH, CHES¹; Jessie Moore, MS²; Alexis Roberts MPH,RDN,LD²; Jung Sun Lee PhD, RDN¹

¹ Department of Foods and Nutrition, University of Georgia, Athens, GA; ² Cooperative Extension, University of Georgia, Athens, GA

BACKGROUND

- Food insecurity is associated with reduced diet quality and chronic disease management¹
- Typically, FVRx programs provide food insecure patients with clinic provider generated produce prescriptions for free and fresh local produce and nutrition education
- The 2017 Pilot Athens FVRx Program demonstrated produce prescription combined with culturally tailored nutrition education improved multiple behaviors supportive of the purchase and consumption of locally grown fruits and vegetables²
- However, changes in food security and health outcomes were limited when compared to a control group
- Financial and food resource management skills are associated with food security behaviors and outcomes^{3,4}
- To improve food security outcomes the 2018 Athens FVRx Intervention expanded from one SNAP-Ed curriculum (2017) to two SNAP-Ed programs and one financial literacy program in community and clinic settings

STUDY OBJECTIVE

- To examine the effects of an FVRx program with expanded nutrition education and financial literacy education on nutrition and clinical outcomes in low-income adults.

METHODS: STUDY DESIGN

- **Non-randomized controlled trial (Figure 1)**
- **Intervention:** Six-month FVRx program
 - Produce prescription: Redeem \$1/day per household member per week at Athens Farmers Market
 - Nutrition education program: Two University of Georgia SNAP-Ed Direct Education Curricula
 - Financial literacy program: University of Georgia Extension Services
 - Health Screening: Clinical lab and biometric assessments by the Athens Nurses Clinic
- **Study Sample and Recruitment**
 - Eligibility: 1) >18 years and older, 2) SNAP-eligible or food insecure, and 3) one or more diet-related chronic conditions (i.e., overweight and obesity, diabetes, pre-diabetes, hypertension, and hyperlipidemia)
 - Intervention (FVRx) group: Purposive sampling at one safety-net clinic, and two community partner implementation sites
 - Control group: Purposive sampling at partnering safety-net clinic site following FVRx intervention enrollment
 - Ad-Hoc Nutrition Education group: Convenience sampling at UGA SNAP-Ed direct nutrition education programming in Bartow and Gilmer counties.

METHODS: DATA ANALYSIS

- Descriptive analyses were conducted for participant characteristics,
- To compare the differences between or within intervention and comparison groups, one-way ANOVA (continuous variables) and chi square test or Fisher's Exact test (categorical variables) were used
- IBM SPSS Statistics for Windows (Version 24, Armonk, NY: IBM Corp.)
- P values were set at < 0.05 (Indicated by *)

Figure 1. The 2018 Athens FVRx Study Design

Timeline	Group			Intervention Components
	FVRx	Nutrition Education only	Control	
June	A,D,E,F	A or B,E	E,F	A- UGA SNAP-Ed 'Food Talk' (6 weekly classes)
July	A,D,E			B- UGA SNAP-Ed 'Food Talk: Better U' (4 weekly classes)
August	B,D,E			C- UGA Extension Financial Literacy (4 monthly classes)
September	C,D,E			D- Produce Prescription (\$1/day/family member)
October	C,D,E			E- Biometrics (BMI, Blood Pressure)
November	C,D,E,F	E	E,F	F- Clinical Lab Assessments (HbA1c, Lipids)

Table 1. Study Measures

Self-reported	
Fruit and Vegetable Intake	• Fruit and Vegetable (FV) Intake: 6-Item FFQ
Food Security	• Validated modified 6-item USDA Household Food Security Survey Module
Food Purchasing Practices, Attitudes, and Nutrition Knowledge	• Food purchasing practices tested in the Athens Pilot FVRx Program ² (primary food and FV purchasing locations and frequency, money/EBT spent) • Local food purchasing attitudes and knowledge developed by Wholesome Wave Georgia • Nutrition knowledge and behavior measures included in the SNAP-Ed Evaluation Framework
Food and Financial Resource Management Behaviors	• Change in food resource management practices included in the SNAP-Ed Evaluation Framework • Ability to afford non-food items (household essentials, pet food, cleaning supplies, etc.) • Ability to afford more bills (utility, phone, and gas) than usual last month
Measured or Abstracted	
Clinical Lab Assessments	• Hemoglobin A1c (HbA1c) • Lipid Panel (LDL, HDL, Triglycerides and Total Cholesterol)
Biometrics	• Anthropometrics (Height, Weight) • Blood Pressure

Table 2. Study Measures Assessment Timeline

Measures	Month 1: Pre	Month 2	Month 3	Month 4	Month 5	Month 6: Post
Fruit and vegetable Intake	■	■	■	■	■	■
Food Purchasing Practices, Attitudes, Knowledge	■	■	■	■	■	■
Financial and Food Resources	■	■	■	■	■	■
Food insecurity	■	■	■	■	■	■
Biometrics	■	■	■	■	■	■
Clinical Biomarkers	■	■	■	■	■	■

■ All Groups ■ Intervention Group ■ Intervention and Control Group

RESULTS

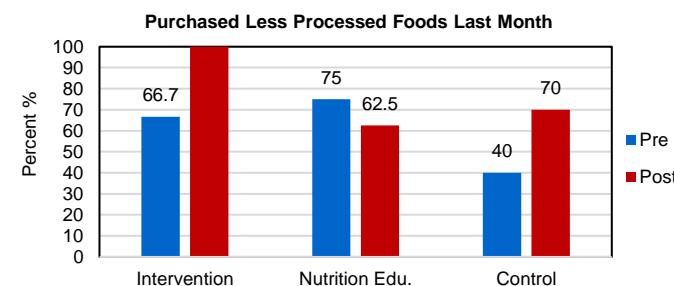
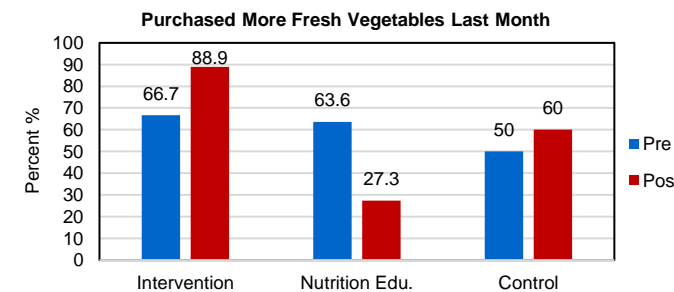
Participant Characteristics (Table 3)

- A final enrollment of each group included: FVRx (31), NE (10), and Control (16). The final analytic sample (n=36) were (54.5 ± 12.6) years, female (90.0%), food insecure (58.3%), and uninsured (69.4%).

Table 3. Participant Characteristics

Characteristic	Intervention (n=18)	Nutrition Education (n=8)	Control (n=10)
Age in years* M (SD)	49.28 ± 9.79	67.38 ± 11.66	50.90 ± 8.90
Hispanic ethnicity* n (%)	10 (55.6%)	0	0
Receiving federal assistance n (%)	10 (55.6%)	2 (25.0%)	5 (50.0%)
Uninsured* n (%)	14 (77.8%)	1 (12.5%)	10 (100.0%)
Food Insecure n (%)	11 (61.1%)	4 (50.0%)	6 (60.0%)
BMI (kg/m ²) M (SD)	36.80 ± 9.78	32.88 ± 12.17	37.54 ± 7.86

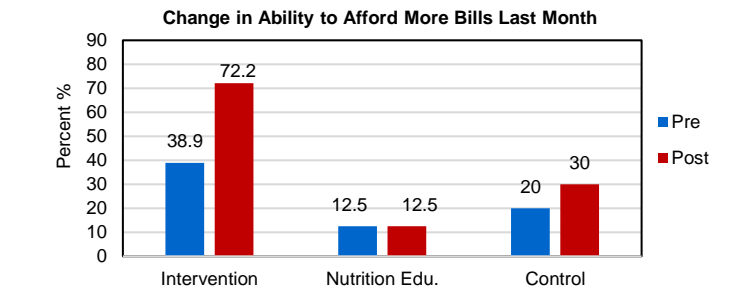
- **Fruit and Vegetable Intake:** FVRx participants significantly increased the frequency of consuming vegetables (once a day-once a week) by 22.2%, especially 'Dark Green' vegetables (P<0.05)
- **Food Security:** The FVRx Intervention group significantly increased (33%) self-reported food security (p<0.05), however this did not remain significant against the comparison groups
- **Food Purchasing Practices, Attitudes, and Knowledge**
 - FVRx group significantly increased the purchase, preference and knowledge of local and seasonal fruits and vegetables, purchased more fresh vegetables, and purchased majority of fruits and vegetables at the Farmer's Market (all p<0.05)
 - FVRx group significantly increased frequency of reading nutrition facts label and purchasing less processed foods compared to the comparison groups (p<0.05)



RESULTS, CONT'D

Financial and Food Resource Management

- FVRx participants were significantly more likely (33%) to afford more bills compared to comparison groups (p<0.05)
- No significant differences in the frequency of 'comparing prices before buying food' or 'adjusting meals to include more budget-friendly items' were observed



- **Clinical Assessments:** FVRx group significantly improved HDL cholesterol compared to the Control group following the intervention period (3.83 ± 3.93 vs. -2.5 ± 7.05, p=0.01). No other significant changes in clinical or biometric outcomes between groups

CONCLUSIONS AND DISCUSSION

- Produce prescription combined with nutrition and financial literacy education improved financial resources, nutrition knowledge and healthy food purchasing practices as key determinants of food security and diet quality
- Produce prescription and incentive programs using local food systems should consider use of nutrition education to support and enhance participant outcomes
- Although our study design and sampling limited comparability across groups, use of ad-hoc Nutrition Education group expand and strengthen outcome findings
- Future research should consider intervention, study design, and sampling strategies to improve health outcomes for specific chronic disease processes

REFERENCES

1. Laraia BA. Food Insecurity and Chronic Disease. *Advances in Nutrition*. 03/06 2013;4(2):203-212. doi:10.3945/an.112.003277
2. Slagel N, Newman T, Sanville L, et al. The effects of a Fruit and Vegetable Prescription program (FVRx) for low-income individuals on fruit and vegetable intake and food purchasing practices. *J Nutr Educ Behav*, 50(7S). 2018:S103-S103
3. Kaiser L, Chaidez V, Algert S, et al. Food Resource Management Education With SNAP Participation Improves Food Security. *Journal of nutrition education and behavior*. 2015/07/01/ 2015;47(4):374-378.e1. doi:https://doi.org/10.1016/j.jneb.2015.01.012
4. Gundersen, C. G., Garasky, S.B. (2012). Financial management skills are associated with food insecurity in a sample of households with children in the United States. *J Nutr*, 142(10), 1865-1870. doi:10.3945/jn.112.162214

ACKNOWLEDGEMENTS

- Athens FVRx Partners, UGA SNAP-Ed team, UGA Cooperative Extension Service Partners, and our research participants
- Funding: USDA SNAP-Ed, Wholesome Wave Georgia, Piedmont Healthcare, UGA Office of Sustainability
- Contact nslagel@uga.edu for questions and comments