Acknowledgments

This report was prepared by the Emory University Evaluation Team for Wholesome Wave Georgia.

Emory Team:

Miranda Cook, MPH
macook2@emory.edu

Amy Webb-Girard, PhD
awebb2@emory.edu

Wholesome Wave Georgia Team and FVRx Program Contributors:

Rachael Ward, MPH
Director of Programs
Wholesome Wave Georgia

Tori Mister
FVRx Intern
Wholesome Wave Georgia
Program Description

Wholesome Wave Georgia’s Fruit and Vegetable Prescription Program (FVRx) for the year 2017 was conducted across 6 primary care clinics serving low-income communities in Atlanta, Athens, and Augusta, GA. Participants were eligible based on chronic disease risk factors and low income level. Over six months, patients received fruit and vegetable vouchers worth $1 per family member per day, redeemable at a local food retail site, as well as nutrition education, cooking classes, and, for some sites, group exercise classes.

This evaluation report contains information for the Athens site only.

Data Collection

Participants completed surveys at baseline and post-intervention to assess demographic characteristics, food security, knowledge of factors related to fruits and vegetables, importance of factors when purchasing fruits and vegetables, difficulties involved in purchasing and consuming produce, as well as fruit and vegetable consumption. At monthly visits, all sites collected information on both fruit and vegetable consumption as well as BMI, and blood pressure. The Athens site collected additional information on waist circumference.

Statistical Methods

Descriptive statistics (e.g., means, frequencies, cross-tabulations) were used to document program implementation, to assess baseline characteristics of FVRx program participants, and to describe any changes in key outcomes, such as frequency of shopping at farmers’ markets, fruit and vegetable consumption, and body weight, from pre-test to post-test. Paired t-tests were used to test the significance of change in measurements for continuous outcomes including knowledge, importance, fruit consumption, and vegetable consumption outcomes. Longitudinal approaches were used to analyze measurements collected on a monthly basis. Mixed models were used to create unadjusted and adjusted models with both fixed and random effects to control for variations across site and for the confounding presented by participant education and household size. Model specification was determined using the backwards elimination technique.
Demographics

The 2017 FVRx Athens site reached a total of 22 households with a 91% rate of retention overall. Additionally, the Athens food incentives totaled at $10,710. The 2017 FVRx cohort at the Athens site represents a largely underserved population with 79% reporting a household income less than $25,000 annually and 62% receiving some form of public assistance. Over 80% of participants did not have any form of health insurance and the remainder reported to be insured through Medicaid, Medicare, or other public insurance. Figures 1 - 3 compare the Athens cohort to the overall cohort including all sites combined on key demographic characteristics.
Food Security

Participants were asked questions at baseline and post-intervention about food security indicators for the last 30 days. Participants that did not complete both pre and post surveys were excluded from this analysis. From baseline to the end of the program at the Athens site, the percentage reporting that they cut the size of meals or skipped meals due to financial restraints decreased by 38%, the percentage reporting that they ate less than they felt they should due to financial restraints decreased by 66%, and the percentage reporting that they were hungry because there wasn’t enough money for food decreased by 100%. Additionally the percentage reporting that often food didn’t last and there wasn’t money to buy more did not change from baseline to post-intervention and the percentage reporting that they couldn’t afford a balanced meal decreased by 100% (Figure 4).

At Baseline:

- **50%** cut the size of meals or skipped meals due to financial constraints
- **56%** ate less than they felt they should due to financial restraints
- **13%** were hungry because there wasn’t enough food

Post-Intervention:

- **31%** cut the size of meals or skipped meals due to financial constraints
- **19%** ate less than they felt they should due to financial restraints
- **0%** were hungry because there wasn’t enough food

**Figure 4.** Baseline and Post-Intervention Food Security in the Last 30 Days at the Athens Site
Difficulties Eating Fruits & Vegetables

Participants were asked questions at baseline and post-intervention to better understand barriers to eating fruits and vegetables. All sites asked questions related to difficulty at baseline but only Athens asked these questions at the post-intervention survey. At baseline, 94% of participants reported some form of difficulty and the most common issue reported was cost of produce. At the Athens site, any difficulty reported decreased from 90.5% to 33.3% from baseline to post-intervention, a statistically significant reduction.

Figure 5. Baseline Difficulties Eating Fruits and Vegetables by Site

* Statistically significant
Knowledge & Importance

Participants were asked questions at baseline and post-intervention about their knowledge related to fruits and vegetables. For each topic, participants were asked to specify whether they knew a lot, some, only a little, or none. These responses were then converted into a score ranging from 0 to 3, with 0 indicating no knowledge, 1 indicating a little, 2 indicating some, and 3 indicating the most knowledge, so that average knowledge could be assessed (Table 2). Only participants that completed both baseline and post-intervention surveys are included in Table 2. At the Athens site, knowledge of preparation of fresh fruits and importance of fruits and vegetables in the family’s diet increased significantly. Additionally, participants were asked questions at baseline related to their perceived importance of various factors related to purchasing fruits and vegetables.

Table 1. Change in Knowledge Related to Fruits and Vegetables From Baseline to End of Intervention for the Athens Site

<table>
<thead>
<tr>
<th>Categories of Knowledge</th>
<th>Baseline Average Score</th>
<th>Baseline N</th>
<th>Post-Intervention Avg Score</th>
<th>Post-Intervention N</th>
<th>Mean Change (95% CI)</th>
<th>T Value</th>
<th>T-Test P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of Fruits &amp; Vegetables Grown Locally</td>
<td>1.3</td>
<td>16</td>
<td>1.9</td>
<td>1.8</td>
<td>0.5 (-0.1, 1.1)</td>
<td>1.83</td>
<td>0.0879</td>
</tr>
<tr>
<td>How to Prepare Fresh Fruits &amp; Vegetables</td>
<td>2.0</td>
<td>16</td>
<td>2.5</td>
<td>2.5</td>
<td>0.5 (0.2, 0.8)</td>
<td>3.16</td>
<td>0.0064</td>
</tr>
<tr>
<td>Where to Buy Produce</td>
<td>1.3</td>
<td>15</td>
<td>2.1</td>
<td>2.4</td>
<td>1.1 (0.4, 1.7)</td>
<td>3.38</td>
<td>0.0045</td>
</tr>
<tr>
<td>Importance of Fruits &amp; Vegetables in Family’s Diet</td>
<td>2.1</td>
<td>16</td>
<td>2.8</td>
<td>2.7</td>
<td>0.6 (0.0, 1.1)</td>
<td>2.18</td>
<td>0.0454</td>
</tr>
</tbody>
</table>

*Note: At baseline, participants were asked about knowledge of where to buy locally-grown produce but at post-intervention, participants were asked about knowledge of where to buy all produce.
Knowledge & Importance

For each topic, participants were asked to specify whether it was very important, pretty important, a little important, or not at all important. These responses were then converted into a score ranging from 0 to 3, with 0 indicating that the aspect is not at all important, 1 indicating it is of little importance, 2 indicating it is pretty important, and 3 indicating it is very important, so that average importance could be assessed (Figure 6). Importance scores were not asked at the post-intervention survey for participants at the Athens site so only baseline averages are presented.

Figure 6. Baseline Importance Scores for the Athens site

![Bar chart showing baseline importance scores for the Athens site.](image)
Fruit & Vegetable Consumption Pre & Post Surveys

Participants were asked at baseline and after completion of the program to report average weekly fruit, dark vegetable, and other vegetable consumption as well as shopping frequency and number of meals cooked at home. Only participants who completed both pre- and post-intervention surveys are included in the analysis presented below. At the Athens site, produce shopping frequency significantly increased by 1.4 trips per week. Dark vegetable consumption significantly increased by an average 2.9 cups per week, other vegetable consumption significantly increased by an average 2.5 cups per week, and total vegetable consumption significantly increased by an average 5.3 cups per week (Table 3).

Table 3. Baseline and Post-Intervention Average Reported Weekly Consumption and Participation in Behaviors for the Athens Site

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Baseline average weekly consumption/participation in behavior</th>
<th>Baseline N</th>
<th>Post-intervention average weekly consumption/participation</th>
<th>Post-Intervention N</th>
<th>Mean Change (95% CI)</th>
<th>T Value</th>
<th>T-Test P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit consumption (cups/week)</td>
<td>3.6 (0.9, 6.2)</td>
<td>16</td>
<td>4.8 (2.9, 6.6)</td>
<td>16</td>
<td>1.2 (-2.0, 4.4)</td>
<td>0.80</td>
<td>0.4351</td>
</tr>
<tr>
<td>Dark green vegetable consumption (cups/week)*</td>
<td>2.3 (0.9, 3.8)</td>
<td>15</td>
<td>4.9 (2.2, 7.7)</td>
<td>16</td>
<td>2.9 (1.0, 4.9)</td>
<td>3.23</td>
<td>0.0061</td>
</tr>
<tr>
<td>Other vegetable consumption (cups/week)</td>
<td>1.8 (0.4, 3.2)</td>
<td>16</td>
<td>4.3 (2.4, 6.2)</td>
<td>16</td>
<td>2.5 (0.4, 4.6)</td>
<td>2.53</td>
<td>0.0231</td>
</tr>
<tr>
<td>Total vegetable consumption (cups/week)</td>
<td>4.0 (1.4, 6.5)</td>
<td>16</td>
<td>9.2 (5.4, 13.1)</td>
<td>16</td>
<td>5.3 (2.7, 7.8)</td>
<td>4.39</td>
<td>0.0005</td>
</tr>
<tr>
<td>Produce shopping frequency (weekly)</td>
<td>1.7 (1.0, 2.4)</td>
<td>16</td>
<td>3.1 (2.7, 3.6)</td>
<td>16</td>
<td>1.4 (0.7, 2.2)</td>
<td>4.07</td>
<td>0.001</td>
</tr>
<tr>
<td>Meals cooked at home (weekly)</td>
<td>4.7 (3.3, 6.0)</td>
<td>16</td>
<td>5.8 (4.9, 6.6)</td>
<td>16</td>
<td>1.1 (-0.1, 2.3)</td>
<td>2.00</td>
<td>0.0645</td>
</tr>
</tbody>
</table>
Fruit & Vegetable Consumption Pre & Post Surveys

Figure 7 shows the baseline and post-intervention mean weekly consumption and participation in behaviors for the Athens site.

Figure 7. Baseline and Post-Intervention Average Reported Weekly Consumption and Participation in Behaviors for the Athens Site
Fruit & Vegetable Consumption Monthly Measures

Fruit and vegetable consumption was measured at monthly clinical visits via self-report. Figures 8 & 9 show mean reported fruit and vegetable consumption, respectively, over the course of the program. Only participants with at least three months of data available are included in the analyses presented below. Neither fruit nor vegetable consumption increased significantly over the course of the program for the Athens site. This could be related to small sample size limiting the statistical power to detect differences.

Figure 8. Fruit Consumption (Cups/Week) Reported at Clinical Visits, Measured Monthly

Figure 9. Vegetable Consumption (Cups/Week) Reported at Clinical Visits, Measured Monthly
Clinical Outcomes

Health indicators including BMI, waist circumference, and blood pressure were measured monthly at clinic visits. Only participants with at least three months of data are included in the analyses presented below. BMI decreased by 14% at the Athens site from first to last measure and decreased by 6% overall (Figure 10). Waist circumference decreased by 8% at the Athens site from the first to last measure collected and decreased by 4% overall (Figure 11). At the Athens site, systolic blood pressure decreased by 8% and diastolic blood pressure decreased by 7% while overall, systolic blood pressure decreased by 4% and diastolic blood pressure decreased by 4% (Figure 12).

Figure 10. Mean BMI (kg/m²) collected at clinical visits, measured monthly

Figure 11. Mean waist circumference in inches at clinical visits, measured monthly

Figure 12. Mean blood pressure (mmHG) at clinical visits, measured monthly
Clinical Outcomes

At the Athens site, fruit and vegetable consumption, BMI, waist circumference, and blood pressure were collected. Unadjusted results and controlled results are presented below in Table 4. Only participants with at least three months of data available are included in the analyses presented below. Note on interpretation of estimates in Table 4: fruit consumption can be interpreted as having increased an average 0.39 - 0.40 cups per week for every visit completed and vegetables as having increased by an average of 0.01-0.03 cups per week for every visit completed, however this change was not statistically significant. Participant education and household size was controlled for in Model 2 presented, as they were the only significant confounders identified in model selection. Participants across education level and household size distributions had significantly different baseline and post-intervention measures for key measures presented; these differences were controlled for in the statistical models presented in Table 4. Participants at the Athens site experienced significant decreases in diastolic blood pressure. No other clinical outcomes changed statistically significantly over the course of the program. It is likely that the site-specific estimates are statistically underpowered to detect changes in the measures collected, perhaps contributing to the null findings.

Table 4. Baseline Difficulties Eating Fruits and Vegetables by Site

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Observations</th>
<th>Unadjusted Model (95% CI)</th>
<th>Model 2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit consumption, cups per week</td>
<td>131</td>
<td>2.78 (1.11, 4.45)</td>
<td>3.05 (1.35, 4.75)</td>
</tr>
<tr>
<td>Vegetable consumption, cups per week</td>
<td>131</td>
<td>3.67 (1.66, 5.67)</td>
<td>3.89 (1.88, 5.90)</td>
</tr>
<tr>
<td>BMI, kg/m2</td>
<td>122</td>
<td>0.15 (-0.30, 0.59)</td>
<td>0.14 (-0.32, 0.60)</td>
</tr>
<tr>
<td>Systolic blood pressure, mmHg</td>
<td>138</td>
<td>-0.87 (-2.33, 0.58)</td>
<td>-0.65 (-2.07, 0.77)</td>
</tr>
<tr>
<td>Diastolic blood pressure, mmHg</td>
<td>138</td>
<td>-0.36 (-1.47, 0.74)</td>
<td>-0.17 (-1.21, 0.88)</td>
</tr>
<tr>
<td>Heart rate, beats per minute</td>
<td>55</td>
<td>1.05 (-0.58, 2.68)</td>
<td>1.09 (-0.54, 2.73)</td>
</tr>
<tr>
<td>Blood glucose, mg/dL</td>
<td>99</td>
<td>2.18 (-3.11, 7.46)</td>
<td>2.28 (-3.10, 7.65)</td>
</tr>
</tbody>
</table>

* Model 2 controls for participant education