EFNEP
Connecting the Pieces
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The Effect of the Expanded Food and Nutrition Education Program on Participants’ Diet Quality: Does Supermarket Access Matter?

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State Background

Population: 2.966 million

University of Arkansas

Buffalo National River

Ozark Mountains

#1 Rice Producer/Region in U.S.

State Capitol & Location of University of Arkansas Cooperative Extension Service Headquarters

Source: Google Maps
Study Objectives

To assess program effectiveness within the context of the commercial food environment, we ask:

**Does supermarket access impact EFNEP effectiveness?**
What do we mean when we say food environment?

• Connecting the pieces between:
  – Where we choose to shop
  – Where we can shop
  – The decisions we make about the foods we buy
  – The way we eat
  – Health

• How EFNEP fits into these pieces for Arkansas in 2013 and 2014
Guiding Questions for Discussion

• Does access to healthy food impact the education you deliver in your EFNEP program?
• What types of retail food outlets are most prolific in your EFNEP communities?
• How can we adapt EFNEP programming to address food access constraints?
• What additional questions should we be examining?
Previous Research

• We know that graduation from the EFNEP positively impacts HEI.

• Research from public health, geography, and agricultural economics illustrates the growing connection between food environments, access to healthy food, and the decisions we make about what we eat.

• We examine the effect of access to supermarkets on the effectiveness of EFNEP in Arkansas.
Does supermarket access impact EFNEP effectiveness?
Getting Started & Finding Data

• We needed to find out:
  – Where do the EFNEP participants in Arkansas live?
  – How far are they from supermarkets?

• To do this we used:
  – WebNEERS
  – USDA SNAP Retail Locator
  – GIS software

• We define supermarkets as grocery stores with fresh produce departments
Data and Methods: Food Environment

Used data from the 2014 USDA SNAP Retailer Locator to capture the food environment in EFNEP counties.

Commercial food environment classified retail outlets as: supermarkets, convenience stores, dollar stores, specialty stores, farmer’s markets.
Data and Methods: Mapping Participants

Using the WebNEERS database and R, matched participant address with identifying information

— To protect identity of participants translated data points into census block centroids to use as a proxy for participant location

Census Block Centroids: Program Years 2013 & 2014
Census Blocks Reflect the Residential Neighborhood:

• They are the smallest unit of measurement defined by the Census Bureau in terms of geography and population.

• Arkansas has
  – 75 counties
  – 686 census tracts
  – 2,147 census block groups
  – 186,211 blocks
Data and Methods

• Used Healthy Eating Index to assess changes in participant’s diet quality from pre to post
  – Healthy Eating Index = HEI

• HEI is calculated from data collected through diary surveys
  – Entering and exiting survey comparison to determine change

• HEI is calculated as a value between 0 and 100
  – With lesser number representing poor diet quality, the higher the value the healthier the diet
  – Categories include: grains, fruits, vegetables, proteins, oils, SoFAS (solid fats, alcoholic beverages, added sugars)
Data and Methods

• Defining Food Access:
  – Having a supermarket within 1 mile of the census block center point for URBAN participants
  – Having a supermarket within 10 miles of the census block center point for RURAL participants

• These cutoffs are based on existing food desert research

• Measured as a radial distance
Empirical Model

• Outcome variable:
  – Change in Healthy Eating Index

• Explanatory Variables:
  – Complete (completed 8 lessons)
  – Income (dollars, monthly)
  – Education Level (highest grade less than 12\textsuperscript{th})
  – SNAP (receives SNAP benefits)
  – WIC (receives WIC)
  – Race (white, African American, other)
  – Hispanic (yes/no)
  – Gender (male/female)
  – Age (years)
  – Staff (fixed effects for county educators)
Analysis: Using the Model

• We wanted to examine how all those factors played into our outcome measure, the change in HEI.
• The question of interest is whether the effect is different for sample with and without supermarket access.
• We included county-level, educator fixed-effects to control for differences between EFNEP staff.
• We estimated models for three different subsamples:
Who are our EFNEP participants?

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Mean</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HEI at Entry</td>
<td>51.24</td>
</tr>
<tr>
<td>HEI at Exit</td>
<td>56.76</td>
</tr>
<tr>
<td>Change in HEI</td>
<td>5.524</td>
</tr>
<tr>
<td>SNAP recipients</td>
<td>58%</td>
</tr>
<tr>
<td>WIC recipients</td>
<td>34%</td>
</tr>
<tr>
<td>Classified as Urban</td>
<td>83%</td>
</tr>
<tr>
<td>Classified as No Access</td>
<td>48%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean</th>
<th>Race</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td>African American</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
</tr>
<tr>
<td></td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Income ($/mo.)</td>
</tr>
<tr>
<td></td>
<td>Age (yrs.)</td>
</tr>
</tbody>
</table>
Thinking through our sample: *Descriptive Statistics*

- Our sample is:
  - Largely African American
  - Largely urban
  - More than half receive SNAP, almost half receive WIC
  - They begin EFNEP with HEI’s around 51, and after graduating their HEI increases an average of 5 points

- Recall that we pooled program years 2013 and 2014

- “Urban” is a census-defined categorization
### Results: entire population

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>No Access</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-5.322</td>
<td>-5.157</td>
<td>-10.851</td>
</tr>
<tr>
<td>Complete</td>
<td>4.022***</td>
<td>3.407</td>
<td>4.882**</td>
</tr>
<tr>
<td>Income</td>
<td>&lt;0.000</td>
<td>-0.002*</td>
<td>0.002</td>
</tr>
<tr>
<td>Highest Grade Less than 12th</td>
<td>-1.285</td>
<td>0.247</td>
<td>-2.439</td>
</tr>
<tr>
<td>SNAP recipient</td>
<td>1.110</td>
<td>0.568</td>
<td>2.461*</td>
</tr>
<tr>
<td>WIC recipient</td>
<td>-0.678</td>
<td>-1.217</td>
<td>-0.343</td>
</tr>
<tr>
<td>Gender</td>
<td>0.630</td>
<td>0.038</td>
<td>0.068</td>
</tr>
<tr>
<td>Age</td>
<td>-0.092**</td>
<td>-0.088</td>
<td>-0.079</td>
</tr>
<tr>
<td>Number of observations</td>
<td>1209</td>
<td>583</td>
<td>626</td>
</tr>
</tbody>
</table>

*** = p<0.001, **=p<0.01, *=p<0.05
Interpreting Results: entire population

• We see a significant improvement in HEI for students that graduate from EFNEP among the full sample.

• **The graduation effect is even larger among the sample with access to supermarkets.**

• However, there is no significant graduation effect among the sample without access to supermarkets.

• **Conclusion:** *There is evidence that benefits of EFNEP graduation depend on the food environment.*
Results: African American subsample

<table>
<thead>
<tr>
<th></th>
<th>All</th>
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<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-8.491</td>
<td>-9.327</td>
<td>-10.038</td>
</tr>
<tr>
<td>Complete</td>
<td>2.812</td>
<td>-0.056</td>
<td>4.884**</td>
</tr>
<tr>
<td>Income</td>
<td>0.001</td>
<td>-0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Highest Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 12th</td>
<td>-0.212</td>
<td>0.522</td>
<td>-1.322</td>
</tr>
<tr>
<td>SNAP recipient</td>
<td>2.441*</td>
<td>2.442</td>
<td>4.065**</td>
</tr>
<tr>
<td>WIC recipient</td>
<td>-0.826</td>
<td>-2.550</td>
<td>0.564</td>
</tr>
<tr>
<td>Gender</td>
<td>4.426**</td>
<td>5.095</td>
<td>3.097</td>
</tr>
<tr>
<td>Age</td>
<td>-0.067</td>
<td>-0.088</td>
<td>-0.031</td>
</tr>
<tr>
<td>Number of observations</td>
<td>747</td>
<td>339</td>
<td>408</td>
</tr>
</tbody>
</table>
Diving Deeper: African American Subsample

• Among the African American subsample, there is no significant graduation effect except in the sample with access to supermarkets.

• Graduation had no measurable effect among the sample with no access to supermarkets.

• Conclusion: Again, there is evidence that benefits of EFNEP graduation depend on the food environment.
Results: Urban Subsample

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>No Access</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-4.742</td>
<td>-4.679</td>
<td>-14.86</td>
</tr>
<tr>
<td>Complete</td>
<td>3.946**</td>
<td>3.471</td>
<td>5.169**</td>
</tr>
<tr>
<td>Income</td>
<td>0</td>
<td>-0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Highest Grade Less than 12th</td>
<td>-0.592</td>
<td>0.747</td>
<td>-1.601</td>
</tr>
<tr>
<td>SNAP recipient</td>
<td>0.442</td>
<td>0.621</td>
<td>1.252</td>
</tr>
<tr>
<td>WIC recipient</td>
<td>-0.747</td>
<td>-1.548</td>
<td>0.134</td>
</tr>
<tr>
<td>Gender</td>
<td>0.73</td>
<td>0.412</td>
<td>-0.281</td>
</tr>
<tr>
<td>Age</td>
<td>-0.117***</td>
<td>-0.112*</td>
<td>-0.083</td>
</tr>
<tr>
<td>Number of observations</td>
<td>1000</td>
<td>522</td>
<td>478</td>
</tr>
</tbody>
</table>

*** = p<0.001, **=p<0.01, *=p<0.05
Diving Deeper: Urban subsample

- Again, we see a significant improvement in HEI for students that graduate from EFNEP among the urban sample.
- Once again, the graduation effect is even larger among the sample with access to supermarkets.
- Conclusion: Once again, there is evidence that benefits of EFNEP graduation depend on the food environment.
Conclusions

• Graduation from EFNEP should be encouraged.
• But, there is evidence that access to supermarkets matters.
  – We see this in our entire sample, as well as in our African American and urban subsamples.
  – We reached this main conclusion controlling for age, gender, race, ethnicity, educational attainment, income, and access to additional food resources conferred by SNAP and WIC.
  – Interestingly, the control for SNAP was positive across all models and was larger and more significant in models estimated from samples with supermarket access.
Discussion & Areas for Future Research

• How does access to other types of retail food outlets (dollar stores, convenience stores, farmers markets) influence EFNEP effectiveness?

• Are there marketing opportunities to highlight healthy food specials in underserved areas?

• Is there potential to pair EFNEP with outreach programs to increase access to healthy foods?
  – Through supermarkets, co-op models, community supported agriculture, farmers markets

• How would food environment impact EFNEP effectiveness more generally, outside of the context of Arkansas?
Think, pair, share: guiding questions:

• Does access to healthy food impact the education you deliver in your EFNEP program?
• What types of retail food outlets are most prolific in your EFNEP communities?
• How can we adapt EFNEP programming to address food access constraints?
• What additional questions should we be examining?
Questions? Comments?
Thanks for listening!