IMPROVING ACCESS TO FRESH PRODUCE FOR PREDOMINANTLY NON-HISPANIC BLACK NEIGHBORHOODS IN DURHAM COUNTY, NC THROUGH THE MOBILE FARMER'S MARKET COLLABORATIVE PROGRAM

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A Capstone Project submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Public Health in the Public Health Leadership Program, Nutrition, and Health Policy and Management.

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ABSTRACT

Katie Crawford, Hannah Preston, Elizabeth Shin, Stephanie Sperry, Yuhan Tao: IMPROVING ACCESS TO FRESH PRODUCE FOR PREDOMINANTLY NON-HISPANIC BLACK NEIGHBORHOODS IN DURHAM COUNTY, NC THROUGH THE MOBILE FARMER'S MARKET COLLABORATIVE PROGRAM
(Under the direction of [Seema Agrawal, Elizabeth Tomlinson, W. Oscar Fleming])

The infrastructure of a community's physical surroundings and environment dictate their access to fresh, healthy foods. Compared to the North Carolina average of 24%, more than 30% of Durham County residents are burdened by poor grocery store access (Food Security and Nutrition, n.d.). This disparity is reflected in the higher rates of food insecurity and diet-modifiable chronic disease among racial and ethnic minority groups (Durham County, 2021; Osei & Gaillard, 2017). This proposal aims to increase access to fresh produce for residents of primarily non-Hispanic Black neighborhoods through the creation and maintenance of a Mobile Farmer's Market Collaborative, rotating weekly between predominantly non-Hispanic Black neighborhoods, churches, hospitals, and other community locations. The cost of produce available through the Collaborative will be subsidized to address the financial barriers of healthy eating, and cooking demonstrations in conjunction with nutrition education will be provided to foster long-term health maintenance for beneficiaries.

Keywords: Social determinant of health, neighborhood, food access, nutrition education, Durham County, North Carolina

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LIST OF ABBREVIATIONS

BIPOC – Black, Indigenous and People of Color

BMI – Body Mass Index

CDC – Centers for Disease Control and Prevention

CEFS – Center for Environmental Farming Systems

CFPCGP – Community Food Projects Competitive Grant Program

CSOS – Customer Satisfaction and Outcomes Survey

CWS – Community-Wide Survey

DCPH – Durham County Department of Public Health

DINE – Durham's Innovative Nutrition Education

DPS – Durham Public Schools

EBT – Electronic Benefit Transfer

FAO – Food and Agriculture Organization of the United Nations

FVQQ – Fruit and Vegetable Quantity Questionnaire

HOP – High Obesity Program

MFMC – Mobile Farmers Market Collaborative

MM – Mobile Markets

NCGT – North Carolina Growing Together

NCIOM – North Carolina Institute of Medicine

NKQ – Nutrition Knowledge Questionnaire

REACH – Racial and Ethnic Approaches to Community Health

SDOH – Social Determinant of Health

SNAP – Supplemental Nutrition Assistance Program

SPAN – State and Physical Activity Nutrition Program

WIC – Special Supplemental Nutrition Program for Women, Infants, and Children

USDA – United States Department of Agriculture

USDHHS – United States Department of Health and Human Services

COMMON PROPOSAL

Social Determinant of Health Analysis and Goals

The neighborhood and built environment is a social determinant of health which greatly influences one's overall health and wellbeing (United States Department of Health and Human Services (USD HHS), n.d.). The neighborhood and built environment refers to an individual's physical surroundings and environment, including buildings, streets, sidewalks, open spaces, playground, overall infrastructure, and access to resources. This social determinant of health greatly influences food access, which the Food and Agriculture Organization (FAO) defines as, “Access by individuals to adequate resources for acquiring appropriate foods for a nutritious diet” (2006). Where people live, work, and play significantly impacts their overall health and access to food as the neighborhood dictates access to food vendors and other resources, availability of fast-food restaurants, and surrounding communities’ food prices (USD HHS, n.d.). The lack of food access has been associated with multiple chronic health conditions including diabetes, obesity, and heart disease, as well as multiple mental health conditions (National Institute on Minority Health and Health Disparities, 2022).

Food access and availability is a significant issue in Durham County. It is estimated that over 30% of Durham residents have poor grocery store access, which is higher than the North Carolina average of 24% (Food Security and Nutrition, n.d). The food environment score of 8.6 for Durham County, which measures total healthy food retailers in the community along with their typical food options, is also lacking in comparison to North Carolina’s score of 9.7 (Food Security and Nutrition, n.d.). Durham County’s 16.5% food insecurity rate is also higher than the North Carolina state average of 14.6%, and the United States average of 10.2%, as well as surrounding counties of Wake and Orange (Food Bank of Central and Eastern North Carolina, n.d.; United States Department of Agriculture, 2022). Food access issues in Durham County disproportionately affect Black residents, who were more likely than White residents to skip a meal due to a lack of food in the household and to live in areas with a higher proportion of fast-food restaurants (Durham County, 2021). Additionally, 25.1% of Durham’s food insecure residents were Black, while only 9.4% were White (Durham County, 2021). Food access issues offer a partial explanation for higher chronic disease among Black residents (Durham County, 2021; Durham Neighborhood Compass, 2019).

Addressing food access through the neighborhood and built environment shifts the focus and solution strategies from the individual to community. Improving food access in Durham County could lead to lower rates of food insecurity and improved diet quality for Black residents, bettering overall health in the County. Improving food access can also help to improve health outcomes and health conditions, especially among those most affected by diet-modifiable diseases and contribute to improved productivity and economic growth (Ziso et al., 2022). The goal of our proposal is to improve food access and availability in Durham County through collaborative efforts to alter the environment and resources of communities, to in turn, reduce health inequities in the County.

Policy and Programmatic Changes

The proposed program to increase access to fresh foods in Non-Hispanic Black neighborhoods is the Mobile Farmer's Market Collaborative. The Collaborative would bring healthy options to residents in their communities, while also addressing the financial burdens of healthy eating. The Collaborative will create a coalition of nutritious food sources and mobile markets throughout the county and provide funding and resources for mobile produce markets already in place. The Collaborative program will also create a new mobile produce market, specific to Black residents in Durham County. The market will travel weekly to predominantly Black neighborhoods and will also frequently visit other common community locations, including churches and hospitals. The prices of produce at the market will be subsidized to reduce the cost burden of healthy food purchases. Research has shown that when SNAP transactions are accepted at mobile markets, more fruit and vegetable purchases are made by low-income customers (Rummo et. al., 2021). Therefore, EBT, SNAP, and WIC benefits will not only be accepted at the market, but they will be doubled in value to encourage more money to be spent on healthier items. On-site nutrition education and cooking demonstrations will also occur in support of long-term behavior change (County Health Rankings & Roadmaps, 2020). The Collaborative will also hold monthly meetings to discuss the successes and challenges of mobile produce markets in the community, and to offer additional resources for food access for Durham residents.

Mobile produce markets have been found to increase consumption of fruits and vegetables and improve access to healthier foods in under-resourced neighborhoods (County Health Rankings & Roadmaps, 2020; Hsiao et al., 2019). Therefore, these markets can contribute to improved health outcomes and reduce health disparities associated with poor nutritional habits (County Health Rankings & Roadmaps, 2020). Mobile markets can also work to strengthen the food system and support local farmers and agriculture (Delivering Community Benefit, 2018).

Previously implemented food market programs have demonstrated sustainability, meaning they have improved fresh food access in the community while remaining financially viable (United States Department of Agriculture (USDA), 2018).

Budget

Staffing Costs

We assume that the program will require two full time employees and nine part time employees. All part-time employees will be paid a living wage of $15 per hour. Full time employees will be paid a salary, instead of a contract. The budget accounts for fringe benefits and indirect staffing costs at a rate of 30%, as well as an additional 2% annual increase in salary. Part time employees will be expected to work zero to 30 hours per week and full-time employees are expected to work 40 hours per week. We assume a half FTE for the Coordinator and Director for the first two years, as well as FTE for our drivers and market. staff. The nine part-time employees will be needed to staff three market trucks, each with one driver and two workers. Volunteer support may also be needed but is not included in staffing costs.

Income and Revenue

There are five federally funded grants that this program would be eligible for. These grants range from one year to three years offering various amounts based on scope and need. While we assume that the Durham County Commission would apply for grant funding from these sources, the Durham County Commissioners Office would pick which grants are preferred.

Direct Costs

We assume that 50 families will participate in year one of the pilot program. Followed by a 10-family increase for year two (60 families), and an additional 10 for year three (70 families). Having three trucks will support providing program service in rural communities and other communities further from the Durham City center. Based on previous research, we assume an estimated total cost of $400 per family per month. This will cover four weeks of meals for a family for four. We plan to contract with five to ten farmers to account for the produce needs. However, data was not readily available for the cost of these contracts. Therefore, the MFMC Pilot program will include a quarterly workshop with farmers and healthcare providers to resolve this gap in information. We have allocated $200 for food and beverages for each of the workshops.

The largest upfront expense will be the one-time purchase of food trucks, which can range in price from $10,000 to $150,000 with an average cost of $50,000. We estimate spending $150,000 on three trucks. Equipment was budgeted at $1,000 per year, per truck, totaling $36,000 per year and $108,000 over three years.

Indirect Costs

The majority of direct costs are attributed to maintenance and fees for the food trucks. We assume that maintenance for the trucks will be $10,000 per truck annually. In addition, we are assuming gas will be $3,640 per year based on the average food truck mileage for 2020. The costs for additional applications and fees are $78 for all three trucks, and $225 for three yearly mobile food unit applications.

Total Costs

The total cost for this program, are as follows: (Year 1) 25,227, (Year 2) -112,559, (Year 3) -72,876. Total calculations assume that successful receipt of the Community Food Projects Competitive Grant Program. Years 2 and 3 currently show a surplus, but it is important to reiterate that this does not include the yet unknown price of contracts with farmers.

Program/Policy Evaluation

Program success will be evaluated based on a 15% increase in fruit and vegetable consumption (number of servings per day) in predominantly-Black communities in Durham County by May 2025, after two years of implementation. The evaluation plan is modeled after the evidence-based Green Grocer Mobile Farmer's Market program in Allegheny County, Pennsylvania, which demonstrated improved health outcomes in underserved communities by offering accessible healthy food options (Gary-Webb et al., 2018).

The study team will collect data through surveys and focus groups. The survey can be administered via online platforms, in-person, or through mail. A sample of 50 to 100 participants will be recruited through community-based organizations. Prior to interacting with the program, participants will be asked to complete a baseline survey that includes questions on fruit and vegetable consumption, demographic characteristics, health status, and knowledge of nutrition and healthy eating habits. Follow-up surveys will be administered annually to assess for changes in fruit and vegetable consumption following the intervention. Additionally, two focus groups will be held each year to gain insights into the attitudes, beliefs, and behaviors surrounding fruit and vegetable intake in Durham County. Data may be gathered through open-ended survey questions or focus group discussions.

To evaluate the effectiveness of a mobile farmer's market intervention in increasing fruit and vegetable consumption in Durham County, NC, we will assess the number of participants, nutrition education classes held, visits to the mobile market, and the amount of produce purchased. Outcomes will be assessed by measuring changes in fruit and vegetable consumption, expenses, and produce quality. Background data on socioeconomic status, education, transportation options, quality of life and nutrition knowledge will also be evaluated. The Fruit and Vegetable Quantity Questionnaire (FVQQ) and Nutrition Knowledge Questionnaire (NKQ) will be used to gather data and assess changes. The information obtained will inform future policies and interventions by providing insights into the intervention's impact on different population subgroups. Progress will be defined as a statistically significant increase in the consumption of fruits and vegetables in terms of quality, quantity, and variety, as well as an increase in knowledge of nutrition and healthy eating habits. In the event that progress is not observed, follow-up actions may involve engaging with stakeholders, such as public health officials, to identify barriers to participation or better understand the needs of the target population.

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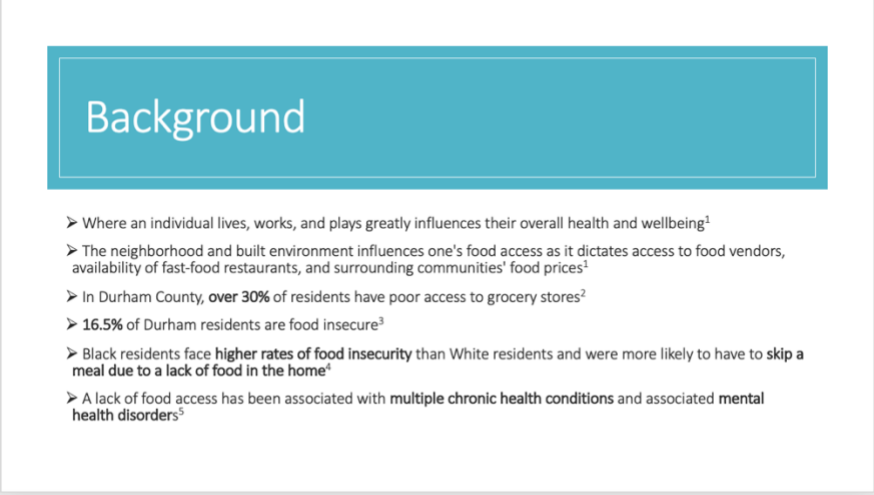
APPENDIX A: GROUP DELIVERABLES

Appendix A.1: Soft Systems Analysis - Rich Picture

Figure 1. Soft Systems Analysis – Rich Picture

Appendix A.2: Neighborhood and Built Environment Team Presentation

Katie: Hello Durham County Commissioners. Thank you for joining us today. Hannah, Elizabeth, Stephanie, Yuhan, and I will be discussing our plan to improve food access in predominantly Non-Hispanic Black neighborhoods in Durham County. The Mobile Farmer's Market Collaborative is our chosen program to address the issue of food access through upstream determinants of health such as the neighborhood and built environment.



Katie: Social determinants of health are defined as the conditions in the environment where people are born, live, and play that affect their health and quality of life. Healthy People 2030 is focused on improving the health and safety in these places where an individuals spends time to improve their overall health. The neighborhood and built environment is a social determinant of health that needs to be prioritized as it greatly influences one's food access which has been defined as access by individuals to adequate resources for acquiring appropriate foods for a nutritious diet. Where people live, work, and play significantly impacts their overall health and access to food as the neighborhood dictates access to food vendors and other resources, availability of fast-food restaurants, and surrounding communities' food prices. The lack of food access has been associated with multiple chronic health conditions including diabetes, obesity, and heart disease, as well as multiple mental health conditions. In Durham County specifically, food access is a major issue as It is estimated that over 30% of Durham residents have poor grocery store access, which is higher than the North Carolina average of 24%. Durham County's 16.5% food insecurity rate is also higher than the North Carolina and United States averages as well as surrounding counties of Wake and Orange. Additionally, food access issues in Durham County disproportionately affect Black residents who were more likely than White residents to skip a meal due to a lack of food in the household and to live in areas with a higher proportion of fast-food restaurants. In addition, 25.1% of Durham's food insecure residents were Black,

while only 9.4% were White. Food access issues may offer a partial explanation for higher chronic disease among Black residents. Improving food access in Durham County could lead to lower rates of food insecurity and improved diet quality for Black residents, bettering overall health in the County while improving productivity and economic growth. By addressing food access through the neighborhood and built environment, the focus and solution strategies shift from the individual to the community.

Mobile Farmer's Market Collaborative

- Mobile produce markets increase fruit and vegetable consumption[6]
- Coalition of nutritious food sources and mobile markets throughout Durham County
- Bring fresh food options directly to predominantly Black neighborhoods and community locations on a rotating schedule
- Financial support: doubling value of food assistance program benefits
- Monthly Collaborative meetings to discuss program and provide additional resources

Stephanie: Mobile produce markets have proven to be effective at increasing the consumption of fruits and vegetables by improving access to healthy foods (Hsiao et al., 2019). Our proposed Mobile Farmer's Market Collaborative will create a coalition of nutritious food sources and mobile markets throughout Durham County as well as provide funding and resources for existing mobile produce markets. The Collaborative aims to bring fresh food options to residents in their home communities, utilizing a dedicated mobile market rotating between predominantly Black neighborhoods, and locations such as community centers, churches, and hospitals. To address some of the financial burdens of healthy eating, the price of produce will be subsidized and made more accessible to low-income individuals by doubling the value of food assistance benefits. The Collaborative will also plan to hold monthly townhall meetings to receive feedback from the community and provide additional food access resources to Durham County residents.

Nutrition Program

- Cooking demonstrations[7]
- Nutrition education[7]

The program aims to:

- Improve health outcomes[7]
- Reduce health disparities[7]
- Strengthen the food system[8]
- Support local farmers and agriculture[8]
- Sustainability

Elizabeth: The program is modeled after the evidence-based Green Grocer Mobile Farmer's Market program in Allegheny (Al-uh-gain-ee) County, Pennsylvania, which demonstrated improved health outcomes in underserved communities by offering accessible healthy food options (Gary-Webb et al., 2018). The Collaborative will provide on-site cooking demonstrations and nutrition education to promote long-term growth and behavior changes (County Health Rankings & Roadmaps, 2020). The program aims to improve health outcomes and reduce health disparities associated with poor nutritional habits (County Health Rankings & Roadmaps, 2020). It also aims to strengthen the food system and support local farmers and agriculture (Delivering Community Benefit, 2018), while maintaining sustainability.

Hannah:

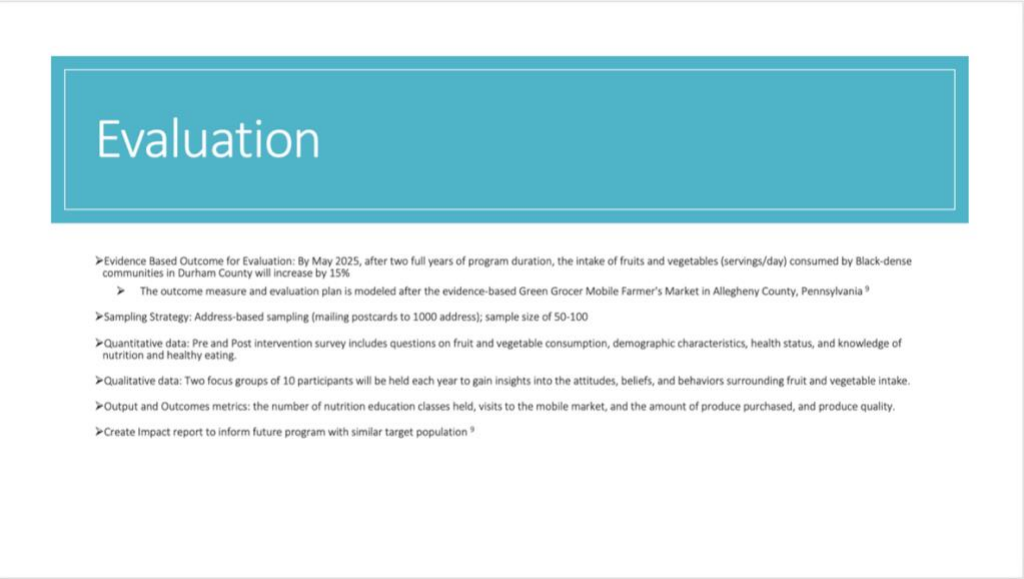
Script- Assumptions: There are various assumptions included within the mobile markets budget. This budget does not account for the price of the partnership between farmers and our program. Upon researching, data was not available to portray an estimated cost of this portion of the program. Additionally, we are assuming that this program will work with 50 families in year 1, 60 in year 2, and 70 in year 3. And 3 food trucks total.

Estimated Total Price: The total price for year 1 an estimated $225 thousand , Y2 $87 thousand Y3 $127 thousand The assumption for the total cost was found by taking the total costs of Direct Costs, Indirect Costs, Income/Revenue and Staffing costs.

Employees: We assume that there are two full-time employees and nine part-time employees. All employees will be paid a living wage. Part-time employees will be paid $15 per hour and full-time employees will be paid a salary, instead of a contract. We are assuming a .5 FTE for our Coordinator and Director for the first two years, as well as FTE for our drivers and market staff.

Prices: We are assuming that 50 families will participate in year one of the pilot program. Three trucks are needed for 50 families because it allows for our trucks to venture to rural communities and other communities further from Durham City center. Based on previous research, we are assuming an estimated total of $400 per family per month. This $400 will cover four weeks of meals for a family of four. The Pilot program is going to have a workshop each quarter between farmers and healthcare providers. Funds will be allocated for food and beverages for each of the four workshops per year.

Grants: Based on the classification of this project there are various federal grants that this project is eligible for. These grants range from 1 year to three year grant, and the award ranges from $200 thousand to $600 thousand. The Durham County Commission would be able to choose which grants work best.



Yuhan: Program success will be evaluated based on a 15% increase in the number of servings of fruit and vegetable consumption per day in predominantly-Black communities in Durham County by May 2025, after two years of program implementation. The evaluation plan was modeled after the evidence-based Green Grocer Mobile Farmer's Market in Allegheny County, Pennsylvania, which had shown promising outcomes in improving access to fresh produce and dietary habits among participants. Address-based sampling will be used to recruit residents to complete the survey and participate in the focus groups. Postcards will be mailed to 1,000 addresses within Durham where census tracts over 50% are Black. The same addresses will be contacted again in May 2025 to assess post intervention changes. A targeted sample size would be 50-100 participants. The program will collect both quantitative and qualitative data to gain a comprehensive understanding of the participants' experiences and outcomes. The pre and post-intervention survey is aimed at measuring the change in fruit and vegetable intake over the course of the program, and will also include questions on demographic characteristics, health status, and knowledge of nutrition and healthy eating. The qualitative data will be collected through two focus groups of 10 participants each. They will be held annually to gain insights into the attitudes, beliefs, and behaviors surrounding fruit and vegetable intake, as well as identify barriers and facilitators to healthy eating within the community. In addition, the evaluation team will also track several output and outcome metrics such as the number of nutrition education classes held, visits to the mobile market, the amount of produce purchased and produce quality. At the end of the program, an impact report will be created to inform future programs with a similar target population, outlining the program's successes, challenges, and lessons learned.

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APPENDIX B: KATIE CRAWFORD'S INDIVIDUAL DELIVERABLES

Appendix B.1: Individual Problem Statement

Social Determinant of Health

The social determinants of health are the factors and conditions in one's living and working environments that contribute to their overall health and wellbeing (United States Department of Health and Human Services (USD HHS), n.d.). One of these determinants is one's neighborhood and built environment, which refers to an individual's physical surroundings and environment, including buildings, streets, sidewalks, open spaces, playgrounds, overall infrastructure, and access to resources. Additionally, where one lives also impacts their access and availability to healthy and nutritious foods. The Food and Agriculture Organization (FAO) defines food access as, "Access by individuals to adequate resources for acquiring appropriate foods for a nutritious diet (2006)." The neighborhood affects food access as it determines the stores in which individuals have access to, their transportation options to get to food, availability of fast-food restaurants, and availability of food assistance programs (USD HHS, n.d.)

Food access, impacted by one's built environment and neighborhood, can impact one's overall health and wellbeing. The lack of access and availability of healthy foods has been associated with multiple chronic health conditions including diabetes, obesity, and heart disease (National Institute on Minority Health and Health Disparities, 2022). Additionally, limited food access has also been associated with mental health disorders including depression and anxiety (National Institute on Minority Health and Health Disparities, 2022). In the short term, lack of food access can lead to fatigue, irritability, and inability to concentrate (Raskind et al, 2022). Food insecurity, or a lack of consistent access to food for a healthy life, and a lack of access to food has been correlated with impaired academic performance and a lower GPA (Feeding America, n.d.; Raskind et al, 2022). Similarly, an increased access to fast food restaurants and unhealthy food options increases one's chances for obesity (James et al., 2014).

Geographic and Historical context

Durham County is located in the central portion of North Carolina and is home to over 324,800 residents (Durham County, 2021). Durham is a rapidly growing county as its population has grown over 64% since 2000 (Durham County, 2021). Durham is known for its top-tier medicine and healthcare as it is home to both Duke University and Duke University Hospitals (Durham County, 2021). Prior to the healthcare takeover, Durham was a home for the tobacco and textile industries and was driven by many African American led companies (Durham County, 2021). Diversity is still present in Durham as 36% of their residents are African American, which is a

higher proportion than the state of North Carolina. 42% are White, 13.5% are Hispanic or Latino, 4.9% are Asian, and 0.2% are American Indian (Durham County, 2021). The median age of Durham residents is 35, which is younger than the median ages for North Carolina and the United States (Durham County, 2021). At least 70% of Durham residents have at least some college education and 13.4% of residents live in poverty (Durham County, 2021). Durham is home to over 357 congregations and religious organizations, as faith and spirituality is a large part of Durham's culture (Durham County, 2021). See Appendix B.1b , Table 1 for additional demographics.

Durham County and its residents are aware of certain challenges surrounding the housing and built environment in the county, including the issue of food access. The Durham County Community Health Assessment recommended certain strategies to improve food access for residents including advocating for food policy changes, addressing root causes of food insecurity, assessing equity within the food system, and sustainability (Durham County, 2021). There are currently multiple initiatives within Durham County to address the issue, including Root Causes, an organization that gives fresh produce to food insecure residents and conducts research for policy change and advocacy work in the community (Durham County, 2021). Additionally, Farmer Foodshare is an organization that partners with local farms to reshape the food system through local produce donations to create a more equitable food system for all (Durham County, 2021). While these initiatives are a step in the right direction, there is potential for great change in food access for all community members through partnering with local community organizations and the Durham County nutrition assistance programs to improve the environments in which residents live.

Priority Population

Durham is a diverse community with people of many different ages and ethnicities. For the purposes of this assignment, racial and ethnic minorities groups will be analyzed, specifically Non-Hispanic Black individuals. This group was chosen because Black residents make up 36% of Durham County's population, a higher proportion than the North Carolina average (Durham County, 2021). Additionally, Black individuals are disproportionately affected by food insecurity and housing challenges, as well as lacking access to certain amenities and opportunities due to previously segregated housing and redlining in Durham communities (Durham County, 2021). Black individuals also face higher rates of certain diseases including cardiovascular disease and diabetes, as well as face additional health inequities including a lack of access to care (Osei & Gaillard, 2017). In 2019, the rate of type 2 diabetes for Black individuals was 18.6% compared to a rate of 12.9% for the adult population of Durham County, 13.2% for Hispanic residents in Durham County, and 12.4% for North Carolina as a whole (Durham Neighborhood Compass,

2019). Additionally, in Durham County, the age adjusted death rate for heart disease is greater in Black residents (204. 7 per 100,000) than in White residents (152.4 per 100,000), as well as the stroke mortality rate (Durham County, 2021). In choosing this population, there is hope to reduce various health inequities by addressing food access in the Durham County community through evidenced based policy changes and interventions in the neighborhood and built environment.

Measures of SDOH

Between 20-30% of Durham County residents are categorized as having low access to a grocery store (Durham County, 2021). Over 30% of Durham residents have poor grocery store access, characterized as residents in urban areas living more than one mile from a grocer, and those in rural areas living more than ten miles from a grocer (Food Security and Nutrition, n.d.). This is significantly higher than the North Carolina average of 24% (Food Security and Nutrition, n.d.). Durham's food environment score of 8.63, which measures total food retailers in the community that are considered healthy along with their typical food options, is also lacking in comparison to North Carolina's score as a whole of 9.71 (Food Security and Nutrition, n.d.). See Appendix B.1.b, Figure 1. Additionally, as seen in Appendix B.1.b, Figure 2, 16.5% of residents are considered food insecure in Durham County, which is significantly higher than Orange County (12.7%), Wake County (15%), and the state of North Carolina (14.6%) (Food Bank of Central and Eastern North Carolina, n.d.). Durham County's 16.5% food insecurity rate is also higher than the rate for the United States as a whole which is estimated to be 10.2% (United States Department of Agriculture, 2022). Food insecurity and food access issues are also seen at a disproportionately higher rate in racial and ethnic minority groups. In 2017, 25.1% of Durham's food insecure residents were Black, 15.7% were Hispanic, and 9.4% were White (Durham County, 2021). Black residents were also more likely than white residents to have to skip or cut a meal due to a lack of food in the household (Durham County, 2021). Additionally, Black residents, along with other racial and ethnic minority groups, are more likely to live in areas with a higher proportion of fast-food restaurants than White residents (Durham County, 2021). These disproportionate rates in access to food in Durham County contribute to the vast health inequities Black Americans face, including high levels of chronic disease and limited access to care.

Rationale/Importance

Food access for Black residents in Durham County is an extremely important issue that needs to be addressed through changes to the neighborhood and built environment. As mentioned above, Durham County has

higher rates of food insecurity than surrounding counties and the North Carolina average (Food Bank of Central and Eastern North Carolina, n.d.). Additionally, racial and ethnic minority groups are also more likely to be impacted by food insecurity and food access issues in Durham, and face higher rates of diabetes, cardiovascular disease, and other chronic diseases (Durham County, 2021; Osei & Gaillard, 2017). If this issue is addressed, improved food access in Durham County could lead to lower rates of food insecurity and improved diet quality for Black residents, bettering Durham County as a whole (Ziso et al., 2022). There is also the potential for improved health outcomes, including lower rates of obesity, heart disease, and diabetes, especially among those most affected by these chronic diseases, as well as improved productivity and economic growth (Ziso et al., 2022). This social determinant of health is one of top priorities that can be addressed through evidenced based changes to the neighborhood and built environment.

Disciplinary Critique

Food access in Durham County is a public health issue that needs to be addressed. It is essential for public health dietitians and nutritionists to be involved in improving food access through changes to the neighborhood and built environment of Durham County. Low food access can lead to high levels of food insecurity, as well as contribute to obesity, and diabetes, which are conditions dietitians are trained to combat through medical nutrition therapy (National Institute on Minority Health and Health Disparities, 2022). In Durham County specifically, health inequities already prevail partially due to the neighborhood and prior segregation (Durham County, 2021). Therefore, dietitians must be involved to not only help address these health inequities in nutrition and disease, but also to help prevent additional negative health outcomes and disparities associated with food access and the built environment from occurring. Dietitians must be involved in improving food access in the neighborhood and built environment to help improve the food environment, community infrastructure, and sustainable agriculture of neighborhoods (The Public Health Nutritionists of Saskatchewan, 2015). Additionally, having local Durham dietitians and nutritionists is essential as they have knowledge of not only how the community functions, but also of local resources and they can provide a perspective as a resident. They can be involved through program planning, policy implementation, and public health advocacy to create more equitable food access. Improving food access through the neighborhood and built environment of Durham County will not only work to improve health conditions and quality of life, but it will also work to better the economy by creating better opportunities for education, human capital, and achievement in the workforce (USD HHS, 2021). Additionally, addressing the neighborhood and built

environment will work to create more environmentally friendly communities that are sustainable and equitable for all (United States Environmental Protection Agency, n.d.).

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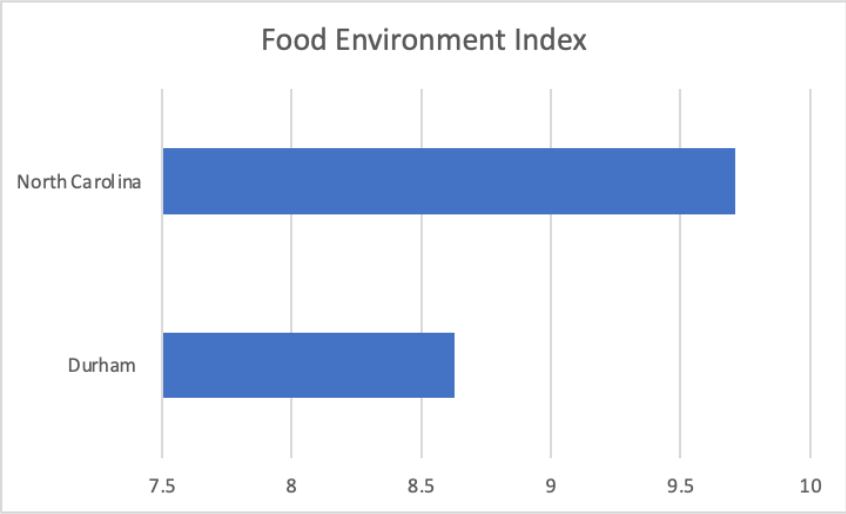
Appendix B.1a: Individual Problem Statement Appendix

Table 1. *Demographics of North Carolina, Durham County, Wake County, and Orange County*

	Durham County	**Wake County**	**Orange County**	**North Carolina Average**
Number of Residents	326,126	1,150,204	148,884	10,565,885
Race	White: 42% African American: 36% Hispanic or Latino: 13.5% Asian: 4.9%	White: 57.1% African American: 18.1% Hispanic or Latino: 11.4% Asian 8.6%	White: 60% African American: 13% Hispanic or Latino: 20% Asian: 3%	White: 70.1% African American: 22.3% Hispanic or Latino: 10.2% Asian: 3.4%
Median Age	35.4	36.4	35.1	39.1
Median Household Income	$61,962	$80,591	$74,803	$56,642

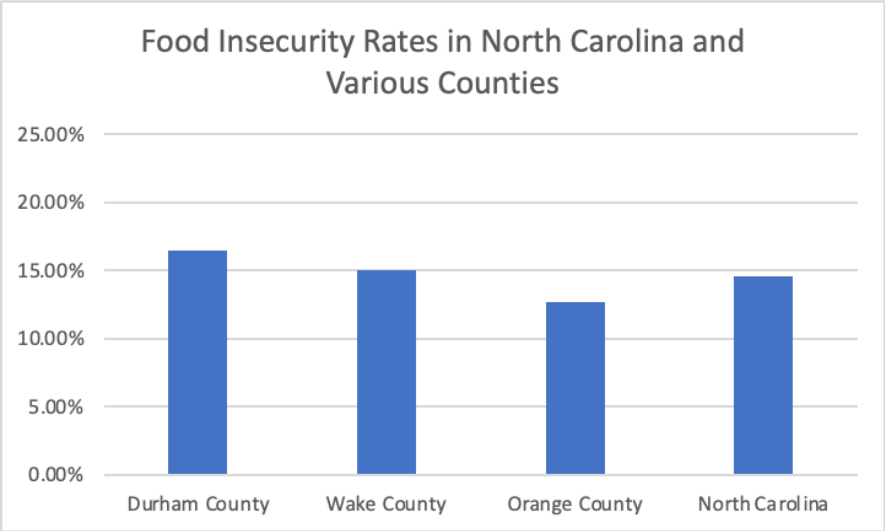
*Data from tables obtained from each county's Community Health Assessment, The Census, and Data USA.

Figure 2. Food Environment Index in Durham County and North Carolina



The Food Environment Index assesses communities based on the total food retailers in the community that are considered healthy and their typical food options (Food Security and Nutrition, n.d.). The Index ranges from 0 (worse) to 10 (best).

Figure 3. Food Insecurity Rates in Durham County, Wake County, Orange County, and the State of North Carolina



Food Insecurity is defined as, "a lack of consistent access to enough food for every person in a household to live an active, healthy life (Food Bank of Central and Eastern North Carolina, n.d.)." Durham County has significantly higher rates of food insecurity compared to nearby counties and North Carolina as a whole.

Appendix B.2: Nutrition Program Analysis and Implementation

Introduction

The neighborhood and built environment includes where one lives, works, and plays, and greatly influences their overall health and wellbeing (United States Department of Health and Human Services (USDHHS), n.d.). The neighborhood and built environment greatly affects one's access to food and healthy options, as it impacts one's availability of grocery stores, transportation options, surrounding fast food restaurant density, and distance to healthy markets (USDHHS, n.d.). Additionally, gentrification in communities can lead to an increase in food prices and healthy options, leading to further decreased access to food (Cohen, 2018). Limited food access in neighborhoods can lead to chronic health conditions, as well as an overall poor quality of life (USDHHS, n.d.).

Food access is an extremely important issue in Durham County and a number of qualitative themes are associated with the neighborhood and food access including geographic access, quality of food, and nearby grocery stores (Evans et al., 2015). An individual's access to food will always be affected by where they live and what resources their community has to offer. Lack of access to healthy foods has been associated with multiple chronic health conditions including diabetes, obesity, and heart disease, as well as various mental health conditions (National Institute on Minority Health and Health Disparities, 2022). While the overall food environment in Durham County, measured by healthy food retailers in the community and their food options, is worse than surrounding communities, Black residents struggle most with food access, and therefore are the target population for the program (Durham County, 2021). Black residents were more likely than White residents to have to skip a meal due to a lack of food, and they also face higher rates of food insecurity as 25.1% of Durham's food insecure residents were Black (Durham County, 2021). Chronic disease rates are also higher for Black individuals, which may be partially due to the communities they live in which inhibit their access to healthy foods and health care, contributing to vast health inequities in the county (Durham County, 2021; Durham Neighborhood Compass, 2019). See Appendix B.2b, Figure 3. Economic costs of a lack of food access are also severe as the estimated annual cost of food insecurity and related illnesses is $130.5 billion (Iowa Food Bank Association, 2023). Food access is a major issue and addressing it through the built environment shifts the focus and solution strategies from the individual to the community.

Evidence Based Nutrition Program

The Mobile Farmer's Market Collaborative is our chosen program to address food access and establish more healthy food options in Durham County, specifically for Black residents. The Collaborative will create a

coalition of nutritious food sources and mobile markets throughout the county, both pre-existing and new. It will provide funding and resources for markets already in place, create an additional mobile produce market specific to Black residents in Durham County, and encourage the creation of more healthy food sources. Mobile produce markets have been found to increase consumption of fruits and vegetables and improve access to healthier foods in under-resourced neighborhoods (County Health Rankings & Roadmaps, 2020; Hsiao et al., 2019; Delivering Community Benefit, 2018). Additionally, markets have reduced residents' consumption of processed foods, while increasing consumption of foods grown locally (Leone et al., 2017). Therefore, these markets can potentially work to improve health outcomes and possibly reduce health disparities associated with poor nutrition habits, including high diabetes and obesity rates (County Health Rankings & Roadmaps, 2020). Mobile produce markets have also been found to be sustainable, meaning they have both improved fresh food access and remained financially viable (United States Department of Agriculture (USDA), 2018; Fresh Truck Annual Report, 2018). To be sustainable and successful, they must be properly executed in collaboration with organizations with similar missions that can offer various capabilities and resources (USDA, 2018). For more financial data, see Appendix B.2b, Tables 2 & 3. In Durham County, a lack of transportation and healthy grocery store options is a barrier to healthy food consumption and overall access to food (Durham County, 2021). The idea of the Collaborative is to bring the healthy options to residents in their communities while also addressing the financial barrier of healthy eating. Mobile markets can also work to strengthen the food system and support local farmers (Delivering Community Benefit, 2018).

Evidence Based Outcomes

Short Term Outcomes

By May 2025, after two full years of program duration, the intake of fruits and vegetables consumed (servings/day) by Black dense communities (those with census tracts over 50% Black) in Durham County will increase by 15%. The 15% increase was chosen based on evidence from studies in which produce consumption increased from 7%-20% in similar communities (Gary-Webb, 2018; Hu et al., 2021). This will be assessed through a pre/post survey analyzing fruit and vegetable consumption as well as focus groups with residents before and after the implementation of the Collaborative. Additionally, by May 2025, money spent at the produce market by consumers will increase by 12%. This was selected based on annual reports of mobile farmers markets (Cruz et al., 2017; Fresh Truck Annual Report, 2018). This will be assessed through sales reports of the Collaborative market.

Long Term Outcome

In 7 years post implementation (May 2031), the proportion of food insecure residents in Durham County that are Black will decrease from 25.1% to 20.1%. This will be addressed through the Durham County Community Health Assessment data. Although this objective may seem unattainable, the research portrays that similar markets, with recommendations for additional components which are included in our program, can help relieve food insecurity in communities (Widener et al., 2012; Gary-Webb, 2018). We are hopeful that with the support of the community and local organizations, the Collaborative will be a success and expand further throughout Durham County to help combat the issue of food insecurity by addressing both food access and affordability.

Evidence Based Implementation Strategies and Activities

The Mobile Farmer's Market Collaborative will incorporate many different components and activities with the goal of increasing food access in Durham County. The largest component of the Collaborative will be the creation of an additional mobile produce market that comes to communities themselves, specifically targeted for Black residents. There will be various market locations including predominantly black churches on Sundays, biweekly at Durham community centers, and weekly at local hospitals. The market will also come weekly to predominantly Black neighborhoods, starting with census tracts 13.01, 13.03, and 20, which have large proportions of Black residents (Durham Neighborhood Compass, 2021.). To maximize utilization of the market by community members, residents of these neighborhoods will be surveyed to find out the best times and locations for the market to come. To address the aspect of food availability that is the expense of produce and healthier items, prices at the mobile market will be subsidized and potentially sold for cheaper than at grocery stores (County Health Rankings & Roadmaps, 2020). For the market to be sustainable while subsidizing produce, collaboration and support from stakeholders and community members will be essential. It has been found that when SNAP transactions are accepted at mobile markets, more fruit and vegetable purchases are made among low-income customers (Rummo et al., 2021). Therefore, electronic benefit transfer (EBT) funds, including both SNAP and WIC, will be accepted and encouraged. To further combat the issue of unaffordable produce, all EBT funds, including both cash and card will be doubled at the Collaborative markets to encourage more money to be spent on healthy items and produce. A prepackaged meal box that people can purchase will also be sold biweekly at the mobile market. This box will contain all the ingredients and meal components along with the recipe and cooking directions to help eliminate other barriers to cooking and eating healthy. Residents will also be surveyed monthly to see what foods they want at the market to ensure culturally appropriate foods are being offered. Unique to the Collaborative's mobile produce

market, nutrition education and cooking demonstrations will also occur in support of long-term behavior change (County Health Rankings & Roadmaps, 2020). Cooking classes, tastings, and demonstrations of recipes using seasonal produce will all take place monthly at various locations. Take home educational flyers and nutrition information will also be given to shoppers at the market. In addition to the mobile market, the Collaborative will have monthly meetings with all groups and organizations involved. The meetings will be an opportunity to discuss successes and challenges of the mobile produce markets and offer additional resources for food access, as well as pose opportunities for change. The meetings will be held in predominantly Black neighborhoods and will be open to the public, both in person and virtually, so all residents can be involved and offer feedback on the Collaborative. In addition to these components, the Mobile Farmer's Market Collaborative will work to support existing mobile markets and food access organizations and will be a resource for research and community outreach.

The implementation team for the Collaborative will include one full time program director who is in charge of the implementation of the program, which includes working with stakeholders, surveying community members, marketing, and logistics. There will also be three part-time employees to assist the director and work the actual mobile market. The Collaborative will rely on the support of the community and volunteers to help with packing the produce, marketing, and any additional tasks for the Collaborative's success. Through the Collaborative, we hope to reach 50 households weekly, including those who come to the markets and engage with nutrition education.

The Collaborative addresses the individual characteristics and living and working conditions levels of the social ecological framework. Individual characteristics are addressed as the program will include a nutrition education component with the goal to empower residents and increase individual's nutrition education and cooking skills. The Collaborative will work to improve residents' individual skills in hope of empowering them to change their dietary patterns. Living and working conditions are also greatly impacted as the program is altering neighborhood features to increase access to fresh produce. Through the Collaborative mobile market, produce options will come to the residents themselves, improving their food environment and making it easier for them to make healthy choices.

Stakeholders

One of the main stakeholders for the program is Durham County residents, specifically Black residents, as they are the group we are hoping to reach. It is essential to have their voices at the table through the development, implementation, and evaluation processes, as well as to help ensure the market options are foods they will like and

are culturally appropriate. We will also rely on other Durham residents and organizations for support, donations, and volunteers. Because of this, we will take a community based participatory research approach to ensure Durham residents are involved with all efforts of the program. To assure this is done, we will have a community advisory board with community residents and all stakeholders listed below, as well as focus groups with community residents throughout the program to ensure their needs are best met. The focus groups are also where we will survey our residents to find out about the best locations, times, and items for the mobile market, as well as gather baseline data about fruit and vegetable consumption and overall food access. Another important stakeholder is the mobile markets already in place in Durham County, including the Duke Mobile Market, Inter-Faith Food Shuttle, and East Durham Farmers Market. Since these markets are already happening in Durham, it will be important to get them to join the Collaborative so our resources can be pulled. Although our market will be slightly different as it is specifically targeting Black residents and will come more frequently to actual neighborhoods themselves, it will be important to have them on board to create a central source for food access in the county. Another stakeholder of our program will be the Durham County government and their officials, since we will need to have approval from the city and obtain licensure to sell foods from our vehicle. It will also be important to explain the mission of the Collaborative to officials to have the city of Durham's support, as well as to encourage long term change for the built environment of the County. Additionally, residents can use federal nutrition program benefits at the market, so we will need the support and approval from the local government, Durham Public Health Department, and NC Department of Health and Human Services. Since we will be doubling participants' EBT benefits, this will also support and improve their business. Lastly, another stakeholder will be local farmers in Durham County as we will need to buy produce from them to sell and distribute at the produce markets. Creating a symbiotic relationship where both parties benefit will be crucial to the success of the program and will encourage farmers to sell their products to the Collaborative as we will buy them at a competitive price. In the case that stakeholders are reluctant to participate, we will look for common ground among parties, reinforce outcomes, and potentially modify our engagement approach.

Budget

Funds for the Collaborative will be obtained through a grant with support from the Durham County Health Department, along with additional support from local hospitals, universities, and community members. The Collaborative will begin as a pilot program to gauge success and implementation for additional years. 75% of the budget will be spent on personnel including the salary for the program director and three part time employees. We

believe paying our staff fairly is essential for the wellbeing of our employees and for the success of the overall program. Next, 7% will be spent on office supplies and marketing. Since most of our program will take place in the communities themselves, we will only need a small office for our program director. An additional 10% of the budget will be spent on equipment/cost of goods, which includes buying the produce itself along with grocery bags, nutrition education materials, and cooking demonstration supplies. This will also include buying refrigerators and pantries to store the food in while the mobile market is not out in the community. Lastly, about 8% of the budget will be put towards the vehicle expenses. See Appendix B.2b, Table 4 for more details.

Conclusion

The Mobile Farmers Market Collaborative is a program to increase food access in Durham County, specifically in Black communities, with the support of community members and existing mobile markets. In the research, there is evidence to support mobile produce markets in increasing fruit and vegetable consumption (Gary-Webb, 2018; Hu et al., 202; County Health Rankings & Roadmaps, 2020). The Collaborative will also support local farmers, and work to strengthen sustainable food systems in Durham County. Another advantage of the Collaborative is that foods will be subsidized, and residents can use benefits from food assistance programs when shopping at the markets. The Collaborative is also targeting long term behavior change through nutrition education and cooking demonstrations. However, there are disadvantages of the program. The market will come weekly and will consider times that work best for residents, but there is the potential to miss community members in need. To help avoid this, the market will also travel to other common locations, including churches and community centers. Additionally, the market is reliable on the seasons, which dictates what produce will be available. The evidence shows that mobile markets are sustainable in communities when programs receive grants and additional funding but are not necessarily profitable businesses (USDA, 2018; Fresh Truck Annual Report, 2018). For mobile markets to be profitable, they must collaborate with organizations for various resources (USDA, 2018). The intervention is also not addressing food prices outside of the Collaborative markets to alter the permanent food environment.

In developing the Mobile Farmer's Market Collaborative, we are prioritizing "the now," as this is a quicker fix to address the neighborhood and built environment to increase food access, instead of an option that would actually change the infrastructure of Durham County for the long term. Through a social justice lens, the program is working to eliminate health inequities in the County, including disproportionate rates of food insecurity for Black

residents, by prioritizing these residents most in need and collaborating with them directly. Although we recognize this is not a forever solution, we hope this program will spur change and long-term initiative in Durham County.

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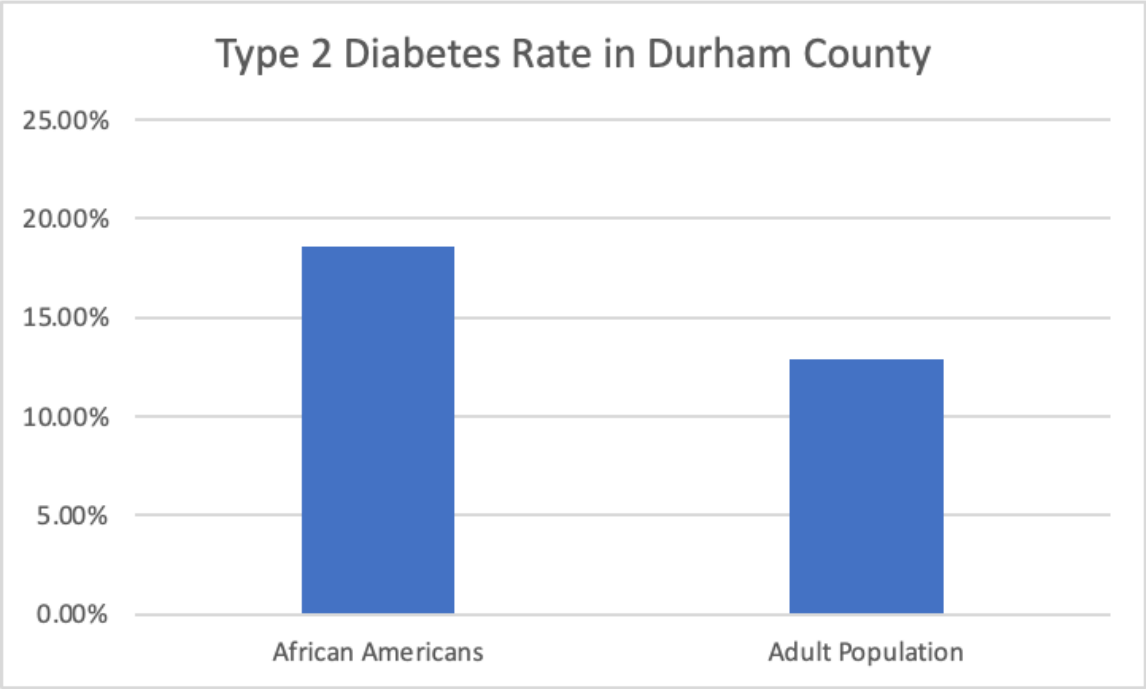
Appendix B.2a: Nutrition Program Analysis and Implementation Appendix

Figure 4. Rate of Type 2 Diabetes in Durham County



The figure portrays the rate of type 2 diabetes in Durham County for African American Residents versus the entire adult population (Durham Neighborhood Compass, 2019).

Table 2. Fresh Truck Sales Report (Fresh Truck Annual Report, 2018; Fresh Truck Annual Report, 2020)

Fresh Truck Sales Reports	**2018**	**2020**
Total Mobile Market Sales	$630,431	$904,921
Revenue	$1,560,000	$7,100,000
Expenses	$1,180,000	$6,700,000
Profit	$380,000	$400,000

Table 3. Arcadia Mobile Market Sales Report (Arcadia, n.d.)

Mobile Market	Revenue	Expenses	Profit
Arcadia Mobile Market	$105,478	$99,395	$6,083

Table 4. Itemized Budget for Mobile Market Program

Item	Percent of Budget (%)	Description
Personnel	75%	Personnel will be responsible for the development and implementation of the program. They will monitor the program flow, lead cooking classes, offer social support, and facilitate communication with the participants and program partners. The program will also rely on community volunteers for support.
Program Director (1)		
Employees/Community Health Worker (3)		
Volunteers		
Equipment/Cost of Goods	10%	Equipment will be used for storage of produce products and other mobile-market-related needs (i.e., produce, and bags). Refrigerators and pantries will need to be purchased to store food overnight and when the bus is not out in the community. Cooking demonstration supplies will also be needed for the nutrition education component. This section also includes the costs of goods, including purchasing the actual produce to sell at the markets.
Storage for produce (refrigerators, pantries, etc.)		
Produce		
Bags		
Cooking demonstration supplies		
Office Supplies/Marketing	7%	Office space will be utilized for team meetings among personnel members and as a space to keep produce when the mobile market is not running. Marketing supplies will be used for program promotion, advertising, and nutrition education-related needs.
Small-sized office		
Printed educational handouts/community resources		
Vehicle	8%	We will need to purchase a bus for the mobile market. Vehicle supplies are necessary for transport of produce products to various mobile market locations. This section also includes expenses such as gas, maintenance, insurance, registration, etc.
Gas		
Maintenance		
Insurance, Registration		

Appendix B.3: Nutrition Program Evaluation Plan

Introduction

The neighborhood and built environment is a social determinant of health that influences all aspects of one's overall wellbeing (USDHHS, n.d). Food access is an important component of the social determinant of health, as where one lives determines the stores they have access to, transportation options to get food, fast food restaurant density, and surrounding communities food prices (USDHHS, n.d.). The lack of food access has been associated with multiple chronic diseases and mental health conditions (National Institute on Minority Health and Health Disparities, 2022). In Durham County, over 30% of residents have poor access to grocery stores, and the county has a food insecurity rate of 16.5%, which is higher than the North Carolina average of 14.6% (Food Security and Nutrition, n.d.; Durham County, 2021). Additionally, Black residents are more affected by food access issues in Durham County as they were more likely to have to skip a meal due to a lack of food and they experience higher rates of food insecurity (Durham County, 2021). To address food access in Durham County, the Mobile Farmer's Market Collaborative will be implemented as a pilot program to create a coalition of nutritious food sources and provide funding for existing mobile markets, while implementing a new mobile produce market. The Collaborative market will specifically target Black residents and neighborhoods but will be accessible for all. Prices will be subsidized and electronic benefit funds (EBT) will be accepted and doubled. Nutrition education and cooking demonstrations will also occur at the market. The implementation team will include one full-time program director and three part-time employees but will also rely on volunteers and stakeholders.

Evidence Based Outcome for Evaluation

By May 2025, after two full years of program duration, the intake of fruits and vegetables (servings/day) consumed by Black-dense communities (census tracts 13.01, 13.03, 20) in Durham County will increase by 15% (Gary-Webb, 2018; Hu et al., 2021).

Study Design/Data Collection

To evaluate Durham's residents' fruit and vegetable consumption, we will use both a questionnaire and focus groups, a strategy adopted from a similar program (Gary-Webb et al., 2018). The SNAP-ED Fruit and Vegetable Checklist questionnaire will be used to analyze fruit and vegetable consumption (USDA, 2016). See Appendix B.3b, Figure 5 for more details. This USDA tool was selected as it analyzes the amount of fruit and vegetables consumed, as well as the type and variety of produce (USDA, 2016). It is short, straightforward, and easy

to understand, so it should have a low participant burden. The questionnaire will collect baseline data before the program begins as well as data two years after the implementation to assess resident's changes in consumption. To assess qualitative data, focus groups with residents will take place in May of 2023 to gather baseline data, again in May 2024 to assess progress, and finally in May of 2025 to assess whether the market changed consumption. Two focus groups with 10 residents each will be held, and the participants will be the same throughout the three sessions. Discussions will be a round robin format with a variety of open-ended questions to gather data on views of the market. See Appendix B.3b, Figure 6 for more details. The initial focus groups will assess residents' access to food, perceptions of the food environment, and their current fruit and vegetable intake. The post implementation focus group will assess the market's affordability, selection, food quality, and resident's beliefs on changes to their consumption patterns. Since both pre/post questionnaires and focus groups will be used to collect both quantitative and qualitative data, the design is a non-experimental pre/post mixed methods outcome evaluation.

Sample and Sampling Strategy

Address-based sampling will be used in order to recruit residents to complete the questionnaire and participate in the focus groups. The address sampling will randomly select 1,000 addresses within Durham census tracts 13.01, 13.03, and 20 in which the mobile produce market will come. Postcards will be mailed to these addresses describing the questionnaire and how to complete it. To decrease participant burden, the questionnaire can be completed online through a Qualtrics survey, or by phone through a computer assisted telephone interviewing system. If phone numbers are available through the address-based sampling, phone calls will be made to these addresses a week after the postcard is sent to urge them to participate. The same strategy will be used with the same addresses in May of 2025 to assess changes to fruit and vegetable consumption. To encourage participation and compensate residents for their time, those who complete the questionnaire will be entered to win gift cards. We are sampling 1,000 addresses as this is 6% of the population of these census tracts, and we know a large proportion of residents will not participate. There is also the potential that residents will move, or only complete one questionnaire in which they are excluded from the sample. We hope to have a sample size of 50 total residents complete the questionnaire from census tracts 13.01, 13.03, and 20 for the evaluation. Similar recruitment will occur for participants to engage in the focus groups, as letters will be sent to addresses explaining what the focus groups are and urging residents to participate. To further encourage participation, dinner, childcare, and transportation will

be provided. The sample size for focus groups will be 20 residents, as there will be two sessions of 10 people each. This sampling strategy was adapted from a similar program with the same objective (Gary-Webb et al., 2018).

Specific Measures

Two outputs for the program include weekly produce market visits at scheduled locations and monthly nutrition education/cooking classes. These outputs will help measure the process of the implementation to ensure the program is running smoothly. To track this, a calendar will record where the market goes and how many residents come to the shop, along with taking attendance at education classes throughout the entire program duration. The outcome being assessed is a change in fruit and vegetable consumption for residents, which will be measured by the Fruit and Vegetable Checklist. Measuring this is essential to ensure success of the program and increase food access.

Timing

Evaluation with stakeholder engagement is an ongoing process that should start with the implementation of the program. The evaluation will begin in May of 2023 when residents will be sampled and the initial survey will be sent out to gather baseline data, in addition to conducting the initial focus group. In order to assess the Collaborative's progress, focus groups with the same residents will be held again in May 2024. If participants are lost to follow-up, their responses will be excluded, and new focus groups members will be recruited from the same census tracts. Progress will be defined through the qualitative focus groups if residents believe their food access has somewhat increased and they are pleased with the prices and selection of items at the market. If no progress is noted, focus group participants will be asked what they believe can be done to better the Collaborative market. In this case, meetings with stakeholders and other community residents will be held to brainstorm ways the market can be improved (i.e., coming at different times/locations, offering various items, reduced prices, etc.). In May of 2025, the final questionnaire will be sent, and a final focus group will be held with the same residents. Having stakeholders involved throughout the entire evaluation process will be important to not only help conduct the evaluation, but to provide additional perspective. Data analysis will then occur followed by dissemination of results.

Analysis Plan

The analysis plan will include mixed statistics measuring the change in fruit and vegetable consumption as well as perceptions on how the mobile market changed food access and consumption. To analyze data from the Fruit and Vegetable Checklist, descriptive statistical analysis will be run through software (i.e., STATA). Variables in the

survey include number of servings, types of fruit and vegetables, and consumption times. Quantitative variables, such as mean values and percent changes in fruit and vegetable consumption, will be analyzed. To determine the difference in consumption before and after implementation, bivariate analyses will test for the significance of pre-post survey metrics. A paired comparison test will be used to determine if there is a difference between the means of the group from baseline to two years post implementation, and the P value defined for significance will be $a = 0.05$ (Gary-Webb et al., 2018). To analyze the focus group data, conversations will be recorded and transcribed, and the results will be coded to summarize responses. Using the transcribed version, themes such as "affordability," "access," and "consumption" will be identified. Quotes will be selected to illustrate findings and participant's perspectives. The analysis plan was adapted from a similar program (Gary-Webb et al., 2018).

Sources of Funding

The program will begin as a two-year pilot program with a grant from the Durham County Department of Public Health. To ensure success and sustainability of the program, collaboration with organizations with various resources, such as Duke University and Duke Medical Center, will be essential. See Appendix B.3b, Table 5 for additional sources of funding to support program implementation and the evaluation process.

Data Use and Dissemination

It will be essential to share the results of our evaluation to not only community members, but also to the Durham County Department of Public Health, policy makers, and other stakeholders. In order to provide complete transparency, anonymized data and findings will be compiled and shared with stakeholders. A webinar will be held where the results will be shared with the Durham County Department of Public Health. Durham County residents and other stakeholders will also be encouraged to attend. The information will also be summarized and available online as a factsheet for those who cannot attend the presentation. If the evaluation results are negative or do not find any positive change, possible program adaptations will be suggested. Feedback, opinions, and suggestions from the health department for any shortcomings of the program will be considered. The results can be used to potentially extend the program, advocate for additional funding, or to help guide the implementation of similar programs.

Conclusion

Food access in Durham County is a major public health issue that is contributing to vast health inequities within the county. The Collaborative is a pilot program to help improve food access in the county by collaboration and interdisciplinary work with other organizations. To analyze success, fruit and vegetable consumption will be

evaluated before implementation of the program and after two years. Questionnaires and focus groups will gather both quantitative and qualitative data to evaluate the success of the program on changing produce consumption and overall food access in specific Durham neighborhoods. Evaluation results will be shared with the community to help improve Durham residents' food access and nutrition while working to reduce health inequities within the county.

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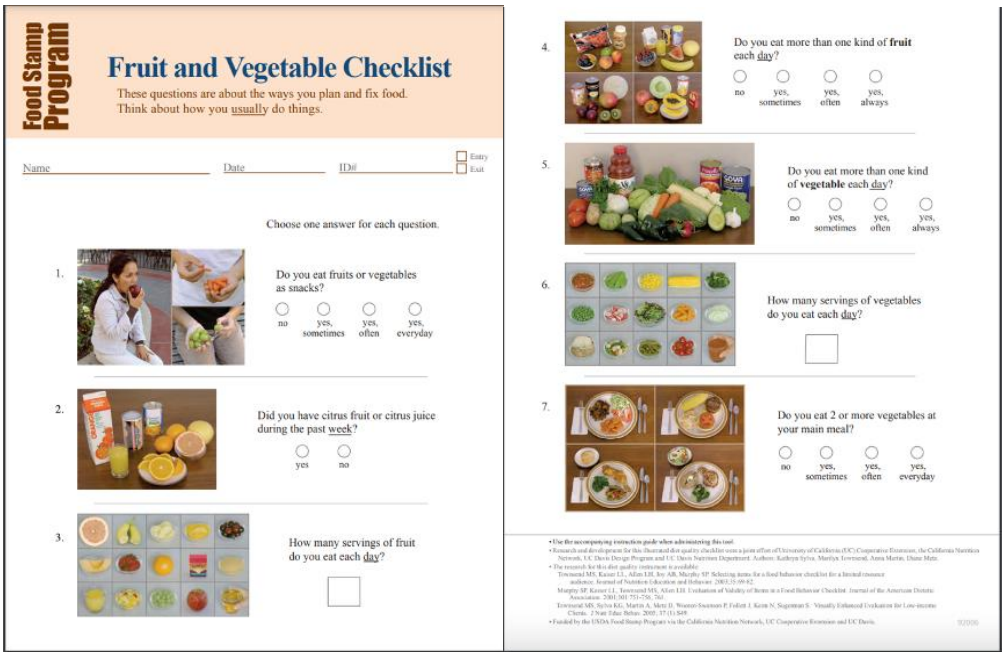
Appendix B.3a: Nutrition Program Evaluation Plan Appendix

Figure 5. USDA Fruit and Vegetable Checklist



Food Stamp Program

Fruit and Vegetable Checklist

These questions are about the ways you plan and fix food.
Think about how you usually do things.

Name _____ Date _____ ID# _____ Entry Exit

Choose one answer for each question.

1. Do you eat fruits or vegetables as snacks? no / yes, sometimes / yes, often / yes, everyday

2. Did you have citrus fruit or citrus juice during the past week? yes / no

3. How many servings of fruit do you eat each day? ☐

4. Do you eat more than one kind of **fruit** each day? no / yes, sometimes / yes, often / yes, always

5. Do you eat more than one kind of **vegetable** each day? no / yes, sometimes / yes, often / yes, always

6. How many servings of vegetables do you eat each day? ☐

7. Do you eat 2 or more vegetables at your main meal? no / yes, sometimes / yes, often / yes, everyday

Figure 6. List of Focus Group Questions

Baseline Focus Group

How would you describe your current fruit and vegetable intake?
Where do you most often shop for food?
What are your largest barriers to accessing healthy foods?
How would you describe your current food environment?
What are the best times/days for you to shop or come to the market?

Post Implementation Focus Group

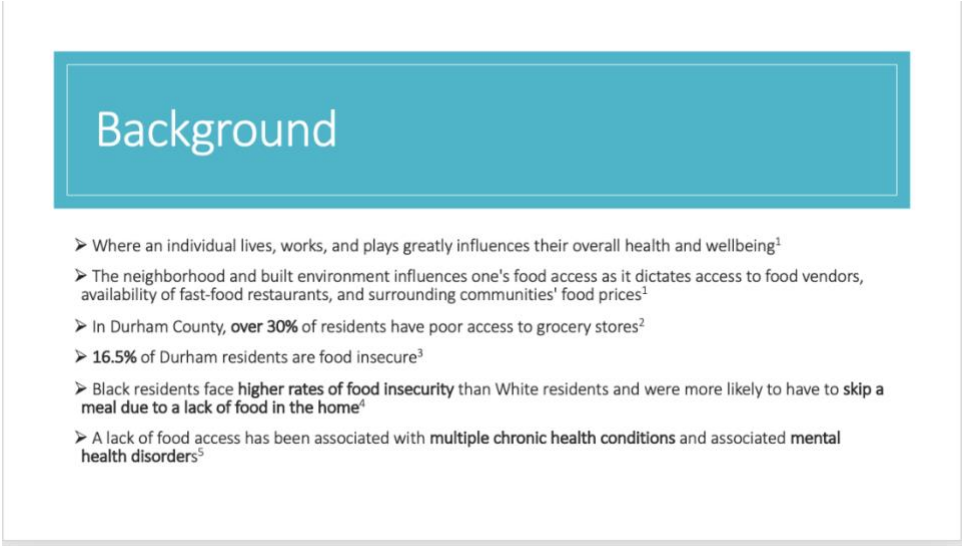
How would you say your fruit and vegetable intake has changed because of the mobile market?
How often did you shop at the mobile market?
What items did you purchase the most? Are there any additional items you wished were at the market?
How would you describe the affordability and food quality of the market?
Has your food access increased, decreased, or stayed the same as a result of the mobile market?
What suggestions do you have to improve the mobile market?

Table 5. Program Funding Sources

Funding Opportunity	Source	Amount	Deadline	Use of Funding
Community Food Projects Competitive Grant Program (CFPCGP)	https://www.nifa.usda.gov/grants/funding-opportunities/community-food-projects-competitive-grants-program	$5,000-$400,000	TBA	Mobile produce market support, funding for sourcing produce, support for evaluation process
CDC-RFA-DP-23-0013: The High Obesity Program (HOP 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342939	$500,000	March 21, 2023	Mobile produce market support, funding for sourcing produce, support for evaluation process
CDC-RFA-DP-23-0012: State and Physical Activity Nutrition Program (SPAN 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342954	$600,000	March 28, 2023	Mobile produce market support, funding for sourcing produce, support for evaluation process
CDC-RFA-DP-23-0014: Racial and Ethnic Approaches to Community Health (REACH 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342940	$500,000	April 11, 2023	Support in food access for Black residents in the community, help source culturally appropriate foods

Appendix B.4: Individual Presentation Slides and Script

Hello Durham County Commissioners. Thank you for joining us today. Hannah, Elizabeth, Stephanie, Yuhan, and I will be discussing our plan to improve food access in predominantly Non-Hispanic Black neighborhoods in Durham County. The Mobile Farmer's Market Collaborative is our chosen program to address the issue of food access through upstream determinants of health such as the neighborhood and built environment.



Social determinants of health are defined as the conditions in the environment where people are born, live, and play that affect their health and quality of life. Healthy People 2030 is focused on improving the health and safety in these places where an individuals spends time to improve their overall health. The neighborhood and built environment is a social determinant of health that needs to be prioritized as it greatly influences one's food access which has been defined as access by individuals to adequate resources for acquiring appropriate foods for a nutritious diet. Where people live, work, and play significantly impacts their overall health and access to food as the neighborhood dictates access to food vendors and other resources, availability of fast-food restaurants, and surrounding communities' food prices. The lack of food access has been associated with multiple chronic health conditions including diabetes, obesity, and heart disease, as well as multiple mental health conditions. In Durham County specifically, food access is a major issue as It is estimated that over 30% of Durham residents have poor grocery store access, which is higher than the North Carolina average of 24%. Durham County's 16.5% food insecurity rate is also higher than the North Carolina and United States averages as well as surrounding counties of

Wake and Orange. Additionally, food access issues in Durham County disproportionately affect Black residents who were more likely than White residents to skip a meal due to a lack of food in the household and to live in areas with a higher proportion of fast-food restaurants. In addition, 25.1% of Durham's food insecure residents were Black, while only 9.4% were White. Food access issues may offer a partial explanation for higher chronic disease among Black residents. Improving food access in Durham County could lead to lower rates of food insecurity and improved diet quality for Black residents, bettering overall health in the County while improving productivity and economic growth. By addressing food access through the neighborhood and built environment, the focus and solution strategies shift from the individual to the community.

APPENDIX C: HANNAH PRESTON'S INDIVIDUAL DELIVERABLES

Appendix C.1: Individual Problem Statement

The Social Determinant of Health being in accordance with Healthy People 2030 is *Eliminating Very Low Food Security in Children*. Specifically looking at black children in Durham County. Within the 2020 Durham County Health Priorities, the main five priorities were Affordable Housing, Access to Healthcare and Insurance, Poverty, Mental Health and Obesity, Diabetes and Food Access (Durham County NC). Eliminating Very Low Food Security in Children addresses the fifth priority; Obesity, diabetes and food access.

Short term impact of food insecurity for children includes negative health outcomes and can cause children to have trouble in schools. One scholarly source stated that food insecurity can have negative long term health outcomes. These negative health outcomes include birth defects, anemia, cognitive disabilities, depression, and oral health (Durham County Public Health). It was found that children in highly food insecure families have 2-3 times higher chance of getting anemia, and 1-2 times higher chance of getting asthma (Gunderson & Ziliak).

Geographically, Durham County is in the central part of North Carolina. Durham County neighbors Chatham County, Granville, Orange and Wake County. According to the 2020 Census there are over 300,000 Durham County Residents. The Durham County Community Health Assessment detailed the change in demographics for this county. Specifically, the population in Durham has increased by 64 percent from 2000-2019 (Census.gov). 54.5% of Durham County Residents are white, 35.9% of Durham County Residents are black, 13.8% Hispanic or Latina and 5.6% are Asian (Kaiser Family Foundation, 2023). Additionally, 13.45% of residents in Durham County are persons in poverty (Office of Disease Prevention and Health Promotion).

Durham Single-City County a culturally rich culture, diversity, tobacco and textile industries (U.S. Census Bureau). Historically, the city was deemed "Black Wall Street", leading the way for many pillars to what makes Durham what it is today. These include religion, healthcare, business and governmental affairs. Durham is a Democratic Country and comprises Districts 29,31,2, and 30 for the house seats and Districts 20 and 22 for the Senate Seats.

It is important for health policy professionals to be involved within addressing this Social Determinant of Health because policy can be used as a tool to increase funding. Funding can be gained and allocated to increase the resources provided for healthy food options. Additionally, it is important for a policy expert to be included within

this conversation because policies address communities at large. When addressing the various levels of health interventions, policies have the most outreach to affect numerous communities in a short amount of time.

Addressing *Eliminating Very Low Food Security in Children* addresses health equity concerns on a federal, state and local level. Federally, according to Healthy People 2030, 59% of households with children under 18 years old reported to have very low food security in 2018 (U.S. Department of Health and Human Services). That means that over fifty million people are food insecure in the United States (University of Wisconsin of Population Health Institute). In addressing this social determinant, it will decrease the percentage of families with food insecurity. As stated previously, food insecurity among children causes various severe health outcomes. Some of which are exacerbated by the preexisting conditions that are more prevalent in black people than white people. Consider reflecting this onto a local context. Within Durham County, "1-6 Black residents skipped meals because they did not have enough money" (Durham County Public Health). Addressing food insecurity would become appealing to the County Commissioner because it will create jobs and create more revenue into the city when families can afford to buy groceries.

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Appendix C.2: Policy Analysis

Background Information

The Durham County Health Assessment Established Obesity, Chronic Disease, and Food access as a priority in 2019, especially among Black Durham County Residents. A study conducted by California State University Department of Health detailed across the United States, higher BMI scores were more likely among residents of rural, minority neighborhoods of lower socioeconomic status (J. Epidemiol Community Health, 2019). 15% of adults in Durham County consume fruits, vegetables or beans 5 more times a day (Durham County Health Assessment, 2019) The NCIOM found 26% of adults in Durham County are obese, 7.2% of adults have diabetes in Durham County and 13.5% of adults in Durham County are facing food insecurity (Durham County Health Assessment, 2019). The 2019 Community Health Assessment survey reported 1 in 10 people (10.2%) reported skipping meals because they didn't have enough money to buy food. Black residents (14.9%) were more likely than white residents (6.6%) to have skipped a meal either sometimes or frequently in the past year. The likelihood of skipping meals for Hispanic or Latino residents was 12.6% (Durham County Health Assessment, 2019). Data at the neighborhood level in Durham County show that in 2017, 12.9% of adults in Durham County had Type 2 Diabetes. Census tracts in central and northeastern Durham consistently had adult diabetes percentages over the county average, with the highest rate of 21.6% (Durham County Health Assessment, 2019). The U.S. The Department of Agriculture (USDA) categorizes 20 to 30% of Durham residents as having low access to a grocery store (Durham County Health Assessment, 2019). The Social Ecological Model suggests policy is the only way to address public health issues among a large population. A policy that addresses food insecurity on a local level will improve better health outcomes for all Durham County residents.

Policy Option Description

Policy 1: The Mobile Farmers Market Collaborative (MFMC) provides healthy and cost-effective options for families in communities that live in food deserts within Durham County. The Mobile Farmers Market Collaborative would include the Durham County Commission, the Durham County Department of Health, current farmers markets, local medical providers and other food sources. This collaboration creates farmers' markets in communities that did not have access previously, specifically focused on healthcare facilities and low-income neighborhoods. The Mobile Farmers Market Collaborative (MFMC) will provide funding for farmers' markets that

are already present to adapt to support the mobile market. This policy will work with healthcare providers, to prescribe to the farmer's market.

Policy 2: NC Growing Together was a project created in 2013 that ran until 2018. This program brought together various partners across the state in both the private and public sectors to provide healthy food options in brick-and-mortar stores, located in low-income communities. This program also provided economic incentives for local farmers to join this program. Specifically, NC Growing Together integrated local food into retail food outlets that did not have healthy food options previously. Stores of focus would include corner stores, gas stations and general stores. It is important to note that NC Growing Together was a statewide program. This policy scales this project down to the local level. This policy would mimic the retired program both in funding and in nature, but with a smaller county-wide scope. This policy would be funded in partnership with the Durham County Department of Health, as well as private partners.

Evaluation of Policy Based on Selected Criteria

Each policy option will be graded based on a selected evaluation criterion, included within this criterion are the following topics: Cost to County, Impact on the Community, Equity and Political Feasibility. The criteria explanations can be found below.

Policy Option 1:

Costs to the County: Based on the estimated cost from other states, this policy would cost an estimated $320 per person (Oregon State University, 2023). This cost was calculated based on the Oregon State University Veggie RX Program cost listed on their website. The breakdown for this number is not publicly available and therefore cannot be adjusted to Durham County at this time.

Impact on the Community: Durham County currently offers 3 farmers markets throughout the county located on Foster Street, NC Highway 55, and S Driver Street (DCPO Public Health, 2022). Two farmers markets operate Saturdays April – November 8am-12pm, and December to March 10-12pm, and Wednesdays 3-6pm (DCPO Public Health, 2022). The other farmers market located on Driver Street is only offered on the 4th Saturday of every month 9am-2pm (DCPO Public Health, 2022). The Mobile Farmers Market Collaborative would fill in these gaps by offering services in communities that are not reached on Saturdays. Additionally, the Mobile Farmers Market Collaborative would operate during the week on various days.

Political feasibility: It is a brand-new program that would require buy-in from health care providers. Post pandemic, it is unclear how many providers would want to participate. Durham County Department of Public Health: DCPH has a program called The DINE Healthy Environments Program. This program is a community-based nutrition program that supports affordable healthy options for Durham County's economically disadvantaged individuals (Durham County Public Health, 2022). This program works with a number of community organizations including food pantries, faith-based organizations and farmers' markets to increase access to healthy foods. The Durham County Department of Public Health would be a key stakeholder to support this policy as well as provide partnership opportunities.

Equity: Durham County has the Farmers Market Double Bucks Program. All Durham residents who are SNAP, WIC and Durham Housing Authority beneficiaries get their money used at any farmers market doubled. This preexisting program would work for the Mobile Farmers Market Collaborative. The Mobile Market Collaborative would adopt this program. Additionally, it is unclear how the three current farmers market locations were decided. A community survey would be taken for Durham County in order to address the communities in most need.

Policy Option 2:

Costs to the County: There is no data to support the former NC Growing together program. Therefore, it is difficult to conclude an accurate cost to the county.

Impact on the community: This policy would provide incentives to local farmers and dietary support to food desert-stricken communities. Additionally, this policy provides support to brick-and-mortar stores located in food deserts to offer affordable healthy food options.

Political feasibility: The Center for Environmental Farming Systems would be a key stakeholder for this policy. CEFS created the original policy and program in 2013. This policy is an adaptation of the original program. The support of the CEFS would allow more funding sources through outlets like the USDA. The largest question for political feasibility is, Why did this program stop originally? This brings hesitation to if politicians would support this policy, especially when the cost is unknown.

Equity: To cost and reach within Durham County, it is unclear how many stores this program would serve. Therefore, it is hard to grasp the locations and communities that this policy would serve. While the goal is to implement this program in all low-income communities that have non-Hispanic Black Durham Residents, it is unclear if that is feasible.

Final Recommendation

Based on the selected criteria, The Mobile Farmers Market Collaborative (MFMC) is the recommended policy. This policy is the most politically feasible, while also having the largest impact on the community and equity. The process measure will identify the percentage of people who are using the Mobile Farmers Markets. This percentage will be tracked by the number of participants recorded each week that use the mobile markets. The Outcome Measure to address the success of this policy is to increase consumption of fruit and vegetables for Black Non-Hispanic in Durham County. This will be found by conducting self-reported surveys three times throughout the year. The baseline survey before the start of the Mobile Markets. There will then be another remeasurement period of 6 months from the baseline, and 1 year after baseline.

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Appendix C.2a: Policy Analysis Appendix

Selected Criteria Matrix: Each policy option will be graded based on a selected evaluation criterion, included within this criterion are the following topics: Cost to County, Impact on the Community, Equity and Political Feasibility. The scale is on a 0-5 scale, 0 is the least impactful, 5 is the most impactful. The recommended policy should score the highest.

Table 6. Selected Criteria Matrix

Policy	Costs to the County	Equity	Impact on the Community	Political Feasibility
Policy 1: Mobile Farmers Market Collaborative	3/5	3/5	4/5	3/5
Policy 2: NC Growing Together	0/5	2/5	3/5	2/5

Appendix C.3: Budget Justification

Summary

The Mobile Farmers Market Collaborative (MFMC) provides healthy and cost-effective options for families in communities that live in food deserts within Durham County. Food deserts are areas that lack affordable and nutritious food options. The mobile farmers markets would alleviate the nutritious burden in neighborhoods that are considered food deserts. The Mobile Food Collaborative brings nutritious foods to communities in need. The Mobile Farmers Market Collaborative would be funded by Durham County Commission, in partnership with the Durham County Department of Health, current farmers markets, and local medical providers. We are asking the Durham County Commission to fund a three-year Pilot Program for MFMC. The program would have three food trucks readily available to go into impacted neighborhoods, and healthcare facilities located within Durham County. This collaboration provides economic incentives for local farmers' markets to supply each food truck with nutritious food. This food is locally sourced and helps the farmers within the county. Each truck would have local produce packaged in boxes for the week. Then healthcare providers throughout Durham County would have the ability to opt into the program. By opting in, providers would be able to prescribe boxes for families enrolled in the program.

Budget Narrative

Staffing Costs

Regarding staffing costs, we assume that there are two full-time employees and nine part-time employees. All employees will be paid a living wage of $15 per hour. Part-time employees will be expected to work 0-30 hours per week and full-time employees are expected to work 40 hours per week. Full-time employees will be paid a salary, instead of a contract. 30% is then added to account for fringe benefits and indirect staffing costs, as well as an additional .2 annual increase in salary. We are assuming a .5 FTE for our Coordinator and Director for the first two years, as well as FTE for our drivers and market. staff. These calculations can be shown within the various salaries between Year 1 through Year 3. Nine workers were chosen because there will be three trucks. Each truck will have one driver and two staff workers. Volunteers are mentioned; however, a specific number has not been specified.

Income/Revenue

There are five federally funded grants that this program would be applicable for. These grants range from one year to three years offering various amounts based on scope and need. We are assuming that the Durham

County Commission would apply for grant funding listed within all of these grants for the MFMC Pilot Program. Durham County Commissioners Office would pick which grants are preferred. They are listed this way to show the eligible grants and funding amounts. It is assumed that not all of the grants would be applied for and used.

We are assuming that 50 families will participate in year one of the pilot program. Followed by a 10-family increase for year two (60 families), and an additional 10 for year three (70 families). Three trucks are needed for 50 families because it allows for our trucks to venture to rural communities and other communities further from the Durham City center. Based on previous research, we are assuming an estimated total of $400 per family per month. This $400 will cover four weeks of meals for a family for four. One area of revision will need to be the contacts among various farmers. We are looking to contact 5-10 different farmers to account for the produce needs. However, data was not readily available for the cost of contracted partnerships in other counties/states. The MFMC Pilot program is going to have a workshop each quarter between farmers and healthcare providers. $200 is allocated for food and beverages for each of the four workshops per year.

Direct Costs

The largest upfront expense will be the food trucks themselves. Food trucks can range in price from $10,000-$150,000. The average food truck costs $50,000. This would be a one-time expense of $150,000 given each truck is $50,000 and there are three trucks. Equipment was budgeted for $1,000 per year, per truck, totally $36,000 per year and $108,000 over three years.

Indirect Costs

Most direct costs are attributed to maintenance and fees for the food trucks. We are assuming that maintenance for the trucks will be $10,000 per truck annually. In addition, we are assuming gas will be $3,640 per year based on the average food truck mileage for 2020. The costs for additional applications and fees are $78 for all three trucks, and $225 for three yearly mobile food unit applications.

Total Costs

The total cost for this program, if we have successful received the Community Food Projects Competitive Grant Program is as follows: (Year 1) 25,227, (Year 2) -112,559, (Year 3) -72,876. The assumption for the total cost was found by taking the total costs of Direct Costs, Indirect Costs, Income/Revenue and Staffing costs and subtracting that from the grant totals. While year 2 and year 3 portrays that we would be making money, it is

important to reiterate that we have not taken the price of contracts of farmers into account. This will make our cost higher and we can assume that the program would not be generating the revenue listed within the table.

Appendix C.3a: Budget Justification Appendix

Table 7. Staffing Costs

Position	Year 1	Year 2	Year 3	Total
Full time				
Project Coordinator	32136	48203.2	75,196	155,536
Program Director	32136	48203.2	75,196	155,536
Part time				
Driver Truck 1	16068	19188	22932	58188
Driver Truck 2	16068	19188	22932	58188
Driver Truck 3	16068	19188	22932	58188
Truck Staff Truck 1	16068	19188	22932	58188
Truck Staff Truck 1	16068	19188	22932	58188
Truck Staff Truck 2	16068	19188	22932	58188
Truck Staff Truck 2	16068	19188	22932	58188
Truck Staff Truck 3	16068	19188	22932	58188
Truck Staff Truck 3	16068	19188	22932	58188
Volunteers	0	0	0	
Total	208884	269098.4	356,781	

Table 8. Direct Costs

Name	Year 1	Year 2	Year 3	Total
Food Truck 1	50,000	0	0	50,000
Food Truck 2	50,000	0	0	50,000
Food Truck 3	50,000	0	0	50,000
Equipement	36,000	36,000	36,000	108,000
Staff T shirts	$200	$200	$200	$600
Total	186,200	36,200	36,200	258,600

Table 9. Indirect Costs

Name	Year 1	Year 2	Year 3	Total
Mobile Food Unit Application	225	225	225	675
Internet	36,000	36,000	36,000	108,000
Gas	3,640	3,640	3,640	10,920
Websites	$200	$200	$200	$600
Food Truck Permit	78	78	78	234
Food Truck 1 Maintenance	10,000	10,000	10,000	30,000
Food Truck 2 Maintenance	10,000	10,000	10,000	30,000
Food Truck 3 Maintenance	10,000	10,000	10,000	30,000
Social Media	$200	$200	$200	$600
Workshops	$600	$600	$600	$1,800
Total	70,143	70,143	70,143	210,429

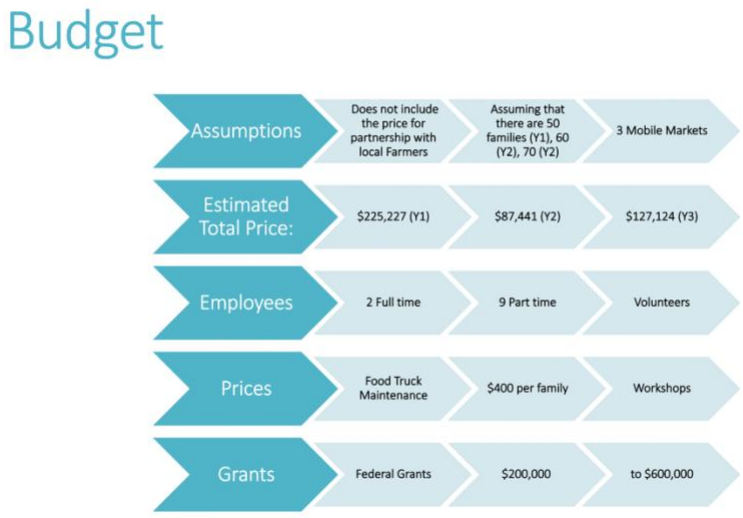
Table 10. Income/Revenue/Grants

Name	Year 1	Year 2	Year 3	Total
Grants				
Community Food Projects Competitive Grant Program (CFPCGP)	200,000	200,000	200,000	600,000
CDC-RFA-DP-23-0013: The High Obesity Program (HOP 2023)	500,000	500,000	500,000	1,500,000
CDC-RFA-DP-23-0012: State Physical Activity and Nutrition Program (SPAN 2023)	600,000	600,000	600,000	1,800,000
CDC-RFA-DP-23-0014: Racial and Ethnic Approaches to Community Health (REACH 2023)	500,000	500,000	500,000	1,500,000
Gus Schumer Nutrition Incentive Program	166666.6667	166666.6667	166666.6667	500000
Contracts				
Contracts with Local Farmers (10 vendors)				
Services ($400 per family, assuming we will have 50 families the first year with a 10 family increase each year following).	240000	288000	336000	864000
Total	2,206,667	2,254,667	2302666.667	

Table 11. Total Costs

Name	Year 1	Year 2	Year 3	Total
Direct Costs	186,200	36,200	36,200	258,600
Indirect Costs	$70,143	$70,143	$70,143	210,429
Income/Revenue	-240000	-288000	-336000	-864000
Staffing Costs	208,884	269,098	356,781	834,763
Cost Total	225,227	87,441	127,124	439,792
Community Food Projects Competitive Grant Program (CFPCGP)	200,000	200,000	200,000	
	25,227	-112,559	-72,876	

Appendix C.4: Individual Presentation Slides and Script



Script- Assumptions: There are various assumptions included within the mobile markets budget. This budget does not account for the price of the partnership between farmers and our program. Upon researching, data was not available to portray an estimated cost of this portion of the program. Additionally, we are assuming that this program will work with 50 families in year 1, 60 in year 2, and 70 in year 3. And 3 food trucks total.

Estimated Total Price: The total price for year 1 an estimated $225 thousand , Y2 $87 thousand Y3 $127 thousand The assumption for the total cost was found by taking the total costs of Direct Costs, Indirect Costs, Income/Revenue and Staffing costs.

Employees: We assume that there are two full-time employees and nine part-time employees. All employees will be paid a living wage. Part-time employees will be paid $15 per hour and full-time employees will be paid a salary, instead of a contract. We are assuming a .5 FTE for our Coordinator and Director for the first two years, as well as FTE for our drivers and market staff.

Prices: We are assuming that 50 families will participate in year one of the pilot program. Three trucks are needed for 50 families because it allows for our trucks to venture to rural communities and other communities further from Durham City center. Based on previous research, we are assuming an estimated total of $400 per family per month. This $400 will cover four weeks of meals for a family of four. The Pilot program is going to have a workshop each quarter between farmers and healthcare providers. Funds will be allocated for food and beverages for each of the four workshops per year.

Grants: Based on the classification of this project there are various federal grants that this project is eligible for. These grants range from 1 year to three year grant, and the award ranges from $200 thousand to $600 thousand. The Durham County Commission would be able to choose which grants work best.

APPENDIX D: ELIZABETH SHIN'S INDIVIDUAL DELIVERABLES

Appendix D.1: Individual Problem Statement

Social Determinant of Health

In this analysis, the specific objective is to focus on official school policies that engage in practices to promote a healthy and safe physical school environment. A social determinant of health that will be focused on is the neighborhood and built environment which focuses on the health and safety of where people live, work, learn, and play (*Neighborhood and Built Environment*). Schools are an integral part of children's lives and it is important to create a safe environment for them. According to the CDC, "creating safe and supportive environments (SSE) emphasizes aspects of the school environment that encourage students to be more engaged in their school life and feel connected to important adults at school and at home" (Centers, 2020). These environments can also help to create a network of peers and adults which are important in building a foundation towards a solid support system.

Specifically focusing on nutrition-related policies to encourage healthy eating habits and reduce the risk and later onset of certain diseases. Having a healthy diet may help to protect against chronic diseases, such as diabetes, heart disease, stroke, and obesity. The short-term impacts include learning healthier eating habits, gaining more nutrition knowledge, children becoming more productive, and having stronger immune systems (World, 2023). The long-term impacts include having a lower risk of non-communicable diseases and creating opportunities to break cycles of poverty and hunger (World, 2023).

Geographic and Historical Context

Durham County is a single-city county located in the Piedmont region of North Carolina and was formed on April 17, 1881 (Powell, 2006). The county is 25 miles long, 16 miles wide, and 28 miles from end to end and is one of the most compact counties in the state. The city is also known as the City of Medicine with healthcare and education as the major industries. It was founded in 1881 and named for Dr. Bartlett Durham (*2020 Durham County Community Health Assessment*).

Durham County is the 6th most populous county in North Carolina with an estimated population of 311,848 people and the non-Hispanic Black community constituting 35.9% of it (*2020 Durham County Community Health Assessment*). The median household income grew from $60,958 to $62,812 between 2019 and 2020, which was a 3.04% increase (*Durham County, NC*. Data USA). Durham County is home to major educational institutions: Duke University and North Carolina Central University; along with additional institutions such as North Carolina School

of Science & Math, Durham Technical Community College, many private schools, charter schools, and Durham Public Schools (*2020 Durham County Community Health Assessment*). There are also two major corporate and research parks, known as Research Triangle Park (RTP) and Treyburn (Powell, 2006). Activity in residential development has been occurring at a high pace as the population is expected to grow fairly rapidly (*2020 Durham County Community Health Assessment*). Therefore, as more people plan to move to Durham county, it is important to establish policies in schools in order for children to grow in healthy and safe school environments.

Priority Population

The priority population will be Black American adolescents who attend elementary, middle, and high schools in Durham County. There has been an increasing concern about poor health and food literacy levels among Black adolescents which can lead to health disparities (Armstrong, K. J. 2021). Black people tend to have a higher prevalence of diet- and lifestyle-related conditions, such as hypertension (Jones, et al., 2022). In 2015-2018, the Centers for Disease Control and Prevention (CDC) reported that there was a 58.4% prevalence of hypertension in Black men, which was greater than 49.8% in White men, 51.9% in Asian males, 50.4% in Hispanic or Latino males, and 50.3% in Mexican males (Jones, et al., 2022). In addition, adolescents living in racially diverse, low socioeconomic status, and urban communities often experience decreased access to healthy food (Armstrong, K. J. 2021). In Durham County, Black, Indigenous and People of Color (BIPOC) residents are disproportionately and negatively affected by the county's food system (*2020 Durham County Community Health Assessment*). They are also more likely to live in areas with high density of fast food restaurants and lower access to retailers with more healthy options compared to white residents (*2020 Durham County Community Health Assessment*). They may also have limited access to public transportation services due to the area they live in and have longer commutes to and from the grocery stores (*2020 Durham County Community Health Assessment*).

Measures of SDoH

In Durham County, 18% of people are food insecure and 25% of children under 18 are food insecure (*2019-2020 Durham County Profile*). The median income for Black households in 2018 was $42,417, which was less than white and Hispanic households, $76,962 and $44,004, respectively (*2020 Durham County Community Health Assessment*). U.S. Census Bureau survey results from 2019 show that about 14.1% of Durham's population lives below the poverty line with 18.4% of Black populations living in poverty (*2020 Durham County Community Health Assessment*). Due to this, there has been a rise in program enrollment such as Supplemental Nutrition

Assistance Program (SNAP) and Medicaid for the low-income populations. Currently, the DPS (Durham Public Schools) offers School Nutrition Services to provide quality meals to students in a clean and sanitary environment (*School Nutrition Services*). There are currently only standards for elementary schools within these services, so moving forward, it would be essential to work on standards for middle and high schools within the program (*School Nutrition Services*). Focusing on adolescent nutrition in school settings would help prevent the later onset of chronic diseases and help mitigate the issues with accessing healthy food in the environment, see Appendix D.1b, Table 12 for details on food insecurity and hunger statistics.

Rationale/Importance

This is a high-priority public health issue and important in Durham County as 35.9% of the population are non-Hispanic Black people (*2020 Durham County Community Health Assessment*). There has also been an increasing concern about poor health and food literacy levels among Black adolescents which can lead to health disparities (Armstrong, K.J., 2021). Food literacy is an individual's nutrition knowledge and food skills which influence food choices, impacting overall health and well being (Armstrong, K.J., 2021). Compared to other racial groups in America, Black Americans experience injustices as a result of poor food literacy which leads to poorer health outcomes (Armstrong, K.J., 2021). Additionally, adolescents that live in low socioeconomic status and in urban communities experience decreased access to healthy food (Armstrong, K. J., 2021). Therefore, it is important to provide resources and more nutrition education to improve their health for the future.

Disciplinary Critique

Ensuring that children and adolescents live in a healthy and safe environment is an important social determinant of health in the public health world. Furthermore, it is important that they have access to healthy foods and nutrition knowledge. That way, they are eating healthier and preventing the onset of chronic diseases, such as cardiovascular disease and hypertension. The focus on non-Hispanic Black adolescents is crucial considering that non-Hispanic black people make up about 36.5% of Durham County's population (*2020 Durham County Community Health Assessment*). Public health nutritionists should ensure that healthy food can be readily available and accessed by Black adolescents as they typically live in low socioeconomic status and in urban communities. The focus should be in the rural areas of Durham County to address the health disparities that they face and promote greater health.

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Appendix D.1a: Individual Problem Statement Appendix

Table 12. Food Insecurity and Hunger Statistics for Durham County in 2019-2020 (County Population = 306,460)

Food Insecurity	
Number of people who are food insecure	55,320
Percentage of people who are food insecure	18%
Children under 18 who are food insecure	16,580
Percentage of children under 18 who are food insecure	25%
Hunger	
Number of children receiving free/reduced school meals	20,774
Percentage of children receiving free/reduced school meals	61%

Appendix D.2: Nutrition Program Analysis and Implementation

Introduction

The neighborhood and built environment is a social determinant of health that focuses on the health and safety of where people live, work, learn, and play (*Neighborhood and Built Environment*). The built environment consists of physical, man-made structures in a certain space that impact and influence people's health and well-being (*Neighborhood and Built Environment*). A key part of the system is addressing access to healthy foods such as fresh fruits and vegetables among non-Hispanic Black residents living in Durham County. Policies such as gentrification, redlining, and affordable housing shortages result in the displacement of lower-income residents and has affected Black neighborhoods in Durham County for many years (Lu, J. 2021). According to The Centers for Disease Control and Prevention, those affected by gentrification typically have shorter life expectancy, higher cancer rates, greater infant mortality, and higher incidence of asthma, diabetes, and cardiovascular disease (Centers for Disease Control and Prevention, Racial, 2022). They are more likely to have limited access/availability to affordable healthy housing, healthy food choices, transportation choices, social networks, and bicycle and walking paths (CDC, Healthy, 2022). It is important to make improvements in the infrastructure of an environment for the health and happiness of the people. With this in mind, improving food access among non-Hispanic Black residents aims to address the structural barriers that they face and create a healthy and equitable environment for them to live in.

Evidence Based Nutrition Program

The United States obesity prevalence is 41.9%, with non-Hispanic Black adults having the highest age-adjusted obesity prevalence of 49.9% (CDC, Adult Obesity, 2022). There is a link that connects obesity to food insecurity and one study found that food insecure adults were 32% more likely to be obese than food secure adults (Pan, et al., 2012). According to Feeding America, 13.5% of Durham County residents and 14% of North Carolina residents were food insecure (Feeding America, 2018). Of the 14% of food insecure individuals in NC, 25.1% were Black residents (*2020 Durham County Community Health Assessment*). In Durham County, obesity was identified as one of the top five county health concerns at 17% (*2020 Durham County Community Health Assessment*). Some barriers to food access include income, lack of transportation, distance to the nearest foodstore, and limited resources (Rhone, A, et al., 2022). These barriers hinder the ability for people to eat a healthy diet. According to a Community Health Assessment Survey, 14.8% of residents reported always eating healthy while 10.2% of residents reported skipping meals or cutting the size of their meal because of not having enough money to buy food (*2020*

Durham County Community Health Assessment). Black residents were significantly more likely than white residents to have skipped or cut meals either sometimes or frequently in the past year (14.9% vs 6.6%) (*2020 Durham County Community Health Assessment*). In 2015, 8.89% of the population were Black people who had low access and proximity to grocery stores (*Go to the Atlas*). In 2016, Durham County had 52 grocery stores, 6 supercenters and club stores, 120 convenience stores, 18 specialized food stores, and 56 WIC-authorized stores (*Go to the Atlas*). In 2018, there were 6 farmers' markets in Durham County (*Go to the Atlas*).

The Mobile Farmer's Market program has shown results of an increase in fruit and vegetable consumption among certain populations, such as children and seniors (Gary-Webb, et al., 2018). The program allows for market stops to be in areas where grocery stores are less accessible and there is an increase in perceived food access. Implementing this program in Durham County will help in promoting local farmers, and work with the food system within the community to make healthy food readily available for the residents.

Evidence Based Outcomes

A short-term outcome of the program is that by May 2025, the proportions of fruits and vegetables consumed by non-Hispanic Black communities will increase by 15% (Gary-Webb, et al., 2018). This will be measured through community surveys administered to Black residents living in Durham County prior to the start of the program and at the end of the program. A long-term outcome of the program is decreasing food insecurity from 25.1% to 20.1% (*2020 Durham County Community Health Assessment*).

Evidence Based Implementation Strategies and Activities

The mobile market program is the main focus of the intervention and will target non-Hispanic Black residents. The entire intervention will span over the course of two years and consist of 6 months of program planning, a 12 month intervention, and 6 months of evaluation. Additional steps in the intervention will include a marketing campaign and educational programming (Gary-Webb, et al., 2018).

During the 6 month planning period, this will be the time to recruit participants, hire and train community health workers, and devise lesson plans. The goal is to recruit around 40 participants, with hopes to retain 75% (30 participants) by the completion of the intervention. Recruitment will be conducted via marketing campaigns, tabling at events throughout the community, outreach to community organizations and businesses, and visiting farmers markets and local farms. Three community health workers will be hired, one educator that has a nutrition background and the other two, representatives from the community. These community health workers will be trained

to plan and lead focus groups prior to the intervention period and develop lesson plans. The focus groups will be facilitated to understand the food environment and the availability of fresh foods currently available in the community.

During the 12 month intervention period, this will mostly consist of the mobile market program. At the start of this period, community surveys will be administered to the participants to collect the intake of fruit and vegetable consumption as well as a consumer satisfaction survey, which will evaluate the satisfaction of participants. Both of these surveys will be administered again at the end of the program. Potential locations/stops for the mobile markets will include hospital lots, community centers, local churches, local businesses/organizations/ recreation centers, and parks. There will also be an educational component where nutritional handouts and pamphlets will be distributed to participants containing nutrition facts and food recipe ideas utilizing the produce from the markets. Meetings will also be held bi-weekly with community members, local farmers, and residents to check-in on what is going well, what is not, and what is needed to move forward. The last 6 months will consist of the evaluation period which will include another community survey which will analyze pre and post changes in fruit and vegetable consumption as well as neighborhood perceptions of food access.

The levels of the sociological framework that the intervention targets are interpersonal, intrapersonal, community, and organizational. Addressing healthy food access targets many levels of the SEF to ensure optimal impact on the target population. The part of the intervention that addresses the interpersonal level of the SEF are the bi-weekly meetings and will help to build a support network among residents, community members, and local farmers. To address the community and organizational components of the SEF, community health workers will work with the county health department to assist with the intervention implementation.

Stakeholders

Stakeholders for this program would include the farmers' markets and mobile markets that currently exist in Durham County, along with all the vendors, owners, and local farmers that sell their produce at the markets. Durham County currently has three farmer's markets which are: Durham Farmers' Market, South Durham Farmers' Market, and East Durham Farmers' Market. Duke University also has a Duke Mobile Market, which could be a great way to gain insight and advice on successful implementation of mobile markets (Duke University). The Inter-Faith Food Shuttle, a non-profit organization that "seeks to support low-income families in food deserts with adequate access to nutritious food", already has a mobile market program which could be a potential partner in the

program (*Mobile Markets*). Another important stakeholder is the Durham County Health Department, who can help with the implementation of the program and gathering of community members. Local community organizations, such as churches, businesses, and recreation centers could also be important partners as these could be potential locations for mobile markets. In addition, hospitals and other health care facilities could also be helpful partners in gathering participants with certain health conditions as well as incorporating healthcare professionals in community involvement.

Budget

The funds for the program hopes to be obtained through grants from the State Physical Activity and Nutrition Program (SPAN 2023), Racial and Ethnic Approaches to Community Health (REACH 2023), and Farmers Market Promotion Program. See Appendix D.2b, Table 13 for additional details regarding the budget allocation.

Conclusion

One of the advantages of the program is supporting and helping out the local farmers that will be participating in the mobile markets. This will help in strengthening the community and local economy and residents will also get better quality products at lower prices (5 Reasons, 2021). A second advantage is being able to bring the produce to the residents themselves, especially if they have lack of access to public transportation, grocery stores, and/or other barriers to healthy food. Another advantage of mobile markets is the strengthening of a sustainable food system within Durham County. With a sustainable food system in place, this would encourage the entire community (residents, farmers, community members) to work together to make healthy foods more available, accessible, and affordable to all (Toward, 2007).

However, a disadvantage to consider is that this program would heavily rely on the seasons and weather. Since most produce is grown seasonally, there might be certain food items that are not available all year-round and growing crops can also be very dependent on the weather. This in turn could result in a limited produce selection which could deter participants from wanting to purchase the produce. Another disadvantage is affordability as although mobile markets have been shown to be sustainable, they are not necessarily profitable businesses (Gary-Webb, et al., 2018). In addition, if not enough revenue is generated, then it would be difficult to cover the costs to keep the program running. Ultimately through this program, the hope is to address the disparities that Black residents face in Durham County by making healthy food more available, accessible, and affordable.

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Appendix D.2a: Nutrition Program Analysis and Implementation Appendix

Table 13. Itemized Budget for Mobile Market Program

Item	Percent of Budget (%)	Description
Personnel	80%	Personnel will be responsible for the development and implementation of the program. They will monitor the program flow, lead cooking classes, offer social support, and facilitate communication with the participants and program partners.
Program Director (1)		
Employees/Community Health Workers (3)		
Volunteers		
Equipment	7%	Equipment will be used for storage of produce products and other mobile-market related needs (i.e. produce, and bags). Cooking demonstration supplies will be needed for the nutrition education component.
Storage for produce (refrigerators, pantries, etc.)		
Produce		
Bags		
Cooking demonstration supplies		
Office Supplies/Marketing	7%	Office space will be utilized for team meetings among personnel members. Marketing supplies will be used for program promotion, advertising, and nutrition education-related needs.
Small-sized office		
Printed educational handouts/community resources		
Vehicle	6%	Vehicle supplies are necessary for transport of produce products to various mobile market locations.
Gas		
Maintenance		
Insurance, registration		

Appendix D.3: Nutrition Program Evaluation Plan

Introduction

The neighborhood and built environment is a social determinant of health that focuses on the health and safety of where people live, work, learn, and play (*Neighborhood and Built Environment*). The built environment consists of physical, man-made structures in a certain space that impact and influence people's health and well-being (*Neighborhood and Built Environment*). An integral part of the neighborhood is addressing access to healthy foods such as fresh fruits and vegetables among non-Hispanic Black residents living in Durham County (*2020 Durham County Community Health Assessment*). The evidence-based nutrition program is the Mobile Farmer's Market program, which has shown results of an increase in fruit and vegetable consumption among certain populations, such as children and seniors (Gary-Webb, et al., 2018). The program allows for market stops to be in areas where grocery stores are less accessible and demonstrates an increase in perceived food access (*5 Reasons to Support your Farmers Market*). Implementing this program in Durham County will help in promoting local farmers, and work with the food system within the community to make healthy food readily available for the residents (*5 Reasons to Support your Farmers Market*) . Additionally, the program will be conducted by the Durham County Public Health Department.

Study Design/Data Collection

A pilot study will be conducted to test the feasibility and success of the Mobile Farmers Market program. The evaluation plan is modeled after the evidence-based Green Grocer Mobile Farmer's Market program in Allegheny County, Pennsylvania, which demonstrated improved health outcomes in underserved communities by offering accessible healthy food options (Gary-Webb et al., 2018). A short-term outcome of the program is that by May 2025, after two full years of program duration, the intake of fruits and vegetables (servings/day) consumed by Black dense communities in Durham County will increase by 15% (Gary-Webb, et al., 2018). This will be measured through community surveys administered to Black residents living in Durham County prior to the start of the program and at the end of the program.

The evaluation method will consist of pre/post surveys and focus groups while collecting qualitative and quantitative data. The surveys that will be used include a Customer Satisfaction and Outcomes Survey (CSOS) and the Food Stamp Program: Fruit and Vegetable Checklist. The goal is to have about 50-100 people complete the survey. The Fruit and Vegetable Checklist will be administered at the start of the program and will collect fruit and

vegetable intake of participants (*Fruit and Vegetable Checklist*, 2009). The primary outcomes from the survey will be the measures of fruit and vegetable consumption. The reported intake will be in terms of "days per week" and "servings per day" and using the measure from the Behavioral Risk Factor Surveillance System (Gary-Webb, et al., 2018). Refer to Appendix D.3b, Figure 7 for more details. The Customer Satisfaction and Outcomes Survey (CSOS) will be administered pre- and post-intervention to assess the individual-level dietary patterns, behaviors, and perception of food access. The outcomes will consist of metrics evaluating participants' satisfaction with the mobile market program (Gary-Webb, et al., 2018). Refer to Appendix D.3b, Figure 8 for more details. Focus groups will also be used and held at the start of the program, 1 year after program implementation, and at the end of the program. The focus groups will be with the same participants to access qualitative data. There will be 2 groups with 10 people in each group and the gathered data will be about the perceptions of the program and intake of fruits and vegetables.

Sample and Sampling Strategy

The goal sample size will be 50 residents in already-identified neighborhoods in Durham County. The neighborhoods will consist of Black dense communities, in which their census tracts are over 50% Black residents. The sampling strategy will be an address-based sampling within three Durham census tract neighborhoods (Gary-Webb, et al., 2018).. The goal is to sample 1000 addresses by mailing postcards or calling to inform about the survey. If they are interested, they can either go online to a website or call a phone number to complete the survey (Gary-Webb, et al., 2018). Additionally, an incentive for completing the survey will be established where the participants will have a chance to win a gift card.

Specific Measures

The outputs that will be measured include weekly market visits and monthly nutrition education/cooking classes which will be used to help with the implementation and measure the amount of produce purchased. The outcome will be the change in fruit and vegetable consumption and this will be measured by the survey, which will look at the change in percentage of fruit and vegetable expenses. A construct that will be measured is the knowledge of nutrition and healthy eating habits. The specific scale that will be used is the USDA Fruit and Vegetable Checklist (*Fruit and Vegetable Checklist*, 2009).

Timing

Evaluation starts with the pre-surveys that will be administered to residents, at the start of the program, to gather baseline data. After 1 year of program implementation, another focus group will be held to assess the progress of the program . The final evaluation will be held at the end of the program with final post surveys and focus groups.

Analysis Plan

The type of statistics that will be used is a mixed-method approach. Qualitative data will come from both focus groups and surveys, while quantitative data will only come from surveys. The quantitative data will include the descriptive statistics for the sample, both from the overall data and data from each neighborhood and the percentage of fruit and vegetable consumption by Black residents in Durham County. The descriptive statistics will include gender, race, age, marital status, annual household income, and education level. This statistic will be measured for the overall sample and for each neighborhood. In addition, the means and standard deviation for numeric and count variables will be taken as well as the frequency and sample categorical measures. The qualitative data will consist of metrics evaluating the neighborhood food environment and participants' satisfaction with the progress of the mobile market program.

Sources of Funding

The funds for the program hopes to be obtained through grants from the State Physical Activity and Nutrition Program (SPAN 2023), Racial and Ethnic Approaches to Community Health (REACH 2023), and Farmers Market Promotion Program. See Table 1 in Appendix for additional details regarding funding opportunities.

Data Use and Dissemination

An important part of the program plan is communicating the findings to stakeholders to gain support for implementing the Mobile Market program in other counties in North Carolina. The data will also be shared with public health officials in Durham County, as well as other County Health Departments in North Carolina. To disseminate key findings, professional briefs with the Durham County Health Department, elected officials, and community/economic development organizations will be held. Social media utilization (i.e. Facebook, Instagram, Twitter) will also be used to share the results of the Mobile Market program. The use of social media platforms will help in reaching various key stakeholders, such as community members and local farmers, as well as the general public. To further engage Durham County residents, flyers will be sent out to acquire interest and gain support for

further implementation of the program. For the future, annual impact reports will be created for future programs to consider when developing food access-related interventions.

Conclusion

Ultimately, interdisciplinary approaches are essential in addressing public health issues related to nutrition and promoting equity. In collaboration with the Durham County Public Health Department, community stakeholders, and residents of Durham County, the hope of the program is to make healthy food more available, accessible, and affordable. Furthermore, it is important to address the root causes of the health disparities that Black residents face in Durham County and develop effective strategies to improve healthy food access within these communities. Through these efforts, there is hope in working towards a more equitable and just food system that supports the health and well-being of all members of the Durham County community.

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Appendix D.3a: Nutrition Program Evaluation Plan Appendix

Table 14. Funding Opportunities

Funding Opportunity	Link	Amount	Deadline
CDC-RFA-DP-23-0012: State Physical Activity and Nutrition Program (SPAN 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342954	$600,000	March 28, 2023
CDC-RFA-DP-23-0014: Racial and Ethnic Approaches to Community Health (REACH 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342940	$500,000	April 11, 2023
USDA-AMS-TM-FMPP-G-23-0010: Farmers Market Promotion Program	https://www.grants.gov/web/grants/search-grants.html	$500,000	May 2, 2023

Figure 7. USDA Fruit and Vegetable Checklist

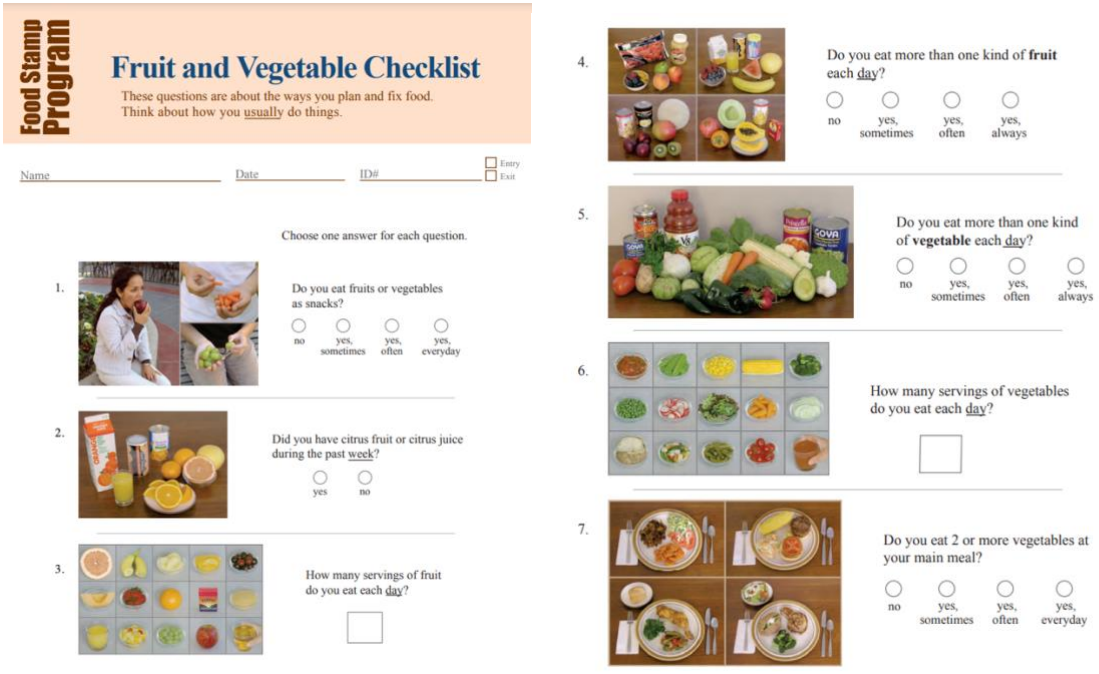

Figure 8. Consumer Satisfaction and Outcomes Survey

1. Mobile Farmers Market is affordable
    1. Strongly agree
    2. Somewhat agree
    3. Neutral, somewhat, or strongly disagree
2. Food purchased from Mobile Farmers Market is of high quality
    1. Strongly agree
    2. Somewhat agree
    3. Neutral, somewhat, or strongly disagree
3. Pleased with selection of Mobile Farmers Market items
    1. Strongly agree
    2. Somewhat agree
    3. Neutral, somewhat, or strongly disagree
4. Produce typically purchased most from
    1. Supermarket, grocery
    2. Supercenter, discount store
    3. Mobile Farmers Markets/farmer's market, garden, produce to people
    4. Food pantry, other

Appendix D.4: Individual Presentation Slides and Script

The program is modeled after the evidence-based Green Grocer Mobile Farmer's Market program in Allegheny (Al-uh-gain-ee) County, Pennsylvania, which demonstrated improved health outcomes in underserved communities by offering accessible healthy food options (Gary-Webb et al., 2018). The Collaborative will provide on-site cooking demonstrations and nutrition education to promote long-term growth and behavior changes (County Health Rankings & Roadmaps, 2020). The program aims to improve health outcomes and reduce health disparities associated with poor nutritional habits (County Health Rankings & Roadmaps, 2020). It also aims to strengthen the food system and support local farmers and agriculture (Delivering Community Benefit, 2018), while maintaining sustainability.

APPENDIX E: STEPHANIE SPERRY'S INDIVIDUAL DELIVERABLES

Appendix E.1: Individual Problem Statement

Background

Social determinants of health are the various socioeconomic, environmental, and general living conditions that impact individuals' quality of life and overall health. Health care itself is a relatively weak determinant of health, compared to the social determinants (Artiga, 2018). Physical activity is an integral component of holistic health. Harmony between the physical, mental, social, and emotional wellbeing of individuals lends itself to improved health measures, notably in aspects of physical health. Physical activity as a social determinant of health is impacted greatly by location, namely neighborhoods and the surrounding built environment. A person's postal code has been found to be a better predictor of health than their genetic code (Graham et al., 2015). In the short-term, physical activity can reduce symptoms of anxiety, improve symptoms of depression, and stimulate endorphin levels to improve mood and emotional balance (Walden University, 2016). There are also long-term health benefits to physical activity. Adults who engage in regular physical exercise have a reduced risk for developing chronic illnesses such as cardiovascular disease and type 2 diabetes (CDC, 2022). The presence of sidewalks in neighborhoods, protected street-crossings, parks or green spaces, walking trails, bike paths, and recreational facilities for physical activity all promote physical activity. Access to green spaces impact perceptions of general health and are positively associated with levels of physical activity (Maas et al., 2006; Mytton et al., 2012).

Demographics

Durham County is located in the central Piedmont region of North Carolina. Following the Civil War, the tobacco manufacturing industry prospered in the area and Durham County separated from Orange County and Wake County in 1881 (Durham County, n.d.). The demographic breakdown of Durham County is outlined below. According to the US Census Bureau estimates for 2021, Durham County has a total population of 326, 126 residents (US Census Bureau).

Table 15. Demographics of Durham County

Demographics of Durham County US Census Bureau	
White	54.5%
Black or African American	35.9%
Hispanic or Latino	13.8%
American Indian and Alaska Native	1.0%
Hawaiian or other Pacific Islander	0.1%
Two or more races	2.8%

In Durham County, 40% of low-income adults do not live within a 10-minute walk to a park and the county resident satisfaction survey showed residents believed that greenways and trails should be a priority over the next two years (Durham County Community Health Assessment, 2020). The safety and walkability of neighborhoods was also a concern. The 2019 Community Health Assessment survey identified that 67% of respondents indicated the presence of more sidewalks connecting to other places would cause them to walk more. Globally and nationally, heart disease is a leading cause of death, diabetes is #9 leading cause (World Health Organization, 2020). Black and Hispanic individuals have a higher prevalence of heart failure than other races (Breathett, 2020). Physical activity reduces the risk of heart disease by improving cardiovascular health. Low-intensity daily exercise and low-fat diet reduce risk of developing type 2 diabetes (Colberg et al., 2010) In line with the Healthy People 2030 objective to improve cardiovascular health in adults, Durham County can encourage physical activity through structural improvements that make walking as a means of transportation and exercise easier. The epidemiological measures of physical activity as a social determinant of health can be evaluated by the incidence and prevalence of Type 2 diabetes and cardiovascular disease.

Health Impacts

Health policy and public health practitioners are invested in population health and disease prevention on large and small scales. The focus is on the interconnected factors that impact a policy or health outcome. In this case, the intersection of city planning, Durham Parks and Recreation, Go Durham Transit, and neighborhood developments would all be taken into consideration and valued as stakeholders in the neighborhood and built environment. Policy experts, as part of the policy process, would provide legislative advising for initiatives to improve the physical health of residents of Durham in direct and indirect ways. This might be achieved through direct project management or negotiation with identified

stakeholders. Policy advisors can oversee health initiatives and act as liaison between stakeholders in negotiating agreements to protect or create more green space and generate infrastructure for outdoor areas within a community. Gaps in racial disparities found in health and wellness can be addressed by initiatives that improve walkability and access to green spaces. Hispanic and Latino neighborhoods in Durham County specifically cited neighborhood safety as a barrier to physical activity, expressing a desire for more police response to violent crime and better neighborhood lighting (Durham County Community Health Assessment, 2020).

Improving the infrastructure of walkability and physical activity in Durham County would have secondary economic benefits. Outdoor gathering spaces and spots for congregating would attract community members. Community members are likely to support local businesses and vendors nearby or along their walking routes. Public spaces increase the opportunity to host community events like flea and farmers markets, drawing support for the local community and from the local community. This would in turn bolster economic benefits for small business-owners and local agriculture.

There are many complex dynamics impacting the potential for residents of Durham County to be physically active in their community. Walking is a common form of exercise and the presence of sidewalks, bike paths, and green spaces all influence an individual's feelings of safety in walking. Additionally, neighborhood safety in relation to crime and police response very directly impact residents' physical activity. Durham County has a chance to prioritize such issues and improve the health of its residents as well as benefit from the positive economic outcomes of the interconnected factors following physical activity as a social determinant of health.

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Appendix E.2: Policy Analysis

Background

The Durham County Community Health Assessment of 2020 named obesity, diabetes, and food access as a top five health priority, following the 2019 Community Health Assessment Survey. This survey identified that Black residents were more likely to skip meals sometimes or frequently in the last year, at a rate of 14.9% compared to white residents at 6.6% (2020). Cost (15.7%), difficulty finding healthy options while out (6.7%), and limited access to healthy foods (5.1%) were identified by residents as reasons they do not consume fresh, healthy foods. Consumption of fresh produce is a staple of dietary fiber recommendations, which contribute to lower risks of cardiovascular disease and play a role in obesity prevention (Slavin & Lloyd, 2012). The purpose of this analysis is to identify policy options to address the aforementioned barriers and increase access to fresh foods for residents of predominantly non-Hispanic Black neighborhoods in Durham County, North Carolina.

Introduction

The first policy option, a prescription produce program, is based on a previously successful initiative in Oregon. The Veggie Rx program used prescriptions from health care providers as vouchers for fresh produce at local farmers markets (Central Oregon Health Council, n.d.). The second policy option would revive a statewide program that operated from 2013-2018 across North Carolina. NC Growing Together facilitated collaborations between private, public, governmental, and university sectors to sustain the local food supply chain and support the economic viability of smaller, local producers (Center for Environmental Farming Systems, 2018). The proposed policy options will be evaluated according to estimated cost to the county, magnitude of impact, political feasibility, and equity-focused implementation. Policies that maximize return on investment while not placing significant financial strain on the county will be more desirable. Recognizing the impact of a policy is the primary concern, impact will be prioritized over cost, so long as the cost is not burdensome. Since the policies aim to address an equity gap in access to healthy food, equity is a main feature of both proposals and are not expected to differ significantly. Finally, the political feasibility will largely be a product of the funding mechanism of each policy proposal and engaging key community members as stakeholders in the endorsement of the proposed policies.

Policy Analysis

Prescription Produce Program

Based on the pilot Veggie Rx program of Oregon, the proposed Prescription Produce Program will mimic the use of provider prescriptions that provided fresh produce via prescriptions redeemed at local farmers markets for patients with diet-modifiable diseases and experiencing food insecurity. This prescription acted as a subsidy, increasing access and reducing the financial burden of fresh produce while also creating community linkages between health care and community resources to benefit participants (Central Oregon Health Council, n.d.). In 2020, eleven Veggie Rx programs collectively served an estimated 1,300 participants and bolstered the business of small farmers (Support, 2022). The proposal for a similar Durham County Prescription Produce Program will leverage Durham's high concentration of healthcare providers, between both Duke University and University of North Carolina at Chapel Hill health systems, while also providing economic benefit for Durham's more than 300 farms and numerous open air farmers markets (Ohletz, 2022).

These prescription subsidies will also be redeemable at participating food co-ops and fresh markets. In a statewide survey of participating programs in Oregon, Veggie Rx served more than 10,000 patients and created an economic stimulus of almost $125,000 for local agriculture (Summer and Mujeres, 2017). Serving more than 1,300 individuals at a benefit equivalent of $320 per participant in 2021, Veggie Rx cost more than $400,000. The majority of the cost will be reimbursement to local farmers for the prescription redemption. The potential impact of the program will be determined by the accessibility of health care providers to write produce prescriptions for residents in the areas where access to healthy food is most needed. This would require existing health coverage and regular visits with a provider unless a free community clinic model were incorporated. The community clinic model would better address the equity of access as well as the potential disparity among the non-Hispanic Black neighborhoods. The Lincoln Community Health Center, located in Durham, is poised to serve as an access point for produce prescriptions. Serving primarily uninsured populations and those at or below the Federal Poverty Level, Lincoln Community Health Center Health care providers in the Triangle area and small farms would be primary stakeholders, as well as beneficiaries of the program. Overall, Prescription Produce programs seem relatively politically feasible, with no parties expected to note strong opposition. Health care providers in the area are somewhat powerful and might be more inclined to get involved in the proposal because the burden on them would

be minimal. Small farmers are not very powerful, though might readily support the program if the reimbursement for their participation is advantageous to their own growth and security.

North Carolina Growing Together (NCGT) 2.0

The second policy option is based on a federally funded program that ran from 2013-2018 in North Carolina. The United States Department of Agriculture funded a project spearheaded by the Center for Economic Farming Systems that addressed food security in North Carolina by facilitating collaborations between local agriculture and retail grocers across the state, stocking markets with locally grown produce (Center for Environmental Farming Systems, 2018). The mission of this program would be consistent with NCGT, but focus its efforts on bringing fresh, local produce to chain grocers and local markets around Durham County. Archival evaluation data of this program has yet to be released. The revival of this project would narrow its focus to Durham County and farms within 60 miles of the county. Similar to the travel limitations of farmers market vendors, this mileage restriction will promote the inclusion of local agriculture. Uniquely, NCGT 2.0 will intentionally create partnerships between local agriculture and local chain grocers and markets, maximizing the accessibility of fresh produce in stores closest to neighborhoods where the impact is aiming to reach. These stores will likely include various Food Lion, Harris Teeter, and Wegmans locations.

Since the original NCGT program was funded by a grant, the proposed replication might also be eligible for federal funding, minimizing the cost to the county in securing more than $200,000 in USDA grant funding for Community Development (). The program would likely be successful in increasing access to healthy food, though it will not address the cost burdens faced by non-Hispanic Black residents in economically disadvantaged neighborhoods. For this reason, the program might not have the scope to address the issue of fresh food access in an equitable way. Local farmers as well as grocery market franchise managers would likely support the program and be engaged in its proposal, though their political power is somewhat limited.

Final Recommendation and Evaluation

Based on evaluations of each policy's estimated cost to the county, magnitude of impact, political feasibility, and equity-focused implementation, the Prescription Produce Program stands out as a promising proposal to address the obesity, diabetes, and food access health priority named in the 2019 Community Health Assessment Survey by way of increasing access to fresh produce. The Prescription Produce Program will utilize the high concentration of healthcare providers in the Research Triangle area as well as the reach of the Lincoln Community

Health Center in Durham to maximize the magnitude of impact and equity-focused implementation. With no anticipated opposition from stakeholders or special interest groups, the favorable political feasibility is also an endorsement for the policy.

Throughout the duration of the program, data will be collected on the number of produce prescriptions being written compared to the number of prescriptions being redeemed at farmers markets, fresh markets, and co-ops. This data will be used as a process evaluation metric for the program. To assess the effectiveness of increasing access to and consumption of fresh, healthy food as an outcome measure, surveys will be administered prior to initiation and 18-24 months into the program to collect participant data on self-reported consumption of fresh produce. Changes in these data will be meaningful for the success of the program as well as providing an efficiency metric.

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Appendix E.3: Budget Justification

Summary

The proposed Prescription Produce Program emulates previously successful efforts to increase access to fresh produce in other states. Similar to implementation in Oregon, this program will use health care provider prescriptions as vouchers for fresh produce while establishing community linkages between beneficiaries, health care providers, and local farmers (Central Oregon Health Council, n.d.). These prescriptions will be redeemable at local farmers markets, grocery chains, and other fresh markets. In the heart of the Research Triangle, Durham County has unparalleled access to health care providers. This program hopes to leverage the accessibility of providers and existing community relationships through low and no-cost visits at the Lincoln Community Health Center for produce prescriptions. The goal of this pilot program is to improve access to fresh produce for neighborhoods made up of predominantly non-Hispanic Black residents. Census tracts 13.01 and 13.03 have been identified as having more than 50% non-Hispanic Black residents and being low-income areas. The budget reflects anticipated start-up costs to the program as well as costs for a duration of 3 years. The program will seek funding from federal grants as well as endowments.

Budget Narrative

Projections were made for Year One, including start-up costs, and operating costs for Years Two and Three. By initially focusing on residents in census tracts 13.01 and 13.03, the program hopes to reach a combined 3,000 residents to provide them with access to affordable fresh produce. Following the models established by other statewide programs, this program aims to provide a benefit equivalent to $300 per resident per year in produce prescriptions (Newman et al., 2022). This total amount will be paid through a reimbursement contract to local farmers who supply the produce.

A small core staff and office space will be maintained near the identified census tracts, on Fayetteville Road in Durham. The staff will consist of a Program Director, two Senior Program Coordinators, and five junior-level Program Coordinators. Salaries were determined based on ranges for similar positions in nonprofit organizations (Salary.com, n.d.). Physicians at Lincoln Community Health Center are each projected to contribute .1 full-time equivalent within their existing health center arrangements. Initial costs for furnishing the office will be incurred in Year 1 but have been subtracted from subsequent years for the estimated office upkeep. Office supplies are anticipated to be an ongoing expense as are building utilities and technology maintenance.

The program will seek revenue to cover program costs through grant allocations provided by the United States Department of Agriculture National Institute of Food and Agriculture's Gus Schumacher Nutrition Incentive Program - Produce Prescription Program and allocations from the Duke Endowment. A similar Duke Endowment was awarded in 2021 to fund research on the benefits of food prescriptions (Gillings School of Global Public Health, 2021). The Durham County Prescription Produce Program hopes to leverage community relationships and local agricultural investment to further bolster the economic benefit for both residents and farmers, and meet the obesity, diabetes, and food access priority identified in the Durham County Community Health Assessment Survey (2020). Mindful of the health benefits of the consumption of fresh produce, such as lower risks of cardiovascular disease and obesity prevention, the Produce Prescription Program hopes to alleviate some of the burden of access to fresh produce while improving the health of residents living in predominantly non-Hispanic Black neighborhoods in Durham County (Slavin & Lloyd, 2012).

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Appendix E.3a: Budget Justification Appendix

Table 16. Prescription Produce Program Budget

Staff Costs	**# of employees**	**Salary**	**Fringe benefits (30% incl. tax + health insurance)**	**Total Annual Cost**	**Projected 2% increase/year**	**Staff costs for 3 years**
Full-time						
Program Director	1	$75,000	$22,500	$97,500	$3,536	
Senior Program Coordinators	2	$68,000	$20,400	$176,800	$7,280	
Program Coordinators	5	$56,000	$16,800	$364,000	$12,766	
				$638,300	**$23,582**	**$685,464**
Part-time	**FTE**					
Physicians at Lincoln Community Health Center 915)	0.1	Independent from program				
Other Program Costs				**Total annual non-personnel expenses**		**Non-personnel expenses for 3 years**
Rent	$15,066	1,116 square feet				
Utilities	$2,343.60	$2.10 per sq feet				
Technology	$4,800	$600 per employee				
Office furnishings and equipment	$12,000					

Office supplies	$8,000					
				$42,210		**$102,628.80**
Contracts	**Benefit Equivalent**	**Anticipated Beneficiaries**		**Total annual contract amount**		**Total contract amount for 3 years**
Local Agriculture Reimbursement Contract	$300 per resident per year	3000 residents	(piloted in Durham census tracts 13.01 and 13.03)	**$900,000**		**$2,700,000**
				Total Year 1 Cost		**Total 3 Year Program Cost**
				$1,580,509.6		**$3,488,092.8**
Income and Revenue						
Grants and Endowments		**Award**		**Total Revenue**		**Total Revenue for 3 Years**
The Gus Schumacher Nutrition Incentive Program - Product Prescription Program	USDA Grant	$950,000				
The Duke Endowment	Endowment	$765,000		**$1,715,000**		**$5,145,000**
			Bottom Line Revenue - Costs	**$134,490.40**		**$1,656,907.20**

Appendix E.4: Individual Presentation Slides and Script

Mobile Farmer's Market Collaborative

- Mobile produce markets increase fruit and vegetable consumption[6]
- Coalition of nutritious food sources and mobile markets throughout Durham County
- Bring fresh food options directly to predominantly Black neighborhoods and community locations on a rotating schedule
- Financial support: doubling value of food assistance program benefits
- Monthly Collaborative meetings to discuss program and provide additional resources

Mobile produce markets have proven to be effective at increasing the consumption of fruits and vegetables by improving access to healthy foods (Hsiao et al., 2019). Our proposed Mobile Farmer's Market Collaborative will create a coalition of nutritious food sources and mobile markets throughout Durham County as well as provide funding and resources for existing mobile produce markets. The Collaborative aims to bring fresh food options to residents in their home communities, utilizing a dedicated mobile market rotating between predominantly Black neighborhoods, and locations such as community centers, churches, and hospitals. To address some of the financial burdens of healthy eating, the price of produce will be subsidized and made more accessible to low-income individuals by doubling the value of food assistance benefits. The Collaborative will also plan to hold monthly townhall meetings to receive feedback from the community and provide additional food access resources to Durham County residents.

APPENDIX F: YUHAN TAO'S INDIVIDUAL DELIVERABLES

Appendix F.1: Individual Problem Statement

Social Determinant of Health (SDoH):

Social determinants of health (SDoH) are the conditions that influence a wide range of health, functioning, and quality-of-life outcomes and risks in the environments in which people are born, live, learn, work, play, and worship (Healthy People 2023, n.d.). Neighborhood and the built environments is one of the five SDOHs identified by Healthy People 2030; one objective is access to foods that support healthy dietary patterns within the neighborhoods. Lack of access to healthy food directly impacts many people's health outcomes, including Durham County, North Carolina residents. Short term impact of this issue includes inadequate intake of fresh fruit and vegetables, dairy products, and complex micronutrients (Evans et al., 2015). Long-term impacts of low healthy food access include a high prevalence of all-cause mortality, Obesity, type 2 diabetes, cardiovascular disease, and certain types of cancer (Healthy People 2023, n.d.)

Geographic and Historical Context:

Durham County ranked number 6th for the most populous county in North Carolina. The county seat, Durham, is the 4th largest municipality in the state (City of Durham, n.d.). The county population has a diverse racial profile, including 42.2 % of White (Non-Hispanic), 36.5% of Black or African American (Non-Hispanic), 9.11% of White (Hispanic), 4.89% of Asian (Non-Hispanic), and 3.33% of Other (Hispanic) (Data USA, n.d.). In 2020, Durham County, N.C., had a population of 318k (Data USA, n.d.). The population has grown by around 50k, representing an increase of about 16%, in the past decade (City of Durham, n.d.). In 2015, the U.S. Department of Agriculture (USDA) determined that 20-30% of Durham residents live in neighborhoods with low access to a grocery store. In addition, 46% of the residents agreed that Obesity, diabetes, and food access are one of the top county's health priorities (Durham County Department of Public Health, 2020). Durham County, N.C., has many ongoing community initiatives and grants that aim to supply and deliver fresh and nutritious food to residents living in low-healthy food access regions, such as the Farmer Foodshare and Root Causes Fresh Produce Program.

Priority Population:

The priority population is the low-income non-Hispanic Black population living in Durham County, N.C. According to Dutko et al. (2012), nationwide surveys have indicated that the percentage of non-Hispanic Black living in urban food desert neighborhoods is twice as large as in other urban neighborhoods. Durham county has a

significantly large non-Hispanic Black population of 112k, accounting for 36.5% of the population. 13.5% of people in Durham County, NC, live below the poverty line, which is higher than the national average of 12.8%; in addition, the largest ethnic group living in poverty is Black, followed by White and Hispanic (Data USA, n.d.). Current research has indicated that low-income individuals living in limited healthy food access neighborhoods are more likely to adapt to an unhealthy diet and have a higher risk for nutrition-related chronic diseases compared to higher-income neighborhoods (Evans et al., 2015)

Measures of SDOH:

Food Environment Index score (0 to 10), also known as FEI, is calculated based on the percentage of people with limited access to healthy food and the percentage of people with food insecurity to indicate the amount of support for healthy eating in the local food environment. Durham county's FEI is 6.8, which is below the county average in North Carolina of 7.5. 18% of Durham residents lack access to reliable food sources, higher than the state average of 16%. In addition, 7% of low-income residents (200% or less of the federal poverty threshold for the family size) have limited access to a grocery store, which is higher than the state average of 5% (North Carolina Division of Public Health, 2018).

Rationale/Importance:

Eating a healthy diet is very challenging without access to healthy food. Adequate nutrition impacts the health and well-being of people across all age groups, including lowering the risk of all chronic diseases, such as diabetes and heart disease (Azétsop et al., 2013). Food access is a critical component of food insecurity, and food insecurity related healthcare expenses cost about $90 billion per year (Azétsop et al., 2013). In Durham County 42, 890 people are food insecure, and 13,720 are children under 18 (Foodbank of Central & Eastern North Carolina, n.d.). Food insecurity is associated with delayed development in young children, increased risk of chronic illness, such as asthma and anemia, and behavioral issues, such as anxiety and aggressive behaviors (Feeding America, n.d.)

Disciplinary Critique:

Dietitians interact with patients affected by food insecurity in many settings, including clinical and community (Wetherill, 2018). These patients are more likely to experience nutrient deficiencies that can lead to anemia, low bone density, and other metabolic syndromes (Wetherill, 2018). Dietitians have undergone training to apply the Nutrition Care Process for food-insecure populations to identify nutrition problems, design interventions, and monitor and evaluate progress (Wetherill, 2018). Improving food access significantly impacts populations that

face systemic disadvantages in healthcare access, such as racial and ethnic minority communities, low-income residents, people living in rural areas, and older adults (Healthy People 2023, n.d.) Therefore, policies and programs promoting more equitable access to healthy food are crucial for everyone to achieve a healthy dietary pattern.

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Appendix F.2: Nutrition Program Analysis and Implementation

Introduction

Neighborhood and built environments are among the five SDOHs identified by Healthy People 2030; one objective is to provide access to foods supporting healthy dietary patterns within the neighborhoods (Healthy People 2030, n.d.). According to the USDA, 20–30% of residents in Durham County live in areas with limited access to grocery stores. (Durham County Department of Public Health, 2020). In addition, it has been shown by studies that low-income and racial/ethnic minority populations are disproportionately affected by low food access, which raises challenges in making healthy food choices (Hilmers et al., 2012). According to data from the Durham County Public Health Department, Black non-Hispanic households in Durham County, North Carolina, are more likely to experience food insecurity than their white counterparts. In 2018, 14% of the population in Durham County, N.C., experienced food insecurity. Within this group, African Americans made up 25.1%, Hispanics made up 15.7%, and white people made up 9.4% (Durham County Public Health Department, 2020). This disparity in food insecurity is likely due to various factors, including lower household income, limited transportation, and distance to healthy foods (Durham County Public Health Department, 2020). This nutrition program aims to improve the neighborhood disparities in healthy food access and bring equitable resources into underserved communities to promote healthy eating habits and strengthen nutrition-related health outcomes.

Evidence-Based Nutrition Policy or Program

The lack of healthy food options and limited food access in Durham County has been linked to a range of adverse health outcomes, including obesity, type 2 diabetes, cardiovascular disease, and poor mental health outcomes, such as depression and anxiety (Durham County Department of Public Health, 2015; Gunderson et al., 2014; Hilmers et al., 2012). The most significant barriers preventing low-income individuals and ethics minorities from engaging in healthy food shopping were the high cost of healthy food, insufficient geographic access to healthy food, the poor quality of the healthy food that was available, and the generally poor quality of the nearby retail stores (Evans, 2015). Mobile markets (MM) are increasingly being recognized as a potential solution to improve food access, especially in rural areas where families must travel great distances to obtain grocery stores that provide fresh food and where access to healthful food is limited (Healthy Food Access, n.d.; Gary-Webb, 2018). MM, like farmers' markets, can visit different areas on a regular or rotating basis and serve several towns in a short amount of time because of their flexibility in terms of location (Healthy Food Access, n.d.). Based on a quantitative study, the

MM reaches customers who are food insecure, and long-term MM use is associated with lower food insecurity and higher F.V. intake. (Horning et al., 2021). Successful programs across the U.S., including the Green Grocer Mobile Farmer's Market in Allegheny County, Pennsylvania, have improved health outcomes in underserved communities by providing accessible healthy food options. A pre-post survey found that the Green Grocer program resulted in a significant increase in fruit and vegetable intake among participants; specifically, Homewood and Clairton residents showed a 13% and 20% increase in vegetable intake, respectively. The majority of participants also reported a positive experience with the program, and most intended to continue shopping at the mobile farmer's market in the future (Gary-Webb et al., 2018). Furthermore, N.C. Triangle Double Bucks Incentive Program and similar initiatives provide matching funds for federal nutrition assistance benefits used to purchase fresh produce at participating farmers' markets and retail stores in the Research Triangle region of North Carolina, with the goal of increasing access to healthy food, improving health outcomes, and supporting local farmers and businesses (Rural Advancement Foundation International-USA, 2023).

Evidence-Based Outcomes

The first short-term outcome objective is that, by May 2025 (2 years of implementation), the proportion of fruits and vegetables consumed by African American dense communities in Durham County will increase by 15%. The outcome will be evaluated by a pre-post survey every six months. The percentage increase is determined based on the increase in vegetable intake of the Green Grocer mobile farmer's market, which was 13-20% (Gary-Webb et al., 2018). The second objective is that, by May 2025, after one full year of program duration, money spent at the market will increase by 12%, which will be evaluated by the sales report. This outcome is determined through the impact report of an existing mobile farmer's market named Fresh Truck. One of the major milestones they concluded is the amount of dollars spent on healthy food (About Fresh, 2022). This program's long-term impact is to reduce the African American food insecurity rate in Durham County from 25.1% to 20.1% by seven years of program implementation, which will be tracked by census data and Durham County Community Health Assessment annually. This outcome is determined by a study that has suggested that mobile produce distribution systems can be a strategy to address food insecurity and improve health outcomes in low-income urban communities (Widener, 2012).

Evidence-Based Implementation Strategies and Activities

A mobile market is a condensed farmers market that can be driven to places like food deserts, low-income neighborhoods, and areas without fresh, wholesome food options. (Delivering community benefit: Healthy food playbook, n.d.). The proposed program will deliver fresh produce weekly to low-income and predominantly black neighborhoods in Durham County, N.C., available for vehicle shopping and online pick-up orders. The program will start by serving communities with a population of greater than 50% black residents, such as census tract 13.01, 13.03, and 20 (Statesman Journal, n.d.) A mixed-method online survey will be distributed monthly to the community to determine culturally appropriate foods that residents want to purchase from the mobile market. A prepackaged meal box will also be available for purchase at a discounted price that includes uncooked fresh produce and seasonings needed to cook a specific recipe that can serve a family of four with a step-by-step recipe card or video demonstration and require minimal cooking and preparation. The program will also collaborate and rent space with local hospitals to host monthly in-person nutrition education, cooking demonstration, a taste test of the prepackaged meal box, and a nutrition handout for in-season produce.

A group of five public health graduate students, collaborating with local organizations, will carry out the implementation. The program is aimed to reach 50 households weekly by providing low-cost fresh produce. By bringing fresh produce into the underserved community and implementing policy to aid financially, this program addresses the socioecological model's community and organizational level.

Stakeholders

During the program preparation stage, the implementation team will hold focus group sessions with non-Hispanic Black residents to learn about their grocery needs, preferred location and time of the mobile market, and nutrition education needs. The discussion will be recorded and transcribed for qualitative analysis by the implementation team. The focus group will occur in multiple locations within the neighborhoods, such as local hospitals, community centers, and local churches. The program will also establish connections with existing farmers' markets and mobile markets, such as East Durham Farmers' Market, Duke Mobile Market, and Inter-Faith Food Shuttle. The implementation team will also reach out to potential locations for holding the mobile markets, such as Hospitals and other healthcare facilities, churches, local farms (local Black farmers), businesses, universities, recreation centers, and community organizations. Once the program proposal is developed, the implementation team will reach out to the Durham County Department of Public Health to present the proposal. The aim is to explore

potential funding opportunities and obtain their perspective on community needs that were not previously considered.

Budget

The funds for the program will be obtained through grants from the Durham County Health Department, Community Food Projects Competitive Grant Program (CFPCGP), and Racial and Ethnic Approaches to Community Health (REACH) (North Carolina Department of Health and Human Services, n.d.; National Institute of Food and Agriculture, n.d.; Centers for Disease Control and Prevention, n.d.). See Table 17 in Appendix F.2b for additional details regarding the budget allocation.

Conclusion

One important aspect of neighborhood and built environments that can affect health outcomes is food access, which refers to the availability and affordability of healthy foods within a given area (Larson, Story, & Nelson, 2009). A mobile market can bring produce to underserved communities with limited access to grocery stores, and accepts various forms of payment, including SNAP/EBT and WIC vouchers. All socioeconomic and racial/ethnic groups should have the resource to make healthy food choices in neighborhoods that represent social justice and equity (Hilmers et al., 2012). One potential trade-off is the cost of operating a mobile market, which can be high due to expenses such as vehicle purchase and staff salaries. This can make it challenging to sustain the program in the long term, especially if it does not generate enough revenue to cover its costs. Another trade-off is the limited selection of products that can be offered on a mobile market, which may not be as extensive as what is available at a commercial grocery store. While mobile markets can provide access to fresh fruits and vegetables, they may not have a wide variety of nonperishable groceries and household supplies, which can limit the options for consumers. It is important to consider and address these trade-offs through effective management, program expansion, and ongoing efforts to secure funding. Encouraging programs that improve access to healthy food in underserved communities, as well as fostering community involvement and accountability in decisions about public policy and neighborhood-built issues, can help ensure their success. (Hilmers et al., 2012).

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Appendix F.2a: Nutrition Program Analysis and Implementation Appendix

Table 17. Itemized Budget for Mobile Market Program

Item	Percent of Budget (%)	Description
Personnel	80%	Personnel will be responsible for the development and implementation of the program. They will monitor the program flow, lead cooking classes, offer social support, and facilitate communication with the participants and program partners.
Program Director (1)		
Employees/Community Health Workers (3)		
Volunteers		
Equipment	7%	Equipment will be used for storage of produce products and other mobile-market related needs (i.e. produce, and bags). Cooking demonstration supplies will be needed for the nutrition education component.
Storage for produce (refrigerators, pantries, etc.)		
Produce		
Bags		
Cooking demonstration supplies		
Office Supplies/Marketing	7%	Office space will be utilized for team meetings among personnel members. Marketing supplies will be used for program promotion, advertising, and nutrition education-related needs.
Small-sized office		
Printed educational handouts/community resources		
Vehicle	6%	Vehicle supplies are necessary for transport of produce products to various mobile market locations.
Gas		
Maintenance		
Insurance, registration		

Appendix F.3: Nutrition Program Evaluation Plan

Introduction

Healthy People 2030 recognizes neighborhood and built environments as one of the five social determinants of health (SDOH), with a key objective of improving access to foods that promote healthy dietary patterns within these communities (Healthy People 2030, n.d.). 14%, Black non-Hispanic households experience higher levels of food insecurity than their White counterparts, with African Americans accounting for 25.1% of those experiencing food insecurity in 2018 (Durham County Public Health Department, 2020). To address this issue, a mobile farmers' market program has been proposed to provide fresh produce to low-income neighborhoods, particularly those with a population of over 50% black residents, such as census tract 13.01, 13.03, and 20 (Statesman Journal, n.d.). This program will be implemented by a group of five public health graduate students in collaboration with local organizations. The program is an evidence-based program, modeled after the successful Green Grocer Mobile Farmer's Market program in Allegheny County, Pennsylvania, which has been shown to improve health outcomes in underserved communities by offering accessible healthy food options.

Mobile farmer's market initiatives have the potential to effectively address equity, public health, and nutrition issues in underserved communities. Mobile markets, like farmers' markets, are advantageous in that they can serve multiple areas within a short time frame (Healthy Food Access, n.d.). The proposed program will deliver fresh produce weekly to the target communities and will collaborate with local hospitals to host monthly in-person nutrition education, cooking demonstrations, taste tests of prepackaged meal boxes, and distribution of nutrition handouts for in-season produce. By targeting neighborhoods with high percentages of black residents, this program seeks to address health disparities related to food insecurity and lack of access to healthy food options. To achieve success, it is crucial to adopt a collaborative and interdisciplinary approach that involves stakeholders from various fields, including agriculture, nutrition, public health, and community development.

Outcome

By May 2025, after two full years of program duration, the proportion of fruits and vegetables consumed by Black-dense communities (those with census tracts over 50% Black) in Durham County will increase by 15%.

Study design/data collection

To compare pre- and post-intervention levels of fruit and vegetable consumption, the evaluation will use survey and focus groups. Prior to the intervention, participants will be asked to complete a baseline survey that includes questions on fruit and vegetable consumption, demographic characteristics, and other relevant factors. Follow-up surveys will be administered annually to assess any changes in fruit and vegetable consumption following the intervention. The survey can be administered via online platforms, in-person, or through mail. See Table 2 in the Appendix F.3b for sample questions. Furthermore, two focus groups will be held each year to gain insights into the attitudes, beliefs, and behaviors surrounding fruit and vegetable intake in Durham County. The study team will analyze the data collected from the surveys and focus groups to evaluate the effectiveness of the mobile farmer's market intervention.

Sample and sampling strategy

To accurately evaluate the impact of a mobile farmer's market on the fruit and vegetable consumption of Black non-Hispanic populations in Durham, NC, it is critical to ensure a robust and representative sample size. To achieve this, a targeted sampling strategy could be implemented, with a focus on areas of the city where the census tract includes over 50% of Black non-Hispanic residents. Community-based organizations could also be leveraged to aid in participant recruitment. Outreach efforts may include targeted advertisements in local newspapers and social media platforms, as well as partnerships with community-based organizations and participation in community events. According to a recent pilot study evaluating the feasibility of a mobile farmer's market, a sample size of approximately 50-100 participants would be both feasible in terms of time and resources, while allowing for an adequate level of precision (Gary-Webb et al., 2018).

Specific measures

To assess the impact of a mobile farmer's market intervention in increasing fruit and vegetable consumption in Durham County, NC, several outputs, outcomes, disparities, and constructs will be measured.

To evaluate the effectiveness of a mobile farmer's market intervention in increasing fruit and vegetable consumption in Durham County, NC, we will assess the number of participants, nutrition education classes held, visits to the mobile market, and the amount of produce purchased. Outcomes will be assessed by measuring changes in fruit and vegetable consumption, expenses, and produce quality. Background data on socioeconomic status, education, transportation options, quality of life and nutrition knowledge will also be evaluated. To evaluate these

outcomes, we will employ various measurement tools, including the Fruit and Vegetable Quantity Questionnaire (FVQQ) and Nutrition Knowledge Questionnaire (NKQ). By analyzing these measures, we can determine the efficacy of the intervention in improving health outcomes and increasing access to fresh produce in the community.

The outputs, outcomes, disparities, and constructs will be used to evaluate the effectiveness of the mobile farmer's market intervention in increasing access to fresh produce and improving health outcomes. The measurement tools, FVQQ and NKQ, will be used to gather data and assess changes in behaviors and knowledge. The information gathered will provide insights into the impact of the intervention on different subgroups of the population, which will inform future interventions and policies.

Timing

Evaluation and stakeholder engagement activities will be conducted prior to baseline and at 12-month intervals following the implementation of the mobile farmer's market intervention in Durham County, NC. At baseline, data will be collected on participants' fruit and vegetable consumption, health status, and knowledge of nutrition and healthy eating habits. After 12 months, the same data will be collected to assess progress and evaluate the impact of the intervention. Progress will be defined as an increase in the consumption of fruits and vegetables in terms of quality, quantity, and variety, as well as an increase in knowledge of nutrition and healthy eating habits. In the event that progress is not observed, follow-up actions will be taken to identify the reasons for the lack of progress. This may involve engaging with stakeholders, such as public health officials, to identify barriers to participation or better understand the needs of the target population. Additionally, we may consider adjusting the intervention strategy or implementing supplementary activities to increase participation and engagement.

Analysis plan

Descriptive statistics will be employed to summarize the data collected on participant demographics, fruit and vegetable consumption, health outcomes, and knowledge of nutrition and healthy eating habits. These statistics may include measures such as means, standard deviations, frequencies, and percentages. To assess changes in fruit and vegetable consumption and health outcomes, paired t-tests will be utilized to compare pre-intervention and post-intervention data. Confidence intervals and p-values will be calculated to determine the significance of the observed differences. To gain insights into participants' experiences with the intervention, qualitative data may be gathered through open-ended survey questions or focus group discussions. Content analysis will be conducted to identify themes, and correlation coefficients may be calculated to explore relationships between variables.

Sources of funding

The funds for the program could be obtained through grants from the Durham County Health Department, Community Food Projects Competitive Grant Program (CFPCGP), and Racial and Ethnic Approaches to Community Health (REACH) (North Carolina Department of Health and Human Services, n.d.; National Institute of Food and Agriculture, n.d.; Centers for Disease Control and Prevention, n.d.). See table 18 in Appendix F.3b for the funding amount.

Data use and dissemination

After data analysis, an impact report will be developed to disseminate the findings of the mobile farmer's market intervention to stakeholders. The report will provide a detailed description of the intervention, the data collection and analysis methods employed, the results obtained, and any conclusions or recommendations based on the findings. The report will be targeted towards stakeholders who are interested in the results of the intervention, including local government officials, community organizations, and funders. Dissemination channels such as social media, email newsletters, and community meetings will be utilized to share the report. The data collected from the intervention will also inform future mobile farmer's market interventions in similar geographic settings and target population.

Conclusion

A mobile farmer's market program has the potential to effectively promote equity, public health, and nutrition in underserved communities. Achieving success in such programs is contingent upon employing collaborative, interdisciplinary approaches that incorporate stakeholders from diverse fields, including agriculture, nutrition, public health, and community development. By prioritizing collaboration and interdisciplinary engagement, and by focusing on equity and public health concerns, such programs can contribute to the cultivation of healthier and more resilient communities, while also promoting sustainable agricultural practices.

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Appendix F.3a: Nutrition Program Evaluation Plan Appendix

Table 18. Funding Opportunities

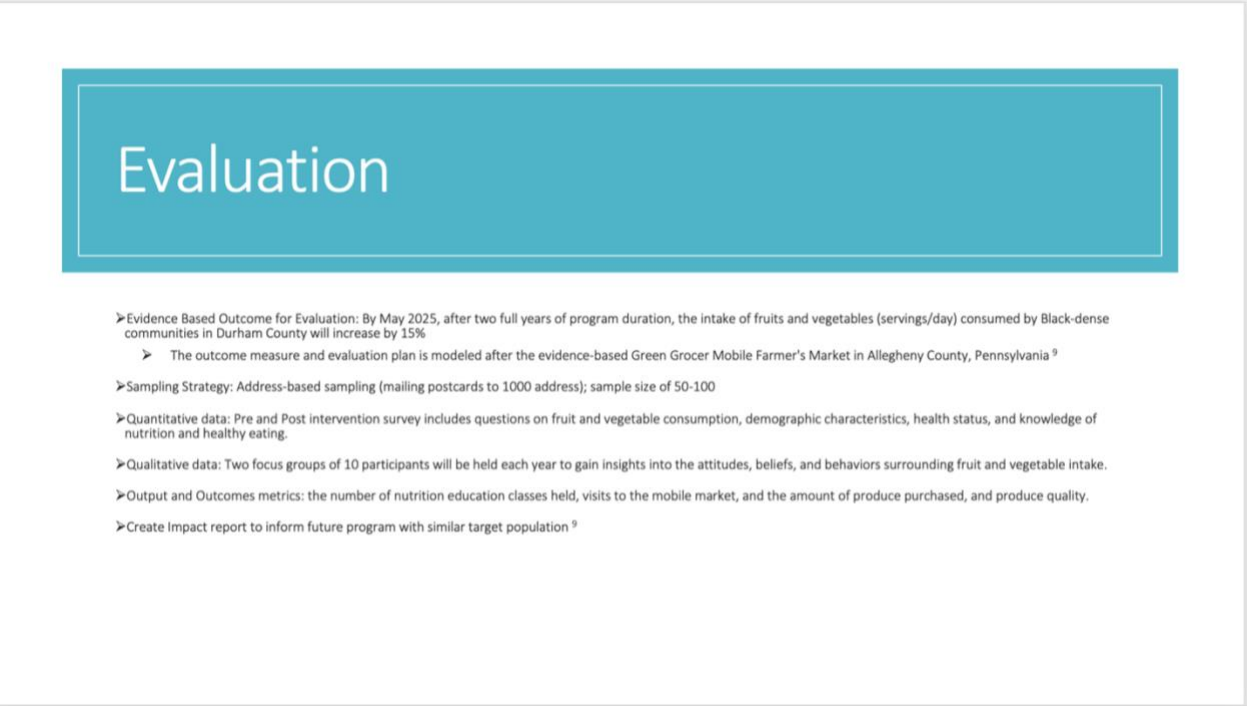
Funding Opportunity	Link	Amount	Deadline
Community Food Projects Competitive Grant Program (CFPCGP)	https://www.nifa.usda.gov/grants/funding-opportunities/community-food-projects-competitive-grants-program	Between $5,000-$400,000	TBA
CDC-RFA-DP-23-0013: The High Obesity Program (HOP 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342939	$500,000	March 21, 2023
CDC-RFA-DP-23-0012: State Physical Activity and Nutrition Program (SPAN 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342954	$600,000	March 28, 2023
CDC-RFA-DP-23-0014: Racial and Ethnic Approaches to Community Health (REACH 2023)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=342940	$500,000	April 11, 2023

Figure 9. Sample Survey Question

1. What is your age?
    a. 18-24
    b. 25-34
    c. 35-44
    d. 45-54
    e. 55-64
    f. 65 or olde
2. What is your gender?
    a. Male
    b. Female
    c. Other (please specify)_____
3. What is your highest level of education completed?
    a. Less than high school
    b. High school or equivalent
    c. Some college or trade school
    d. Associate's degree
    e. Bachelor's degree
    f. Master's degree or higher
4. What is your race and ethnicity? (Select all that apply)
    a. White, non-Hispanic
    b. Black or African American, non-Hispanic
    c. Asian, non-Hispanic
    d. Hispanic or Latino
    e. Native American or Alaskan Native

    f. Native Hawaiian or other Pacific Islander
    g. Prefer not to answer
5. How often do you consume fruits on a weekly basis?
    a. Never
    b. Rarely (1-2 times per week)
    c. Sometimes (3-4 times per week)
    d. Often (5 or more times per week)
6. How often do you consume vegetables on a weekly basis?
    a. Never
    b. Rarely (1-2 times per week)
    c. Sometimes (3-4 times per week)
    d. Often (5 or more times per week)
7. On average, how many servings of fruits do you consume per day?
    a. None
    b. 1 serving
    c. 2 servings
    d. 3 or more serving
8. On average, how many servings of vegetables do you consume per day?
    a. None
    b. 1 serving
    c. 2 servings
    d. 3 or more serving
9. Do you find it easy to access fresh fruits and vegetables in your community?
    a. Yes, very easy
    b. Somewhat easy
    c. Somewhat difficult
    d. Very difficult
10. What are some barriers to consuming more fruits and vegetables?
    a. Cost
    b. Availability
    c. Taste preferences
    d. Other (please specify) _____

Appendix F.4: Individual Presentation Slides and Script



Program success will be evaluated based on a 15% increase in the number of servings of fruit and vegetable consumption per day in predominantly-Black communities in Durham County by May 2025, after two years of program implementation. The evaluation plan was modeled after the evidence-based Green Grocer Mobile Farmer's Market in Allegheny County, Pennsylvania, which had shown promising outcomes in improving access to fresh produce and dietary habits among participants. Address-based sampling will be used to recruit residents to complete the survey and participate in the focus groups. Postcards will be mailed to 1,000 addresses within Durham where census tracts over 50% are Black. The same addresses will be contacted again in May 2025 to assess post intervention changes. A targeted sample size would be 50-100 participants. The program will collect both quantitative and qualitative data to gain a comprehensive understanding of the participants' experiences and outcomes. The pre and post-intervention survey is aimed at measuring the change in fruit and vegetable intake over the course of the program, and will also include questions on demographic characteristics, health status, and knowledge of nutrition and healthy eating. The qualitative data will be collected through two focus groups of 10 participants each. They will be held annually to gain insights into the attitudes, beliefs, and behaviors surrounding fruit and vegetable intake, as well as identify barriers and facilitators to healthy eating within the community. In addition, the evaluation team will also track several output and outcome metrics such as the number of nutrition education classes held, visits to the mobile market, the amount of produce purchased and produce quality. At the end of the program, an impact report will be created to inform future programs with a similar target population, outlining the program's successes, challenges, and lessons learned.