

INCREASING HEALTH LITERACY AND ACADEMIC PERFORMANCE AMONG HISPANIC AND
LATINO STUDENTS IN DURHAM COUNTY PUBLIC SCHOOLS THROUGH SCHOOL MEALS

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WILGENBURG

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ABSTRACT

REBECCA BERUBE, RANA HAMMOUDA, DANIEL LERCHER, VEDA LUTHRA, and ANNA
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INCREASING HEALTH LITERACY AND ACADEMIC PERFORMANCE AMONG HISPANIC AND
LATINO STUDENTS IN DURHAM COUNTY PUBLIC SCHOOLS THROUGH SCHOOL MEALS
(Under the direction of Seema Agrawal, W. Oscar Fleming, and Elizabeth Tomlinson)

Education access and quality is a key social determinant of health that has a major influence on wellbeing (Healthy People 2030, n.d.). Higher levels of education have been shown to lead to increased opportunities, employment, income, and health status (The Lancet Public Health, 2020). Health literacy plays a large role in the decreased health status among those with lower educational attainment. Inadequate health literacy has been shown to have a stronger association with poor health than age, income, employment status, or race (Shahid et al., 2022). Within Durham County, race is highly associated with educational attainment, as over 50% of both Hispanic males and females do not have a high school diploma compared to less than 5% of white males and females (Statistical Atlas, 2018). This proposal will create both a cultural school meal food program as well as a health literacy and English-as-a-second-language (ESL) curriculum within Durham Public Schools (DPS). These proposed programs will create improvements in academic performance and health literacy among Hispanic/Latino youth, leading to long term improvements in the overall health status of Durham County's greater Hispanic/Latino community.

Keywords: Social determinant of health, education, cultural/traditional meals, health literacy, English-as-a-second-language (ESL), Hispanic/Latino students/community, Durham County, North Carolina

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LIST OF ABBREVIATIONS

DPS	Durham Public Schools
EOC	End of Course
ESL	English-as-a-second-language
NC	North Carolina
SDOH	Social Determinant of Health
US	United States

COMMON PROPOSAL

SDOH Analysis and Goals

Education is important as a social determinant of health because people with higher levels of education are more likely to live longer, healthier lives (Raghupathi & Raghupathi, 2020). Benefits associated with higher levels of education include improved health literacy, increased knowledge of health and healthy behaviors, higher earnings and better resources, reduced stress, and greater probability of having health insurance (Virginia Commonwealth University, 2015; Zajacova & Lawrence, 2018). This program is aimed at improving education and health literacy among the Hispanic/Latino populations in Durham County. By focusing on improving education and graduation rates of Hispanic/Latino students in the Durham County Public Schools (DPS) system, health literacy, and consequently health outcomes, will improve and could benefit the social and economic state of the county as a whole (Virginia Commonwealth University, 2015). Disparities in education that contribute to disparities in health, particularly in the DPS system, include racial/ethnic disparities in end-of-grade performance and graduation rates (Durham County Public Health, 2021). In particular, graduation rates of Hispanic/Latino students in DPS high schools is the lowest of all racial/ethnic groups, despite the group making up over one third of the student population in DPS schools (Durham County Public Health, 2021). Goals of addressing this social determinant of health include increasing health literacy rates in the county, particularly in the Hispanic/Latino population, and helping residents to unlock the benefits of higher levels of education (Virginia Commonwealth University, 2015).

Policy and Programmatic Changes

There is a program and a policy recommended to address graduation rates and health literacy among Hispanic students in Durham County. The proposed program is to incorporate cultural meals in Durham public schools to boost school meals participation, and food acceptance among Hispanic/Latino population. This program would build off the success of a similar program implemented in Cambridge Public Schools which worked to incorporate culturally appropriate menu items into their school lunches

(Healthy Food Choices in School, 2019). School meals play a large role in students' nutritional intake. The intake of nutritious food is vital for students' academic performance and contributes greatly to their educational attainment. It is important to recognize the large racial/ethnic diversity of Durham Public Schools (DPS) in Durham County and the fact that students from different cultural backgrounds may not want to eat the American school meals that are offered. Research on children in early childhood education programs found that children more often accept and eat familiar food or food that is normally eaten in the household (Ayers Looby et al., 2020). Therefore, proposed program goal is to increase school food acceptance and school meal participation among Hispanic/Latino students by incorporating six traditional Hispanic and/or Latino lunches and breakfasts per three-week meal cycle within Durham Public Schools. Traditional meals would include those that originate from or are commonly eaten in Hispanic or Latin countries. More appealing meals lead to better meal participation, which over time contributes to better educational outcomes among Hispanic/Latino students.

The other policy recommendation is to create an English-as-a-second language (ESL) health literacy program for Hispanic students in Durham County. The proposed program's objectives are to develop, implement, and evaluate a health literacy/ESL curriculum. The curriculum will integrate theories of health literacy and health behavior research and practices. The overall goal is to familiarize students with literacy demands of health care settings (Mas et al., 2015). The content of the curriculum will teach prose literacy, document literacy, numeracy, clinical practices, preventive practices, and navigation of health care systems (Mas et. al., 2015). Furthermore, the program will be offered in Durham County public schools, public libraries, and/or community churches.

Community Partners

To deliver culturally inclusive meals at DPS to improve food acceptance and nutrition, it is imperative to engage appropriate community resources. At current state, public school meals consist of prepared foods due to limited equipment, staff time, and funding. In ideal state, this intervention brings together the school kitchen staff, the local community college culinary arts students, and local mobile food alliance to prepare culturally appropriate meals that meet the USDA requirements for school

nutrition with input from the student body. Partnership for Healthy Durham is a key community partner as this organization has been working in community-based initiatives to improve the health of Durham residents since 2004 with a subcommittee focused on food access. In addition, they have a stated goal to “increase nutritious and culturally relevant food on school menus by 5%” (Healthy Durham 2022). This organization should be top priority for engagement as to align visions and resources to avoid duplicity. It truly has lived experience addressing SDOH in Durham County and has many local partners including Durham Public Schools, Durham Farmers Market, and End Hunger Durham.

In addition, this program could benefit from community chefs with expertise in culturally inclusive meals such as those that operate out of food trucks. The RDU Mobile Food Alliance is a local organization of food truck operators with this skillset that may be willing to partner with DPS as one of their core values is to not only to serve the community, but also to be part of and give back to the community (RDUMFA, 2022).

Budget

The health literacy ESL program will be a three-year program offered in Durham County. A team consisting of a program manager, program assistant, two researchers, two ESL teachers, and a health educator from fields of health education/communication and adolescent literacy. Funding for this policy option will come from the National Heart, Lung, and Blood Institute and National Institutes of Health (NIH) (Mas et. al., 2015). Program expenses include program advertising, which may include a Canva subscription, funds for curriculum development, employee salaries, team meetings, employee benefits, insurance, etc.).

After calculating costs to run a health literacy program, a contract/grant of \$950,000 each year will be sufficient. The specific costs for three years add up to \$910, 336.10, \$923,996.70, and \$939,256.53 from 2024 to 2026. For personnel costs, two ESL teachers are appropriate to run an ESL health literacy program for about 200 students. Each teacher is full-time, with a salary of \$43,000. The salary range for an ESL teacher in Durham County is \$25,000 to \$51,000 (*ESL Teacher Salary in Durham, NC*, 2023). The program will have two researchers and a health educator to develop an ESL

health literacy curriculum that combines health literacy content with English-language instructions. Both researchers will be paid \$48,000, annually. One health educator will be paid \$52,000, annually (*Health Educator Salary in Durham, NC, 2023*). Finally, a program manager and program assistant will be hired full-time and receive a salary of \$55,000 and \$50,000, annually, to oversee the three year program.

Engagement and Improvement Plan

To introduce a novel program, several engagement strategies are proposed to build collaborative partnerships among key community partners. The proposed strategies include the Give-Get Grid technique, nominal group technique, Plan-Do-Study-Act (PDSA) cycles, and student surveys. These strategies will be defined subsequently along with how the data can be used to improve the program in future iterations.

The program is more likely to be accepted if it aligns with an established strategic plan. The current strategic plan for DPS spans years 2018-2023, and this program aids 3 of the 5 goals. To convey this message, the Give-Get Grid technique is ideal. This engagement method clearly states the ask or investment of each partner (i.e. the give) followed by the benefits to the partner (i.e. the get). Engagement with this technique will be measured through an iterative process of refining and agreement between the program coordinator and the stakeholders. During this engagement process, the program coordinator can use nominal group technique, a “structured method for group brainstorming that encourages contributions from everyone and facilitates quick agreement on the relative importance of issues, problems, or solutions” (American Society for Quality n.d.). Engagement will be measured through agreement of program implementation. Once agreed upon, engagement will be measured over the course of the program implementation through a scaled scoring system. For example, if the stakeholder met all of their input (give) requirements, then engagement would be 100%. The output (get) would also be scored similarly as a marker of areas of improvement.

These techniques are perfect for the pilot program in select schools and lays the foundation for PDSA cycles to scale up to additional schools. This engagement strategy will be measured through

adoption at these additional schools. Finally, overall success of the program will be measured through school lunch participation and student surveys about the program.

Program/Policy Evaluation Component

The nutrition program will be evaluated using a quasi-experimental pre-post study design. Data on Hispanic/Latino students' End of Course (EOC) scores in Math 1, Math 3, and English II will be collected from both pilot schools one year prior to program implementation. After program implementation, scores will be collected on an annual basis. The long term outcome objective is to see a 0.03 standard deviation increase in Math 1 and Math 3 scores and a 0.04 standard deviation increase in English II scores among Hispanic/Latino students after five years of program implementation. A multiple regression will also be used to capture the impact of cultural meal provision on EOC scores. Based on the results of the data analysis, sociodemographic characteristics including sex, nationality, primary language spoken at home, English proficiency, birth country, and attendance will either be adjusted for or stratified for. If an increase in EOC scores trending towards the long term outcome objective are not seen within 3 years of program implementation, then program adjustments will be made, including holding focus groups with Hispanic/Latino students, meal quality assessment, and engagement of additional community partners.

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APPENDIX A: GROUP DELIVERABLES

COMMON PROPOSAL PRESENTATION

Increasing Health Literacy and Academic Performance Among Hispanic and Latino Students In Durham County Public Schools Through School Meals

Rebecca Berube, Rana Hammouda, Daniel Lercher, Veda Luthra, and Anna Wilgenburg
SPHG 992 Spring 2023



What we'll discuss

- Education as a social determinant of health
- Proposed culturally inclusive school meal program
- Proposed English-as-a-second language program
- Community partners
- Evaluation, engagement, and accountability



Education is an important social determinant of health

Health literacy skills allow patients to be advocates for their own health, as well as understand statistics about procedures and instructions for medications

Anna: Social determinants of health are environmental conditions that affect a wide-range of health and quality of life outcomes. Education access and quality is one of the five domains stated by Healthy People 2030, with the goal of increasing educational opportunities and helping children and adolescents do well in school. Education is important as a social determinant of health because people with higher levels of education are more likely to live longer, healthier lives. Related, health literacy skills allow patients to be advocates for their own health, as well as understand statistics about procedures and instructions for medications.

Benefits of Education and Health Literacy Skills



Increased awareness and knowledge of health and healthy behaviors

Important for self-advocacy and effective communication around health concerns with both family and medical professionals



Reduced stress, high quality of social networks and improved social and psychological skills

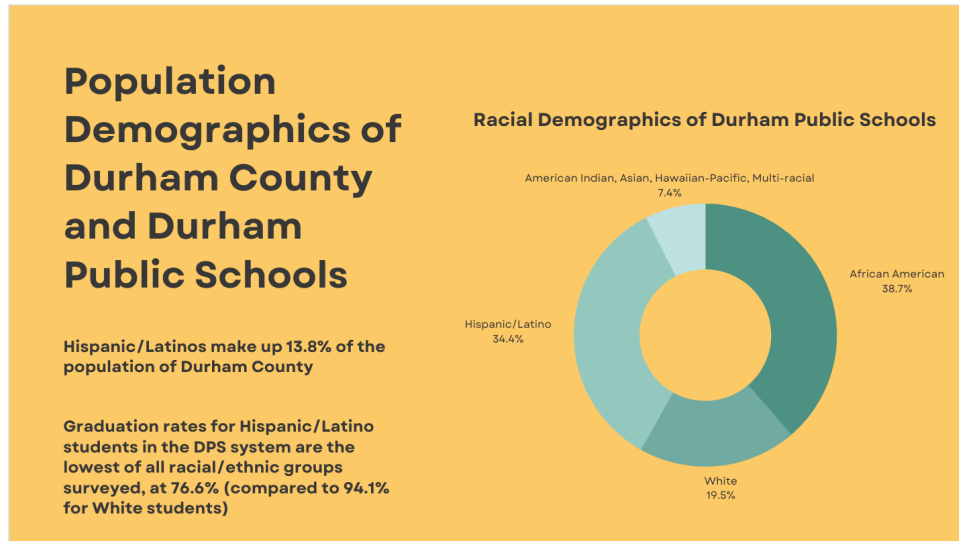
Important for maintaining health and having access to coping methods and social support if a health issue arises



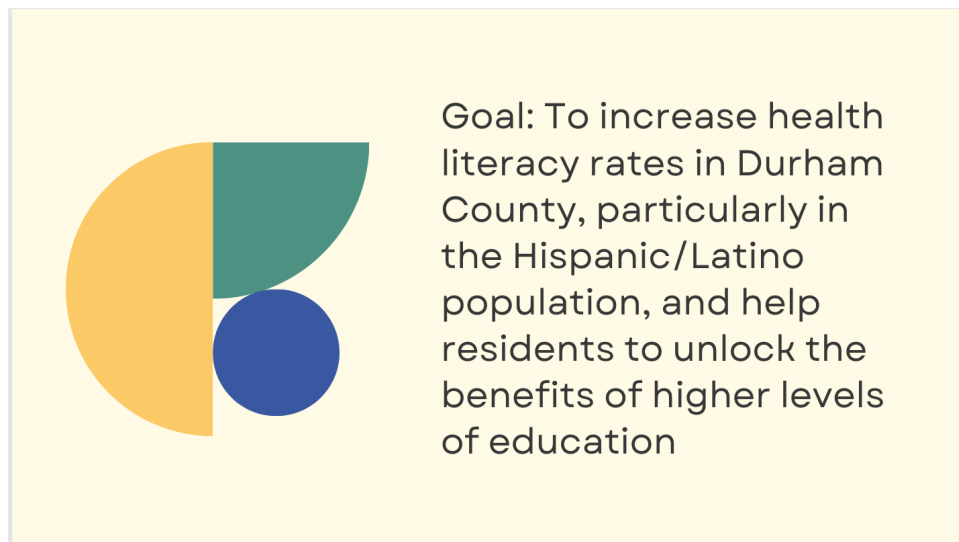
Higher earnings and better resources for good health, including insurance

Important for access to medication that may be out of reach without insurance coverage, and the monetary resources to afford preventative care

Anna: Short-term health benefits of education include increased literacy, awareness and knowledge of health and healthy behaviors, and improved social skills and networks. Long-term benefits include higher earnings and better resources for good health, reduced stress, greater probability of having health insurance, and better access to supermarkets, green space, quality schools and neighborhoods with lower rates of crime.



Anna: In terms of population, Hispanics and Latinos make up 13.8% of Durham County. They are more highly represented in the Durham Public School System, where they comprise 34.4% of the students. This is a priority population, as graduation rates in Durham Public Schools are lowest for this racial/ethnic group.



Anna: Keeping this population in mind, the goal of this program and policy is to increase health literacy rates in Durham County, particularly in the Hispanic/Latino population, and help residents to unlock the benefits of higher levels of education.



School Meals in Durham Public Schools

- School meals play a large role in students' nutritional intake
- Important to recognize the large racial/ethnic diversity
- Students from different cultural backgrounds may not want to eat the American school meals offered
- Children are more likely to accept and eat familiar food or food that is normally eaten in their household
- Increases the risk for low school meal consumption and acceptability among students from different cultural backgrounds
- Increased risk of hunger in school which is associated with negative academic outcomes

Rana: The intake of nutritious food is vital for students' academic performance and contributes greatly to their educational attainment. School meals play a large role in students' nutritional intake. It is important to recognize the large racial or ethnic diversity of Durham Public Schools when considering school meals in Durham County, and the fact that students from different cultural backgrounds may not want to eat the American school meals that are offered. Research on children in early childhood education programs found that children are more likely to accept and eat familiar food or food that is normally eaten in their household. Thus, although there is no available evidence within Durham County on school meal consumption by racial ethnic group, this research suggests that students who come from different cultural backgrounds are less likely to consume school meals due to unfamiliarity. This increases the risk for low school meal consumption and acceptability among students from different cultural backgrounds, leading to increased risk of hunger in school which is associated with negative academic outcomes such as repeating a grade, lower grades, inability to focus.

Proposed Cultural School Meal Program



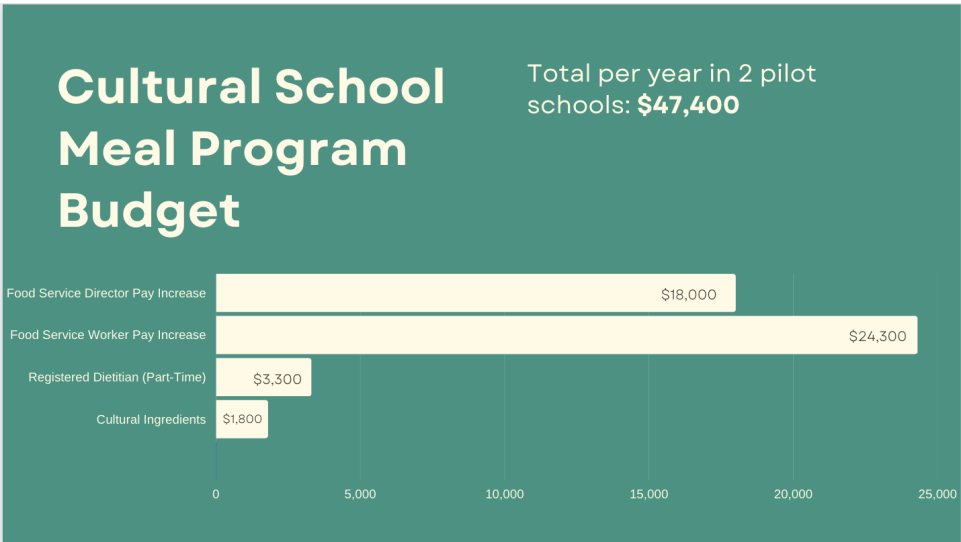
Goal: increase school food acceptance and school meal participation among Hispanic/Latino students **by incorporating six traditional Hispanic and/or Latino lunches and breakfasts per three-week meal cycle within Durham Public Schools**



Traditional meals = foods originating from or are commonly eaten in Hispanic or Latin countries

More appealing meals = better meal participation = better educational outcomes

Rana: Our proposed program would work to increase school food acceptance and school meal participation among Hispanic/Latino students by incorporating six traditional Hispanic and/or Latino lunches and breakfasts per three-week meal cycle within Durham Public Schools. Traditional meals would include those that originate from or are commonly eaten in Hispanic or Latin countries. More appealing meals lead to better meal participation, which over time contributes to better educational outcomes among Hispanic/Latino students.



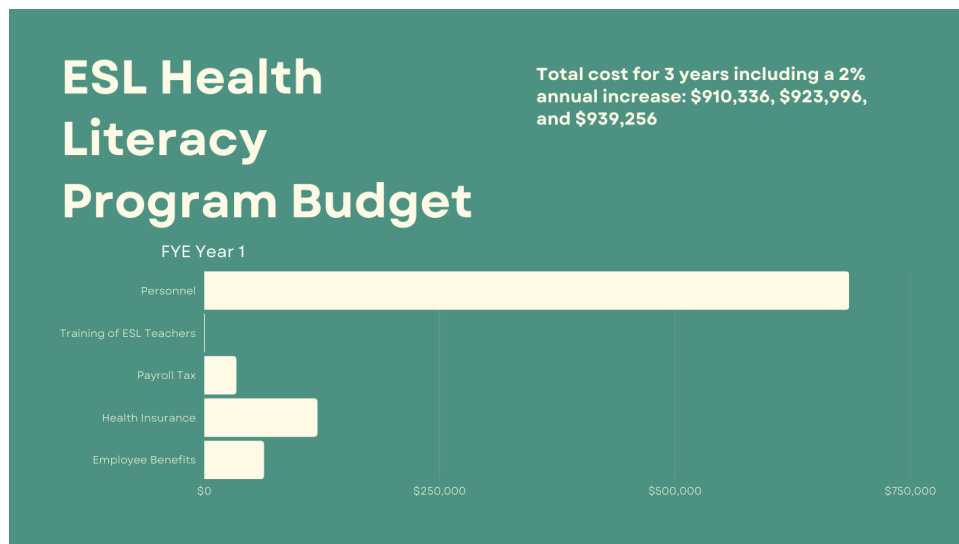
Rebecca: The proposed cultural school meal program will cost a total of \$47,400 per year to pilot in two high schools within Durham County. \$18,000 or 38% of the budget will go towards pay increases for food service directors running the program. \$24,300 or 51% of the budget will be for pay increases for food service staff who may require additional training and work hours to implement the program. \$3,300 will go towards hiring a part time dietitian to work at both pilot schools, helping to implement the program and ensure that all cultural meals are compliant with the National School Breakfast and Lunch guidelines. Finally, \$1,800 will go towards the purchase of any necessary or additional cultural ingredients needed to make the meals.

Proposed ESL Health Literacy Program

Goal: improve functional health literacy among Hispanic/Latino students **by familiarizing students with comprehension demands in a health care setting through a combined ESL and health literacy program**

Test of Functional Health Literacy (TOFHLA): a health literacy assessment tool scored on a scale of **0-100**

Veda: To address this disparity, we will also implement an English-as-a-second language (ESL) health literacy program for Latinx youth. The goals of this program include development, implementation, and evaluation of a health literacy ESL curriculum. The program will combine health literacy content and English language instructions designed for bilingual Latinx high school students, because coming from Spanish-speaking households, language and cultural differences play a role in difficulty understanding health information and services. A program like this will help Latinx youth learn more about the complexities of health systems and encourage active engagement in their own health. The program will integrate health literacy and health behavior lessons – the goal being to familiarize students with literacy demands in a health care setting. The content will focus on developing prose literacy, the ability to comprehend educational articles about medical conditions for patients. Document literacy, the ability to comprehend medical maps and tables like the body mass index chart. Numeracy, the ability to understand clinical and public health data, and finally, the ability to understand the benefits of preventive practices and navigate health care systems.



Veda: The proposed ESL health literacy program will cost a total of \$910,336, \$923,996, and \$939,256 to pilot in Durham County high schools for three years. These totals include \$120,000 for health insurance, \$600 for training of ESL teachers, and a 2% annual increase for employee benefits and personnel salaries. Non-personnel expenses such as program advertising, school supplies, snacks for students, team meetings, online subscriptions to use for teaching, and a flat expense of \$700 for curriculum development are also included in the total costs. The team will consist of seven full-time employees. A program manager salaried at \$55,000, program assistant salaried at \$50,000, two researchers each salaried at \$48,000, a health educator salaried at \$52,000, and two ESL teachers salaried at \$43,000 each. Funding for this program will come from the National Heart, Lung, and Blood Institute and the National Institutes of Health.

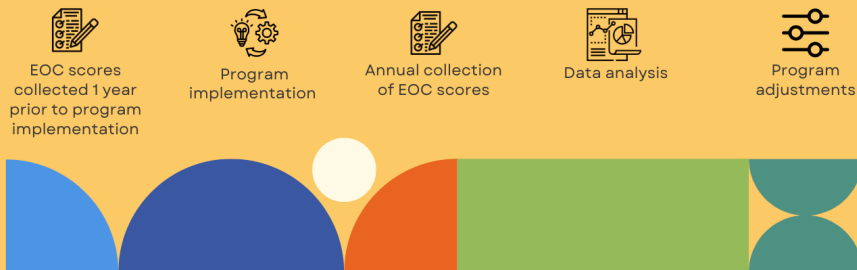


Dan: Durham is rich with community organizations vested in the improvement of residents of the city. A few of these organizations important to the success of any culturally inclusive school meal plan include Durham Public Schools, Durham Tech Community College, Partnership for a Healthy Durham, El Centro Hispano, and RDU Mobile Food Alliance. These organizations represent vital components of the community with a shared vision and similar mission statements to engage and improve their local community. These partners will be able to shift the current state of school lunch – prepared meals due to limited equipment, staff time, and funding – to the proposed state of culturally inclusive meals that have the potential to improve meal acceptance and nutrition, leading to improved academic performance and high school graduation rates.

Especially important is Durham Public School and Partnership for a Healthy Durham. As the proposed pilot site of intervention, DPS is vital for this program. Besides the proposed pilot site, Partnership for a Healthy Durham is essential for success as this organization possess both experience with similar community programs as well as established relationships with other local partners.

Cultural School Meal Program Evaluation

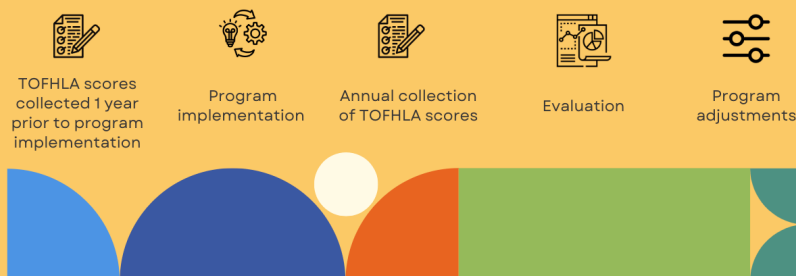
Long term outcome: **0.03 standard deviation increase** in Math 1 and Math 3 End-of-Course (EOC) scores and a **0.04 standard deviation increase** in English II EOC scores among Hispanic/Latino students after **five years of program implementation**



Rebecca: The long term outcome of the cultural school meal program is to see a 0.03 standard deviation increase in Math 1 and Math 3 End-of-Course (EOC) scores and a 0.04 standard deviation increase in English II EOC scores among Hispanic/Latino students after five years of program implementation. Evaluation of the program will begin one year prior to implementation, with the collection of math and English EOC scores from a random sample of Hispanic/Latino students. During program implementation, a random sample of EOC scores will be taken again at the end of each school year. After data collection each school year, data analysis will be performed to ensure that the program is on track to meeting the long term outcome. If it's found that during the first five years or the program and/or at year 5, EOC scores are not improving or the long term outcome has not been met, appropriate program changes will take place, including holding focus groups with Hispanic/Latino students to determine meal acceptability, assessing the quality of meals, and looking for additional community partners, such as local Hispanic/Latino restaurants.

ESL Health Literacy Program Evaluation

Long term outcome: improved Test of Functional Health Literacy (TOFHLA) scores between **75-100** among Hispanic/Latino students after **three years of program implementation**



Veda: Studies have shown that English speakers have higher functional health literacy (FHL) scores than Spanish speakers, with an average TOFHLA score of 92% and 62%, respectively. Due to inadequate health literacy, Spanish speaking patients attend follow-up appointments less frequently than patients with adequate health literacy. They also report less understanding of emergency department instructions than those with adequate health literacy. The primary reasons for not attending follow-ups are cost and poor understanding of care instructions.

Engagement and Improvement

Initial

Community Partner	Give	Get
Durham Public Schools		
RDU Mobile Food Alliance		
Durham Tech Community College		
El Futuro Hispano		
Partnership for Healthy Durham		

Scale up

Design

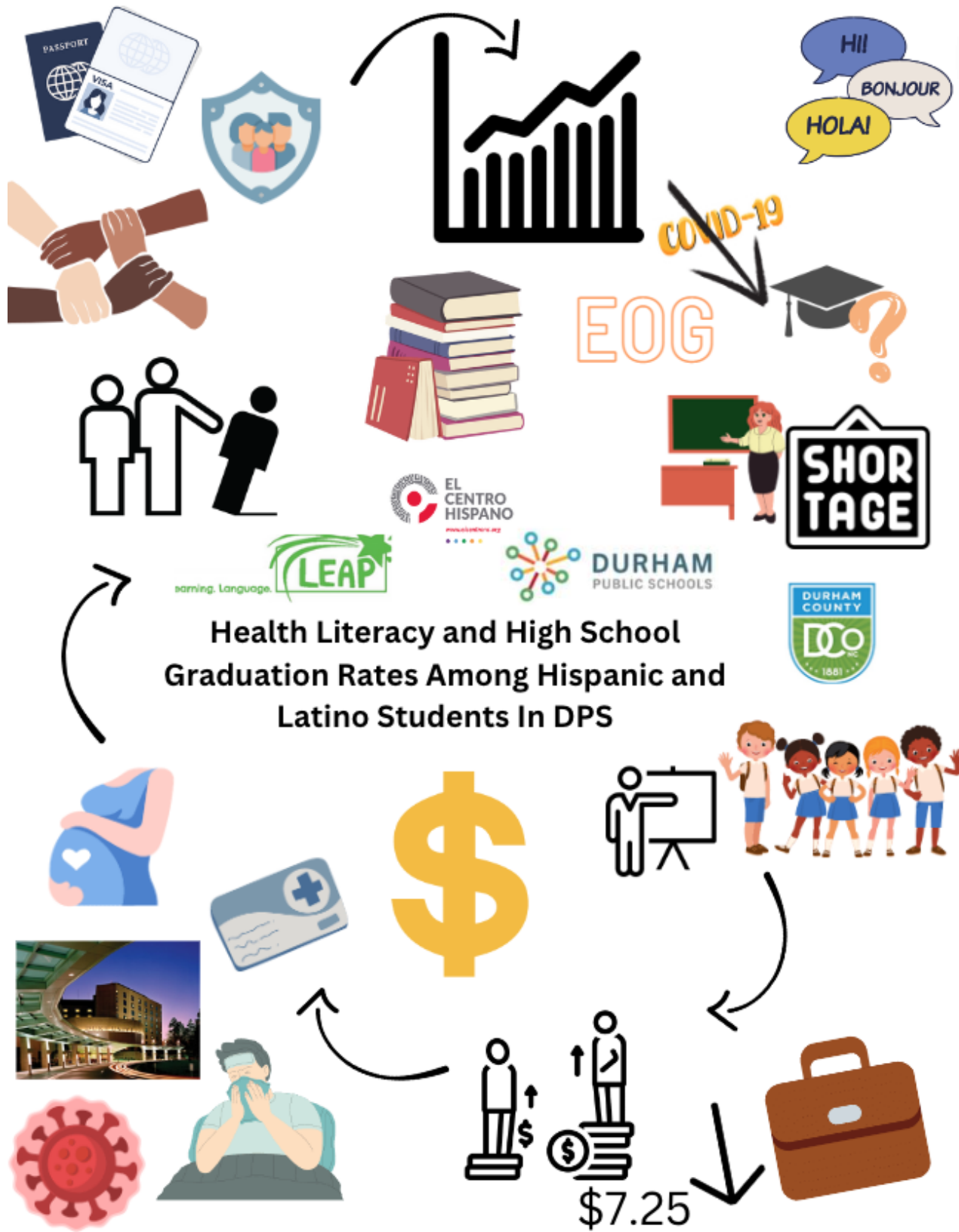
Improve

NICHQ.org

Dan: To introduce a novel program, several engagement strategies are proposed to build collaborative partnerships among key community partners. The proposed strategies include the Give-Get Grid technique, nominal group technique, Plan-Do-Study-Act (PDSA) cycles, and student surveys. Without getting too caught up on the intricacies of these tools, they are common engagement and improvement tools for different phases of the program.

More importantly, the program is more likely to be accepted if it aligns with an established strategic plan. Thus, this proposal aligns with 3 of the 5 goals of the DPS 2018-2023 strategic plan. The program coordinator will work with DPS and other community partners to set expectations and investment of each partner followed by the benefits to the partners. Once the partners are formalized, a group brainstorming session will facilitate design and agreement on the finer details of the program along with any potential problems.

Engagement will be measured in the pilot stage if the partners meet their investment and receive their benefit along with feedback from the students through survey data. This data will aid in the scale up process utilizing improvement strategies.



Health Literacy and High School Graduation Rates Among Hispanic and Latino Students In DPS

Social Determinant of Health:

Education access and quality is an extremely important social determinant of health that Durham County commissioners need to prioritize (Healthy People 2030, n.d.). Higher educational attainment is associated with improvements in life expectancy, morbidity, and health behaviors. This leads to the increased opportunities, employment, income, and healthcare access (The Lancet Public Health, 2020). In addition, students' physical attendance at school also has a positive impact on social and emotional development, physical exercise, and safety, particularly for students living in poor or abusive households (The Lancet Public Health, 2020).

However, many inequities exist within education access and quality. For example, low income students, students with disabilities, and students who face social discrimination have been found to perform poorly in both math and reading (U.S. Department of Health and Human Services, n.d.). It has also been found that both low income students and students of color face unique barriers to postsecondary education, including lack of financial capital and systemic discriminatory practices (Shankar et al., 2013). As a result, these students have decreased opportunities for high paying jobs, thus, decreasing their income and access to health care and increasing their likelihood of developing health problems such as diabetes, cardiovascular disease, and depression (U.S. Department of Health and Human Services, n.d.)

Geographic and Historical Context:

Much of Durham's economic success can be attributed to people of color. In the late nineteenth century, tobacco farming was one of Durham's major industries. Durham's success in the tobacco industry can be attributed to African American workers, whom large tobacco companies hired for menial pay in order to achieve a greater profit (Porter & Scott, 2018). In more recent history, construction, which relied heavily on Hispanic immigrants, was one of Durham's major industries in the early 2000s (Duke University, n.d.). In 2019, non-Hispanic African Americans made up 36.5% of Durham's population, while non-Hispanic whites made up 51.9% of the population. Native Americans, Asians, and other ethnicities accounted for 11.6% and Hispanics made up 13.5%. In 2019, 25.3% of the population was

below the federal poverty line; the majority (31%) being Hispanic or Latino (Durham County Department of Public Health, 2020). In terms of education specifically, Durham Public Schools (DPS) have incorporated some initiatives to help improve education quality and access. These includes racial equity training for DPS teachers and administrative staff, the introduction of core curriculum for both reading and math, and the creation of a teacher assistant to teacher program (Durham County Department of Public Health, 2020).

Priority Population and Measures of SDoH:

The priority population for the improvement of education access and quality within Durham County should focus on Hispanic high school students. Compared to the state of North Carolina, Durham County has a higher percentage of Hispanic residents lacking a high school diploma. Of female Hispanic residents in Durham County, 52.6% lack a high school diploma compared to 39.7% in North Carolina (Statistical Atlas, 2018). The same trend is seen among male Hispanic residents, with 55.8% in Durham County lacking a diploma compared to 47.4% in North Carolina, as shown in Table 1 (Statistical Atlas, 2018).

As previously noted, Durham's Hispanic population is relatively large (13.5%). However, in 2019, Hispanic students struggled to attain proficient test scores, with only 41.5% of Hispanic students meeting proficient scores in all subjects (Table 2) (Durham County Department of Public Health, 2020). Hispanic students' high school graduation rate (76.6%) is also lower than the combined graduation (82.9%) in DPS and below the graduation rate of both White students (94.1%) and Black students (81.7%) (Table 3) (Durham County Department of Public Health, 2020).

Rationale/Importance:

This disparity in educational performance and attainment can be seen among the adult Hispanic population in Durham County. Of the major racial/ethnic groups in Durham County, those who identify as Hispanic have the highest percentage of residents below the federal poverty line (31%) (Durham County Department of Public Health, 2020). This indicates that the lower educational attainment of Hispanic students likely leads to fewer opportunities for high wage jobs among Hispanic adults.

An example of this could be seen during the first year of the COVID-19 pandemic. On December 21, 2021, approximately 44% of Durham County COVID-19 cases were Hispanic residents, compared to a total Hispanic population of only 13.7% (Durham County Department of Public Health, 2020). It is assumed that this overrepresentation of cases among Hispanic residents may again be tied back to employment. Durham County employment data shows that industries such as construction, restaurants, and janitorial services have a majority of Hispanic employees compared to other races/ethnicities. Thus, since these jobs still required in-person work during the height of the pandemic, Hispanic residents were put at a greater risk of contracting COVID-19 (Durham County Department of Public Health, 2020). This again is likely rooted in the inequitable educational quality and access that Hispanic students in Durham County face, leading to decreased employment opportunities and as a result, increased health risks.

Disciplinary Critique:

Education quality and access is of particular importance to public health dietitians because much of a dietitian's role involves community and patient education. Health literacy is an important part of nutrition education. Although dietitians tailor education to the health literacy of those they are educating, there can still be many nutrition concepts that individuals struggle to understand. Thus, by improving education quality and access, this can increase health literacy and increase the effectiveness of nutrition education.

Since Hispanic residents make up such a large portion of Durham County, improvements in education quality and access among Hispanic high school students in particular will help to boost DPS's overall subject proficiency scores and graduation rates. This in turn will help to increase the number of residents qualified for higher paying jobs, which then has the ability to improve the overall healthcare access and health status of Durham County. In addition, having more residents qualified and working in higher paid positions will help stimulate the county's overall economy. Thus, fundamental changes to the education access and quality of Hispanic high school students in Durham County has the potential to yield large, positive county-wide change.

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B.1.a: APPENDIX SDOH ANALYSIS

Table 1. Percent of racial or ethnic group lacking a high school diploma (or equivalent), 2018

Racial/ethnic group	Location			
	North Carolina		Durham County	
	Male	Female	Male	Female
White	11%	8.8%	4.6%	3.4%
Black	18.5%	14.4%	14.6%	11.9%
Asian	12.6%	16.8%	7.3%	10.1%
Hispanic	47.4%	39.7%	55.8%	52.6%
Other	38.6%	29.3%	42.7%	39.5%

Source: Statistical Atlas, 2018

Table 2. Composite Subgroup Academic Performance Durham Public Schools, 2019

Racial Subgroup	Percent of Proficient Test Scores Across All Subjects
American Indian	51.2%
Asian	74.9%
Black	39.5%
Hispanic	41.5%

Multi-Racial	62.2%
White	80.9%

Source: Durham County Department of Public Health, 2020

Table 3. Cohort Graduation Rate Durham Public Schools, 2019

Cohort	Graduation Rate
All	82.9
American Indian	66.7
Asian	100
Black	81.7
Hispanic	76.6
Multi-Racial	82.9
White	94.1
Academically Gifted	96.5
Economically Disadvantaged	77.9
Limited English Proficiency	66.4

Students with Disabilities	67.4
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Source: Durham County Department of Public Health, 2020

B.2 PROGRAM/POLICY ANALYSIS

Introduction

Education access and quality is a key social determinant of health that has a major influence on wellbeing (Healthy People 2030, n.d.). Higher levels of education have been shown to lead to increased opportunities, employment, income, and health status (The Lancet Public Health, 2020). As shown in Table 1, in 2021, the unemployment rate of those in the U.S. with less than a high school diploma was 8.3%, compared to only 3.5% among those with a Bachelor's degree (U.S. Bureau of Labor Statistics, 2022). Additionally, a large non-communicable disease burden is seen among those with lower educational attainment. In 2011, the prevalence of diabetes among adults without a high school diploma (15%) was more than double the prevalence among those with at least a Bachelor's degree (7%) (Virginia Commonwealth University Center on Society and Health, 2015).

Health literacy plays a large role in the decreased health status among those with lower educational attainment. Inadequate health literacy has been shown to have a stronger association with poor health than age, income, employment status, or race (Shahid et al., 2022). Additionally, research has found that lower educational attainment is associated with lower health literacy (Lee et al., 2010). Within Durham County, disparities in educational attainment are associated heavily with race. Hispanic residents make up 13.7% of the population in Durham County (Durham County Department of Public Health, 2020). However, as seen in Table 2, over 50% of both Hispanic males and females do not have a high school diploma (Statistical Atlas, 2018). Additionally, Table 3 shows at the college level, less than 15% of Hispanic males and females have a bachelor's degree or higher (Statistical Atlas, 2018). The effects of this lower educational can be seen within the income disparities in Durham County, as Hispanic households only make up 12% of all high income (\$150-200k) households (Statistical Atlas, 2018). Please see Table 4 for the full racial/ethnic breakdown of high income households. Thus, among Hispanic residents, lower educational attainment beginning at a young age results in long term disparities throughout the lifespan.

Evidence Based Nutrition Policy or Program

A major factor that contributes to students' academic performance and educational attainment is access to nutrition. Research shows improvements in academic achievement when students consume adequate nutrition (Centers for Disease Control and Prevention, 2014). A study in Boston Public Schools found that students with reduced nutritional intake had a significantly lower GPA (2.1) compared to the mean GPA of all students (2.6) (Kleinman et al., 2002).

School meals play a large role in students' nutritional intake. When considering school meals in Durham County, it is important to recognize the large racial/ethnic diversity of Durham Public Schools (DPS) and the fact that students from different cultural backgrounds may not want to eat the American school meals that are offered. Research on children in early childhood education programs found that children more often accept and eat familiar food or food that is normally eaten in the household (Ayers Looby et al., 2020). Thus, although there is no available evidence within Durham County on school meal consumption by racial ethnic group, this research suggests that students who come from different cultural backgrounds are less likely to consume school meals due to unfamiliarity. This increased risk for low school meal consumption among students from different cultural backgrounds can then lead to increased hunger in school which has been associated with negative academic outcomes such as repeating a grade, lower class grades, and inability to focus (Centers for Disease Control and Prevention, 2014).

This proposed program would work to increase school food acceptance and school meal participation among Hispanic/Latino students by incorporating six traditional Hispanic and/or Latino lunches and breakfasts per three-week meal cycle within Durham Public Schools. Traditional meals would include those that originate from or are commonly eaten in Hispanic or Latin countries. This program would build off the success of a similar program implemented in Cambridge Public Schools which worked to incorporate culturally appropriate menu items into their school lunches helping to increase school meal acceptance and participation (Healthy Food Choices in School, 2019).

Evidence Based Outcomes

The short term objective of this program is to achieve an increase in average participation in free and reduced school meals in Durham County from 55% (2022-2023 school year) to 66%, the highest average participation Durham Public Schools has had in free and reduced school meals in the past 14 years (Durham Public Schools, n.d.), after two years of program implementation. The long term outcome objective is a 0.03 standard deviation increase in Math 1 and Math 3 End-of-Course (EOC) scores and a 0.04 standard deviation increase in English II EOC scores among Hispanic/Latino students after five years of program implementation. This is based on a study conducted in New York City middle schools which found a 0.03 standard deviation increase in math test scores and a 0.04 standard deviation increase in ELA scores with the implementation of universal free meals (Schwartz & Rothbart, 2020).

Evidence Based Implementation Strategies and Activities

This program will build off of a similar program implemented in Cambridge Public Schools (CPS), which serves four culturally appropriate menu items in each meal cycle (Freedman, n.d.). After the implementation of this program, CPS reported an increase in the sense of school community as well as meal participation (Healthy Food Choices in Schools, 2019). The proposed program in DPS will aim to serve six traditional Hispanic and/or Latino meals per three-week meal cycle, including three breakfasts and three lunches. The focus of cultural menu items will be on Hispanic/Latino items specifically, as Hispanic/Latino students represent one of the largest racial/ethnic groups in DPS during the current 2022-23 school year, making up 34.3% of all students (Durham Public Schools, 2022).

The program will begin as a pilot in 2 high schools within DPS with long term expansion to all Durham public schools at all levels. This program intends to expand the CPS program's model by also including cultural breakfasts, as evidence has shown an association between students eating a habitual breakfast and improved academic performance (Adolphus et al., 2013). Additionally, all students, regardless of income, are eligible for free breakfast in DPS (Durham Public Schools, n.d.). Thus, including breakfast expands the program's reach to ensure that all students have access to the cultural breakfasts each meal cycle. Similar to the CPS program, this program will engage students, parents, and

Durham County’s Hispanic/Latino community to help develop and test appropriate recipes. The school food service director at each pilot high school will be responsible for overseeing implementation at their respective school. This will include reviewing the choice of traditional recipes, managing the program budget, and designing educational materials for students.

At this time there is no proposed reach for the pilot program, as there is no available data on the reach of similar programs, such as the CPS program. However, the scope of this proposed program will allow it to address each level of the socioecological model. On the individual level, this program will help provide Hispanic/Latino students with traditional/familiar food as well as promote learning among school food service staff, who may be working with new dishes, ingredients, and cooking methods. On the interpersonal level, parents will be involved in the brainstorming and selection of recipes. Additionally, this program has the potential to foster interpersonal relationships among students through the sharing of cultural food. Organizationally, this program will involve the participation of the pilot high schools, with eventual expansion to all public schools within Durham County. On the community level, recipe ideas will be sourced from parents, students, and members of the Hispanic/Latino community in Durham County. Finally, at the policy level, this program has the potential to be expanded into a cultural food policy within Durham County. For example, a policy requiring that a certain number of cultural meals must be served within a meal cycle in all Durham public schools.

Stakeholders

The primary stakeholders in this program are Hispanic/Latino students in Durham public schools, as they are the priority population being served. Thus, it will be important to obtain student input to ensure the program is culturally appropriate, community based, and beneficial. As mentioned, parents will play an important role in the recipe development to ensure that familiar, traditional foods are provided. Additionally, organizations such as the Mayor’s Hispanic/Latino Committee (City of Durham, n.d.) and the Durham County Department of Public Health will help form connections with the larger Durham County Hispanic/Latino community, who also have valuable input and the potential to donate time and/or resources to the program. School food service workers will also be important stakeholders to consider, as

this program may require them to learn about new cooking techniques and ingredients as well as cook more labor intensive meals. Thus, it is important that the proper training and compensation are provided in order to support the increased burden this program will have on school foodservice workers. Finally, registered dietitians from the Hispanic/Latino community will be important to ensure that new menu items are both culturally appropriate and meet all required federal nutrition standards (North Carolina Department of Public Instruction, n.d.).

Budget

Current available resources will be utilized as much as possible to decrease the program's overall cost. This will include utilizing USDA funds for as many ingredients as possible as well as available school resources (e.g. computers, printers, meeting spaces). Additional funding needed for cultural ingredients, staff hiring, and pay increases will be obtained through local community grants (e.g. Triangle Community Foundation, The Forest at Duke, etc.). The full estimated budget for the program can be found in Table 5. The estimated total cost of the pilot program is \$47,400 per year. 38% of this budget is dedicated to pay increases for food service directors, 51% for pay increases for food service workers, 7% for hiring of a part time registered dietitian, and 4% for the purchase of cultural ingredients.

Conclusion

There are many advantages to this program, most notably an increase in school meal participation among Hispanic/Latino students that will translate into increased academic performance (Schwartz, 2019). Additionally, this program will help increase the sense of inclusivity and validation among Hispanic/Latino students by serving culturally diverse meals that students are familiar with (Freedman, n.d.). One possible disadvantage of this program is that Hispanic/Latino students may be familiarized with American school lunches and thus, would not have an interest for culture menu items. Alternatively, this program could cause Hispanic/Latino students who normally bring meals from home to switch to eating school lunches, which may not be as nutritious as home-packed meals. However, a recent study on the effects of the Healthy Hunger Free Kids Act (HHFKA) found that HHFKA implementation was associated with a decrease in BMI among school-aged children in the U.S. (Chandran et al., 2023). In

terms of labor, this program will place a large burden on food service directors and food service workers. However, although the initial burden will be high, as the program continues it is expected to become less burdensome and more routine for staff. The high community engagement this program seeks to foster will also help to relieve the burden on food service staff. Thus overall, the many positive, far reaching impacts this program could have among Durham's Hispanic/Latino community likely outweigh these potential disadvantages.

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B.2.a: APPENDIX PROGRAM/POLICY ANALYSIS

Table 4. Unemployment rate by educational attainment, 2021

Educational Attainment	Unemployment Rate (%)
Doctoral degree	1.5
Professional degree	1.8
Master’s degree	2.6
Bachelor’s degree	3.5
Associate’s degree	4.6
Some college, no degree	5.5
High school diploma	6.2
Less than a high school diploma	8.3

Source: U.S. Bureau of Labor Statistics, 2022

Table 5. Percent of racial or ethnic group lacking a high school diploma (or equivalent), 2018

Racial/ethnic group	Location			
	North Carolina		Durham County	
	Male	Female	Male	Female
White	11%	8.8%	4.6%	3.4%
Black	18.5%	14.4%	14.6%	11.9%
Asian	12.6%	16.8%	7.3%	10.1%

Hispanic	47.4%	39.7%	55.8%	52.6%
Other	38.6%	29.3%	42.7%	39.5%

Source: Statistical Atlas, 2018

Table 6. Percent of racial or ethnic group with a bachelor’s degree or higher, 2018

Racial/ethnic group	Location			
	North Carolina		Durham County	
	Male	Female	Male	Female
White	32.5%	32.5%	61.6%	62.9%
Black	15.8%	22.3%	28.3%	36.3%
Asian	58.6%	49.9%	77%	69.1%
Hispanic	11.4%	15.8%	10.4%	14.4%
Other	13%	19.6%	17%	23.6%

Source: Statistical Atlas, 2018

Table 7. Percent of major racial/ethnic groups in Durham County contributing to high income households (\$150-200k), 2018

Racial/Ethnic Group	Percent Contribution
White	33%
Hispanic	12%

Black	13%
Asian	22%
Mixed	18%
Other	2%

Source: Statistical Atlas, 2018

Table 8. Estimated program budget

Budget Item	Cost Estimate Basis	Cost
Food service/nutrition director pay increase	-Average salary in US: \$59,324 (Comparably, n.d.) -Based on pay increase of 15%	\$18,000/year
Food service worker pay increase	-Starting salary in Durham, NC: \$15/hour (Frontline Education, 2023) -Based on each employee working extra 6 hours per month -Assumed average of 15 food service workers per high school	\$24,300/year
Registered Dietitian (part time)	-Average hourly wage in special food services in US: \$30.98 (U.S. Bureau of Labor Statistics, 2021) -Based on working 12 hours per month with one RD overseeing recipe development of both pilot schools	\$3,300/year
Cultural ingredients	-Dependent on recipes during meal cycles and schools' student population -Assumed extra \$100 spent each month on new ingredients	\$1,800/school year
Total		\$47,400/year

B.3 EVALUATION PLAN

Introduction

Education access and quality is a social determinant of health that has a major influence on wellbeing (Healthy People 2030, n.d.). Higher levels of education help lead to increased opportunities, employment, income, and health status (The Lancet Public Health, 2020). Within Durham County, race is highly associated with educational attainment, as over 50% of Hispanic males and females do not have a high school diploma compared to less than 5% of White counterparts (Statistical Atlas, 2018). The proposed program aims to incorporate six traditional Hispanic/Latino breakfasts and lunches per three-week meal cycle in two pilot high schools in Durham County. The program seeks to increase school meal acceptance and participation among Hispanic/Latino students and decrease hunger, as hunger in school has a strong association with negative academic outcomes (Centers for Disease Control and Prevention, 2014). The program will be conducted by the food service director at each school and a part time registered dietitian. The long term outcome objective is a 0.03 standard deviation increase in Math 1 and Math 3 End-of-Course (EOC) scores and a 0.04 standard deviation increase in English II EOC scores among Hispanic/Latino students after five years of program implementation. This is based on a study conducted in New York City middle schools which found a 0.03 standard deviation increase in math test scores and a 0.04 standard deviation increase in ELA scores with the implementation of universal free meals (Schwartz & Rothbart, 2020).

Study design/data collection

Evaluation will utilize a quasi-experimental pre-post study design. Data on Hispanic/Latino students' EOC scores in Math I, Math 3, and English II will be collected one year prior to program implementation. After implementation, EOC score data will be collected annually, and a final comparison of average scores between one year pre-implementation and five years post-implementation will be conducted. EOC scores will be requested from both pilot schools over this five-year period. Additional student data will be collected through school records in order to adjust for potential confounders,

mediators, and modifiers. This will include data on sex, nationality, primary language spoken at home, English proficiency, birth country, and attendance. Data on Hispanic/Latino students' purchase of traditional meals will also be collected from point of sale (POS) systems. Finally, data on school lunch and breakfast participation among Hispanic/Latino students will be collected annually from each school.

Sample and sampling strategy

During each year of program implementation, as well as one year prior to implementation, a random sample of EOC scores will be taken from 65% of Hispanic/Latino students in both pilot schools. This is based on Schwartz and Rothbart's study on the impact of universal free meals in New York City middle schools, which collected data on 155,496 students enrolled in public middle schools (Schwartz & Rothbart, 2020). Comparing this to the 232,536 total number of middle school students in New York City, their sample accounted for approximately 66% of all students (New York State Education Department, 2021). However, it is important to note that this study was conducted from 2010-2013, while data on the total number of middle school students is from 2020-2021, as there is no available data on student enrollment between 2010-2013.

Specific measures

Program outputs will include the number of traditional meals served based on POS data, staff training sessions completed, educational materials and recipe cards provided, and grants awarded. All measures will be collected through detailed documentation throughout the program's implementation. The program's two main outcomes will focus on EOC test scores and school meal participation. These measures will be collected through data provided by schools at the end of each year. Based on the results of data analysis, the previously mentioned sociodemographic characteristics including sex, nationality, primary language spoken at home, English proficiency, birth country, and attendance will either be adjusted or stratified for.

Timing

Evaluation will begin one year prior to program implementation, with the collection of Hispanic/Latino students' EOC scores and sociodemographic data. Community partner engagement will

begin two years prior to program implementation. These activities will focus on Hispanic/Latino parents, students, and community members helping to develop traditional recipe ideas. Upon program implementation, EOC scores and sociodemographic data will continue to be collected at the end of each school year. Progress will be defined as an increase in average EOC scores in Math 1, Math 3, and English II among Hispanic/Latino students. If an increase in EOC scores trending towards the long term outcome of a 0.03 standard deviation increase in math and a 0.04 standard deviation increase in English is not seen within 3 years of program implementation, then program adjustments will be made. This will include holding focus groups with Hispanic/Latino students to determine meal acceptability, assessing quality of meals, and looking for additional community partners (e.g. local Hispanic/Latino restaurants).

Analysis Plan

The main type of statistics that will be used will be quantitative based on EOC scores pre and post implementation. The average baseline EOC scores for each academic subject will be based on scores one year prior to program implementation. After data collection over the five-year period, test scores will be transformed into z-scores by grade and school year. The number of standard deviations above/below the average baseline EOC scores will then be calculated to determine if the long term outcome has been met. A multiple regression, along with corresponding R-squared value, will be used to capture the impact of cultural meal provision on EOC scores. Additionally, a separate multiple regression will be used to determine the relationship between cultural meal provision and school breakfast and lunch participation. Both regressions will be adjusted for based on the previously mentioned sociodemographic characteristics.

Sources of funding

Funds to support staff pay increases and the hiring of a part time registered dietitian will come from community grants, including the Triangle Community Foundation, Duke Doing Good Community Fund, and The Forest at Duke. The timing of grant applications will vary based on the funding timeline of specific grants/organizations. For example, the Triangle Community Foundation has a variety of individual grants that provide funding from 1-3 years and whose applications vary from September to

April (Triangle Community Foundation, n.d.). Meanwhile, foundations such as the Duke Doing Good Community Fund have an annual grant application cycle, with applications due in October each year (Duke Office of Durham & Community Affairs, n.d.).

Data use and dissemination

Data from this pilot program will be used to help inform any necessary program changes needed before expansion into other schools throughout Durham County. This data can also be utilized by other school districts who may be interested in implementing a similar program. As the program expands, data can be used to add to the currently limited body of research on the association between cultural school meal options and academic performance. Data will be disseminated through end-of-year reports sent to other schools within Durham County, superintendents, principals, and food service directors in other interested schools outside Durham County, and to Durham County commissioners. This report as well as a more reader friendly infographic will be provided on the schools' websites and as an annual print-out for parents and teachers.

Conclusion

This proposed program offers a unique collaboration between Durham County public schools, leaders in the community's food service and nutrition spaces, and the greater Hispanic/Latino community in Durham to improve academic achievement and in turn, long term health outcomes for Hispanic/Latino youth. The interdisciplinary approach of this program, from working with dietitians to members of the Hispanic/Latino community to students themselves, will work to promote familiarity and inclusivity in school meals. This in turn will help to promote equity in the classroom, ensuring that no student goes hungry due to lack of inclusive meals. This program will work to create a cascade of public health benefits for Durham County's Hispanic/Latino youth, starting with increased academic performance and graduation rates, leading to improved health literacy and job opportunities, and finally resulting in an overall improvement in health status (The Lancet Public Health, 2020).

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APPENDIX C: RANA HAMMOUDA'S INDIVIDUAL DELIVERABLES

C.1 SDOH ANALYSIS

Social Determinants of Health (SDoH):

Health and quality-of-life outcomes are affected by nonmedical conditions in the environment in which people are born, grow, live, work and age. These conditions are the social determinants of health (SDoH). The SDoH are classified into 5 domains which include economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context (Healthy People 2023, n.d.). This paper will focus on the education access and quality SDoH of the Durham County community in North Carolina. Individuals with higher education level tend to live longer and have better health outcomes compared to their less educated peers (Zajacova & Lawrence, 2018).

Because education affects one's future, Healthy people 2023's goal is to "increase educational opportunities and help children and adolescents do well in school" (Healthy People 2023, n.d.). One objective to meet this goal is to "increase the proportion of high school students who graduate in 4 years" (Healthy People 2023, n.d.). However, this objective is a challenge due to the inequities and inequalities that some high school students face. Students from low-income households, students who are differently abled, and students who continually experience social discrimination are more likely to perform poorly in schools which puts this population at risk. This also has a negative long-term impact on students as they will be less likely to find a high-paying job, and more likely to have chronic diseases and depression (Healthy People 2023, n.d.).

Geographic & Historical Context:

Durham County is located in the Piedmont region of central North Carolina and is named after the town of Durham which was already established. The land was inhabited by the Occaneechi and Eno

Indians tribes, followed by English, Scottish-Irish and German settlers (Encyclopedia of North Carolina, 2006). As of 2023, Durham's current population is 300,060 which makes it the 4th largest city in North Carolina and the 73rd largest city in the United States (World Population Review, n.d.).

According to the Durham County Community Health Assessment (CHA), "in 2019 estimates, the largest racial groups were White (161,919), Black or African American (113,682) and Hispanic or Latino (42,079) residents." (Durham County CHA, 2020). As of 2019, 88.4% of the population have at least high school degree, and 48.2% of the population have at least a bachelor's degree (AssessNC, 2021). Durham was famous for tobacco and banking industries, and although both businesses continued to develop, Durham is now known as the "City of Medicine" due to the foundation of three educational institutions: Duke University, North Carolina State University and University of North Carolina at Chapel Hill (City of Durham, n.d.).

Although Durham is known for its prosperous healthcare, disparities in healthcare still occur among the communities. According to the Durham County CHA, disparities in health and education are addressed by community collaborations such as Early Childhood Action Plan and Durham PreK initiative. These initiatives aim to "build a well-paid and high-quality early education workforce" (Durham County CHA, 2020).

Priority Population:

Graduating high school is a major milestone in one's life as it symbolizes the beginning of adulthood and independence. High school degree opens a lot of opportunities to people such as getting a job as it is a standard requirement for most jobs, as well as pursuing higher education opportunities. According to CareerOneStop, having a high school diploma makes an individual more likely to earn 40% more income than someone without one. It also raises one's chances of being employed by 33% upon finishing high school (CareerOneStop, n.d.). Additionally, according to Healthy People 2030, failure to

obtain a high school degree negatively impact health, as well as limited employment prospects, low wages leading to poverty (Healthy People 2030, n.d.)

According to MyFutureNC, high school graduation rates in North Carolina was the lowest among Hispanic students in 2022 which was 80%, compared to White students with 90% graduation rate and Black students with 83% graduation rate (MyFutureNC, 2022). Additionally, according to Durham Public Schools (DPS), the cohort graduation rate in 2022 among Hispanic students was 75.9%, which is the lowest among American Indian students (87.7%), Asian students (94%), Black students (86.1%), Multiracial students (86.5%) and White students (92.7%) (DPS, n.d.). Our main priority population we will focus on this paper is Hispanic students as we need to address the gaps and inequities that places this population at disadvantage which affects the completion of their high school.

Measures of SDOH:

There are a lot of factors that can contribute to low graduation rate and school readiness for school, including poverty, food insecurity, abuse, neglect as well as socioeconomic statuses of families. Poverty rate by race/ethnicity in Durham County was 32.4% in Hispanic, 23.5% in Black, 17.4% in Asian, and 8.4% in White (De Marco & Hunt, 2018). The median household income in Durham County was \$41,123 in Hispanic compared to their white counterparts whose median household income is \$68,913 (De Marco & Hunt 2018). Additionally, according to the Durham County Health Department, about 1 in 4 Latino skipped meals because they did not have enough money. These disparities were exacerbated with the COVID-19 pandemic (Durham County, n.d.).

Rationale & Importance:

Poverty and food access are from the top 2020 Durham County Healthy priorities (Durham County CHA, 2020). If Durham County addresses inequities and gaps in the community, we will see improved trends in poverty rates as well as food insecurity among the Hispanic population, we will see

higher graduation rates among students. With higher high school graduation rates, students will have high-paid jobs, higher education opportunities and eventually have better health outcomes.

Disciplinary Critique

Registered dietitians (RDs) and public health professionals should be aware of the factors that can contribute to the student's performance in schools. Good nutrition and balanced diet are critical for students as it helps them concentrate and be prepared to learn. Having said that, RDs need to take into consideration the student's social and environmental conditions as it affects their nutritional and overall health. Not every student has the same opportunities for education, quality of education, or access to nutritious food which has a positive long-term impact on the student's wellbeing and health outcomes. For this reason, RDs need to advocate for equitable nutrition interventions within the Durham community that work to prevent the decrease in graduation rates among students and ensure higher educational attainment for all students.

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C.2 PROGRAM/POLICY ANALYSIS

Introduction

The Social Determinants of Health is a collection of social and environmental factors that can affect one's health. Domains of the SDoH include economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context (Healthy People 2030, n.d.). Education access and quality is the focus of this paper. Earning a high school degree opens the door for higher education degrees as it is a prerequisite for most accredited American colleges and universities (Acceleration Academies, n.d.). It also grants you higher earning potential and better employability. Higher levels of education are also associated with improvements in life expectancy, morbidity, and health behaviors (The Lancet Public Health, 2020). Health literacy plays a major role in the poor health outcomes among those with lower education attainment. Low health literacy is associated with poorer health outcomes and poorer use of health care services (Berkman et. al, 2011). A study done in 2018 showed that higher education attainment was associated with higher scores on the health literacy aspects (Jansen et. al., 2018). As shown in Table 1, high school graduation rates were the lowest in Hispanic students among their peers in North Carolina. In Durham County, Hispanic students make up 33% of total number of students in Durham public schools (Durham Public Schools, 2021). The goal of the proposed program is to increase graduation rates and healthy literacy among Hispanic students in Durham County.

Evidence Based Nutrition Policy or Program

Intake of food and nutrition is vital for students' academic performance and contributes greatly to educational attainment. Data from the 2019 national Youth Risk Behavior Survey (YRBS) show that students with higher academic grades are more likely to engage in healthy dietary behaviors compared to students with lower grades (CDC, 2021). Another research study results suggest that diet may be

associated with academic achievement among students (Burrows, et. al., 2017). This is why school meals plays a very important role in the students' nutritional intake during the school day. As shown in table 2, the Hispanic/Latinx population make up 34.3.% of the student racial composition in Durham public schools (DPS, 2023). Therefore, it is important to recognize the fact that Durham Public Schools (DPS) have students from different cultural backgrounds and ethnicities. Culture influences food choices and acceptability. A study found that nearly half of Latino students and households (44.7%) are food insecure. This means they are without reliable access to enough affordable, nutritious food. This is far more than their White (31.4%), Black (16.7%) and other peers (7.2%). This same study found that students in food-insecure and marginally secure households were more likely to participate in the National School Breakfast and Lunch Programs (Forrestal et. al., 2021). A proposed program that is build off a successful similar program implemented in Cambridge Public Schools is to incorporate three traditional lunches and breakfast per month in Durham public schools to boost school meals participation, and food acceptance among Hispanic/Latinx population (Healthy food choices in Schools, 2019).

Evidence Based Outcomes

Short-term objective of this program is, after two years of implementation, to achieve an increase in average participation in free and reduced school meals in Durham County from 55% to 66% in the 2022-2023 school year, which is considered the highest average participation Durham Public Schools has had in free and reduced school meals in the past 14 years (Durham Public Schools, n.d.). Additionally, the percent of Hispanic/Latinx students proficient test scores across all subjects in 2019 was 41.5%. For the long-term impact of this program is, after ten years if program implementation, to see the percent of Hispanic/Latinx students scoring proficient test scores across all subjects increase from 41.5% to 59% measured by End of Grade test results (Durham County Department of Public Health, 2020. This is based on research showing that students who consume school breakfast have scored 17.5% higher on

standardized math tests compared to students who do not consume school breakfast (School Nutrition Association, n.d.).

Evidence Based Implementation Strategies and Activities

As previously mentioned, the proposed program in DPS is based off of a similar program that is implemented in Cambridge Public Schools (CPS) that serves four culturally appropriate menu items each cycle in their school lunch program (Healthy Food Choices in Schools, 2019). Since DPS meals cycle is 3 weeks, this program's goal will similarly serve 6 total traditional Hispanic/Latinx breakfast and lunches per month, that is 3 meals for breakfast and 3 meals for lunch (DPS, n.d.). Adding cultural breakfast items serves as an expansion to the CPS program's model. Most students participate in school lunch programs are automatically eligible for free meals if anyone in their household gets SNAP, TANF, or FDPIR benefits (USDA, 2022). Additionally, according to a report published in the journal *Frontiers in Human Neuroscience*, students who regularly eat breakfast help them meet their daily nutrient needs easily and improve academic performance (Healthy Eating, 2018). The program will start off as a pilot in 2 high schools in Durham Public Schools with hopes to expand to other public schools across all levels. This program will also engage with students, parents, community members from the Hispanic/Latinx community in Durham, registered dietitians from Durham County Department of Public Health DINE team to help develop culturally appropriate recipes and taste test them. School food service director will be managing and overseeing the implementation of this program in their schools.

It is anticipated that by the end of year two of this program's implementation that the 90% of Hispanic/Latinx students, who are the priority population, have tried at least one meal from the culturally appropriate items offered for breakfast and lunches in DPS. This program also addresses several levels of the socioecological model. Firstly, on an individual level, this program will provide familiar foods for the Hispanic/Latinx population which will give them sense of inclusivity. On an interpersonal level, this program will influence behavior such a knowledge, attitudes, and beliefs among students through sharing

of cultural food. On an organizational level, this program will help school districts implement this policy as it expands to all public schools in Durham County. On a community level, this policy will engage parents, students, as well as members from the Hispanic/Latinx community where they will all get together to help better the students' experience in schools. Lastly, on a policy level, this program could potentially be expanded into cultural food policy within Durham County.

Stakeholders

Identifying menu option items and making this program succeed is a team effort. Primary stakeholders in this program are Hispanic/Latinx students in Durham public schools as they are the key population being served by this program. They will make suggestions about adding ingredients to dishes they taste test based on their families' preparation of the same meals. It is very crucial to obtain their input and feedback to ensure the program is culturally appropriate and is effective for them. Parents will also play a very important role in the process as they can help with providing ideas of traditional foods and recipes that are likely to be served for their children. Moreover, Durham's Innovative Nutrition Education (DINE) team in Durham County Department of Public Health are responsible for the SNAP-Ed classes carried out in Durham public schools. DINE team are all registered dietitians. They can help introduce culturally appropriate recipes through their interactive nutrition classes in Durham public schools, as well as taste test appropriate recipes (Durham County Public Health, n.d.). Lastly, it is important to engage with food service workers in schools as they are the ones cooking the culturally appropriate meals for the students. They will have to familiarize themselves with cooking these recipes.

Budget

For this program, most of the available resources will be used to avoid additional program's cost. USDA funds will be used for many ingredients used in the cultural food items that will be incorporated in the meal cycles, as well as resources available in the schools such as meeting rooms, classrooms, and technology resources. Local community grants from Triangle Community Foundation, Caring

Community Foundation, DPS Foundation will cover the program's additional funding required for the ingredients needed in the cultural recipes as well as staff pay increases. Table 3 shows the full estimated budget for the program. The estimated total cost of the pilot program is \$30,600 per year if it operates at two high schools. 60% of this budget is dedicated to pay increases for food service directors, 35% is dedicated to pay increases for food service workers, and 5% is dedicated to the purchase of cultural ingredients.

Conclusion

This program has many advantages and benefits to offer with regard to school meal participation among Hispanic/Latinx population and food acceptability that will result in improved academic performance and education attainment. Nutrition is a very integral part of students' academic success. Serving culturally diverse meals will also increase the inclusivity and familiarity among Hispanic/Latinx students. A possible disadvantage of this program is that students from other backgrounds and ethnicities might feel left out as dishes from their culture is not being served in school lunches. Additionally, food service workers in school might find it very burdensome having to learn the cooking techniques and the recipes of these new items. Overall, this program has the potential for many benefits and far-reaching impacts among the Hispanic/Latinx students in Durham public schools including sense of belonging, inclusivity, better school learning environment leading to potentially higher graduation rates and better health outcomes.

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C.2.a: APPENDIX PROGRAM/POLICY ANALYSIS

Table 9. High school graduation rate among different students’ race & ethnicity, 2022

Race/Ethnicity	High School Graduation Rates in 2022
Asian	95%
White	90%
American Indian	85%
Black	83%
Hispanic	80%

Source: My Future NC, 2023

Table 10. Student racial composition in 2022-23 academic year

Race	Student Racial Composition
African American	38.5%
Hispanic/Latinx	34.4%
White	19.4%
American Indian, Asian, Hawaiian Pacific, Multi-racial	7.8%

Source: Durham Public Schools, 2023

Table 11. Estimated program budget

Budget Item	Cost Estimate Basis	Cost
Food Service/nutrition director pay increase ¹	-Average Salary in US: \$59,324 -Based on pay increase of 15%	\$18,000/year
Food service worker pay increase ¹	-Average salary in Durham, NC: \$10/hour -Based on each employee working extra 4 hours per month -Assumed average of 15 food service workers per high school	\$10,800/year
Cultural ingredients ¹	-Dependent on recipes during meal cycles and schools' student population -Assumed extra \$100 spent each month on new ingredients	\$1,800/school
Total		\$30,600/year

¹Assuming pilot program occurs in 2 high schools in Durham County

C.3 EVALUATION PLAN

Introduction

Education access and quality can create opportunities for better health. The link between higher levels of education and better health is the financial stability through education. Education creates opportunities to get higher paying jobs, access to good health insurance, safe housing in an unpolluted environment, have higher health literacy which all leads to better health outcomes (Raghupathi, 2020). Completion of high school can also serve as a health indicator. Several studies were cited in Healthy People 2020 that found links between dropping out of high school and premature death and poor health (Tulane University School of Public Health, 2021). The focus of this paper is to propose an evaluation plan for a program that aims to address education access and quality. The population that is focused on is the Hispanic/Latinx population in Durham Public Schools, as they have the lowest graduation rates among their peers (Durham Public Schools, 2021). The proposed program aims to increase graduation rates and health literacy among Hispanic students in Durham County. Because intake of nutritious food is vital for students' academic performance and contributes greatly to their educational attainment, the program's goal is to incorporate three cultural meals for lunches and breakfast per month in Durham Public Schools to increase school meal participation and increase End-of-Course (EOC) scores using inclusive meals and increased food acceptance (Healthy food choices in Schools, 2019). The long-term outcome objective of the program is a 0.03 standard deviation increase in Math 1 and Math 3 EOC scores and a 0.04 standard deviation increase in English II EOC scores among Hispanic/Latino students after five years of program implementation (The Maxwell School, 2019).

Study Design/Data Collection

The study design that will be conducted is a quasi-experimental design to study the cause-effect relationship between school meal participation and EOC scores using inclusive meals and increased food acceptance. The outcomes that will be evaluated in the program include Hispanic/Latinx student participation in the school meal program especially their acceptability of the cultural meals implemented,

as well as their overall satisfaction and how the participants view the effectiveness of the program. To evaluate, a mixed-methods approach will be executed, using both quantitative and qualitative data. To measure quantitative data, school lunch program questionnaire will be given by the Durham Public School to students. The questionnaire is adopted from the School Lunch Survey of Eco Literacy, refer to Appendix 1. This questionnaire will measure the percentage of students' participation and acceptability of school meals. To measure qualitative data, interviews will be conducted with the students to know if having cultural appropriate dishes make them more likely to eat the meals provided by the school. Focus groups will also be conducted to elicit insights and perspectives of parents on their children's acceptability in school meals, as well as their satisfaction of the program including implementation and outcomes, as well as any improvements in the food quality. The focus group will also gather feedback and suggestions from parents to adapt and improve the program to better assess the students' needs.

Sample and Sampling Strategy

Since this is a pilot program, it will be implemented in two Durham Public Schools. Sampling of the students will be randomized among the Hispanic/Latinx population in the high schools chosen to implement the program in. Random sampling is the simplest form of data collection as well as offers an equal chance of selection which are strengths to this method.

Specific Measures

The outputs which this evaluation will specifically measure is the percentage of Hispanic/Latinx students participating in school meals as well as their acceptability of the cultural meals provided. By the end of the school year, the outcome in which the evaluation will measure is the change in the EOC scores in Math 1 and Math 3, and English II among the Hispanic/Latinx population. The scores should reflect the progress and academic performance of the students in the school. Additionally, the questionnaire and focus group will gather data about the students' satisfaction, and effectiveness as it relates to food acceptability of school meals, as well as the parents' insight on the program.

Timing

Stakeholder engagement activities will occur before implementation, as it is important for stakeholders to have input in the program's design. Evaluation will occur at two time periods within the academic school year. There will be a midpoint evaluation in December and an endpoint evaluation in June. The overall timeline of the program is seen in Appendix 2. Progress of the program will be defined as the number of children participating in school meals and their acceptability of the cultural dishes. It will also be defined by the increase in Math 1 and Math 3 EOC scores and English II EOC scores among Hispanic/Latino students. If there is a small number of students participating, parents will be contacted as well as students to ask for reasons, and ways to better this program.

Analysis Plan

The schools' superintendents will analyze results from the school lunch questionnaire given to students. For the questionnaire, a chi-square test will be performed to analyze any statistically significant difference in school meal participation and acceptability among the Hispanic/Latinx students in Durham Public Schools before and after the implementation of the culturally appropriate meals. Results from the questionnaire will be translated into percentages to assess the program's strength and areas of improvement. A qualitative analysis will be performed for the focus group to find common themes. Data will be coded for recurring themes that occur during the discussion.

Sources of Funding

Funding for the program will come from the Durham County Department of Public Health. El Centro Hispano which is an organization that serves the Hispanic/Latinx population. To sustain the program, there will be a collaboration with different community partners in such as El Centro Hispano as well El Futuro. Both organizations help to serve the Hispanic/Latinx population in Durham.

Data Use and Dissemination

Data will be used to evaluate further improvement for the program. Data will be disseminated through emails and flyers to all stakeholders, including all the families who have children enrolled in the

program. Since this is a pilot program, data will be used to measure the effectiveness of the program to evaluate whether this can be expanded to all public schools in Durham.

Conclusion

The aim of this program is to increase the Hispanic/Latinx students' participation in school meals by providing cultural and traditional dishes to increase food acceptability. Adequate nutrition plays a huge part in school performance. Students who skip meals tend to have lower test scores than their peers, as hunger can lead to children missing school or having to repeat grades which all lead to lower graduation rate (Momentous Institute, 2018). High education attainment leads to financial stability and thus better health outcomes. This program has a great potential in achieving equitable school performance among the Hispanic/Latins population in Durham Public Schools, and it can all be possible through the collaboration of public health practitioners, school superintendents, local community partners, parents, and students to make this program succeed.

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C.3.a: APPENDIX EVALUATION PLAN

1. Where do you normally get lunch on school days? Mark all that apply. From the school cafeteria. A. I bring my lunch.
B. I buy it off campus.
C. I do not eat lunch.
D. Other? Please describe: _____

2. How often do you eat the cafeteria food? Mark one.
A. about six or more times a month
B. about two to five times a month
C. about once a month
D. Never

3. If you've eaten in the cafeteria at least one time this year, list three words you would use to describe the food: _____

4. In general, how would you rate the taste of the cafeteria food? Mark one.
A. Delicious
B. Pretty good
C. Okay
D. Terrible
C. I don't eat it

5. What is the best thing you've eaten in the cafeteria? _____
What did you like about it? _____

6. What was your least favorite food item? _____
What didn't you like about it? _____

7. If the cafeteria could change one or two things to make the food tastier, healthier, or more interesting, what would you suggest? Be as specific as you can:

8. Do you feel you have enough time to eat your lunch? _____
If not, how much would make a difference for you? _____

9. In addition to the food itself, what changes (for instance in the lunchroom) would improve the overall dining experience? _____

Think about students you know who don't regularly eat the school lunch. What changes might make them more likely to participate?

Table 12. Estimated program timeline

Program Launch	Program Launch			Program Year 1												Program Year 2											
	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May		
Community Meetings with Schools Superintendents, School Kitchen Staff, Parents	■													■	■	■										■	
Choose 2 Durham Public Schools		■																									
Baseline EOC scores			■													■											
Strengthen Relationship with Local Community Organizations	■	■	■											■	■	■	■										
Taste-test Cultural Appropriate Recipes and Traditional Dishes	■	■	■	■									■	■	■	■											
Program Year 1																											
Conduct School Lunch and Acceptability Questionnaire				■									■			■										■	
Implement Cultural Appropriate Dishes in School Lunch				■	■	■	■	■	■	■	■	■	■	■	■	■											
Conduct Focus Groups																											
Analyze Survey, Focus Groups and Evaluation Data									■	■	■													■	■		
Program Year 2																											
Implement Cultural Appropriate Dishes in School Lunch																■	■	■	■	■	■	■	■	■	■	■	
Follow Up with Parents and Students													■	■	■											■	

APPENDIX D: DANIEL LERCHER'S INDIVIDUAL DELIVERABLES

D.1 SDOH ANALYSIS

Social Determinant of Health

“Social determinants of health are the conditions in the environments where people are born, live, learn, work, play, worship, and age that affects a wide range of health, functioning, and quality-of-life outcomes and risks” (Healthy People 2030). These determinants include economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context. This brief is going to focus on education, specifically high school graduation rates as a surrogate marker for health literacy, in Durham County, North Carolina.

“People with higher levels of education are more likely to be healthier and live longer” (Healthy People 2030). This umbrella statement has a multitude of drivers and metrics that makes education an extremely complex topic. Missing in these metrics is any measure of healthy literacy. As defined by the Centers for Disease Control, “Personal health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others” (CDC 2021). In one of the most comprehensive health literacy studies, 36% of Americans have basic or below basic health literacy, whereas only 12% were judged proficient (Kutner et al 2006). If the education system is not adequately providing the foundational knowledge for graduates to make appropriate health choices, overall health will continue to flounder, especially for students who are not graduating high school.

Geographic and historical context

Durham County, originally formed in 1881, is in north central North Carolina and spans 299 square miles. Its main industries consisted of textiles and tobacco until the collapse of these markets shifted to healthcare and is now known as the City of Medicine (Durham County Gov 2023).

Durham has a population of almost 330,000 people and consists of a diverse population, mainly white, African American, and Hispanic (Table 1) (Census 2020). The target population, public school students enrolled in Durham Public Schools (DPS), comprises 31,113 students in grades kindergarten

through grade 12 attending 55 schools (DPS 2022). This cohort entails an estimated 84.1% of children enrolled in school with 15.9% enrolled in private school (Census 2020). The overall population demographic for residents under 18 is shifting towards Hispanic or Latino origin and mixed races, indicating these subgroups are the fastest growing. Student racial composition of DPS is even more skewed towards Hispanic or Latino origin (Table 2) indicating that other subgroups are proportionally attending private or home school options (Census 2020, DPS 2022). Of note, 54.8% of enrollees are on free or reduced lunch (DPS 2022)

According to the NC school report cards, students made significant progress from the 2015 – 2019 academic years in overall performance. The percent of students not proficient in the four measured metrics (Math, Reading, Science, and Biology) decreased from 54.5% to 46.25% (Table 3). In addition, DPS performance was closing the gap compared to overall state data. There is no data for 2019-2020 as the global pandemic canceled end of grade examinations. Student performance fell off significantly in every measurable category compared to the rest of the state as a result of a lost year of learning (NC Report Cards 2021). The percentage of DPS students not proficient skyrocketed to 63% post pandemic. This data has improved to 51.75% for the most recent academic year but is still below prepandemic levels. Not included in these data are any measures of health literacy upon graduation.

As indicated in the Durham County Community Health Assessment (CHA) 2020, the county has some amazing initiatives including Durham Children Initiative, Emily K Center, Book Harvest, and El Centro Hispano to list a few. The CHA recommends an “increase emphasis on racial equity” as “a high school diploma predicts several health-related outcomes” (DC CHA 2020). Durham County has a strong foundation, but gaps remain.

Priority population and Measures of SDOH

The priority population are the students that attend Durham Public Schools, specifically Hispanic or Latino students as they are the fastest growing subgroup with graduation rates that continue to lag (Table 4). As a reminder, attainment of a high school diploma predicts several health-related outcomes and is a surrogate marker for basic health literacy (DC CHA 2020).

Durham Public Schools follows the CDC developed Whole School, Whole Community, Whole Child (WSCC) model as mandated by policy SHLT-000: Healthy Active Children (HAC) Policy. The policy also directs schools to complete both a HAC policy report and Youth Risk behavior Survey (NC DPI 2020). Unfortunately, these data are not broken down by school district to analyze.

Rationale/Importance

Health literacy is important for community members of Durham County to make decisions on their own wellbeing. They need to understand prescription medication instructions, after visit healthcare summaries, or be able to navigate the local healthcare system. These tasks are not always simple nor straightforward. For example, FDA approved medication guides have a mean reading level of 10th to 11th grade (Fincham 2013). Patients with low health literary skills “have difficulty reading, writing, numeracy, communication...which impede access to and understanding of health care information” (Wittink 2018). On the contrary, as educational level increased, the health literacy level increased (Kutner et al 2006). It is imperative health literacy increases to improve overall health as “healthier populations contribute to a stronger local economy, and a stronger local economy contributes to a healthier population” (BCBS 2017). This feedback loop reinforces the goals of the Durham County CHA.

Disciplinary critique

A public health professional with public health leadership skills is critical in improving health literacy rates in Durham Public School graduates. Using a deep toolbox, this leader can help identify key stakeholders such as Duke University Medical Center, Durham County Department of Public Health, El Centro Hispano, and Lincoln Community Health Center. Bringing together education and health partners along with students and their parents would be an ideal starting point to study current state. This initial groundwork will help identify gaps on a more granular level. Subsequent steps utilizing design theory would lead to a combined vision of a delivery mechanism of the CDC WSCC model.

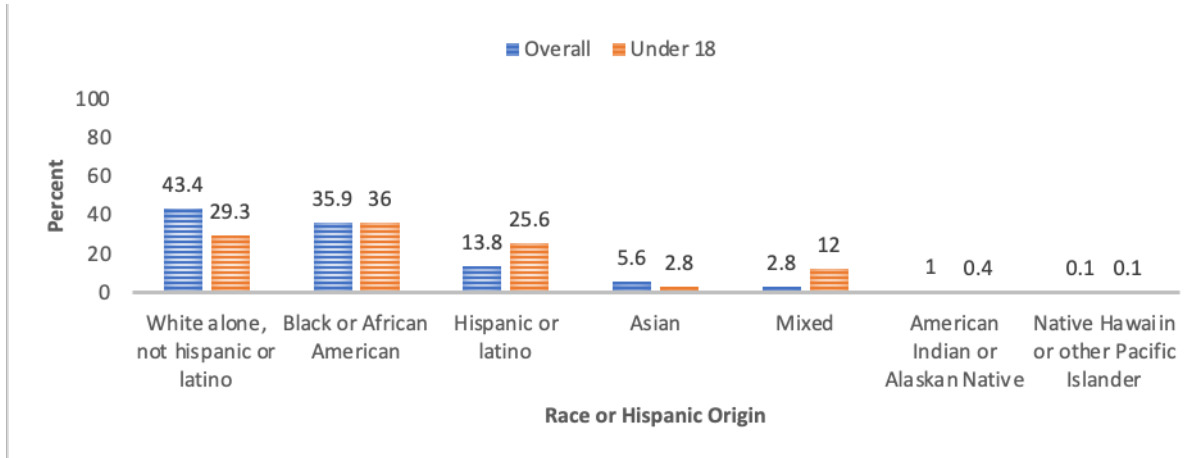
Beyond health equity, improving health literacy should create a healthier Durham, with more people active, able to work and play. A healthier population is a happier population.

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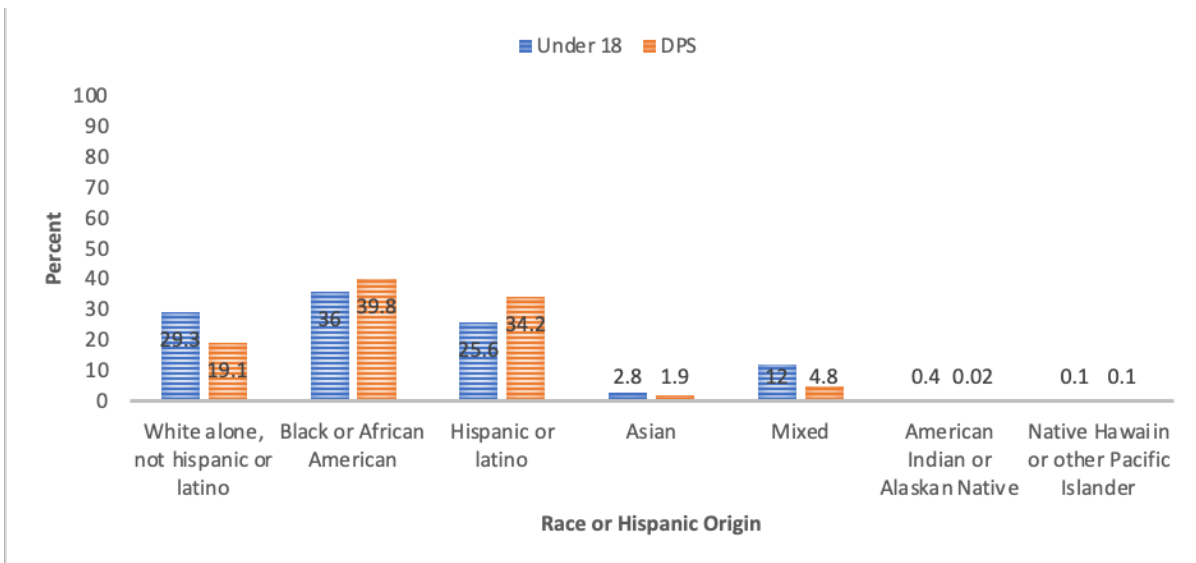
D.1.a: APPENDIX SDOH ANALYSIS

Figure 1: 2020 US Census Data Durham County



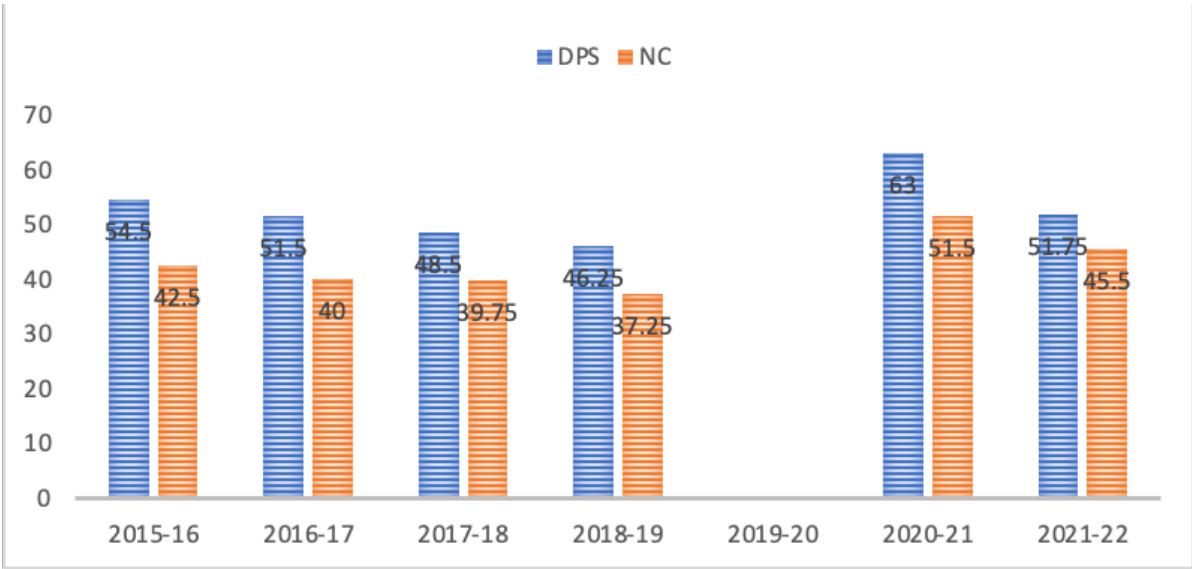
(Census 2020)

Figure 2: Under 18 population compared to Durham Public School enrollment



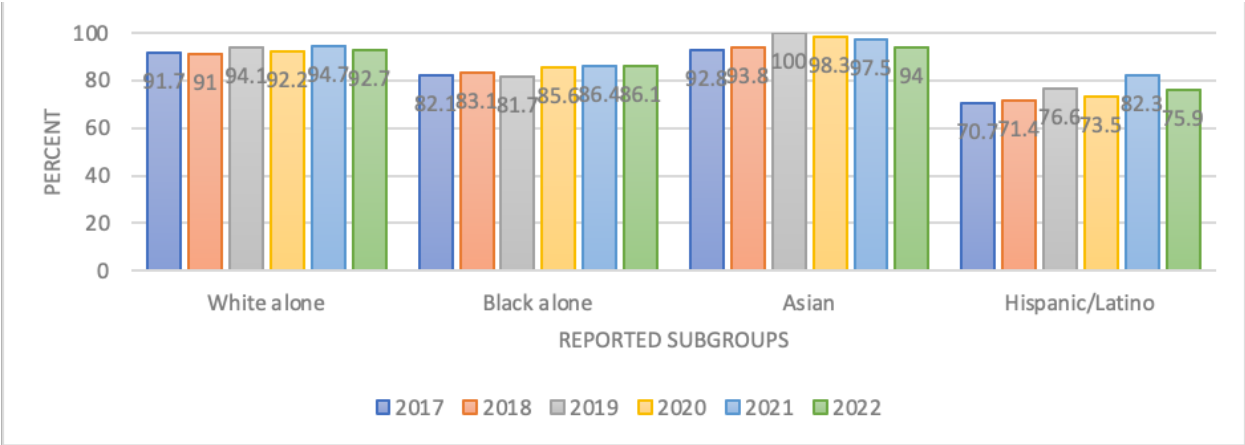
(NC Report Cards 2021)

Figure 3: Percent not proficient



(Census 2020, DPS 2022)

Figure 4: DPS cohort graduation rates 2017-2022



(DPS 2022)

D.2 COMMUNITY PARTNER ANALYSIS

Introduction

Durham has a population of almost 330,000 people and consists of a diverse population, mainly white, African American, and Hispanic (Census 2020). The target population, public school students enrolled in Durham Public Schools (DPS), comprises 31,113 students in grades kindergarten through grade 12 spread across 55 schools (DPS 2022). This cohort entails an estimated 84.1% of children enrolled in school with 15.9% enrolled in private school (Census 2020). The overall population demographic for residents under 18 is shifting towards Hispanic or Latino origin and mixed races, indicating these subgroups are the fastest growing. Student racial composition of DPS is skewed towards Hispanic or Latino origin indicating that other subgroups are proportionally attending alternative schooling options (Census 2020, DPS 2022).

The social determinant of health (SDOH) in focus is education access and quality. The Healthy People 2030 goal for this SDOH is to increase educational opportunities and help children and adolescents do well in school (Healthy People 2030). The COVID-19 pandemic dealt academic progress a major setback in improving core subject proficiency and graduation rates leading to over 50% of students not proficient in the four measured categories and graduation rates below prepandemic levels (NC Reports Cards 2021).

The drivers of these setbacks are complex and multifactorial. One known factor is childhood hunger. Hunger in school is associated with repeating a grade, lower class grades, lower attendance, and an inability to focus (CDC 2014). 60% of DPS students qualify for free or reduced lunch program. During the pandemic, the US Department of Agriculture (USDA) funded policy to support free school lunch for all students attending public school (usda.gov 2021). However, this federally subsidized program is reverting to providing meals only to public school students meeting income requirements (EducationNC 2022). This change is expected to add additional barriers to learning by decreasing meal participation and stigmatizing children on free or reduced lunch plans (No Kid Hungry NC n.d.).

To counter the expected drop in school lunch participation and the noticeable decrease in academic performance metrics, DPS needs to respond quickly and creatively to prevent further backslide. One school lunch program showed the introduction of culturally appropriate menu items into the meal cycle helped to increase school community and meal participation (Freedman n.d.; Healthy Food Choices in Schools 2019). Students eat food from home culture when not in school (Obeng-Gyasi et al. 2019). This community partner analysis will identify key partners to enact a culturally representative school lunch program to increase inclusivity, promote cultural education among peers, celebrate the diverse community, and increase meal participation with the goal of decreasing childhood hunger and improving academic performance.

Community Partner Analysis:

Table 1 provides a comprehensive list of all potential community partners that are affected by the proposed intervention and could provide significant input in the success of a rotating culturally representative school lunch program. The analysis uses a Give-Get Grid tool to show what each partner may be asked to provide to the program in column 2, and the benefit the partner may receive in column 3. In current state, most public school meals consist of prepared foods due to limited equipment, staff time, and funding. This intervention brings together the school kitchen staff, the local community college culinary arts students, and local mobile food alliance to prepare culturally appropriate meals that meet the USDA requirements for school nutrition tied to reimbursement. DPS has worked on a similar program in the past, Durham Bowls 2018, that brought together local chefs with public school staff to create more palatable bowls (dpsnc.net 2018). This experimental program had a hypothesis that better school meals would increase participation, thus increase revenue to create a financial solvent self-sustaining model. Unfortunately, it seems this program dissolved with the pandemic as little information is available beyond 2019. The Partnership for Healthy Durham has a subcommittee focused on nutrition and food access with intimate knowledge of the resources and other partners available. Our proposed program could greatly benefit from their experience in this area. In addition, local farmers could provide some of the ingredients depending on the cost, creating a potential win-win scenario for all partners. Not to be forgotten is the

School Food Council, a student led organization that will guide the culturally appropriate menu options. Each participating DPS site will be required to create this organization.

Partnership for Healthy Durham has been working in community-based initiatives to improve the health of Durham residents since 2004. As mentioned, it has a subcommittee focused on food access, and their improvement plan specifically states “increase nutritious and culturally relevant food on school menu by 5%” (HealthyDurham.org 2022). Some of their partners include Durham Public Schools, Durham Farmers Market, and End Hunger Durham. This organization could be a facilitator of this intervention given their expertise or could immediately stop the program if not engaged appropriately as our intervention overlaps with their work. Additionally, the funding and economics of this proposal must adequately support the program as the current federal reimbursement rate for school lunches is \$4.33-\$4.50 per meal depending on the school.

Worldview Exploration:

Childhood hunger, education performance, and school meals create a complex system with many partners needed to address the many components (Table 1). The output for analysis is defined as the following: the system to feed our diverse students that attend Durham Public Schools culturally appropriate, nutritious foods. Two key partners worth exploring further are the Partnership for Healthy Durham and RDU Mobile Food Alliance (RDUMFA) using the soft system methodology tool called CATWOE (Table 2a and 2b).

As described previously, the Partnership for Healthy Durham has a long history of working to address the needs of the community. The organization has a worldview that is committed to collaboratively improving the health and well-being of the Durham community and the citizens who live in it, using racial equity principles. Additionally, all children deserve to eat nutritious and culturally relevant food. Similarly, the RDUMFA has a worldview of commitment to serving food of the highest quality and safety with an emphasis to not only serve the community, but also to be part of the community. These two worldviews are closely aligned and seemingly indispensable to bringing this food program to fruition. The customers, actors, and owners are the same for both analyses with similar

constraints except for the addition of permits and appropriate bandwidth for the food trucks. Based on this analysis, with appropriate engagement, these partners should be willing to discuss operationalizing this school lunch program.

Conclusions:

In comparing the stakeholders, community and community engagement are core values among the stakeholders identified in this analysis. Community must be the starting point for any ideation of an intervention. This intervention has implications to promote inclusivity among students by serving culturally representative meals, introducing foods of different cultures, supporting local small businesses and farmers, and fostering the local culinary arts training program with the goal of increasing community-school partnership, decreasing childhood hunger, improving academic achievement, and graduation rates. Most importantly, the students will have a voice in shaping the meal choices.

This community partner analysis has many strengths and weakness. The most important strength is the alignment of this intervention with the work already being done to improve childhood hunger through the public school system. The key stakeholder with both lived experience and operational expertise has a similar goal to improve nutrition and culturally relevant food choices in school lunches. This intervention takes that goal and adds involvement from multiple community organizations to create a novel school lunch program. However, these inputs also present the programs greatness weakness - the unknown of cost to deliver. Therefore, engagement of each stakeholder using empathy interviewing using the following list of questions:

1. What do you envision this partnership to look like?
2. What resources would you need to participate (funding, staff, equipment, program support)?
3. How much time could you dedicate to this program?
4. What barriers and pitfalls do you foresee?
5. Can your meals meet USDA nutrition guidelines for schools?
6. Can you prepare these meals at the government reimbursement rate?

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D.2.a: APPENDIX COMMUNITY PARTNER ANALYSIS

Table 13. Comprehensive Community Partner List to Enact a Culturally Representative School Lunch Program for Durham Public Schools

Community Partner	Give	Get
Durham Public Schools	<ul style="list-style-type: none"> -use of kitchen facilities -Kitchen staff -lived experience 	<ul style="list-style-type: none"> -culturally appropriate meals -meet 2 of their strategic plan priorities -increased participation in school meals
Durham Farmers Market	<ul style="list-style-type: none"> -supply fresh farm goods for meal creation 	<ul style="list-style-type: none"> -compensation for supplied goods -exposure to Durham community -guaranteed payment
RDU Mobile Food Alliance	<ul style="list-style-type: none"> -Culinary expertise -menu preparation -Time 	<ul style="list-style-type: none"> -payment for meal preparation -Exposure to Durham community -potential employees
Durham Tech	<ul style="list-style-type: none"> -Culinary arts students 	<ul style="list-style-type: none"> -Oversight from professional culinary experts -Exposure to meal preparation for large group -Meal planning, budget experiences

		-Job experience and potential employment prospects
School Food Council	-Time	-Voice of the student body for input into food choices
Partnership for Healthy Durham	-expertise with lived experience	-program in line with their mission and values

Table 14: CATWOE Analysis: Partnership for Healthy Durham

Worldview	The Partnership for a Healthy Durham is committed to collaboratively improving the health and well-being of its community and those who live in it, using racial equity principles. All children deserve to eat nutritious and culturally relevant food.
Transformation process	To engage multiple stakeholders in our community to improve school lunch inclusivity
Customers	Current and future DPS students
Actors	Students (DPS and Durham Tech), Mobile chefs, School staff, Farmers
Owner	DPS
Environmental constraints	Funding, USDA regulations, DPS

Root definition: We strive as a partnership to bring culturally appropriate meals to the students of Durham Public Schools, by providing our expertise and facilitate the many parts of the program, to improve student inclusivity, meal participation, and promote school-community engagement.

Table 15: CATWOE Analysis: RDUMFA

Worldview	The North Carolina Mobile Food Associated is committed to quality, safety, and community with an emphasis on to not only serve the community but be part of the community.
Transformation process	To serve, introduce, and celebrate culturally diverse food to our school children to better engage with our community
Customers	Current and future DPS students
Actors	Students (DPS and Durham Tech), Mobile chefs, School staff, Farmers
Owner	DPS
Environmental constraints	Funding, USDA regulations, DPS, permits, bandwidth

Root definition: We strive as an association to prepare and serve culturally appropriate meals to the students of Durham Public Schools, by providing culinary and mobile food preparation expertise, to improve nutrition and be part of our community.

D.3 ENGAGEMENT PLAN

This proposal will use a tool called RASCI, a responsibility assignment matrix, to describe the various roles and tasks needed for implementation of the proposed intervention. RASCI (Table 1) is short for: responsible, accountable, supportive, consulted, and informed. It is a project management tool to keep stakeholders engaged and projects moving forward.

The program of interest is a culturally representative school lunch program to increase inclusivity, promote cultural education among peers, celebrate the diverse community, and increase meal participation with the goal of decreasing childhood hunger and improving academic performance. The key stakeholders in this proposal include Durham Public Schools (DPS) and Partnership for Healthy Durham with ad hoc involvement from a previous program called Durham Bowls. DPS is integral to the SDOH of interest as this organization both teaches and feeds many children in Durham. DPS has immense experience in delivering USDA compliant school meals and is ultimately accountable for all programs at their facilities, and thus may need the most convincing that a novel program will align with their strategic planning. Partnership for Healthy Durham has program management experience with a vast network of local partners. Engagement from and between these two organizations is key to successful implementation.

DPS current strategic plan spans years 2018-2023 and has the following priorities (DPS n.d.):

1. Increase academic achievement
2. Provide a safe school environment that supports the whole child
3. Attract and retain outstanding educators and staff
4. Strengthen school, family, and community engagement
5. Ensure fiscal and operational responsibility

A plan to enact a culturally representative school lunch program meets many of these strategic goals, thus a thoughtful engagement strategy is necessary to convey our vision. Aligning this program with strategic plan priorities is the first and most important factor in partnering with DPS. Specifically, hunger

in school is associated with repeating a grade, lower class grades, lower attendance, and an inability to focus (CDC 2014). Thus, this program could help increase academic achievement by decreasing hunger. Additionally, this program also aligns with priority 4, “every school will have a community partner that is committed to providing meaningful programs and services to meet the diverse needs of the students” (DPS n.d.). The largest barrier to involvement is mentioned in priority 5, the funding and fiscal sustainability of the program. The program must include appropriate and adequate funding along with careful planning to stay within budget to have any effect on the goal of reducing childhood hunger and the downstream effects of increasing academic achievement and health literacy.

Partnership for Healthy Durham has been working in community-based initiatives to improve the health of Durham residents since 2004. It has a subcommittee focused on food access, and their improvement plan specifically states “increase nutritious and culturally relevant food on school menu by 5%” (Healthy Durham 2022). Given their experience with project management, they are an ideal partner.

For the program to be successful, DPS must be engaged early by the designated project manager to determine the key stakeholders at potential pilot locations. According to the organizational structure of DPS, there is a director of School Nutrition who seems to be the most logical starting point (DPS n.d.). This individual oversees all aspects of food delivery from purchasing to preparation to serving. DPS will likely need to assign a program lead to coordinate this nutrition program with the external project coordinator.

The Give-Get grid technique (Table 2) will help define the request from DPS and the expected output from the program (Southerland et al. 2013). This engagement method clearly states the ask or investment of each partner (i.e. the give) followed by the benefits to the partner (i.e. the get). Engagement will be measured over the course of the program implementation through a scaled scoring system. For example, if the stakeholder met all their input (give) requirements, then engagement would be 100%. The output (get) would also be scored similarly as a marker of areas of improvement.

After agreement of participation by DPS, the plan can shift into the design phase. In this phase, key stakeholders will assemble for a one-day kickoff event and use nominal group technique (NGT). NGT is

“a structured method for group brainstorming that encourages contributions from everyone and facilitates quick agreement on the relative importance of issues, problems, or solutions” (ASQ 2023). NGT promotes holistic participation, especially if there are unequal power dynamics between stakeholders. Engagement will be measured through exit surveys that will measure agreement of final proposal to ensure equitable involvement of stakeholders and completion of a systems map of the program presented to the DPS project manager.

The initial program should start at 1-2 schools as pilot sites in year 1. Since this culturally representative school lunch will be served intermittently in place of a standard meal, the team should approach each school lunch served as a unique event to study utilizing the Plan-Do-Study-Act (PDSA) methodology with an informal World Café engagement session with project manager (The World Café 2023). After each unique event, the project manager can interview each stakeholder to determine what went well and what did not go well to improve on subsequent events, integrating feedback. The method for measuring engagement in this improvement phase will be usage of the PDSA tool.

This program could then be scaled to additional school sites across DPS including elementary, middle, and high schools using lessons learned from the pilot sites. The framework should be in place for the project manager to train site managers with the number of additional sites being the measures of success. These metrics will be used as feedback to both the project manager and the County commissioner as benchmarks of success.

Accountability Plan

A memorandum of understanding (MOU) is documentation of an agreement between parties to develop a sustainable partnership. In this setting, the MOU would be signed between DPS project manager and the school site. This document will define the purpose of the agreement, the scope of the relationship, shared interests, terms of agreement, and communication terms.

The purpose section will define the shared vision of both entities entering the MOU. This section is extremely important as it incorporates the goals of the program and defines the boundaries. A separate

MOU should be drafted for each program site i.e. participating school that will list team members and leadership responsibilities of each individual. In defining responsibilities, this section clearly assigns accountability to ensure program delivery. Additionally, this document lists agreed upon goals and metrics as a measurement of success. Clearly outlining this information provides transparency not only to the agreeing parties, but also to any oversight committees. This document should be signed by the agreeing parties as a non-binding partnership. Once signed, the copies of the MOU will be disseminated to all stakeholders with an electronic version on the DPS nutrition website and the pilot site individual website for review by students and their families.

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D.3.a: APPENDIX ENGAGEMENT PLAN

Table 16. RASCI

RASCI Table		
Program – to enact a culturally representative school lunch program to increase inclusivity, promote cultural education among peers, celebrate the diverse community, and increase meal participation with the goal of decreasing childhood hunger and improving academic performance		
RASCI Levels Who is...	Community Partners	Rationale
Responsible =owns the challenge/ project	DPS Project Manager	Project Manager is responsible for all aspects of coordination of this program
Accountable =ultimately answerable for the correct and thorough completion of the deliverable or task, and the one who delegates the work to those <i>responsible</i>	Durham Public Schools	DPS is ultimately responsible for feeding students and all programs involved in their school sites
Supportive =can provide resources or can play a supporting role in implementation	Partnership for Healthy Durham	Community nonprofit with vested interest and alignment of goals with lived experience
Consulted =has information and/or capability necessary to complete the work	Durham Bowls Project Manager	Similar past program expertise
Informed =must be notified of results, process, and methods, but need not be consulted	DPS Director of School Nutrition	Supervisor of DPS project manager

Table 17: Engagement and Feedback

Engagement Method	Facilitator/ Barrier	Phase(s)	Performance measure	Assessment method	Frequency
Give-Get Grid	Shared purpose	Design	Stakeholder Agreement to Participate	% Sign on	Once
Kick Off Event/Nominal Group Technique	Power differentials	Design	% of stakeholder agreement	Likert scale	Once
World Cafe		Improve	% of participation	PDSA Cycle usage	Quarterly
Charettes	Identifying site champions	Scale	# of addition sites	Strategic plan goal alignment	Yearly

APPENDIX E: VEDA LUTHRA'S INDIVIDUAL DELIVERABLES

E.1 SDOH ANALYSIS

Social Determinant of Health

Social determinants of health (SDOH) are the conditions in the environments where people are born, live, work, play, worship, and age that affect a range of health and quality of life outcomes and risks (Healthy People 2030). People with higher levels of education are more likely to be healthier and live longer. As a social determinant of health, education gives people the tools they need to lead fulfilling lives, and contribute to their communities (Healthy People 2030). Health literacy falls under education and according to Healthy People 2030, there are two components of health literacy, which include personal health literacy and organizational health literacy. Personal health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others (HRSA, 2022). Organizational health literacy is the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others (HRSA, 2022). Research has shown that health literacy increases the use of preventive health care, lowers unneeded emergency room visits, and improves overall health outcomes (HRSA, 2022).

Geographic and Historical Context in Durham County

Durham County in North Carolina is a county with relatively high education. At least 70% of county residents have some college education (DukeHealth et al., 2020). Additionally, Durham County residents over the age of 25 with a bachelor's, graduate, or professional degree is higher than North Carolina or U.S. percentages (DukeHealth et al., 2020). Durham County is also known as the City of Medicine with healthcare and education as major industries. It is home to major educational institutions such as Duke University and North Carolina Central University (NCCU). However, despite the county's overall success, there are still significant disparities in housing, education, practices and laws since Durham County's birth in 1881 (DukeHealth et al., 2020). This includes disparities in health literacy.

Rates of low health literacy in the United States are linked to race, ethnicity, income, educational attainment, age, and are independently related to health outcomes (Logan et al., 2015). In North Carolina, The Sheps Center for Health Services Research established NC Health Literacy in 2007. Their work includes outreach to rural and underserved communities to incorporate health literacy into practice in order to improve health outcomes for all North Carolinians (UNC Health Science Library, 2022). In 2022, the Durham County Department of Public Health (DCoDPH) received a \$4 million grant from the US Department of Health and Human Services Office of Minority Health for a partnership to improve health literacy and equity among communities of color in Durham (Durham County NC, 2022). DCoDPH led this project in partnership with North Carolina Central University to address health disparities within the Latinx community as a result of the COVID-19 pandemic (Durham County NC, 2022).

Priority Population

The priority population will be Latinx adults between the ages of 18 to 35 in Durham County. According to the health literacy data map created by the University of North Carolina at Chapel Hill (UNC), health literacy levels in Durham County are fairly widespread with red indicating low health literacy and dark green indicating high health literacy (Fang & UNC Chapel Hill, 2014). The U.S. Census from 2021 shows that 13.8% of Durham's population is Latinx (U.S. Census Bureau, 2021). Areas in Durham County with low levels of health literacy may have large Spanish-speaking populations with an education, on average, at the seventh-grade (Smith et al., 2012).

Measures of SDOH (Health Literacy)

One study conducted in the emergency department of UNC Hospitals in Chapel Hill that serves the greater Raleigh-Durham-Chapel Hill metropolitan area sought to evaluate the association of functional health literacy (FHL) with adherence to emergency department (ED) discharge instructions amongst White and Hispanic populations. The main results of this study found that English speakers had a significantly higher FHL than Spanish speakers with average Test of Functional Health Literacy in Adults (TOFHLA) scores of 92.98 and 62.18, respectively (Smith et al., 2012). Spanish speaking patients with inadequate FHL attended follow-up appointments less frequently than patients with marginal or adequate

FHL (36% vs 40% vs 59%) (Smith et al., 2012). Furthermore, patients with low FHL also reported less understanding of ED instructions than those with higher FHL (60% vs 82% vs 95% understood instructions) (Smith et al., 2012).

On the other hand, Spanish speaking patients who scored high on the TOFHLA-S had higher rates (95%) of self-reported understanding of their discharge instructions than those with either marginal (82%) or low (60%) FHL (Smith et al., 2012). Additionally, Spanish speaking patients with high FHL also had significantly higher rates of attending follow-up appointments with 59% vs 40% of marginal FHL patients and only 36% of low-FHL patients going to their follow-up appointments (Smith et al., 2012). When asked why they did not attend their follow-up appointment, Spanish speaking patients pointed out cost and poor understanding as the primary reasons for nonadherence.

Importance of Improving Health Literacy

The improvement of health literacy for communities of color, particularly the Latinx population in Durham County is a public health challenge worth addressing because they make up a significant percentage of Durham's population (13.8%) and contribute to the county's economy and functioning. Improving health literacy and, therefore, the overall health of the Latinx community will potentially lead to the long-term success of Durham.

Policy Implications

It is critical for policy makers to address the issue of low health literacy amongst the Latinx population in Durham because the process for improving health literacy is rooted in health reform and training of healthcare professionals to be more culturally sensitive and engage in patient education. Steps to address health literacy have already been taken by the Agency for Healthcare Research and Quality. *The AHQR Health Literacy Universal Precautions Toolkit*, 2nd edition, helps primary care practices reduce the complexity of health care by increasing patient understanding of health information, and enhancing support for patients of all health literacy levels. In the context of the Latinx population, a disproportionate number of them have below basic health literacy skills (North Carolina Institute of Medicine, 2007). This difference may be due to the large number of Hispanics who have recently

immigrated to America and do not speak English as their primary language. Even if health literacy tests are administered entirely in Spanish, Spanish speakers still score lower than English speakers (North Carolina Institute of Medicine, 2007).

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E.1.a: APPENDIX SDOH ANALYSIS

Table 18. Understanding and adherence of discharge instructions based on functional health literacy score in the Spanish-speaking population

Table 2. Understanding and Adherence of Discharge Instructions Based on Functional Health Literacy Score in the Spanish-Speaking Population					
Primary Language	Functional Health Literacy Status	No.	Understood Discharge Instructions	Filled Prescription as instructed	Followed Up With a Physician as Instructed
Spanish	Low	20	60%	88%	36%
	Medium	11	82%	78%	40%
	High	19	95%	88%	59%
	Total	50	78%	85%	46%
English	Low	1	100%	100%	100%
	Medium	0	N/A	N/A	N/A
	High	49	94%	88%	83%
	Total	50	94%	88%	83%

Source: Smith, P. C., Brice, J. H., & Lee, J. (2012). The Relationship Between Functional Health Literacy and Adherence to Emergency Department Discharge Instructions Among Spanish-Speaking Patients. *Journal of the National Medical Association*.

E.2 POLICY ANALYSIS

Background

Many areas in Durham County with low levels of health literacy have large Spanish-speaking populations with an average education, on average, at the seventh-grade level education (Smith, et al., 2012). One study found that English speakers have higher functional health literacy (FHL) scores than Spanish speakers, with average Test of Functional Health Literacy in Adults (TOFHLA) scores of 92.98 and 62.18, respectively (Smith et., al 2012). Due to inadequate health literacy, Spanish speaking patients attend follow-up appointments less frequently than patients with adequate health literacy (Smith et., al 2012). They also reported less understanding of emergency department (ED) instructions than those with adequate health literacy. When asked why they did not attend follow-up appointments, Spanish speaking patients pointed out cost and poor understanding as the primary reason for nonadherence (Smith et., al 2012). 13.8% of Durham County's population is Latinx, making low health literacy a public health challenge worth addressing as they make up a significant portion of Durham's population and contribute to the county's economic success (U.S. Census Bureau, 2021).

Policy Recommendation

For Latinx youth from ages 12 to 20, who come from Spanish-speaking households, language and cultural differences play a role in difficulty understanding health information and services. Adolescents are an appropriate age group to target for a health literacy intervention because adolescents' needs differ from young children and adults in that adolescents are healthier as far as disease risks overall but undergoing a time of great change due to their physical, emotional, and intellectual growth (Skopelja et al., 2008). Additionally, the information that is available to them has greatly expanded with the Internet, both for good and ill (Skopelja et al., 2008). The most requested subjects asked by teens on health websites include sex and sexuality, body issues, growth and development, diet and nutrition, substance abuse, and violence (Skopelja et al., 2008). One policy option to improve health literacy of Latinx youth in Durham is English-as-a-second language (ESL) instruction through community engagement in public

schools, public libraries, and/or community churches. Objectives include development, implementation, and evaluation of health literacy/ESL curriculum. Health content in ESL instruction can develop both language skills and critical thinking needed to understand health information and navigate health services. The second policy option is to implement a program to enhance health literacy, specifically, in reproductive health or safe sex for Latinx youth in Durham County since sex and sexuality is a topic of growing curiosity for this group and the information out there can be inaccurate. The evaluation criteria to be used for these two potential policy interventions are cost of the programs, their impact on the Latinx community, timeliness of implementation, political feasibility, and equity. Each criteria will be given a numerical score (1-5) with 1 being the least feasible and 5 being the most feasible in terms of successful implementation.

The health literacy and ESL curriculum will combine health literacy content and English-language instructions designed for bilingual Latinx students. It will integrate theories of health literacy and health behavior research and practice, the goal being to familiarize students with literacy demands of health care settings (Mas et al., 2015). The health literacy content will focus on developing skills related to prose, documents, numeracy, clinical practices, preventive practices, and navigation of health care systems (Mas et al., 2015). Modeled after the success of Mas et al.'s study that took place at El Paso Community College in Texas, the pilot program would be a three year program offered at Durham County public schools, public libraries, and/or community church like the three different locations described above. As implemented in El Paso, teachers would be recruited and they would receive stipends equivalent to the typical ESL teacher salary. They will be trained to teach the developed curriculum to Latinx youth. Potentially, training will come from a team of researchers in health education, communication and adult literacy, and practitioners from a local college with strong commitment to adolescent education. Latinx youth will be recruited from the community via social media and school advertisement. The program will be available to about 200 low-income Latino students who want to enroll and their baseline Baseline health literacy will be assessed using TOFHLA.

Overall, Mas et. al.'s study was effective in increasing the average TOFHLA score for the intervention and control groups, moving participants closer to an adequate functional health literacy level (Mas et al., 2015). In the context of Durham county, a program like this will help Latinx youth learn more about the complexities of health systems and encourage active engagement in their own health.

The other policy option is modeled after Hess & Straub's study of a school-based health care transition education intervention designed to equip adolescents and young adults in Florida with special health care needs with important health literacy, self-advocacy, and self-determination skills (Hess & Straub, 2010). Evidence from this study shows that all focus group participants found the curriculum highly relevant and valuable (Hess & Straub, 2010). Teachers reported little difficulty with ease of implementation. This is a pilot program that can potentially be executed in Durham County public schools targeted towards improving the health literacy of Latino adolescents. An interdisciplinary team of professionals in health education, social work, and health care can guide the development of a health care curriculum adaptation (Hess & Straub, 2010). The curriculum can be reviewed by an adolescent medicine physician, a school district nurse, and even Spanish language teachers. This program will be available to about 200 low-income Latino students from ages 12 to 20 who have an interest in improving health literacy.

Evaluation of Policy Options

The Latino population makes up about 13.8% of Durham's population, but at most, both programs will impact about 200 Latino students per program in order to assess their effectiveness before extending these programs to the rest of Durham County's Latino youth. Therefore, the ESL program and safe sex program potentially impact 38,000 individuals through health literacy education of Durham county's Latinx student population. The political feasibility of both programs (the ESL program and school-based health care transition education program) is relatively high as there is interest and commitment to improving this population's understanding of health systems and health behavior amongst physicians, health educators, and Durham County officials. Improved health literacy of Latino youth has long-term consequences for Durham County's economy if this group learns how to better manage their health, which could lessen ED utilization as well as improve their participation in Durham County's

workforce. Key community partners who are likely to support both programs such a program include Javiera Caballero, a Democrat on Durham's City Council who supports immigrant's rights and success. She would also support the ESL program to improve health literacy for immigrant populations in Durham and a health care transition education program. One stakeholder group potentially against contraception education in schools would be the organization called North Carolina Protect Our Students as their goal is to restrict local and state sex education efforts. Timeliness of implementation for the ESL program may be easier to implement than the health care transition education program since it is already geared towards a Latino population. It may also take time to hire and train teachers to educate students. Training can be facilitated by health educators, social workers, and school nurses.

Inadequate health literacy is disproportionately seen in Latinx communities across America (North Carolina Institute of Medicine, 2007). This disparity may be due to the large number of Latinos who immigrate to America and do not speak English as their primary language. The proposed health literacy policy options will provide culturally sensitive health education to this population. Finally, the costs to implement both programs will at minimum require salary consideration for hired teachers. It will need to be decided how many teachers to hire, and the cost to create program materials for students.

Final Policy Recommendation

The final recommended policy option is the ESL program as it is already tailored towards a Latino population whereas the Health Care Transition Education Program will have to be recreated in the context of Latino Youth in Durham County. One process measure to examine for this policy is how well teachers communicate with students by giving out surveys to students asking them about the quality of their experiences and learning from teachers. Are they accurately answering students' questions about how health systems work and specific health conditions? Are they being patient and open to questions to begin with? And encourage students to ask questions. One outcome measure is measuring to see if there has been improvement in student's health literacy by comparing baseline health literacy scores to later scores.

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E.2.a: APPENDIX POLICY ANALYSIS

Table 19. Policy analysis

	ESL Health literacy Program	Health Care Transition Education Program
Cost Per Person Served (2/5)	3	3
Impact (3/5)	3	3
Political Feasibility (4/5) & (2/5)	4	4
Timeliness of Implementation (3/5)	4	3
Equity (4/5)	4	4

E.3 BUDGET AND NARRATIVE

Program Summary

Our policy recommendation is to implement an English-as-a-second language (ESL) program for Latinx youth from ages 12 to 20 years of age. The goals of this program include development, implementation, and evaluation of a health literacy/ESL curriculum. The program will combine health literacy content and English language instructions designed for about 200 bilingual Latinx students. It will integrate theories of health literacy and health behavior research and practice, the goal being to familiarize students with literacy demands in health care settings. The health literacy content will focus on developing the following skills: prose literacy, the ability to search and comprehend educational articles and brochures for patients. Document literacy, the ability to search and comprehend medical maps and tables like the body mass index chart. Numeracy, the ability to understand clinical and public health data. And finally, the ability to understand clinical practices, preventive practices, and navigate health care systems.

This will be a three-year program offered in Durham County public schools, public libraries, and/or community churches. A team consisting of a program manager, program assistant, researchers, ESL teachers, and a health educator from fields of health education and communication and adolescent literacy will be established to implement and evaluate the program.[SB2] The health educator and researchers will design the curriculum and help recruit participants while ESL teachers will retain participants and facilitate the implementation the curriculum. The two ESL teachers will need to be recruited as well and will receive salaries equivalent to the typical ESL teacher salary in Durham County. Once the program is ready to launch, health literacy will be assessed using the Test of Functional Health Literacy.

Budget Narrative

Funding for the ESL program will come from the National Heart, Lung, and Blood Institute and the National Institutes of Health (NIH) as they were the funding source for the pilot program this policy

recommendation is based on (Mas et. al., 2015). After calculating costs to run a health literacy program, a contract/grant of \$950,000 each year will be sufficient. The specific costs for three years add up to \$910,336.10, \$923,996.70, and \$939,256.53 from 2024 to 2026. For personnel costs, two ESL [SB4] teachers are appropriate to run an ESL health literacy program for about 200 students. Each teacher is full-time, with a salary of \$43,000. The salary range for an ESL teacher in Durham County is \$25,000 to \$51,000 (*ESL Teacher Salary in Durham, NC, 2023*). The program will have two researchers and a health educator to develop an ESL health literacy curriculum that combines health literacy content with English-language instructions. Both researchers will be paid \$48,000, annually. One health educator will be paid \$52,000, annually (*Health Educator Salary in Durham, NC, 2023*). Finally, a program manager and program assistant will be hired full-time and receive a salary of \$55,000 and \$50,000, annually, to oversee the three year program.

Other program expenses include program advertising, which can include a team Canva subscription to create flyers and brochures to pass along to students. A Canva subscription costs \$149.90. School supplies will cost about \$336 as supplies would include educational materials such as health literacy guides and homework printed for each student (200 of them). Meetings for the program team will be about \$120. Additional subscriptions, which could include online learning resources the teachers will use to teach students relevant health content is estimated to cost about \$2,000. Curriculum development will cost about \$700 in the first year. Food/snacks will cost about \$1,500. Overall, the grant/contract with National Heart, Lung, and Blood Institute and NIH will be subject to change as the program continues over three years.

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E.3.a: APPENDIX BUDGET AND NARRATIVE

Table 20. Policy budget

Anticipated Expenditures (2024-2026)				FYE 06/2024	FYE 06/2025	FYE 06/2026	Anticipated Revenues (2024-2026)			
							FYE 06/2024	FYE 06/2025	FYE 06/2026	
Personnel Expenses										
Personnel (Salaries to researchers and teachers)				\$684,780.00	\$698,475.60	\$712,445.12	Total grants, contributions, etc.	\$950,000.00	\$950,000.00	\$950,000.00
Training of ESL teachers				\$600.00	N/A	N/A	Income from fundraising events	\$4,000.00	\$4,000.00	\$4,000.00
Payroll tax				\$33,900.00	\$33,900.00	\$33,900.00	Total	\$954,000.00	\$954,000.00	\$954,000.00
Health insurance				\$120,000.00	\$120,000.00	\$120,000.00				
Employee benefits				\$63,250.20	\$64,515.20	\$65,805.51				
Total				\$902,530.20	\$916,890.80	\$932,150.63				
Non-personnel expenses										
Program advertising				\$149.90	\$149.90	\$149.90				
School supplies				\$336	\$336	\$336				
Team meetings for teachers and researchers				\$120.00	\$120.00	\$120.00				
Dues/Subscriptions				\$2,000.00	\$2,000.00	\$2,000.00				
Printing/copying				\$3,000.00	\$3,000.00	\$3,000.00				
Curriculum development				\$700.00	N/A	N/A				
Food/snacks				\$1,500.00	\$1,500.00	\$1,500.00				
Total				\$7,805.90	\$7,105.90	\$7,105.90				
Total specific costs				\$910,336.10	\$923,996.70	\$939,256.53				
Direct costs				\$692,216.00	\$705,311.60	\$719,281.12				
Indirect costs				\$218,720.10	\$218,685.10	\$219,975.41				
2024 Salaries										
	FTE	Duration	Rate	Salary	Taxes	Total				
ESL Teacher	1	1	43000	43000	4300	47300				
ESL Teacher	1	1	43000	43000	4300	47300				
Program Manag	1	1	55000	55000	5500	60500				
Program Assista	1	1	50000	50000	5000	55000				
Researcher	1	1	48000	48000	4800	52800				
Researcher	1	1	48000	48000	4800	52800				
Health Educator	1	1	52000	52000	5200	57000				

APPENDIX F: ANNA WILGENBURG'S INDIVIDUAL DELIVERABLES

F.1 SDOH ANALYSIS

Social Determinant of Health (SDoH)

Social determinants of health are environmental conditions that affect a wide-range of health and quality of life outcomes (Healthy People 2030, 2022). Education access and quality is one of the five domains stated by Healthy People 2030, with the goal of “increasing educational opportunities and helping children and adolescents do well in school” (Healthy People 2030, 2022). Education is important as a social determinant of health because people with higher levels of education are more likely to live longer, healthier lives (Raghupathi & Raghupathi, 2020). While the relationship between education and health is complex, it is well documented. Short-term health benefits of education include increased literacy, awareness and knowledge of health and healthy behaviors, and improved social skills and networks ((Virginia Commonwealth University, 2015; Zajacova & Lawrence, 2018)). Long-term benefits include higher earnings and better resources for good health, reduced stress, greater probability of having health insurance, and better access to supermarkets, green space, quality schools and neighborhoods with lower rates of crime (Virginia Commonwealth University, 2015; Zajacova & Lawrence, 2018). While education impacts good health, poor health and conditions such as asthma, chronic illness or disabilities can also negatively impact education (Virginia Commonwealth University, 2015).

To promote education, Healthy People 2030 identified objectives to guide interventions focused on children and adolescents doing well in school and attending and affording college (Healthy People 2030, 2022). The objective of importance to this project identified by Healthy People 2030 is the proportion of high school students who graduate in four years (Healthy People 2030, 2022).

This project will focus primarily on high school graduation rates, as this is associated with higher levels of educational achievement including better jobs, higher earnings, increased health knowledge, better self-reported health and fewer chronic conditions (United Health Foundation, 2022). Additionally, health materials are typically written at a 10th-11th grade reading level (Hutchinson, Baird, & Garg, 2016). By focusing on high school graduation rates, the students' progress will be targeted and their

reading levels will surpass the level expected for health literacy, in turn achieving the benefits associated with increased health literacy, including understanding and being an advocate for their own health conditions.

Geographic and historical context

Durham County, North Carolina is an area rooted in agriculture and industry. Prior to the Civil War, plantations in the county relied on slave labor to grow tobacco and other crops (Museum of Durham History, 2023). A railroad station was funded by Dr. Bartlett Durham, for whom the city is named (Museum of Durham History, 2023). Following the cease fire from the Civil War, the city continued to thrive on the tobacco industry (Museum of Durham History, 2023). Trinity College moved to Durham county in 1892, and was renamed Duke University in 1924 (Museum of Durham History, 2023). The school is still currently one of the nation's top universities. As of 2021, Durham County has a population of 326,126 (U.S. Census Bureau, 2021). For population demographics, see table 21.

In regard to education access and quality, parents in Durham County choose between the Durham Public School (DPS) system and various private and charter schools in the area. Private schools in the area range in quality, religious affiliation, and price (with some schools' tuition rates as high as \$30,000 per year) (Durham Academy, 2023). The Durham Public School system serves 31,124 students enrolled in 56 schools throughout the county (Durham Public Schools, 2023). The student racial composition in the DPS system for the 2022-23 school year includes 38.5% African-Americans, 34.3% Hispanic or Latino, 19.4% White, and 7.8% American Indian, Asian or Multi-racial students (Durham Public Schools, 2023). This differs greatly from the racial composition of the county's population. 54.8% of students enrolled in the DPS system receive free and reduced lunch, and 57.3% of students are considered economically disadvantaged (Durham Public Schools, 2023). The Durham Public Schools Strategic Plan focuses on five key priority areas including increasing academic achievement, providing a safe school environment and support, attracting and retaining quality educators and staff, strengthening school, family and community engagement, and ensuring fiscal and operational responsibility (Durham Public Schools, 2021). In regard to increasing academic achievement, the DPS system hopes to have at least 60% of all

their students achieving grade-level proficiency standards. The strategies behind this program include adopting and implementing reading, math and science curriculums with access to both print and electronic resources, establishing and monitoring individual student achievement goals using a centralized system, increasing in-school instructional support, and creating a plan of intervention and support for students (Durham Public Schools, 2021). If these strategies are successful, a higher proportion of students will be on track to graduate.

Priority population

The population of interest within the context of access to and quality of education in Durham County is the students of the Durham Public School system, and particularly Hispanic/Latino high school students. Compared to private and charter schools in Durham County, as well as public schools in nearby Orange County, test scores and other measures of performance indicators are lower in the DPS system (CHCCS School Data Profiles, 2021; Durham Public Schools, 2023). Within Durham Public Schools, large racial disparities exist in test scores, graduation rates, and 3rd-grade and 8th-grade end-of-year reading scores (Durham County Public Health, 2021). The four-year graduation rate of White students in Durham Public Schools is 94.1%, while the rate of Hispanic/Latino students is 76.6% (Durham County Public Health, 2021). This is the lowest graduation rate of all racial/ethnic groups surveyed and included, and as this group comprises over one third of the student population in the DPS system, it is indicated that Hispanic/Latino high school students are a priority population for intervention.

Measures of SDOH

Measures of occurrence for education access and quality include four-year graduation rates and grade level proficiency scores. As evidenced by the data, DPS falls short of its neighboring district, Chapel Hill and Carrboro City Schools, in both measures of education access and quality (CHCCS School Data Profiles, 2021; Durham Public Schools, 2023). Additionally, the graduation rates in the DPS system compared to Carrboro High School are lower, particularly the rate of Hispanic/Latino students (CHCCS School Data Profiles, 2021; Durham Public Schools, 2023). For statistics, see table 22.

Rationale/Importance

Education access and quality, and more specifically graduation rates of Hispanic/Latino high schools students within Durham Public Schools, is a public health priority in Durham County. This county's public school system, while improving, is still behind its neighbors in graduation rates (Durham County Public Health, 2021; UNC Chapel Hill, 2014). By addressing this social determinant of health, residents of Durham County, particularly those enrolled in the DPS system, can access the benefits associated with increased education and literacy levels. These benefits include increased income, increased job stability, and increased access to health insurance (Virginia Commonwealth University, 2015). Research has also shown that not completing high school is associated with lower rates of health literacy, and that health literacy is an important skill in advocating for, understanding, and improving one's health outcomes (Yamashita & Kunkel, 2015).

Disciplinary critique

The role of a public health nutritionist or dietitian serves in addressing education access and quality is an important one. For the priority population of Hispanic/Latino students, a public health nutritionist or dietitian could educate on the health benefits of cultural foods and how to incorporate them into the school lunch program, and how to add extra health benefits to traditional meals. In the education system, it has been documented that students are more successful in school if they are properly nourished (Center for Disease Control, 2022). When students receive a balanced diet, they are more likely to have fewer absences, improved behavior and concentration, and better academic performance (Center for Disease Control, 2022). In the Durham Public Schools system, 54.8% of students receive free and reduced lunch (Durham Public Schools, 2023). By helping students with access to free and reduced lunch learn about healthy choices and how to make them, starting with school breakfast and lunch, concentration during the day and performance in school can be improved (Kleinman et al., 2002).

Regarding the overall impact of addressing education access and quality, focusing on this social determinant of health would result in increased health equity for Durham County residents, particularly those who identify as Black or Latino (Durham Public Schools, 2023). Other benefits to the county could

include increased per capita income as more high school graduates are ready for college and the workforce, as well as increased safety of neighborhoods and better health outcomes for residents (Virginia Commonwealth University, 2015). These benefits would reduce healthcare costs and improve both the economy of Durham County and the overall health of its residents.

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F.1.a: APPENDIX SDOH ANALYSIS

Table 21: Population Demographics of Durham County

Race/Ethnicity	54.4% White 35.9% African-American 13.8% Hispanic/Latino 5.6% Asian 1.0% Native American
Level of Education	89.9% of people over 25 years old is a high school graduate or higher 50.7% of people over 25 years old has a Bachelor’s degree or higher
Household Income	\$67,000 per year (median household income)
Health Insurance Status	13.5% of people under 65 years old do not have health insurance
% Living in Poverty	13.4% living in poverty

Source: (U.S. Census Bureau, 2021)

Table 22: Comparison of Durham and Orange County Public School Performance Statistics

Measure of Occurrence	Durham Public Schools	Carrboro High School	McDougle Elementary School
4th-grade reading proficiency	30.6%	N/A	67.8%
Graduation rate	84%	91.6%	N/A

Source: (CHCCS School Data Profiles, 2021; Durham Public Schools, 2023)

F.2 PROGRAM/POLICY ANALYSIS

Introduction

Education access and quality is one of the five domains stated by Healthy People 2030, with the goal of “increasing educational opportunities and helping children and adolescents do well in school” (Healthy People 2030, 2022). Education is important as a social determinant of health because people with higher levels of education are more likely to live longer, healthier lives when compared to those with lower levels of education (Raghupathi & Raghupathi, 2020). While the relationship between education and health is complex, it is well documented (Raghupathi and Raghupathi, 2020; Zajacova and Lawrence, 2018). Short-term health benefits of education include increased literacy, awareness and knowledge of health and healthy behaviors, and improved social skills and networks, while long-term benefits include higher earnings and better resources for good health, reduced stress, greater probability of having health insurance, and better access to supermarkets, green space, quality schools and neighborhoods with lower rates of crime (Virginia Commonwealth University, 2015; Zajacova & Lawrence, 2018). Disparities in education exist based on income, race/ethnicity and neighborhood/school performance, leading to disparities around the outcomes listed above (Brookings, 1998). Graduation rates for Hispanic/Latino students in the Durham Public Schools system are significantly lower than all other ethnic/racial groups assessed (Durham Public Schools, 2023). Poor educational attainment is associated with low levels of health literacy (Bayati, Dehghan, Bonyadi, and Bazrafkan, 2018). The NIH recommends that health materials be written at a 6th-7th grade reading level (National Institutes of Health, n.d.). The majority of health materials are written at a 10th grade reading level or above (Cutilli and Bennett, 2009). Good health literacy can help patients prevent health problems, protect their health, and manage health problems if they arise, and poor health literacy is associated with poor health (Cutilli and Bennett, 2009). Improvements in educational attainment (monitored by graduation rates) in Hispanic/Latino students are likely to increase health literacy rates, and therefore overall health and wellbeing. Both higher levels of education and improved health literacy are associated with positive health outcomes (Cutilli and Bennett, 2009; Virginia Commonwealth University, 2015).

Evidence Based Nutrition Policy or Program

The key issue is that students who are inadequately nourished have lower academic achievement. Additionally, students who are from a variety of cultural backgrounds may prefer the food of their home country/culture to the lunch and breakfast foods served in American schools (Ayers, et al., 2020). In the case of Durham County and Durham Public Schools, 13.8% of the population of Durham County is Hispanic/Latino, but 34.4% of the students enrolled in the Durham Public School (DPS) system are Hispanic/Latino (Durham Public Schools, 2023). This indicates that they are disproportionately represented within the public school system. The 4-year graduation rate of Hispanic/Latino students in the DPS system is 58.3%, the lowest rate of all surveyed race/ethnicities (Durham Public Schools, 2023). To target these low graduation rates, this program will focus on incorporating culturally-relevant foods in an effort to increase participation in the school lunch and breakfast program and target both hunger and feelings of inclusivity. By incorporating three Hispanic/Latino lunches and three breakfasts into each 3-week meal cycle, students from this background will have consistent access to the food from their home country at school, increasing both the probability that they will choose to eat the food and feelings of inclusivity at school. This is modeled off of a successful program that focused on incorporating culturally relevant meals in the Cambridge School System in Massachusetts (Healthy Food Choices in Schools, 2019). In this model, the Cambridge School District incorporates four culturally-appropriate meals into each meal cycle (Freedman, n.d.). Food service staff were sure to taste test recipes with students and there were promotional posters along the lunch line for students (Freedman, n.d.).

Evidence Based Outcomes

Outcomes of this program will be measured in both short and long term objectives. The short term objective of this program is to achieve an increase in average participation in free and reduced school meals in Durham County from 55% (2022-2023 school year) to 66%, the highest average participation Durham Public Schools has had in free and reduced school meals in the past 14 years (Durham Public Schools, n.d.), after two years of program implementation. The long term impact of the program is to see the percent of Hispanic/Latino students scoring proficient test scores across all subjects

(as measured by End of Grade test results) increase from 41.5% (2019) to 59% (Durham County Department of Public Health, 2020), after ten years of program implementation.

Evidence Based Implementation Strategies and Activities

As stated above, this intervention is modeled off of the Cambridge Public School system program, in which CPS served four culturally appropriate menu items in each meal cycle (Freedman, n.d.). They partnered with a Community Engagement Team and Public Health Department to design recipes over the course of two years (Freedman, n.d.). This helped to increase the sense of school community and meal participation (Healthy Food Choices in Schools, 2019).

This program will serve three Hispanic/Latino lunches and three Hispanic/Latino breakfasts per three week meal cycle. It will begin as a pilot program in two DPS high schools with a plan to expand to all DPS schools in the long term. The food service director and/or nutrition director at each school will oversee the implementation of this program at their respective schools. They will also be responsible for ordering ingredients, overseeing the training of staff, and budget maintenance. Other responsibilities will include program promotion, community outreach for engagement and recipe suggestions, and student engagement through flyers, surveys, and a student taste testing panel. Similar to the Cambridge Public Schools model, the students and community will be involved in developing and testing appropriate recipes.

The expected reach of this program will be that by the end of year 2 of program implementation, 90% of all Hispanic/Latino high school students within pilot schools will have tried at least one Hispanic/Latino school breakfast or lunch. While data for this expected reach is unavailable, justification lies in the fact that all DPS students are eligible for free/reduced lunch and that 54% of all DPS students already participate in free/reduced lunch (excluding those who pay for school lunches) (Durham Public Schools, 2023). This program will have an impact on all levels of the socio-ecological model. On the individual level, this program will promote access to six culturally-relevant meals per cycle and give opportunities to learn about cultural dishes and to contribute to recipe development and provide feedback to the individual students. Graduation rates and school performance should also increase. On the

intrapersonal level, there will be opportunities for social connection through food and engagement with parents and families, particularly those of Hispanic/Latino heritage, for recipes and suggestions. On the organizational level, this program will increase knowledge of cultural foods in the school as students and faculty of other races/ethnicities will have the opportunity to learn about the Hispanic/Latino dishes. On the organizational level, there will be potential expansion to other DPS system schools following the initial pilot program. On the community level, there will be an increase in knowledge of cultural foods as students and faculty of other races/ethnicities will have the opportunity to learn about and try various Hispanic/Latino dishes. On the societal level, there is potential for policy in this area, or further expansion of the program.

Stakeholders

There are many different stakeholders involved in this program. The first group is the Hispanic/Latino students in the DPS system and their families. This is the priority population and the focus of this program. The role of this group will be helping to design and create recipes to be used, as well as providing suggestions and feedback on the menu items and the program overall to ensure that it is relevant and beneficial. Additionally, Durham County Hispanic/Latino Organizations will be involved in the program, primarily through providing feedback and suggestions through surveys. This will promote community involvement and be an opportunity for further cultural advising. Local Hispanic/Latino restaurants will also be consulted and potentially asked for meal donations. This will promote local businesses while increasing awareness of the cultural foods. It will also increase variety in meal choice. The Durham Public School System Board of Education is also an important stakeholder. Their role is promoting the program in schools, facilitating the administrative efforts and potentially funding aspects of the program. The Durham County Public Health Department will also be involved through providing funding, monitoring the program, and evaluating the success and potential for expansion. Grant organizations will be consulted to potentially provide additional funds and alleviate some of the funding responsibility from the schools and Board of Education. School food service workers are involved as they are having one-on-one interactions with the students and providing education and answering questions if

students are interested. They are responsible for promoting the meals and ensuring that students are aware of what they are eating and where it is traditionally served.

Budget

Funds will be acquired primarily from the DPS budget, although additional funds may come from grants. To decrease cost, equipment and ingredients that are used will already be present in schools. The estimated total cost of the pilot program (assuming it operates at two high schools) is \$30,600 per year. 60% of this budget is dedicated to pay increases for food service directors, 35% is dedicated to pay increases for food service workers, and 5% is dedicated to the purchase of cultural ingredients. For a more detailed budget, see table 23.

Conclusion

Advantages of the recommendation include the ability to provide culturally relevant meals to Hispanic/Latino students and promote learning about other cultures to non-Hispanic/Latino students at DPS, the potential to increase academic performance and graduation rates in schools (particularly among Hispanic/Latino students), and the potential to increase feelings of inclusivity among Hispanic/Latino students in DPS system. Additionally, this program is inexpensive due to utilization of existing resources and will be focused on community involvement through local organization and restaurant involvement. Disadvantages of the recommendation include relatively low levels of evidence available for similar programs, a higher burden of responsibility on school food service workers, and potential difficulties sourcing uncommon ingredients and spices. Additionally, this program does not impact Hispanic/Latino students who do not participate in school lunch or breakfast programs. Trade-offs and priorities of this program include the high initial burden on staff. This can be alleviated through community engagement opportunities (recipe development and suggestions can come from these), and the program will eventually become routine as staff adjusts to new menu items, keeping the long-term burden low.

In regard to social justice, this program will target an under-served group in Durham County and Durham Public Schools. Hispanic/Latino students have the lowest rates of academic achievement in the

DPS system and they are also burdened by higher rates of poverty, difficulties with citizenship status, and other adverse health outcomes.

The final recommendation is that the inclusion of traditional Hispanic/Latino menu items will help to increase school meal participation and sense of inclusion among Hispanic/Latino students, potentially resulting in improved academic performance, increased graduation rates, opportunities for higher wage jobs and improvements in healthcare access and health status.

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F.2.a:APPENDIX PROGRAM/POLICY ANALYSIS

Table 23: Budget Table (assumes intervention takes place in two Durham County Public Schools):

Budget Item	Cost Estimate Basis	Cost Estimate
Food service/Nutrition director pay increase	-Average salary in US: \$59,324 (Comparably, n.d.) -Based on pay increase of 15%	\$18,000 per year
School food service worker pay increase	-Average salary in Durham, NC: \$10/hour (ZipRecruiter, 2023) -Based on each employee working extra 4 hours per month -Assumed average of 15 food service workers per high school	\$10,800 per year
Culturally-relevant ingredients	-Dependent on recipes during meal cycles and schools' student population -Assumed extra \$100 spent each month on new ingredients	\$1,800 per school year
Total		\$30,600 per year

F.3 EVALUATION PLAN

Introduction

Education is an important social determinant of health, and is an essential step towards health literacy. Health literacy is associated with a person's ability to engage in their own health and disease management (Hickey et al., 2018). Patients with low levels of health literacy, those who are unable to successfully engage with and understand their conditions and treatment plans have higher mortality, increased hospitalization rates, and develop more diseases (Aaby, Friis, Christensen, Rowlands, & Maindal, 2017). This program is aimed at improving health literacy rates in the Hispanic and Latino populations in Durham. While the CDC recommends that health documents be written at a 6-7th grade reading level, the majority are written at a 10th grade level or above (Cutilli & Bennett, 2009). By improving graduation rates and end-of-course scores in Math and Reading of Hispanic and Latino students in the Durham Public School system, health literacy rates will improve. This will be done with a nutrition intervention targeting the school lunch and breakfast system. By offering six culturally-Hispanic/Latino meals per 3-week meal rotation for those students who choose school lunches, feelings of inclusivity at school will increase, and feelings of hunger throughout the day will decrease, in turn promoting better school performance and improving scores and graduation rates for the target population, Hispanic/Latino students in the DPS system (Kleinman et al., 2002). The implementation setting for this pilot program is initially two DPS high schools, and will be conducted by the food service and nutrition directors at each school.

Evidence Based Evaluation Plan

The long term outcome objective is a 0.03 standard deviation increase in Math 1 and Math 3 End-of-Course (EOC) scores and a 0.04 standard deviation increase in English II EOC scores among Hispanic/Latino students after five years of program implementation. This outcome objective draws on previous research based on New York City middle schools and the impact of universal free lunches and associated increased academic performance (Schwartz & Rothbart, 2020).

Study Design/Data Collection

This pilot program will take place over a five-year period, with the potential to expand into a permanent program based on success and outcomes. It is a quasi-experimental study design, utilizing pre- and post-tests to determine effectiveness. The evaluation methods used will stem primarily from quantitative data, including data sets related to end-of-course scores for Math 1, Math 3, and English II, categories by race/ethnicity, as well as program participation data. Program participation data will include information based on the number of culturally appropriate meals consumed at school over the course of the year, as well as qualitative data from surveys given to students including questions about the palatability of the meal and their feelings of hunger and inclusivity. Focus groups will be utilized following the conclusion of each school year, asking similar questions to the surveys but allowing for a space for students, families and community partners to share their experiences and any suggestions they may have to improve the program or meals offered. This will improve the information collected from participants, as focus groups encourage open discussion and uncover opinions and ideas that may have been missed by the surveys (DeFranzo, n.d.).

Sample and Sampling Strategy

The sample size will be 65% of the population of Hispanic/Latino high schools students enrolled at the two DPS high schools involved in the pilot program. An estimated 750 Hispanic/Latino students are enrolled in the two DPS high schools (data adapted from the Durham Public Schools Facts and Figures page), therefore 490 students will be sampled (Durham Public Schools, 2023). Age and education level of the participants will naturally be standardized in this sample, based on the target population. The sampling strategy is randomized, as this intervention is targeting all Hispanic/Latino students in the two target high schools and randomly selecting 65% of them to survey and monitor.

Specific Measures

Specific outputs include staff training, recipe creation (through focus groups with students, families, and community partners), and sourcing and ordering of new ingredients. Outcomes measured include number of meals eaten at school, number of culturally-relevant meals eaten at school, previous and current end-of-course scores for Math 1, Math 3 and English II for all students and for

Hispanic/Latino students specifically, as well as graduation rates for Hispanic/Latino students overall. Disparities that may exist in the target population (Hispanic/Latino high school students) could include parental income, food insecurity, and commute time to school, which may impact the student's eligibility to participate in school breakfast meals.

Timing

Community partner engagement activities will occur in the one year prior to the start of the implementation of the intervention, as data from focus groups and surveys will guide the meals offered in schools. Data will be collected prior to the start of the program, from historical statistics kept by each DPS school, as well as at the end of each academic period (9 months). Evaluation will occur in the last year of the five-year program. Progress will be defined by rates of program participation (in Hispanic/Latino students), as well as end-of-course grades in Math 1, Math 3, and English II classes and focus group data following the program with questions about meal satisfaction and feelings of hunger and inclusivity during school. The program will rely on feedback from the target population to improve the program. If progress does not occur, the program will need to be re-evaluated and follow-up questions about the frequency of the culturally-appropriate meals provided, adequacy and palatability of the meals, and timing (i.e. breakfast and lunch, or only lunches) of meals will be assessed.

Analysis Plan

Quantitative statistics will be used to assess the majority of the outcomes, including number of culturally-relevant meals consumed by each participant, and corresponding changes in end-of-course outcomes in Math 1, Math 3 and English II. Qualitative statistics and analyses will be utilized to assess the data from the end-of-course/year surveys and focus groups. The long term outcome objective, to achieve a 0.03 standard deviation increase in Math 1 and Math 3 End-of-Course (EOC) scores and a 0.04 standard deviation increase in English II EOC scores among Hispanic/Latino students after five years of program implementation, is based on changes in standard deviations and previous research documenting the impact of free meals on student school performance (Schwartz & Rothbart, 2020). As the Durham Public School system already monitors district statistics, figures, and programs, the nutrition director for

each school and the district administration will be in charge of the data analysis for this program. This will include coding for key phrases in focus groups, monitoring quantitative data, and reviewing electronic survey responses.

Sources of Funding

Sources of funding will include grants, government funding, and potential donations from local restaurants. Costs will be kept to a minimum by utilizing the school kitchen equipment and ingredients that are already in use in the school kitchens. An attempt will be made to source any additional ingredients needed from the wholesale provider used by the school, to keep ingredient costs low. A low cost is one of the main reasons that this program will be sustainable. There are relatively few upfront costs to this program, as the kitchen is already in-place and functioning and no new staff need to be hired. This means that program costs are spread across the five-year program timeline, including staff salary increases and ingredient purchases. The school nutrition director will have additional responsibilities corresponding to the salary increase, which will include creating the meal schedule, aiding in recipe development (in collaboration with students and community partners), and training the current staff on the new meals and recipes. Additional responsibilities of the school lunch staff include learning the new recipes and having basic knowledge of the dish so they are able to answer questions the students may have.

Data Use and Dissemination

Program data will be used to monitor the success of the program and evaluate whether it should be expanded from a pilot program in two DPS high schools, to a program available in all DPS schools. Data will be disseminated through the DPS system so the district can have access to and evaluate the success of the program. Facts and figures are reported on their website, and they provide a strategic plan that could go into detail on this program and the potential benefits of expansion upon conclusion (Durham Public Schools, 2021, 2023). This could influence the potential expansion of the pilot program upon its conclusion.

Conclusion

This public health program promotes equity as it focuses on improving academic performance and graduation rates in a racial/ethnic group that, historically in the DPS system has been underperforming in school, by working to improve their feelings of inclusivity in the school system. If this program is successful, by providing nutritious, culturally-appropriate meals, feelings of hunger in this group will be decreased, and feelings of inclusivity will increase. This program also promotes collaboration, by involving members of the community in focus groups. Additionally, this program promotes interdisciplinary learning about other cultures to the non-Hispanic/Latino students in the participating high schools, as information about the meals will be provided and teachers will be encouraged to incorporate information about the culture being showcased in their classes.

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