

Improving the School Lunch System to Reduce Childhood Obesity

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Abstract

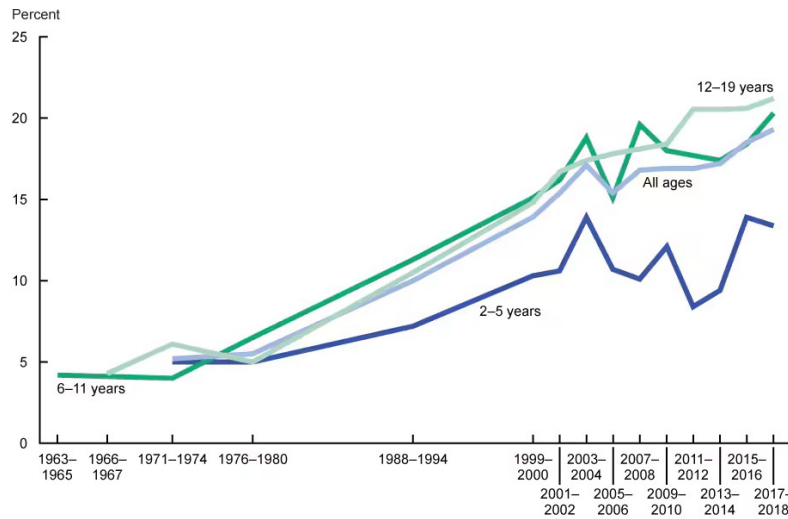
Childhood obesity critically affects a child's health, both physically and mentally. It is one of the leading causes of severe health issues and low self-esteem. One in five children suffer from obesity in the United States, deeming it a critical national concern (CDC, n.d.). The purpose of this research paper is to focus on childhood obesity, a severe health condition and a form of malnutrition that occurs when children are not getting the nutrients necessary for a balanced diet. This growing concern connects to the second United Nations (UN) Sustainable Development Goal (SDG) of hunger and malnutrition, the third SDG of good health and well-being, the fourth SDG of quality education, and the tenth SDG of reduced inequalities, all of which our solutions will target. Our research focuses on trends that connect childhood obesity to the school lunch system, such as resource availability, socioeconomic status, and eating disorders. To address these issues, we will promote the implementation of quality farm-to-school (F2S) initiatives to foster partnerships between local farmers, schools, government agencies, and stakeholders to create sustainable programs. The hypothesis is if educational programs and partnerships are implemented, the likelihood of childhood obesity affecting children will decrease, as well as its physical and mental effects. To investigate our research problem, we utilized the database Google Scholar. We searched for specific keywords that would produce the most relevant results, such as "low-income families", "school lunches and obesity," and "farm-to-table programs." This method allowed us to collect a variety of primary and secondary sources, which helped justify our proposed solutions to improve inefficient farm-to-school programs. It is vital to prioritize low-income communities, health education, and government incentives to form long-lasting partnerships between local farms and schools. Through government funding initiatives to provide balanced meals, reimburse underprivileged communities, and implement nutrition lessons, mutually beneficial partnerships through farm-to-school programs can be formed. By considering these factors, childhood obesity will be significantly reduced in the United States, thus improving the country's overall health.

Introduction

Due to the growing obesity rates over the past few decades, there has been increasing concern regarding the nutrition and eating habits of children. In 1978, 5% of children were obese; in 2016, this percentage spiked to 18.5%, as shown in Figure 1 below (Schanzenbach, 2019).

Figure 1

Trends in Obesity Among Children by Age in the United States, 1963-2018 (Fryar et al., 2021)



According to the Centers for Disease Control and Prevention (CDC), in 2020, one out of five children and adolescents in the U.S. were obese or had a body mass index (BMI) over 30. These statistics translate to around 14.7 million children (CDC, n.d.). Therefore, it is imperative to reduce the prevalence of childhood obesity in the United States, primarily through the school lunch system. Various factors, including diet, genetics, and physical activity, cause obesity. However, it is especially prominent in low to middle-income communities where people lack immediate access to high-quality, healthy food. One contributor to this is food deserts, defined as areas that need access to fresh food since they are often neglected in the distribution of produce (Roger, 2012).

As the commonality of childhood obesity rises, it is essential to note the many consequences, such as Type 2 diabetes and multiple forms of cancers. Additionally, there has been a connection between childhood obesity and mental illnesses, including anxiety and depression, which can lead to high-risk behaviors such as substance abuse. One major contributor to childhood obesity is schools, which provide one-third to two-thirds of students' meals. Studies have shown that children who get their lunch from a school cafeteria are more likely to be obese than children who bring their lunch from home (Schanzenbach, 2009). For this reason, the widespread implementation of farm-to-school programs is necessary to form long-lasting partnerships that provide students with equal access to healthy food, thus lowering obesity rates.

Problem Statement

Childhood obesity is a form of malnutrition since these children often lack the

nutrients, such as protein, carbohydrates, dairy, fruits, and vegetables, to maintain a balanced diet. While obese children consume more calories than what is needed, the food consumed is often low in nutrients, with highly processed “empty calories” that are often high in fats, sugars, and sodium. These foods are frequently found in school cafeterias, which are contributing to the growing problem of childhood obesity. Reducing this issue through the school lunch system falls under the second UN SDG of zero hunger and malnutrition, the third SDG of good health and wellbeing, the fourth SDG of quality education, and the tenth SDG of reduced inequalities. This further relates to the U.S. Department of Agriculture (USDA) and National Institute of Food and Agriculture (NIFA) guidelines of Education and Food and Nutrition Security aimed at improving the nation's overall health.

These goals and guidelines can be met by combatting the various factors that are contributing to childhood obesity, including economic inequality, resource unavailability, and poor eating habits. Childhood obesity is detrimental to a child's physical and mental health and can lead to severe health conditions in a child's future. Specifically, childhood obesity in the United States is increasing due to unhealthy practices in the school cafeteria, as it is the sole provider of healthy meals for some students. In the past, farm-to-school programs have been created to control this issue. However, they have been unsuccessful as they do not properly target underprivileged areas, meet USDA nutrition guidelines, or have the resources needed to create a significant impact. To ensure equal access to healthy and sustainable meals, action must be taken to create quality farm-to-school programs. New initiatives must be implemented to form long-lasting partnerships between local farmers, schools, government agencies, and other stakeholders necessary to combat this rise of childhood obesity.

Methods

To research the problem, we initially gathered information on the causes and statistics of childhood obesity from the CDC. To go further in-depth about low-income communities and obesity, we typed in the key phrases, “the correlation between low-income families and increase of childhood obesity”, “food deserts”, and “food oasis”.

The evidence to support our proposition originated from ScienceDirect, several medical universities, JSTOR, ScholarWorks, and the International Journal of Environmental Research and Public Health. To find these sources, we used the Virginia Tech Database and performed a broad search for these specific keywords; “school lunches and obesity,” “farm-to-table programs,” and “adolescent health concerns concerning childhood obesity.” We used approximately 30 primary and secondary sources, including research papers, experts in the field, and published statistics that provided great insight and further understanding of the topic.

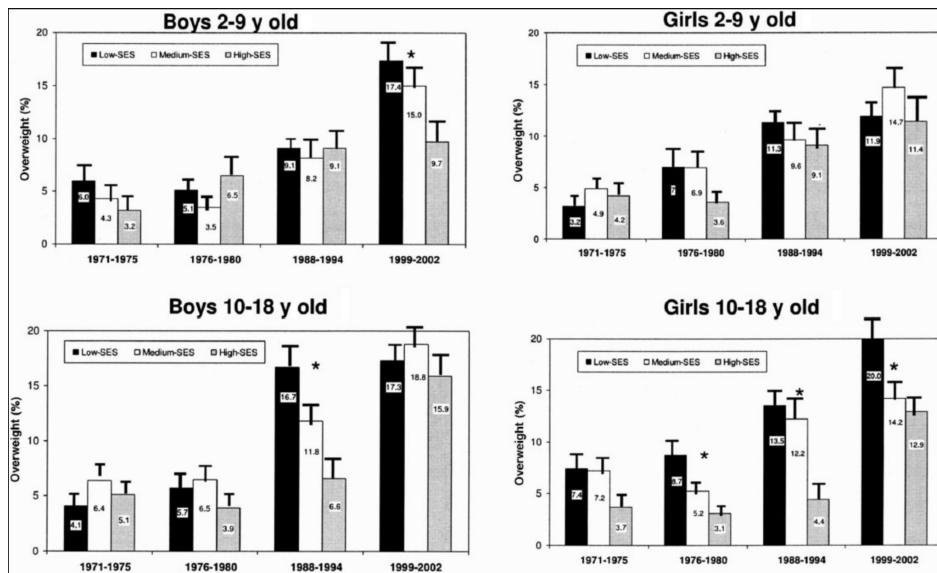
Background

Childhood obesity has a significant effect on children's health. Concern is growing as “In low-income, urban African-American and Latino communities, rates of overweight or obesity [have] surpassed [ed] 40% of elementary school populations” (Antronette, 2007). The issue of childhood obesity has a prominent effect on society; however, not enough attention

has been directed toward it, especially in communities facing economic inequality. Specifically, food deserts have become more prevalent, and these occur when rural towns do not have immediate access to fresh, healthy food (Howlett, 2015). This can significantly affect families affected by economic inequality, as most food deserts are found in low-income areas, limiting the necessary food that children require to grow.

Figure 2

Increase in Childhood Obesity in Minority Groups between 1971-2002 (Youfa, 2006)



Food deserts and food oases, along with the socioeconomic status of families of different racial backgrounds, are just a few of the contributing economic factors to childhood obesity. This was taken into account to conclude that the proportion of white children who were obese decreased from 80.8% to 60.8% between 1971 and 2002, while the proportion of minority children who were obese increased, as shown in Figure 2 (Youfa, 2006). It demonstrates the relationship between social privilege and economic status. Overall, economic struggles have a significant connection to children’s food intake, security, and nutrition that often goes unnoticed.

Obesity is also correlated to the development of many types of cancers, including colon cancer, postmenopausal breast cancer, endometrial cancer, and kidney cancer. Furthermore, it can also make establishing the correct dose of chemotherapy harder and lessen the effects of anticancer treatments (Krupa-Kotara & Dakowska, 2019). Finally, childhood obesity can cause precocious puberty, halting bone growth at an earlier age, which can keep adolescents from reaching their full height potential. Moreover, this condition significantly affects skeletal and neural development (Li et al., 2017).

Childhood obesity does not just have physical effects, but it also has emotional and

mental effects. There is a relationship between childhood obesity, low self-esteem, and antisocial behavior. Adolescents struggling with obesity are more likely to suffer from mental illnesses, such as depression and anxiety, and participate in high-risk behaviors, like smoking tobacco and drinking (Held, 2014). A study performed by the National Institute of Health found that children with obesity have a 34% higher risk of developing depression than children at a healthy weight (Jebeile, 2019). Children seeking obesity treatment can display even higher levels of mental illness since up to 50% of children identified as having depression or anxiety-related psychiatric disorders (Jebeile, 2019). Children with obesity are at a higher risk of developing eating disorders due to psychological and social factors (Held, 2014). It is clear that childhood obesity has a direct effect on both children's physical and mental health, along with their health in the future, so it is necessary to take action to reduce its causes.

In the United States, childhood obesity has been directly linked to the school lunch system. According to a study from the University of Wisconsin, it was found that average school lunches don't reach the necessary calorie intake and nutrients for a balanced diet, contributing to the ongoing trend of childhood obesity. Students eating school lunch every day has been linked to negative consequences since by the end of first grade, 14% of school lunch buyers are obese, while only 11% of students who pack their lunch are obese. Compared to school lunch buyers, students who pack their lunch are more likely to have health-conscious parents with a higher income, giving them access to quality ingredients to pack nutritious lunches. The CDC's Third National Health and Nutrition Examination Survey Data set found that students who buy lunch daily consume at least 46 more calories at lunch than students who pack lunch daily. These findings were consistent with the US Department of Agriculture (USDA) findings as a part of the National School Lunch Program: school lunch buyers consume up to 120 more calories at lunch per day (Schanzenbach, 2009). When a child is obese, they require more calories to maintain their weight, so eating high-calorie school lunches that lack nutritional value can increase obesity by 2-7%. At the end of the study, it was concluded that a small difference in calorie intake could increase BMI. (Schanzenbach, 2009).

Currently, some programs aim to lower obesity rates in the U.S., provide all children access to food, and educate children about nutritional meals. The National School Lunch Program (NSLP) is one of these programs. The NSLP was established under the National School Lunch Act in 1946 and is meant to provide nutritional meals that are low-cost or free to children every school day (USDA's Food and Nutrition Service, 2017). Although the NSLP is meant to improve students' health and reduce childhood obesity, research has shown that the National School Lunch Program's meals don't always meet the standards set by the USDA. The NSLP doesn't take into account the age, gender, and level of activity of the students, so the meals aren't customized to the students' needed nutrition (DiSiena, 2015).

The School Breakfast Program (SBP) is another example of a food and nutrition assistance program. In Virginia, every school is required to offer the SBP since research has shown that students perform better when they have eaten breakfast as they are more likely to be on time to class, be better focused, and are more likely to retain what they have learned (VDOE, n.d.). Participating schools receive cash subsidies for each reimbursable meal they give to students. In exchange, the schools must serve lunches that meet USDA nutrition

guidelines and offer free or reduced-price meals to underprivileged students. (USDA's Food and Nutrition Service, 2017). Programs like these lack nutrition education, which is necessary to teach students about the importance of balanced meals and a healthy diet since it has been shown to reduce eating disorders and childhood obesity. Farm-to-school programs must provide nutritional food that meets USDA standards and educate children to form lifelong healthy eating habits.

There are also many programs in place to support food and nutrition assistance programs, such as the NSLP and SBP, by purchasing locally sourced food from farms for schools participating in these programs. One example is USDA Food In Schools: they purchase approximately 2 billion pounds yearly from U.S. farmers (USDA's Food and Nutrition Service, 2022). The USDA Foods in Schools program supports American agriculture and adds budget-friendly options for schools to provide students with healthy meals (USDA's Food and Nutrition Service, 2022). However, the food provided has been shown to have high rates of sodium and sugar, therefore lacking nutritional value. Also, the USDA changes the nutrition standards as it sees fit, so schools should work towards meeting the new nutritional standards as it can improve the health of the children. However, it can take a while for all schools to implement these new requirements set by the changing USDA Food in Schools guidelines (USDA, 2024). These are two negatives of the USDA Food in Schools program, but it has a key role in providing food for schools nationwide.

To combat the increasing rate of childhood obesity, it should be targeted through one of the places children spend the most time in – schools. As they provide many children's meals, it is necessary to offer healthy and sustainable options that originated from local farms through government-regulated and funded programs. To help cultivate successful and lasting farm-to-school relationships, government agencies should create financial incentives, such as tax breaks and reimbursements, for local farms to participate in such programs. These programs are developed to increase nutrition education, decrease food access inequality, and improve students' physical and mental health.

Solutions

The Widespread Implementation of Effective Farm-to-School Programs

Farm-to-school programs should be created to ensure children's nutritional needs are met through increased access to high-quality and healthy foods (Wilson, 2021). Congress first pushed the programs through the Food, Conservation, and Energy Act of 2008, which states, "Institutions receiving funds under this Act are required to use a geographic preference for the procurement of unprocessed agricultural products, both locally grown and locally raised" (Food, Conservation, and Energy Act of 2008, 2008, pp. 204). Through F2S programs, schools can provide locally produced farm fresh foods to promote a balanced diet, such as fruits, vegetables, dairy, meat, eggs, beans, and more. Not only do F2S programs include a curriculum focused on healthy eating, but they also allow for farm visits, field trips, and sustainable agriculture practices in the majority of communities.

Implementing farm-to-school programs will lower obesity rates and provide children

with equal access to food. These programs must provide schools with high-quality local produce to create nutritional meals for students. Schools must be mandated to follow USDA nutritional guidelines and educate students on balanced diets. F2S programs should allow for greater access to healthy food and health education, thus decreasing and preventing childhood obesity. F2S program networks consist of local farms supplying schools with fresh products such as produce, dairy, grains, and meat, which will then be prepared to form healthy meals with various options. By increasing access to nutritious, lower-calorie meals and health education, obesity rates will be reduced—specifically in low-income communities and food deserts.

While there is no current long-term research on the direct effect of F2S programs on reducing childhood obesity, several studies illustrate that children who participate eat more fresh fruits and vegetables. On average, children who do not participate in F2S programs consume about 0.99 servings of fruits and vegetables daily. Children participating in F2S programs consume 30% more fresh produce, about 1.33 daily servings (Knai et al., 2006). Fruits and vegetables have a higher volume and lower caloric value than highly processed alternatives, which are dense in fats, sugars, and sodium. Fruit is filled with necessary nutrients when eaten alongside meals, helping reduce the consumption of unhealthy, high-calorie foods, thus preventing childhood obesity (Arnotti & Bamber, 2019). By developing F2S programs and increasing access to quality fruits and vegetables, childhood obesity can be significantly reduced.

A concern of the childhood obesity crisis is the rising rate in low-income, rural, and minority communities. These people often lack the funding, resources, and leadership to access high-quality, healthy food. As F2S programs are implemented, the food access gap will be reduced, contributing to social equity. In rural communities, F2S programs can create strong connections between local farms and schools because one out of three grants for farm-to-school projects goes to rural communities to improve nutritional education and form partnerships (USDA, 2024). In general, farms should provide produce to schools in local areas rather than shipping it off to locations inaccessible to their communities (La Trobe, 2008). F2S programs would, as a result, help reduce social inequality and the development of food deserts.

In low-income communities, F2S programs will increase access to nutritious meals and convince students to form long-lasting healthy habits, both inside and outside of school. Through education about locally grown produce, students can identify and support nearby farmers, who often have affordable prices. Studies have shown that students from low-income households are often unaware of the variety of locally grown fruits and vegetables, causing education to be necessary to promote healthy consumption (Greer et al., 2018). This can be done through health lessons and campaign posters highlighting local produce as being beneficial for the environment, community building, and tasting better than processed foods. These materials should be placed in areas with large audiences and bright colors to further appeal to students. Finally, F2S networks will implement local farm field trips, school gardens, food labeling initiatives, and taste tests of local produce, promoting healthy eating in the cafeteria and beyond and improving food security. Through the Healthy Hunger-Free Kids Act (HHFKA), F2S programs can gain grants from the USDA to develop farm-to-school programs

across the country, especially in communities facing food insecurity. These grants will transport local produce to rural communities and allow for cheaper meal plans for students struggling with economic inequality.

Farm-to-school programs should also provide access to healthy food outside schools by incorporating food stamps. Food stamps are one of the major food assistance programs in the US, helping low-income families with grocery budgets and food prices (Clarkson, 1975). The Supplemental Nutrition Assistance Program (SNAP) is a specific program focusing on the benefits of food stamps. The program's main goals are to reduce the increase of poverty in struggling communities and maintain economic growth. By implementing programs similar to SNAP within F2S networks, families of lower socioeconomic statuses will improve their lifestyles by gaining access to resources. Programs such as SNAP will also provide food security for children to ensure that they get sufficient nutrients to allow for healthy growth. Through these programs, reduced costs and improved food selections will significantly lower the risk of childhood obesity. Thus, food stamps are an impactful tool that should be provided for families in need.

Furthermore, the tight budgets of school meal providers in low-income communities can create additional challenges since they often cannot afford the healthy food that farmers and food distributors provide. Meal providers must work with farm-to-school programs and understand these challenges. They can take action by donating leftover produce to limit food waste, storing root vegetables for the winter months, and reducing experimentation with meals that students may not enjoy. To support the integration of F2S programs, reimbursement programs have been created that give schools \$0.10 for every breakfast, lunch, or snack provided with an additional serving of a fruit or vegetable on the side (Izumi et al., 2009). New farm-to-school initiatives will incorporate more funding and reimbursement programs to support underfunded school systems.

The Use of Educational Programs and Healthy Alternatives

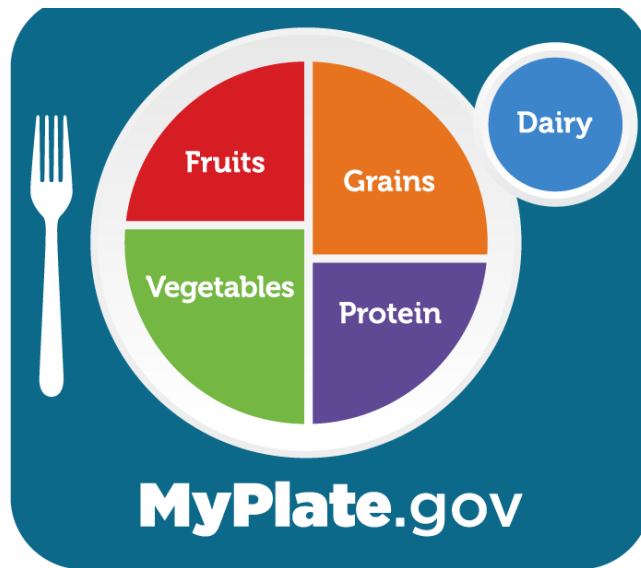
Alongside providing produce from local farms, an integral piece of F2S programs is education about healthy eating. This can consist of lessons on healthy eating and lifestyle, the origin of local produce, and hands-on experience in growing food. A Pre-K farm-to-school program, Harvest for Healthy Kids, has demonstrated that participating children are more willing to try and enjoy new fruits and vegetables (Izumi et al., 2015). When children are more likely to experiment with produce, there is a greater chance that they will consume it both in school and at home. Similarly, a study conducted in a school in South Carolina found that children in F2S programs are more likely to ask their parents to buy them healthier foods and produce from the grocery store (Jones, 2015). For this reason, children need to receive health education to learn about the benefits of the food they eat. Additionally, F2S programs decrease students' preferences for unhealthy food (Evans et al., 2012). This could reduce the amount of high-calorie and nutrient-deficient food children consume, creating better eating habits likely to translate to a better diet overall. As a result, F2S programs have a strong potential to combat the issue of childhood obesity, making it a worthwhile program to implement.

Healthy and unhealthy foods develop significantly different effects concerning a child's health and mental well-being. For instance, when children consume foods high in fat, sugar, and sodium, with low nutritional value, such as bagged chips, soft drinks, french fries, and milkshakes, with no moderation, severe health issues will follow. This can lead to increased risk of infection, fatigue, poor performance, and lack of sufficient nutrients (Chauhan, 2016). Regardless of the calories, the nutrients and the amount of food a child consumes are significant factors of obesity. Nutritional content, such as vitamins, iron, calcium, and protein, are key to physical and mental health and should be focused on in school. By teaching students to read nutrition labels to make healthy food choices, healthy habits will be formed, decreasing childhood obesity rates.

Local F2S programs must develop alternative meals and snack options that are more palatable for children. This will lead to less interest in unhealthy foods that do not contain nutrients (Chauhan, 2016). These programs must implement foods with a high concentration of probiotics and nutrition, such as yogurts, fermented milk products, cheeses, and sourdough bread. These foods provide microbial β -galactosidase, an enzyme that breaks down lactose into glucose and galactose, which can lead to improved digestibility and lactose tolerance (Sánchez et al., 2016). By helping students understand the biological components of food and its effect on their health, farm-to-school programs can effectively lower the risk of health conditions, particularly obesity.

Figure 3

USDA My Plate Model Illustrating Food Group Guidelines (USDA, n.d.)



The widespread implementation of educational programs regarding a healthy diet is necessary to ensure that students receive proper nutrition and growth when attending school.

For example, a form of health education called MyPlate, as seen in Figure 3, published by the USDA's Center for Nutrition Policy and Promotion, should be implemented in public schools. Research studies have demonstrated an increased understanding of food groups when students were introduced to the MyPlate concept (Segalita, 2019). The children's understanding of healthy eating and the five main food categories: protein, carbohydrates, dairy, fruits, and vegetables, portrays the effectiveness of educational programs for young children. Considering this, to influence children to maintain long-lasting, healthier diets, educational programs that teach the importance of healthy eating and physical and mental wellness are imperative to implement in schools nationwide. Furthermore, providing interactive activities and visual tools will reinforce the concepts of healthy eating and recognition of certain foods. These initiatives can improve children's lifestyles, forming long-lasting habits to last a lifetime.

Lastly, to incorporate healthy meal plans for young children, developing alternative, appealing options would improve their outlook on healthy foods. By serving desserts that consist of vibrant colors and natural flavors, such as fruit salads, naturally dyed yogurts, homemade trail mix, frozen banana pops, or ants on a log, farm-to-school programs can provide alternatives that make eating enjoyable for young children. Ensuring the visual presentation is appealing will improve the likelihood of consumption, as the visual appeal of foods has a strong effect on the consumption of fruit and other healthy alternatives (Jansen, 2010). Providing a variety of healthy food options that prioritize a child's nutritional needs and psychological appeal will ultimately help prevent an increase in childhood obesity and improve students' understanding of healthy eating.

The Role of Government Agencies to Incentivize Farm-to-School Programs

The backbone of F2S programs is the collaboration between farmers and schools, as farmers will provide the necessary produce to promote healthy eating for students. Government agencies are essential in sustaining these long-lasting partnerships (Wilson, 2021). These programs are economically advantageous for farmers since they enter them into million-dollar markets, it increases their income, reducing poverty. It allows them to provide for schools comfortably. In 2014, more than \$789 million was used to purchase local foods in 42,587 schools in the U.S. – these programs are expected to continue growing (National Farm to School Network, 2020). Farmers can buy large amounts of produce ahead of time by participating in these programs, which can guarantee a fair price through bulk orders. Furthermore, to create nutritious meals, food processors and distributors will purchase their products from local farmers, thus increasing their revenue streams. This new food system model will also benefit farmers by creating new jobs. Models illustrate that school districts create jobs by purchasing food from local farms and additionally create 0.27 – 2.35 more jobs from surrounding economic activity (National Farm to School Network, 2020). By forming partnerships through F2S, farmers will gain monetary incentives, improve their reputation, and market their businesses.

In addition to the economic benefits of partaking in F2S programs, incentives must be given to farmers for their contributions. One crucial incentive is state-level tax breaks, which can help reduce costs for farmers. One tax credit program that can be used is the Virginia

Agricultural BMP Tax Credit Program, which focuses on tax incentives for farmers who follow specific agricultural guidelines, reducing pollution and increasing sustainability (Virginia Department of Conservation and Recreation, 2024). F2S programs will work with state departments to offer tax incentives of up to 25% of the first \$100,000 spent by localized farms to produce healthy food for schools sustainably. This will give preference to farmers using renewable energy sources, conservation equipment, and sustainable practices. The eligibility and requirements for tax credits will be outlined for farmers before joining the program. This helps promote safe agricultural practices while incentivizing them to work with local schools and communities instead of large corporations. As a part of the F2S programs, the tax breaks will begin on the state level through local state departments and eventually expand to national levels.

To participate in the F2S programs, schools must receive funding from government agencies, such as the USDA. The USDA will reimburse schools that participate in farm-to-school programs through cash subsidies. This money can motivate schools to follow the USDA guidelines for child nutrition and offer meals at a free or reduced price for students from low-income households (USDA, 2017). To further fund and incorporate educational materials into the F2S programs, federal grants from the USDA will be provided to schools to kickstart local chapters of the F2S programs. Planning grants will be provided to create detailed plans to foster partnerships between local farms and schools through regulations, guidelines, and contracts. Implementation grants will be given to start a farm-to-school program by acquiring localized produce, food safety training, school gardens, kitchen equipment, nutrition education, and more. Finally, support service grants will be instituted to increase the outreach of F2S programs, especially in communities lacking the proper resources to access localized farms (National Sustainable Agriculture Coalition, 2019). These grants will be used to implement solutions to pair up farms and schools, transport goods, and create meal plans to guarantee the success of F2S programs in every school.

State government intervention is crucial in regulating F2S programs as they are stakeholders in forming connections throughout farm-to-school programs. Some examples of key government agencies include the Department of Education, Department of Agriculture, and Department of Health since they can create regulations to ensure that farms and schools work together to provide quality education and nutritious meals sustainably. Government agencies will work with stakeholders by hosting training, sharing resources, collecting data, and generating funding to support farm-to-school programs. Through professional development training, educators and nutrition professionals can gain access to local ingredients, create health education curriculums, and incorporate school gardens. Additionally, low-income districts can be accounted for through effective distribution of resources, especially through statewide lesson plans and funding initiatives. State Administrative Expense (SAE) funds can be used to support statewide farm-to-school programs to align with the State's approved SAE plan, which usually includes the creation of training materials for educators, school garden coordinators, and district conferences through regional farm-to-school initiatives (USDA, 2023). Finally, government agencies can measure the progress made on both a state and national level to reduce childhood obesity. Through data collection and mandatory surveys, F2S programs will be able to reach the proposed goal of reducing childhood obesity and work toward the second UN SDG of hunger and malnutrition and the

third UN SDG of good health and wellbeing. With the oversight of agencies, non-participating school districts and stakeholders will be identified and incentivized to join the program, allowing for future expansion. Through partnerships with nonprofits, such as Feeding America, Action Against Hunger, and local food banks, state governments can gain funding to continue the F2S programs, contributing to its success.

Partnership Strategies to Further Farm-to-School Initiatives

To form long-lasting partnerships between farms and schools, school meal providers and food distributors must be motivated to participate in F2S programs and overcome challenges. When schools buy food directly from small to mid-sized farmers, schools face time and budgetary constraints, requiring more effort to implement than normal procedures. These procedures favor “broad line distributors—essentially one-stop shops which carry nearly all the food, supplies, and equipment needed to operate a food service kitchen” (Izumi et al., 2009, pp. 336). F2S programs will account for these challenges by incorporating various mediators to connect farmers with schools— to reduce additional school administration efforts. For example, Grower’s Collaborative is a non-profit that allows customers to evaluate farmers’ prices, set the price they are willing to pay, and inquire about growing practices. Similarly, liaisons can also facilitate communication between school meal service providers, food distributors, and localized farmers, by buying from farmers through mediators, school meal providers can get quality products, control delivery schedules, and reduce costs— a crucial selling point for low-income communities.

Farm-to-school programs have partnered with regional food distributors that help the school meal industry, such as the National Systems and Services Company (SYSCO). Through its Buy Local, Sell Fresh program, SYSCO can contribute to F2S programs by relocalizing food systems through complex supply chains. This can help F2S programs significantly increase their scope and efficiency, helping reach rural and urban communities alike (Izumi et al., 2009). One challenge with this model is the lack of commitment of large food distributors to local schools, highlighting the need for regional-based food distributors. Regional distributors have often been associated with local farmers for generations, thus forming long-lasting partnerships of reliability, trust, and codependence, aiding farm-to-school programs.

An additional issue is the mismatched summer agricultural production cycle and the fall-to-spring school year since it can limit access to certain types of produce. While this may hinder the progress of F2S programs and reduce the availability of certain meals, protocols can be implemented to decrease this effect. Some solutions will be used with technologies such as unheated hoop houses to better align with the school year. It extends the growing season of common crops used in school lunches, such as cucumbers, lettuce, and tomatoes. A short-term alternative to combat this problem is to freeze seasonal produce and serve them throughout the year in meals that use frozen ingredients. This can include roasted vegetables, stir fry, vegetable soup, fruit strips, and fruit parfaits. Schools can serve more uncommon fruits and vegetables in the fall months, such as pumpkins, squash, beets, and turnips. Additionally, schools store root vegetables in the winter months, increasing access to healthy produce in non-growing seasons (Izumi et al., 2009).

These challenges can be mitigated through technological and funding initiatives, furthering the growth of F2S programs.

Conclusion

The objective of our research was to propose farm-to-school programs to improve the school lunch system as a form of reducing and preventing childhood obesity and enhancing children's diets. In the US, one in five children suffers from obesity, primarily in low-income, rural, and minority communities (CDC, n.d.). It is essential to address childhood obesity since it can cause severe physical and mental issues that can continue into adulthood. Due to a lack of access to food rich in nutrients and necessary for a balanced diet, children often turn to food filled with “empty calories,” which are high in sugar, sodium, and fats. A significant reason for the prevalence of childhood obesity is because of the high accessibility of food that is rich in calories and low in nutritional content. To combat this issue, farm-to-school programs have been implemented in the past. However, they often lack strict guidelines and funding initiatives to maintain a long-lasting impact.

In general, the widespread implementation of farm-to-school programs has demonstrated significant improvement in children's diets and the reduction of childhood obesity. F2S programs aim to attack obesity and malnutrition caused by a divide between food distribution to wealthy communities and needy communities. F2S programs are necessary to increase food production and distribution to high-risk communities, such as low-income minority groups. This program provides access to high-quality, fresh products such as fruits, vegetables, meat, dairy, grains, etc. Furthermore, it educates children about a balanced diet and a healthy lifestyle, improving their eating and forming lifelong healthy habits (DiSiena, 2015). As a result, F2S programs target deep racial, social, and wealth disparities in the US and improve upon existing programs by meeting nutritional guidelines, providing health education, and implementing various meal options. Moreover, it stimulates economic growth in local areas through funding initiatives supported by government agencies and stakeholders, making it a sustainable method of food distribution. These new and improved F2S programs benefit children, farmers, schools, and distributors alike, thus improving overall public health. By targeting the ongoing childhood obesity crisis, farm-to-school programs will ensure the health and well-being of many future generations.

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