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MINI REVIEW

Farm-to-school nutrition programs with special reference to Egypt and Morocco

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Abstract

The United States' Farm-To-School Program (F2SP) is a competitive grant program that targets participants of the National School Lunch Program and School Breakfast Program with the aim of increasing the quantity and frequency of locally sourced fruits and vegetables offered to children during the school year. This narrative review aims to summarize the outcomes of the F2SP's interventions on child health and wellness using the research available to date and provide points to consider when implementing the F2SP outside of the United States, particularly in Egypt and Morocco. Analysis of the existing literature showed that both Egypt and Morocco have been beneficiaries of their aid and have seen improvements in the number of children receiving meals at school. With its centralized school meals system, and with support from the World Food Programme (WFP), Egypt has the infrastructure to set up and sustain a long term F2SP that will enrich local communities, grow local economies, and support the health of the next generation. As the WFP continues its work in Morocco, the focus should be maintained on developing a strong school meals system and addressing immediate food insecurity. The viability of such a program being implemented should be reassessed once outcomes from current hunger relief efforts become available. Additional research is needed to continue to study the feasibility, applicability, and impact of this program, especially as it would be applied in areas with no centralized school meals programs across North Africa.

Keywords: Farm-to-school nutrition; school meals; Egypt; Morocco

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1 Introduction

The school setting provides continuous contact with the same group of children through the school year, making school an ideal environment to focus intervention activities. Studies have shown that food preferences are shaped during childhood and that establishing favorable behaviors early on can lead to lifelong benefits to health [1]. With the evidence supporting the long-term impact of childhood nutrition growing, many countries have shifted their focus to environmental and policy approaches to child health and nutrition in an effort to positively impact the sustained wellness of their populations.

One such policy approach is the United States' Farm-To-School Program (F2SP) implemented by the United States Department of Agriculture (USDA) with the aim of improving childhood nutrition. This competitive grant program targets participants of the National School Lunch Program (NSLP) and School Breakfast Program (SBP) with the aim of increasing the quantity and frequency of locally sourced fruits and vegetables offered to children during the school year [2]. The F2SP ranges from the procurement of food to meal planning and preparation [3]. This program's goal is to establish a food system that promotes wellness through the consideration of the community, the economy, and the environment by focusing on classroom education, community support, and the incorporation of locally procured foods in the cafeteria [4, 5]. The F2SP emphasizes the procurement of local food and agriculture education [6].

Analysis of the F2SP and its methods can provide future organizers of school-based wellness initiatives with a better understanding of the variables being impacted and those being neglected by such interventions. Additionally, such analysis can serve as a guide for spending, highlighting the strengths of such programs worth investing in, and the weaknesses that result in a drain of finances, time, and energy. This narrative review aims to summarize the outcomes of the F2SP's interventions on child health and wellness using the research available to date and provide points to consider when implementing the Farm-To-School program outside of the United States, particularly in Egypt and Morocco.

2 F2SP Overview

The F2SP is based on the following principles [6]:

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- Local sourcing of foods for schools participating in the National School Lunch Program (NSLP) and School Breakfast Program (SBP);
- The education of program participants on agriculture, food production, health, and nutrition, including hands-on learning using community and school gardens;
- Collaboration with community organizations, non-government partners, and agricultural partners to encourage program sustainability and community engagement.

A set outline is not provided for applicants, and each program meets the requirements of the F2SP in a way that best matches the needs and vision of the population being served. Program eligibility is limited to schools, non-profits, tribal communities, adult care programs, and other entities that are already participating in the NSLP or SBP [7].

Grants are awarded to applicants meeting the principles of the program. Award amount varies by applicant, and the focus, design, and overall intent varies from applicant to applicant. Each applicant can define "local procurement" in a way that matches the capacity of the applicant [6]. Upon grant request, the recipient must present a plan to include local procurement of at least one of the five staples of the NSLP locally [4]: grain, meat/meat alternative, fruit, vegetable, and/or milk [8].

The F2SP's adaptability to the needs of each individual applicant is a strength that allows the program to be well-suited to both rural and urban communities. However, the wide range of program designs results in a lack of standardization within the program, making its impacts very difficult to study. Despite this challenge, the majority of research on the F2SP is optimistic about the program's outcomes on local economic growth, fruit and vegetable intake, and community engagement [9].

While not explicitly stated as a goal, it is a well-advertised implication that the program's focus on food education will result in increased self-efficacy toward fruit and vegetable intake and subsequent changes in dietary behavior, resulting in favorable changes to childhood nutrition [3]. Many studies investigating program outcomes have successfully demonstrated the relationship between F2SP activities, nutrition knowledge, and increased fruit and vegetable intake at mealtime [10-13]. A quasi-experimental study done integrating the F2SP classroom component with a specific nutrition education curriculum called the Coordinated Approach to Child Health (CATCH) looked into whether increased nutrition education impacted fruit and vegetable intake [10]. Researchers found that this structured education approach within the confines of the F2SP's goals resulted in an increase in knowledge compared to baseline, as well as increased observed fruit and vegetable intake [10].

An important limitation of the studies done to date regarding fruit and vegetable intake is that they are all multi-variable; no study looked solely at the education component of the F2SP as it impacts increased fruit and vegetable intake, and most studies included other interventions such as farm visits, cafeteria visual cues, and taste tests [3, 11]. It is also important to note that, due to the variability between programs, no study was able to demonstrate a causal relationship between the F2SP and intake [3]. Despite the lack of clarity regarding the variables impacting the outcomes of these studies, the results are reliable because the F2SP is at least as multifaceted as the studies. While researchers cannot say with certainty that the classroom education being provided in the F2SP is solely responsible for the increased consumption of fruits and vegetables, they can surmise that education with a combination of the F2SP's components play a role in increasing the fruit and vegetable intake of program participants.

The community component of the F2SP strongly emphasizes the creation of school gardens in order to encourage hands-on learning of nutrition, food science, agriculture, as well as the opportunity for taste tests and increased physical activity [9]. To date, there are no strong studies showing a causal relationship between school gardens in the context of the F2SP and improved nutrition or education outcomes. However, the study carried out by Skelton *et al.* [1] not associated with the F2SP looking solely at school garden participation have observed improvements to attendance, academic performance, and social interactions. For this reason, it is therefore not unreasonable to assume that similar benefits would be seen with school gardens in the F2SP.

The F2SP is feasible in the United States for several reasons, one of the most prominent of them is the presence of a centralized and highly organized school meals program. Despite the variability between school districts in the daily items being served at mealtimes, public schools are mandated to provide the five staples mentioned above at the risk of losing their funding should they not comply. This approach standardizes meals throughout the country, ensuring balanced and varied nutrition is offered to all children despite socioeconomic standing. Mandating participation in the NSLP and SBP ensures that the F2SP prioritizes children of low-income families, as enrollment in free and reduced school meals is subsided by the federal government. Upon implementation, the F2SP must function within the parameters of the NSLP and SBP. These regulations ensure that the F2SP selects for areas of higher free and reduced meal enrollment, allowing for populations at risk for poverty to have greater access to locally procured and varied produce.

Powell and Wittman (2018) summarized the implications and challenges of attempted implementation of the F2SP in British Columbia (BC) which lacks a centralized school lunch program, explaining that this approach limits the reach of the program because it does not have government backing. Despite this, independent programs have been successfully initiated and grown, depending on private funding and community support of the intention of the program [14].

3 Applying the F2SP to Egypt

Egypt has developed an ongoing centralized school nutrition program in partnership with the World Food Programme [15, 16]. This program targets social and economic development through improved nutrition in a few ways. First, through a partnership

with the Government of Canada and the German Development Bank, in-school nutritious snacks are provided to nearly half a million children. Second, students are given take-home rations for their families provided they achieve 80% school attendance monthly. This aid is reinforced through assistance from the European Union, which provides food assistance to 100,000 children and 400,000 family members. Third, electronic food vouchers are given to about 15,000 families to help subsidize their groceries. The combination of these methods has a demonstrable impact on student success; a 2020 study examining the impact of the National Egyptian School Feeding Program on the growth, development, and school achievement of children found that children who were provided with a meal during the day had better scores on visual memory, auditory vigilance tests, and working memory test [17].

The robust government interest, financial support, and established centralized structure, demonstrated by the Egyptian government, suggest that a F2SP would not be impossible to implement. The funds being allocated could, in theory, go toward incentivizing farmers by offering subsidies for growing crops that local schools would be interested in purchasing.

The majority of the total national land in Egypt is used for cultivation, the fertile area primarily concentrated by the Nile Valley and delta [18, 19]. This means that nutritious, home-grown food is available and could potentially be redistributed to students using a farm-to-school approach incorporated into the current National School Feeding Programme.

The geographic concentration of the agricultural lands in Egypt would likely result in a natural barrier to the implementation of such a program to the minority of schools located outside of the Nile Delta. However, the F2SP intentionally leaves out a definition for "local procurement," and "local" can be defined as any produce coming from Egypt allowing the participation of schools located outside of the Nile Delta. A F2SP can enable the Egyptian government to use its purchasing power in favor of local production and procurement. This can have a significant impact on Egypt's agricultural economy, especially considering that 28% of all jobs in Egypt fall in agriculture [20].

Data strongly supports that economic improvements result in improvements to childhood health and wellness, and tackling childhood malnutrition, in turn, assists in raising national GDP[21]. Rashad and Sharaf (2018) found that in Egypt, there was a "significant negative association between economic growth and underweight and wasting at the 1% significance level. A 10% economic growth rate is expected to reduce the underweight rate by 11.3% and wasting rate by 11.8%." Local spending which is central to the F2SP in the United States has demonstrated benefits such as $2.16 generated for every dollar spent locally, increased school revenue for school meal programs, created new economic opportunities for farmers, including long-term revenue streams [9]. The implementation of such a program in Egypt would probably generate similar economic impacts, leading to improved health outcomes among Egypt's most at-risk children.

The F2SP's classroom component may also be a contributing factor in aiding against the struggle of the "double burden of malnutrition." In Egypt, as with many other countries facing income inequality, low-income families are forced to choose energy-dense, low micronutrient foods in order to keep their families fed, resulting in excess weight-to-height in combination with stunting [21]. Having a structured classroom curriculum on micronutrients and nutrition in combination with cafeteria availability as a result of local procurement can be a vital step in addressing this issue.

F2SP activities – a structured classroom curriculum on micronutrients and nutrition, cafeteria availability of healthy foods as a result of local procurement, and community education and engagement in the form of school and community farming – can be supportive factors in addressing the nutrition-related vulnerabilities documented above.

Egypt has around 12.2 million primary school students and 8.9 million secondary school students split between public and private institutions, with the private institutions largely being exclusively accessed by students from wealthy families [22]. The imbalance in wealth distribution is compounded by gaps in educational access as over 2,000 villages have no primary schools [23]. The access discrepancy is a priority of the Egyptian government which is actively seeking to increase the education enrollment by expanding the educational system [24]. Despite the efforts, those in rural communities are disproportionately representative of those who either drop out of school or choose not to enroll altogether; of the 0.72% of children out-of-school children, 50.2% were girls coming from rural environments [24].

Schools located in areas that do not have access to agriculture, do not have established meals or mealtimes, or cannot participate in a national school meals program may not be a good fit for the F2SP. It may be a better use of government and private funds to prioritize nutritional aid by way of rations and other immediate food assistance. Additionally, if out-of-school increases are related to social factors such as child labor, child marriage, or poverty as suggested in a 2014 report analyzing out-of-school figures [24], addressing these factors could prove to be more impactful for keeping kids in school and, in turn, getting them fed.

4 Applying the F2SP to Morocco

The agricultural and policy atmosphere in Morocco is different from the United States and Egypt and would likely not be conducive to the successful integration of a school meals initiative like the F2SP.

In 2013, the Moroccan government requested assistance from the World Food Programme (WFP) to help fund a national school meals program specifically targeting the 70% of schools located in rural areas [25]. The WFP's Plan of Action was endorsed by the government by July 2016 and comprehensive assessments of the project are ongoing.

Morocco is subjected to irregular droughts, making agriculture highly variable [25, 26]. The inconsistency in crop production would

make it challenging for schools to depend on farms for the local procurement of their produce. The F2SP would need to be modified to instead ensure regular, fresh, and diverse produce regardless of origin.

A lack of a consistent and centralized meals program would pose a challenge to implementing the F2SP for the reasons discussed by Powell and Wittman (2018): there is a lack of consistency across school lunches and schools have little to no purchasing power to effectuate change in distribution chains for sourcing meals. Even with the availability of federal grants, Morocco's current school meals infrastructure would likely be insufficient to make use of those funds to implement and sustain a F2SP.

5 Conclusions

Currently, the World Food Programme (WFP) is leading humanitarian efforts in food aid and school nutrition around the world [27]. Both Egypt and Morocco have been beneficiaries of their aid and have seen improvements in the number of children receiving meals at school 20. In a 2020 program analysis, the WFP said the following [28]: "The largest school feeding programs in the world all rely on locally sourced food, which helps create jobs, make markets more predictable and helps establish lifelong dietary preferences for locally available fresh foods. There is a need to help low-income countries scale-up home-grown school feeding efforts as key elements of their national programs."

The F2SP is a viable option for countries with existing centralized school meals programs aiming to improve their local economies while simultaneously improving child wellness through the availability and accessibility of locally procured, varied foods. This program has shown promise in the United States and is gaining momentum because of its outcomes. With its centralized school meals system, and with support from the WFP, Egypt has the infrastructure to set up and sustain a long term F2SP that will enrich local communities, grow local economies, and support the health of the next generation.

As the WFP continues its work in Morocco, the focus should be maintained on developing a strong school meals system and addressing immediate food insecurity. The viability of such a program being implemented should be reassessed once outcomes from current hunger relief efforts become available.

This review has demonstrated that the F2SP can be an effective tool in influencing the dietary preferences of children at an early age using school gardens, increased exposure to a variety of fruits and vegetables, classroom education, and other F2SP activities. Moreover, the F2SP has shown to be an effective tool for stimulating the local economy using government purchasing power and school meal sourcing. Additional research is needed to continue to study the impacts of this program and the applicability of this program, especially as it would be applied in areas with no centralized school meals program.

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