Maximizing Nutrition and Cost-Effectiveness: Sustainable Strategies for School Feeding and Gardening for Greater Impact in Cambodian Schoolchildren

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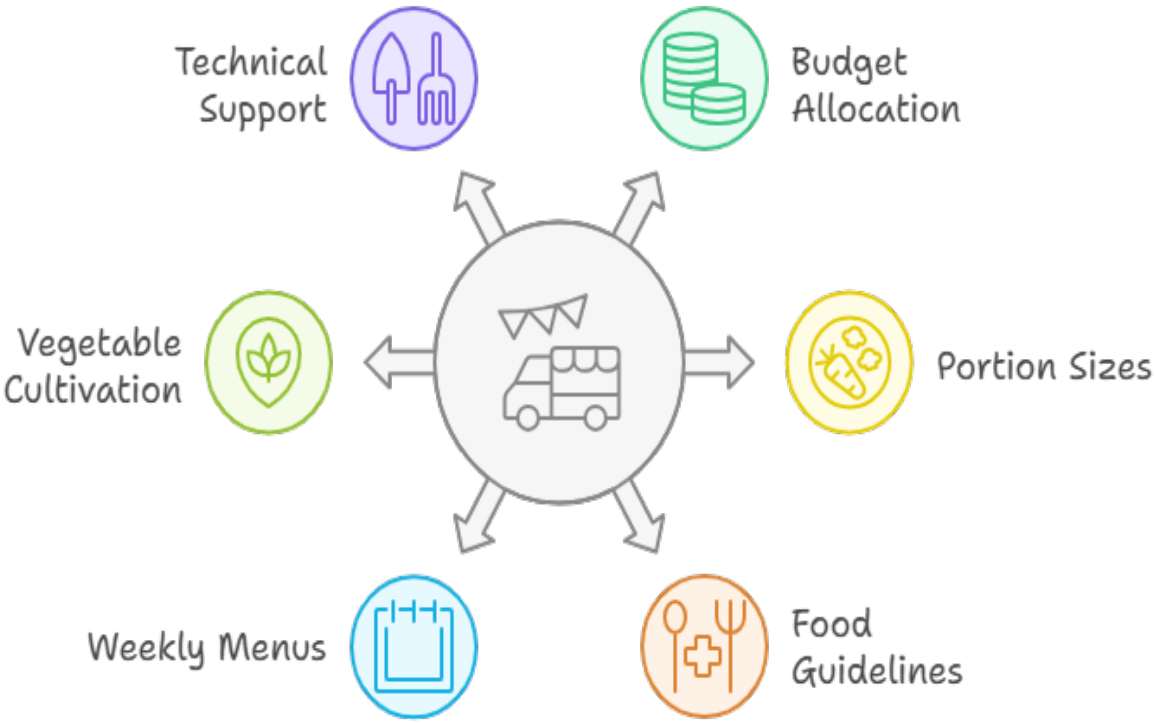

Introduction

Why is School Feeding Program Important?

School feeding programs (SFPs) in Cambodia are instrumental in addressing issues of malnutrition and enhancing educational attainment among children. Supported by both the World Food Programme (WFP) and the Cambodian government, these programs are structured to provide balanced and nutritious meals aimed at promoting physical health and cognitive development in school-age children. Despite the evident significance of SFPs – Home-gown School Feeding Program (HGSFP), they somehow face challenges in cost-efficiency, nutritional adequacy, and long-term sustainability. This brief undertakes a comparative evaluation of three major SFP models in Cambodia – state-run, WFP-run, and school-gardening programs – highlighting key findings and providing specific recommendations to optimize the impact of these initiatives.

What Does Matter in SFPs in Cambodia Context?

The effectiveness of Cambodia's school feeding programs varies significantly across the different implementation models. State-run models demonstrate cost-efficiency, averaging USD 38.9 per child per annum; however, this efficiency is often achieved at the expense of nutritional quality and meal adequacy. Conversely, the WFP-run model incurs higher operational costs (USD 55.24 per child annually), which contributes to enhanced meal quality, yet limits scalability. The school-gardening initiative, though beneficial in terms of sustainability and educational value, is comparatively costly (USD 53.08 per child annually), making it less feasible for large-scale implementation without external support.

Moreover, current SFP practices in Cambodia fail to meet essential nutritional standards. The average caloric intake per meal, at 230 kcal, is significantly below the recommended 25-30% of daily energy requirements, which could impede students' cognitive and physical development. Deficiencies in macronutrients (proteins, fats, carbohydrates) and vital micronutrients (calcium, iron, vitamins A, C, and D) further exacerbate these challenges, placing students at risk of malnutrition-related health issues such as stunted growth, anemia, and compromised immunity.

How does SFPs' Cost and Nutritional Evaluation work?

This policy brief synthesizes findings derived from a mixed-methods analysis conducted at school level across five Cambodian provinces during the 2022-2023 academic year. The methodology encompassed both quantitative and qualitative data collection that covers school-level expenditure, possibility of school-gardening, opportunities and challenges. These involves:

- Cost Analysis: Evaluation of recurring and non-recurring expenditures to determine cost per beneficiary for each model.
- Nutritional Analysis: Assessment of macronutrient and micronutrient levels in school meals.
- Comparative Analysis: A comparison of the cost-efficiency, nutritional adequacy, and sustainability across the state-run, WFP-run, and school-gardening models.
- Sensitivity Analysis: Assessment of how different scenarios affect nutritional outcomes.

Key Findings

Are the Implemented Programs Effective or Efficient Enough?

Based on the expenses, the cost drivers in the targeted schools fall heavily on recurring costs with the share of 66.94% -- consisted of food, labor, utilities, and administrative costs. Meanwhile, the non-recurring costs contributed only 33.05%. Most of the expenditures are consumed by food consumption costs, hitting approximately 57%. At the same time, the average annual cost per student reaches USD 42.10 with the average expense of USD 22.98 on food for each student annually. In overall, the two modalities could capitalize the cost-efficiency, comparing to the current budget support on food.

State-run modality exhibits the highest cost-efficiency, with an annual expenditure of approximately USD 38.9 per child, while the cost per breakfast only spends USD 0.14 compared to the current subsidy USD 0.195. This illustrates the effectiveness of the budget spending on the program, while efficiency is possibly achieved through strict budgeting and resource management, particularly in food and operational expenditure. However, the pursuit of cost-effectiveness limits access to diverse, nutrient-rich foods, likely resulting in nutritional compromises that may undermine the intended health and cognitive benefits of the program.

The WFP-managed model incurs higher costs per beneficiary, estimated at USD 55.24 annually, due to more extensive management and operational standards that include constructions and other facilities. Additionally, the cost per meal is not really far different from the state-run case with the cost of USD 0.15, making both modalities cost-effective compared to the current subsidy provided for each child. These additional expenses facilitate somehow improved meal quality to a certain point and administrative oversight, although scalability remains a constraint due to the high per-capita cost. However, the bidding process for food suppliers in all modalities often encounter constraints, where they have to bid lower than the actual subsidy on food to be able to secure the contract, resulting in concern about the food quality. This pinpoints a potential loophole in the expenditure process, where focusing much on cost-saving could even impact the nutritional quality of the meal provided to schoolchildren.

School-Gardening Initiatives model entails an annual cost of USD 53.08 per child, reflecting investments in gardening infrastructure, maintenance, and related educational resources. School-gardening provides additional benefits, such as sustainability education and potential revenue generation, but the initial and recurrent costs render it less scalable without substantial financial support. Nevertheless, produce sales (USD 600-900 annually) can help offset some expenses, enhancing the financial resilience of participating schools. Since there are advantages in this initiative, schools are willing to promote gardening with incentives and technical support.

How Does the Current Practices Affect Nutritional Outcomes?

All of the SFP models exhibit significant nutritional inadequacies, which could have serious implications for students' physical and cognitive development:

Caloric Deficiency: The meals provided through these programs roughly 230 kcal, falling short of the recommended 25-30% of daily energy intake. This caloric insufficiency may hinder students' ability to remain attentive and active throughout the school day, thereby impacting academic performance, supported by Rampersaud et al. (2005) and Adolphus et al. (2013).

Macronutrient Deficiency: The breakfast provides insufficient protein (7-8 grams), carbohydrates (≈39 grams), and fats (≈3.6 grams), compared to recommended intake levels. Macronutrient deficiencies can restrict physical growth and cognitive development, leading to long-term impacts on educational attainment.

Micronutrient Deficiency: Key micronutrients, such as calcium, iron, and vitamins A, C, and D, are inadequately represented in the meal provisions. The average levels of iron (1.2 mg) and calcium (57 mg) per breakfast fall significantly below recommended intake, exacerbating risks of anemia, stunted growth, and immune deficiencies among schoolchildren.

Supplemental Benefits of School-Gardening

School-gardening initiatives provide several auxiliary benefits that contribute to the program's sustainability and educational value:

1. **Environmental Education and Sustainable Practices:** The gardening model facilitates practical learning in environmental stewardship and sustainable agriculture, equipping students with skills relevant to food security and resource conservation.
2. **Revenue Generation:** Produce from the gardens generates additional income for schools, which can be reinvested into school operations or used to supplement the feeding program. This revenue generation contributes to the program's self-sufficiency and financial resilience.
3. **Community Engagement:** Gardening initiatives encourage participation from local communities, fostering a sense of shared responsibility and collective investment in the program's success.

How Could Policy Implementation Work in this Regard?

Though one of the three School Feeding Program modalities exhibits a cost-efficient strategy, they are more likely to fall behind the

consideration of nutritional outcomes. To ensure the effectiveness of the implementation at the school-level especially on the expenditures and nutritional consideration, the decision makers could consider:

1. **Increase Budget Allocation and Supportive Mechanism.** Enhance funding to align the average per-student budgets to approximately USD 0.26 with recommended nutritional standards, ensuring that each meal provides at least 25-30% of daily caloric and nutrient needs to maintain the better absorption of both macro and micronutrient to support physical and cognitive growth. This could involve increased government allocations or expanded partnerships with international organizations. Most Importantly, there should be a vigorously supportive mechanism on the bidding procedure by preventing the food suppliers from bidding lower than the current subsidy (USD 0.195), affecting the quality of the food and nutrients.
2. **Expand and Support School-Gardening Programs.** Offer financial incentives and technical support to foster sustainable gardening practices, with the goal of diversifying meal offerings and generating additional income. Nutrient-dense vegetables should be promoted to grow around the campus, which consist of amaranth, moringa, long-yard bean, morning glory, pumpkin, etc. There should be capitalized by other interventions which also include growing additional fruit trees that could be more beneficial to students. These fruit trees could range from papaya to banana. These interventions could provide additional nutrients to the schoolchildren. Specific technical support should be provided which includes techniques in cultivating vegetables to withstand the harsh environment or specific types of lands, initiating irrigation system for plantations, and diversifying the practices of fish feeding to ensure the availability of meat supply.
3. **Develop National Standardized Nutritional Guidelines.** Establish and enforce nutritional guidelines for meal planning across all SFPs, ensuring consistency in meal quality and adequacy, maximizing nutritional outcomes.
4. **Strengthen Multi-Sectoral Collaborations.** Deepen partnerships with governmental, non-governmental, and private-sector entities to mobilize resources, disseminate best practices, and enhance program sustainability. Meanwhile, provide autonomy for the schools to allocate resources for managing their expenses to implement the program.
5. **Implement Comprehensive Monitoring and Evaluation (M&E) Systems.** Establish M&E frameworks to systematically assess cost-effectiveness, nutritional outcomes, and the program's impact on student health and educational performance. Regular data collection will allow for data-driven policy adjustments and continuous improvement. This could be bi-monthly or semi-annual data collection to ensure robustness and seek the loopholes of the program implementation.

Conclusion

Transforming School Feeding for Sustainable Impact.

School feeding programs in Cambodia are crucial in promoting child health and educational outcomes. Addressing the inefficiencies in these programs through increased budget allocations, support for school-gardening, standardized nutrition

guidelines, and collaborative partnerships for monitoring the implementation can significantly enhance program sustainability and impact. The success of these improvements will hinge on coordinated efforts among governmental bodies, NGOs, and local communities, with the ultimate goal of ensuring all Cambodian children receive adequate nutrition and support for their educational journey.

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