

Evaluating the Physical Environment of Onsite School Feeding Programmes in Hohoe Municipality, Ghana: An Observational Cross-Sectional Study

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Abstract

Background:

School feeding programmes (SFPs) play a critical role in enhancing child nutrition, educational attainment, and social protection. However, infrastructural limitations, poor hygiene practices, and inconsistent meal quality often undermine programme effectiveness in resource-constrained settings. This study assessed the physical environment, food safety practices, and dietary diversity of meals provided under the Ghana School Feeding Programme (GSFP) in selected schools within Hohoe Municipality, Ghana.

Methods:

A cross-sectional observational study involving eleven (11) public basic schools benefiting from the GSFP was conducted from February to March 2023. Data were collected through nonintrusive structured observations via a checklist adapted from a validated tool that focused on key domains, including infrastructure, hygiene, food safety, meal diversity, and stakeholder involvement. Dietary diversity was assessed via a 10-food group classification aligned with the FAO and WFP frameworks. The data were analysed descriptively via frequencies and percentages, with thematic synthesis of field notes for contextual insights.

Results:

Most schools lacked designated dining areas and adequate seating arrangements. Only 18% had soap available for hand washing, and none provided cutlery to the pupils. Food was often served uncovered and placed on the ground, and in more than half of the schools, the utensils were not washed onsite. The observed meals predominantly featured starchy staples and pulses, with minimal inclusion of fruits, vegetables, or animal-sourced proteins. None of the documented meals achieved moderate or high dietary diversity; 37.5% of the meals were classified as very low diversity (2–3 food groups), and 62.5% were classified as low diversity (4–5 groups). Equitable portioning of protein components was inconsistent, and the active involvement of teachers in programme supervision was limited.

Conclusion:

Despite its potential, the GSFP's implementation in Hohoe Municipality faces significant gaps that threaten its nutritional impact. Infrastructural inadequacies, poor hygiene practices, low meal diversity, and minimal oversight compromise the program's effectiveness. Enhancing dietary diversity through the inclusion of affordable, locally available nutrient-dense foods (e.g., orange-fleshed sweet potatoes, mushrooms, leafy greens), improving hygiene infrastructure, and strengthening school-level monitoring mechanisms are critical to realizing the programme's full benefits. These findings provide context-specific evidence for informing GSFP improvements and offer broader lessons for school feeding initiatives in resource-limited settings.

INTRODUCTION

School feeding programmes (SFPs) are recognized globally as cost-effective interventions that address child hunger, enhance educational outcomes, and contribute to broader social protection and food system objectives (1–3). By providing regular meals to school-aged children, these programmes improve nutritional status; support cognitive development; and increase enrolment, retention, and learning achievements, particularly among vulnerable populations (4–6).

Ghana's School Feeding Programme (GSFP), established in 2005, remains a flagship social intervention aimed at alleviating short-term hunger, promoting basic school education, and stimulating local agricultural production (7). Evaluations of the GSFP have reported positive impacts on school attendance, enrolment, and dietary diversity among pupils (8,9). However, challenges such as infrastructural deficits, inconsistent meal quality, and operational inefficiencies continue to hinder its optimal implementation (10,11).

Physical infrastructure, including designated eating areas, seating arrangements, and hygiene facilities, is critical for the success of school feeding programmes. Inadequate infrastructure can compromise food safety, deter proper hygiene practices, and diminish the overall experience of meal consumption (4). Studies in Ghana and other low- and middle-income countries (LMICs) have highlighted that the absence of dining halls, kitchens, and sanitation facilities significantly affects the quality and safety of meals served in schools (12,13). Furthermore, infrastructural shortcomings may lead to unhygienic practices, such as children eating on the ground or sharing utensils without proper cleaning, thereby increasing the risk of foodborne illnesses (14).

Ensuring the nutritional adequacy of meals is another critical dimension. While the GSFP emphasizes the use of locally produced foods, limited funding and supply chain challenges often constrain menu diversity, resulting in monotonous, carbohydrate-heavy meals with insufficient protein and micronutrients (15). Global evidence indicates that balanced school meals, i.e., those rich in fruits, vegetables, and animal-source foods, significantly improve child growth, cognitive performance, and health outcomes (16,17).

Equally important is the role of health promotion and the broader food environment within and around schools. The absence of nutrition education materials and the unregulated sale of unhealthy foods near schools undermine efforts to inculcate healthy eating habits among pupils (18). Integrating behaviour change communication strategies into school feeding programmes has been shown to reinforce positive dietary behaviours and enhance programme impact (19).

Finally, the active involvement of teachers, school heads, and community stakeholders is essential for effective programme delivery. Studies have shown that when school staff and local actors are engaged in monitoring and managing feeding programmes, adherence to food safety standards improves, and issues such as inequitable food distribution are more readily addressed (20,21).

In the Hohoe Municipality of Ghana's Volta Region, public basic schools face operational challenges that mirror broader systemic issues in SFPs across many LMICs, including infrastructural inadequacies, limited resources, and inconsistent implementation fidelity. While the GSFP has been instrumental in enhancing school enrolment and addressing child hunger, critical gaps in the quality, diversity, and safety of meals persist. Understanding these operational realities is vital not only for informing national programme improvements but also for contributing to the global evidence base on how school feeding interventions can be optimized in resource-constrained settings to deliver better nutritional and educational outcomes. This study evaluated the physical environment and operational practices of school feeding programmes in selected public basic schools within Hohoe Municipality, Ghana. Specifically, we assessed the physical infrastructure, cleanliness of serving/eating areas, and adequacy of seating arrangements; examined food safety and hygiene practices, including contamination prevention and waste management; and documented the types and diversity of meals provided. Additionally, we identified the presence of promotional materials or initiatives encouraging healthy/unhealthy food consumption and evaluated the level of engagement of school heads and teachers in programme implementation.

METHODOLOGY

Study Design and Context

This study employed a cross-sectional observational design and was conducted as part of a supervised student practicum for final-year Bachelor of Public Health Nutrition students at the Fred N. Binka School of Public Health, University of Health and Allied Sciences (UHAS), Ghana. The practicum aimed to provide experiential learning in school food environment assessments while contributing to evidence on the implementation of the GSFP.

Study Area and Sampling

The study was conducted in Hohoe Municipality, which is located in the middle belt of Ghana's Volta Region, between February and March 2023. Hohoe is a predominantly peri-urban municipality characterized by a mix of urban settlements and rural communities, with schools often facing infrastructural constraints and limited resources typical of nonmetropolitan districts. While the GSFP operates nationwide, much of the existing research and programme assessments have been concentrated in urbanized regions such as Greater Accra, where implementation of the GSFP is relatively better documented (22). In contrast, operational realities in municipalities such as Hohoe remain underexplored, despite their significant program coverage and unique implementation challenges.

For this study, eleven (11) public basic schools participating in the GSFP were purposively selected in consultation with municipal education officials. Schools were chosen to ensure variation in geographic location (urban, peri-urban, and rural), enrolment size, and school type to capture a broad representation of implementation contexts within the municipality.

Data collection instrument and procedure

Data collection was conducted through nonintrusive, direct observation via a structured checklist adapted from the Measurement, Evaluation, Accountability, and Leadership Support for Noncommunicable Disease Prevention (MEALS4NCDs) project tool (23). The checklist was modified to reflect GSFP-specific operational aspects and included both structured items and space for field notes. The checklist captured seven key domains:

1. *The physical environment* (availability and condition of designated eating areas, roofing, seating arrangements),
2. *Hygiene and sanitation* (availability of water and soap, cutlery usage, and cleaning practices),
3. *Food safety* (food storage, serving practices, contamination prevention),
4. *Meal quality and quantity* (types of meals served, portion sizes),
5. *Waste management* (presence and condition of rubbish disposal systems),
6. *Nutrition promotion* (signage or posters promoting healthy/unhealthy foods),
7. *Stakeholder involvement* (participation of headteachers, teachers, and caterers during meal service).

Student researchers, working in groups of seven, conducted systematic observations of meal service activities in real time during the afternoon serving period (12:00 pm–1:00 pm) without engaging in formal interactions with school staff or caterers. The observers maintained a nonparticipatory role, recording practices as they naturally occurred, ensuring minimal interference with school routines. Observations were documented via printed checklists, and contextual notes were taken to capture environmental conditions and observable practices. No interviews or questionnaires were administered; data collection was strictly based on what was visibly observable in the school environment during visits.

Dietary Diversity Assessment

Dietary diversity was evaluated through direct observation of the meals served, following the GSFP's Menu Guide, which recommends integrating locally available staples, pulses, vegetables, fruits, and animal-source foods to achieve balanced nutrition (24,25). Each meal was assigned a dietary diversity score on the basis of the number of distinct food groups present. Dietary diversity was assessed on the basis of a 10-food group classification system, including grains, pulses, nuts/seeds, milk/dairy, meat/poultry/fish, eggs, dark green leafy vegetables, other vitamin A-rich fruits and vegetables, other vegetables, and fruits. Meals were categorized as "Very Low Diversity" (≤ 3 groups), "Low Diversity" (4–5 groups), "Moderate Diversity" (6–7 groups), or "High Diversity" (≥ 8 groups), following adapted criteria from the FAO's MDD-SAC (Food and Agriculture Organization's Minimum Dietary Diversity for School-Aged Children) and WFP (World Food Programme) School Menu Analysis Frameworks (25). Furthermore, observed meals were qualitatively compared against the GSFP-recommended menus to assess adherence and identify gaps in meal variety and nutritional adequacy.

Data analysis

Data from the observational checklists were entered into Microsoft Excel and analysed via descriptive statistics (frequencies and percentages) to summarize the school feeding environment conditions. The key variables analysed included infrastructure adequacy, the availability of hygiene facilities, food safety practices, waste management, meal types, and stakeholder involvement.

The cleanliness of serving and eating areas was evaluated via a 10-point hygiene scale adapted from the WHO Five Keys to Safer Food, UNICEF WASH in Schools Monitoring Package, and the Codex Alimentarius General Principles of Food Hygiene, with scores categorized as low (1–3 points), moderate (4–7 points), or high (8–10 points), reflecting observed levels of dirt, waste, and sanitation. Two trained observers independently scored each setting, resolving discrepancies through consensus discussions among the group members.

Narrative synthesis of field notes provided contextual insights to complement the quantitative findings, informing thematic reporting in the results section (e.g., infrastructure gaps, hygiene practices, food distribution equity, food related promotional materials).

Ethical considerations

This study involved non-intrusive, observational assessments of the physical and operational aspects of school feeding environments and did not include interviews, surveys, or the collection of any personal or sensitive data from pupils or staff. No photographs identifying students were taken. As such, formal Institutional Review Board (IRB) approval was not required. However, the study protocol was reviewed and approved by the Teaching and Learning Committee of the Fred N. Binka School of Public Health, University of Health and Allied Sciences, Ghana.

The research was conducted in compliance with the ethical principles of the Declaration of Helsinki. Administrative approval was obtained from the Ghana Education Service (GES), Hohoe Municipal Directorate, and permission was granted by headteachers of the participating schools. Since no direct interaction occurred with pupils, and no personal data were recorded, parental consent was not applicable.

Throughout the study, the ethical principles of transparency, non-intrusion, and confidentiality were upheld. Observations were strictly limited to the school feeding environment, ensuring that the privacy and dignity of all individuals were fully respected.

RESULTS

The onsite observations of the SFP in 11 public basic schools in Hohoe Municipality revealed several areas for improvement in implementation, as summarized in **Table 1**. The findings cover various aspects of the program, including the physical setup and cleanliness of eating areas, the availability of seating, the provision of eating utensils, access to hand-washing facilities, hygiene and food safety practices, waste disposal measures, meal composition, nutrition and food promotion, and the involvement of school staff in the feeding program.

Physical Infrastructure and Eating Environment

The majority of the observed schools served meals in open-air settings that were partially roofed or covered (10 out of 11 schools, ~91%), with only one school (9%) having a partially enclosed area for meal service, underscoring a general lack of dedicated dining infrastructure. The cleanliness of serving and eating areas was evaluated via a 10-point hygiene scale. On this scale, 27% of the schools were rated as having low cleanliness (1–3 points), 64% as moderate (4–7 points), and only 9% as having high cleanliness (8–10 points). These classifications reflected the presence of visible dirt or waste or poor sanitation practices. Seating arrangements were inadequate in most schools; 9 out of 11 (82%) lacked chairs or tables for pupils, leading children to stand or sit on the ground to eat. For the two schools (18%) that provided some seating, the cleanliness ratings remained only moderate, suggesting that even where infrastructure existed, upkeep and sanitation needed improvement.

Food safety and hygiene measures

In all the observed schools, pupils arrived with their bowls and cutlery. If a child forgot to bring these, they had to wait until others finished eating to borrow a bowl and spoon. Typically, such borrowed utensils are not washed before reuse, posing a potential health risk due to the spread of germs. Water for hand washing and utensil cleaning was inconsistently available at the meal serving points. Only 1 school (9%) had running water from the public supply on site, and 4 schools (36%) supplied water from large plastic tanks (*veronica* buckets or similar containers). Two schools (18%) provided clean water in buckets for washing, whereas one school (9%) had only a bucket of previously used (unclean) water available. Importantly, three schools (27%) had no water source in the eating area. Access to soap was even more limited: only 2 schools (18%) had soap available for hand washing, whereas the remaining 9 schools (82%) did not provide any soap for students to wash their hands before eating.

Hygienic practices for cleaning nondisposable utensils were generally poor. Only one school (9%) enforced washing bowls and spoons with running water and soap. Four schools (36%) rinsed their utensils with water only, without soap. The majority, 6 out of 11 schools (55%), did not conduct any utensil washing on site, meaning that children took their bowls home unwashed or reused them uncleaned. Food safety during service was also suboptimal in many cases. In approximately 4 schools (36%), the catered food was kept on an elevated surface at least one meter above the ground, as recommended. Nevertheless, the majority of schools (64%) placed food containers on or near the ground, contrary to food safety guidelines (**Figure 1**). Furthermore, none of the schools fully protected the food from flies and dust. While approximately 5 schools (45%) made partial attempts (for instance, loosely covering food containers), not a single school had comprehensive measures in place to adequately cover or shield the meals from contamination. Waste management infrastructure was limited at the feeding sites: 5 schools (45%) had a rubbish bin available where children ate, whereas 6 schools (55%) had no bin present. Even among the

schools that provided bins, only one bin was covered; the other four were open containers that were susceptible to flies and overflow. This lack of covered waste bins could attract pests and further compromise hygiene around the eating area.

Appearance of food handlers

Observations of the food handlers (caterers) revealed mixed compliance with hygiene attire. In seven of the schools (approximately 64%), the caterers were properly dressed in clean work attire, including an apron and a hair cover, while serving food to the pupils. However, in three schools (27%), the caterers wore no protective clothing apart from their everyday clothes, and no aprons, hair coverings, or gloves were used. In one school (9%), the designated caterer was not present during the serving time; instead, a teacher and a pupil took over the serving of the meal. This scenario underscored not only a lapse in the hygiene protocol (due to the absence of proper attire) but also an interruption in the caterer’s duties, as the caterer left right after offloading the food for that school day.

Table 1: Observations of key aspects of onsite school feeding program implementation

Observations	Frequency (n)
Area where meals are served	
<i>Partially enclosed</i>	1
<i>Open space</i>	10
Eating/Serving area	
<i>Partially roofed/covered</i>	10
<i>Not roofed/covered</i>	1
Cleanliness Rating of Serving/Eating Area	
<i>Low</i>	3
<i>Moderate</i>	7
<i>High</i>	1
Availability of seats/tables for eating	
<i>Yes</i>	2
<i>No</i>	9
Cleanliness rating of serving/eating seats and/or tables	
<i>Low</i>	0
<i>Moderate</i>	2
<i>High</i>	0
Provision of plates/bowls/cutlery for the children	
<i>Yes, disposable cutlery</i>	0
<i>Yes, nondisposable cutlery</i>	0
<i>No cutlery provided (pupils bring their own cutlery)</i>	11
Availability of water for washing at the serving/eating point	
<i>Yes, running water from the public supply system</i>	1
<i>Yes, running water from plastic tanks (with or without a tap)</i>	4
<i>Yes, water in buckets (clean water)</i>	2
<i>Yes, water in buckets (unclean water)</i>	1
<i>No water</i>	3
Availability of soap for hand washing at the serving/eating point	
<i>Yes</i>	2
<i>No</i>	9
Washing of nondisposable cutlery	
<i>With running water and soap</i>	1
<i>With running water only</i>	4
<i>No washing</i>	6
Food kept < 1 m from the ground	
<i>Yes</i>	4
<i>No</i>	7
Food adequately protected from flies and dust	
<i>Yes</i>	0
<i>Partially</i>	5
<i>No</i>	6
Rubbish bin available at the serving/eating site?	
<i>Yes</i>	5

No	6
State of the rubbish bin (covered, overfilled, open and overfilled, etc.)	
Covered	1
Open	4
Advertisements/signs/posts promoting healthy food consumption on site	
Yes	0
No	11
Advertisements/signs/posts promoting unhealthy food consumption on site	
Yes	0
No	11

Low (1-3): Indicates a low level of cleanliness, with the area being unclean.

Moderate (4-7): Indicates a moderate level of cleanliness, with the area being moderately unclean or slightly clean.

High (8-10): Indicates a high level of cleanliness, with the area being clean, very clean, or extremely clean.

Type, Quality, and Dietary Diversity of Meals Served

There were observed gaps in the type, quality, quantity, and diversity of meals served. While meals were culturally familiar and generally well received by students, they frequently lacked nutritional adequacy, consistency in portion sizes, and equitable distribution.

As shown in **Table 2**, meals typically revolve around staples such as *akple* with *ademe* soup (traditional cornmeal dish served with soup made with jute leaves/Egyptian spinach), *beans with gari* (beans served with roasted cassava flakes), *jollof rice* (rice cooked in a tomato-based stew/sauce), and *waakye* (rice and beans dish), accompanied by sauces such as *shito* (spicy pepper sauce), groundnut soup, or soya bean stew. Although these dishes align with local culinary traditions, they largely rely on starchy staples and pulses, with minimal inclusion of fruits, vegetables, or animal-source proteins. For example, while one school served *jollof rice* with a slice of pawpaw and a small piece of fish, this level of diversity was the exception rather than the norm.

An assessment of **dietary diversity**, using a 10-food group classification adapted from global frameworks (1,25), indicated that none of the observed meals met the threshold for “moderate” (6–7 food groups) or “high diversity” (≥8 food groups). Eight distinct meals were documented:

- **Three meals (37.5%)**, such as *beans with gari*, *beans with gari and palm oils*, and *Jollof rice*, contained only 2 to 3 food groups and were classified as **very low diversity**.
- The remaining **5 meals (62.5%)**, including *Akple with ademe soup and meat*, *Waakye with soya bean stew*, and *Jollof rice with pawpaws and fish*, contained 4 to 5 food groups categorized as **low diversity**.

Staples were present in all meals, pulses appeared in 62.5%, and dark green leafy vegetables and fruits were each observed in only 12.5% of meals. Animal-sourced foods (meat or fish) were included in 25% of the meals, but dairy and eggs were absent from all the observed servings. These patterns reflect deviations from the GSFP menu guidelines, which emphasize the inclusion of diverse food groups to meet children’s nutritional needs.

Beyond the composition of meals, notable issues related to portioning and distribution were observed. Unequal allocation of protein components, such as fish or meat, was common. Caterers often served these items selectively, leaving some pupils without, and in some cases, food ran out before all children in the queue were served, causing visible distress.

Table 2: Observed school meals and dietary diversity classification

Name of food	Grains, roots, tubers, and plantains	Pulses (beans, peas, and lentils)	Nuts and seeds	Milk and milk products	Meat, poultry, and fish	Eggs	Dark green leafy vegetables	Other vitamin A-rich fruits and vegetables	Other vegetables	Other fruits	Total Food Groups	Diversity Classification
Akple with ademe soup with meat	Yes	No	No	No	Yes	No	Yes	Yes	Yes	No	5	Low Diversity
Beans with gari	Yes	Yes	No	No	No	No	No	No	No	No	2	Very Low Diversity
Beans with gari and small palm oil	Yes	Yes	No	No	No	No	No	Yes	No	No	3	Very Low Diversity
Jollof rice	Yes	No	No	No	No	No	No	Yes	Yes	No	3	Very Low Diversity
Jollof rice with pawpaw and a tiny piece of fish	Yes	No	No	No	Yes	No	No	Yes	Yes	No	4	Low Diversity
Waakye with groundnut soup	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No	5	Low Diversity
Waakye with shito	Yes	Yes	No	No	No	No	No	Yes	Yes	No	4	Low Diversity
Waakye with soya beans stew	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No	5	Low Diversity

Teacher and head teacher involvement in supervision

Another important observation was the generally low participation of teachers and head teachers in overseeing the school feeding sessions. In 90.9% of the schools visited, no teachers or school administrators were actively monitoring the food distribution or assisting with organizing the pupils during mealtime. The serving of food and the management of the mealtime routine were left almost entirely to the caterers (and in some cases, to the pupils themselves). This lack of onsite supervision by school staff represents a gap in the program's implementation, as basic practices (such as ensuring hand washing or orderly queues) were not reinforced by teachers. Only in rare instances did school staff step in to help: as noted, one school had a teacher (and a student helper) serve the food when the caterer was unavailable.

Figure 1 provides a visual illustration of several typical scenarios observed during the program: pupils lining up with their own bowls to receive their meals, a caterer dispensing *jollof* rice to children while wearing proper attire, and, in exceptional cases, a teacher without protective gear helping to serve food. These images exemplify both the routine functioning of the feeding program and the ad hoc measures taken when standard arrangements faltered. Overall, the limited involvement of teachers and head teachers in day-to-day monitoring of the feeding program was evident, highlighting an area where greater engagement and oversight could strengthen the program's effectiveness and safety.

Availability of healthy/unhealthy food advertisements/promotion of material

None of the 11 schools had any form of posters, signs, advertisements, or educational materials promoting healthy foods or discouraging unhealthy foods on their premises. We did not observe any wall paintings, banners, or signage that encouraged fruit and vegetable consumption or any that advertised potentially unhealthy products (such as sugar-sweetened drinks) within the school environment. In summary, no onsite promotional materials related to food, either healthy or unhealthy, were present in any of the schools observed.

DISCUSSION

The findings from our observation of the onsite school feeding program revealed that GSFP meals in Hohoe, while culturally appropriate (based on local staples such as maize, rice, and cassava), lacked dietary diversity. This aligns with recent findings from other regions of Ghana: for example, It has been reported that school meals typically included only 2–3 out of 5 recommended food groups, mainly starchy staples and legumes, with fruits never included. Such monotony in the menu is of concern because diets dominated by staples provide calories but can be deficient in micronutrients (15). In sub-Saharan Africa, most school feeding programs rely heavily on grains/cereals (present in 99% of programs) and legumes (87%), whereas only a minority include nutrient-rich foods such as fruits (19% of programs) or animal protein (eggs in 15% of programs, dairy in 18%) (26). Our findings mirror this pattern: the near absence of fruits, vegetables, dairy, and animal-sourced foods in the observed GSFP meals points to gaps in meeting children's micronutrient needs. This

lack of diversity can contribute to hidden hunger (micronutrient deficiencies) even if children receive a regular meal. While the meals were culturally acceptable and made from local ingredients (an approach that can enhance program acceptability and sustainability), cultural suitability must be paired with nutritional adequacy. Without a broader range of food groups, the GSFP may fall short of its goal of providing 30% of children's daily nutritional requirements. Recent evaluations support this concern. Liguori et al. (2024) reported that despite the use of minimally processed local foods, GSFP meals often fail to meet diverse standards and provide inconsistent nutrient quality.

To improve dietary diversity and nutritional quality, practical strategies are needed. One recommendation is to integrate locally available, low-cost, nutrient-dense foods into the menus. For example, orange-fleshed sweet potato (OFSP), a vitamin A-rich biofortified crop, could be incorporated in place of or alongside white-fleshed yams and cassava. The introduction of OFSP in African communities has been shown to significantly increase vitamin A intake and improve children's vitamin A status (27). Similarly, mushrooms are an underutilized local food that could enhance GSFP meals. Ghana has indigenous edible mushrooms that are nutrient-dense, i.e., they are low in calories but relatively high in protein, B-vitamins, and minerals such as selenium. Moreover, mushrooms can be cultivated cheaply and quickly from agricultural waste, making them an economically feasible ingredient for resource-limited programs. By adding ingredients such as orange-fleshed sweet potato (OFSP) for carotenoids and energy; mushrooms for plant-based protein and micronutrients; leafy green vegetables for iron, calcium, and fibre; and legumes or eggs when available, the dietary diversity of school meals could be markedly improved. Recent studies emphasize that these kinds of locally sourced foods can enhance the nutrient profile of school lunches while keeping costs manageable. Thus, a key implication of our findings is the need to diversify GSFP menus with more fruits and vegetables and novel staples such as OFSP to provide a wider array of nutrients to children.

Beyond the menu composition, the study identified operational gaps in food hygiene and the general implementation of the GSFP. The nonintrusive observations revealed issues such as inadequate sanitary facilities (e.g., some schools lacked handwashing stations with soap) and lapses in safe food handling practices. These observations are consistent with prior assessments of GSFP operations in Ghana, which have highlighted deficiencies in hygiene infrastructure and practices. For example, a 2020 survey in Wa and Cape Coast revealed that in many GSFP schools, more than 90% of pupils did not wash their hands with soap under running water due to the lack of handwashing facilities, and a majority of school cooks had no health certificates or recent training in food safety (14). The same study's checklist showed that most kitchen staff did not strictly adhere to basic food hygiene principles, compromising the wholesomeness of the food served. Our findings in Hohoe echo these concerns that, without regular training and proper facilities, even well-intentioned school feeding staff may inadvertently expose children to health risks. These problems are not unique to Ghana; rather, they reflect systemic implementation gaps in school-feeding initiatives across many low- and middle-income countries. In fact, an evaluation by UNICEF revealed that in schools in low-income countries, only approximately 51% had access to adequate water, and 45% had adequate sanitation facilities (28), underscoring the widespread nature of WASH (Water, Sanitation, and Hygiene) shortcomings in educational settings. This suggests that improving WASH conditions in schools (e.g., installing water stations, ensuring soap availability) and providing food safety training to cooks/caterers should be high priorities. Such improvements are necessary to safeguard the health benefits of the program; otherwise, the nutritional gains from school meals could be offset by foodborne illnesses or infections. Indeed, the need for training kitchen staff on hygiene and safe food preparation has been highlighted as a crucial step in improving GSFP meal quality.

Stakeholder involvement emerged as another important factor in program performance. The GSFP is designed as a decentralized, locally operated program in which caterers (often local women) are contracted to purchase ingredients from local markets or farmers, prepare meals, and serve children. In theory, this home-grown school feeding model should stimulate the local economy and ensure community buy-in. Notably, nationally, approximately 80% of food for the GSFP is reportedly procured from local sources, supporting small-scale farmers, and the program has created thousands of jobs for local caterers (predominantly women) (29). Our observations suggest that while this model is beneficial, it also introduces variability in implementation. We noted, for example, that some schools had more active involvement from teachers in monitoring meal service and hygiene, whereas others relied solely on the caterer with minimal oversight. In cases where school stakeholders were less engaged, issues such as inequitable food distribution (some children receiving smaller portions or meals running out) were more pronounced. This aligns with broader insights from low-income country programs: strong community involvement and oversight tend to improve service delivery and sustainability. Conversely, when local monitoring is weak, problems such as favouritism in portions or mismanagement of resources can occur. It is therefore critical to strengthen stakeholder engagement in the GSFP. School management committees and parent-teacher associations (PTAs) should be empowered and encouraged to take an active role in supervising the feeding programme, for instance, by helping to enforce hygiene standards, ensuring that all children are fed fairly, and providing feedback on menu acceptance. Such community-level governance can complement official monitoring by the GSFP coordinators.

Finally, our study's findings must be interpreted in the context of national school nutrition policy and common implementation challenges in resource-limited settings. Ghana's National School Feeding Policy (enacted in 2015) and related GSFP guidelines set clear objectives for providing nutritious daily meals to pupils as a means to improve both education and health outcomes. However, implementation fidelity, the degree to which the program on the ground adheres to the policy's standards, is hindered by several systemic issues. Funding constraints are chief among these. Currently, the GSFP allocates approximately GHS 2.0 (approximately \$0.20) per child per meal, an amount widely considered insufficient given the rising costs of food. Liguori et al. (2024) noted that many caterers struggled to follow official menu plans because food item costs often exceed their budget, leading over half of them to deviate from planned recipes and resort to cheaper, repetitive meals based on staples. Our observation of inconsistent meal quality and quantity in Hohoe is likely a direct manifestation of this funding gap. Recent program reports corroborate this reality: from 2020-2021, government funding for the GSFP was not adequate to meet program targets in terms of the quantity and quality of food provided or the frequency of feeding intended. In addition to low funding levels, delays in disbursing funds to caterers have been documented, which can disrupt the procurement of ingredients and meal schedules. These financial and logistical challenges are not unique to Ghana; they are common hurdles in school feeding programs across many low- and middle-income countries. Inflation and shocks such as the COVID-19 pandemic have further strained resources. For example, pandemic-related disruptions temporarily halted school feeding and later led to reduced meal diversity and portion sizes when the program resumed on a tighter budget. All these factors underscore the significant gap that often exists between policy ambitions and on-the-ground realities in resource-limited settings. Bridging this gap will require not only increased investment but also stronger administrative capacity and accountability mechanisms to ensure that funds are used effectively and reach the school level promptly.

Moreover, adaptive strategies, such as menu flexibility to use seasonal or donated foods, are needed to cope with resource constraints without sacrificing nutritional balance.

Strengths and Limitations

This study has several strengths worth noting. This study is one of the few to provide direct observational evidence of GSFP implementation at the school level in Ghana. By using structured, nonintrusive observations across 11 schools, we were able to capture authentic day-to-day practices without significantly altering the behavior of staff or pupils. This approach enhances the validity of our findings on what children are being served and how meals are delivered. The multifaceted observation checklist (covering infrastructure, hygiene, stakeholder presence, and food diversity) allowed a comprehensive assessment of the school feeding environment. Additionally, focusing on a single municipality (Hohoe) enabled us to delve into context-specific details and variations between schools, offering a nuanced picture of program operation in that area.

However, there are important limitations to consider. First, the study's geographic scope is limited to one district, which may affect the generalizability of the results. The conditions in Hohoe Municipality (part of the Volta Region) might differ from those in other regions of Ghana, where food availability, cultural food preferences, and program administration could differ. Caution is needed in extrapolating these findings nationally. Second, our data were obtained solely through observation and document review, without interviews or surveys of the stakeholders (such as the pupils, cooks, teachers, or program officials). This means that we can only infer the reasons behind certain observations. For example, we observed low dietary diversity and could hypothesize causes such as budget limitations or a lack of nutrition knowledge, but we did not directly ask the caterers or coordinators for their perspectives. The absence of qualitative insights from those implementing and benefiting from the program is a limitation; such insights could have provided a deeper understanding (e.g., explaining why fruits were rarely served or how children felt about the meals). Third, while nonintrusive, the presence of observers might have introduced some observer effect; for instance, kitchen staff might have demonstrated better food handling practices while being watched or served slightly different portions knowing they were being evaluated. We attempted to minimize this by being as discreet as possible, but it is a potential source of bias. Finally, the study was cross-sectional, essentially providing a “snapshot” of the feeding program during the period of data collection. We did not track changes over time or across different seasons. It is possible that meal quality or diversity fluctuates throughout the school year (for instance, if certain foods are more available in the harvest season or if funding arrives intermittently). These temporal dynamics were not captured in our study. Despite these limitations, this study offers valuable real-world evidence. It highlights concrete areas for improvement in the GSFP and can serve as a baseline for future research or evaluations, ideally combining both observations and stakeholder interviews across multiple districts to build on our findings.

Conclusion

The feeding programme in the schools assessed meets important needs, delivering a daily meal, and using culturally familiar foods while creating jobs for women. However, there are key gaps in the physical and operational environment. While the GSFP provides an important social protection and educational support mechanism, the intended nutritional and health benefits may not be fully realized under current conditions. Issues such as limited dietary diversity, hygiene lapses, and inconsistent service practices pose risks to programme quality. Addressing these challenges through modest resource adjustments, routine supervision, and practical nutrition standards could strengthen programme delivery. However, as this was an observational study in selected schools, the findings should be interpreted with caution and may not represent all GSFP settings across Ghana.

Abbreviations

GSFP Ghana School Feeding Programme

WASH Water, Sanitation and Hygiene

FAO Food and Agriculture Organization (United Nations)

SFP School Feeding Programme

WFP World Food Programme

LMICs Low- and middle-income countries

MEALS4NCDs Measurement, Evaluation, Accountability, and Leadership Support for Non-Communicable Disease Prevention

FAO's MDD-SAC Food and Agriculture Organization's Minimum Dietary Diversity for School-Aged Children

IRB Institutional Review Board

GES Ghana Education Service

OFSP Orange-Fleshed Sweet Potato

UNICEF United Nations International Children's Emergency Fund

PTAs Parent-Teacher Associations

Ethics Approval and Consent to Participate

The research adhered to the ethical principles of the Declaration of Helsinki. Administrative approval was obtained from the Ghana Education Service (GES), Hohoe Municipal Directorate, and permission was granted by headteachers of the participating schools. Since no direct interaction with pupils occurred and no personal data were collected, parental consent was not applicable. Transparency, non-intrusion, and confidentiality were upheld throughout the study.

Not applicable.

The authors declare that they have no competing interests.

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P.A. conceived and designed the study and drafted the initial manuscript. J.A.S.F., M.A.A., F.T., O.A.K., C.S.A., S.S.D., E.A., M.A., M.S., B.A.M., and A.L. contributed to data collection, performed the data analysis, and assisted in manuscript preparation. P.A., S.O.A., and F.B.Z. provided overall supervision, critical input, and substantive revisions to the manuscript. All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

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11. Budgit Ghana. Feeding Futures: The Ghana's School Feeding Program Journey Through Challenges and Hope – Ghana [Internet]. 2025 [cited 2025 Aug 3]. Available from: <https://ghana.budgit.org/2025/04/10/feeding-futures-the-ghanas-school-feeding-program-journey-through-challenges-and-hope/>
12. Desalegn TA, Gebremedhin S, Stoecker BJ. Successes and challenges of the Home-grown School Feeding Program in Sidama Region, Southern Ethiopia: a qualitative study. *J Nutr Sci*. 2022;11(87):1–7.
13. Aikins Araba Ruth. Implementation Challenges Facing Ghana School Feeding Programme: A Case of Tarkwa Nsuaem Municipality. Nkrumah University of Science and Technology; 2018.
14. Bigson K, Essuman EK, Lotse CW. Food Hygiene Practices at the Ghana School Feeding Programme in Wa and Cape Coast Cities. *J Environ Public Health* [Internet]. 2020 [cited 2025 Aug 3];2020:9083716. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC7240644/>
15. Liguori J, Amevinya GS, Holdsworth M, Savy M, Laar A. Nutritional quality and diversity in Ghana's school feeding programme: a mixed-methods exploration through caterer interviews in the Greater Accra Region. *BMC Nutr* [Internet]. 2024 Dec 1 [cited 2025 Aug 3];10(1):1–11. Available from: <https://bmcnutr.biomedcentral.com/articles/10.1186/s40795-024-00936-9>
16. Cupertino A, Ginani V, Cupertino AP, Botelho RBA. School Feeding Programs: What Happens Globally? *Int J Environ Res Public Health*. 2022 Feb 1;19(4).
17. Critch JN. School nutrition: Support for providing healthy food and beverage choices in schools. Vol. 25, *Paediatrics and Child Health* (Canada). Oxford University Press; 2020. p. 33–46.
18. Senyo Amevinya G, Vandevijvere S, Kelly B, Afagbedzi SK, Aryeetey R, Adjei AP, et al. Advertising of unhealthy foods and beverages around primary and junior high schools in Ghana's most urbanized and populous region. *Front Public Health*. 2022;10(917456).
19. Mogre V, Sefogah PE, Adetunji AW, Olalekan OO, Gaa PK, Ayettey Anie HNG, et al. A school-based food and nutrition education intervention increases nutrition-related knowledge and fruit consumption among primary school children in northern Ghana. *BMC Public Health*. 2024 Dec 1;24(1).
20. Iddrisu I, Sayibu M, Zhao S, Ahmed AR, Suleiman AS. School feeding as a social protection programme or a political largesse: a review. *International Journal of Comparative Education and Development*. 2019 Feb 4;21(1):16–30.
21. World Food Programme. WFP supports the Ghana School Feeding Programme to digitize its monitoring system | World Food Programme [Internet]. 2021 [cited 2025 Aug 3]. Available from: https://www.wfp.org/news/wfp-supports-ghana-school-feeding-programme-digitize-its-monitoring-system?utm_source=chatgpt.com
22. Liguori J, Amevinya GS, Holdsworth M, Savy M, Laar A. Nutritional quality and diversity in Ghana's school feeding programme: a mixed-methods exploration through caterer interviews in the Greater Accra Region. *BMC Nutr*. 2024 Dec 1;10(1).
23. Laar A, Kelly B, Holdsworth M, Quarpong W, Aryeetey R, Amevinya GS, et al. Providing Measurement, Evaluation, Accountability, and Leadership Support (MEALS) for Noncommunicable Diseases Prevention in Ghana: Project Implementation Protocol. *Front Nutr*. 2021 Aug 18;8.
24. Food and Agriculture Organization of the United Nations. Food-based dietary guidelines - Ghana [Internet]. [cited 2025 Aug 3]. Available from: <https://www.fao.org/nutrition/education/food-dietary-guidelines/regions/countries/ghana/en/>
25. Food and Agriculture Organization of the United Nations. Minimum dietary diversity for women. Minimum dietary diversity for women. FAO; 2021.
26. Wineman A, Ekwueme MC, Bigayimpunzi L, Martin-Daihirou A, Eth EL, Etuge P, et al. School Meal Programs in Africa: Regional Results From the 2019 Global Survey of School Meal Programs. *Front Public Health*. 2022 May 26;10.
27. Low JW, Thiele G. Understanding innovation: The development and scaling of orange-fleshed sweetpotato in major African food systems. *Agric Syst* [Internet]. 2020 Mar 1 [cited 2025 Aug 3];179. Available from: <https://pubmed.ncbi.nlm.nih.gov/32127727/>
28. Adams John, Simms J., Chartier Y., Bartram J., World Health Organization . Water Sanitation and Hygiene Standards for Schools in Low-Cost Settings. World Health Organization Stylus Pub., LLC [distributor]; 2009.
29. Ghana School Feeding Programme. Major themes – School feeding [Internet]. 2021 [cited 2025 Aug 2]. Available from: <http://schoolfeeding.gov.gh/major-themes/>

Figures



A school girl with a bowl with beans



A school child with a bowl of jollof



A caterer scooping *jollof* into bowls



A caterer scooping beans into bowls



Students served with plain rice and stew



Students served with *waakye*



A teacher scooping food for children

Figure 1

Observed meal servings during GSFP implementation in Hohoe Municipality