

Comparison of Two School Feeding Programmes in Ghana, West Africa

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Abstract: *Background:* Malnutrition of children in Ghana continues during school years. There is limited information on how school meals meet nutrient recommendations in Ghana.

Objectives: The aim of this study was to compare energy and nutrient content of meals served by Ghana School Feeding Programme (GSFP) and Non-Governmental School Feeding Programme (NGSFP) and adherence to nutrient recommendations.

Methods: This was a cross sectional study design involving observation of school meals at two sites: GSFP and NGSFP. Average weights of a week's meal were converted to energy and nutrient equivalence and compared with international recommendations. Differences assessed with *t*-tests.

Results: NGSFP provided significantly higher portion size (416 ± 96 g vs. 243 ± 50 g; $p=0.007$), energy (776 ± 427 kcal vs. 315 ± 24 kcal; $p=0.042$) and fats (17 ± 8 vs. 6 ± 2 ; $p=0.019$) but similar micronutrient contributions to GSFP. NGSFP met energy and macronutrient recommendation set by World Food Programme; whereas, GSFP did not meet the recommendations.

Conclusion and Recommendations: The NGSFP had more energy and macronutrients per serving size than the GSFP. Regulation of meals served by GSFP should be reviewed to ensure they contribute to the adequacy of children's diets as well as meet recommendations set by World Food Programme.

Keywords: Malnutrition, school breakfast and lunch programmes, nutritional value, diet diversity, Ghana.

BACKGROUND

Malnutrition among school age children is a public health problem in developing countries [1]. The most commonly reported nutritional problems among school age children include underweight and micronutrient deficiencies of iron, zinc, iodine and vitamin A [1]. While nationwide data on the nutritional status of Ghanaian school age children are currently unavailable, a study in the Eastern region of the country found that 44% of the 645 rural school age children assessed were stunted and 70% of them were anaemic [2]. In Ghana 14% and 28% of preschool age children are underweight and stunted, respectively [3]. Uncorrected undernutrition in the preschool age years means that many children may be entering school with nutritional deficits [4]. School feeding programmes have been established in an effort to lessen hunger and its negative effect on the nutritional status and learning capacity of school age children [5].

Globally, the United Nations World Food Programme (WFP) has been supporting implementation of school feeding programmes [5]. School feeding programmes as an intervention contribute to improving the nutritional status of school age children by eliminating hunger in the short term. In a systematic review of school feeding programmes, improvements in weight, height especially in younger children (6-8 years), school attendance, mathematics performance, bone mineral density, arm muscle, concentrations of B-vitamins and behaviour were reported in children participating in school feeding programmes [6].

During the school age period, interventions can be targeted at children to promote catch up with growth and reduce residual effect of malnourishment occurring during the preschool age [4]. The school system is a good platform for delivery of services to improve the health and nutritional status of school children. The Ghana School Feeding Programme (GSFP) was initiated in 2005 under the New Partnership for Africa's Development, 'Home Grown' School Feeding Programme concept [7]. The goal of GSFP was to use locally produced food to feed children in order to reduce poverty and malnutrition by providing a hot

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meal to public primary and kindergarten children. In 2010, GSFP had contributed to 20-25% increase in enrollment and 90-95% increase in school attendance and retention [7].

Nutrition statistics in developing countries have focused on children under five years of age and there is limited information about school age children [8]. In Ghana, large-scale evaluation of GSFP has centred on enrolment and attendance; however, there are limited studies on how closely school feeding programmes meet World Food Programme nutritional recommendations for school age children. Therefore, the aim of this study was to evaluate two feeding programmes in Ghana: the Ghana School feeding programme (GSFP) and one run by a non-governmental organisation (NGSFP). This study compared the diet and nutritive values of meals served under GSFP and NGSFP in two neighbouring semi-rural communities in Ghana.

METHODS

The study was conducted in two public schools in neighbouring semi-rural areas and located in the La Nkwatanang Madina Municipal area of the Greater Accra region. The communities were purposively selected because they had similar geographic and socioeconomic characteristics in addition to the presence of a government-based school feeding programme (GSFP) in one community and a non-government-based school-feeding programme (NGSFP) in the other community to facilitate comparison between the two types of school feeding programmes.

Data Collection

Data were collected from January 2013 to April 2013. Meals served to school children at both school feeding programmes sites were weighed over one week period. Seven portions of each meal were weighed prior to consumption. All plates were reweighed after consumption to the nearest 1g. The average weight of each daily food sample was calculated and used in calories and other selected nutrients computation. Meals served to school children were also documented over a four week period. Informal discussions were conducted on menu with managers of catering units of both school feeding programmes. The research protocol was reviewed and approved by the Institutional Review Board (IRB) of the Noguchi Memorial Institute for Medical Research,

Accra, Ghana (Protocol Number: 012/12-13). Permission to carry out the study at the schools was obtained from Ghana Education Service Directorate at Ga-East Municipal and the heads of the schools.

Data Analysis

SPSS version 16.0 was used for data management and analysis. Dietary information was converted to energy and nutrients using the Research to Improve Infant Nutrition and Growth (RIING) Nutrient Database. The student *t*-test was used to compare selected nutrient content of meals served at both school feeding programmes. Macronutrients of school meals were compared with recommendations of World Food Programme based on 35-45% of energy intakes for energy and 30% of intakes for proteins and fats [9, 10]. Selected micronutrient recommendations were also based on 30% of dietary reference intakes set by FAO for primary school age [10, 11]. Dietary diversity scores (DDS) were also calculated using the FAO guideline [12]. Level of significance was set at $p < 0.05$.

RESULTS

Description of School Feeding Programmes

Attributes of the two types of feeding programmes assessed are summarised in Table 1. At the time of the study the NGSFP, which was inaugurated in May 2012, was managed by Prembaf, a non-governmental organisation, under its Food for the People (FFP) project. The objective of the Prembaf school feeding programme was to provide one healthy meal a day to school children as a means for increasing school attendance and performance. The cost of meal per child was 70 pesewas (\$0.36 in 2013). The programme was delivered through a well-resourced (with staff and equipment including plates and utensils for eating) kitchen and dining facility located close to school. The facility served a mid-morning meal (at 10:00 am) for younger children (from kindergarten to primary 5) and a lunch meal at 12 noon for older children (from primary level 6 to Junior Secondary School level) on school days and one non-school day, Saturdays. Usually the same meal was served for mid-morning and lunch meal times. The facility also made special provisions for children with known food allergies who could not eat the regular meal provided on any day.

Although GSFP was launched in 2005, it was started at the selected public school in January, 2012. The programme provided a mid-morning meal at a cost

Table 1: Description of Two School Feeding Programmes in Ghana, 2013

Attributes	NGSFP ¹	GSFP ²
Year of Establishment	May, 2012	January, 2012
Type of meal	Midmorning/Lunch	Midmorning
Cost of meal/child	70 pesewas (\$0.36 in 2013)	40 pesewas (\$0.21 in 2013)
Place meals are served	Dining hall	On school block veranda
Location for eating meals	Dining hall	No designated area
Type of Bowls	Standardised bowls provided	Each child brings his/her bowl except for kindergarten children who are provided with bowls

¹NGSFP Non-government School Feeding Programme.

²GSFP Ghana School Feeding Programme.

of 40 pesewas (\$0.21 in 2013) per child. The programme had four staff members who fed children in kindergarten up to Primary 6. Meals were served on a veranda and children sit anywhere on the school compound including under trees to eat the food. Whereas children in kindergarten were provided bowls for meals, others (primary 1-6) had to bring their own bowls or forfeit meal.

The menus for both sites are shown in Tables 2 and 3. Some of the meals served to the children were: tomato stew (sauce made from tomatoes, oil, pepper and onion); waakye (made of rice, beans and dried millet leaves for colour); jollof (rice cooked in tomatoes sauce); banku (fermented corn flour with cassava cooked into a thick pap); kenkey (fermented corn meal cooked into a thick pap); light soup (prepared with tomatoes, pepper, onions and eggplant; and gari eba (dried cassava flour grits soaked in hot water to

become thick pap). When the menu is compared with meals served within the 4 week period (Table 2), it can be observed that beans and gari (dried cassava flour grits with beans sauce) originally on the menu was never served. Informal discussion with the caterer in charge of GSFP indicated that seasonal variability was the main reason for not serving that meal. According to the caterer palm oil, a source of vitamin A was very expensive and will raise the cost of feeding per child more than the money the government had given to cater for school meal. However, the NGSFP manager indicated they do not have a fixed menu. The menu is prepared each week and takes into consideration seasonal availability of food.

Nutrient Content of Meals

Dietary diversity scores (DDS) for GSFP meal was 3.2 ± 0.4 and NGSFP meal was 3.2 ± 0.4 based on 9

Table 2: Original Weekly Menu Versus Actual Menu of Ghana School Feeding Programme

Day	Original Menu	Actual Menu Observed			
		Week 1	Week 2	Week 3	Week 4
Monday	Rice and Tomato stew or Palava sauce	Rice and Tomato stew anchovies ¹	Rice and Tomato stew anchovies	Rice and Tomato stew anchovies	Rice and Tomato stew anchovies
Tuesday	Waakye and Tomato stew anchovies	Waakye and Tomato stew Anchovies	Waakye and Tomato stew anchovies	Waakye and Tomato stew anchovies	Waakye and Tomato stew anchovies
Wednesday	Beans and Gari	Jollof and anchovies	Jollof and anchovies	Jollof and anchovies	Jollof and anchovies
Thursday	Banku Okra or palmut soup and dried fish	Banku Okra soup and anchovies	Jollof and anchovies	Banku Okra and anchovies	Banku and Tomato stew anchovies
Friday	Jollof and anchovies	Jollof and anchovies	Banku Okra soup and anchovies	Jollof and anchovies	Jollof and anchovies

Tomato stew is a tomato sauce (tomatoes, oil, pepper and onion); Waakye is made of rice; beans and dried millet leaves; Jollof is rice cooked in tomatoes sauce; Banku is a fermented corn flour and blended cassava (yuca); ¹for all meals, some children received 5-6 grams of anchovies, others did not receive any whole pieces.

Table 3: Menu Observed at Non-Government School Feeding Programme in Ghana

Day	Week 1	Week 2	Week 3	Week 4
Monday	Rice tomato stew and Sausage	Rice tomato stew and Sausage	Rice, tomato stew and egg	Rice, tomato stew and Sausage
Tuesday	Gari Eba, light soup and chicken	Gari Eba, light soup and chicken	Rice, tomato stew and sausage	Yam with cabbage stew and Tuna
Wednesday	Ga Kenkey, hot pepper and fried fish	No food served because of gas shortage	Banku, light soup and chicken	Ga Kenkey, hot pepper and fried fish
Thursday	Waakye, tomato stew and sausage	Rice, tomato stew and egg	Yam, cabbage stew with Tuna	Waakye, tomato stew and boiled egg
Friday	Banku, light soup and fried fish	Banku, light soup and fried fish	Gari eba, light soup and chicken	Gari eba, light soup and chicken

Tomato stew is a tomato sauce (tomatoes, oil, pepper and onion). Kenkey is a fermented corn meal; Banku is a fermented corn flour and blended cassava (yuca). Light soup is sauce prepared with tomatoes, pepper, onions and eggplant. Gari eba (dried cassava flour grits soaked in hot water to become thick pap).

food groups proposed by FAO [12]. Protein portion (anchovies) in GSFP was small. Some children in GSFP did not receive anchovies, whereas, all meals served by NGSFP had a protein portion. The energy and nutrient contents of weighed samples of food served to children in the GSFP and the NGSFP are

summarised in Tables 4 and 5. The portion size of the GSFP meal served to the school age children was significantly lower than that of the NGSFP (243 ± 50 vs. 416 ± 96 g, $p=0.007$).

The meals served to children in the NGSFP met the World Food Programme's recommendations for energy

Table 4: Nutrient Content of 5-Day Menu of School Meals of GSFP and NGSFP

	Day	Menu	Portion size (g)	Energy (kcal)	Protein (g)	Fats (g)	Iron (mg)	Zinc (mg)	Calcium (mg)	Vitamin	
										A (μ g)	C (mg)
¹ GSFP	M	Rice and Tomato stew	273	353	6.38	4.68	3.98	1.11	22.0	40.5	7.8
	T	Waakye and Tomato stew	234	302	5.87	4.58	2.78	1.11	39.2	40.5	7.8
	W	Jollof with anchovies	186	290	8.7	7.61	3.5	1.18	46.3	39.1	8.54
	R	Banku Okra Soup with anchovies	310	312	10.4	3.66	8.54	2.22	70.0	2.52	9.72
	F	Jollof and anchovies	210	319	6.3	7.77	3.55	1.07	22.3	44.1	10.3
² NGSFP	M	Rice, tomato stew and egg	370	486	11.6	9.97	5.29	1.69	45.5	110	11.7
	T	Rice, tomato stew and sausage	355	482	9.53	10.6	5.04	1.55	31.9	59.7	11.4
	W	Banku, light soup and chicken	524	783	38.4	26.3	6.78	4.44	54.8	47.3	3.5
	R	Yam, cabbage stew with Tuna	316	623	8.33	11.3	1.13	0.83	44.0	7.8	40.2
	F	Rice, tomato stew and egg	513	1507	33.5	24.6	6.87	5.43	168	44.9	31.9

¹GSFP Ghana School Feeding Programme. ²NGSFP Non-government School Feeding Programme. Tomato stew is a tomato sauce (tomatoes, oil, pepper and onion). Waakye is made of rice, beans and dried millet leaves. Jollof is rice cooked in tomatoes sauce. Banku is a fermented corn flour and blended cassava (yuca). Light soup is sauce prepared with tomatoes, pepper, onions and eggplant. Gari eba is dried cassava flour grates soaked in hot water. Days: M-Monday, T-Tuesday, W-Wednesday, R-Thursday, F-Friday.

Table 5: Energy, Macronutrient and Selected Micronutrient Content of GSFP and NGSFP Meals Compared to World Food Programme Recommendations

	¹ WFP	² GSFP	³ NGSFP	⁴ P
Portion size (g)		243 ± 50	416 ± 96	0.007
Energy (kcal)	555-830	315 ± 24	776 ± 427	0.042
Protein (g)	13.8	8 ± 2	20 ± 14	0.087
Fats (g)	10.5	6 ± 2	17 ± 8	0.019
Iron (mg)	2.4 – 3.0	4 ± 2	5 ± 2	0.717
Zinc (mg)	1.5 – 2.4	1.3 ± 0.5	3 ± 2	0.158
Calcium (mg)	240 – 390	40 ± 20	69 ± 56	0.309
Vitamin A (µg)	120 – 180	33 ± 17	54 ± 37	0.291
Vitamin C (mg)	7.5 – 13.5	9 ± 1	20 ± 16	0.155

Values are Mean ± SD: ¹WFP World Food Programme. ²GSFP Ghana School Feeding Programme. ³NGSFP Non-government School Feeding Programme. ⁴P value of <0.05 was considered significant.

and macronutrient content; however, those in the GSFP did not (Table 5). Despite the differences in portion sizes, micronutrient content of meals were not significantly different from each other and were nearly similar (Table 5).

DISCUSSION

This present study found differences in menu and nutritive value of meals at feeding sites. Whereas the GSFP had a fixed menu with one of the menu item never served during the study period, NGSFP did not have a fixed menu. In Ghana, there is not a fixed national menu for school feeding programmes [10]. Menus are prepared at each district level with the help of the Nutrition Officer from the Ghana Health Service in the district [10]. Thus menus differ from one district to the other. In other African countries such as Botswana, South Africa, Nigerian Osun State, there are similar menus nationwide or statewide [10, 13, 14]. Flexible menus that consider seasonal variability and community food sources may be ideal for meeting nutritional needs of school children. The differences in menu that was observed in this study despite both programmes being in the same district may be attributed to the differences in programme and caterers: GSFP versus NGSFP. Meals served by programmes in this study were typical of school feeding meals in Ghana in general, a carbohydrate portion which was either yam, rice, cassava or corn based meal of a stew with vegetables and a protein source [10].

Logistic support for GSFP includes kitchen for cooking, dining hall, bowls for serving meals to

children, portable water and storage facilities and latrines [15]. The GSFP as observed in our study had no dining hall but the NGSFP had a dining hall. It is surprising that even in 2013, after nearly 8 years of implementing the GSFP (School feeding programme at the study site was started in January 2012), the school did not have a dining hall. Two studies in Ghana found schools did not have logistic support [15, 16]. Additionally, Sulemana and colleagues reported irregular meetings of implementing committees and sporadic payment of cooks [16].

There are limited studies comparing nutrient content of meals served by GSFP to WFP recommendations. The mean energy content of meals served by GSFP in three schools participating in programme at Ashanti Region was reported to be 460.4 ± 30.1 kcal [17] which was higher than what was observed in the present study (315 ± 24 kcal). Similarly, Danquah and colleagues also found that GSFP meals did not meet any of the energy and macronutrient requirements that have been set by WHO and FAO, this was also observed in our study. In a review of nutritional value of school meals in Accra using linear modeling based on price of food ingredients, it was reported that energy was 534.48 ± 94.39 kcal, proteins 11.03 ± 4.38 g, fats 19.95 ± 6.02 g, iron 3.38 ± 2.67 mg and vitamin A was 15.42 ± 18.19 µg [18]. Parish and Gelli [18] found a higher energy content than the present study and met proteins contributions of children. We need to keep in mind the analyses were based on yearly prices of food ingredients; whereas, the current study weighed what was actually on the plate of school children. The energy content of meals served to primary pupils in Osun state of Nigeria was higher than meals served

under the Ghana School Feeding Programme (772 ± 129 kcal vs. 315 ± 24 kcal) in the present study but similar to NGSFP (772 ± 129 kcal vs. 776 ± 427 kcal).

There were no significant differences between micronutrient content of NGSFP and GSFP. This was quite surprising considering the vast difference in portion size of meals served by the two programmes. Similar mean dietary diversity scores (3.2 ± 0.4) and food groups may account for the non-significant differences in micronutrients. WFP recommends that school meals should contain at least four food groups or multi-fortified foods to stabilise or reduce undernutrition among school children [19]. Despite the non-significant differences between micronutrient content of these meals, iron and zinc contents were nearly within limits for recommendations [11]. Calcium and vitamin A contents were fairly lower than a minimum requirement of 30% for all school feeding programmes. Vitamin A and iron content has been found to be very low in school feeding meals in Ghana [18]. Similarly, micronutrients such as vitamin C, iron, zinc and calcium have been found to be lower than 30% of nutrient requirement of children in Osun state of Nigeria [20]. Osun [14] found zinc content of school meals in Nigeria to be lower than 30% of children's intake. Even in South Africa that most schools (9 out of 10 involved in the study) supplied a higher energy than what was observed in the Ghana study, micronutrient content of zinc and iron were not much different [13]. The GSFP is doing its best to meet nutritional needs of school children with limited resources; however, there still needs to be improvement in the both macronutrients and micronutrients supplied to children to ensure adequacy.

CONCLUSION

To the best of our knowledge, this was the first study in Ghana that examined two feeding-schemes in Ghana, NGSFP and GSFP. The study has another strength of using actual meals served and eaten by school children in nutrient analysis; however, school menus may not always be followed due to seasonal variability of some food commodities. The sample of two schools, one each for the programme in a single District in Greater Accra Region of Ghana limits the generalisability of information to all feeding programmes in Ghana. Albeit, these programmes are similar in the southern regions since they do not receive WFP support.

RECOMMENDATIONS

Further research should focus on assessing nutrient content of menus in a calendar year to ascertain effects of seasonal availability on nutrient content of meals and explore the relationship between less leftovers and quantity of meals served. Recommendations of energy content of school meals is set at 30-45 % of dietary intakes for school children. Meals provided by GSFP did not meet any of the macronutrients recommendations set by World Food Programme, NGSFP on the other hand met these recommendations. It is essential to review the quantity of meals served by GSFP so as to ensure adequacy of diets. Efforts such as increasing the funding of GSFP meals may be necessary in order to provide quantity and quality meals which meet the calorie and nutrient needs of growing children.

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