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Evaluation of acquisition and storage of food under the Ghana school feeding programme in the Wa and Cape Coast cities

Kate Bigson [1,2*], Edward Ken Essuman [3], Gifty Serwaa Otoo [4], John Nsor-Atindana [3]

[1] *Department of Home Economics Education, University of Education, Winneba, Ghana.*
[2] *Department of Catering, Hotel and Institutional Management, Wa Polytechnic, Wa, Ghana.*
[3] *Department of Nutrition and Dietetics, University of Health and Allied Sciences, Ho, Ghana.*
[4] *Department of Agricultural Engineering, University of Cape Coast, Ghana.*

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ABSTRACT

This research was designed to evaluate how foodstuffs are acquired and stored prior to meal preparation under the Ghana School Feeding Program in Wa and Cape Coast schools. A cross-sectional and descriptive survey research design was used in the study. A purposive and simple random sampling technique was employed in selecting 120 participants computed with Graph pad prism version 16, statistical software. Information was obtained using questionnaire, observation and unstructured interview instruments. Data were analysed using Statistical Package for Social Science software version 22. Findings revealed that most schools did not have food storage places. This situation may force kitchen staff to keep the food ingredients in their homes and bring them when they need. Kitchens were mostly shed and firewood was mostly used as cooking fuel. It was observed that some of the caterers bought some food ingredients from hawkers who found their ways to the school compounds. Almost all the kitchen staff (97.3% for Wa and 100.0% for Cape Coast) buy from the open market and not the farm gate. This has resulted in food insecurity in some of the regions. Owing to the findings, it was recommended that government should enact policies for all caterers to buy directly from the farm gate at cheaper prices; designated and well-built kitchens, as well as dining rooms, be provided for schools.

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1. Introduction

School Feeding Program (SFP) positively impacts nutritional status and consequently, the cognition of school children (1). It is also claimed to alleviate hunger and poverty in regions where the program has been successfully instituted (2). In Ghana, the implementation of the program is however entwined with many challenges, denying the nation the full benefit that comes with the program. Among the challenges are foodstuff acquisition, process and storage of the food by many of the involved schools.

To eliminate extreme poverty and hunger in line with World Health Organization´s demand on member countries of the United Nations, the SFP proposed that the food ingredients be purchased directly from subsistent farmers at their farm gates by the involved schools (3). The aim was to provide a direct market for the farmers' produce, eliminating middlemen who control prices and flow of the food ingredients in the marketplaces and keeping food ingredients prices high. Therefore, by eliminating the middlemen, prices of foodstuff were expected to drop and accessibility increased. This has become necessary because, a report

* Corresponding author. Tel.: +233 244174639
E-mail address: katedjbigson@gmail.com

by Send Ghana and Netherlands Development Agency (SNV) in Ghana 2008 reported that, food for the GSFP was not purchased from farmers within the communities in which the schools are situated (4).

Furthermore, most of the schools benefiting from the SFP do not have enough facilities to store their food products especially when food is in season (5). The few facilities are also not in good condition to facilitate proper storage. Reports reveal that poor storage of the foodstuff leads to unsafe food products with contamination from biological, chemical or physical hazards. According to Tamplin (6) to ensure food safety, one must establish standards that focus on controlling time and temperature, practice good personal hygiene, maintain a sanitary facility, prevent cross-contamination and purchase food products from approved suppliers.

The research was undertaken to provide information to the key stakeholders to support schools benefiting from the GSFP with improved technology to help perverse the quality of food in storage. The choice of schools for the study was based on Ghana Statistical Service (7) data that points to the three northern regions (Upper East, Upper West and Northern Regions) and the Central Region as the poorest regions in Ghana. The aim of this study was to evaluate how food ingredients are acquired and stored for meal preparation to feed school going children in Wa and Cape Coast.

2. Materials and methods

2.1. Study area

The study was conducted in two major capital towns, Wa and Cape Coast in the Upper West and Central Region of Ghana respectively (Figure 1). According to the Ghana Statistical Service (7), the total population of the Wa Municipality is 98,675 with the Wa town totaling 66,441. The growth rate of the Wa Municipality varies between 2.7% for rural and 4% for the urban. The major economic activity of the region is agriculture. A report by the Ghana Statistical Service (7) reveals 118,106 to be the population of the Cape Coast Metropolis. Majority (60%) of the people are farmers and fishermen accounting for approximately 18,000 being in agriculture with 0.3% being commercial farmers and the remaining 99.7% being peasant farmers (7). The Cape Coast Metro has its market located in the town though other smaller markets exist in most communities like Abura and Efutu.

2.2. Study population

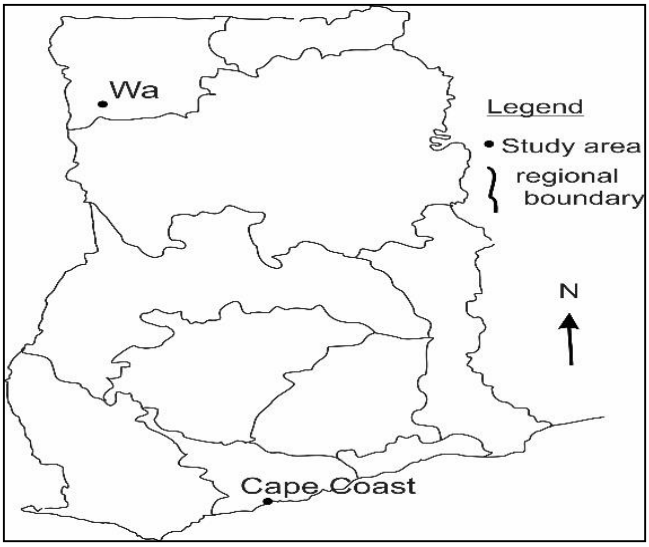

Figure 1. Map of Ghana showing the study areas

The target population included teachers and kitchen staffs found within schools benefitting from GSFP in the Wa Municipality and Cape Coast Metropolis. There are 14 schools under the school feeding program in Cape Coast. Each school had an average of 300 students. Also, the Wa Municipality had 68 schools participating in the Ghana School Feeding Program (GSFP) with an average population of 300 pupils in a school.

2.3. Sample Size

A total of 120 respondents participated in the study. This sample size was computed using Graph Pad Prism Version 16, statistical software. It used the following parameters: standard normal variance (at 5% type 1 error; $P < 0.05$), a critical z-score of 1.96% and at 1% type 1 error ($P < 0.01$) with 95%±2.58 confidence interval.

2.4. Study design

In this study, the researchers employed descriptive and survey designs. This approach is termed the mixed method which, according to Johnson and Onwuegbuzie (8), involves collection and analysis of numerical and narrative data to address research question(s) defined for a particular research study that otherwise could not be fully answered with either quantitative or qualitative designs. In the method, both quantitative and qualitative research approaches complement each other to fully answer a complex question (9). Descriptive (observational) and cross-sectional surveys were adopted to identify the existence

and extent of disparity that might be in the GSFP in the Wa and Cape Coast metropolitan schools.

2.5 Sampling Techniques, Instrumentation and Analysis.

Non-probability sampling using purposive sampling was employed to identify public schools benefitting from the GSFP in both Wa and Cape Coast. Probability sampling using simple random sampling method was used to select 12 schools out of the 68 schools under the School Feeding Program from Wa while 8 out of 14 schools were selected from the Cape Coast School Feeding Program.

A pre-tested standardized validated questionnaire consisting of closed-ended questions (comprising of where food ingredients were purchased, how they were treated and stored) with multiple choice answers and open-ended questions was used to solicit information on conditions under which food ingredients are purchased and stored. The food ingredients were grouped into animal products; legumes, nuts and oily seed; fruits and vegetables; cereals and grains; starchy roots and plantain; and fats and oils. To test the reliability of the data collection instruments used in this study, a pilot was carried out in two schools around Winneba with similar features and also benefitting from GSFP. These pilot-test respondents did not form part of the final sample used. An unstructured observational guide was developed to ascertain the fact about the responses that were given by the respondents. This was done by observing and following up to where they buy the food ingredients and how these food ingredients were stored and processed. The observational guide was non-interventional in nature. Data were analysed using Statistical Package for Social Science software version 22 (10). The interpretation of the data was done using frequencies, percentages, graphs and descriptive analysis of the information gathered.

3. Results

3.1. Procurement of food ingredients under the GSFP in Wa and Cape Coast schools

Table 1 represents the sources where ingredients were obtained for meal preparation for GSFP in Wa and Cape Coast schools. It was revealed from the kitchen staff that the ingredients were obtained mostly from both open market places and local farmers in both Wa and Cape Coast. In Wa, 97% of the staff indicated that they procured their food ingredients from the open market while 3% were purchased from the local farmers.

3.2. Observation on how food ingredients were secured.

Table 1. Sources of procurement of ingredients used in meal preparation from kitchen staff's point of view

Sources of ingredients	Wa		Cape Coast	
	Yes (%)	No (%)	Yes (%)	No (%)
Open market	97.3	2.7	100.0	0.0
Local farmers	2.7	97.3	0.0	100.0
Total	100.0	100.0	100.0	100.0

It was observed that some of the caterers bought some ingredients from hawkers who found their ways to the school compounds. An interview with some caterers in both Wa and Cape Coast municipal schools revealed that the farmers increased the prices of their goods if they knew they were caterers from GSFP. Caterers alleged that the farmers thought the government had given out huge sums of monies to the caterers for the purchases and thus could afford more expensive food ingredients, hence the increased in prices. Again, an interview with some of the Head Teachers at two schools in Wa also revealed that the government sometimes supplied the caterers with local rice, canned tomatoes, cooking oils, and iodized salts on credit basis, payable within 3 months' period. Storage of food ingredients under the GSFP in Wa and Cape Coast schools

Table 2 shows where the ingredients are kept in the schools when brought from the market before supplying to the kitchens. Majority of the respondents (85%) in Wa indicated that the ingredients were stored in sacks and put inside aluminum basins or on wood on the floor of storerooms. In Cape Coast, 75% of the respondents store the food ingredients in roofed store with pallet.

Table 2. Ways of storing food ingredients in schools before they are supplied to the kitchen in both schools

Ways of storing food ingredients	Wa %		Cape Coast %	
	Yes	No	Yes	No
Roofed store with pallet	6	94	75	25
Roofed store without pallet	3	97	8	92
On tables in the store rooms	3	97	8	92
Kitchen cupboards in the store room	3	97	4	96
In sacks or basin or wood or on the floor of the store room	85	15	25	75

3.3. Observation at the storerooms

Some of the storerooms were not accessible to the researchers and some were non-existent. The reasons given by some caterers for their inability to show the storerooms to the researchers were that they had to rent rooms in town to store the food ingredients. Others had to use their own house because separate storage rooms

had not been built for the caterers. These situations were observed in both Cape Coast and Wa schools. 3.4. Observation at the kitchens.

All the schools (12) visited in Wa municipal, either cooked in the open or under sheds because their kitchens were too small. The kitchen staff also used firewood to cook and thus could not work in restricted environments like their small kitchens where smoke could be trapped. Eight schools out of 12 had kitchen while four did not have kitchens. In this circumstance, all the schools in Wa cooked in the open. In Cape Coast, six schools had kitchens and two schools had no kitchens. For the six schools with kitchen, they also sometimes cooked under sheds likewise the other two that did not have kitchens.

3.5. Cooking fuel

All the schools (12) visited in Wa used firewood as fuel for cooking. An interview with some of the pupils in three schools revealed that the school authorities asked each pupil to come to school with some firewood each week. In Cape Coast, 4 schools used gas and charcoal while the other 4 used both charcoal and firewood.

3.6. Length of time for food storage

All the respondents (100.0%) reported that fresh ingredients including pepper and green leaves were stored for less than one week. However, 77.8 and 50.0% of the respondents in Wa and Cape Coast respectively reported that the dry ingredients were stored for 4 weeks and above (Table 3).

Table 3. Number of weeks food ingredients stayed in storage before being used to prepare food

Storage duration (weeks)	Wa Municipal		Cape Coast Municipal	
	Fresh food ingredients (%)	Dry food ingredients (%)	Fresh ingredients (%)	Dry food ingredients (%)
1	100.0	0.0	100.0	0.0
2	0.0	8.3	0.0	16.6
3	0.0	13.9	0.0	33.4
4 and above	0.0	77.8	0.0	50.0
Total	**100.0**	**100.0**	**100.0**	**100.0**

Ways by which food ingredients are treated to extend shelf life

An interview with one of the caterers in Wa revealed that she stored her beans in sold chemically sprayed sacks for three months and over without sun drying them. Figure 2 depicts how ingredients are treated prior to being used for meals preparation. In the case of the fresh ingredients, 83% of the kitchen staff in Wa stated that no chemical or physical treatment was performed on fresh ingredients besides being washed with clean water and 17% indicated there was periodic drying of the fresh vegetables. While in Cape Coast metro schools, 100% of the respondents stated that there was no treatment of the fresh ingredients besides washing with clean water.

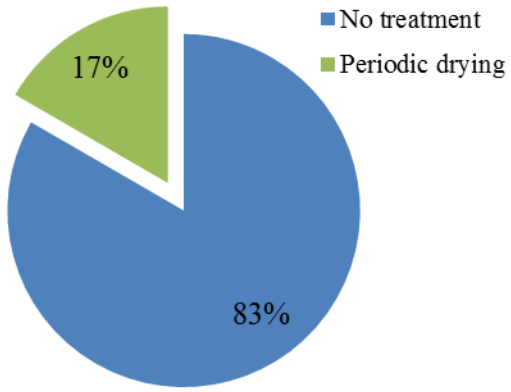

Figure 2. Ways by which fresh ingredients are treated to extend shelf life in Wa Municipal schools.

In the case of the dry ingredients, 61% of the respondents in Wa indicated a periodic drying of the ingredients while 28% said there was no treatment at all. Five percent (5%) and 6% of the respondents indicated that there were periodic spraying and regular sweeping of the storage places respectively (Table 4). In Cape Coast metro schools, 50% of the respondents stated that there was no treatment at all while 42% said there was a periodic drying, and 8% indicated that there was a regular sweeping of the storage room to keep the food ingredients safe from insects and pests during storage. Canned tomatoes were not treated like other raw food ingredients because they were already preserved in a can.

Table 4. Ways by which dry food ingredients were treated in both schools to extend shelf life

Dry food ingredients	Wa Municipal (%)	Cape Coast Municipal (%)
No treatment	28	50
Periodic spraying	5	-
Periodic drying	61	42
Regular cleaning	6	8
Total	**100**	**100**

4. Discussion

4.1.Conditions under which food ingredients of the GSFP were procured and stored in Wa and Cape in Coast schools.

The Millennium Development Goals (MDGs) aimed at achieving poverty reduction and improving academic enrolment through the provision of energy and nutrient-dense meals to SAC using locally grown foods which meant that the food ingredients ought to be cheaper and of higher quality in terms of nutrients and energy. To acquire this, required that the ingredients be bought at farm gates at lower costs rather than in the open markets where they are more expensive. The research findings, however, revealed that the food ingredients were not bought from the farm gate and therefore were more expensive. This defeated the MDG goal upon which the GSFP was built to provide a ready market for the local farmers in the municipality (11). Again, contrary to expectations that the food ingredients used in the feeding program be bought from local farmers, the bulk of food ingredients in both Wa and Cape Coast schools were bought from the open/local markets in and outside the various districts.

Although in some cases certain ingredients for the program were not locally available or produced in sufficient quantities, the program failed to buy from farmers in cases even when food ingredients were available. This attitude defeated one of the intended goals of the GSFP program (12) which was to directly provide a market for the farm produce to eliminate middlemen. The purchasing of processed and imported items also defeats one of the purposes for which the GSFP was instituted, which was to access fresh products from the local farmers. Buying from the market and not the farm gate is as a result of food insecurity in the Northern Regions of Ghana leading to unstable food production according to FAO (13).

Storage of food ingredients are not just kept, but in the most appropriate conditions for maximum retention of both quality and quantity (14). In Wa, dry ingredients like beans, rice, and dried okro were stored in sacks or basins or on wood on the floor in stores. In Cape Coast, the dry ingredients were stored on roofed stores with a pallet. In the case of fresh vegetables, they got spoiled in a few days due to lack of proper storage facilities in both Wa and Cape Coast. How and where they are stored affects food quality and safety. When foods are stored improperly and not used on time, quality and safety will suffer. Poor storage practices can cause food to spoil quickly, with potentially serious results (15). Not having enough storage facilities may also force some of the kitchen staff to keep the food ingredients bought in their home and bring them when the need arises. Even though in numerous decentralized home-grown school feeding (HGSF) programs, execution of the program is assigned to mostly the local government (as seen in Ghana and other neighboring countries) or to individual school as in Nigeria and Thailand, the issue of essential framework necessities, such as kitchen sheds, stores for food ingredients and utensils stills continue (5).

Generally, post-harvest losses of vitamin C are very high in green leaves a few days after harvest. Vitamins A and C were easily destroyed when sun-dried and this is a method of preservation commonly used in both Wa and Cape Coast. Nevertheless, only substantial quantities of both vitamins are lost if kept at room temperature (16). Kotschevar (17) posits that every facility has a wide variety of products that needs to be stored. Some he said may be stored for a few hours and others may be in storage for several weeks. In any case, herbs are as a rule subjected to drying and can be stored for a longer period. Drying too has the advantage of decreasing the weight of the product thereby reducing transportation and storage cost which are decided by item weight (18). Longree (19) opines that storerooms for dry foods should be clean and dry. Dry foods have a long shelve life if held in the right conditions. Moisture and heat are the biggest problems in the storeroom. Dry foods should be stored at least six inches off the floor away from walls and out of direct sunlight. Foods should be stored on shelves in their original packages whenever possible. Storerooms should be well ventilated.

Other methods such as periodic chemical spraying of sacks were also used in Wa, but this posed health risks to consumers. However, in Cape Coast, no chemical spraying was used by the kitchen staff who rather applied periodic drying and regular sweeping. All the same, cereal grains are invariably sprayed with insecticides for storage in bulk silos after harvest to reduce losses during storage for 1 year or more at ambient temperature (20). In situations where chemicals are used in treating dried ingredient, washing the ingredients with plenty of water before processing and consumptions remove any residues of pesticides or insecticides. According to Yuan et al. (21) washing is the most effective means of removing pesticides residues and minimizing dietary intakes from fresh food ingredients.

5. Conclusion

Failure of the school feeding programme not acquiring food ingre dients from the farmers will go a long way to hinder the direct market to the farmers produce and promote middlemen's business thereby affecting the price of produce. Inadequate and or good

storage facilities to store the food ingredients can leads to unsafe food products with contamination from biological, chemical or physical hazards. It is therefore recommended that government enact policies for all caterers to buy directly from the farm gate where prices are relatively cheap and that proper storerooms are built for each school under the GSFP.

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Conflict of interest

There is no conflict of interest among the authors.

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