

FOOD WASTE MANAGEMENT PRACTICES: EVIDENCE FROM SENIOR HIGH SCHOOLS IN KUMASI METROPOLIS

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ABSTRACT

Food wastage establishes a critical offer of which about 33% of food produced is squandered internationally. Measures to diminish food squander have turned into a point of convergence of interest as food squander is a critical boundary to manageability. Continuation of this, food waste management practices in schools ranging from planning the meals to the serving of the food are imperative. This paper investigates the food waste management practices in the kitchens and dining halls of a few chosen second cycle institutions. The study sampled three matrons and cooks from each of the selected second-cycle schools. Qualitative data were collected through participant observation and interview with respondents sampled from Senior High Schools within the Kumasi Metropolis. Results of the study reveal a notable highlight on food waste reduction measures. The study concluded that preparation of food at the school's kitchen take into consideration the student population in order to reduce unserved foods and consequent plate waste.

Key words: Food waste, food waste management practices, Senior High Schools, dining halls, cooks, matrons, Ghana

1 INTRODUCTION

Food that is squandered adversely affects foodservice tasks as it brings about loss of income due to the extra expenses one would incur in purchasing other food stuff not planned for. Once more, the monetary effect of food squander achieves unnecessary strain and request on any of the areas of the food of production service (Buzby et al., 2011). As per research by Parfit et al.,

(2013), "920,000 tons of food is squandered in the UK every year, with 75% sorted as 'avoidable,' and a huge concern in regard to food service at the different institutions." Gunders (2012) recommends that an incredible amount of food is wasted among organisations like schools and hospitals. This means that eliminating food waste in institutional cafeterias is more important than in households. The enormity of food waste concerns has prompted many more institutions and fraternities to address waste issues. A few driving associations such as the European Union Association and the US Branch of Agriculture (USDA) are altogether zeroing in on decreasing food wastage in institutions (European Association, 2016; Refed, 2016).

The European Association gave a recommendation that characterized measures to forestall food squander, share best practices and assess progress over the long run (European Association, 2016). The USDA brought to pass the scattering of best practices pointed toward diminishing food wastage. At long last, it has been shown that diminishing food squander is basic to fostering a reasonable food framework with negligible financial, social, and ecological outcomes (Goebel et al., 2015). As per Starovoytova and Namango (2018), a huge level of food squander (37%) occurs in Kenyan colleges, which is ascribed to the way that meals offered to school children are modest and copious. As indicated by their discoveries, students' devour enormous servings of food at plates and waste most of it. They proceeded to say that the situation requires a change in conduct. Food squander is regularly the aftereffect of different practices that are done over the long run, as indicated by Quested et al., (2013), and this intricacy of conduct at various time-frames improves the probability of waste. The Gourmet experts for Change Ghana Establishment (CFCG) report uncovered that more than 45% of food in Ghana goes uneaten (Ghana Web, 2017).

At the point when food is delivered and not devoured, impacts adversely on the climate and costs money. Meanwhile, the accessibility of food has become an issue for people leaving in poor families, and those who cannot afford a three square meal a day, yet portions of food served to the second-cycle schools go waste and are discarded. With the presentation of President Nana Addo Dankwa Akuffo Addo's Administration (fourth Republic of Ghana) Free Senior Secondary School Strategy, it is normal that students enrolment at schools will keep on rising every year, and to sufficiently take care of the students populace, it is important to evaluate the variables related with secondary school students' on food wastage conduct. Changing human conduct is turning out to be progressively significant in review, with an accentuation on better arrangement why food is squandered, especially among Senior Secondary School students. People's mentalities are communicated to be affected by the standards of the general public (Tarkianen and Sundqvist, 2005). As of now, Ghana's approach on free senior secondary school training furnishes students with free instruction, just as free nourishment for boarding students. The Free Senior Secondary School strategy expects to build enrolment, work on quality through scholarly achievement, and, in particular, free guardians from the monetary weight of paying their youngsters' school educational cost. Senior Secondary School education in Ghana keeps going three years and it is for people between ages 14 to 18. There are 863 (562 public and private 301) Senior Secondary Schools in Ghana (Ghana Education Service, 2016). The Ashanti region has

134 government funded schools out of which 13 schools are inside the Kumasi Metropolis (Ghana Education Service, Ashanti Region, 2020). Very much like other maintainable issues, 'the utilization of innovative arrangements alone will not do the work, an adjustment of conduct and culture is central for the accomplishment of any significant change (Redman and Redman, 2014). There is a need to bring issues to light and advance a feeling of culpability to assist with diminishing food squander (Miroso et al., 2016).

This study pointed towards recognising the prescribed procedures and measures for forestalling food squander at the kitchen and purchaser level in the in the dining halls of second-cycle schools in the Kumasi Metropolis, Ghana. The building up interventions or effective management practices need not only be regarded as the answers to schools' cafeteria food waste but also an understanding of what measures to apply to inspire institutions to reduce wastage of foods.

2 LITERATURE REVIEW

2.1 Food waste management practices

The foodservice business faces significant maintainability issues with regard to food squander control. Most undertakings pointed toward diminishing food squander will generally zero in on changing individuals' conduct all through the cooking system, utilization, and waste management (Lundie and Peters, 2005) or raising their familiarity with more nutritious eating regimens, which are likewise connected to less waste (Tagtow, et al., 2015). Food squander aversion, as per FAO (2013), limits the utilization of regular assets in food production. Most fundamentally, lessening food squander diminishes the possibly negative natural and monetary impacts of waste removal. Verona Region in Italy and Last-Minute Market (LMM), an auxiliary of the College of Bologna, directed a review on food squander decrease in schools that exhibited the recuperation and conveyance of unserved meals that were impeccably fit for eating to low-pay areas of the populace. The LLM idea was fixated on the recuperation of deserted fit for human utilization dinners rather than the counteraction of food squander (Segr et al., 2010). The literature on food squander in school cafeterias and canteens is extremely uncommon, as per Lagorio et al., (2018). In any case, certain exploration has moved toward this issue in the past from a scope of perspectives, introducing different answers for food squander decrease. Li et al., (2016), for instance, propose the change of food into energy through biofuels or biogas. Assuming there could be no alternate method for involving the nourishment for human utilization, in any case, this technique can be utilized. At the point when food leftovers from school canteens might be reused, changing them over to energy turns into a less engaging other option.

Jungbluth et al., (2016) and Toth et al. (2017) investigated foodservice purchasing activities. They observed that people who consume foods are not the ones in particular who waste food but food preparation staff who have received no training can bring about huge food wastage in the

cause of discharging their duties. By focusing harder on food preparation and preservation strategies, food waste can be diminished by 10%' (Toth et al., 2017). Food quality, purchaser menu decisions, and waste can be generally impacted by past periods of the food creation process (like natural substance and provider determination, planning, and capacity) (Jungbluth et al., 2016). A few examinations recommend various remedies, including bringing down serving sizes and focusing on the substance and visual structure and presentation of menus and dishes (Rodriguez et al., 2015) and (Martins et al., 2014). Silvennoinen, et al., (2015) led research on different Swedish catering firms that give cafeteria services in schools. Their examination prompts diminishing self-service and buffet choices and zeroing in additional on students food waste and nutrition training. Byker et al. (2014) explored leftover foods at an American school cafeteria on this last issue. Food wastage has expanded since the presentation of another guideline for food service industries requiring the consideration of a more prominent number of nutritious dinners, as per their exploration. Thus, students should be shown the need of eating a nutritious eating regimen. School canteen in the Italian town of Brusapoto is dependent upon tough guidelines, both as far as the quantity of bits to serve and the menu structures (Lagorio et al., 2018). These principles were set up to guarantee that meals were significant, nutritious, and enduring (with specific consideration on serving occasional and privately created food). In their journey to diminish food squander, Falasconi et al. (2015) proposed lessening snacks ate during diversion, though Bonomi et al., (2016) propose re-utilizing prepared however not-served food to help poor families with the association of a gathering of partners working in the field, like students and their families, instructors, public specialists, non-administrative associations, and caterers.

As per Lagorio et al., (2018), the literature on food waste in school canteens is genuinely scant; regardless, certain exploration has handled this subject in the past from an assortment of viewpoints, exhibiting different procedures for food squander decrease. One strategy proposed by Li et al. (2016) is to change food into energy utilizing biofuels or biogas. In any case, assuming there is no elective method for using the nourishment for human utilization, this procedure can be utilized. At the point when food extras from school bottles might be reused, changing them over to energy turns into a less engaging other option.

2.2 Impacts of Food Waste on the Environment

Papargyropoulou et al., (2014 and WRAP (2011) affirmed that 'When food is discarded, every one of the assets important to deliver it, like energy, water, and labour, are additionally discarded'. Food that is wasted towards the finish of the chain has a significantly more prominent ecological effect than food that is lost before in the channel because of these horrendous externalities. At the point when food is discarded, the natural effect perseveres. Biomass strong waste occupies a great deal of room in landfills, and when the natural material breaks down, ozone depleting substances like methane are delivered. The additional time it lays, the higher the quantity of emanations. Besides, the rotting system of natural materials makes reuse and reusing

more troublesome since the item's quality corrupts after some time (Papargyropoulou et al., 2014). 'Beside the natural ramifications of landfilling biomass squander, as indicated by Vergara and Tchobanoglous (2012 and Buzby and Hyman, 2012); it additionally influences general wellbeing since there is plausible of water violation and sickness fascination. Food squander has a high monetary expense because of the assets used to make, store, transport, and by and large oversee something that does not, over the long haul, meet its planned capacity of sustaining people (Buzby and Hyman, 2012). Food wastage in the retail and utilization stages is a significant channel on metropolitan assets, and all endeavours should be guided toward diminishing it to ease the strain on the city's assets.

2.3 Food Wastage reduction in Schools

Most people oppose wasting edible food, especially when others are unsure where their next meal will come from; it has serious environmental consequences (greenhouse gas emissions), and water and fertilizer are used to grow food that will not nourish anyone (Bloom, 2018). Students in Senior High Schools in Ghana do not have a choice in the type of meals they get. In theory, having choices reduce waste, but students in Senior High Schools in Ghana are only served with just one or two dishes, that some will not eat or others not finish their food. One of the main explanations behind thinking often about squandered food at school during during meal times is that it is dietary in nature, suddenly; a portion of the food lost is from great food varieties. As per a Harvard School of Public Health research, 60% of new foods grown from the ground are discarded (Harvard School of General Wellbeing, 2014). The desirable outcome would be improved nutrient intake by minimizing the amount of food wasted and increasing the amount consumed. This is especially essential for undernourished students for whom school meals is their primary source of nutrition (Williamson, 2019).

Ranging from planning the meals to serving the food, food waste reduction measures can be implemented. Schools can employ "offer versus serve" during the serving process, as described by Folliard et al. (2019), to allow students to choose whatever food items they want rather than being compelled to eat only one meal that is provided to everyone. When students have the option of choosing what they eat, they are less likely to produce trash (Folliard et al., 2019). The amount of time allotted to students' mealtime for them to sit and eat their meals is key to food waste reduction. Studies have proven that students need to have not less than twenty minutes to sit and consume their meals, surely not twenty-minute duration for meal period (Folliard et al., 2019). Instead of feeling rushed, students who are given ample time to be seated and have a meal consume more of their food. Because mealtimes are generally a social time in our society, allowing students enough time to eat and mingle is essential (Folliard et al., 2019). The catering establishments in school is an ideal limit for intercessions since an enormous number of students are been served in a solitary area bringing about a generally thought food wastage. Any food decrease in this sort of organization significantly affects the impression in regard to food waste (Derqui and Fernandez, 2017; Wilkie et al., 2015). All the more, along these lines, assuming that it is properly done, the advantage will not be reduced to schools alone.

2.4 RESEARCH THEORY

2.4.1 Theory of Planned Behaviour

The theory of Theory of Planned Behaviour (TPB) was propounded by Ajzen (1991) which turned into an extension of the Theory of Reasoned Action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). The thought proposed three basically various parts of direction. The first of the forerunners is a singular's disposition toward the conduct being referred to, which alludes to how certain or negative they think the conduct is. The subsequent forerunner is the abstract standard, which alludes to the prevalent difficulty to perform or not play out the conduct. The third precursor is seen as social control, which alludes to the level of seen straightforwardness or trouble in doing the conduct. It is accepted to think about the past experience just as expected blocks and boundaries. All in all, it alludes to how much control an individual has over their food squander conduct (Ramos, 2018). The more ideal a singular's mentality and emotional standard toward conduct are, and the more prominent the apparent social control, the more grounded a singular's expectation to take part in the conduct in issue ought to be. Contingent upon the conduct and circumstance, the impact of disposition, abstract standard, and social control in anticipating expectations is probably going to contrast. Subsequently, perspectives alone might be surveyed to appropriately affect aims in certain applications, while mentalities and social control are adequate to essentially affect expectations in others, and all indicators contribute autonomously in others (Ajzen, 2002). TPB has been utilized to comparable exploration themes including people's food squander aim and resulting conduct (for example van der Werf, Seabrook, and Gilliland, 2019; Lorenz et al., 2017; Tooth et al., 2017; Parizeau et al., 2015), exhibiting the helpfulness of involving the theory for this examination.

3 MATERIALS AND METHODS

A qualitative approach was used, using a series of structured interviews with participant's samples of matrons and cooks who were kitchen staff in the selected senior high institutions. The authors used critical realism to increase the fairness of research findings due to the availability of diverse opinions as well as in the minds of participants (Lincoln & Guba, 2003; Pegues, 2007). A structured interview was used in this study, which consisted of a set of questions that were carefully phrased and presented for interview participants. The Kumasi Metropolitan Directorate and the Heads of the selected Senior High Schools accepted the study protocols. The interviews conducted were recorded upon agreement by the respondents for transcription that in a way captured information provided by the study participants. In each of the schools, the interview was conducted once, however, several observations were carried out ahead of the interview. Our assessment of food waste management practices covered areas of food preparation, portion control, menu cycle, leftover foods, time frame for food consumption, and the stipulated number of students to sit at a table for meals. The interviewees were requested authorization before

conducting the interviews and were assured of confidentiality. The interviews questions were coordinated around one topic that is information connecting with food squander management practices in senior high schools. The examination populace was picked to incorporate all Senior Secondary School cooks and matrons in the Kumasi. This populace was reasonable as it comprises people who are straightforwardly engaged with food preparations and its wastage. Taking all things together, there are thirteen (13) Senior Secondary Schools in the Kumasi, five (5) single-sex schools, and eight (8) blended schools. The review involved a multi-stage testing strategy in choosing the respondents. As indicated by Alvi (2016), multi-stage cluster sampling turns into an exceptionally valuable testing way to deal with a study that has an enormous populace dispersed across different areas.

4 RESULTS

4.1 Preparation of Food to Lessen Food Waste

When respondents were asked ways in which food is prepared in order not to have so much unserved food leftover, all respondents indicated that they know the number of tables to serve and as a result, they adapt the quantity of food to be served to the students' population. With this experience, they were able to make an accurate estimation of the number of students to be served every day. One respondent added that her school uses measuring containers to measure the exact quantities of foodstuffs needed for cooking. Another respondent said that the school's stores distributes food based on the student numbers, thus there is little or no unsold food.

4.2 Practices that consider Foods waste

All respondents indicated that they consider particular foods students do not like (for example Groundnut soup and Kenkey, Beans stew, and Gari) and reduce their quantities during its preparation. "The kitchen staff knows which foods students eat less of, therefore the store's department releases less of that raw or uncooked food for cooking," one responder stated.

4.3 Days that the quantity of food prepared is reduced

All respondents indicated that they have days such as visiting days, early days of school reopening and during interschool's sports competition (only lunch meals) where the quantity of food prepared is reduced. Dining hall masters and mistresses give them with the number of pupils who have reported for food to be made for them in the early days of school reopening. On visiting days, one respondent stated, "quantities of food are reduced at their discretion."

4.4 Food portioned to reduce waste

Serving pans are used to measure adequate food for the number of students at a table, according to participant responses. Table heads use ladles to portion food at the table so each student gets just enough food. When probed further if students complain of the portion being too much, one respondent said "students do not usually complain of too much portion except days that a significant number of students do not appreciate the food served. On such days, There would be more unsold lunches, and some students would consume more than they could handle. When

asked how food is portioned per head, one responder responded, "We take into account the worth of between GHS1 and GHS 1.50 pesewas Kenkey and the Kenkey is portioned per head." With this "portion method" in mind, we portion our Kenkey same'.

4.5 Students Food Preference

All respondents said that student preferences are not taken into account, and that the current government has a set menu cycle for students that they follow. One respondent however indicated that "students' preference may only be considered when we ran out of stock on certain foods".

4.6 Changes in Menu Cycle

One respondent indicated that menu changes help reduce waste, in that, when certain foods are in season, for instance, if plantain is in season, fried plantain is served with beans stew and Gari and that encourages the student to eat more and less waste is generated. "When other food crops are in season, for example, when kontomire is out of season and cabbage is in abundance, the menu can be adjusted to suit the food crop in season (e.g. cabbage replaces kontomire in a stew) and that encourages the students to eat more at that time of change unless some students simply do not like those new foods," another respondent said in response to the question.

4.7 Number of people at the table

Two respondents indicated they have a required number of students to sit at a table (example, 10 students) however, some students may not sit up to the number required and those students could serve themselves more portions per head which may result in waste. They went on to say that if all students report to the table, there will be less food waste. On days when there are more students absent from the dining hall, one respondent stated that the dining hall master ensures that students sit up to the number at the table to diminish how much food left unfinished.

4.8 Time allotted for eating meal

Thirty minutes is the time given for eating meals, according to one respondent. However, students would have to walk from the classroom to the dining hall and finish meals within that same time. Those who report late might not be able to finish their meals and since food is not supposed to leave the dining hall, it may result in wastage. One respondent also said that "students may only rush through their meals during exams time and that may result in food wastage, if not, for this reason, time allotted for meals is enough for students to finish their meals. "The time for meals is plenty for pupils to complete their meals," another respondent noted, "but if changed a little, it would help every student have ample time to finish their meals."

4.9 Presence of competitive food sources

One respondent indicated that 'food provision is not permitted in schools. Only snacks such as snacks were sold at school and this convinced students to eat the meals served in the canteen'. Another respondent pointed out that 'the presence of caterers prevents students who can afford food from wasting food in the cafeteria'. One respondent said that "some students will not even

go to the cafeteria because they have access to caterers." "Meals are mandatory, however this requirement has lately been loosened a bit," respondents said when asked if they were required to eat. 'The presence of caterers and food in students chop boxes did not assist prevent food waste in the dining hall,' according to one respondent. The respondent said, "Initially, when caterers were not permitted to enter the school, students ate restaurant meals in greater numbers, resulting in less food waste."

4.10 Supervisory role of dining hall masters

All respondents indicated that the canteen teacher and the duty teacher ensure that the required number of students is seated at a table. The canteen teachers also remind the students that "no food leaves the canteen", which encourages them to eat more. "The teachers and hall teachers went around and taught some students how to use silverware properly and encouraged them not to waste food," one respondent said. "On days when student attendance is low in the dining hall," another respondent added, "students who desire more food are served with additional food."

4.11 Handling of unserved foods

One respondent indicated that on days that they have unserved foods, it is given to the dining hall prefects. When probed further, if unserved food is used for any leftover dish, she replied: "pan leftover food is not used for preparing any dish in the school. Students will protest against it if they get to know. If we have too much-unserved food and nobody wants it, it is been discarded". Two respondents, however, indicated that unserved foods are given back to students who want more food to eat and if they still have excess it is given out as a donation to the town folks who they refer to as "sope boys".

4.12 Treatment of plate leftover

All respondents indicated that plate leftovers are given out to feed animals. One out of every three respondents "indicated that on days when the food waste collectors do not come, it is dumped." Another respondent said that the "pantry men" comb through the plate waste and offer to the leftovers to the "sopi boys" (that is community boys who visit the schools for leftovers)

4.13 Educational programmes on food waste

All respondents indicated there is no formal program to educate students on food waste. However, one respondent said the kitchen staff only register their displeasure on days that the students produce a great deal of food squander and urge them to lessen it. Another respondent, on the other hand, stated that students were once shown a video on how to behave in the dining hall and how to use cutlery set correctly.

5 DISCUSSION OF RESULTS

The outcomes from the interview from the different schools support discoveries from different examinations which have managed waste management practices. In the investigation of Derqui and Fernandez (2017), for example, the same opinion on how food is prepared to avoid waste is shared, which reported that precise calculation of the number of people to be served, reduces food waste. This means that if meals are produced to serve the correct number of students, there

will be little or no unsold food, reducing food waste (Martins et al. 2014) and Rodriguez et al., (2015), who claim that 'the quantity of food given to students be reduced and that the presentation and appearance of menus should be prioritized,' back up the participants' views on how food is portioned. Results on students' food preference do not support the studies of Falasconi et al. (2015) and WRAP (2011), which suggested that lack of flexibility and not getting a meal option of choice contributes to plate leftovers because consumers may end up not eating the food. This implies that when students are offered variety in their choice of meals, and their food preference considered, they are likely to eat more and waste less. The finding that changing the menu cycle in school dining halls helps reduce waste, such as when plantains are in season, ripe ones are fried and added to beans stew and gari, agrees with Lagorio et al. (2018) and Falasconi et al. (2015), who both recommended that meals be prepared using seasonal and locally produced foods. Seasonal foods are inexpensive and delicious, and when used in meal preparation, they add diversity and additional nutrients because they are fresh.

On the responses of time allotted for eating meals at the dining halls, results in concord with the conclusions drawn in the studies of Lazell (2016), Quedsted et al. (2013), WRAP, (2011), and Folliard et al. (2019), which reported that students should be given enough time to be seated to consume and finish their meals. The results of the presence of competitive food sources, confirm the studies of Falasconi et al. (2015) and Marlette et al. (2005), which reported that selling of foods at school premises where dining meals are provided contributes to food waste. It is notable that, students who can afford food from vendors at the schools' cafeteria buy foods and consume them ahead of time or during break time leading to waste of food at the dining halls. In the views of Falasconi et al. (2015) and Marlette (2005) snacks and different food items sold typically have high nutritional value that influences the energy equilibrium and loss of hunger, prompting the dismissal of the food served.

The result in that unserved and plate leftovers foods are given to town folks as the donation is in line with the studies of Segre (2010) and Segre et al. (2010) that is aimed at recovering and distributing unserved meals that are impeccably fit for utilization to the people who do not have much money. Segre (2010) and Segre et al. (2010) believe that the beneficiary of the food is needed to be located in the neighbourhood for the safety of the food, as long-distance and duration might cause food contamination. Preparation of food for students at the dining halls takes into consideration the student population to reduce unserved foods. The stores give the culinary staff less raw food, which the students dislike. On visiting and early days of school reopening, the quantities of food prepared for students are reduced. Meal preparation does not always take into account students' preferences; however, when specific foods are in season, they are included. Dining hall supervisors ensure that students do not waste food by making sure that the required number of students sits at the table for meals. The presence of food vendors is a disturbing factor for food waste reduction. Schools in the sample do not have any educational programs on food waste and must endeavour to inculcate it in the schools' programme of activities to minimize food waste.

6 CONCLUSION

Preparation of food for students at the dining halls takes into consideration the student population to reduce unserved foods. The stores' department releases less of any raw food item to the kitchen staff which students do not like. On visiting and early days of school reopening, the quantities of food prepared for students are reduced. Students' preferences for food are not necessarily considered in meal preparation, however, when certain foods are in season, they are included in meal preparation. Dining hall supervisors ensure that students do not waste food by making sure that the required number of students sits at the table for meals. The presence of food vendors is a disturbing factor for food waste reduction. Schools in the sample do not have any educational programs on food waste and must endeavour to inculcate it in the schools' programme of activities to minimize food waste.

6 LIMITATIONS

The study failed to assess the preventive measures that were set up for purchasing raw food supplies to the storage of the food. Again, the reliability and the data could be compromised by the honesty of the study participants.

7 FUTURE RESEARCH

Future exploration is expected to develop the discoveries of this review in different regions of to evaluate the viability of the proposed food waste reduction strategy.

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