JOURNAL OF CURRENT RESEARCH IN FOOD SCIENCE

E-ISSN: 2709-9385
P-ISSN: 2709-9377
JCRFS 2021; 2(2): 57-62

www.foodresearchjournal.com
Received: 26-05-2021
Accepted: 28-06-2021

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Exploring alternatives to plastic food packaging in the Berekum municipality

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Abstract
The aim of the study was to explore alternative food packaging material other than the use of plastic bags by small scale food vendors in Berekum Municipality and its possible effects on the environment. The case study design was employed with small scale foods vendors and consumers as the targeted population. Purposive and convenient sampling techniques were used to select a sample of size of 50 respondents For the study. Open- ended Narrative, face-to-face general interview guide approach and observation were used to elicit response for the study. Test-retest technique was used to determine the reliability of the instrument. Data was analysed thematically. It was concluded that plastic after use serves as a major material for environmental hazard such as air and land pollution which poses danger to human life and plant. It was recommended that alternative packaging materials like leaves and papers should be encouraged and be made more available and affordable for road-side food vendors to use to avoid over reliance on plastic bags.

Keywords: Plastic packaging, paper packaging, food safety, environmental hazards, Berekum

Introduction
In recent times, packaging of food is one area that has attracted attention because the use of suitable materials for cooked foods improves shelf-life and contributes to the wholesomeness of the products, (Stillwell, 1991) [1]. Food packaging is a structure designed to contain a commercial food product, that is, to make it easier and safer to transport, protect the product against contamination, loss, degradation and also to produce a convenient way to dispense the product. It is an essential way of ensuring that consumers obtain food products that correspond to their food quality and safety expectations. According to the World Bank (1996) [2], there has been a steady increase in the use of plastic products resulting in a proportionate rise in plastic waste in the municipal solid waste streams in large cities in sub-Sahara Africa. Waste from the consumption of products that are either preserved in plastic containers or packaged in plastic bags are on the ascendency in both developed and developing countries.
According to Soroka (2002) [3], food has been prepared and packaged since the earliest days of man's history on earth. In the early days of traditional food preparation, the main aim of packaging was preservation to maintain a supply of wholesome, nutritious food during the year and in particular to preserve it for hungry periods, for example when hunting was poor. Food was seldom sold but traded and bartered (Soroka, 2002) [3]. While the main objective food preparation remains the provision of a safe nutritious diet in order to maintain health, other aspects particularly the generation of wealth for the producer and seller worth researching.
The rapid growth of urban population and the increasing number of working women have caused changes in the eating habits of Ghanaians. Parents are often employed outside the home and children attend schools far away. Consequently, fewer people, especially in the urban areas eat full home-cooked meals; much food is purchased from vendors. As a result, the fast-food industry has been growing rapidly. Around offices and factories, at schools, hospitals, and commercial centres, and along various street in the major towns and cities can be found food stalls, mostly operated by women. In Berekum, a municipality within the Bono Region of Ghana for example, has a number of restaurants, "chop bars," and food hawkers which is likely to increased consumption of street food rapidly in recent times. These street foods may be consumed where it is purchased or can be taken away and eaten elsewhere (WHO, 1996) [2]. Street food vending is a prevailing and distinctive part of a large informal sector.

It is commonly seen in public places, particularly in the cities and is distinctive in the sense that it provides a basic need to the urban inhabitants (Muzaffar *et al*., 2009) [4].

The adoption of a modern mode of packaging food, beverages, water and other products which is considered hygienic brought plastic packaging to replace the existing cultural packaging methods such as "leaf wrappers, brown paper and metal cup uses" in cities and towns (Adarkwa and Edmundsen, 1993; KMA, 1995; World Bank, 1995; Schweizer & Annoh, 1996; cited in Fobil and Hogarh, 2006) [5, 6, 7, 8, 9]. This wide spread replacement has made plastics the most favoured packaging materials in commerce with firms making huge profits and transferring the environmental cost associated with cleaning plastic waste on the general public.

Among the dwellers of Berekum, the packaging materials are most often dumped anywherere at the convenience of the trekking population since there is usually no mechanism that allows proper disposal of these materials after consumption of the cooked food. This gave rise to indiscriminate dumping of various materials ranging from leaf wrappers through paper to plastics. In Ghana even though some of the municipalities and assemblies have initiated policies to manage the waste disposal menace, these initiates are without a long history hence requires continuous studies to explore. The aim of the study was to explore some other alternatives to using Plastics Food Packaging within the Berekum Municipality of Ghana.

Research approach and Methodology

Design for the Study

A case study design was used for the research. According to Seidu (2006) [10], a case study involves an intensive investigation on the complex factors that contributed to the individuality of a social unit, a person, family or a group of people. The researchers considered a case study design because the topic under study is only peculiar to that of Berekum Municipality. Hence, a case of exploring alternatives to plastics food packaging in Berekum Municipality and not any other municipality. Here the outcome of the research may not necessarily be generalized to include all the Municipalities in Ghana. With this, all data relevant to the case are gathered and organized in terms of the case. This rested on the assumption that the case being studied is typical of cases of a certain type. However, through intensive analysis generalizations may be made that will be applicable to the cases of the same type.

Population of the Study

The population of this study was made up of all the small-scale food vendors and their customers in the Berekum Municipality of the Bono region. According to the Environmental Protection Agency inspectors, the total registered members mandated to sell food items are estimated to be about 1245 vendors in the municipality. Hence, the registered members who were road side food vendors constituted the population for the study.

Sample and Sampling Technique

Thirty (30) small scale food vendors and twenty (20) consumers were selected to constitute the sample size. Purposive sampling technique was employed to select thirty (30) small scale food vendors for the study. Purposive sampling technique was considered because it is the type of sampling method where the researchers carefully selects the sample to reflect the purpose of the investigation. Again, convenient sampling procedure was used to select twenty (20) consumers for the study. With this, the researchers at a convenience kept visiting and contacted the market at convenience until a quota of 50 were contacted to respond to the instrument and those who agreed were used for the study.

Instruments for Data Collection

The researchers used open- ended narrative, face-to-face, general interview guide approach and observation to gather the necessary data for the study. The interviews were conducted with the sampled population and was guided by the questions based on the research questions. The interview guide was made up of five sections. To be certain that the interview guide was used in the research is valid, it was discussed with colleagues and later vetted by competent professors. Some additions were suggested to enrich the interview guide.

Reliability of Instrument

Reliability is the degree of consistency that the instrument or procedure demonstrates. That is, whatever the instrument is measuring, it does so consistently. It is also the degree of a research instrument (a test, a questionnaire, an interview schedule, or an observation scheme) to measure a subject or variable at different occasions and on all occasions consistently to give the same or similar results (Seidu, 2006) [10]. Five small scale food vendors in Dormaa Ahenkro were selected for the pilot testing of the instrument to test its reliability. The same groups were tested two weeks later. Cronbach's Alpha (â) was computed for all the two sections to determine the internal consistency and co-efficient of the instrument. According to Munro and Page (1993) [11] Cronbach's Alpha (â) co-efficient is a measure of internal consistency reliability. Such reliability, the continue, is an alternative way of looking at the extent to which items go together. According to Coolican (1999) [12] Cronbach's Alpha (â) is probably the commonly used statistics for estimating a test's reliability.

Data Analysis

The interview responses were recorded both electronically and manually in a field notebook. The data was transcribed, edited and analyzed base on themes derived from the objective of the study. This focused on identifying key ideas and patterns of responses received from the field in relation to the research objectives. Data was presented using SPSS or Excel.

Ethical Considerations

Consent for the conduct of the research was sought from the food vendors. A letter of introduction was obtained from the head of department. This enabled the researcher to seek consent for conduct of the study. This enabled the researchers to formally introduce themselves to the study participants, during data collection. The researchers also liaised with the district assembly and other agencies responsible for proper food packaging and, storage practices. Participants were assured of their anonymity and confidentiality.

Results and discussion

Demographic information on respondents

Table 1 speaks to the classification of respondents who participated in the study. Here, a quota of 5 respondents were given to each sampled food vendor. Ten percent (10%) were waakye vendors, 10% were Gari and Beans vendors; 10% were rice vendors; 10% were Roasted plantain vendors; 10% were fish vendors; 10% were Kenkey/Banku vendors while 40% were Customers.

Table 1: Category of food vendors

Category of respondents	Frequency	Percentages(%)
Waakye vendors	5	10
Gari and Beans vendors	5	10
Rice venders	5	10
Roasted plantain vendors	5	10
Fish venders	5	10
Kenkey/banku vendors	5	10
Customers	20	40
Total	50	100

Field work, 2021

Educational Background of Respondents

Table 2 indicates the academic qualification of the respondents. Out of 50 respondents, 42% had no formal education, 28% had Middle School Leaving Certificate; 24% had West African School Certificate, 2% of the total respondents had either GCE 'O' or 'A' level certificates, 2% had 3-years cert 'A' Post Secondary Certificates and 2% had diploma certificate. It could however be deduced that an average of 70% of the vendors have lower educational background.

Table 2: Educational Background of Respondents

Academic Qualification of Respondents	Frequency	Percentage %
No formal education	21	42
Middle School	14	28
WASCE	12	24
G.C.E 'O' And 'A' Level	1	2
3-Years Cert 'A' Post Sec	1	2
Diploma	1	2
Total	50	100

Field work, 2021

Examples of foods from respondents that can be packaged in Leaves

Table 3 indicates respondent's views on food items and their major ingredients which are usually packaged in leaves. An open face to face interaction was used to engage all the respondents to give their views. Here each respondent was allowed to give more than one view (hence the multiple responses). Categorization was done based on the similarities of responses gathered and summarized. Forty(40) respondents mentioned kenkey; 38 respondents indicated Waakye, 40 respondents mentioned Etsew, 35 respondents mentioned Piiwa, 37 respondents indicated Apapransa, 38 respondents indicated Fish, 33 respondents indicated Gari and beans; 39 repondents mentioned Aboloo; 38 respondents indicated Cooked rice while 40 respondents stated nkyekyeraa. In congruence with the responses gained, Roden, (1997)[13] asserts that most traditional maize products consumed in southern Ghana are wrapped in leaves. Etsew (Another form of fante kenkey) and 'agidi', which are wrapped while hot in plantain leaves and the leaves of Marantoclea spp. respectively, can be stored for three days. Cooked rice and beans are stored in bulk in a large pan and sold wrapped in the leaves of T. populnea.

Table 3: Examples of foods from respondents that can be packaged in Leaves

View on Product Packed in Leaves	Major Ingredients and Characteristics	Number of respondents
Kenkey	Maize	40
Waakye	Rice and Beans	38
Etsew	Corn Dough	40
Piiwa	Maize	35
Apapransa	Maize and palm Soup	37
Fish	Smoked, Dried and Fried	38
Gari And Beans	Cassava and Beans	33
Aboloo	Maize	39
Cooked Rice	Rice and Stew	38
Nkyekyeraa	Maize and groundnut	40

Field work, 2021

Examples of foods packaged in Papers from respondents

Table 4 indicates respondent's views on food items which are usually packed in papers and the major ingredients. Here an open face to face interaction was used to engage all the respondents to give their views. Each respondent was allowed to give more than one opinion (hence the multiple responses). Categorization was done based on the similarities of responses gathered and summarized.

Thirty nine (39) respondents mentioned Fish, 40 respondents indicated Bread, 35 respondents mentioned Roasted Plantain, 36 respondents indicated roasted Yam, 37 respondents roasted Maize while 40 respondents indicated Pastries. This is in agreement with Robertson (2013)[14] that paper is a secondary packaging material for some pre-packaged products such as kenkey.

Table 4: Examples of foods packaged in Papers from respondents

View on pproducts packed in papers	Major ingredient and characteristics	Number of respondents
Fish	Smoked, dry, fried	39
Bread	flour	40
Roasted plantain	Plantain	35
Roasted yam	Yam	36
Roasted maize	Maize	37
Pastries	Flour	40

Field work, 2021

Examples of foods from respondents that are packaged in polythene bags

Table 5 indicates respondents' views on food pproducts packed in polythene bags. Again an open face to face interaction was used to engage all the respondent to give their opinion. With this each respondent was allowed to give more than one opinion (hence the multiple responses). Categorization was done based on the similarities of responses gathered and summarized. Thirty nine respondents 39 mentioned cooked rice, 38 respondents indicated water, 40 respondents indicated fish, 30 respondents mentioned Sobolo, 35 respondents mentioned Bread, 36 rspondents indicated Meat, 40 respondents mentioned Banku, 26 respondents indicated Soup, 37 respondents indicated Waakye, 29 respondents mentioned Ahaie, 31 respondents intimated Lemogin, 40 respondents indicated Pastries while 40 respondents mentioned porridge. This finding is similar to a study made by Gupta & Dudeja (2017)[15] which affirms the findings made from the research that plastic bags increase the shelf life and maintain the freshness of the product. More so, Items that are extremely moisture free can be stored in plastic bags for long.

Table 5: Examples of foods from respondents that are packaged in polythene bags

Examples of foods Packaged in Polythene Bags	Major Ingredient and Characteristics	Number of respondents
Cooked Rice	Rice And Stew	39
Water	Iced Water	38
Fish	Smoked, Dried, Fried	40
Sobolo	Bisap Leaves	30
Bread	Flour	35
Meat	Meat	36
Banku	Maize and cassava dough	40
Soup	Light Soup, Groundnut, Palm Nut	26
Waakye	Rice, Beans	37
Ahaie	Maize	29
Lemogin	Maize	31
Pastries	Flour	40
Porridge	Maize	40

Field work, 2021

Respondent's views on leaves and papers as packaging material: Table 6 shows respondents' views on views on the possibilities of using leaves and papers as an effective packaging material other than plastic bags. Again an open face to face interaction was used to engage all the respondent to give their opinion. With this, each respondent was allowed to give more than one opinion (hence the multiple responses). Categorization was done based on the similarities of responses gathered and summarized. Forty-four (44) respondents indicated that Leaves are cheaper than the plastics, 41respondents indicated that Leaves can be gotten anywhere and are more available, 36 respondents indicated that there is no pproblem with handling with leave, papers or plastics, 29 respondents indicated that plastics are harmful to health but it has come to stay, 49 respondents indicated that leaves have been in use for years now and it medicinal, 40 respondents indicated that leaves and papers are more preferable, 31 respondents indicated that the use of plastics could be banned so we can go back to the use of leave and papers; 50 respondents indicated that there should be more education on the dangers of plastic food packing so that people can resort to leaves and papers, 40 indicated that more investment should be made into making leaves and papers available on the market for vendors to buy to package foods. A research conducted by Robertson (2013) [14] opposes this finding by explaining that for Ga kenkey the raw dough is incompletely wrapped in a single layer of maize sheaths with portions of the dough remaining exposed which may be lost in the water during cooking. Also, according to Selke (1994) [16] products wrapped in leaves after cooking generally have a shelf-life of only two days.

Leks-Stepien (2011) [17] explains that natural materials used for packaging production, such as paper and board, pose little risk to the environment or human health, this finding is in agreement to responses from about 58% of respondents of this study who indicated that plastics are harmful to human health.

Table 6: Respondent's views on leaves and papers as packaging material

Statement	Number of respondents
Leaves are cheaper than the plastics	44
Leaves can be gotten anywhere and are more available	41
There is no problem with handling with leave, papers or plastics	36
Plastics are harmful to health but it has come to stay	29
Leaves have been in used for years now and it medicinal	49
Leaves and papers are more preferable	40
The use of plastics could be banned so we can go back to the use of leave and papers	31
There should be more education on the dangers of plastic food packing so that people can resort to leaves and papers	50
More investment should be made into making leaves and papers available on the market for venders to buy to package foods	40

Views on effect of plastic packaging on the environment

Table 7 represents Community member's views on environmental impact of refuse dump. To obtain data an open face to face interaction was used to engage all the respondent to give their opinion. With this each respondent was allowed to give more than one opinion (hence the multiple responses). Categorization was done based on the similarities of responses gathered and summarized each of the categories over hundred percent. Out of 50 respondents, 100% indicated that refuse dump causes unpleasant odour, 20%, indicated that refuse dump causes global warming, 96%, indicated that refuse dump causes air pollution; 84% mentioned groundwater contamination, 96% indicated that refuse dump causes surface water contamination; 100% indicated that refuse dump causes blockage of water flow in drainages leading to flooding and erosion, 88% indicated that refuse dump attract rodents, vultures and vector insects, 30% indicated that refuse dump causes fire and explosions, 70% mentioned that refuse dump causes crop damage, 100% indicated that refuse dump causes dirty environment; 42% indicated that refuse dump causes soil contamination (toxins, metals, nutrients) - potential to convey heavy metals to the soil.

Table 7: Views on effect of plastic packaging on the environment

Views on Environmental Impact of Refuse Dump	*Frequency/50	Percentage%
Unpleasant odour	50	100
Global warming	10	20
Air pollution	48	96
Groundwater contamination	42	84
Surface water contamination	48	96
Blockage of water flow in drainages leading to flooding, erosion	50	100
Attraction of Rodents, vultures and vector insects	44	88
Fire and explosions	15	30
Crop damage	35	70
Dirty environment	50	100
Soil contamination (toxins, metals, nutrients) - potential to convey heavy metals to the soil.	21	42

Field work, 2021

Discussion

The research revealed that Polythene bags are now widely used as a major form of packaging materials within the district. Again these bags comes in difference sizes and shapes. The study observed that polythene bags are very affordable and manageable which could be used for any form of packaging. The study also revealed that the most predominate food packaging materials for used by the vendors was plastic bags even though other materials like paper and leaves are sometimes used. Here the food items they use the plastics to package range from solid to liquid food items as shown in table 4.9 above. Robertson, (2013)[14] indicated that Ideally, a food package would consist of materials that maintain the quality and safety of the food over time; are attractive, convenient, and easy to use while conveying all the desired information; are made from renewable resources, thereby generating no waste for disposal; and are inexpensive. Rarely, if ever, do today's food packages meet these lofty goals. Creating a food package is as much art as science, trying to achieve the best overall result without falling below acceptable standards in any single category.

The study found that the one of the possible ways to shun from the use of plastic bags as a packaging material was to employs stringent measure such as banning it sales and importation. As indicated in table 4.10 about 62% of the respondent ressed tregistered their displeasure about the rampant use of the plastic bags and exp heir interest in going back to use leaves.

Again the research also revealed that another possible means of avoiding plastic as a packaging material due to it harmful content was to engage in more-education on the dangers of plastic food packing so that people can resort to leaves and papers. This has become necessary because studies have shown that many vendors expose their products to the sun while sealed in the plastic bags. Moisture condenses inside the bags, and this facilitates mould growth. Sometimes air is blown into bags with the mouth to open them. This introduces vapour and micro organisms, which sets the stage for spoilage when foods are placed in the bags (Mead, 1997) [18]. Some vendors package vegetables such as carrots, cabbages, and tomatoes in polythene bags with tied ends. This speeds the rate of deterioration since the exchange of moisture and gas with the atmosphere is cut off. Heavier-weight polyethylene film wraps have limited application for street foods except for bulk packaging, or covering such items require heat and moisture to be retained (Robertson, 2013) [14].

Conclusion

The study also concluded that leaf and paper could be used as packaging material since consumers did not have any particular packaging material preference. Most vendors possess some basic knowledge on food packaging materials they virtually lack proper standards as to the chemical composition and the dangers of plastic bags of the nutrition and on human health. It was concluded that vendors' purpose of material choice was not based on any scientific research or medical analyses to ascertain the impact of the material on the food nutrient or health implications of the material choice which possibly could be linked with respondent's high rate of illiteracy and lack of proper nutritional education. The research concluded that these plastic after been used serves as a major material for environmental hazard such as air and land pollution which poses danger to human life and plants.

Recommendations

1. It is recommended that alternative packaging materials like leaves and papers should be encouraged and be made more available and affordable so that local food vendors to use to avoid over reliance on plastic bags.

2. The general public should be given education to resort to biodegradable and environmental friendly material like paper and leaves for the safety of the environment
3. Reusable containers should also be encouraged to reduce the use of disposable plastic bags.

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