SURVEY ON THE STREET FOOD SITUATION IN GHANA (SFSIG)

COLLABORATING AGENCIES

ACCRA METROPOLITAN ASSEMBLY

FOOD RESEARCH INSTITUTE

GHANA STANDARDS BOARD

UNIVERSITY OF GHANA

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SFSIG

ACRONYMS

AMA	Accra Metropolitan Assembly
CSIR	Council for Scientific and Industrial Research
CCP	Critical Control Point
CP	Critical Point
DNF	Department of Nutrition and Food Science
FAO	Food and Agriculture Organisation of the United Nations
FRI	Food Research Institute of CSIR
GSB	Ghana Standards Board
HACCP	Hazard Analysis Critical Control Points
LPG	Liquified Petroleum Gas
MOHD	Medical Officer of Health Department
NGO	Non-Governmental Organisation
PRA	Participatory Rapid Appraisal
SFB	Street Food Business
SFC	Street Food Consumers
SFE	Street Food Environment
SFSIG	Street Food Situation In Ghana
SFV	Street **Food** Vendors
UNDP	United Nations Development Programme

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PREFATORY REMARKS

The survey on the street food situation in Ghana (SFSIG) was sponsored by the UNDP, executed by F.A.0 and implemented by the Ghana Standards Board in collaboration with three institutions. These are The Nutrition and Food Science Department of the University of Ghana, The Food Research Institute and the Medical Officer of Health Department of the Accra Metropolitan Assembly. The survey was , conducted from Nov. 1994 to Nov.1996 in five (5) phases viz:

Phase I - Review - 1994/95

This phase dwelt on the review of the street food situation in Ghana with special emphasis on various studies conducted nationally-

Phase 11 - Data Collection 1995

This phase concentrated on the socio-demographic characteristics of street food vendors and consumers, economics and environment of the street food business, processing techniques for street foods and handling practices in street food delivery.

Phase III - HACCP Studies 1996

Phase III was devoted to the HACCP Studies on Street foods selected on the basis of patronage and susceptibility to contamination.

Phase IV - Participatory Rapid Appraisal Workshop 1996

This workshop was organised to train the members of the local team handling the survey and selected field workers in the techniques of participatory rapid appraisal. The acquired techniques were later used in cross checking some of the results of Phase II.

Phase V - Workshop on SFSIG 1996

This workshop was organised to discuss the results of the survey with representatives of all the actors involved in the street food business in Ghana.

Emphasis was placed on the major issues that militate against the production and delivery of safe street foods and the involvement of NGO's in the provision of basic infrastructure for the street food business.

This final report is a compilation of all the reports of the five phases with recommendations.

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1.0 INTRODUCTION

The Street food industry is important in national development. The activities of the operators in this vibrant sector do provide employment and income. The industry also serves as a source of inexpensive nutritious foods (1). Even though, street foods can provide a positive contribution to national economy and health, the street food industry in Ghana has not been well studied.

Studies conducted on Street foods in Ghana are rather limited in scope. They dwelt on small sample sizes with respect to vendors, consumers and food. In most cases the studies were confined to University campuses and surrounding areas.

This paper reviews work that has so far been done on street foods. It covers the historical development of the industry, aspect of socio-economy, production and vending, wholesomeness, safety and nutritional value of street foods. The paper also looks at the problems associated with the street food industry in Ghana especially waste disposal and provision of potable water.

On the basis of these, recommendations are finally made for improving the street food industry so that it can adequately play its proper role in Ghana's economic development.

Some school children also patronise street foods. Bachelors, people without cooking facilities, those who do not want to cook and poor people have all found street foods convenient.

As a result, the street food industry has grown rapidly: hawkers and vendors can be observed around offices and factories, schools, markets, construction sites, beaches, lorry stations, commercial centres and along virtually every street in major towns and cities.

1.2 REGULATORY CONTROL

The Medical Officer of Health Department, Ministry of Health, and to some extent the Ghana Standards Board are the government agencies involved in Street Food Control activities. Realising the significant contribution to the nutritional needs of a large proportion of the population, the sale of street foods is controlled through licensing ,by-laws and regular inspection in order to ensure the safety and quality of such foods .The overall aim is to protect the consumer against poor quality and unsafe food.

The Medical Officer of Health Department is responsible for the control of sanitary conditions of places where food is sold and consumed including chop bars, wayside and street stalls and restaurants.

The functions of the ministry of Health include the provision of technical know-how for the disposal of waste.

The Ghana Standards Board, established in 1967 as the National Standards Board under NLCD 199 is also empowered to ensure high quality of food produced in Ghana both for local consumption and export.

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1.2.1 Bye-Laws

In Ghana there are Local council Bye-Laws which seek to control the preparation and sale of street foods. For example in Accra, the Accra (Street Market Bye-Law) made under the Accra Town Council Ordinance of 1943, has made provisions for

1.2.1.1 Food to be sold at Specific places;

1.2.1.2 Food to be sold on tables or raised from the ground at least 2 feet;

1.2.1.3 Food to be protected from dust and flies;

1.2.1.4 Prohibited Persons: i.e. people of unsound mind or persons suffering from contagious or infectious disease are not to handle food and

1.2.1.5 Animals/Pets are excluded from food premises.

The prepared foodstuff Bye-Law of 1972 also enjoins the street food vendor to provide the following:-

- Separate rooms for preparation, sale and consumption,
- Adequate lighting and ventilation in all rooms
- Adequate and potable water for preparing, drinking and washing;
- Washing arrangements;
- Waste disposal arrangements etc.

1.2.2 Constraints to the effective enforcement of Bye-Laws

The enforcement of these bye-laws has almost always been an uphill task for the following reasons:

1.2.2.1 The bye-laws operate from 06h00 to 18h00 and from Monday to Friday.

1.2.2.2 Inadequate Personnel and logistics.

1.2.2.3 Consumers uncaring attitude to where food is prepared, sold and consumed.

1.2.2.4 Unavailability of means and resources of vendors to meet the mandatory provisions.

Ghana has fairly recently promulgated the Ghana Food Law. This is seriously being studied by the legal department of the controlling authority with the view of preparing relevant bye -laws to properly regulate and control the street food business.

1.2.3 Licensing

There are two main forms of licences issued to street food vendors i.e Hawkers Licence and Operational Licence.

1.2.3.1 Hawkers Licence:

These are issued to street food vendors who as the name implies hawk their ready to eat foods from place to place, around lorry stations, construction sites, offices and even within the markets.

The licence which is issued by the revenue collectors of the controlling authority is on daily basis. The rate is according to the type and size of food offered for sale. This activity is more of a revenue generation to the authority than anything else.

1.2.3.2 Operational Licence

These are annual licences issued to applicants who demonstrate their intention to go into street-food vending. These applicants are required to meet the mandatory provisions of the bye-law. The licence is issued after an inspection has been conducted by officers of the controlling authority from hygiene point of view. The licence is withdrawn and sometimes the vendors prosecuted if subsequent inspections reveal low hygiene conditions or serious omission in the mandatory provisions.

1.2.4 Inspection

The inspection activity serves as a forum for hygiene education to food vendors, food safety to consumers and revenue generation to the controlling authority.

However the regularity and frequency of these inspections are poor due to lack of personnel and logistic support.

Below is a breakdown of number of inspections conducted on chop bars including snack bars from 1990 to 1993.

Table 1 : Chop bars and snack bars inspected (1990-93)

Year	No. of Inspection
1990	179
1991	177
1992	89
1993	99

Source : Medical Officer of Health Department, Ministry of Health.

The data indicate that the poor state of resources and logistics for food control activities further deteriorated during the period.

In many of these inspections, it was realized that water stored for consumers and used by street vendors was either not adequate or properly stored even though it was potable.

Provision of sanitary conveniences and proper disposal of waste water and refuse including garbage was a big problem. In short, many of the mandatory provisions could not be met.

1.3 CHARACTERISTICS OF VENDORS

Three major studies have been conducted on the characteristics of street food vendors. These were to obtain a demographic profile of street food vendors, their age, sex and educational background; family situation, etc.

These studies were conducted independently by: Department of Nutrition and Food Science, University of Ghana, Department of Home Economics, University of Ghana, Food Research Institute, Council for Scientific & Industrial Research (CSIR).

1. 3. 1 Sex

A survey which covered about 300 respondents from Accra and Tema of the Greater Accra Region of Ghana showed that about 88% of Street Food Vendors were females. (3)

1.3. 2 Age

The minimum age of a vendor recorded in the studies listed above was 7 years and a maximum of 65 years. Majority were between the ages of 20 and 29 years (3).

1.3.3 Educational Background

Information on educational background indicates that majority of the street food sellers are either illiterates or primary and middle school leavers.

1.3.4 Marital Status and Number of Children

The study by the Department of Nutrition and Food Science, University of Ghana revealed that about 50% of food vendors were married, 40% were single and the rest either divorced, separated or widowed.

The average number of children for the sample interviewed in one study , (4) worked out to be three . Fifty percent had children above 11 years.

1.3.5 Income

Two of the studies (3,4) revealed that almost 90% of street food vendors have the job as their only means of earning a livelihood.

*1.4 STREET **FOOD BUSINESS***

1.4.1 Types of street food vendors

There are two types of street food vendors in Ghana Viz: Stationary and Ambulatory.

1.4.1.1 Stationary street vendors

The stationary vendors sell their food at fixed locations . The chop bar keepers are housed in large wooden structures or blocks made into rooms . Some sell their food in wooden stalls and wooden kiosks. Others use metal containers especially those who sell soft drinks and alcoholic beverages . Some use tables and chairs with or without sheds whilst others offer tables , chairs , plates and cutlery for customers. Others do not offer such facility. These stationary vendors can be found everywhere especially where there is a large a number of people like the market , place around factories and offices , construction sites , airport , lorry parks, hospitals etc. Some use their homes for sale of food . Reasons given for selection of particular spot include : ready market , availability of space , caring for a particular group of consumers (5).

1.4.1.2 Ambulatory vendors

Ambulatory vendors carry the food around from place to place .These range from children to middle aged women . They hawk their food around , from office to office , from house to house , and from place to place . They can also be found in the markets , lorry parks , ports, on the streets and anywhere they will get people to purchase their food (5).

1.4.2 Working hours

Studies on street foods in Accra revealed that sale of food starts with daylight and does not end until evening. A few vendors close as late as 02h00. The working hours are determined by factors like location of the vendor, type of food, etc.

If the street food is near offices, the vendors close with the workers (5) . At places like the ports, lorry stations, etc. sale of food continues until there is no more movement of people. The markets in Accra close at 18h00 and so do the food vendors. However there are food vendors along the streets who start selling food at 17h00. and continue selling until almost all cars are off the road and cinemas and discos have closed. Most vendors do not work on sundays and holidays. Street food vendors generally operate their own flexible hours with little or no constraints on their time. The nature of certain street foods also determines the selling hours. For example ※koko※ - porridge is usually sold in the morning and/or evening.

1.4.3 Membership of Street Food Vending (SFV) Association

Majority of Street Food Vendors in Ghana did not belong to any SFV association and were not even aware of the existence of any such association (4).

1.5 STREET FOODS CHARACTERISTICS

1.5.1 Types of street foods

Street foods are ready to eat foods and beverages sold and often prepared by vendors and hawkers especially in the streets and other similar public places (6). Street foods in Ghana range from western and traditional type snacks and fruits to complete meals. Some foods are prepared at the site of sale whereas others are prepared at home, or in a factory and carried around and sold or taken to a particular site to sell.

Some examples of food prepared on site are roasted ripe plantain, fried plantain or yam, fufu and soup, rice and stew, gari and beans, banku and okro soup. These foods can also be prepared in the home and carried to the site of sale. Some foods which must be eaten hot are carried around by hawkers and they are packaged in such a way as to keep them warm all the time. Some even put their soup or stew on live charcoal and carry them on the head.

Foods prepared in factories or cottage Industries and sold by hawkers and vendors include drinks, alcoholic beverages, cocoa drink, ice cream, yoghurt, meat pie, sweets, chocolates, etc.

The following are examples of complete meals available in Ghana.

1.5.1.1 Fufu and soup

Fufu is cooked cassava and plantain mixture pounded into a smooth elastic mass moulded into balls and served with soup - light soup , groundnut soup or palmnut soup.

1.5.1.2 Kenkey and fried fish + pepper

Kenkey - fermented corn dough , is divided into two . Half is cooked into a sticky paste . The other half is mixed with the cooked half and moulded into balls. The balls are covered with corn sheaths and boiled. (ready when properly cooked). This is served with fried fish and pepper sauce.

1.5.1.3 Akpler and okro soup

(Akpler is prepared by mixing fermented corn dough and fermented cassava dough and cooking the mixture into a dumpling.

1.5.1.4 Gari and cooked beans, plus palm oil

1.5.1.5 Waakye (cooked rice and beans and added colour)

1.5.1.6 Rice and stew (boiled, plain rice, stew with meat, fish or eggs. Stew prepared from tomatoes , onions pepper and oil).

1.5.1.7 Kontonmire stew plus boiled yam :

(kontomire stew - cocoyam leaves , washed , steamed and mashed - added to gravy prepared from palm oil , ground tomatoes , onions , pepper and oil).

1.5.1.8 Snack foods

Snack foods include flour confectionery or other cereal based food . Examples are wheat bread , doughnuts , meat pies , cakes and biscuits , popcorn . other snack foods are root crops and plantain cut into pieces and grilled , fried or baked.
Yams, cocoyams and sweet potatoes are also used. There are the protein based snacks like kebabs, boiled or fried eggs, roasted nuts and akala (fried bean cakes).Snack foods also include fruits, i.e. bananas, oranges, pineapples, apples, coconut, pawpaw, guava, blackberries. Cold snacks include ice cream, yoghurt and ice lollies.

1.5.1.9 Beverages

Soft drinks and alcoholic drinks are sold by vendors.They also sell ▒nmedaa▒ - non alcoholic corn wine. Coffee, tea and cocoa are also sold by vendors to customers for breakfast and dinner.

1.5.1.10 Breakfast foods

All the different types of foods are consumed anytime of the day, but there are few that are taken only by adults and children at breakfast.

They are the porridges prepared from cereals like maize, examples are koko, ablayo, rice water, all forms of porridge. Generally street foods in Ghana have high carbohydrate content. This has been illustrated by studies on street food. Results of this study are embodied in the table attached as Appendix I.

1.6 STREET FOOD ENVIRONMENT

The street food business lacks adequate infrastructure that enhances food sanitation.

1.6.1 Provision of Water

A recent report indicated that only 50% and 15% of people residing in urban and rural communities respectively have access to potable water (9).

This is an indication of one of the problems associated with food handling practices because water is needed for preparation of food and cleaning of utensils and environment.

The study by Osei (4) revealed that water used for various preparation and service activities are stored without any attention to good sanitary practices. Seventy three percentum of respondents reported that they store water in containers without covers. Materials used for storing water include metal barrels, plastic buckets, aluminium pans, metal buckets and drums (4).

1.6.2 Human Waste disposal

In response to how vendors within Legon and Madina manage their toilet needs, about 50% of the respondents replied that they use nearby bush area, nearby gutter or empty tins (4). The problem of waste disposal cuts across the entire country.

A study on the availability of facilities for human waste disposal indicated a generally alarming situation. only 50% of the urban, 15% of the rural and 27% of the total population in Ghana have adequate sanitation installations (7).

Conditions are far worse in rural setting ,Okyere et. al (8) observed that in 3 rural communities in the Densu Basin River area, 62.1% of respondents in Ashaladza 49.3% in Ayikai Dobro and 27.3% in Kojo Ashong defecated in the bush.

1.6.3 Garbage Disposal

Information on garbage disposal by street food vendors indicates that food sellers disposed of food waste, used wrappers and rubbish in nearby bushes or just piled them up close by. Very few have access to well managed refuse dumps (4). Generally the behaviour of Ghanaians on waste disposal in both rural and urban settlements poses serious health hazards. The open drains are clogged through indiscriminate littering in urban areas creating pools of water which serve as fertile breeding grounds for agents of diseases (9).

1.6.4 Problems of Street Food & Waste Disposal

There is a provision in the bye laws which states that all waste should be handled and disposed of in such a manner as to avoid contamination of food, water and the environment. In particular, access to food wastes by pests (insects/rodent) as well as animals (dogs/cats) should be avoided.

From various inspection reports and observations, the above has not been the case due to the following reasons:-

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Street Food Vendors, as indicated earlier on have not got the means or the resources to meet the mandatory provisions of the bye-laws.

Low level of personal and food hygiene practices among the street food handlers and

The inability of the controlling authority to discharge its sanitation duties satisfactorily.

This situation exposes the street food consumer to all forms of hazards, since microbiological and chemical contaminations cannot be ruled out. This perhaps could be the reason for the endemic nature of cholera and other diarrhoea diseases in the country as evidenced by table below from the Centre for Health Statistics at Korle-Bu.

Table 2

FOOD BORNE DISEASES REPORTED IN GREATER ACCRA REGION

YEAR	DIARRHOEA	TYPHOID	INTESTINAL WORMS
1990	34 482	339	10619
1991	32 862	248	9716
1992	24 650	314	8548
1993	31 502	998	10223

Source: Medical Officer of Health Department, Ministry of Health

1.7 CHARACTERISTICS OF CONSUMERS

Few studies conducted on characteristics of street food consumers (4, 10, 19) have been limited in scope as they covered only areas in and around University campuses in Accra (Legon) and Kumasi.

The studies showed that consumers were mainly students and workers from low and middle income groups with ages ranging between 23 and 48 years. Sixty three percentum of the consumers in one of the studies (4) were males. Sixty seven percentum of the consumers patronise street foods once to three times daily.

Two of the studies (4, 19) which were conducted in 1990, indicated that consumers pay between:

¢20 - 50 for snacks
¢50 - 100 for breakfast
¢100 - 200 for lunch
and ¢50 - 150 for supper

1.7.1 Motivation in Street Food selection

Many consumers are motivated to patronise street foods for various reasons. They include: convenience (with respect to time and proximity), food is cheaper, convenient than cooking and is also filling and nutritious (4, 5, 17).

Consumers of street food in the Accra study were however not satisfied with:

cleanliness of dishes used for serving, cleanliness of the surrounding environment, seating arrangements, safety of drinking water.

These responses imply that patrons were aware of the unhygienic conditions prevailing, and the dangers posed to their health, but still took chances and ate at the vending site (4). Some recommendations made by consumers towards the improvement of street foods delivery are listed in Appendix 3.

1.7.2 Where Consumers eat the food they purchase

Sixty seven percentum of the respondents in the study (19) ate the meals they purchased at the selling site whilst the rest 33% took them away.

1.7.3 Frequency of Purchising Street Food

In response to a question on how often consumers purchase street food, the following results were obtained in the study (19).

47% - once - three times daily
24% - few times a week
28% - occasionally,

1.8 PROCESSING TECHNIQUES FOR STREET FOODS

1.8.1 Equipment & Utensils used

The equipment/implements used by the street food vendors are pots, pans, frying pans, laddles, spoons and cooking stoves, etc. The sources of energy are firewood, charcoal, electricity and recently Liquified Petroleum Gas (LPG).

If the vendors sell beverages, usually there is a fridge or freezer, or cooler or dispenser. Hawkers of cold snacks like ice cream, yoghurt and lollies also use insulated boxes.

1.8.2 Studies on Traditional Food Processing Systems

The Food Research Institute has documented traditional food processing methods and developed improved technologies for the processing and preservation of cereals (rice, maize and wheat) fish and meat, grain legumes, oil-seeds and oils, fruits and vegetables.

Some of the improved products are gari, kokonte, groundnut paste, cowpea flour and fermented maize meal. Pilot scale facilities exist for general food processing, as well as a Cassava Processing and Demonstration Unit (5).

Sefa-Dedeh and Mensah (11) have also conducted a detailed study on the processing of cereals in the Greater Accra Region. Flow charts of the preparation of 15 cereal based products have been documented.

1. 8. 3 Packaging And Storage

Some of the foods are prepared once and sold all day, like kenkey bread and waakye. The kenkey is therefore kept hot by wrapping in Polythene sheet as well as cloth and sold from a large bowl. Bread is also packaged in Polythene films. Some hawkers cover their bread with only cloth. Some of the foods are prepared in batches and the next batch is prepared when the one before is getting finished. Examples are fried ripe plantain, fried yam, etc. Some foods like fried eggs are prepared on demand. The vendors try as much as possible to keep hot foods hot, sometimes by leaving the food on low fire during the sales. This is a good practice because it lowers the bacteria count. Pots with lids are used for soups, stews, and rice as well. Some use glass cabinets, baskets and other containers to display the food.(Appendix 2).

1.8.4 Food handling practices

Quality and safety of food depend on how it is handled. Foods prepared under insanitary conditions and improperly handled are very likely to be contaminated. In a study of 202 small scale women food processors in and around Accra as many as 69% handled cooked foods using bare hands directly and yet onlv 41% practiced washing hands before and during handling (12).

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In the Legon study (4) unhealthy practices of food sellers observed by patrons of street food include:

- the use of few (inadequate number) cups, plates, spoons, benches.
- use of bare hands to dish out food.
- dirty water for washing dishes, hands and for turning fufu
- uncovered drinking water and food
- dirty tables, surroundings, clothing and rags for cleaning food wrappers (e.g. leaves)
- foreign objects in food
- use of cut (bruised) or infected fingers.

Sai (13) in a paper entitled "Defining family health needs standards of care and priorities" stated that the eating places of sellers are frequently unhygienic. A study on snack bars by Addy (14) revealed that bars were situated near filthy gutters and refuse dumps.

Two studies conducted in the Cape Coast municipality of the Central Region of Ghana showed that vending premises and food handling practices observed were not committed to ensuring food hygiene. The following were observed:

- conditions of premises for handling food were generally poor due to deterioration and neglect of facilities in the preparation area.
- food handling personnel do not have any formal knowledge about food hygiene which will make them conscious of its application in their normal duties.
- medical certification is not a pre-requisite for employment or during the course of it (15, 16).

1.9 THE NUTRITIONAL QUALITY OF STREET FOODS

1.9.1 Food Composition Tables

The Food Research Institute has conducted chemical analysis of local foods and come out with Food Composition Tables. The publication reports on the proximate composition and mineral content of 329 items of raw, prepared and processed foods commonly consumed in Ghana (20).

1. 9. 2 Nutritional Value, Chemical Composition and anti-nutritive constituents of foods

A number of studies have been conducted on the nutritional value, chemical composition, and anti-nutritive constituents, of foods by the Department of Nutrition and Food Science. The list of the studies is in Appendix 4.

1.10 POTENTIAL CHEMICAL AND MICROBIOLOGICAL CONTAMINATION OR ADULTERATION DURING PREPARATION, HANDLING STORAGE AND VENDING OF STREET FOODS

1.10.1 Chemical and microbiological contamination of food

Chemical and microbiological contamination of food is a serious health hazard. Data compiled from routine analysis of processed foods by the Ghana Standards Board indicate that in 1990, 6% of samples analyzed failed to meet the microbiological standards while the failure rate for chemical contamination was 16%. Chemical contamination of foods is generally brought about by the Uncontrolled use of chemicals in agriculture and food production.

In 1967 for example, 20 people died from consumption of grains intended for planting, after treatment with mercury containing pesticides. Similarly in 1971, 3 out of 10 people who ate tuo zafi (a stiff porridge prepared from millet or guinea corn) contaminated with an unspecified organo-chlorine pesticide died within 7 hours after eating. A report from the Forensic Section of the Ghana Standards Board indicates the indiscriminate use of pesticides in fresh water fishing in Ghana especially during the dry season. Not only does it disturb the ecological balances of rivers and lakes, it more importantly endangers the lives of people who consume such fish. Dangerous additives are sometimes Used in order to enhance quality texture and taste of certain food items. Examples are the uncontrolled use of monosodium glutamate, the indiscriminate use of unpermitted food colours and the addition of potasium bromate to flour for bread making. The food may also be contaminated by dust, fumes from car exhaust if left uncovered. A typical example is the sale of fried chicken pieces which are left uncovered.

1.10.2 Microbiological quality of foods

A study was conducted in Accra to assess the microbiological quality of fried chicken pieces. Bacteriological assays on 27 samples from 3 establishments indicated the presence of 5 organisms of public health significance in 7 samples (18). These include Staphylococus aureus (coagulase positive) Shigella flexneri, Escherichia coli faecal coliforms and streptococci other microbiological tests showed the presence of yeasts and moulds.

Microbiological screening of ten chop bars in the Accra metropolis was carried out by the Food Research Institute. Ten chop bars were investigated from the Public Health view point to know how diseases may be spread by foods and how such transmission can be prevented.

Drinking water samples, dish water and Food samples were examined and the following results were obtained.

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(i) Sixty percentum of the water samples and 20% of dish water sample were found to be contaminated with faecal coliform.

(ii) Seventy percentum of the food examined were also contaminated, with faecal coliform. Most of these were cold foods such as fufu and rice balls.

Only one out of the 10 chop bars was entirely free from contamination of the indicator organisms - Escherichia coli. The foods which were not affected were all hot foods like soups, konkonte and Akple.

The Department. of Nutrition and Food science of the University of Ghana has since its inception, undertaken research into the microbiological quality of foods. A list of projects conducted is presented in Appendix 4.

1.11 MANAGEMENT OF STREET FOOD

1.11.1 Training and Education of Food Handlers

Training of food handlers in personal hygiene and safe handling and preparation of food, as practicable under local street food vending conditions, is an essential part of any programme to improve the safety and quality of street vended food. But in Accra and probably the whole country, street food activity has not been seriously recognised for its regulation, because of its informal nature. And Therefore no serious efforts, have been made to offer training to food handlers, let alone consumers.

However, this activity which is supposed to be on going, is periodically carried out by the health unit of the Controlling Authority, through organised associations like the Prepared Food Sellers Association, khebab Seller Association etc. and religious organisations.

The impact of this education even though not great, has progressed from that of awareness creation to proper food handling practices in some Sections of the vendor community. This is evident by the following facts:-

(i) That in most of the Chop bars food is served almost always hot.

(ii) That green leaves, printed materials, cement paper etc. have almost given way to polythene bags as food wrappers.

(iii) That most of the ready to eat- foods are now protected from dust, flies and fumes and,

(iv) That in some school compounds medical examination of food handlers is a pre-requisite for food vending activity.

Another interesting development is that the Hotel, Catering and Tourism Training Institute (HOTCATT) in conjunction with the U.N.D.P. and the World Tourism Organisation (WTO) is developing hygiene training programme as a component of basic training module for food handlers in Ghana.

1.11.2 Seminars and Workshops

As part of the educational programmes to enlighten street food vendors and consumers, a seminar on "Street Foods - Nutrition, Safety and Management" was organised by the Ghana Institute of Nutrition and Food Technology in December 1993. An appraisal of the existing situation and recommendations for improvement were made. The seminar which was opened to the general public was attended by over 100 participants.

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The state of the street food industry in Ghana was highlighted during Food and Agriculture Organization (FAO) sponsored inter country workshop on street foods in Africa held in Accra, Ghana from 27 April - 1 May, 1992.

A seminar on National Food Safety sponsored by the World Health Organisation (WHO) was held at Kasse, Ghana from 18 - 22 October, 1993.

1.11.3 Street Food Vendors/Consumers Association

1.11.3.1 Vendors Association

There exist a number of associations for food sellers. Some of these are product specific for example, Khebab Sellers Association while others are for food sellers in general eg. Prepared Food Sellers Association.

Training and Education of food handlers by Public Health Authorities are usually routed through these Associations. None of the respondents in the Legon study (4) knew of the existence of such associations.

1.11.3.2 Consumer Association

This association has been in existence for years. It is a grouping for consumers of all types of goods.

The aims of the Association incLude:

- to promote and sustain the awareness of consumers of their rights and responsibilities.

to promote understanding between consumers and producers with regard to their respective rights and responsibilities.

to provide a channel for consumer opinion and representation.

to serve as a watchdog for consumer interests and seek redress for consumer complaints.

It is however unfortunate that this, Association has been dormant for years. Most of the consumers of street foods in all major studies conducted in Ghana were not. aware of the existence of the Association.

1.12 CONCLUSION AND RECOMMENDATIONS

The role of the Street Food Industry in the economic development of the country, has not been fully recognised. Efforts at controlling the quaLity and safety of street foods are therefore inadequate.

Street foods are very important to the society and contribute to the nutritional needs of the people of Ghana. The following recommendations are therefore being proposed for the improvement of the street food Industry in Ghana.

1.12.1 As a first step to ensuring improvement in the Street food business, a comprehensive national survey addressing issues such as socio-demographic characteristics of vendors/consumers, hygiene and sanitation condition of street food environment and food handling practices of vendors must be carried out. The survey should also touch on personal hygiene, available support service/infrastracture and contribution of the street food industry to the overall economy of the nation. it is recommended that such a survey should be of a much wider scope with reference to vendors, consumers, types of food and localities.

1.12.2 The review established that among the pressing problems of the street food industry are lack of adequate supply of potable water, an almost non-existent waste water and refuse disposal systems, lack of facilities for human waste disposal and inadequate support infrastructure. It is recommended that potable water for the various operations

involved in preparation and serving of food and adequate waste disposal facilities must be provided by the appropriate authority at specific areas designated for street food business. Removal of waste from such final disposal spots, must be done regularly and more frequently. Street food vendors must also be taught to remove waste from, their stalls much more frequently.

1.12.3 Prototype Kiosks should be provided by the appropriate authority and other private food processing companies to selected vendors. Such Kiosks should have proper sanitary, functional and good visible appearance. These should be provided at selected spots convenient to vendors and consumers. Other vendors will then be encouraged to adopt. the kiosks.

1.12.4 There exists a high potential health risk related to preparation and handling of street foods. Efforts at controlling the quality and safety of such foods have also been inadequate. There is therefore the need for:

1.12.4.1 training food vendors to upgrade their knowledge in good manufacturing and handling practices.

1.12.4.2 educating consumers of street foods on safety aspects of foods and their right of access to adequate and nutritious food.

1.12.4.3 training personnel responsible for food vendors, to enable, them perform their duties effectively and creditably.

1.12.5 A way of improving the safety of street food is to strengthen existing agencies involved in food control activities. Inspection of street food business has been recognised to be irregular and in frequent. There is the need therefore, to not only train more personnel but also provide adequate laboratory support. Laws on preparation and sale of street food, must be reviewed since most are outdated. Such a review must ensure that appropriate regulations which take the local conditions into consideration are formulated.

1.12.6 Licensing of street food Vendors is recommended as a means of ensuring the safety of street foods. Licensing will ensure that mandatory provision, of bye-laws related to safety of foods are met, since meeting such provisions will be pre-requisite for obtaining and/or reviewing license. With very good licensing system, collection of revenue will be enhanced and a forum to educate the vendors established.

1.12.7 Although studies conducted have revealed the poor microbiological quality of street foods, no epidemiological studies linking street foods with the incidence of food poisoning outbreaks have been established. A comprehensive epidemiological surveillance must therefore be initiated to establish the possible linkage.

1.12.8 Official recognition of street food vendors is recommended as one of the basic steps towards improving the street food situation. This will ensure governments appreciation of the role of street food industry in the economic development of the country and as a consequence provide the necessary support infrastructure that will enhance food safety.

1.12.9 It is noted that there are either no street food vendors associations in most parts of the country or even where they exist, such associations are dormant. Formation of street food vendors associations at district, regional and national levels is recommended. Those already established must be well organised to make them function properly. This will enhance credit worthiness of vendors, check malpractices (through easy enforcement of code of ethics) and promote ease of contact between government/regulatory agencies and vendors. Such associations will also serve as forum for interaction between Vendors.

2.0 INTRODUCTION

The Street food industry, as mentioned earlier, has been identified to be important in national development (SFSIG-1, 1995). Studies conducted on this industry in Ghana, however lack the national character, as they are limited in scope with respect to vendors, consumers, and food types. This therefore deprives the nation of valuable data that can help with future development of the industry. As a major step in ensuring improvement in the Street food business, a comprehensive survey addressing issues such as socio-demographic characteristics of vendors/consumers, the street food business and its environment, food preparation and handling practices was carried out.

This paper reports the results of the survey and makes the necessary recommendations for the improvement in Street food delivery in Ghana.

2.1 STRATEGY FOR DATA COLLECTION

2.1.1 Design of Questionnaire

The questionnaire was designed to bring out the general sociodemographic characteristics of street food consumers and vendors. Economics, Sanitation and Environmental hygiene of the street food business and the expectations of street food consumers and street food vendors, (from the overall Street Food Business) were also covered in the questionnaire. Although the survey was limited to Accra-Tema metropolis, the sample location was zoned into areas that will take care of food patronised by major ethnic groups and vendor population density. The essence was to provide data that could approximate the National character.

A copy of the questionnaire is attached as Annex 2.9.1

2.1.2 Administration of questionnaire

The questionnaire was administered in such a way that Street Food Vendors and Street Food Consumers could be handled simultaneously. Interviews were conducted in the mornings, afternoons and evenings/nights so that majority of vendors and consumers of street food could provide data. Field workers were drawn from the undergraduate/post-graduate students of the University of Ghana, Legon.

2.1.3 Areas Surveyed

The following constituencies in Accra were targeted for data collection: Ablekuma, Ashiedu-Keteke, Ayawaso, Ga North, Kpeshi, Okai Kwei and Osu Klottey.

The district /constituencies and their suburbs covered under the survey are indicated in Table 2.1. For each given suburb, interviewers were restricted to vendors/consumers at the following specific locations where patronage of Street Food was generally accepted to be high:

Construction sites
Lorry parks
Markets
Ministries/Offices/Factories
Schools
Taxi ranks

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Table 2. 1: DISTRICT/CONSTITUENCIES AND SUBURBS OF ACCRA-TEMA COVERED UNDER THE SURVEY

CONSTITUENCIES/DISTRICT	SUBURBS
Ablekuma	Chorkor, Kaneshie, Mamprobi and Zongo Junction
Ashiedu-Keteke	Bukuom, James Town, and salaga
Ayawaso	Accra New Town , Maamobi and Nima
Ga North	Madina ,Legon
KPESHIE	La, Nungua and Teshie
Okai Kwei	Abeka - lapaz Achimota Kwame Nkrumah Circle Neoplan station and Odawna
Osu Klottey	Ministries , Osu ,Kinkawe and Osu Market Area
Tema District	Community 1 Market - UTC Area, Fishing/ Main Harbours Industrial area and Ashaiman

2.1.4 Pretesting of Questionnaire

The questionnaire was pretested in five suburbs selected from two (2) constituencies under the survey. Results of the pretest enabled the authors to make corrections or revise the questionnaire where necessary.

2.1.5 Data Analysis

Data analysis was based on frequency and percentage distributions using D-base III plus and Freelance Graphics Computer Software

2.2 CHARACTERISTICS OF STREET FOOD VENDORS (SFV)

2.2.1 Socio-demographic data.

A maximum of 500 street food vendors were interviewed in the Accra/Tema metropolis.
The age of the sample population ranged from 16 to 80 years with 89% of the respondents falling within the age group 20-49 years. Thus almost all the food vendors were mature people. Ninetyfour percentum of respondents were females with only 6% males. This seems to imply that food vending is a popular job for women. The very high percentage of women in street food business attests to the fact that women bear the brunt of inadequate finances for house-keeping and are therefore usually compelled to go into the business, which at the moment does not require special skills, to help generate funds to support their families. The few male vendors were somewhat young, all falling within an age group of 16 to 20 years. About 24% of

the street food vendors came from the Greater Accra Region and the remaining 76% originated from the other 9 regions of the country. The regional distribution of street food vendors within the Accra/Tema metropolis (Figure 2.2) is probably a reflection of the regional distribution of the population of Accra/Tema, and tends to indicate that street food vendors intrinsically cater for their regional/ethnic groupings. About three-quarters (76%) of the sample population were Christians. Sixteen percentum were Moslems and 8% either had no religous affiliation or belonged to traditional African religion. Majority of the street food vendors (66%) were married, 28% single and 6% either divorced or separated. Of the 330 vendors who were married, 62% had a faniily size of 4 to 5 children.

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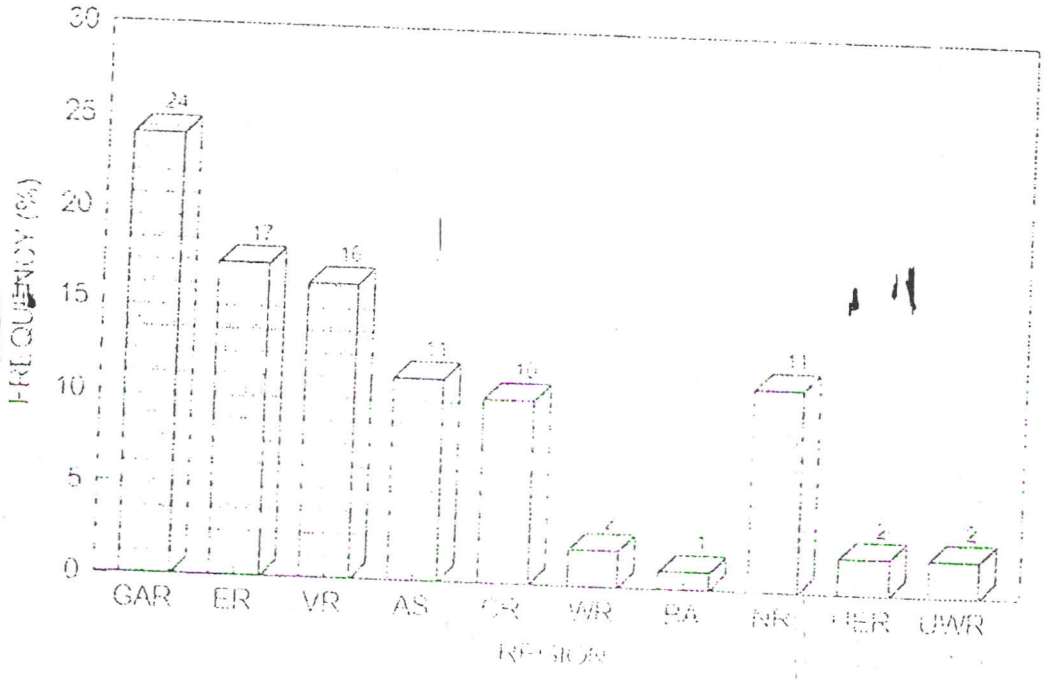
2.2.1.1 Educational Background

Twenty-nine percentum of respondents had no formal education. Fifty-five percentum were educated to Elementary or junior Secondary School level. A fairly low percentage (11%) of the street food vendors had completed Secondary or Senior Secondary School or Technical education. Interestingly and contrary to expectation, one University graduate was found to be in street food vending. Indications were that the uneducated and those at the lower level of the educational ladder were involved in street food vending. The low level of education may be one of the factors militating against the access of food vendors to formal sector occupations.

Figure 2.2 Regional Distribution of Vendors in Accra/Tema metropolis



2.2.2 Economics of Street Food Vending

Majority (85%) of the respondents had street food vending as their only job. The remaining were involved in other activities such as sewing and petty trading. Generation of funds to supplement family income or to wholly support family (42%) , generation of money to start another business (9%) , joining family business (24%) and street food vending as only means of earning a living (18%) were the principal reasons given for going into street food vending. Ninety-eight percentum of vendors would continue as street food vendors given a choice. Only 2% of the sample population claimed they would discontinue being street food vendors. This suggests that this mode of earning a livelihood was first choice for most vendors. The reasons being street food vending was a source of funds to support the family (56%). Others (4 1%) just loved to be in SFV. Those who would quit would do so because the work was tedious (55%) or the profit margin low (45%).

Most lived in rented apartments (5 2%) with about a third (3 1%) being owner-occupiers. The rest (17%) lived with friends or relatives. Nineteen percentum of vendors had spouses who were Public/Civil Servants, 12% had spouses who were Private Sector employees while 15%were Self-employed mostly as artisans. A total of 37% had spouses who were unemployed or were casual labourers making a living as and when job was available. As high as 17% of vendors gave no response.

The majoirty of married vendors (28%) had spouses whose monthly income fell within the medium range (>¢5O 000,00- <¢150 000,00. These were followed by those with spouses earning below ¢50 000,00 a month (25%). The high income spouses (>¢150 000,00/month) accounted for only 3%. This pattern may be expected because generally people earning high income in the Ghanaian community take care of their spouses. The spouses in such situations do not have to go into rather laborious vocation
like street food vending to supplement family income. They would if at all, naturally go into more prestigious ventures. As high as 44% of respondents did not give the salaries/wages of their spouses. This is an indication of the fact that in Ghana, this information is not usually shared between spouses.

Table 2.2: Characteristics of street food vendors

	Percent Frequency
Age Group (Yr)	
0 - 19	5
20 - 49	89
50 - 79	5
80	1
Sex	
Female	94
Male	6
Religion	
Christianity	76
Islam	16
Others	8
Region of origin	
Greater Accra (GAR)	24
Eastern (ER)	17
Volta (VR)	16
Ashanti (AS)	11
Central (CR)	10
Western (WR)	2
Brong Ahafo (BA)	1
Northern (NR)	11
Upper East (UER)	2
Upper West (UWR)	2

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Educational Background

None	29
Elementary / Junior Secondary School	55
Secondary / Senior Secondary / Technical	11
Vocational	3
University	0.2
Others	2

Marital Status

Married	66
Single	28
Others	6

Family Size

1- 2	10
3	21
4 - 5	62
>5	7

Type of Accomodation

Owned	31
Rented	52
Others	17

Other Means (Apart from SFV) of Livelihood

No	85
Yes	13
No response	2

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Reasons for Entering SFB

To support cost of living or cater for family	47
Only means of livelihood	18
To generate money to start another business	9
Joined family business	24
To support education	2

Job of Spouse

Public / Civil Servant	19
Private Sector Employee	12
Self -employed	15
Casual / Unemployed	37
No response	17

Monthly Income / Salary of Spouse

Low (< ¢50 000,00)	25
Medium(>¢050000,00 <¢150000,00)	28
High(> ¢150000,00)	3
No response	44

Continuing with SFV

Yes	98
No	2

Reasons for continuing

Support for family	56
Love for the work	41
Lucrative and profitable	1
Continue till objective is achieved	2

Reasons for not continuing

Tedious nature of work	55
In debt/no profit	45

2.3 CHARACTERISTICS OF STREET FOOD BUSINESS

2.3.1 Location of Business and Mode of Transportation

The vendors studied carried out their activity at locations such as Construction sites (6%), Schools (24%), Markets (10%), Lorry parks/Taxi ranks (20%), around Offices (20%), Waysides (15%), Harbour (5%).

A significant proportion (29%) of respondents relied on taxis to transport them from home to their street food business location. The probable explanation is that the volume of materials, utensils, etc. being taken to business site is such that taxis are the most convenient though more expensive.

Another 22% of the vendors went to work by "trotro" (private bus). Within Accra and "Tema metropolis - Trotro is the most popular means of transport. A very small fraction (about 1%) went by private cars. These may be the lucky ones whose spouses own private cars.

About 35% got to their business locations by means other than cars or "trotro". These included vendors who lived so close to their business location that they could walk and get their employees or children to carry along needed materials. There are also available all over the city, hand drawn mini trucks which are also patronised by traders and street food business operators.

On the whole the vendors spent mostly between ¢1000,00 and ¢3000,00 on transport everyday. Forty-six percentum of vendors owned their business location. Majority (46%) stayed in their present location for between one year and five years. Another 23% have stayed for less than a year, with another 16% having stayed for over 10 years. Only 11% of the sample population (N=55) have had to change locations. Poor patronage (45%), ejection by landlords (4%), harassment by the Local Authority (15%), were some of the reasons given for moving location. Others had changed location for various reasons, such as moving from a previous construction site on completion of building work, falling out of favour with colleagues and needing a change of location.

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Operators from fixed stalls formed the majority (49%). Semi-itinerants constituted another 33% whilst the itinerants were only 15%. The semi-itinerant and fixed stall operators usually sold complete meals which patrons sat down to eat **(Figure 2.3.1).** It is however not uncommon to see itinerant vendors carrying round complete meals such as fufu and soup (with the soup being kept hot on live charcoal) and kenkey with fried fish. All the fixed stall users were females while few females and mostly males were operating as semi-itinerant and itinerant vendors **(Figure 2.3.2).** A greater proportion of fixed stall users were married whilst majority of itinerant vendors were single **(Figure 2.3.3).**

2.3.2 Source of Funding for Street Food Business

Majority of Street Food Vendors (68%) started business with funds from personal/family savings, twenty-one percentum got money from their spouses. Another 10% had to fall on friends to start the business. A very small percentage (1%) depended on loans from the banks and co-operatives. The street food industry has never been organised and has never been formally recognised by the central government. It is therefore not surprising to find that the banks and the co-operatives have not encouraged it to any apreciable extent.

The street food business consists of the preparation stage carrying to the location for sale (in some cases), selling and cleaning up during sale and after business. The preparation of most of the street food in the street food business involves a lot of chores. It was therefore not surprising that of the helpers, about 32% were involved with the preparation. Another 10% assisted with selling and 12% helped with the cleaning up. Most of the helpers (40%) were involved in all types of activities (from preparation through selling to cleaning). Employees were paid in kind (41%) or by cash (59%). Employees being paid cash received between a minimum of ¢600,00 and maximum of ¢500,00 per a day.

Figure 2.3.1 Type of Food by Vendor

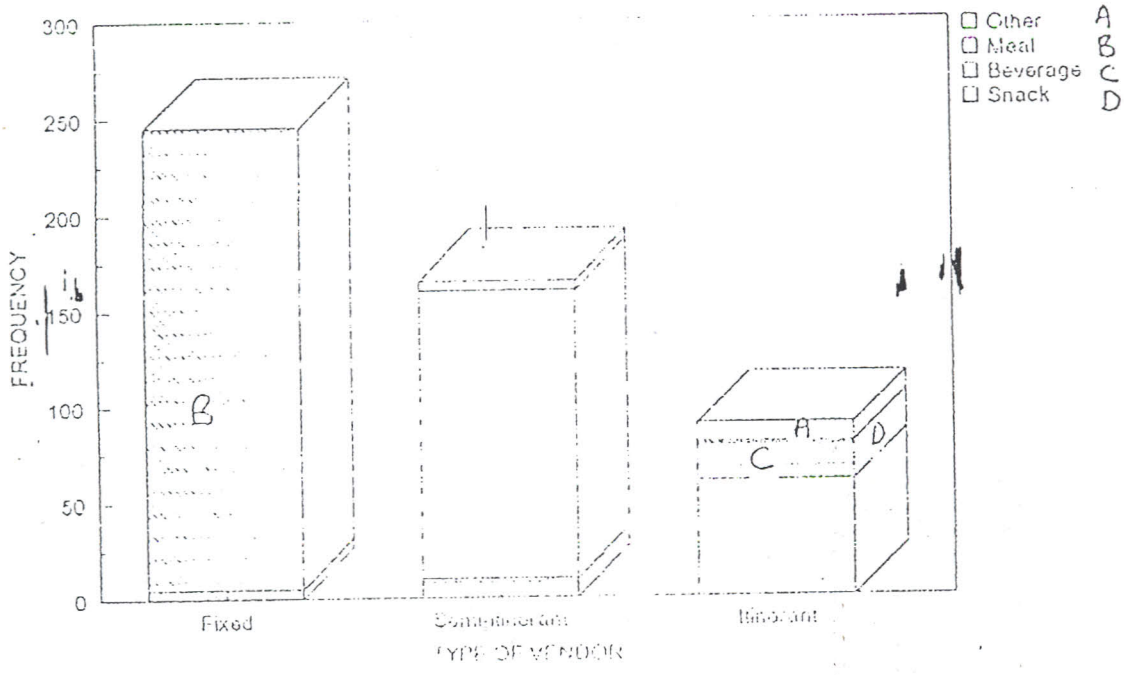

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Figure 2.0.2 Sex by Type of Vendor

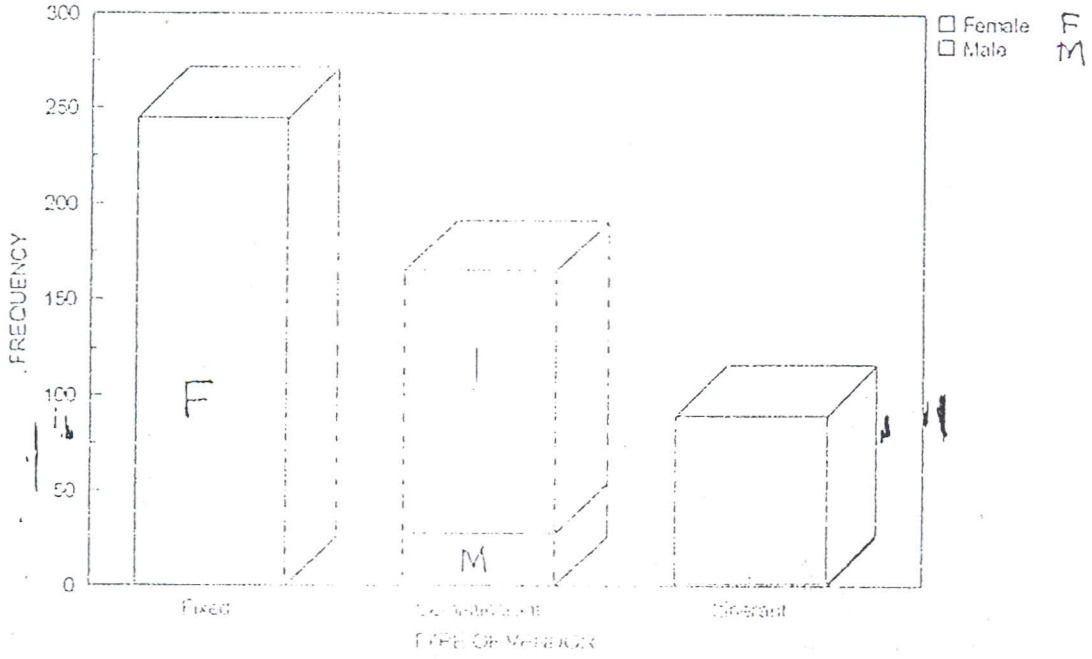
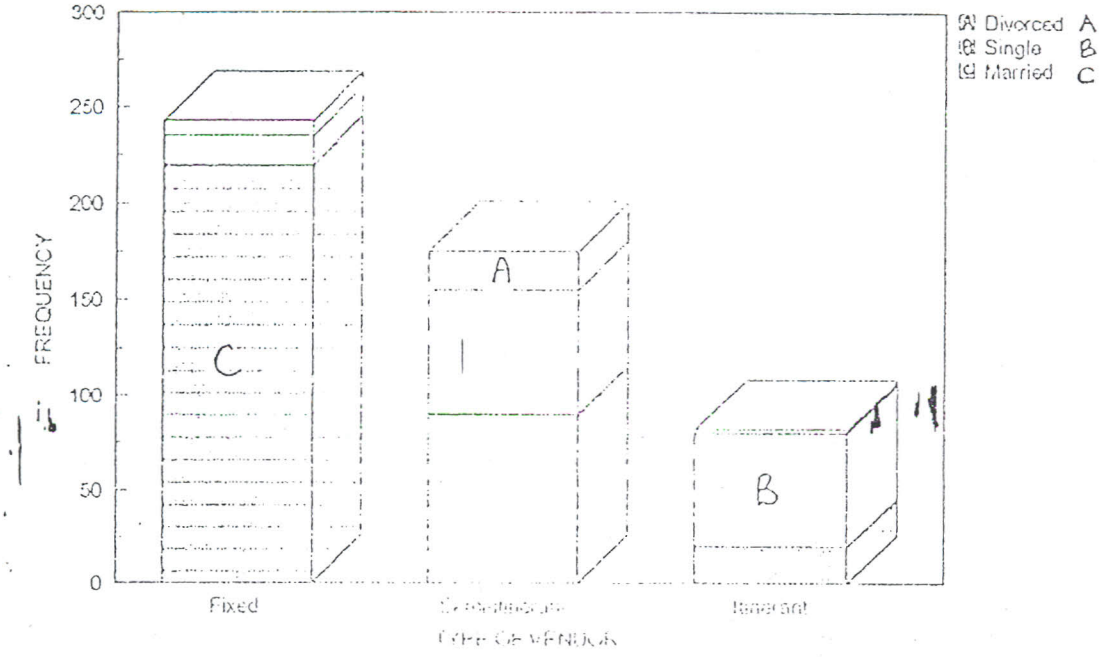


Figure 2.3.3 Marital status by type of vendor



2.3.3 Training/Compliance with the rules and regulations of SFB

Majority (60%) operated without licence from the Local Authority. With the rest (40%) not bothering to get their business licensed. In general, there are 2 types of licences issued to SFV in Ghana, hawkers licence and Operational licence. The former is issued to hawkers by revenue collectors on daily basis. The rate vary according to type and size of food being offered for sale. The latter is an annual licence issued to applicants who demonstrate their intention to go into SFV. (SFSIG 1, 1995). Seventy percentum of the respondents claimed they paid taxes. About 56 % have received training in the street food business. The training however was largely given by family members (50%). A large population (41%) had served apprenticeship under other operators. About 42% had not had any training in food preparation. Only 34% had received training in food/Environmental hygiene. About 60% of respondents had not had any such training. The Public Health Authority were responsible for the training of 15% of the respondents in food/Environmental hygiene. Training in food hygiene by family members accounted for 83% of the respondents.

majority of Street Food Vendors (76%) did not have any medical certificate. As many as 48% had never used any protective clothing at all. Those who used protective clothing mostly used apron (59%) followed by the use of headgear (cap) (40%). In Ghana, there are regulations governing the operations of Street food Business. Unfortunately, inspection of the activities of vendors are very poor with respect to regularity and frequency (SFSIG-1,1995). This might have contributed greatly to the non-compliance by vendors with the rules governing the business.

It is comforting to note that majority (64%) of respondents claimed to be aware of the existence of Public Health Rules applicable to street food vending. The Public Health Rules and regulations mentioned by the vendors included protection of food from dust and flies (64%), display of food on tables raised from ground (25%) and selling of food away from a garbage dump or waste disposal system (11%).

2.3.4 Suggestions for improvement in Street Food Business

The following suggestions in order of priority were made by vendors as a way of improving the street food business ,sanitation and hygiene condition (66%), provision of running water (12%). These were followed by the use of good quality raw materials (11%), provision of adequate waste disposal system (5%), provision of clean water for washing hands (4%) and proper washing/cleaning of serving plates, cooking utensils (2%).

2.3.5 Expected Government Assistance

Majority of the food vendors expected government to offer financial assistance to Street Food Business (63%). Other areas where government support was expected were monitoring the operation of Street Food Vendors (10%), provision of sanitation facility (15%) provision and regular supply of water (7%), encourage formation of Association (2%). In Ghana at the moment, the street food industry has not received government recognition, even though it is important in national economy. Street Food Vendors may be able to pass on these suggestions to government if they are encouraged to form associations. However only 12% of street food vendors belonged to a street food vendors' association. The major reason vendors gave for not being members of such an association was that they did not know of its existence. Confirming an earlier observation made (SFSIG-1, 1995).

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2.3.1: CHARACTERISTICS OF STREET FOOD BUSINESS (SFB)

	Percent Frequency
Nature of SFB	
Itinerant	18
semi-itenerant	33
Fixed Stall	49
LOCATION	
Construction sites	6
Lorry parks/ Taxi ranks	20
Around Offices	20
schools	24
Markets	10
Harbour	5
Wayside	15
FORM OF TRANSPORTATION	
Trotro	22
Taxi	29
Private	1
Others	48
PERIOD OF STAY AT PRESENT LOCATION	
< 1 year	23
1 - 5 years	46
5 - 10 years	15
> 10 years	16
Period of stay at previous location	
< 1 year	35
1 - 5 years	65
Reasons for changing location	
Harassment from local Authorities	15
low patronage	45
Ejection by Landlord	4
others	36

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Table 2.3.1 cont'd

	percent frequency
Source of funds to start SFB	
Bank/Co-operative	1
Loan from Friends	10
Loan from spouse	21
Personal /Family Savings	68

Table 2.3.2: Type of Job and Payment of Employees

No. of Employees	Percent Frequency
None	18
1 - 2	25
3 - 4	42
5 - 6	15
Work of Employees	
preparation	32
selling	16
cleaning	12
others	40
Form of Payment of Employees	
Cash	59
Kind	41
Amount/Day Paid to Employee	
¢600,00	20
¢ 600,00 < ¢1000,00	35
¢1000,00 - ¢1 500,00	45

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Table 2.3.3: Training/Compliance with rules of Street Food Business

Operating under Licence	
Yes	12
No	84
No response	4
Paying of Tax	
Yes	56
No	44
Training in SFB	
Yes	56
No	44
Source of Training in SFB	
Family member	50
Friends	3
School	4
Others (apprenticeship)	41
Training in Food/Environmental Hygiene	
Yes	34
No	60
response	6
Source of Training in Food/Environmental Hygiene	
Family member	83
Public Health Authority	15
No response	2

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Table 2.3.3 continued

	Percent Frequency
Awareness of Public Health Rules of SFB	
Yes	64
No	36
Type of Public Health Rules	
Protect Food from Dust and flies	64
Display Food on Tables raised from the Ground	25
Food should be away from a Garbage Dump or Waste Disposal System	11
Membership of Street Food Vendors Association	
Yes	12
No	84
No response	4
Type of SFV Association	
Chop Bar Operators	52
Food Sellers	26
Kenkey Sellers	8
Yam Sellers	2
Ghana Caterers	12
Use of Protective Clothing	
Always	31
Often	19
Never	48
No response	2

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Type of Protective Clothing

Headgear (cap)	40
Apron	59
No response	1

What Vendors expected of Government

Financial support	66
Monitoring operations of SFV	10
Provision of sanitation facilities	15
Encourage formation of Associations	2
Others	7

Table 2.3.4 Suggestions for Improvement in SFB

Suggestion	Percent Frequency
Sanitation and Hygiene Conditions	66
Provision of Running Water	12
U se of Good Quality Raw Materials	11
Provision of adequate Waste Disposal Systems	5
Provision of Clean Water for Washing Hands	4
Proper Washing/Cleaning of Serving Plates/Cooking Utensils	2

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STREET FOOD CHARACTERISTICS

2.4.1 Production of Street Foods

Street food vendors marketed three (3) types of foods:

SNACKS (home- or commercially prepared solids such as buns, biscuits).

BEVRAGES (home prepared liquids eg. cocoa drink, *nmeda* (a traditional maize-based drink), or commercialy prepared liquids such as soft drinks).

MEALS (traditional home-made complete dish eg. fufu and soup, rice and stew, rice and beans) .

Other foods sold include breakfast food such as koko (a maize-based porridge)and bread.

Vendors bought food supplies mainly with cash (64%) as against) who purchased the raw materials on credit. Purchases were mainly from the market. Eighty-seven percentum bought from market/distributor, the rest (13%) got their raw materials from the farm gate, shop/retailer or hawkers. Availability (49%), good credit facility (24%), suitable price (cheapness) (22%) mostly determined place of purchase.

Maize which incidentally is one of the major staples in Ghana was the predominant raw material used. This was closely followed by rice and plantain. These staples are used by almost all the ethnic groups in Ghana to prepare a variety of foods. The cereal grains have been known to be the major components of Ghanaian diets. Sefah Dedeh and Mensah (1989) have documented over 10 maize-based foods eaten in only the Greater Accra Region
(SFSIG - I,1995). For protein, fish was found to be the major source as compared to meat. This may be because fish is the best source of good quality protein in Ghana. IDAF (1994), quoting a FAO source, reported that fish consumption in Ghana in the year 1990 was 27.1kg./caput/year which was 63.9% of animal

proteins consumed. This was the highest in the West African sub region.

Other ingredients used were vegetables (pepper, onion, tomatoes, garden eggs and cabbage), spices, salt, sugar and flavour enhancers.

Vendors prepared food either at home (away from vending sites) or on site. The foods were sold at public places such as Lorry parks/taxi ranks (39%), Schools (24%), Around offices (21%), construction sites(6%), Harbour and Market (5% each).

Firewood was the most popular (53%) of fuel used in cooking. This was followed by Charcoal (31%), Liquified Petroleum Gas (LPG) and Electricity (3%). The results clearly showed that although government has for years been discouraging the use of firewood in its campaign on checking desertification through a massive afforestation programme, the practice of using gas (which is being encouraged), has remained unpopular because of its cost (25kg LPG sells for ¢5 500,00 and is not readily available).

Most vendors (39%) claimed they prepared the food they sell out the desire to achieve a reputation in the job. Others (22%) did because they wanted to satisfy the taste of the consumer.

2.4.2 Handling of Prepared Foods

Sixty six percentum of vendors prepared food in bulk. Almost all the vendors usually have leftover foods with majority (24%) having leftovers 3 times a week. Most of the leftover foods were usually eaten by family members (45%), mixed with new food 8%), sold next day (12%), given to helpers/employees (12%), or pets, friends and beggars (13%). Leftover foods were usually kept in the kitchen under ambient conditions until required. These leftover foods (especially those sold the next day and those mixed with new food) when not properly handled may constitute public health hazard as a result of growth of infectious or toxigenic microorganisms.

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Table 2.4.1: Production of Foods

	Percent frequency
Food type	
Snack	12
Beverage	7
Meal	78
Other	3
Mode of Procurement of Raw Materials	
Cash	64
Credit	34
Other	2
Source of Raw Materials	
Market/Distributor	87
Farm	2
Shop/Retail	6
Hawkers	2
Other	3
Reasons for buying from source	
Cheap	22
Readily available	49
Good credit facility	24
Good service	2
Good quality	3

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	Percent Frequency
Raw Material Type	
Maize	32
Rice	26
Plantain	17
Groundnut	13
Fish	8
Meat	2
Cocoa Powder	2
How Food is Prepared	
Bulk	86
On order	14
Site for Food Preparation	
Home	50
Vending site	49
Other	1
Type of Fuel used in Cooking	
Firewood	58
Charcoal	36
Gas	3
Electricity	3
Reasons for Preparing food	
Know how	39
Taste of customers	22
Family tradition	16
Store preserve	8
Reputation	5
Easy transportation	4

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Table 2.4.2

	Percent Frequency
Frequency of Left-over Foods	
Everyday	10
Once a week	24
Twice a week	20
Thrice a week	10
More than thrice a week	36
What is done with Left-over food	
Eaten by family members	45
Mixed with new food	18
Sold next day	12
Given as gift to helpers/employees	12
Others	13
Handling of Left-over foods	
Kept in kitchen	98
Keep in Refrigerator	2

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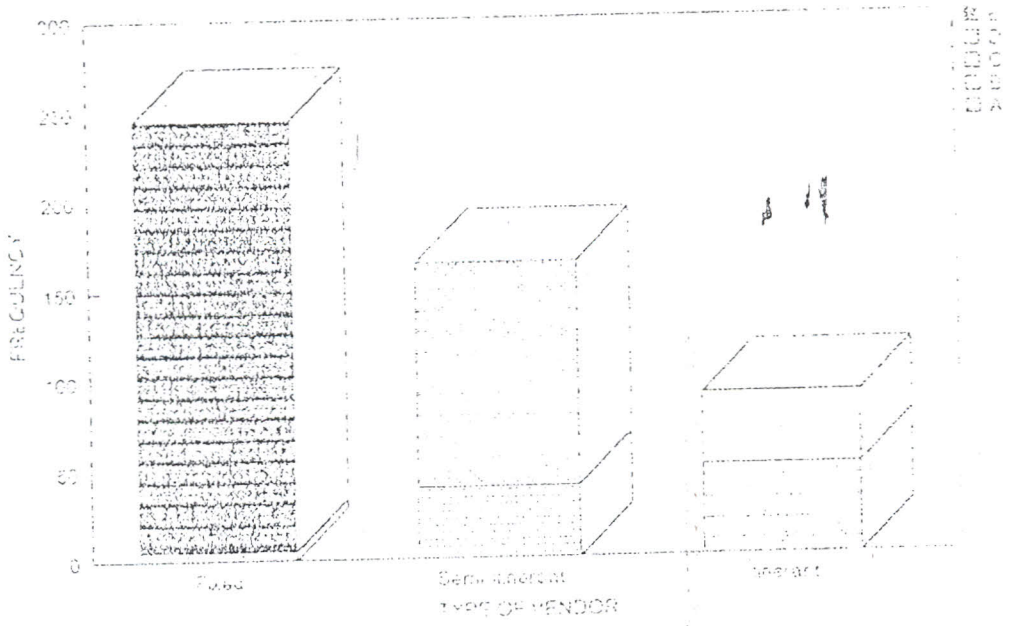
2.4.3 Vending of Foods

Vendors catered largely to a school clientele (53%) and to some extent wage workers (28%). This may explain why the average purchase per consumer was on the low side ,falling largely between ¢100,00 - ¢299,00 Daily sale per vendor ranged from as low as ¢ 2 000,00 - ¢ 60 000,00. Those in fixed stalls made daily sales within the range of ¢30 000,00 - ¢60 000,00 as against the itinerant vendors whose sales fell between ¢5 000,00 and ¢10 000,00. **(Figure 2.4)** This may be so because vendors in fixed stalls mostly sold complete meals such as fufu and soup, banku and stew while the itinerant vendors sold snacks and breakfast foods like koko and bread.

Figure 2.4 Daily sale by type of Vendor



A = <ç 5 000,00
B = >ç5 000,00<ç10 000,00
C = >ç10 000,00<ç30 000,00
D = >ç30 000,00<ç50 000,00
E = > ç50 000,00

Table 2.4.3: Vending of Foods

	PERCENT FREQUENCY
Where Food is Sold	
Lorry parks/Taxi ranks	39
Schools	24
Around offices	21
Construction sites	6
Harbour	5
Market	5
Types of Customers	
School children	53
Wage workers	28
Traders	10
Others	9
Average Sale per Customer	
➢ ¢100 - ¢199	30
➢ ¢200 - ¢299	39
➢ ¢ 300 - ¢ 399	17
➢ ¢ 400 - ¢499	6
➢ ¢ 500 - ¢599	3
> ¢ 600 -	5
Daily Sale per Vendor	
< ¢ 5 000,00	10
> ¢ 5 000,00 < ¢ 1 0 000,00	8
≥ ¢ 10 000,00 < ¢ 30 000,00	8
≥ ¢30 000,00 < ¢ 50 000,00	26
> ¢ 50 000,00	48

2.5 STREET FOOD ENVIRONMENT

2.5.1 Cleaning Practices in Street Food Business(SFB)

Employees of food vendors washed the dishes (41%). In some cases (32%) washing was done by the vendors using mostly bar soap (80%) and the washing water changed only when found to be dirty (88%) or at the close of business (12%). This constitutes a public health risk as proliferation of micro-organisms is encouraged with the build up of organic matter (food particles) in the washing water. Ideally washing should be done under running water. The use of soap (bar soap) for washing dishes is also a bad practice, especially where the food has high oil content, as it encourages the formation of scum. It is preferable to use non-soapy detergent. Serving bowls/plates were stored mostly in the kitchen (on shelves - 42%) after washing or kept in plastic bowls (54%). It is important here to note that a basic principle of cleaning operation is to allow all washed items to drain dry before storing. If not properly dried (as would happen in the storage techniques used above) films of water would be left on the plates/bowls and this can encourage the growth of microorganisms especially in such cases where disinfectants were not used after washing. The vendors in Accra/Tema metropolis all used pipe-borne water for cooking, drinking and washing. Water was usually fetched from nearby public taps by employees of vendors. Water for all stages of food preparation and service was stored mostly in plastic containers (72%) or in metal buckets/drums (12%). A summary of the type of equipment/utensils used for the various activities in street food delivery is shown in **Table 2.5.3.**

2.5.2 Garbage and Waste Water Disposal

Disposal of garbage either at stall level or at final disposal point leaves much to be desired. At the stall level, garbage was disposed off mainly in plastic containers with or without covers (80%) and finally dumped close by to form a heap. The heap of garbage close to the stalls would no doubt serve as source of rats,

rodents to the stall and as a consequence source of pathogenic micro-organisms to the stall.

Disposal of waste water was in metal buckets (86%) or in plastic bowls (14%) at stall level. The waste water was then dumped in gutters (15%), on streets (25%) or at the immediate surrounding area (60%). Generally the behaviour of Ghanaians to waste

disposal in both rural and urban settings poses serious health hazards. The open drains are clogged through indiscriminate littering in urban areas creating pools of water which serve as fertile breeding grounds for agents of diseases such as mosquitoes (SFSIG-1,1995).

2.5.3 Construction of Stall

Materials used for constructing food preparation, storage and serving areas were mostly wood with concrete floors, followed by sandcrete blocks with concrete floors. It must be emphasised that wood when used for construction of food preparation/serving area must always be raised on concrete at least up to splash point (about 2 metres). This is to avoid water from the floor getting in contact with the wood thereby causing rotting and thus serving as source of foul smell within the stall. The concrete floors must also be in such state that they can easily be cleaned and dried without pockets of water being left to encourage growth of organisms.

The cost of constructing the stall ranged from ¢ 10 000 to ¢2O 000. It must be pointed out that such figures were given for stalls constructed at various times ranging from 1 year to 10 years before the survey and therefore do not reflect the real cost as at the time of survey.

Table 2.5.1: Support Infrastructure for street food business

	Percent Frequency		
Source of water			
Pipe-borne water			
cooking	100		
Washing	100		
Drinking	100		
Storage of Water			
	cooking	Drinking	Washing
Plastic Containers	72	85	74
Earthenware Pots	4	-	-
Metal Drums	12	15	23
Metal Buckets	12	-	3
Disposal of Garbage			
Stall Level			
plastic Containers	80		
Metal Buckets	15		
Waste Paper Baskets	5		
Final Point			
Dump near-by	98		
Containers Provided by Local Authority	2		
Waste Water Disposal			
Stall Level			
Metal Buckets	86		
Plastic Bowls	14		
Final Point			
Gutter	15		
Street	25		
Surrounding Area	60		

Table 2.5.2: Cleaning of utensils and Construction of Stall

	Percent Frequency
Washing of Plates/Bowls	
Self	32
Children	14
Employees	41
Others	13
Changing of Water	
When dirty	88
At close of business	12
Cleaning Agents used	
Bar soap	80
Powdered soap	18
Sand	1
Others (ash)	1

CONSTRUCTION OF STALL

Type of Material used	Preparation	Storage	Serving
Wood/Concrete	85	82	89
Sandcrete blocks/Concrete	15	18	11

Cost of Construction	
< ¢ 1 0 000,00	25
¢ 10 000,00 - ¢ 20 000,00	35
>¢ 20 000,00	40

Table 2.5.3: Equipment/Utensils used in Food Preparation and Service

Activity	Equipment	Material Used
Cooking	pot, pan	aluminium, silver
Storing of food for sale	pot, pan cabinet	aluminium, silver glass
Dishing out food	laddle hand	aluminium ,wood
Serving of food	plate	plastic, aluminium
Serving of water	cup	plastic, aluminium

2.6 CHARACTERISTICS OF CONSUMERS

2.6.1 Socio-demographic characteristics

The sample population comprised 500 consumers - 65% males and 35% females. Most of the consumers were either self-employed (26%) or students (29%). Ages ranged between 10 and 60 years with the majority falling in the age group 20-29 years (56%). Seventy-one percentum of the consumers were single and 26% married with the rest 3% either divorced or widowed. Most of the consumers (25%) came from the Greater Accra region where the survey was conducted. The rest (75%) migrated from all but one region (Upper East) in Ghana(Figure 2.6). Majority of consumers (75%) were of the low income group earning less than ¢50 000,00 a month. Only 25 % of respondents lived in their own houses, while 25% and 34% lived in rented accomodation and with relatives respectively. This correlates positively with the finding that most of the consumers were low income earners. Majority of the respondents were Christians (78%). Thirty- nine percentum were elementary/junior secondary school leavers whilst 35% were secondary school leavers, 9% had no formal education.

Osei (1990) as reported in the review on street food situation in Ghana observed that consumers of street food were mainly students and workers from low and middle income group with ages ranging from 23 - 48 years. Majority were males. The study cited, however was limited in scope, covering only the University of Ghana campus.

2.6.2 Patronage of Food Vendors

Majority of the respondents (35%) ate street foods five days in a week. Respondents who ate street foods five days or more per week (82%) greatly outnumbered those who ate between one to four days a week.

Fifty - three percentum of consumers bought food from one particular vendor . Good taste of food sold by the vendor (32%) , closeness of vendor to work place (21%) , good quality of food (15%) closeness to home and vendor cleanliness (11%) were the major reasons why customers preferred selecting a particular vendor. Surprisingly, the quantity of food served, price of food and availability of credit facilities were least cited.

Forty-four percentum consumed street food twice daily whilst 36% consumed street food once a day. Only 3% ate street food more that three times daily. Forty seven percentum of respondents spent less than ¢500,00 on street food per day whilst 43% spent between ¢500,00 and ¢1 000,00

Rice and beans was the most popular food (27%) followed by kenkey and fish (24%) and yam and stew (15%). The least patronised were plantain and stew, snacks and fruits. From the results, the well patronised foods were all examples of complete meals (SFSIG-1, 1995). The reason may be because the consumers were mostly low income earners who preferred spending their hard earned money on meals that would keep them satisfied through out the day, than to enjoy the luxury of having light foods such as snacks.

The most popular reasons why the food chosen was the most favourite was that the quality of the food was good (33%), followed closely by good taste (32%), and good quantity (19%).
Reasons for patronising street foods in general included convenience (66%), cheapness (21%). Cleanliness of vending environment was cited by just 1% of the sample population.

2.5.3 Recommendations for improvement in Street Food Business

Consumers made a number of recommendations towards improvement in Street Food Business. These recommendations are listed in Table 2.6.3. Other recommendations, in another study (Opare-Obisaw, 1995) by consumers were provision of permanent structures with seats and screens to keep off flies, organisation of periodic training by appropriate authorities to

consumers and vendors, provision of clean and dry napkins or hand towels, food must be kept warm all the time and refuse bins must be provided. These recommendations proved that patrons of street foods were aware of the problems associated with street food delivery and that there was the need for positive changes. The recommendations further support the popular view that the most important protection against unsafe food is provided directly by the consumer himself. And that should consumers demand their right, street food vendors would be compelled to do the right things.

2.6.4 Membership of Consumer Association

Of the 443 who responded to a question on the above, 424 (96%) did not belong to any association because they did not know of its existence (91%). Those who claimed to be members of a consumer association said they joined because such an association serves as a forum for airing their views on street foods. It is clear from the response given that although some of the respondents were aware of the existence of Consumer Association they never bothered to join because of the following reasons:

(i) It was time wasting
(ii) They did not care to belong
(iii) It was not important
(iv) They did not have the means - suggesting that some of the respondents thought joining such an association was financially demanding.

SFSIG II

Table 2.6.1: Socio-demographic data of Consumers

Characteristics	Percent Frequency
Age Group (Yr.)	
10 - 19	19
20 - 29	56
30 - 39	20
40 - 49	4
50 - 59	1
60 - 69	1
Sex	
Male	65
Female	35
Religion	
Christian	78
Moslem	11
Bhudist	1
Hindu	2
Traditional Religion	1
None	4
No Response	4
Region of Origin	
Gt. Accra (GAR)	25
Eastern (ER)	23
Volta (VR)	13
Ashanti (AS)	16
Central (CR)	11
Western (WR)	2
Brong Ahafo (BA)	2
Northern (NR)	6
Upper West (UWR)	1

SFSIG 11

Table 2.6.1 Cont'd

	Percent Frequency
Marital Status	
Married	26
Single	71
Others	3
Educational Background	
None	9
Elementary/JSS	39
Secondary/SSS/Tech/Comm.	35
Vocational	4
University	13

Figure 2.6 Regional Distribution of Consumers in Accra/Tema Metropolis

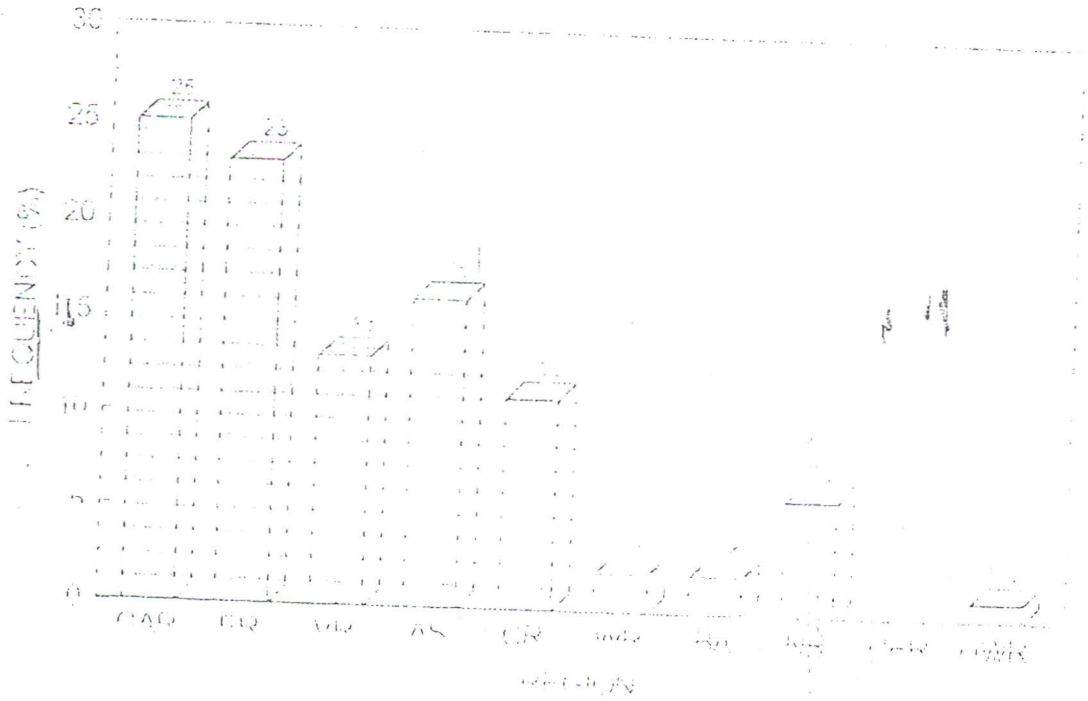


Table 2.6.2 Patronage of Food Vendors.

	Percent Frequency
No. of days in a week SF is eaten	
1	5
2	5
3	6
4	3
5	35
6	21
7	26
Type of Food Preferred	
Rice and Beans	27
Kenkey and Fish	24
Yam and Stew	15
Fufu and Soup	13
Banku and Stew	12
Plantain and Stew	3
Snack	3
Fruits	3
Reasons for Most Favourite Food	
Good quality	33
Good Taste	32
Good Quantity	19
Availability	6
Low Price	3
Patronising a particular SFV	
Yes	53
No	47
Criteria for selecting SFV	
Good taste	32
Close to work	21
Good quality food	15
Close to home	11
Vendor cleanliness	11
Good services	5
Large quantity of serve	3
Low price	1
Credit facility	1

SFSIG II

Table 2.6.2 **Cont,d**

	Percent Frequency
Reasons for patronising street foods	
Convenient	66
Food is cheaper	21
Food is sweet and of good quality	5
Only source of food	4
For a change	3
Cleanliness of vendor/environment	1
Membership of Consumer Association	
Yes	96
No	4
Reasons for not being a Member	
Do not know of its existence	91
Not important	4
Time wasting	3
Do not have the means	2

Table 2.6.3 Consumers recommendations for improvement in street food business

Recommendations frequency	Percent
Vendors should be educated on sanitation/cleanliness	56
improve quality of food	10
Reduce prices of food	8
The Metropolitan Authority should ensure that vendors keep a clean environment	5
Vendors should improve services to consumers	5
Vendors should stop from selling in the open air	5
Vendors should form an association	2
Vendors should change their mode of washing dish	1
Shelter should be provided for consumers	1
Street food vendors should come together to form a canteen	1
All vendors must undergo and pass a medical test	1
Clean water should be supplied by vendors	1
There should be supply of cheap raw materials	0.8
Vendors should provide credit facility for consumers	0.8
The Metropolitan Authority should allow only those with licence to operate	0.2
Child labour must be banned	0.2

2.7 DISCUSSIONS/CONCLUSIONS AND RECOMMENDATIONS

2.7.1 Discussions/Conclusions

Results of the study indicated that majority of street food vendors were females. Confirming earlier findings that street food vending is a woman's world. Most of the vendors were of low educational level. Fixed stalls mostly constructed of wood and concrete were used. The vendors were mostly married and were from families falling within the low income bracket.

Majority of the vendors were involved in preparation of complete meals such as fufu and soup, kenkey and fish and they in, most cases, have employees who help with every stage in the preparation and serving of food. Some of these employees are paid in kind, others in cash.

Firewood was the most popular form of energy for street food vendors. This is because of the high cost and/or an availability of gas and electricity. This poses a lot of challenge to government and it affects government afforestation programme to check desertification.

Pipe borne water is available for use by all vendors within the Accra/Tema metropolis.

Garbage and waste disposal facilities were found to be none existent. Vendors dumped garbage at areas around vending sites and surrounding areas/gutters respectively.

The results confirmed further the poor sanitation/hygiene situation of street food vending.

Most of the vendors were not licensed and majority worked without medical certificate. Training in food sanitation by health officials had been non-existent. All these would no doubt affect the sanitary/quality of the food.

From the study, consumers were mainly school children and wage earners mostly of the low income group who ate street food mainly because of convenience. Recommendation by consumers for improvement in street food business mostly centred on

improvement in sanitation/cleanliness of vendors and environment.

It was however difficult to establish the income/expenditure of the vendors. This may however be achieved through case study approach involving selected vendors.

2.7.2 Recommendations

2.7.2.1 Case Study of Food Vendors

The survey should be immediately followed by an in-depth case study approach of selected vendors. In such study, field workers may observe and interact with families of vendors at home and the vendor/consumer on the street over a fixed period. Areas of investigation should include standard of living, importance of vending activity to the family, transportation of goods to workplace, regularity and faithfulness of consumers, income/expenditure of family, nutritional value, safety and sanitation and hygiene.

2.7.2.2 Training

(i) The study revealed that street food vendors have had no formal training in Food Handling Practices and Sanitation. It is recommended that a programme of Environmental Sanitation, Personal Hygiene and proper food handling and manufacturing practices be drawn up and taught to street food vendors

(ii) SFV should be exposed to the principles of business management and proper book-keeping practices to enable them keep accurate records of their business transactions. Such training is at the moment being organised by government in association with some non-governmental organisations (NGOS) for artisans such as mechanics, carpenters, etc.

2.7.2.3 Fixed Location

It was observed that areas such as markets, schools, taxi ranks/lorry parks record high activity of street food vending. It is recommended therefore that street food vendors should be encouraged further by providing them with selected sites within these areas for selling their food. Such areas should be provided with support infrastructure such as waste and garbage disposal systems, source of water, etc. The areas should be constructed in such a manner as will enhance food sanitation.

2.7.2.4 Formation of Associations

Street food vendors should be encouraged to form associations to bring them together. These would serve to promote effective contact between vendors and government/ control agencies. The Association would also serve as forum for interaction between vendors and will enhance their access to bank loans and other credit facilities.

2.7.2.5 Provision of Credit

The study revealed that majority of street food vendors derived their source of finance from Personal/Family Savings. Credits from Banks or other financial institutions were non-existent. Since street food business plays an important role in the national economy and also serves as employment source, Government and the Banks should be encouraged to have a policy of providing credit lines to enable them build and maintain their business.

3.0 INTRODUCTION

In Ghana, street food vending is a popular economic activity among the poor, low income earners and the least educated without special skills. Street food vendors benefit from a positive cash flow and are often free from taxes, can sell what they want and are able to operate with minimal restriction and capital. In Ghana most street food vendors are frequently free from regulations because the few existing regulations are usually not enforced (1).

Street food vendors provide essential service to low and medium income salary workers, transient persons at work sites, recreational grounds, lorry and train stations. Despite the important economic role of street food business, there are many concerns about the sanitation of the industry. Most street food vending sites lack facilities that meet modern standards of sanitation. Unfortunately, most persons who patronise street vended foods are often pre-occupied with food prices and convenience rather than with food safety, quality and hygiene (2). Most street foods are vended at busy spots to transient persons thus patronage is usually high, service is rapid with little attention for personal hygiene, cleaning and disinfection; food may thus be hand picked, wrapped in leaves, polyethylene bags or newsprint. All these practices constitute a great potential for contamination of these foods. Most street vending sites are made of crude structures, lacking running water, cold storage and proper waste disposal facilities (3). Hands, dishes and utensils are usually washed in one or more bowls of water with or without soap. Foods are therefore not effectively protected from dust, flies and other environmental pollutants.

Furthermore, lavatory facilities are not readily available compelling vendors to eliminate their body waste at adjourning areas without proper washing of hands afterwards.

Most street foods are cooked in bulk, held for several hours with or without heating during display and sale. This situation could allow the germination of spores of pathogenic bacteria to contaminate the food.

The cooking temperatures and times of most of the street foods in Ghana are adequate to destroy microorganisms. However there is a potential for recontamination of cooked food from cutting boards, knives, packing materials, wiping towels and food handlers. Improperly washed and nondisinfected utensils and poor personal hygienic practices also contribute to recontamination of cooked foods.

Health risks are associated with initial contamination of raw foods with pathogenic bacteria and subsequent contamination by vendors during preparation, survival of pathogens during preparation and microbial proliferation during display and sale (4).

In Ghana street vending of food is very common, yet there is still a lack of adequate information about the incidence of food borne illnesses associated with the consumption of street food. To better develop an understanding of the health hazards associated with street vended foods, hazard analyses were used to identify hazards and assess risks associated with certain selected typical Ghanaian street foods. Critical control points were determined and preventive measures suggested with the view of finding practical solutions to improve the safety of street foods in Ghana.

3.1 MATERIALS AND METHODS

To ensure a complete understanding of all the factors influencing the application of HACCP concept at the street food level, a description of the vending sites, food preparation steps and associated hazards were identified. Food and ingredients were analysed microbiologically to ascertain the hazards associated with ingredients and the effectiveness of heat treatment steps in eliminating pathogens during the preparation of street foods. Microbiological hazards resulting from improper handling of cooked street foods were also investigated.

3.1.1 DESCRIPTION OF VENDING SITES

Street food preparation and vending sites in Ghana range from permanent structures, stalls, carts, temporary wooden structures to table tops by the roadside. An overview of street food preparation and handling practices and environmental factors at vending sites is therefore essential for the development of a meaningful strategy to improve the safety of streetfoods. Seven food service facilities at three locations: home, lorry park and by the roadside were therefore selected for the study.

3.1.1.1 HOME BASED

VENDOR 1 : This vendor prepares and sells Rice and Beans (Waakye) with gravy at home. The site consists of a shed with galvanized iron roofing, without walls. There are no pipe borne water, electricity and lavatory facilities. The floor at the shed is sandy. Water for drinking and cleaning is stored in a metal barrel which is emptied and washed every other day.

Food is cooked on charcoal in a tyre-rim with three metal supports. Cooked food is scooped into aluminium bowl with polyethylene cover and placed on a table with insect screen. Food is displayed without warming and sold to customers. The food is dished out with a laddle, loosened with fingers and served onto either leaves (Thespesia populna) or plates.

Leaves for serving food are cleaned with a napkin while pressed against the lap of the cleaner. Two wooden forms and a table serve as eating facilities for customers who eat at the site. Spoons, plates and cups are washed in a bowl of soapy water and rinsed in another bowl of clean water.

VENDOR 11 : Vendor 11 specialises in the preparation and sale of Kenkey and fish at home. The kenkey preparation, cooking, sale and consumption are done in the open under mango tree. The ground is sandy. Kenkey is cooked on firewood. Cooked kenkey is sold either cold or from the pot while on fire. The site has no lavatory and urinal for customers. A bowl of water is provided for hand washing. Water is obtained from a tap in the house. Customers buy the kenkey with their bowls, baskets or plastic containers. Wooden forms and tables serve as eating facilities for those who eat at the site. Discarded leaves and garbage are kept in a metal container without cover

3.1.1.2 BY THE ROADSIDE

VENDOR III : This vendor prepares cooked beans and sells with gari (Yooke Gari) with or without fried plantain. The site consists of an unfenced wooden structure against a concrete wall along an intersection of four busy roads. There are two wooden forms and a table for customers. There is no electricity, cold storage facilities, running tap water, lavatory or urinal. The floor of the structure is not cemented. Dishes and spoons are washed in a soapy water in a bowl and rinsed with water in another bowl. Drinking water is stored in two plastic buckets. Three plastic cups are provided for drinking.

The beans is cooked at home and transported in a taxi to the site. Ripe plantain is fried on site. Gari is stored in the vendor's bed room and part is scooped for each day's sale. The bulk of cooked beans is held in a partly covered container at ambient temperature during display and sale.

VENDOR IV : Vendor IV engages in the roasting of pieces of goat meat on sticks (Khebab) along an untarred road. The goat meat is cut into pieces, put on sticks and dosed with spices. This is roasted on fire and sold on site. The site consists of an enclosed wooden structure with two doors, a window for serving customers and a glass showcase.

Roasted khebab is sold directly while hot or kept in a glass showcase and reheated before serving to customers. The wooden structure is sited next to a gutter and a drinking spot. There is an old heavily pitted wooden stump on which carcass is cut into size able parts using a very old cutlass. There is no tap water or refrigeration facility.

3.1.1.3 LORRY PARK

VENDOR V : The vendor prepares and sells fufu with soup at a very busy lorry park for passengers travelling to Western part of Ghana and Cote d'Ivoire. The site consists of a series of concrete stalls for all food vendors. The unit for this fufu vendor consists of a concrete stall divided into three compartments. The first compartment is an open verandah facing the lorry park. This is where fufu is prepared, displayed and sold. The second compartment serves as the eating room. It has tap water, a wooden table and two wooden forms. The third compartment serves as the kitchen. The kitchen floor is not cemented, it is soggy, crowded with utensils and it is here that soup is prepared and cassava and plantain cooked. The kitchen also serves as a store for mortar, pestle and all utensils after the close of work. There is no lavatory, urinal or refrigeration facility. Food is served in earthenware bowls which are washed in soapy water in a bowl. There is one common hand wiping napkin for all customers.

Mortar and pestles are washed and cleaned dry; the tip of pestle covered with polyethylene bag and kept overnight. The pounding end of the pestle is soaked in hot water for about 1 5 min before use. The mortar is also rinsed with hot water before use.

The soup is held in a pot without cover on charcoal fire during display and sale. Garbage is stored in an open cardboard box at the site.

VENDOR VI : Vendor VI prepares and sells chocolate drink from a dispensing machine. The site consists of a wooden kiosk with a drinking place and a counter for the display of the machine and its content. The drink is held at 9^{0}C during display and served into 300 ml drinking glasses. There is no lavatory, urinal and running water at the site.

VENDOR VII : This vendor prepares and sells fried yam slices in a wooden structure. Yam is fried using firewood. The site has no electricity, running water and lavatory facilities. The fried yam is held either in a partly covered basket or displayed in trays at ambient temperature or sold directly to customers while warm. Yam which has been kept for a long time is refried before sale. Fried yam is served on newsprint or on plastic plates to consumers on site.

3.1.2 PRODUCT AND PROCESS DESCRIPTION

In order to ascertain the current sanitation practices in the streetfood business and to facilitate the design of effective regulatory and educational activities based on HACCP study, it was found necessary that certain typical streetfood preparation sites and foods be selected for study. The following foods were selected as models for the HACCP study in Ghana.

(i) Rice and Beans with stew (Waakye)

(ii) Ga Kenkey

(iii) Gari and Beans

(iv) Khebab

(v) Fufu and Soup

(vi) Chocolate Drink

(vii) Fried yam

The criteria for selection were based on popularity, consumption by all ethnic groups, affordability, availability and acceptability as breakfast, lunch and supper meals. These foods are also sensitive to post preparation contamination. The selected sites also reflect the typical sites for the preparation, display and sale of street foods in Ghana.

For the purpose of this study, foods prepared and sold at homes are classified as Type I, those sold by the roadside as Type II and those sold at lorry parks as Type III.

The preparation of the selected streetfoods are described:

3.1.2.1 RICE AND BEANS: Waakye is a product obtained by cooking rice and beans together at about 98°C for 2.5 h. Dry millet leaves are added during cooking to impart a desirable dark brown colour. Saltpetre may be added to enhance flavour and softening of the beans during cooking. Waakye is served with or without gravy containing fried meat, fried fish or cooked egg either on Thespesia populna leaves or in plates. The gravy is prepared from onion bulb and leaves, pepper, ginger, salt, flavour enhancer, tomato paste and milled fresh tomatoes.

3.1.2.2 GA KENKEY : Kenkey is the product obtained by cooking a mixture of raw and gelatinised fermented corn dough (aflata) moulded into balls and wrapped in dry corn leaves at about 98^{0}C for 2-3 h. Kenkey is commonly eaten with pepper sauce and fried fish.

3.1.2.3 GARI AND BEANS : Gari and beans is prepared by mixing cooked beans and gari with palm oil or other vegetable oil. The product may be eaten with or without fried ripe plantain.

3.1.2.4 KHEBAB : Khebab is the product obtained by sticking pieces of meat interlaced with cut onion onto sticks, dosing the meat with khebab spices and roasting on charcoal fire to a temperature of 58 ^{0} C for 10 -15 min. The average holding time varies from 0-2 h. Khebab which has been held in storage is normally reheated before sale. Khebab is commonly served with spices. Salad may also be added. Khebab spices mix is prepared from defatted groundnut meal, cauliflower, salt, flavour enhancer and ground pepper.

3.1.2.5 FUFU AND SOUP : Fufu is the product obtained by pounding a mixture of cooked unripe plantain, cocoyam or yam with or without cassava to obtain a gelatinous soft paste. Fufu is eaten with soup containing fish or meat.

Cassava and plantain are cooked to about 98^{0}C for about 30 min. The soup is cooked to temperatures over 80^{0}C for 1-2 h respectively. Soup is prepared from either palm fruits, groundnut paste or garden eggs, pepper, salt, meat or fish.

3.1.2.6 CHOCOLATE DRINK : The product is obtained by mixing powdered drinking chocolate, cocoa coverture, sugar and evaporated milk with cold potable water. The mixture is stirred using a wooden ladle before pouring into a self cooling vending machine at 9^{0}C from which the drink is dispensed.

3.1.2.7 FRIED YAM : This is a product obtained by frying peeled, sliced, washed yam. The product is served with pepper sauce prepared from pepper, tomatoes and onion. The product is held in trays or glass showcase or baskets during display and sale. Fried yam which has been kept for a long time may be refried before sale.

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3.1.3 HAZARD ANALYSIS

The hazard analyses involved observing food preparation and storage practices to identify sources and modes of contamination. Temperatures of internal regions of foods after cooking, were periodically measured during display and in some case, after reheating. Samples of ingredients and cooked foods were tested microbiologically. The temperatures of the foods were monitored with the aid of sterile thermometer. All practices, habits and environmental factors which pose hazard to the safety of each food service outlet were noted in the study.

Samples were tested for *Aerobic Mesophilic Colony Count, (AMCC). Staphylococcus aureus, Clostridium perfringens, Bacillus cereus,* Coliforms and Faecal coliforms as applicable, depending on the nature of the food sample and the organisms that are likely to contaminate the food and food contact surfaces.

The flow chart for each food preparation was elucidated and critical control points were identified. Other practices affecting the safety of foods during the preparation, display and serving were noted.

3.1.4 SAMPLE COLLECTION

Five 1 00 g portions each of the ingredients and foods analysed were aseptically sampled into sterile sampling bottles sealed and kept on ice in an insulated container. Samples of water were poured aseptically into sterile sample bottles and sealed.

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Swab samples from food contact surfaces were washed into 9ml sterile 0.1 % peptone water. Samples were collected and immediately sent to the laboratory for analysis on the same day. Each vendor was visited five times during the study.

3.1.5 LABORATORY PROCEDURES

The five 100 g portions of each solid food product were pooled together and aseptically mixed. About 25 g portions of each food and ingredients were aseptically digested in 225 ml of 0. 1 % buffered peptone water in a sterile stomacher bags for 2 seconds. Ten fold serial dilutions were prepared and appropriate dilutions plated onto appropriate media in duplicates using methods elucidated in International Commission for Microbiological Specifications of Foods (ICMSF) (1978) (5).

Swabs were washed into 9 ml aliquots of 0. 1 % Peptone water and surface plated on appropriate media in duplicates. Membrane filteration method (membrane Sartorius pore size 0.45um) was used in the analysis of water samples. Laboratory procedures were aimed at isolation and enumeration of microorganisms of interest.

3.1.5.1 AEROBIC MESOPHILIC COLONY COUNTS: (AMCC) Aerobic mesophilic colony counts was enumerated by surface plating appropriate diluents of each sample onto sterile solidified Plate Count Agar (PCA), (Oxoid CM 325) in duplicates. Inoculated plates were incubated at 35^0C for 48 h in inverted position. ICMSF (1 978).

3.1.5.2 BACILLUS CEREUS: Bacillus cereus was enumerated on Phenol-red egg yolk polymyxin (Merck) agar.

Motility, Citrate, Starch, and Voges-Proskauer tests were used for confirmation. Samples of Khebab spices, gari, chocolate powder and alkalised cocoa powder (couverture) were screened for spores of *Bacillus cereus* by placing 25 g of the food into 50 ml Tryptic Soy Broth (TSB) (Difco). Samples were heated to 70°C in water bath for 1 5 min, cooled in an ice bath, and incubated overnight at 30°C. A loopful of the incubated broth was streaked onto Phenol Red Egg Yolk Polymyxin Agar and incubated overnight at 30°C.

3.1.5.3 *COLIFORM AND FAECAL COLIFORMS :* Coliform bacteria were enumerated by the Most Probable Number (MPN) method using MacConkey Broth Purple (Oxoid CM5a) and MPN table. Faecal coliforms were enumerated using Brilliant Green Lactose Bile Broth (Difco) incubated at 44.5°C in a water bath for 24 h. Cultures showing typical results for faecal coliforms were confirmed biochemically using Indole, Methyl Red, Voges-Proskauer and Citrate tests.

3.1.5.4 STAPHYLCOCCUS AUREUS : Staphylococcus aureus was enumerated on Baird Parker (BP) Agar medium (Oxoid). Confirmation was by coagulase production.

3.1.5.5 CLOSTRIDIUM PERFRINGENS : Clostridium perfringens was enumerated using Shahidi-Ferguson Perfringens Agar (SFP-Agar-Oxoid 1 990) in duplicates. Gelatin-lactose and motility nitrate tests were used for further confirmation.

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3.2 RESULTS AND DISCUSSION

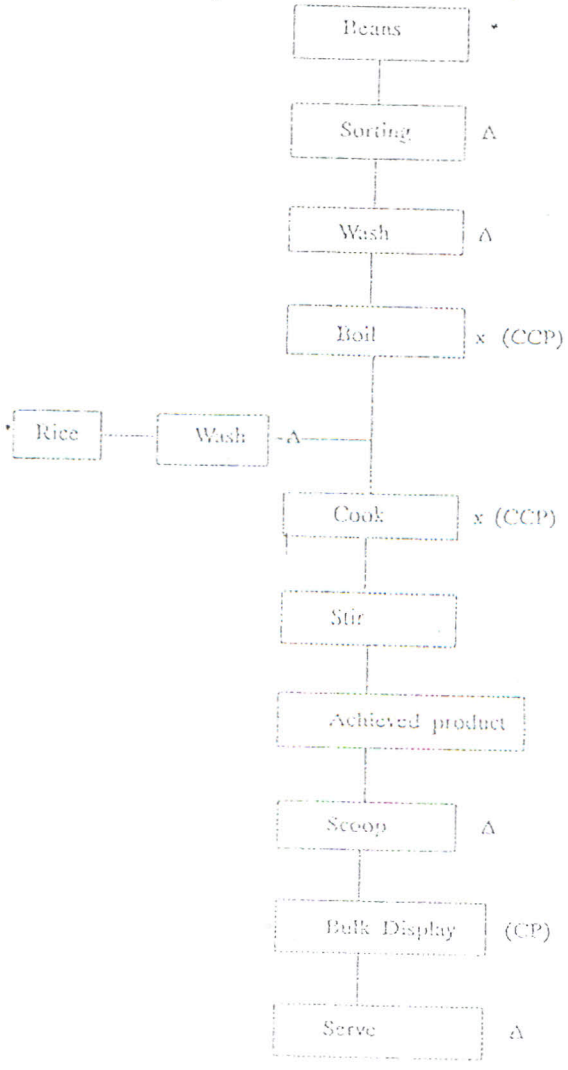
3.2.1 FLOW CHARTS DEPICTING HACCP CONCEPT

The flow charts of the preparation, display and sale of some selected street foods prepared and sold at home (Type I), by the roadside (Type II) and lorry park (Type III) are illustrated in figures 1 - 9. Associated hazards where initial contamination, cross contamination from equipment, utensils, personnel, inactivation of vegetative bacteria, and where there is likelihood of germination of bacteria spores and relevant critical control points are depicted.

The flow charts indicate the following preparation activities which are common to all the food types described. They basically involve raw ingredient preparation and heat treatment step which inactivates vegetative cells of microorganisms and holding foods at ambient temperature or at 9°C as in the case of dispensed chocolate drinks. Khebab and fried yams are reheated prior to serving. Palm soup is kept hot on charcoal fire during display and sale.

To facilitate the application of the hazard analyses of the various streetfoods, control measures for the hazards associated with each product/preparation were identified. Tables 1 - 7 show the hazard identification and criteria for control during raw material handling, processing, display and sale of the foods studied. Apart from microbial hazards, physical and chemical hazards were also considered to ensure a good understanding of the other hazards influencing the safety of streetfoods. The study revealed that these hazards and criteria for control for all the food types are similar. These hazards can however be controlled to enhance the safety of streetfoods in Ghana.

Figure 1 FLOW CHART OF RICE AND BEANS (WAAKYE) PREPARATION SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE



LEGENDS

* - Initial contamination

A - Contamination from equipment/personnel/surfaces/water

CCP - Critical Control Point

x - Inactivation of vegetative forms of bacteria likely

CP - (Critical Point) Germination of spores likely

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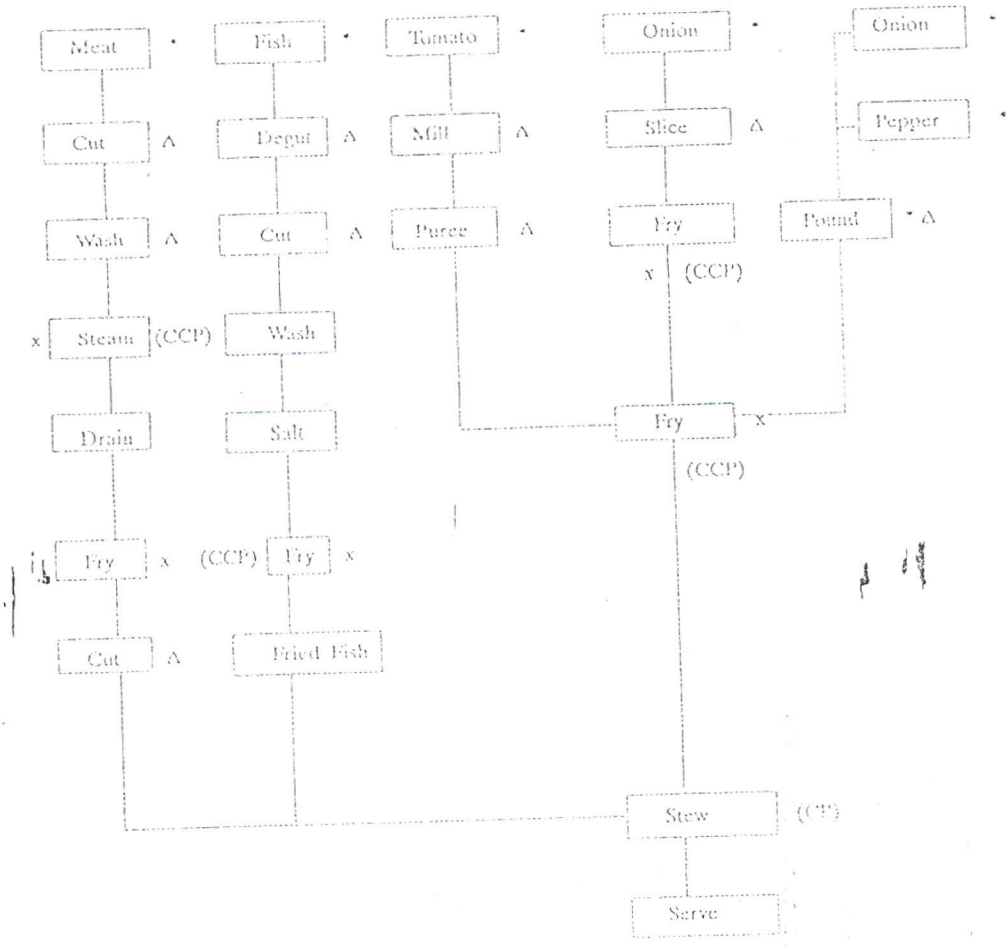
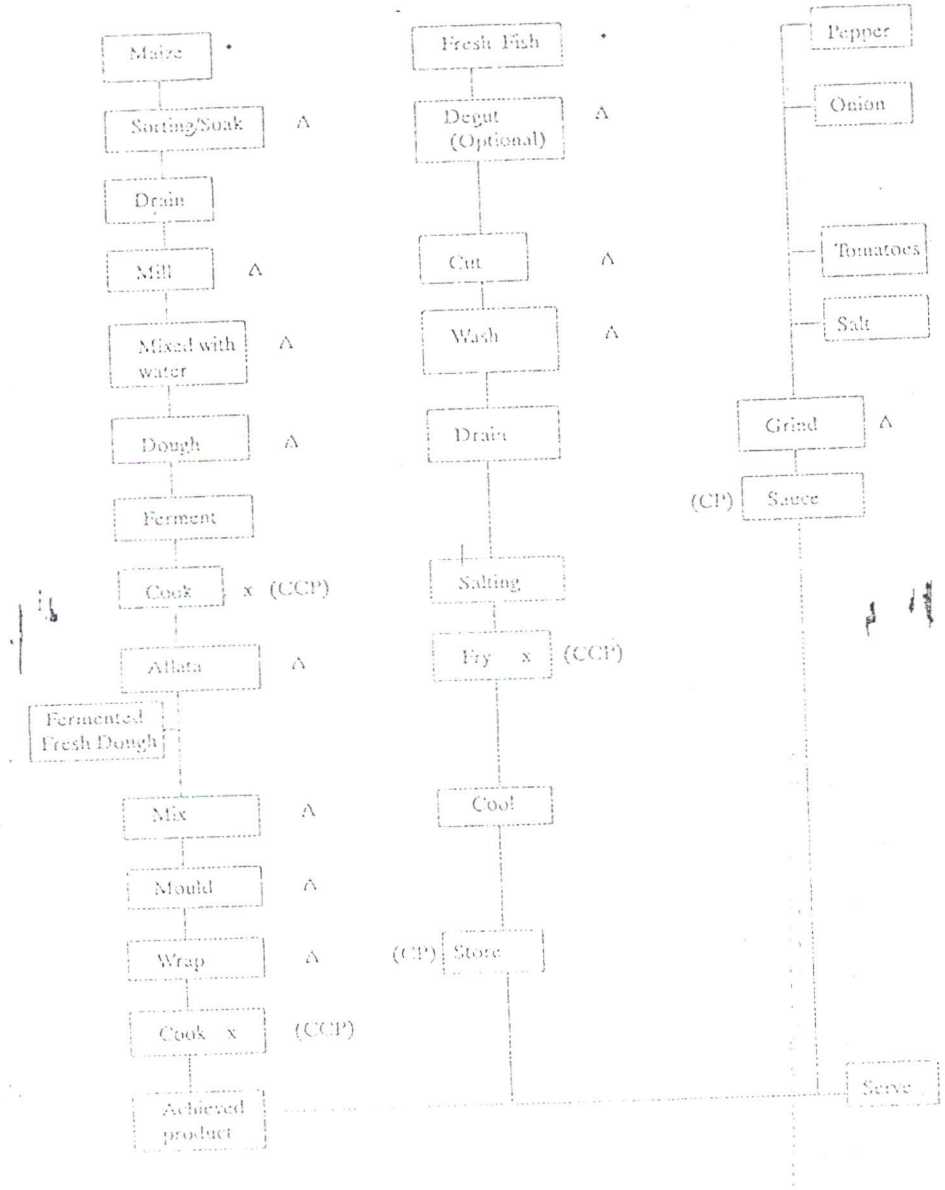
Figure 2 FLOW CHART OF STEW FOR RICE AND BEANS (WAAKYE) SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE



LEGENDS

- • - Initial contamination
- Δ - Contamination from equipment/personnel/surfaces/water
- CCP - Critical Control Point
- x - Inactivation of vegetative bacteria likely
- CP - (Critical Point) Germination of spores and proliferation of vegetative bacteria likely

Figure 3 FLOW CHART OF GA KENKEY PROCESSING SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE



LEGENDS

• - Initial contamination

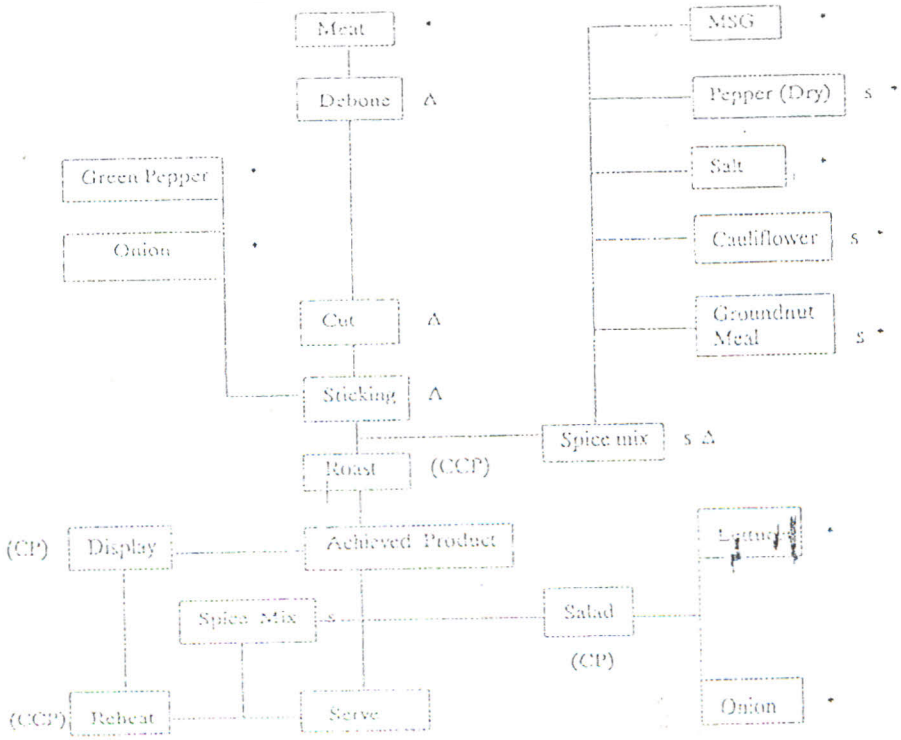
Δ - Contamination from equipment/Personel/Surfaces

x - Inactivation of vegetative bacteria likely

CCP - Critical Control Point

CP - (Critical Point) Growth of bacteria likely

Figure 4 FLOW CHART OF ROASTED MEAT (KHEBAB) PREPARATION SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE

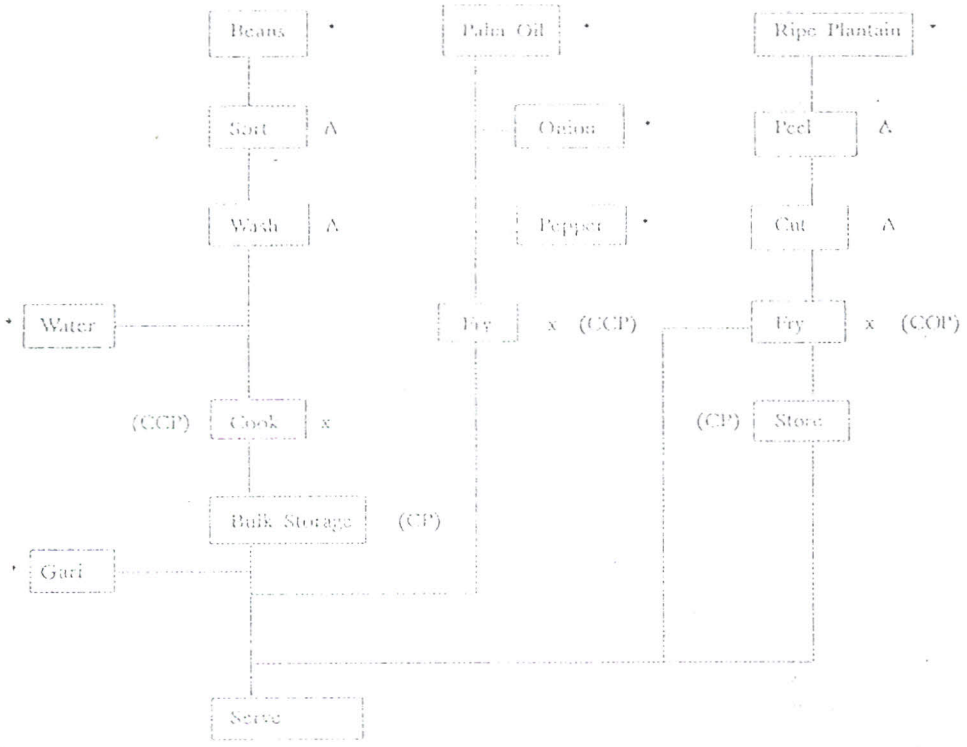


LEGENDS

•	-	Initial contamination
A	-	Contamination from equipment/personnel
CCP	-	Critical Control Point
x	-	Inactivation of vegetative bacteria likely
s	-	Spores likely
(CP	-	(Critical Point) Growth of bacteria likely

Figure 5

FLOW CHART OF GARI AND BEANS (YOO KE GARI) PREPARATION SHOWING POINTS OF CONTAMINATION SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE



LEGENDS

* - Initial contamination

A - Contamination from equipment/personnel/utensils

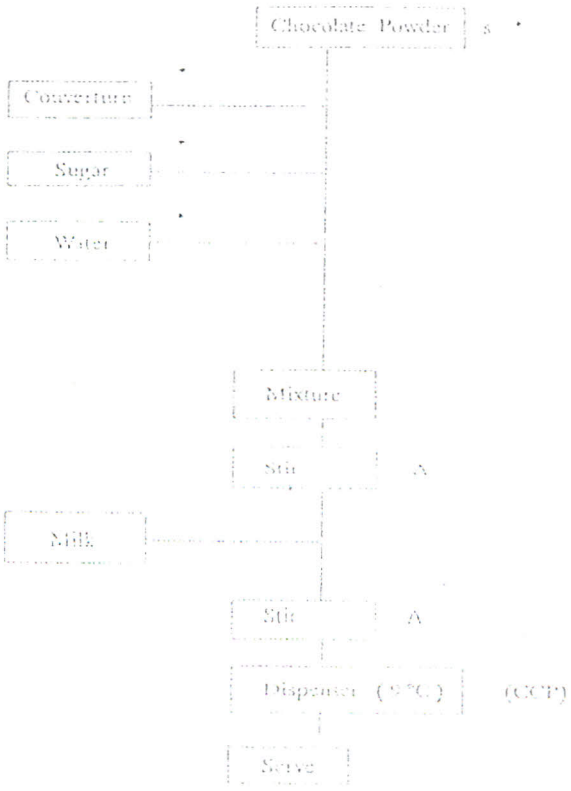
CCP - Critical Control Point

s - Spores likely

x - Inactivation of vegetative forms of bacteria likely

CP - (Critical Point) Germination of spores likely

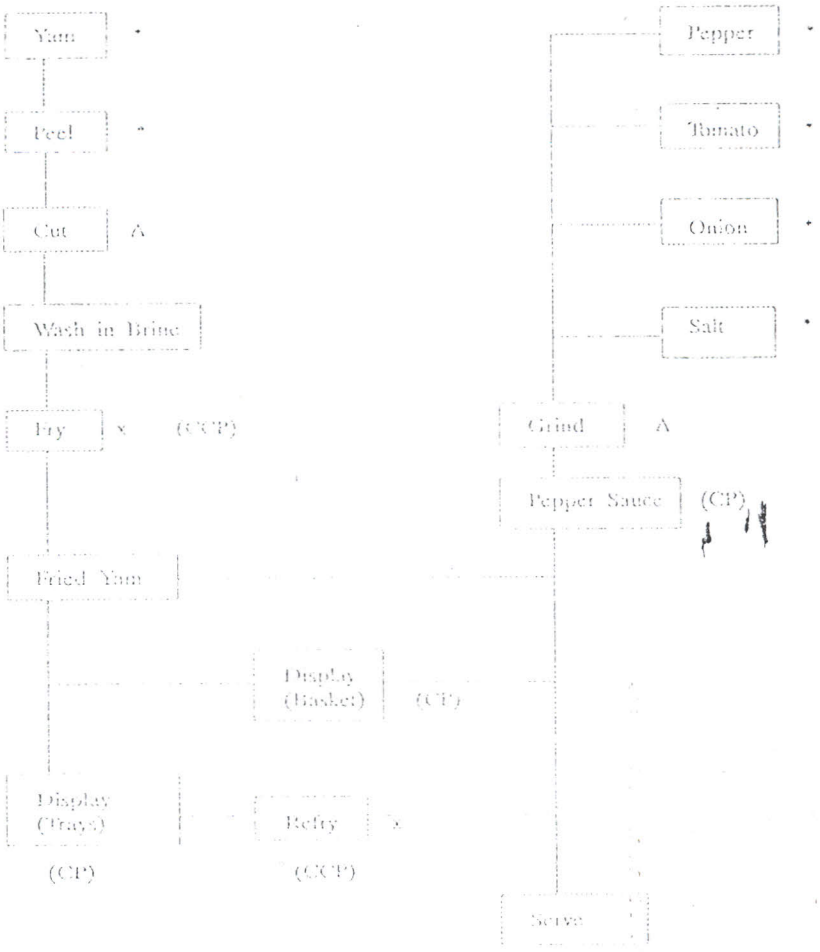
Figure 6 FLOW CHART OF DISPENSED CHOCOLATE PREPARATION SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION DISPLAY AND SALE



LEGENDS:

- Initial Contamination
- A Contamination from equipment/personnel/utensil/water
- Spores likely
- CCP Critical Control Point

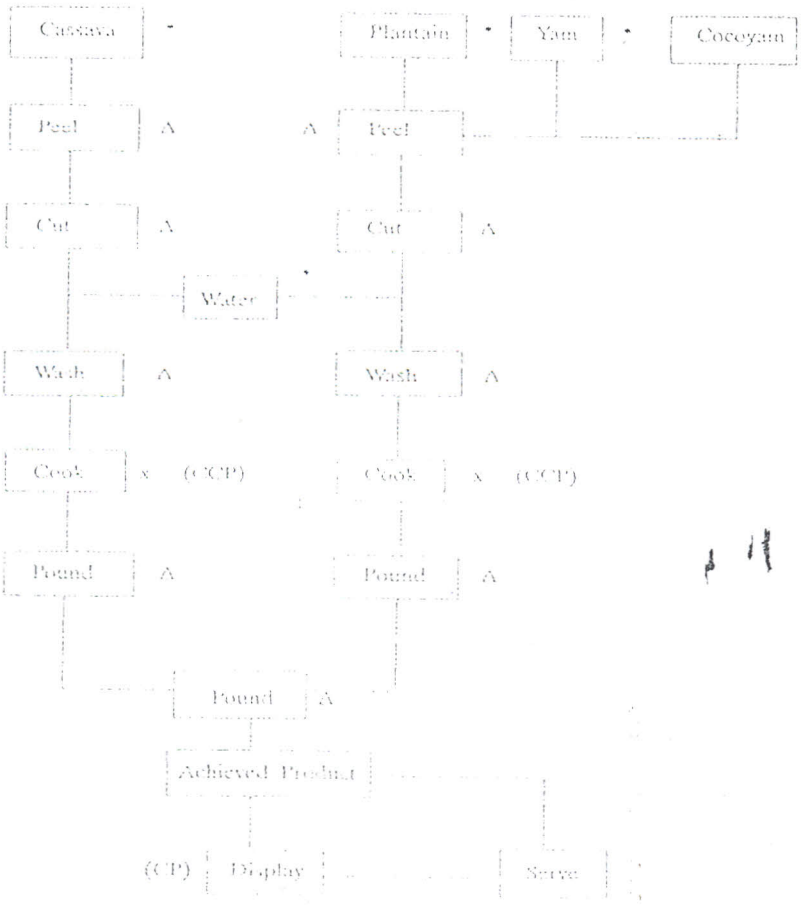
Figure 7 FLOW CHART OF FRIED YAM PREPARATION SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE



LEGENDS

*	-	Initial contamination
A	-	Contamination from equipment/utensils
CCP	-	Critical Control Point
x	-	Inactivation of vegetative forms of bacteria likely
CP	-	(Critical Point) Microbial proliferation likely

Figure 8 FLOW CHART OF FUFU PREPARATION SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE



LEGENDS

* - Initial contamination

A - Contamination from equipment/utensils/personnel

x - Inactivation of vegetative bacteria likely

CCP - Critical Control Point

CP - (Critical Point) Growth of bacteria likely

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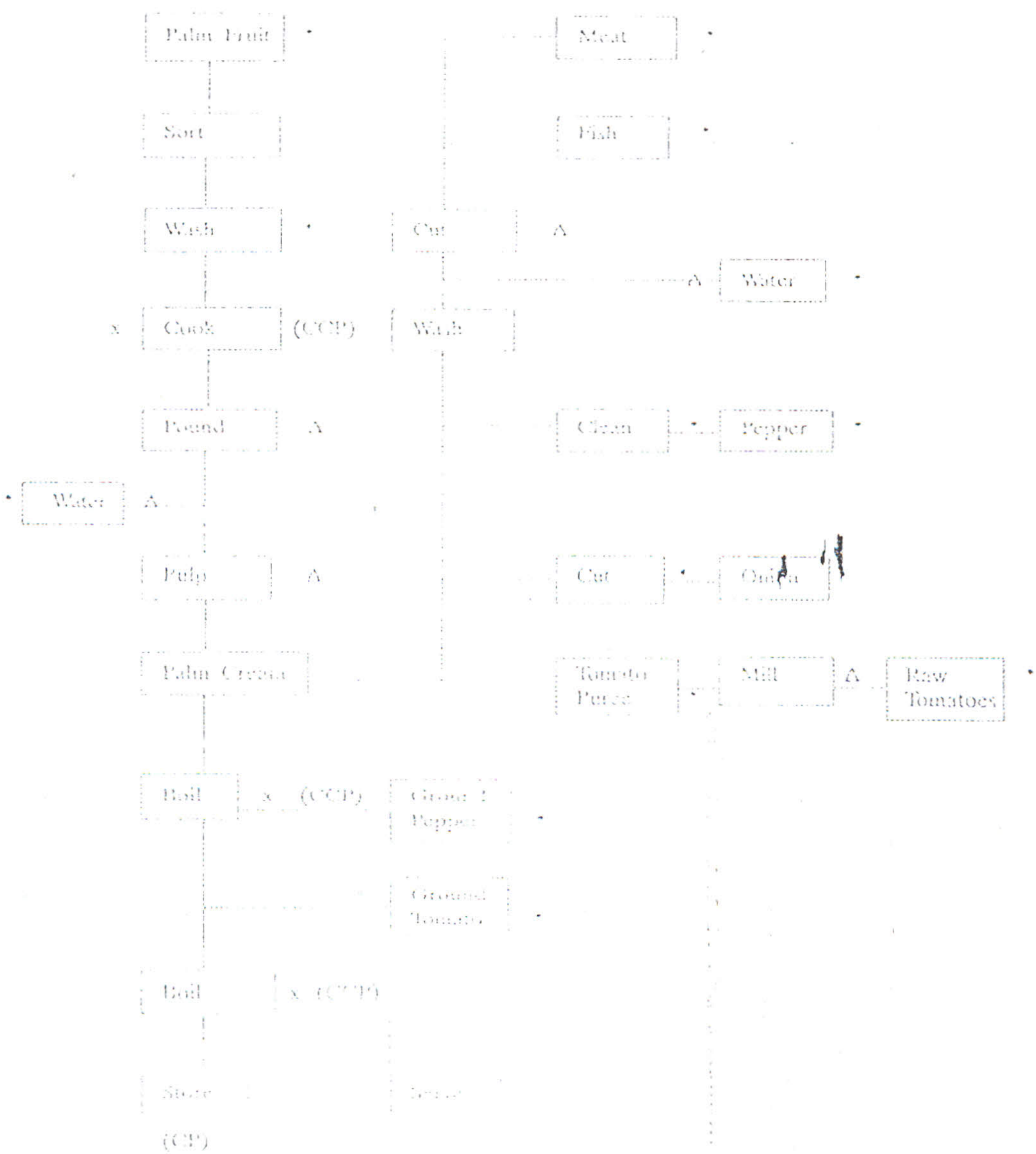
Figure 9 FLOW CHART OF PALM SOUP PREPARATION SHOWING POINTS OF CONTAMINATION, SURVIVAL AND GROWTH OF MICROORGANISMS DURING PREPARATION, DISPLAY AND SALE



LEGEND:

- * - Initial contamination
- A - Contamination from equipment/person/Contaminated water
- x - Inactivation of vegetative bacteria cells
- CCP - Critical Control Point
- CP - (Critical Point) Germination of bacteria spores likely

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TABLE 1

HAZARD IDENTIFICATION AND CRITERIA FOR CONTROL DURING PREPARATION, DISPLAY AND SALE OF RICE AND BEANS (WAAKYE)

PRODUCT/PROCESS	HAZARD	SUGGESTED CONTROL
i. Raw Materials	Physical/Microbial	Remove all pieces of stones, metals
Beans	Stones	and mouldy beans
Rice	Pieces of metals	Wash more than once with clean
	Mouldy beans	potable water.
		Select good quality ingredients.
i. Cooking	Chemical/Microbial	Concentration of added saltpetre
Addition of saltpetre &	Spores on leaves	should be controlled.
Natural food colour	Survival of micro-	
from leaves	organisms	Leaves should be properly cleaned u
		under running water.
		Concentration of food colour
		be monitered and controlled
		cook adequately
i. Frying	Chemical	Use good quality oil.
Fish	Rancidity of oil	Fry adequately.
Stew/Gravy	Microbial	
Onion	Time	Select good quality ingredient
Pepper		

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Tomatoes	Rotten tomatoes	
v. Bulk Display	Microbial	Display products at 600C
Achieved product	Recontamination	Cover products fully
Stew/Gravy	Germination of spores	Scoop with clean laddle.

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TABLE 1 (CONTINUED)

v. Serving Leaves/plates	Microbial Contamination from leaves, utensils and hands	Wash items in soapy water individually, rinse to dry and stor in bucket/bowl with cover. Avoid scooping food with bare Hands
vi. Commercial milling of tomatoes	Microbial contamination from equipment	Clean, disinfect machine before and after use.
vii. Cutting meat after frying	Microbial recontamination	Cut meat, steam before frying
viii. Degutting Fish Utensil Cutting board Hands.	Microbial	Wash adequately under running water

TABLE 2 HAZARD IDENTIFICATION AND CRITERIA FOR CONTROL DURING PREPARATION, DISPLAY AND SALE OF GA KENKEY

	PRODUCT/PROCESS	HAZARD	SUGGESTED CONTROL
i.	Raw Materials Maize/corn Tomatoes Pepper Fish	Microbial (mouldy grains) Physical (stones, metals) Chemical (mycotoxins)	Sort grains Remove mouldy grains, stones, et Select good quality grains, tomat and pepper and wash well under running water Wash degutted fish thoroughly under running water and keep at 40C before frying.
ii.	Soaking	Microbial	Use potable water
iii.	Milling	Microbial recontamination from machine, utensils and hands	Clean, disinfect and dry machine before milling.
iv.	Dough	Microbial hands water	Use potable water; wash hands adequately with soapy wat
v.	Fermentation	Microbial wild mould	Ferment in clean utensil under hygienic conditions for 48 h.
vi.	Aflata preparation	Microbial	Cook adequately.

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TABLE 2 (CONTINUED)

vii. Mixing Aflata and and fresh fermented dough.	Physical (texture) Dust from soil	Use correct proportions of aflata and fresh dough Mix adequately to obtain desirable texture. Mix in enclosed place.
viii. Moulding	Microbial contamination from leaves, hands and environment	Wash hands and leaves under running water. Moulding must be done in an enclosed and well lit room.
ix. Cooking	Microbial	Cook
x. Display Achieved product Pepper sauce	Microbial	Hold food at 60°C and pepper sa at 4°C

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xi. Frying fish	Microbial	Fry fish adequately.
	Chemical (rancid oil)	Keep in glass box and refry before serving.
		Use good quality oil.
xii. Serving	Chemical	Use clean plates.
	Microbial	Leaves must be washed in soapy water individually, rinse under running water and keep in clean closed container.
		Avoid using cement/waste paper for wrapping kenkey.

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TABLE 3

HAZARD IDENTIFICATION AND CRITERIA FOR CONTROL DURING PREPARATION, DISPLAY AND SALE OF ROASTED MEAT (KHEBAB)

PRODUCT/PROCESS	HAZARD	SUGGESTED CONTROL
i. Raw Materials Meat Khebab sauce Onion	Microbial (spores from soil) (vegetative forms) from gut of animal	Wash meat and keep at 4°C during transport and storage. Wash onions, lettuce, and sticks under running water and keep at 4°C.
Sticks lettuce		Use clean spoon/wooden stirrer to stir spice mix. Store khebab spices at 4°C.
ii. Deboning	Microbial contaminaton from equipment knife, personnel	Use clean equipment.
iii Sticking	Microbial contami-nation and proliferation.	Thoroughly wash hands in soapy Water and rinse before sticking meat Process must be rapid.
iv. Roasting	Microbial Survival of vegetative cells a and spores Time	Roast adequately.

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TABLE 3 (CONTINUED)

v. Display	Microbial recontamination and proliferation	Display in glass showcase. Reheat product before serving. Product should be sold in place.
Vi Salad	Microbial	Keep at 4^{0}C
	Proliferation at	Serve with clean spoon
	ambient temperature	Use clean, washed raw materials.

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TABLE 4 HAZARD IDENTIFICATION AND CRITERIA FOR CONTROL DURINGPREPARATION AND SALE OF GARI AND BEANS (YOO KE GARI)

PRODUCT/PROCESS	HAZARD	SUGGESTED CONTROL
i. Beans	Physical (stones,	Sort and clean beans
Gari	sticks)	Wash under running water
Palm oil	Microbial	Use good quality oil
Coconut oil	(mouldy beans)	Use good quality gari.
	(microbial spores)	Keep gari in tight closing container
Ripe plantain	Chemical (Hydrogen	
	cyanide in gari Rancid oil	
ii. Washing	Microbial	Use clean potable water
ii. Peeling/cut	Microbial from	Use clean knife, and utensils.
	knife and utensils/	
	rotten portions	
iv. Cooking	Microbial	Cook beans adequately.
	(spore survival)	
	Time	
v. Frying	Microbial	Fry adequately.
	Time	

TABLE 4 (CONTINUED)

vi. Display Beans Gari Fried plantain	Microbial reconta- mination and proliferation.	Reheat beans to 60^0C. Reheat cold fried plantain before serving Keep gari in tight fitting covered container Scoop gari with clean dry spoon.
vii. Serving	Microbial	Wash plates/spoons individually in soapy water and rinse under running water. Keep washed plates/spoons hygienically.

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TABLE 5 HAZARD IDENTIFICATION AND CRITERIA FOR CONTROL DURING PREPARATION, DISPLAY AND SALE OF DISPENSED CHOCOLATE DRINK

	PRODUCT/PROCESS	HAZARD	SUGGESTED CONTROL
i.	Raw Materials Chocolate powder Couverture Sugar Water	Microbial (spores & vegetative forms)	Store raw materials at 4^0C Tie plastic bag with chocolate powder tightly. Scoop powder with dry, clean, disinfected spoon. Use potable water.
ii.	Mixing/Stir	Microbial utensils equipment	Use clean and disinfected metal/ wooden stirrer
iii.	Display	Microbial	Keep temperature of dispenser at 4^0C instead of 9^0C. Teat and tank of the dispenser should be disassembled, cleaned and sanitized daily.
iv.	Serving	Microbial dust particles on drinking glass	Clean drinking glasses in soapy water and rinse under running water Keep cleaned glasses in a clean container with a cover.

TABLE 6

HAZARD IDENTIFICATION AND CRITERIA FOR CONTROL DURING THE PREPARATION, DISPLAY AND SALE OF FRIED YAM

PRODUCT/PROCESS	HAZARD	SUGGESTED CONTROL
i. Raw Materials Yam Tomatoes	Microbial contamination (Spores/vegetative forms) on skin and bruised portions	Use good unbruised raw material Wash under running water
ii. Peel/cut	Microbial contamination from hands and knife	Use clean hand and knife. Remove any rotten portions.
iii. Wash	Microbial contamination from water, hands, utensils	Use potable water. Change water often. Wash more than once.
iv. Frying	Chemical (rancid oil) Microbial spores Time	Use good quality oil Fry adequately.
v. Display	Microbial contamination and proliferation	Use clean trays. Display product in glass show case Keep pepper sauce at 4^0C.
vi. Serve	Microbial contamination	Refry cold product Avoid handling food with hands. Serve in clean plates.

TABLE 7 HAZARD IDENTIFICATION AND CRITERIA FOR CONTROL DURING PREPARATION, DISPLAY AND SALE OF FUFU AND SOUP

	PRODUCT/PROCESS	HAZARD	SUGGESTED CONTROL
i.	Peeling of cassava and plantain/yam. Palm fruits Smoked fish Meat (raw) Tomatoes Onions Water	Microbial contamination from knife utensils and on product	Use clean utensils and knife. Wash products under running water. Use clean potable water Use good quality raw materials Keep raw meat frozen and other ingredients at 4^0C .
ii.	Cut	Microbial from utensils, knife and hands	Use clean knife, and utensils Clean hand with soapy water prior to cutting.
iii.	Commercial milling of tomatoes	Microbial recontamination from machine/ utensils.	Clean and disinfect machine before and after use.
iv.	Cooking Cassava/plantain Palm fruits	Microbial Time	Cook adequately.

3.2.3 FOODS COOKED AND SOLD AT HOME (TYPE 1)

Results of the laboratory analysis of rice and beans (waakye) are shown in Table 8. Freshly cooked waakye had low microbial counts. Counts lower than 10 CFU/g were recorded for AMCC, *S. aureus, B. cereus and C. perfringens.*

TABLE 8 MICROBIOLOGICAL QUALITY OF WAAKYE

(COLONY FORMING UNITS/G)

Discription of food	Time (H)	TEMP (°C)	AMCC	COLI-FORMS	S.a	B.c	C.p
Rice & Beans	12.00	98	$< 1\times10^{1}$	-	$< 1\times10^{1}$	$< 1\times10^{1}$	$< 1\times10^{1}$
Rice & Beans	16.00	29	2×10^{3}	-	3×10^{2}	1×10^{2}	1×10^{2}

S.a. *Staphylococcus aureus*

B.c *Bacillus cereus*

C.p. *Clostridium perfringens*

After holding cooked waakye in a partly covered bowl under ambient conditions for 4h during display and sale AMCC increased by 2 log cycle. Similarly *S. aureus, B. cereus* and *C. perfringens* increased by 2 log cycle and 1 log cycle respectively. The increase in levels of *B. cereus and C. perfringens* may be attributed to the germination of spore forms of these bacteria in the bulk product. Similarly the high levels of *S. aureus* may be attributed to gross mishandling of waakye by vendor. Some of the hazardous handling practices observed during the visits include: the use of the same hand in scooping waakye, collecting money, packing utensils and picking leaves.

Table 8.1 shows the results of the laboratory analysis of raw materials and gravy for waakye.

TABLE 8.1 MICROBIOLOGICAL QUALITY OF INGREDIENTS AND GRAVY FOR WAAKYE

(COLONY FORMING UNITS/G OR ML)

Description Of food	TIME (H)	TEMP (°C)	AMCC	COLI-FORMS	S.a	B.s	C.p
Ingredient mix (pepper,ging--er, salt)	10:00	29	4×10^{6}	-	1×10^{4}	3×10^{4}	1×10^{2}
Tomato commercially milled	10:00	29	5×10^{7}	-	4×10^{4}	1×10^{3}	1×10^{2}
Gravy (Freshly cooked)	12:00	78	$< 1\times10^{1}$	-	$< 1\times10^{1}$	$< 1\times10^{1}$	$< 1\times10^{1}$
Gravy held for 4 h partly covered	16:00	29	4×10^{5}	-	2×10^{3}	1×10^{2}	$<1\times10^{2}$
Water	11:00	29	3×10^{1}	1×10^{2}	-	-	-

These levels of AMCC ($4x10^{6}$ CFU/g), *S. aureus* ($1x10^{4}$ CFU/g), *B. cereus* ($3x10^{4}$ CFU/g) and *C. perfringens* (1×10^{2} CFU/g) were isolated from raw ingredient mix. Similarly, counts of AMCC ($5x10^{7}$ C F U /g), *S. aureus* ($4x10^{4}$ CFU /g), *B. cereus* (1×10^{3} CFU/g) and *C. perfringens* (1×10^{2} CFU/g) were isolated from commercially milled tomato. These microbial levels indicate the potential hazards associated with these raw materials.

Both the fried meat cutting table and leaves for serving waakye had high levels of AMCC and *S. aureus. Additionally, B. cereus* ($4x10^3$ CFU/cm^2) was isolated from the leaves. These findings indicate that the practice of cutting meat to selling sizes after frying and serving cooked waakye directly unto leaves constitute potential for cross contaminations of both fried meat and cooked waakye. The high levels of *S. aureus* on the cleaned leaves may be attributed to the cleaning process observed at the site. Leaves are cleaned with a common napkin while leaves are pressed against the lap of the cleaner. This mode of cleaning can allow the contamination of leaves from napkin and cloth/dress of the cleaner.

Results of the analysis of Ga kenkey are shown in Table 9. Freshly cooked kenkey had low microbial counts. Counts lower than 10 CFU/g were recorded for AMCC, *S. aureus, B. cereus and C. perfringens.*

TABLE 9 MICROBIOLOGICAL QUALITY OF GA KENKEY

(COLONY FORMING UNITS/G)

DESCRIPTION OF FOOD	TIME (H)	TEMP (°C)	AMCC	COLI- FORMS	S.a	B.c	C.p
Ga Kenkey	11:00	85	$< 1x10^1$	-	$<1x10^1$	$<1x10^1$	<1x1(
Ga Kenkey	15:00	36	$< 1x10^1$	-	$<1x10^1$	$<1x10^1$	<1x1(
Aflata and Fresh dough mixture	09:00	45	$1,4x10^2$	-	$<2x10^2$	$<1x10^1$	<1x1(

After cooked kenkey had been held under ambient conditions for 6 h, during display and sale, there was no increase in microbial levels. Aflata and fresh fermented dough mix had counts lower than 1 0 CFU/g for *B. cereus and C. perfringens.* The presence of *S. aureus* ($2x10^2$ CFU/g) may be attributed to the mixing of the product with bare hands.

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Table 9.1 shows the results of analysis of pepper sauce and fried fish served together with kenkey. Freshly prepared pepper sauce had counts of AMCC ($4xlO^5$ CFU/g), S. *aureus* ($3xl0^4$ CFU/g) and *C. perfringens* (5×10^3 CFU/g).

Holding pepper sauce under ambient conditions for 6 h resulted in increases in AMCC (5×10^7 CFU/g), *S. aureus* ($2xl0^5$ CFU/g) and *B. cereus* ($4xl0^5$ CFU/g).

These findings indicate the potential hazards associated with pepper sauce.

TABLE 9.1 MICROBIOLOGICAL QUALITY OF FRIED FISH AND PEPPER SAUCE FOR SERVING KENKEY

(COLONY FORMING UNITS/G)

DESCRIPTION OF FOOD	TIME (H)	TEMP. (°C)	AMCC	COLI-FORMS	S.a	B.c	C.p
Pepper Sauce	11:00	30	4×10^5	-	3×10^4	5×10^3	-
Pepper Sauce Held for 4h	15:00	30	5×10^7	-	2×10^5	4×10^5	-
Fried Fish	09:00	68	$<1\times10^1$	-	$<1\times10^1$	$<1\times10^1$	-
Fried fish after 6h	15:00	30	2×10^5	-	6×10^4	3×10^3	-

The initial microbial counts of fresh pepper sauce may be attributed to the origin and handling of the ingredients. Pepper sauce therefore poses a public health risk because its preparation does not involve any microbial inactivation step. Again holding the sauce at ambient temperature during display and sale encourages microbial proliferation.

Freshly fried fish had low microbial counts lower than 1 0 CFU/g. After holding the fried fish unc ambient conditions for 6 h during display and sale, AMCC increased by 4 log cycle.

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Similarly, *S. aureus and* . *B. cereus* increased appreciably by 3 log cycle and 2 log cycle respectively. These high increases may be attributed to mishandling of the product during display and sale. Some of the undesirable practices observed at the site include serving fish with bare hands and allowing customers to select fish by touching.

3.2.4 FOODS COOKED AND SOLD BY ROADSIDE (TYPE 11)

Table 10 shows the microbiological quality of roasted khebab. Freshly roasted khebab from both the sedentary and itinerant hawkers had low microbial counts. Counts for E. *coli, S. aureus and C. perfringens* were lower than 10 CFU/g while that for AMCC was less than 1×10^2 CFU/g.

TABLE 10 MICROBIOLOGICAL QUALITY OF ROASTED KHEBAB
(COLONY FORMING UNITS/G)

DESCRIPTION	TEMA (H)	TEMP (°C)	AMCC	B.c	E.COLI	C.p	S.a
Khebab (sedentary hawker	12:00	58	$<1\times10^2$	-	$<1\times10^1$	$<1\times10^1$	$<1\times10^1$
khebab held for 2h in glass display	14:00	30	2×10^3	-	$<1\times10^1$	$<1\times10^1$	$<1\times10^1$
khebab (reheated) after 2h	14:00	52	$<1\times10^1$	-	$<1\times10^1$	$<1\times10^1$	$<1\times10^1$
khebab (fresh) itenarant hawker	12:00	56	$<2\times10^2$	-	$<1\times10^1$	$<1\times10^1$	$<1\times10^1$
khebab held for 5h while roaming	17:00	30	2×10^5	-	$<1\times10^1$	$<1\times10^1$	$<1\times10^4$

In the case of itinerant hawker, holding khebab under ambient conditions during display and sale resulted in high increases in the levels of AMCC ($2x10^5$ CFU/g) and *S. aureus* (1×10^4 CFU/g). Furthermore, *C. perfringens* proliferated to 1×10^2 CFU/g during the same period. The reduction in microbial levels when cold khebab was reheated indicates the necessity for reheating khebab to destroy vegetative cells. The microbial proliferation observed in the itinerant hawking of khebab indicates a potential health risk associated with itinerant hawking of khebab because of exposure to dust and other environmental pollutants.

Results of the analysis of salad, khebab spices and raw meat for the preparation of khebab are shown in Table 10.1. High levels of AMCC ($8x10^7$ CFU/g) and *S. aureus* ($2x10^5$ CFU/g) were isolated from salad during display and sale under ambient conditions.

TABLE 10.1. MICROBIOLOGICAL QUALITY OF SALAD, KHEBAB SPICES AND RAW MEAT USED IN KHEBAB PREPARATION

(COLONY FORMING UNITS/G)

DESCRPTION	TIME (H)	TEMP (°C)	AMCC	B.c	B.SPORES	E.COLI	C.P	S.a
Salad	12:00	30	8×10^7	-	-	-	-	2×10^5
Khebab sauce	12:00	30	4.2×10^7	$<1\times10^2$	2.3×10^4	-	-	2×10^4
Raw meat	11:00	30	8×10^7	-	-	2×10^2	3×10^6	2×10^5

Khebab spices mix had high count of AMCC ($4.2x10^7$ CFU/g), *B. cereus* spores (2.3×10^4/g) and *S. aureus* ($2x10^4$ CFU/g). Similarly, raw meat showed very high microbial count. Counts for AMCC ($8x10^7$ CFU/g), *S. aureus* ($2x10^5$ CFU/g) and *C. perfringens* ($3x10^6$ CFU/g) were recorded. Additionally, *E. coli* ($2x\ 10^2$ CFU/g was isolated from the raw meat. The high microbial count of salad and spices mix may be attributed to mishandling of these products.

Their preparations involve lot of human handling, inadequate cleaning and washing of ingredients and mixing of ingredients in unsterilised bowls. In addition, both ingredients and finished products are stored under conditions which allow microbial proliferation. The high microbial counts on raw meat may be due to poor hygienic practices at the slaughter house. Raw meat is transported to the site on the bare floor of a taxi boot. The time between deboning, slicing, sticking and roasting was about 1.5 h. These conditions expose raw khebab to heavy microbial contamination.

The findings indicate the potential hazards associated with the use of salad, khebab spices and raw meat for khebab preparation. Salad and khebab spices mix should therefore be prepared hygienically and stored under controlled temperatures to prevent indiscriminate microbial contamination and proliferation. These products may also be prepared a little at a time on demand where there is no refrigeration facility. Raw meat should be transported and handled hygienically. Raw khebab should be roasted adequately to guarantee the safety of the product.

The microbiological quality of food contacts surfaces in khebab preparation is depicted in Table 10.2 High levels of AMCC ($4x10^6$ CFU/cm^2), *E. coli* ($2x10^2$ CFU/cm^2) and *S. aureus* ($3x10^3$ CFU/cm^2) were isolated from meat cutting table.

TABLE 10.2 MICROBIOLOGICAL QUALITY OF FOOD CONTACT SURFACES IN KHEBAB PREPARATION

(COLONY FORMING UNITS/CM2)

DESCRIPTION	TIME (H)	TEMP (°)	AMCC	B.c	E.COLI	C.p	S.a
Meat cutting table	11:00	30	4×10^6	-	$2,2\times10^2$	$<1\times10^2$	3×10^3
Meat chopping wooden stump	11:00	30	2×10^8	-	4×10^2	$<1\times10^2$	6×10^3

Similarly high count of AMCC ($2x10^8$ CFU/cm^2), *E. coli* ($4x10^2$ CFU/cm^2) and *S. aureus* ($6x10^3$ CFU /cm^2) were isolated from meat chopping wooden stump. Additionally, C. *perfringens* (1×10^2 CFU/cm^2) was isolated from both meat and meat contact surfaces. These findings indicate a strong tendency for cross contamination of utensils, personnel and roasted khebab. There is therefore the need for cleaning and disinfecting of these food contact surfaces before and after use.

Table 1 1 shows the microbial quality of gari and beans with fried ripe plantain. High counts of AMCC ($3x10^4$ CFU/g) and *S. aureus* ($4x10^3$ CFU/g) were isolated from gari. In addition, both vegetative and spore forms of *B. cereus* were isolated from gari. Holding gari under ambient conditions during display and sale for 6 h resulted in increases in AMCC ($5x10^5$ CFU/g) and *S. aureus* ($3x10^5$ CFU/g). The level of *B. cereus* did not significantly change.

The high levels of AMCC and *S. aureus* may be attributed to mishandling. At this site it was observed that gari is stored in bulk in the vendor's bedroom and a little is scooped for sale daily. The gari is kept in an open bowl and scooped with bare hands during service.

Freshly cooked beans had low microbial counts. Counts for AMCC and *B. cereus* were lower than 10 CFU/g. Holding cooked beans for 6 h during display and sale under ambient conditions resulted in increases in AMCC and *B. cereus* counts by 1 log cycle each. A count of less than 10 CFU/g was observed for *C. perfringens*.

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TABLE 1 1 MICROBIOLOGICAL QUALITY OF GARI AND BEANS

WITH FRIED RIPE PLANTAIN

(COLONY FORMING UNITS/G)

DESCRIPTION	TIME (H)	TEMP (°C)	AMCC	B.c	B.SPORES	C.p	S.a
Gari	09:00	30	3×10^{4}	5×10^{1}	4×10^{2}	-	4×10^{3}
Gari held for 6h	15:00	30	5×10^{5}	6×10^{1}	6×10^{2}	-	3×10^{5}
Cooked Beans	09:00	85	$<1\times10^{1}$	$<1\times10^{1}$	-	-	-
Cooked Beans	15:00	30	3×10^{2}	6×10^{2}	-	$<1\times10^{1}$	-
Fried Ripe Plantain	11:00	68	$<1\times10^{1}$	$<1\times10^{1}$	-	$<1\times10^{1}$	$<1\times10^{1}$
Fried Ripe Plantain held in glass for 6h	11:00	30	4×10^{2}	$<1\times10^{2}$	-	$<1\times10^{1}$	$<1\times10^{2}$

The microbial load of freshly fried ripe plantain, which is normally served with gari and beans, was low . Counts for AMCC, *B. cereus, S. aureus and C. perfringens* did not exceed 10 CFU/g. Holding the fried ripe plantain for 6 h under ambient conditions in a glass show case resulted in increases of 1 log cycle each for AMCC, *B. cereus and* C. *perfringens.* To improve on the safety of gari and beans, gari should be stored hygienically and scooped with clean equipment, cooked beans should be kept hot during display and sale and cold fried ripe plantain should be reheated before serving.

3.2.5 FOODS COOKED AND SOLD AT LORRY PARK (TYPE 111)

Table 1 2 shows the results of the analysis of dispensed drinking chocolate. Freshly prepared chocolate drink had low microbial counts. Counts were below 10 CFU/ml for coliforms and *B. cereus*. However, counts for AMCC, *S. aureus and B. cereus* spores were a little high.

TABLE 12 MICROBIOLOGICAL QUALITY OF DISPENSED CHOCOLATE DRINK

(COLONY FORMING UNITS/ML)

DESCRIPTION	TIME (H)	TEMP (°C)	AMCC	S.a	SPORES	C.FORM	B.c
Chocolate drink	07:00	30	3×10^{4}	$<1\times10^{2}$	$<1\times10^{2}$	$<1\times10^{1}$	$<1\times10^{1}$
Chocolate drink held for 7h	14:00	9	2×10^{5}	3×10^{2}	-	$<1\times10^{1}$	$<1\times10^{1}$

After holding chocolate drink at 9°C for 7 h during display and sale, the levels of AMCC increased by 1 log cycle. There were no significant increases in the levels of coliform bacterium, *B. cereus and S. aureus*. The low increases in microbial growth observed may be due to the low temperature (9°C) at which the drink is displayed and sold. This temperature does not readily support the growth and proliferation of most bacteria.

Table 1 2.1 shows the microbiological quality of ingredients for drinking chocolate and the teat of the dispensing machine. Chocolate powder had low microbial counts. However the presence of these levels of *S. aureus* (1×10^{3} CFU/g), *B. cereus* spores (2×10^{2}/g) and *B. cereus* (1×10^{2} CFU/g) indicates a potential hazard associated with the powder. The presence of these organisms in the powder may be due to mishandling of the product after opening of the polyethylene bag in which the product is packaged. At this site it was observed that the polyethylene was not tightly closed after opening.

Secondly, the left over of the product is kept under ambient conditions. The microbial counts of couverture powder were below 1 0 CFU/g. No *E. coli* was isolated from the water for the preparation of the chocolate drink.

TABLE 12.1 MICROBIOLOGICAL QUALITY OF INGREDIENTS FOR CHOCOLATE DRINK AND TEA' OF DISPENSING MACHINE

COLONY FORMING UNITS/G OR CM2)

DESCRIPTION	TIME (H)	TEMP (°)	AMCC	S.a	SPORES	C.FORM	B.c
Chocolate Powder	07:00	30	4×10^{4}	1×10^{3}	2×10^{2}	-	1×10^{2}
Couverture	07:00	30	3×10^{1}	-	-	-	$<1\times10^{1}$
Water	07:00	30	5×10^{3}	-	-	$<1\times10^{1}$	-
Swab from Teat	07:00	30	4×10^{2}	4×10^{1}	-	-	-
Swab from teat/7h	14:00	9	3×10^{4}	$<1\times10^{2}$	-	-	-

Swabs from the teat of the dispensing machine had initial low count of AMCC (4×10^{2} CFU /cm^2). This level increased to (3×10^{4} CFU/ cm^2) after 7 h display time at 9° C. The non excessive proliferation of microorganisms during the display and sale of the chocoloate drink at 9^0C could be improved if the product is kept at 4 - 5^0C.

Table 13 shows the results of the analysis of fried yam . Freshly fried yam had count of AMCC (2×10^{2} CFU/g), *S. aureus* (1×10^{2}CFU/g) and coliform bacterium (1×10^{3}CFU/g).

TABLE 13 MICROBIOLOGICAL QUALITY OF FRIED YAM

(COLONY FORMING UNITS/G)

DESCRIPTION	TIME (H)	TEMP (°C)	AMCC	S.a.	SPORES	C.FORM	B.c.
Fried Yam	11:00	68	$2x10^3$	$1x10^2$	-	$1,1x10^3$	-
Fried Yam held for 3 h	14:00	30	$8x10^5$	$3,2x10^3$	-	$7x10^4$	-
Fried Yam reheated after 3 h	14:00	62	$1,2x10^2$	$7,2x10^2$	-	$<1x10^1$	-

During display and sale under ambient conditions, AMCC increased by 2 log cycle. Similarly *S. aureus* and coliform bacterium increased by 1 log cycle each respectively.

Refrying fried yam reduced the level of AMCC, *S. aureus* and coliform bacterium appreciably to less than 10 CFU/g. The initial high coliform counts of freshly fried yam may be due to mishandling of the product. Fried yam is picked with bare hands by the vendor during service. This practice allows recontamination of the fried product by the vendor. Keeping fried yams in a glass showcase during display and sale may prevent contamination from dust and environmental pollutants.

Table 13.1 shows the microbiological quality of fried fish and pepper sauce which are served along fried yam. Freshly fried fish had low mocrobial counts. Counts for AMCC ($2x10^3$ CFU/g) and coliform bacterium ($6x10^2$ CFU/g) were recorded.

TABLE 13.1 MICROBIOLOGICAL QUALITY OF FRIED FISH AND PEPPER SAUCE FOR FRIED YAM

(COLONY FORMING UNITS/G)

DESCRIPTION	TIME (H)	TEMP (°C)	AMCC	S.a	SPORES	C.FORM	B.c
Fried fish	11:00	68	2×10^{3}	-	-	6×10^{2}	-
Fried Fish held 3h	12:00	30	$1,2\times10^{5}$	-	-	$2,4\times10^{4}$	-
Pepper Sauce	11:00	30	3×10^{4}	1×10^{2}	-	3×10^{2}	-
Pepper sauce held for 3h	14:00	30	5×10^{6}	2×10^{4}	-	3×10^{3}	-

Holding fried fish for 3 h under ambient conditions during display and sale resulted in remarkable increases in microbial numbers. Counts for AMCC and coliforms increased by two log cycle each. Freshly prepared pepper sauce had microbial counts of AMCC (3×10^{4} CFU/g), *S. aureus* (1×10^{2} CFU/g) and coliforms (3×10^{2}CFU/g). Holding the pepper for 3 h under ambient condition during display and sale also resulted increase in microbial numbers. Counts of AMCC increased by 2 log cycle, *S. aureus* by 2 log cycle and coliforms by 1 log cycle.

SFSIG III

The high microbial count in both products may be attributed to mishandling. It was observed at this site that fried fish is picked with the bare hands during service. The vendor rearranges fish once a while with bare hands during display. Pepper sauce is prepared from inadequately washed pepper, tomatoes and onion. These raw materials can harbour lots of bacteria due to their origin. Additionally, the pepper sauce is ground in an earthenware and kept under ambient conditions in a partly covered bowl during display and sale. The vendor uses one plastic spoon to repeatedly scoop the sauce during service. These food handling practices may account for the increases in the microbial numbers in the fried fish and pepper sauce.

SFSIG III

Table 1 4 shows the microbiological quality of fufu. Microbial counts of freshly pound fufu were relatively low. Counts for AMCC ($2xl0^3$ CFU/g) and *S. aureus* (1×10^2 CFU/g) were recorded.

TABLE 14 MICROBIOLOGICAL QUALITY OF FUFU

(COLONY FORMING UNITS/G)

DESCRIPTION	TIME (H)	TEMP (H)	AMCC	S.a	SPORES	C.FORM	B.c
Fufu	08:00	32	2×10^3	1×10^2	-	$<1\times10^1$	$<1\times10^1$
Fufu held for 7h	15:00	30	3×10^5	2×10^3	-	$<1\times10^1$	$<2\times10^3$

Holding fufu for 7 h under ambient conditions during display and sale resulted in increases in microbial numbers. The level of AMCC increased significantly from $2xl0^3$ CFU/g to $3xl0^5$ CFU/g. Similarly the levels of *S. aureus* increased from 1×10^2 CFU/g to $2xl0^3$ CFU/g. Interestingly, the level of *B. cereus* increased from less than 1 0 CFU/g to $2x10^2$ CFU/g during this same period. The increase in microbial numbers may be attributed to poor handling and hygienic practices. It was observed at the site that the person pounding the fufu was poorly clothed. The profuse sweat on his body was never wiped off. The fufu was pounded in the open which predisposes the product to contamination from the dust. Fufu was also kept in a partially covered bowl during display and sale.

SFSIG III

Table 14.1 shows the microbiological quality of water and pestle for moulding and pounding of fufu respectively. Initial counts of AMCC (1×10^3 CFU/ml), *S. aureus* (1×10^2 CFU/mi) and coliforms (< 1 0 CFU/ml) were recorded for water for moulding fufu. After using the water continuously for 1 h in moulding fufu, microbial levels of the water increased significantly. Counts of AMCC increased to $5\text{x}10^5$ CFU/ml, *S. aureus* to $5\text{x}10^4$ CFU/mi and coliforms to 1×10^2 CFU/ml. These high numbers of bacteria may be due to the continuous dipping of hands into the water during the pounding process. The water was not changed during this period.

SFSIG III

TABLE 14.1 MICROBIOLOGICAL QUALITY OF PESTLE AND WATER FOR MOULDING FUFU

(COLONY FORMING UNITS/ML OR CM2)

DESCRIPTION	TIME (H)	TEMP (°C)	AMCC	S.a	SPORE	C.FORM	B.c
Water for moulding fufu	10:00	30	1×10^{3}	$<1\times10^{2}$	-	$<1\times10^{1}$	-
water for moulding fufu	11:00	30	5×10^{5}	5×10^{4}	-	$<1\times10^{2}$	-
swab from pestle	08:00	30	4×10^{4}	$<1\times10^{2}$	-	$<1\times10^{2}$	-
swab from pestle immersed in hot water 15min	08:00	56	$<1\times10^{2}$	1×10^{2}	-	$<3\times10^{1}$	-

SFSIG III

Microbial counts of swabs from unwashed pounding end of the pestle had high numbers of AMCC ($4x10^4$ CFU/cm^2), *S. aureus* (1×10^2 CFU/cm^2) and coliforms (1×10^2 CFU/cm^2). Counts of swabs from the pestle after immersing in hot water for 15 mins. showed a reduction in microbial numbers. Counts of AMCC reduced from $4X10^4$ CF U/cm^2) to (1×10^2 CFU/cm^2) , and coliforms from (1×10^2 CFU /cm^2) to less than 30CFU /cm^2 . These findings indicate the need to frequently change the water for moulding fufu. The person founding fufu must be properly clothed. The practice of immersing the pounding end of the pestle in hot water for about 15 min before use should be encouraged.

Table 14.2 shows the results of analysis of palm soup for fufu. The uncooked soup had microbial counts of AMCC ($3x10^3$ CFU/ml), *S. aureus* (1×10^2 CFU/ml), *B. cereus* (1×10^2 CFU/ml) and *C. perfringens* (1×10^2 CFU/mi). Freshly cooked soup had microbial numbers less than 10 CFU/ml for AMCC, *S. aureus, B. cereus and C. perfringens.* These findings indicate the effectiveness of the heating process in inactivation of vegetative bacteria associated with the uncooked soup.

Holding cooked soup in an uncovered bowl on smouldering charcoal during display and sale resulted in significant increase in AMCC ($3x10^6$ CF U/ml) . Similarly, the level of C. *perfringens* increased from less than 1 0 CFU/ml to (1×10^2 CFU/ml). The unusually high AMCC counts may be attributed to the exposure of cooked soup without cover during display and sale. Similarly, dust from moving vehicles and persons talking over soup during service may also contribute to the high AMCC count. The proliferation of *C. perfringens* may be attributed to the germination of spore forms of the bacterium. Holding soup in bulk during display and sale results in creating anaerobic condition at the bottom of the soup. This condition coupled with a favourable temperature may favour the germination of spores of anaerobic bacteria.

TABLE 14.2 MICR0BIOLOGICAL QUALITY OF PALM SOUP FOR FUFU

(COLONY FORMING UNITS/ML)

DESCRIPTION	TIME (H)	TEMP (°C)	AMCC	S.a	SPORES	B.c	C.p
Palm soup with meat (raw)	06:00	30	3×10^3	1×10^2	-	1×10^2	1×10^2
Palm soup cooked	08:00	78	$<1\times10^1$	$<1\times10^1$	-	1×10^1	$<1\times10^1$
Soup held for 7h	15:00	32	3×10^6	$<1\times10^1$	-	$<1\times10^1$	$<1\times10^2$
Meat (raw)	06:00	30	3×10^7	4×10^3	-	-	4×10^4
Tomato puree (milled commercially)	06:00	30	5×10^6	3×10^5	-	3×10^4	2×10^2

SFSIG III

Raw meat and freshly milled tomato puree had very high microbial counts. Counts of AMCC ($3x10^7$ CFU/g), *S. aureus* ($4x10^3$ CFU/g) and *C. perfringens* ($4x10^{4}$ CFU/g) were recorded for raw meat. Similarly, counts of AMCC (5×10^6 CFU/g), *S. aureus* ($3x10^5$ CFU/g) and *C. perfringens* ($2x10^2$ CFU/g) and B. cereus ($3x\ 10^4$ CFU/g) were recorded for commercially milled tomato puree.

The high microbial count of raw meat may be due to poor handling practices at the slaughter house, transporting carcass to the site in the boot of a taxi and selling meat under ambient conditions amidst flies. The high microbial load of tomato puree may be attributed to contamination from the milling machine. A visit to the miller revealed poor sanitation and handling practices which can encourage microbial contamination.

3.3 CONCLUSION

Based on the results of the HACCP study on streetfoods in Ghana it is evident that food handling practices in streetfoods, irrespective of where they are prepared and sold are similar. Raw materials for the preparation of streetfoods constitute a potential source of microbial contamination.

However adequate heating processes employed in their preparation inactivate most vegetative bacteria but not bacteria spores. Holding chocolate drink at 9^0C during sale and display suppressed microbial growth and proliferation.

The preparation and sale of streetfoods in Ghana involve excessive human handling. The practice of holding streetfoods under ambient conditions without complete covering during display and sale facilitates microbial recontamination and proliferation.

Streetfood delivery in Ghana lacks support services such as pipe borne water, heating appliances, refrigeration and wash up rooms. Streetfood vendors are neither properly organised nor trained.

3.4 RECOMMENDATIONS

The HACCP study focused on the evaluation of critical controls, hazards and risks associated with the production, display and sale of streetfoods. Based on the data from the microbiological analysis of foods and on the spot verification of processing methods and handling practices, these recommendations are being made for improving streetfood delivery in Ghana.

.4.1 RAW MATERIAL HANDLING

Raw materials for the preparation of streetfoods in Ghana are potentially capable of supporting vegetative and spore forms of bacteria due to their origin from soil, poor hygienic practices on farms, slaughter houses and storage and transport at abused temperatures. It is therefore recommended that vendors be taught and encouraged to:

Buy good quality raw materials from reliable sources.

Store perishable raw materials separately at 4^0C. Meat and poultry should be stored frozen - 20^0C). Where there is difficulty in the provision of refrigeration facilities it is recommended that vendors purchase raw materials as needed.

Store raw materials in a manner which protects them from contamination by insects, rodents, utensils, chemicals, or other agents of public health significance.

SFSIG III

Clean, sort and wash raw materials thoroughly before use.

.4.2 COOKING

Due to the initial high microbial load of most raw materials, any cooking or heating process becomes a critical step in inactivation of vegetative bacteria. Streetfoods requiring heat treatment should therefore be adequately cooked, fried or roasted as appropriate at the right temperature and time parameters to ensure the destruction of most vegetative bacteria.

3.4.3 FOOD DISPLAY

Display of food at ambient temperature predisposes the food to recontamination. Food temperature during display is therefore very critical for the safety of street foods.. It is therefore recommended that :

Cooked food should be kept hot during display. Cold food must be reheated before serving.

Potentially hazardous products like pepper sauce and salad the processing of which does not involve any microbial inactivation step must be ideally kept at 4^0C during display to minimise bacteria proliferation. However in the absence of refrigeration facilities it is recommended that salad and pepper sauce be prepared on demand.

SFSIG III

Dispensed drinks must be kept at 4^0C instead of the current temperature of 9^0C.

All foods should be displayed above floor **level** (1 metre) and covered to prevent contamination.

In case of leftover foods, vendors should be encouraged to adopt one of the following measures :

(i) Reduce to sell

(ii) Give out to helpers as a form of payment.

As much as possible vendors must be discouraged from mixing leftover foods with fresh foods for sale. They must also not keep leftovers under ambient conditions and sell later.

In the absence of refrigeration and constant temperature facility, vendors should be encouraged to prepare food in limited quantities at a time to avoid prolonged holding periods.

SFSIG III

Food shall be held during display with a minimum of manual contact using suitable equipment to prevent microbial recontamination.

More importantly, vendors should be educated on the hazards associated with food handling and display operations so that they will be able to handle food hygienically.

3.4.4 FOOD HANDLING AND PERSONAL HYGIENE

Pathogenic microorganisms contaminate food from human and environmental sources. Acceptable streetfood handling and personal hygienic practices can be achieved through education and provision of desirable infrastructure at the vending sites.

Education

Regular training programmes should be organised for streetfood vendors on personal r cleanliness, employee health and undesirable habits which influence the safety of food. The training must be followed by regular and systematic inspection of premises and practices by an accredited Food Inspection body. In Ghana, the appropriate food control agencies should be strengthened to undertake these activities effectively and efficiently.

SFSIG III

Infrastructure

Apart from two places, there was no evidence of proper Organisation of streetfood vendors with access to certain basic infrastructure like tap water at the site. It is therefore strongly recommended that streetfood business be properly organised and vendors be provided with decent stalls at specified locations. Stalls should be provided with electricity, pipe borne water, effective garbage disposal system, sanitary facilities, pest control, refrigeration facilities where possible for a fee.

SFSIG III

Since the studies revealed that basic infrastructure for streetfood delivery is woefully

lacking in Ghana, it is therefore recommended that the pilot study under Phase V of SFSIG should aim at providing adequate infrastructure over and above that anticipated in the project proposal.

3.4.5 ENFORCEMENT OF BYE LAWS ON STREETFOODS

In addition, there is a need to enforce the existing bye-laws prohibiting the sale of

streetfoods at unauthorised sites and a Code of Practice on Streetfoods to guide all prospective streetfood vendors.

SFSIG - PHASE IV

REPORT ON PARTICIPATORY RAPID APPRAISAL WORKSHOP

4. INTRODUCTION

In preparation for the commencement of the Phase V (Pilot Testing) of the street food project, members of the local team handling the Street Food Situation in Ghana (SFSIG) and selected field workers were introduced to Participatory Rapid Appraisal (PRA) methodology by an international consultant, Fannie Deboer, fielded by FAO.

OBJECTIVES

The objective of the workshop was to equip the local SFSIG team to develop a rapid, reliable and systematic method of assessing the developmental needs of the Street Food Business (SFB) in Ghana, prioritise them and develop a consensus with vendors and consumers on possible solutions.

PARTICIPANTS

A total of eight (8) officers drawn from the collaborating agencies involved in the project participated in the workshop. The list of participants is attached as Annex 4.1.

4.1 METHODOLOGY

The workshop was organised on informal basis with the consultant introducing the topic and encouraging group discussions. The following techniques were discussed:

- *Semi-structured Interview*
- *Focus Group Discussion*
- *Design of Daily Activity Chart*
- *Mapping*

In addition to the theoretical discussions, field trips were organised to practise these techniques.

4. 1. 1 FIELD APPLICATION OF TECHNIQUES

4. 1. 1. 1 Semi-Structured Interview

Participants were divided into three groups based on the categorisation adopted for the HACCP Study conducted under Phase III of the SFSIG project. Home-based, roadside and lorry park street food vendors were accordingly interviewed. Food Inspectors from the Environmental Health Division of Accra Metropolitan Assembly were also interviewed.

Prior to departure to the field, the participants discussed and agreed on common and essential questions. The data obtained after the interviews were analysed and compared with the findings of the initial survey carried out by the team.

4.1.1.2 Mapping

Each group designed a spatial mapping of selected vendors. This involved sketching the location of each vendor and the distances he/she must cover before having access to potable water, garbage disposal facility, toilet, medical care, market, raw material supply and other vital inputs essential for the operation of his/her business. The aim of mapping was to determine access to basic infrastructure within a given location.

4.1.1.3 Daily Activity Chart

A chart depicting the daily activities of each selected vendor from dawn to dusk was drawn. This technique was to highlight the use of time and how one could design a training programme to enable vendors to participate without time constraints.

4.1.1.4 Focus Group Discussion

Three groups comprising 7 - 1 0 persons representing home based, road-side and lorry park street food vendors drawn from Association of Traditional Caterers and Chop Bar Keepers Association and selected consumers were used for testing this technique.

Specific questions relating to their operations were asked and answers were given by the group or a member of the group. Direct answers, manners and facial expressions of interviewees were critically observed during answer time.

The fora served as a medium of interaction between the local team and food vendors/ consumers with the view of identifying the priority problems and finding acceptable and effective solutions which could be implemented with the full involvement of the vendors.

4.2 EVALUATION OF WORKSHOP

The workshop was evaluated on the following:

- Presentation of material
- Quality of course content
- Organisation
- Relevance of workshop
- Participatory involvement
- Field work/theory
- Duration
- Impact of workshop.

A 5-point grading system was used with 5 being excellent and 1 as poor.

The participants generally agreed that the workshop did achieve its objectives.

4.3 CONCLUSION

At the end of the workshop, the SFSIG team in consultation with the international consultant and the FAO official on back stopping mission agreed that due to monetary constraints, the Pilot Study Phase should be substituted with a maximum of three workshops. the objectives of the workshop is to sensitize policy makers, Non-Goyernmental Organisations and other stake holders. This is to facilitate recognition of the economic potential of Street Food Business (SFB), possible funding with respect to the provision of infrastructure and easy implementation of proposals for improvement of Street food delivery in Ghana.

SFSIG V

WORKSHOP ON THE STREETFOOD SITUATION IN GHANA HELD IN ACCRA ON 28 NOV, 1996

5.0 INTRODUCTION

In place of the Pilot Study Phase of the Street Food Situation in Ghana (SFS[G) Project, a seminar was organised by the local SFSIG team for StreetfoodVendors, Consumers, Health Inspectors, Non-Governmental Organisations, Media Practitioners and other stake holders.

OBJECTIVES

The objectives of the workshop were to:

(a) Disseminate the findings of the survey on the SFSIG to food vendors, food handlers and stakeholders with the view of finding solutions to the problems that militate against the delivery of safe street foods in Ghana.

(b) Sensitize stakeholders and especially media practitioners on the economic potential of streetfood business and the need to publicise it for recognition by policy makers.

(c) Sensitize local Non-Governmental Organisations to consider the provision of basic infrastructure to improve the quality of streetfood delivery in Ghana.

SFSIG V

PARTICIPANTS

A total of thirty one (31) participants drawn from streetfood vendors, consumers, media practitioners, non-governmental organisations and Food Control Agencies participated in the workshop. A list of participants is attached as Annex 5.4.1.

5.1 PROCEEDINGS

The workshop was organised on a formal basis with the Director of Ghana Standards Board, who is also the Chairman of the local SFSIG Project as the Chairman. A copy of the workshop programme is attached as Annex 5.4.2. Three speakers discussed the reports of the first three phases of the project. The speakers and the topics were as follows:

i.	*Mr. A. 0. Ntiforo*	*Review of the Streetfood Business in Ghana*
ii.	*Mrs. P. Lokko*	*The state of infrastructural support in streetfood business in Ghana.*
iii.	*Mr. J Odame-Darkwah*	*HA CCP study of selected street-foods in Ghana.*

After each topic, questions raised by the participants were discussed and agreeable recommendations made.

SFSIG V

5. 1.1 REVIEW OF SFSIG

Mr. Ntiforo discussed the history and role of streetfood business in Ghana. He highlighted the socioeconomic importance of streetfood business as income generation venture, providing employment, ready source of nutritious meals outside home to a large sector of both urban and rural dwellers. He further stated that existing Bye-laws on streetfood are outdated and there is the need for review. He elaborated on the characteristics of streetfood vendors, the range of streetfoods on the market, reasons for patronising streetfoods and consumer complaints regarding the hygienic practices in streetfood delivery. Mr. Ntiforo concluded the session with these following observations for discussion;

5.1.1.1 Recognition of streetfood business by policy makers as an important economic activity.

5.1.1.2 Need for nationwide survey to effectively assess the economic impact of streetfood business.

5.1.1.3 Provision of approved prototype kiosks at selected spots convenient to both vendors and consumers.

5.1.1.4 Regular training of vendors and consumers on personal hygiene.

5.1.1.5 Updating Bye-laws on streetfood to include the prerequisite of a training programme for obtaining licence to operate streetfood business.

5.1.1.6 Need for streetfood vendors to develop and enforce their own code of Hygienic Practices.

SFSIG V

5.1.2 SUPPORT INFRASTRUCTURE

The second presentation by Mrs. Lokko covered aspects on socio-demographic data on vendors and consumers, some aspects of characteristics of streetfood business with emphasis on the state of support infrastructure and its effect on the sanitation of streetfood delivery.

The resource person indicated that support infrastructure such as waste and garbage disposal are non-existent. Most vendors therefore use the surrounding areas for refuse dumping and defecating. At the stall level, garbage is disposed off in plastic and metal containers with or without covers and finally dumped at a site to form a heap. Waste water is stored in metal buckets and plastic bowls.

The waste is dumped in open gutters, on streets or immediate surrounding area.

Although all the vendors sampled had access to potable water, there is the problem of storage. Taps are in most cases sited far away from vending sites and as a consequence water must be stored at stall level. Water for washing, cooking and drinking is stored in plastic buckets and metal containers with or without covers.

The resource person added that because of lack of running water, most vendors wash their utensils using water contained in bowls. Such water is not changed frequently and as a result, a scum may form. It was pointed out that it is a bad practice to leave thick scum which may serve as source of contamination.

In conclusion, the resource person made the following recommendations:

That government should provide financial assistance, monitor the operations of vendors, provide sanitation facilities, potable water on regular basis and encourage the formation of associations. She also appealed to the NGO's to provide the necessary infrastructure like: Physical structures equipped with support services (water, electricity, garbage disposal, washing facilities). She stressed that a follow up study revealed that vendors are willing to pay for the use of such facilities.

5.1.3 HACCP STUDY OF SELECTED STREET FOODS

The third presentation focused on the findings of the HACCP study and its recommendations. The presenter touched on the methodology used, the range of streetfoods studied and the types of microorganisms tested for.

He stressed on the following significant findings of the study:

5.1.3.1 Effect of excessive human handling on recontamination of food during presentation, display and sale.

5.1.3.2 Display of cooked foods under ambient conditions resulting in predisposing food to recontamination.

5.1.3.2 Health risks associated with the use of unacceptable or unapproved packaging materials.

SFSIG V

The speaker highlighted on the recommendations of the study to help improve the safety of streetfoods. The recommendations dwelt mostly on raw material source, cooking processes (boiling, frying and roasting), food display, food handling practices and personal hygiene. Highlights of the recommendations are as follows:

- Raw materials for food preparation must be of good quality. They should come from reliable sources and be stored at appropriate temperatures and in a manner that precludes contamination.

- Cooking must be adequate and be carried out at the appropriate temperature and time parameters to ensure destruction of most vegetative bacteria.

- Food must be displayed above floor level, covered and kept hot. Cold food must be reheated before it is offered for sale. In the case of food items where preparation does not involve microbial in activation step, it is essential that they are held at 40C or prepared on demand.

- Vendors, workers and consumers should be educated on personal hygiene. The training should include employees health, undesirable human habits which adversely affect the safety of food and environmental cleanliness.

5.2 WORKSHOP RECOMMENDATIONS

During general discussions, consensus were reached on the following proposals for improving the quality of street food delivery in Ghana.

5.2.1 Training in sanitation for food vendors, their employees and consumers must be carried out regularly. It must also be one of the prerequisites for obtaining licence to operate streetfood business.

5.2.2 The Health Department of Accra Metropolitan Authority should review the relevant Bye-laws and enforce same. The inspection of premises by AMA should be regular and thorough.

5.2.3 The Ghana Standards Board should liaise with Ama to draw up an appropriate training programme on sanitation for food vendors.

5.3.4 Streetfood vending at all unauthorised sites should not be encouraged and the relevant Bye-laws should be enforced.

5.3.5 Vendors Association should develop realistic code of ethics to guide their operations. Membership of Vendors Association must be a criterion for vending relevant street foods.

5.3.6 Vendors agreed to pay prescribed rents if approved stalls with infrastructure support are provided for them.

5.3 CONCLUSION

In his concluding remarks, the Chairman appealed to NGO's to consider venturing into the provision of physical infrastructure for streetfood vendors. The media practitioners were also entreated to publicise the economic potential of streetfood business, the inherent problems, the need for the recognition of the sector by policy makers and provision of infrastructural support.

ANNEX 2.9.1

SFSIG. QUESTIONNAIRE — Section: I, Page 1 of 2

TITLE CHARACTERISTICS OF STREET FOOD VENDORS (SFV) — NOV. 1994

1.1 Name.....

1.2 Age.....

1.3 Sex.....

1.3.1 Male

1.3.2 Female

1.4 Religion.....

1.5 Region of Origin.....

1.6 Education

1.6.1 None
1.6.2 Elementary/J.S.S
1.6.3 Secondary/S.S.S., Technical/Commercial
1.6.4 Vocational
1.6.5 University
1.6.6 Others.....

1.7 Marital Status

1.7.1 Married
1.7.2 Single
1.7.3 Others.....

1.8 Family size (Household size).....

1.9 Children

Age(yr)										
Sex(m/f)										

*Age in descending order

1.10 Type of Accommodation ?

1. 10. 1 Owned
1.10.2 Rented
1.10.3 Others .....

1.11 **Rent per month**.....

1.12 Is **S.F,** your only **Job ?** Yes/No

1.13 **If** answer to 1.12 is No, Please indicate **the following:**

1.13.1 Which other job do you do?.....

.....

1.13.2 How many hours per week?.....

1.14 Why did you go into S.F.B. .. ..

.....

1.15 What job does your spouse do ?

1.15.1 Public/Civil Servant

1.15.2 Private Sector employee

1.15.3 Self-employed - what fields..... .....

1.15.4 Student

1.15.5 Unemployed

1.15.6 Others .....
1 . 1 6 Income/Salary per month
1.16 1 Low c50 *000)*
1.16.2 Medium (> c*50 000* *c150 000)*
1.16.3 High (> *C150 000)*

SFSIG. QUESTIONNAIRE

Section: 2
Page 1 of 2
NOV. 1994

TITLE : STREET FOOD BUSINESS (SFB)

2.1 Where is your business located? .....

2.2 What type of transport do you use from home to SFB?

2.2.1 Trotro
2. 2. 2 Taxi
2.2.3 Private car
2.2.4 Others .....

2.3 Cost of transport per day.....

2.4 How long have you stayed at the present location?

2. 4. 1 < I year
2.4.2 > I year ,<5 years
2.4.3 > 5 years < 10 years
2.2.4 > 10 Years

2.5 Where was your previous location?

.....

2.6 Number of years at previous location.....

2.7 Reasons for changing location
2. 7. 1 Harassment from local. Authority
2.7.2 low patronage
2.7.3 Ejection by Landlord

2.7.4 Others.....

2.8 What is the **nature** of your SFB?

2.8.1 Itinerant Type
2.9.2 Semi-itinerant Type
2.8.3 Fixed Stalls

2.9 Do you own the business place? Yes/No

2.9.1 if the answer is No, what is the rent per month?.....

2.10 How did you get money to start the business?

2.10.1 Bank loan
2.10.2 Loan from co-operatives
2.10.3 Loan from friend
2.10.4 Loan from husband/Wife
2.10.5 Personal/family savings

2.10.6 Others .....

2. 11 When do you start preparing food?

2.12 When do you start selling?

2.13 When is your peak selling time?

2.14 When do you close?

2.15 How many days per week do you work?

2.16 When is the peak selling day?

2. 17 How many employees do you have?

2. 18 How many of the employees are related to you?

2.18. 1 Specify the relationship .....

2.19 What type of work do they do?

2.19.1 preparation

2.19.2 Selling

2.19.3 Cleaning

2.19.4 Others .....

2.20 How do you pay your employees?

2. 20. 1 cash
2. 20. 2 Kind

2.21 If you pay cash, what is the maximum amount of money you give to each employee per day?

.....

2.22 Are you a member of a SFV Association or Group? Yes/No.

2.23 Give your reason for the answer to 2.22 .....

.....

2.24 Give the name of the Association/Group where applicable

.....

2.25 Do you know if there are any Public Health rules applicable to SF vending? Yes/No

2. 26 If answer to 2.25 is yes, what type of rules do you know?

.....

.....

*2. 27 What major improvements would you expect in the SFB?

2.27.1 Sanitation and hygienic conditions
2.27.2 Use of good quality raw materials
2.27.3 Provision of clean water for washing hands before and after eating.
2.27.4 Provision of running water.
2.27..5 Provision of adequate waste disposal system.
2.27.6 Proper washing/cleaning of serving plates, cooking utensils etc.

2.27.7 Others .....

2.28 Do you operate on licence? Yes/No.

2.29 Do you pay any tax? Yes/No

*Improvements to be indicated in order of priority.

2.30 If answer to 2.29 is yes, please state the amount paid per

2.30.1 Day.....

2.30.2 Week.....

2.30.3 Month.....

2.30.4 Year.....

2.31 Did you have any training in food preparation? Yes/No.

2.32 If answer to 2.31 is yes then state source of training:

2.32.1 Family member specify.....

2.32.2 Friends

2.32.3 School (Formal)

2.32.4 Others .....

2.33 Did you have any training in food/environmental hygiene? Yes/No.

2.34 If answer to 2.33 is yes, then state source of training.

2.34.1 Family member specify.....

2.34.2 Public health Authority

2.34.3 Others .....

2.35 How often do you use protective clothing?

2.35.1 Always

2.35.2 Often

2.35.3 Never.

2.36 What type of protective clothing do you use?

2.36.1 Headgear (cap) etc.

2.36.2 Apron

2.36.3 Others .....

2.37 Do you have a medical certificate? Yes/No.

2.38 What do you expect government to do for SFB? .....

.....

.....

.....

3.1 Amount of food sold per day.....

3.2 Type of food sold

3.2.1 Snack
3.2.2 Beverage
3.2.3 Meal
3.2.4 Others .....

3.3 Composition of S.F. sold (e.g. Kenkey and Fish, Rice & Beans, Gari & Beans).

.....

.....

3.4 Predominant raw materials used .....

3.5 Other' ingredients .....

3.6 Where do you buy your raw materials/ingredients?

3.6.1 Market/Distributor
3.6.2 Farm
3.6.3 Shop/retailer
3.6.4 Hawkers
3.6.5 Others.....

3.7 What are your reasons for buying from the source stated?

3.7.1 Cheap
3.7.2 Readily available
3.7.3 Good credit facilities
3.7.4 Good service
3.7.5 Good quality.

3.8 How do you pay for the raw materials/ingredients?

3.8.1 Cash
3.8.2 Credit
3.8.3 Others.....

3.9 Where is the food prepared?

3. 9. 1 On site (vending)
3.9.2 At home away from vending site
3. 9. 3 0thers.....

3.10 Where is the food sold?

3.10.1 At construction site
3.10.2 Around offices
3.10.3 Around Factories
3.10.4 At Schools
3.10.5 At Lorry Parks/Taxi Ranks

3.10.6 Others . .....

3.11 If food is sold-away from the cooking site, how long does it take to transport the food?.....

3.12 What type of fuel do you use in cooking?

3.12.1 Firewood
3.12.2 Charcoal
3.12.3 Electricity
3.12.4 Gas
3.12.5 Others .....

3.13 State the storage facilities you have for the following:

3. 13. 1 Raw material s

3.1 3 .2 Other ingredients

3.1 3. 3 Cooked food

3. 13.4 Serving plates/ bowls
3.13 . 5 Cleaning materials

3. 14 What type of equipment/utensils do you use for the preparation/cooking of the food ?

.....

3.14.1 Specify the main material component in 3.14

.....

.....

3.14.2 Specify the material for selling

.....

3.14.3 Specify the material for dishing out

.....

3.14.4 Specify the material for serving

.....

3.15 How is the food displayed for sale?

3.15.1 On table
3.15.2 In cabinet with glass
3.15.3 In cabinet with insect screen
3.15.4 On fire
3.15.5 Others .....

3.16 Do you prepare food in bulk or according to demand?

.....

3.17 Quantity prepared per

day.....

3.18 Quantity sold per day.....

3.19 What do you do with leftovers?

3.19.1 Sold next day ..... How stored?

3.19.2 Mixed with new food. flow stored?

.....

3.19.3 Eaten by family members

3.19.4 Given as gift to helpers/employees.

3.1.9.5 Others.....

3.20 How often do you have leftover food?

3.20.1 Everyday
3.20.2 Once a week
3.20.3 Twice a week
3.20,.4 Three times a Week

3.20.5 Others .....

3.21 Why do you prepare the food you sell?

3.21.1 Know how
3.21.2 Reputation
3.21.3 Taste of consumers
3.21.4 low cost products
3.21.5 Family tradition
3.21.6 Easy to transport, store, preserve, reuse

3.21.7 Others .....

3.22 Who are your customers?

3.22.1 School children
3.22.2 Wage workers
3.22.3 Traders
3.22.4 Others .....

3.23 What is the average sale per customer?

3.23.1 c 100 - 119
3.23.2 200 - 299
3.23.3 300 - 399
3.23.4 400 - 499
3.23.5 500 - 599
3.23.6 >600

4.1 State the source of water for the following:
- 4.1.1 Cooking
- 4.1.2 Drinking
- 4.1.3 Washing

4. 2 State the quantity/amount of water used daily for the following:

- 4.2.1 Cooking
- 4.2.2 Drinking
- 4.2.3 Washing

4.3 How do you store water for the following?

- 4.3.1 Cooking
- 4.3.2 Drinking
- 4.3.3 Washing

4.4 How do you dispose of garbage and waste water?

- 4.4.1 Garbage at stall level.....
- 4.4.2 Final garbage disposal.....
- 4.4.3 Waste water at sta ll level.....
- 4.4.4 Final waste water disposal .....

.5 Who washes plates/bowls?

- 4 .5.1 Self
- 4.5.2 Children
- 4.5.3 Employees
- 4.5.4 Others .....

4.6 How often is the water for washing plates/bowls changed?

4.6.1 When it is found to be dirty
4.6.2 At the end of the business day
4.6.3 Others .....

4.7 What type of cleaning, agent do you use?

4.7.1 Bar soap
4.7.2 Powdered soap/detergent
4.7.3 Ash
4.7.4 Sand
4.7.5 Others .....

4 . 8 What is the vehicular traffic state of the SF' vending site ?

4.8.1 Light/Low always
4.8.2 Medium always
4.8.3 Heavy always
4.8.4 Heavy only during rush hours

4.9 What material is used for the construction of?

4.9.1 Prepration Area
4.9.2 Storage Area
4.9.3 Serving,, Area

4. 10 What is the cost (and the year) of construction of structure?

.....

4.11 If given a choice would you continue as a SF vendor?

Yes/No. Why.....

.....

4.12 Attitude of respondent

4.12.1 Very co-operative
4.12.2 Co-operative
4.12.3 Reluctant.

TITLE : CHARACTERISTICS OF STREET FOOD CONSUMERS (SFC) NOV. 1994

5.1 Name.....

5.2 Age.....

5.3 Sex.....

5. 3. 1 Male

5 .3. 2 Female

5.4 Religion.....
5.5 Region of Origin.....
5.6 Education

5. 6. 1 None
5.6.2 Elementary/JSS
5.6.3 Secondary/SSS, Technical, Commercial
5.6.4 Vocational
5.6.5 University
5.6.6 Others .....

5.7 Marital Status
5.7.1 Married
5. 7. 2 Single
5.7.3 Others .....

5.8 Type of Accommodation
5.8. 1 owned
5.8.2 Rented
5.8.3 others .....

5.9 Rent per month.....

5.10 Type of job

5.10.1 Public/civil Servant
5.10.2 Private Sector employee
5.10.3 Self-employed
5.10.4 Student
5.10.5 Un-employed
5.10.6 Others .....

5.11 Income/Salary per month

5.11.1 Low (_< ¢ 50 000)
5.11.2 Medium (>¢ 50 000 _< ¢ 150 000)
5.11.3 High (>C 150 000)

5.12 Total expenditure on Food and Beverages per day .....

5.13 Expenses on S.F. per day.....

5.14 Why do you patronise S.F.? ....

5.15 How many times in a day do you eat S.F.?

5.16 Which meals do you eat from SFV ?

5.16.1 Breakfast
5.16.2 Lunch
5.16.3 Dinner
5.16.4 Between Meals

5.17 How many days in a week do you eat S.F.?.....

5. 18 Do you patronise food from a particular S.F.V all the time'.' Yes/No.

5.19 If answer to 5.18 is yes what are the reasons?

5.19.1 Close to home
5.19.2 Low price
5.19.3 Good taste
5.19.4 Credit facility

5.19.5 Others .....

5.20 What criteria do you consider in selecting a S.F.V with reference to your choice of food?

5.20.1 Close-to work place
5.20.2 Close to home
5.20.3 Good taste
5.20.4 Good quality
5.20.5 Large quantity
5.20.6 Good service
5.20.7 Vendor cleanliness
5.20.8 Low price
5.20.9 Credit facility

5.21 Where do you usually have S.F.?

5.21.1 Near home
5.21.2 Work place
5.21.3 "En route"
5.21.4 Others.....

5.22 What is your most favourite S.F.? .....

5.23 Why is it the most favourite food?

5.21.1 Quantity is good
5.21.2 Quality is good
5.23.3 Taste is good
5.24.4 Price is low
5.24.5 Available anytime/anywhere
5.23.6 Others.....

5.24 Do you belong to a consumer association? Yes/No

5.25 Give your reason for the answer to 5.24 .....

.....

5.26 Give the name of the association where applicable .....

.....,,,,

5.27 What improvements would you like to see in the SFB?

.....

.....

.....

.....

ANNEX 4. 1

SFSIG IV

4.4 LIST OF PARTICIPANTS

1.	Mr. L.E. Yankey	Ghana Standards Board
2.	Mr. J.K. Odame-Darkwa	Ghana Standards Board
3.	Dr. E. Collison	Department of Nutrition & Food Science, University of Ghana
4.	Mrs. P. Lokko	Food Research Institute
5.	Mr. J. Laryea	Accra Metropolitan Assembly
* 6.	Mrs. E. Otoo	Food Research Institute
* 7.	Mrs. Regina Vowotor	Ghana Standards Board
* 8.	Mr. J. Tettevi	Ghana Standards Board

*Non Members of the Local Team.

SFSIG V ANNEX 5.4.1

LIST OF PARTICIPANTS

1. Marian Adum-Atta (Mrs)	-	Metro Education Officer (Sch. Feeding Programme
2. Mercy Adofo	-	Ghana Traditional Caterers Association
3. Janet Boadu	-	Ghana Traditional Caterers Association
4. Bertha Amegavi	-	Ghana Traditional Caterers Association
5. Edith Addo	-	Ghana Traditional Caterers Association
6. Gifty Darko	-	Ghana Traditional Caterers Association
7. P.A. Danquah	-	Ghana Traditional Caterers Association
8. E.E. Apraku	-	Ghana Traditional Caterers Association
9. Rose Wutsika	-	Ghana Traditional Caterers Association
10. Moses Azure	-	Khebab Sellers Association
11. R.D. Bunney	-	Ministry Of Trade & Industry
12. Anthony Adotey	-	Department Of Health (AMA)
13. Peter Amuzu	-	Department Of Health (AMA)
14. Christopher Asiedu	-	Ghana Broadcasting Coperation (T.V)
15. Ebenezer Odjawo	-	Ghana Broadcasting Coperation (T.V)
16. Stella Djocey	-	Ghanaian Times Coperation

17.	William Ohene -	Ghanaian Times Corporation
18.	James Asante -	Ghanaian Times Corporation
19.	Eunice Melca -	Ghana Broadcasting Corp. (Radio News)
20.	Salomey A. -	* **Nestle Ghana Limited**
21.	Victor Wireko -	* Nestle Ghana Limited
22.	Nii Dodoo -	Ghana Standards Board (GSB)
23.	A.E. Owusu -	Ghana Standards Board (GSB)
24.	Mrs. R. Obuobi -	Ghana Standards Board (GSB)
25.	Dr. E.K. Marfo -	Ghana Standards Board (GSB)
26.	Mr. A.0. Ntiforo -	Ghana Standards Board (GSB)
27.	Mr. L.E. Yankey -	Ghana Standard Board (GSB)
28.	Dr. J. Odame-Darkwa -	D.N.F.S University of Ghana
29.	Dr. E.K. Collison -	Food Research Institute
30.	Mrs P. Lokko -	MOHD - AMA
31.	Mr. J.0. Laryea -	

* - Agency representing NGOs that have interest in street food programmes

SFSIG V ANNEX 5.4.2

GHANA STANDARDS BOARD

WORKSHOP ON THE STREET FOOD SITUATION IN GHANA (SFSIG)

1. DATE : THURSDAY, 1996-11-28

2. VENUE: G.S.B CONFERENCE ROOM

3. REGISTRATION

4. INTRODUCTION OF CHAIRMAN BY MR. L.E. YANKEY, GSB. 09:30

5. OPENING REMARKS BY CHAIRMAN REV.(DR.)E.K. MARFO. DIRECTOR, GSB 09:35

6. TOPIC 1 REVIEW OF SFSIG BY MR. A.0 NTIFORO, GSB 09:45

7. COFFEE/TEA BREAK 10:15

8. TOPIC 11 DATA COLLECTION - STREET FOOD INTRASTRUCTURE BY MRS. P. LOKKO, FOOD RESEARCH INSTITUTE 10:45

9. TOPIC III QUALITY ASSURANCE/HACCP STUDY ON STREET FOOD BY MR. ODAME-DAKWA, G.S.B 11:15

10. DISCUSSIONS 11:45

11. CHAIRMAN'S CLOSING REMARKS/WORKSHOP RECOMMENDATIONS 12:30

12. VOTE OF THANKS BY MR. J.A. LARYEA, A.M.A 12:55

1.13 REFERENCES

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Appendix 1

Tablo 1 Proximate composition, content of cholesterol and phytosterols and the proportion of fatty acids as saturated, mono-unsaturated and polyunsaturated fatty acids of food samples from Ghana

Food Table no.	Food	Tab. Code	Proximate composition, weight/100g edible portion						Proportion of classes of fatty acids g/100 g total fatty acids			
		Code	Water g	Protein g	Fat g	Total carbo-hydrate g	Choles-terol mg	Phytos-terols mg	SFA	MUFA	PUFA	Not iden-tified
	Cereal Products											
10	akassa, koko	554	93.0	[illegible]	[illegible]	5.3	-	-	-	-	-	-
11	akpler	555	66.6	1.4	1.9	31.2	-	-	-	-	-	-
13	banku	555	73.6	[illegible]	1.3	25.4	-	-	-	-	-	-
19	kenkey, Ga	556	64.2	3.6	1.7	33.5	-	-	-	-	-	-
20	kenkey, Fante	557	70.5	[illegible]	1.4	35.1	-	-	-	-	-	-
29	rice, raw	558	3.4	9.1	1.0	92.5	-	-	-	-	-	-
31	rice, cooked	559	64.7	2.9	0.4	32.0	-	-	-	-	-	-
35	wheat bread	560	34.3	11.7	3.7	60.3	-	-	25.8	16.6	57.6	-
37	togbei	[illegible]	[illegible]	4.5	6.3	55.6	-	-	36.3	3.3	4.3	0.6
350	biscuits	522	35.4	[illegible]	6.7	49.1	-	-	36.6	43.7	12.6	7.2
429	ricewater	609	93.5	[illegible]	0.1	6.1	-	-	-	-	-	-
434	wheat	611	12.4	4.2	[illegible]	31.7	-	-	-	-	-	-
	Starchy roots and fruits											
39	cassava, raw	561	57.2	0.7	0.5	41.6	-	-	-	-	-	-
40	cassava, boiled	557	53.6	0.7	0.5	33.2	-	-	-	-	-	-
44	cassava balls, fried	599	19.5	0.7	6.3	73.0	-	-	29.6	8.8	2.4	0.1
46	gari	562	[illegible]	1.0	1.1	90.3	-	-	-	-	-	-
47	kokonte	563	71.1	0.5	0.5	27.3	-	-	-	-	-	-
49	yake yake	599	53.2	0.4	0.5	45.9	-	-	-	-	-	-
53	cocoyam, boiled	564	59.7	3.3	0.2	37.2	-	-	-	-	-	-
57	plaintain, unripe boiled	565	62.9	1.2	0.9	35.1	-	-	-	-	-	-
58	plaintain, ripe boiled	566	61.9	1.1	0.7	36.4	-	-	-	-	-	-
59	plaintain, roasted	567	49.2	1.7	0.7	49.4	-	-	-	-	-	-
61	plaintain, fufu	568	63.1	0.7	0.4	35.2	-	-	-	-	-	-
67	yam, raw	569	63.0	2.1	0.3	31.7	-	-	-	-	-	-
68	yam, boiled	570	61.5	1.9	0.3	36.1	-	-	-	-	-	-
71	yam	577	51.3	3.3	[illegible]	45.3	-	-	66.3	20.3	13.1	0.2
151	banana	571	[illegible]	1.3	0.3	33.7	-	-	-	-	-	-
330	plaintain, ripe	574	58.3	1.4	2.7	41.7	-	-	76.4	16.7	5.7	1.2
331	plaintain, ripe	576	46.5	1.5	[illegible]	44.3	-	-	90.9	6.6	2.6	-
335	cocoyam, porridge	579	76.0	1.3	4.5	12.2	-	-	51.7	35.5	9.9	-
354	cocoyam	594	32.9	3.4	1.6	61.2	-	-	77.4	17.3	3.6	1.7
559	plaintain balls, ripe	611	37.5	2.2	13.5	45.5	-	-	75.5	19.1	5.4	-
	Legumes											
336	beans	580	[illegible]	[illegible]	[illegible]	17.1	-	-	48.4	37.5	13.9	0.2
	Nuts and seeds											
83	groundnut, roasted	573	[illegible]	26.5	[illegible]	[illegible]	-	-	[illegible]	19.2	26.5	0.1
102	coconut flesh	590	57.4	0.7	[illegible]	9.9	-	-	81.3	13.4	5.2	0.1
104	coconut milk	591	91.9	[illegible]	[illegible]	7.7	-	-	-	-	-	-

Food Table no.	Food	Lab. Code	Proximate composition, weight/100g edible portion: Water g	Protein g	Fat g	Total carbohydrate g	Cholesterol mg	Phytosterols mg	Proportion of classes of fatty acids g/100 g total fatty acids: SFA	MUFA	PUFA	Not identified
Soups												
167	groundnut soup	594	70.2	5.4	10.3	13.1	5	31	27.3	47.1	24.6	1.3
168	light soup	595	93.0	0.2	0.7	5.0						
170	okro soup	597	93.5	1.4	1.2	7.3	5	5	52.5	34.0	4.4	3.1
173	palm soup	590	82.0	1.0	13.9	1.9	3	6	50.9	39.0	9.7	0.4
570	okro soup	615	95.5	1.7	0.7	3.1	-	-	49.4	40.2	10.4	-
Stews												
164	agushie stew	592	59.4	5.4	25.3	9.4	5	73	43.6	31.5	24.8	0.1
165	beans stew	593	62.6	6.6	11.4	18.2	4	32	47.9	39.2	13.1	-
169	nkontomire stew	596	63.3	1.6	24.3	10.5	2	71	49.7	37.2	13.0	0.1
171	okro and garden egg stew	598	64.3	2.3	21.3	11.5	25	33	41.7	38.4	11.4	0.5
335	pie	609	19.3	11.1	16.3	52.7	5	52	39.2	30.4	30.5	-
339	rice and stew	549	66.8	2.6	2.1	28.4	-	6	81.1	11.7	6.4	0.9
340	rice and beans	591	62.7	3.9	4.8	27.6	-	-	74.9	19.2	5.8	0.1
572	garden egg stew	616	63.7	2.8	23.7	7.7	15	33	48.7	37.7	13.4	0.2
Sauces												
172	palaver sauce	599	55.7	3.4	33.2	7.7	5	86	47.2	35.2	17.4	0.2
566	gravy	612	46.1	0.9	44.7	2.3	1	42	91.9	6.6	1.7	-
567	gravy	613	43.4	0.9	46.0	3.2	3	34	85.1	12.4	2.4	-
568	gravy	614	58.4	1.3	31.5	3.1	5	50	53.2	33.6	13.1	0.1
Meat												
197	cowhide	554	75.3	21.5	0.5	-	21	-	47.1	42.0	2.7	8.3
199	snails	512	79.5	18.3	1.5	-	142	-	27.9	40.6	26.1	5.5
Fish and shell-fish												
217	anchovy, smoked	544	10.9	61.3	3.8	-	317	-	37.0	17.7	39.4	5.8
218	anchovy, sun-dried	545	9.1	65.4	7.6	-	364	-	39.2	18.7	35.8	5.8
226	kako	600	31.1	40.7	2.4	-	112	-	44.9	28.1	13.5	3.2
228	crab	601	59.5	13.0	1.1	-	59	-	29.4	28.2	33.4	10.0
233	mackeral, smoked	551	61.5	25.4	11.1	-	93	-	30.2	44.3	24.6	1.3
239	mackeral, tomatoes	552	59.9	17.1	20.6	-	56	-	22.3	45.4	29.3	2.0
249	sardines, smoked	542	10.6	70.8	3.3	-	370	-	33.5	17.7	37.4	5.4
259	sardines, fried	603	3.3	39.4	36.6	-	423	59	31.2	13.8	3.6	3.9
260	sardines, canned	553	52.1	21.6	23.4	-	79	69	16.3	39.3	43.7	0.3
262	seabream, smoked	546	58.9	37.9	2.2	-	124	-	33.5	14.7	41.0	5.8
270	triggerfish	604	44.7	51.3	2.0	-	111	-	35.5	30.6	20.7	13.1
272	tuna, smoked	547	67.3	27.7	1.9		43	-	51.2	29.4	14.7	4.7
282	tilipia, salted	605	37.9	37.9	4.3	-	150	-	51.7	31.1	12.7	4.5
341	herring, smoked	541	51.5	43.3	3.2	-	193	-	45.7	25.9	26.9	1.6
679	tilapia	617	10.9	50.4	35.6	-	139	60	77.4	17.4	5.2	-
683	tilapia	618	10.5	32.5	40.5	-	169	30	72.2	21.7	6.1	-
684	fishmix, smoked	619	43.9	47.6	1.4	-	256	-	38.4	25.3	35.9	0.4
6175	fishmix	620	15.3	35.7	37.6	-	254	-	78.4	15.5	5.1	1.0

TABLE -2

Products packaged in glass bottles or jars

Product	Char-acteristics	Remarks
Pito brewing	Alcoholic beverages brewed from sorghum (local beer)	Bottled after with no cover
Palm wine tapping	Alcoholic drink from the palm tree	Bottled after with no Cover
Iced water Iced kenkey preparation	Kenkey mashed in water and sweetened	Bottled after and chilled
Hausa beer sometimes	Spicy sweet non alcoholic drink	Bottled and corked with folded paper
Akpeteshie for	Local gin distilled from palm wine or sugarcane	Bottled and stored long periods
Tigernut Milk	-Sweetened tigernut extract curdled by boiling	Kept in jars without cover

Essuman (1990)

TABLE 3

Products displayed in glass sided boxes

Product	Characteristics	Remarks
Pastries	Cakes, doughnuts, buns	Sold wrapped in paper
Confectionery	Milk toffees, roasted groundnut or copra candy	Sold wrapped in paper Polythene pouch
Fula	Cooked millet dough moulded into balls	Made into sweetened drink after purchase
Fried foods	Plantain, yams, etc.	Sold wrapped in paper
Tigernut Milk	see table 2	Jars kept in glass sided boxes

Essuman (1990)

TABLE 4

Products packaged in leaves

Product	Characteristics	Remarks
Fante kenkey	Cooked fermented maize dough	Wrapped in plantain leaves before cooking
Ga kenkey	Similar to Fante kenkey	Wrapped in maize sheath before cooking
Abolo	Baked of steamed maize dough	Cooked in leaves of thespesia populnea
Apitsi	Mixtuture of baked ripe plantain and maize flour	Baked and sold in thespesia populnea
Agidi	Light maize products for for invalids	Wrapped in leaves of marantoclea spp. soon after- cooking
Estew	Another type of Fante kenkey	Wrapped in plantain leaves after cooking
Cooked rice, beans	-	Stored in large pans small quantities wrapped in thespesia populnea leaves when soil

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Essuman (1990)

TABLE - 5

Products packed in paper

Product	Characteristics	Remarks
Bread	From wheat flour	
Fish	Smoked or fried	
Ripe plantain	Roasted or fried	
Pastries	Doughnut, meatpies, cakes	
Meat	Fried turkey tail, chicken, pork (roasted)	
Yam	Fried or roasted	
Groundnut	Roasted	
Popcorn	Roasted maize	Sometimes **packed in a special unshaped paper** container

Essuman (1990)

TABLE 6

Products Packed in polythene bags

Product	Characteristics	Remarks
Bread		Usually packed by the retailer
Confectionery	Milk toffees	Plain sheets wrapped around candy and knotted
Ice lollies	Frozen sweets (home made ice cream)	Plastic coups normally used
Groundnuts	Roasted	For both bulk storage and small retail units
Popcorn	Roasted maize	
Gari	Roasted cassava dough	
Sugar	Granulated	Packed in small units for retail
Nmadaa	Non alcoholic maize drink	Normally served in calabash
Iced water		Normally served in cups and bottles

Essuman (1990)

APPENDIX 3

Some Recommendations made by respondents towards the improvement of street foods delivery

Recommendations

1. Selling sites should be kept clean
2. Food should be cooked and sold in permanent structures with seats and screens to keep off flies
3. Vendors should be clean and neatly dressed
4. Food should be covered or sold, in screned boxes
5. Serving plates, cups and cutlery must be cleaned
6. Need for a monitoring team to check activities of vendors and to set standards for their operations
7. Appropriate authorities (e. g . Home Science Dept.) to organise periodic education on basic hygiene and nutrition for vendors
8. Drinking water must be kept Clean and safe
9. Water for washing plates & cups must be changed frequently
10. Vendors should use appropriate serving tools and avoid using bare hands for serving food
11. Vendors should be registered and made to form an association
12. Enough drinking cups should be provided
13. Patrons must insist on hygiene surrounding
14. Children should not be allowed to handle cooked for before it is served
15. Cement paper and printed materials should not be used as food wrappers
16. Left-over food should not be sold

17. **Food** must be kept hot/warm

18. **Enough clean** and **dry** napkins, or hand towels should be **provided**

19. **Vendors** should minimize talking while **serving**

20. Vendors must not use serving hands to receive money

21. Pipe-borne water should be provided at selling sites

22. Proper washing areas with good drainage should be provided

23. Vendors who cannot maintain hygiene practices should be stopped from operating

24. Refuse disposal bins should be covered or food sold near open gutters

25. Vendors should wash and clean ,their hands of ten

Opare-Obisaw (!990)

APPENDIX 4

Nutritional Studies on Street Foods

(a) The nutritional importance of street foods in central Accra.

(b) A study of some brands of fruit juices and drinks.

(c) Nutrient analysis of some local fruits and vegetables.

(d) Nutritional value of bread and its composition in Accra.

(e) Changes in some biochemical and biophysical characteristics of kenkey during processing.

(f) Food purchases and nutrient values of lurch of Legon workers.

(g) Processing, storage, chemical and organoleptic characteristics of bottled Ahei.

(h) Quality of food on the market.

(i) Changes in the cyanide content of cassava during the traditional processing into Gari and Kokonte.

(j) Study of the variability in chemical composition of Ghanaian soups and stews.

(k) Exposure of processed foods to sunlight, effect on chemical and organoleptic characteristics.

(l) Phytic acid and Oxalic acid contents of some foods eaten in Ghana.

(m) Weight changes and the effect on the eating qualities of grapes fruits between hat-vest and consumption.

(n) The nutrient content of some legumes consumed in Ghana and their role in the diet.

(o) The effect of cooking and processing on the Vitamin C content of some Ghanaian staf)le foods.