

UNIVERSITY OF EDUCATION, WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

**FOOD HYGIENE KNOWLEDGE, PRACTICES OF VENDORS AND
CONSUMERS HANDLING BEHAVIOUR OF STREET FOOD IN THE
SAGNARIGU MUNICIPALITY**



MAY, 2020

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**A thesis in the Department of Catering and Hospitality, College of Technology
Education, submitted in the School of Graduate Studies, in partial fulfilment of
requirement for the award of degree of Master of Philosophy (Catering and
Hospitality) in the University of Education Winneba**

MAY, 2020

DECLARATION

Student's declaration

I, Katumi Al-Hassan, declare that except for references to others people's work which have been duly cited, this research work is the result of my own work and that it has neither in whole nor in part been presented elsewhere.

Signature..... **Date**.....

KATUMI AL-HASSAN

Supervisor's declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

Signature:..... **Date**.....

DR. GILBERT OWIAH SAMPSON

DEDICATION

To my family members, friends and love ones.



ACKNOWLEDGEMENT

I am particularly grateful to the Almighty Allah for creating this opportunity for me to undertake this research work. I would like to extend my sincere thanks to the study supervisor, Gilbert Owiah Sampson (PhD) who despite his busy schedules found it befitting all the time to make the necessary corrections that led to the successful completion of this dissertation.

I also want to thank the respondents who voluntarily participated during the administration of the questionnaires at the study setting.

I am equally highly indebted to my friends for their guidance, support and prayers.

I wish to express my sincere thanks to all those names I cannot mention especially those who helped me in one way or the other including my family members for their support in diverse ways.

May Allah bless all of you abundantly.

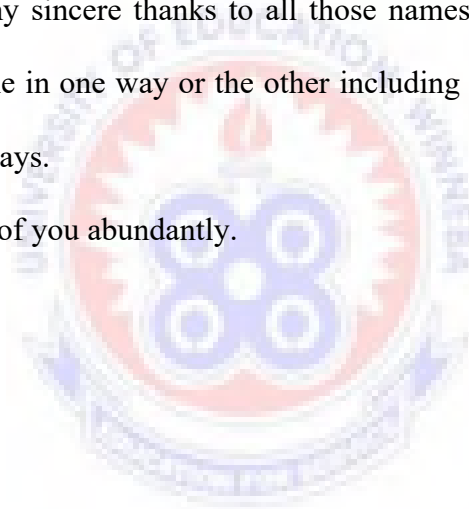


TABLE OF CONTENTS

DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
LIST OF FIGURES	vii
LIST OF TABLES	viii
ABBREVIATIONS	ix
ABSTRACT.....	x
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background to the study.....	1
CHAPTER TWO	6
LITERATURE REVIEW	6
2.1 Introduction.....	6
2.2 Concept of food safety	6
2.3 Concept of street foods vending.....	9
2.4 Knowledge of street food vendors on food hygiene	10
2.5 Hygienic practices of street food vendors during food preparation, selling process and storage.....	17
2.6 How consumers of street food vendors handle food before eating	23
CHAPTER THREE	27
3.1 Study setting.....	27
3.2 Research design.....	27
3.3 Population.....	28
3.4 Sampling techniques and sample size	28

3.5 Data collection instrument	28
3.6 Data analysis	29
3.7 Ethical considerations	29
CHAPTER FOUR.....	30
RESULTS AND DISCUSSIONS	30
4.1 Introduction	30
4.3 Knowledge of street food vendors on food hygiene	34
4.4 Hygienic practices during food preparation	38
4.5 How consumers of street food vendors handle food before eating	42
CHAPTER FIVE	44
5.1 Introduction	44
5.1.1 Summary of the findings, conclusion and recommendations	44
5.2 Conclusions	47
5.3 Recommendations	48
REFERENCES.....	49
APPENDIX I	55
APPENDIX II.....	59

LIST OF FIGURES

Figure 4.2: Assessment of hygienic practice among respondents37

Figure 4.3: Respondents rating of the level of hygiene37



LIST OF TABLES

Table 4.1: Demographic data of food vendors.....	31
Table 4.2: Demographic data of consumers	32
Table 4.3: Practice to ensure food hygiene among respondents at the study setting...35	
Table 4.4: Practices observed during food preparation and selling among respondents	38
Table 4.5: Processes during food storage by respondents	40
Table 4.6: Practices in relation to washing of bowls among respondents	41
Table 4.7: How consumers of street food vendors handle food before eating	42



ABBREVIATIONS

FAO	Food and Agricultural Organization
Or	Odds Ratio
WHO	World Health Organization



ABSTRACT

The operations of street food vendors have increased in the Ghanaian community, especially in the urban areas. The study was conducted to assess food hygiene knowledge, practices of vendors and consumers handling behaviour of street food in the Sagnarigu Municipality. A descriptive cross-sectional study design was used for this research. Purposive sampling technique was used to sample food vendors and consumers. The results revealed that, respondents' knowledge concerning food hygiene practices at the study setting was moderate. The mean score for washed hands properly after urinating are 3.31 ± 1.43 , 3.31 ± 1.79 , 5.28 ± 0.849 and 3.31 ± 1.43 . Also, the mean score for participants ever been screened before by medical team are 0.0 ± 0.0 , 3.20 ± 1.16 , 3.36 ± 1.19 and 5.28 ± 0.849 . The results also showed that, the mean score for study participants wearing a scarf before serving food 4.7 ± 3.4 , 3.36 ± 1.19 , 0.0 ± 0.0 and 5.28 ± 0.849 . The findings also showed that, study participants who used a grinding stone for grinding were 7.22 ± 1.19 , 0.0 ± 0.0 , 3.44 ± 1.19 and 0.0 ± 0.0 . It was showed that, the averages of consumers who washed their hands before eating food were; 3.63 ± 1.05 , 4.05 ± 1.49 and 3.92 ± 1.38 . Consumers were also adhering to food safety precautions. The researcher recommends that the media should be used to educate the public about food safety measures at the study setting.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Worldwide, improper hygiene practices among street food consumers and lack of knowledge on food safety among street food vendors are contributory factors for the spread of foodborne outbreaks (Elvis & Henry, 2016). In addition, there seems to be a change in food consumption patterns as frequency of “eating out” is increasing and commitment to food preparation at home is decreasing (Chukuezi, 2010). Street foods are very well patronized in many developing countries since they are affordable, easily accessible and also serve as an important source of income for women entrepreneurs (Manko, 2018; Tessema, Gelaye & Chercos, 2014). However, these street foods are often prepared and sold under unhygienic conditions and can therefore lead to morbidity and mortality due to food borne outbreaks (Janie & Marie, 2010)

Street food is defined by the Food and Agriculture Organization (FAO, 2013; 23) as “ready-to-eat foods and beverages sold and prepared by vendors or hawkers in streets or other public places”. Conversely, a street food vendor is broadly defined as a person who offers foods for sale to the public without a permanent built up structure but with a temporary static structure or mobile stall-head load/wheel-barrow/truck (Azanza, Gatchalian & Ortega, 2000). Street food provides a convenient diet for many people in developing countries and approximately 2.5 billion people eat street food every day, with the consumption supporting the livelihood of millions of low income people and contributing greatly to the economy (Chukuezi, 2010; Feglo & Sakyi, 2012).

The observation is that street food vendors are uninformed of good food hygiene practices as well as food safety. Their activities can increase the risk of food contamination with pathogens, and have been linked to outbreaks of diarrhoea diseases in developing countries (WHO, 2008) Food-borne illnesses are a growing public health concern worldwide and results from eating food contaminated by pathogenic microorganisms, mycotoxins or chemical hazards (Kubde, Pattankar & Kokiwar, 2017)

On the part of the consumer, there is risk of exposing food to unhygienic environments, contamination and adulteration in this sector. A range of personal, social and environmental factors influence consumers' food handling practice and that these factors need to be addressed in order to change food consumers behaviours (Odonkor, Adom, Boatin, Bansa, & Odonkor, 2011). In Ghana, the story is no more different from other developing nations across the globe. Per the estimates of the Ministry of Food and Agriculture and the World Bank (2006), 1 in every 40 Ghanaian suffers foodborne disease or ailments annually which translates into 420,000 reported cases with the death rate of 65,000. It has even been suggested that the figures could be far higher than these as individuals who patronize health facilities with foodborne illness is very low due to poverty and lack of access to medical facilities in some communities across the country and as such, will rely on traditional herbal medications (Ministry of Food and Agriculture, 2006).

Ghana's food culture has a long history of street food (Elvis & Henry, 2016). Most cities provide street food for inhabitants and tourists, and street food has become part of the characteristic Ghanaian culture. Therefore, street food safety has become a matter of safety concern, and has been shown to be served in poor food handling and unsanitary conditions (Odonkor et al., 2011)

In the Tamale Metropolis, a study by Danikuu, Baguo & Azipala (2015) revealed that, the mushrooming of food vendors on the streets of major sections and locations has come to stay due to inordinate desire of consumers for their services. Their study also revealed that street foods may become contaminated either by spoilage or pathogenic micro-organisms. Customers of street foods are more concerned about convenience than the safety, quality and hygienic status of the food they buy. Food vendors may contaminate food by poor personal hygiene, cross-contaminating raw and processed food, as well as inadequate cooking and improper storage of food.

1.2 Problem statement

Research has established that people all over the world eat street foods almost daily (FAO, 2007). Sale and consumption of street food are on the increase and this will continue to grow (Elvis & Henry, 2016). The rise of street food vending has heightened risk factors like improper and unhygienic handling of food (Omemu & Aderoju, 2008) making all potential consumers prone to food poisoning. In developing countries, up to an estimated 70% of cases of diarrheal diseases are associated with consumption of unwholesome street food (Von & Makhoane, 2006)

Various factors have been said to be associated with unhygienic practice among street food vendors in Ghana some include but not limited to the following; inefficient or lack of education, training of food vendors on health and hygiene, non-provision of needed infrastructure as well as non-regulation and enforcement of by-laws governing street food vending by local authorities (Feglo & Sakyi, 2012). On the other hand, consumers of street food also contribute to food born outbreaks. For example, hands can be an important vehicle for transmitting microorganism to food due to poor personal hygiene. Poor hand washing practices of the food handlers often contribute

to food borne-illness outbreaks and it shows that improvement of food handler's hand washing practices is needed (Danikuu¹, Baguo & Azipala, 2015). Consumers attracted by convenience and low prices may overlook aspects of hygiene or sanitation or may lack the understanding of proper practices and the potential for foodborne illness (Manko, 2018)

The problem at the study setting is that, it is possible all the food consumers have been eating street food without proper hand washing which could lead to pathogen ingestion leading to food poisoning. Sometimes also, there is no proper hygienic water for consumers to wash their hands before eating food at the point of sale. Eating street food without proper hand hygiene has been linked to all manner of food poison. Though studies have been done on hygiene practices of vendors, it may be possible that these food vendors may lack due diligence and that the real cause of food poisoning may be a consumer cross contaminating his/her own meal whilst eating street food. This study would provide contextual understanding of the problem with respect to street food vendors and consumers.

1.3 Main objective

The general objective of the study is to assess food hygiene knowledge, practices of vendors and consumers handling behaviour of street food in the Sagnarigu Municipality.

1.3.1 Specific Objectives

1. To determine the knowledge of street food vendors on food hygiene in Sagnarigu Municipality

2. To examine the hygienic practices of street food vendors during food preparation, selling process and storage in Sagnarigu Municipality
3. To assess how consumers of street food vendors handle food before eating in Sagnarigu Municipality

1.4 Research questions

1. What is the knowledge level of street food vendors on food hygiene in Sagnarigu Municipality?
2. What are the hygienic practices of street food vendors during food preparation, selling process and storage in Sagnarigu Municipality?
3. How does consumers of street food vendors handle food before eating in Sagnarigu Municipality?

1.5 Significance of the study

The study would provide information that could inform policy makers on the right set of regulations and exercises that should be formulated and implemented to ensure good hygienic practices by food vendors and consumers especially at the study setting. The findings would also serve as a basis upon which the Sagnarigu Environmental Health Officers could use the findings to program an educational sensitization of personal and environmental hygiene practices to the people in the study setting concerning food handling practices. The study would serve as a source of reference for future studies on any topic related to hygienic practices among students. The study would add to existing empirical literature on food hygiene and contribute to academia as well. The study would also serve as a baseline data at the study setting.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents empirical reviews of related studies on food hygiene knowledge, practices of vendors and consumers handling behaviour of street food. The literature was searched and reviewed in the following databases: CINAHL, Medline and Biomed related to the topic. The presentation of the literature is done on sub-headings related to the study.

2.2 Concept of food safety

Globally the incidence and prevalence of food borne diseases is increasing and international food trade is disrupted by frequent disputes over food safety and quality requirements especially among consumers (Liu, Guangyi & Zhang, 2014). Despite the fact that food safety is important for everyone, sometimes food do not serve the needed purpose if it is not safe for public consumption (Alamo-Tonelada, Silaran & Bildan, 2018). According to Dwumfour-Asare and Agyapong (2014) food is consumed as any edible substances whether cooked, roasted, fried, boiled or steamed which from a public health perspective form part of the human diet while food safety encompasses all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer.

Empirical studies have revealed that, food safety is explained broadly to mean any food item devoid of any biological, chemical or physical hazards capable of causing harm to consumers (Nurudeen, Lawal & Ajayi, 2014; Chukuezi, 2010). The idea of food safety as a concept is key in the provision of safe and nutritious food which is a necessity ingredient to all human beings (Danikuu, Baguo & Azipala, 2015). The

basic food safety concept is that food would not harm consumer so long as the intended use guidelines are followed when it is prepared by the street food vendors at a hygienic environment or eaten by consumers when all the necessary safety precautions are met during the consumption process (Feglo & Sakyi, 2012; Opoku-Boateng, 2016)

The FAO (2014) revealed that, food is potentially harmful whenever it has been exposed to hazardous agents and intended use guidelines have not been followed by both the formal and informal food operators which lead to consumption of contaminated foods. It is therefore, very important that food control systems be strengthened with the needed equipment to improve food safety among both formal and informal food operators to ensure food safety for all consumers (Olang'o, Olima & Leah, 2012). This is because, formal and informal food operators are very well patronized in many developing countries since they are affordable, easily accessible and also serve as an important source of income for most operators (Obi-Nwosu et al., 2013)

However, these formal and informal food operators largely do not meet proper hygienic standards and can therefore lead to morbidity and mortality due to food borne illnesses, and concomitant effects on trade and development in the world (Olang'o, Olima & Leah, 2012). Studies continue to reveal that, food-borne illnesses are a growing public health concern and results from food contaminated by pathogenic microorganisms, mycotoxins or chemical hazards (Opoku-Boateng, 2016; Nurudeen, Lawal & Ajayi, 2014). Foodborne disease is caused mainly by the oral ingestion of viable microorganisms, or of the toxins they produce (intoxication) in sufficient amounts to develop pathology (Opoku-Boateng, 2016)

These microorganisms can be in the form of rust, dirt, hair, machine parts, nails and bolts, physical contaminants which fall into two broad categories; biological agents such as bacteria, viruses, moulds, antibiotics, parasites, and their toxins, which can cause a wide range of illnesses and chemicals such as lead, cadmium, nitrites and organic compounds which can have both acute and chronic health effects all affect both formal and informal food operators (Obi-Nwosu et al., 2013).

Such contaminants can gain access to the food chain at any stage during the growing, processing, preparation or storage. Microbiological sources stand out for posing a great risk to public health because of the severity of the clinical symptoms and the number of foods and microorganisms that can be involved (Olang'o, Olima & Leah, 2012). Also, *Enterobacteriaceae*, particularly *Salmonella serovas*, *Campylobacter jejuni* and *E coli* are responsible for the majority (>70%) of foodborne bacterial illnesses. Chemical food safety hazards vary widely, but the most common problems cited in the literature include contamination with pesticides, allergens, and natural toxins, including scrobotoxins found in fish and mycotoxins found in crops (Opoku-Boateng, 2016; Feglo & Sakyi, 2012)

Foodborne disease is therefore a matter of concern for general public, it is even of high concern for immune-suppressed consumers of street foods for whom food-borne infections can be life threatening. The issue of food safety and foodborne disease has also proven to be critical in some foodborne nosocomial outbreaks in the hospital environments (Obi-Nwosu et al., 2013). Food is therefore, considered to be safe when it has reasonably demonstrated that no harm will result from its consumption by customers (Nurudeen, Lawal & Ajayi, 2014)

2.3 Concept of street foods vending

The concept of street food vending has been in existence for far too long in the world with humanbeings (Von, Makhoane, 2006; Buted & Ylagan, 2014). Most explanations often attributable to street food vending definition is the location and size of the street food. The term “street food vendors” may appear to exclude those food vendors operating from officially greed off streets such as markets, bus terminals, along the road and school campus and other public spaces (Offei-akoto, 2015; Tessema, Gelaye & Chercos, 2014)

One characteristics of these street foods is that, their activities and modes of operation in these public spaces remain the same as their street counterparts, even after moving off the streets in different parts of the world (Odonko et al., 2011; Liu, Guangyi & Zhang, 2014). In a broad context, street foods are defined by the World Health Organization (WHO) as foods and beverages prepared and/or sold by vendors in streets and “other public places” for immediate consumption or consumption at a later time without further processing or preparation (WHO (2008). The explanation of street foods is often defined to include beverages, drinks and meals as well as snacks (Manko, 2018). Snacks are popularly consumed between mails and thus, of relatively lighter and less substantial and nutritional value (Makwande & Moyo, 2013). It has been revealed that, snacks may be prepared from fruits, vegetables, and cereals and may be eaten in a raw or be processed (Bernardo et al., 2015)

These snacks may include modern and more processed foods that are vended on the street like ice creams, biscuits, and yoghurts. Added to the availability of snacks, drinks and meals, fruits and vegetables and may be eaten in a raw state or be processed (Makwande & Moyo, 2013; Omari, Frempong & Arthur, 2018). Studies have revealed that, street food vendors may vary and this variety would depend on the

culture, religion and climate of localities within where they are sold (Mensah et al., 2002; Omemu & Aderoju, 2008)

In the context of street food, those who are stationary are more prevalence where consumers often have to go and line up and buy the food to eat. On the other hand, some of the street foods are mobile and may be pushed on a truck along the major road for sale (Boateng, 2014). Also, some of the street food vendors operate during certain seasons and others vend on a part time basis to supplement another source of income (Buted & Ylagan, 2014; Liu, Guangyi & Zhang, 2014). Nonetheless, it can be argued that, whether part time or seasonal, these street food vendors would either operate from permanent stands or place of business, or mobile and thus, can be grouped under the category of mobile or stationary food vendors (Makwande & Moyo, 2013; Buted & Ylagan, 2014)

2.4 Knowledge of street food vendors on food hygiene

Food safety knowledge of street food vendors plays a significant role in the economic and health development of nations by safe guarding the nations health, enhancing tourism and international trade, the production, distribution and consumption of safe food (Von & Makhoane, 2006; Odonkor et al., 2011). Despite the importance of food safety, there seem to be few quality control systems to guard against food-related illnesses among street food vendors mushrooming, in developing countries, some of which may be fatal while others can lead to expensive medical care among consumers (Shu-ai, Yi-Mei & Kuo-Wei, 2012; Odonkor et al., 2011)

Studies have revealed that, the issue of street food has been a very important aspect of concern to public health advocates because most of these operators have little or no more knowledge about food hygiene practices (Paola & Allan, 2010; Mensah et al.,

2002). Over the years, about 2.5 billion people world-wide consume street food on a daily basis with knowledge or no knowledge of food hygiene which can lead to foodborne diseases by the practices of these operators (Oghenekohwo, 2015; Kubde, Pattankar & Kokiwar, 2017). The reasons for their patronage have been their accessibility and less costly especially in rural areas where consumers may spend less to afford the food (Ababio & Lovatt, 2015). Added to that, is the fact, less skills are required to operate the business which serves as an important source of food and nutrients to consumers and employment to urban residents as well (Alfers, 2012). In most empirical studies, knowledge of street food vendors have been assessed.

In a study conducted by Osei-boateng (2012) to assess street food vending in Ghana, the findings from the study indicated that, about 78% of the participants knowledge on food hygiene was good. The study revealed that, majority of the street food vendors had ever heard about food hygiene from the media and authorities. The study revealed that, majority of the street food operators worn apron before serving food to consumers while others worn scarf and washed their hands properly after visiting the toilet before serving people with food.

Also, Samapundo et al. (2016) in Vietnam found that street food vendors had knowledge of food hygiene. Majority of them sampled during the study were adhering to safety measures. Same way, Osei-boateng (2012) revealed that, street food vendors identified media as their sources of knowledge concerning food safety precautions. The study found most of the respondents to have knowledge on what constitute food safety.

However, a review on food safety and food hygiene studies by Ababio and Lovatt (2015) in Ghana revealed that, more than 80% of street food operators were less knowledgeable about food hygiene. The study revealed that, majority of the operators

were not using soap to clean utensils. Most of the respondents, 33.5% were not using warm water to rinse their washed bowls whilst 23.8% never rubbed the utensils with clean clothes as the last step of cleaning. The study further revealed that, about 45% of the participants never bathed properly before serving people with food. This was occasioned because most of them sleep in the market. It was further revealed that, majority of the participants were never screened by medical team before they were allowed to serve the food. The study however revealed that, there was no presence of undressed skin lesion among the participants.

In a related development, a study by Offei-akoto (2015) revealed that, most of the street food vendors were operating by the road side. It was further revealed that, more than 88% of participants were not wearing hair restraints and about 56% of the participants were not wearing apron as a way to ensure food hygiene. Majority of the participants were wearing jewelry in their hands and arms as a possible source of contaminants. However, to ensure food hygiene practices, FAO, ensure that, watches, bracelets and rings should be prevented from been worn by food operators and thorough cleaning of hands and forearms be done to ensure food safety among consumers (1997)

Also, a study by Chukuezi (2010) in Owerri, Nigeria among street food vendors revealed that, most operators were not wearing on aprons and their hair nets and some had nail polish applied on their fingers. Another notable flaw was the use of dirty uniforms among the street food vendors, chewing gum while serving people and presence of undressed lesion on their hands. About 40% of the street food operators were found not to be using uniforms. Others were not using personal protective practices like covering saucepans with lid among others and there were no available toilets for consumers to use in times of need.

Also, Nurudeen et al. (2014) found that in the Central State of Northern Nigeria, sampled street food vendors were found not to be wearing apron while serving food to consumers and in Niger Delta University, Oghenekohwo (2015) found that food vendors were found to be wearing jewelry at the time of the study.

Studies on food safety knowledge and practice of street food vendors in rural Northern Ghana by Dwumfour-Asare and Agyapong (2014) found that knowledge level amongst vendors concerning food safety practices was low, although about 34% vendors washed their hands after some major activities, about 45% of them did not use soap to wash their hands while 71% of the vendors had undergone medical screening despite a high knowledge level of its importance. Other studies suggest that, temporary halt of vending for the exclusion of ill-food handlers should be adhered to at all times (Liu, Guangyi and Zhang, 2014). For instance, in a study carried out by Nurudeen, Lawal and Ajayi (2014) in Central State of Northern Nigeria to assess hygiene and sanitary practices of street foods, it was revealed that, about 67% of the participants revealed that, food operators should stop their business for temporal time if they suffer from cough, cold, diarrhea, stomach cramps, typhoid, hepatitis, food poisoning and communicable disease. Also, Sarkodie et al. (2014) found that in Sunyani Township, street food vendors were not having undressed skin lesion.

Similarly, in a survey carried out by Opoku-Boateng (2016) to assess personal hygiene in food businesses, it was revealed that, age, sex, income and educational status of street food vending influence food safety knowledge and attitudes of consumers. The study found that, the odds of having good knowledge was higher in street food operators with education as compared to those without education (OR=1.56; p=0.04). It was further revealed that, knowledge of food hygiene was associated with age of the street food operators. Those who were aged 45 years were

less likely to be knowledgeable concerning food hygiene as compared to those who were aged less (OR=0.83; p=0.05). The income status of street food operators was also found to be statistically associated with the knowledge of food vendors (OR=1.15; p=0.05). It was found that, those who had higher income were more likely to be knowledgeable with food hygiene as compared to those with low income.

Obi-Nwosu et al. (2013) also found that, food safety knowledge, was associated with socio-demographic variable like age, sex and income status with food hygiene among street food vendors (=2.76; p=0.05). However, in a survey carried out by Janie and Marie (2010), it was revealed that, no association exist between educational level of street food operators and food hygiene knowledge at the time of the study (OR=2.83; p=0.15). The practice of reheating left over foods was very common among people who operate street food in Nigeria. Inspection of low personal hygiene was observed. People never had medical examination certificates and had hardly received any form of pre-employment medical examination and never received any form of health education on street food (Omemu & Aderoju, 2008; Olang'o, Olima & Leah, 2012)

In Zimbabwe, it was revealed that, street food operators who had training on food hygiene had good knowledge concerning food hygiene and proper preparation and storage of food as well as environmental conditions that may be detrimental to health. The study further revealed that, about 23% of the participants said, dust was affecting the street foods on daily basis. It was further revealed that foods were sold under unacceptable conditions and these needed to be improved (Makwande & Moyo, 2013) To provide protection against foodborne illness, it is necessary for street food operators to have up-to date knowledge of production, harvesting, and storage techniques to accurately evaluate the quality and safety of raw materials. Thorough knowledge of the food equipment is essential to exercise control over processing,

preservation, preparation, and packaging of food products. An understanding of the vulnerability of food products to contamination will help establish safeguards against food poisoning (Buted & Ylagan, 2014; Boateng, 2014)

Knowledge of the conditions and circumstances that lead people into street vending is important for policy makers and city regulators in understanding why vendors react the way they do to eviction, relocation, and other urban regulatory policies and subsequently to develop policies that satisfy the needs of vendors and of cities and city authorities (Shu-ai, Yi-Mei & Kuo-Wei, 2012)

Alternatively, *Salmonellosis* is one of the major food-borne health hazards and is associated with animal food such as poultry, meat, milk, eggs and fish. The produce enzymes that degrade carbohydrates, fats and proteins thus resulting in softening and flavour deterioration of food (Paola & Allan, 2010). It is revealed that, under favorable conditions during harvesting, processing and storage of food commodities, moulds produce toxic metabolites called mycotoxins which are heat stable and capable of producing diseases of acute or chronic nature when ingested with food (Omari, Frempong & Arthur, 2018). These can affect organs like the liver, the kidney and nervous systems, endocrine and immune systems. However, Manko (2018) revealed that, in Ghana, about 28% and about 21% street food operators had knowledge about *Salmonella E. coli* and hepatitis A. respectively as agent of food-borne illnesses. Only about 34% of the people had knowledge concerning *Listeria* and *Vibrio*, respectively, as food-borne pathogens. About 37% of the participants reported that the food could be made safe by cooking whilst 34% said that the food could be made safe by adding vinegar or lemon juice to the food.

Others were of the view that, contaminated food could not be made safe for eating again. The general hygienic requirement and practices to be followed by the vendors

was also recommended for translation by the relevant authorities into codes of practice and this was recognized as cost effective tools for the control of street foods, by fully taking into account local conditions including specific risk factors that are relevant to each operation. In contrast to the potential benefits, it is recognized that street-food vendors are often poor and uneducated and lack appreciation for safe food handling. Consequently, street foods are perceived to be a major public health risk (Paola & Allan, 2010). If a community is to have the full benefits of street-vended foods with minimal risk of the food borne disease, government intervention is required to ensure that the standard of safety for such foods is the best attainable in the context of the prevailing local situations and laws (Shu-ai, Yi-Mei & Kuo-Wei, 2012)

Similarly, in a study by Azanza et al. (2000) in Italy to assess the knowledge concerning food borne illness and food safety issues among consumers identified that they majority of food consumers and street food vendors who had attended training workshop on food hygiene had high knowledge concerning foodborne diseases control and preventive measures.

In a related development, Kubde et al. (2017) revealed that the protection against foodborne diseases, was necessary to have up to date knowledge of production in terms of preparation of food and storage of food. Thorough knowledge of design, construction, and operation of food equipment is essential to exercise control over processing, preservation, preparation, and packaging of food products. An understanding of the vulnerability of food products to contamination will help establish safeguards against poisoning.

2.5 Hygienic practices of street food vendors during food preparation, selling process and storage

Empirical studies have revealed that, all the problems related to food handling, inadequate or insufficient storage, and poor hygienic conditions by street food vendors increase the risk of contracting foodborne disease. If food handlers develop a correct perception of hygiene, it is possible to succeed in this field, and as a result of this success, the risk of foodborne illness will decrease (Singh et al., 2017; Janie & Marie, 2010). Mishandling of food plays a significant role in the occurrence of foodborne illness. Improper food handling may be implicated in 97% of all foodborne illness associated with catering outlets (Kubde, Pattankar & Kokiwar, 2017; Omari, Frempong & Arthur, 2018)

Empirical studies also revealed that, microbiological risk in the kitchen may be decreased significantly by preparing food properly, otherwise, kitchens by the roads, and other places can also become an important contamination point for food among street food vendors (Elvis & Henry, 2016; Chukuezi, 2010). Therefore, the kitchen staff plays an important role in food safety. It is pointed out that the hands of food service employees may be causing cross contamination because of poor personal hygiene (Omemu & Aderoju, 2008; Feglo & Sakyi, 2012)

In surveys carried out by Azanza, Gatchalian and Ortega (2000) and Odonkor et al (2011) revealed that, about 45.3% of participants did not cover their hair and about 7.9% of the participants had undressed skin lesion. The study further revealed that, about 54.9% participants exposed foods to flies and about 47.5% street vendors used their mouth to blow air into polythene bags to open before using it to package foods for customers. Most of the vendors selling fried yam, plantain and bean cakes packaged the foods in mouth-blown polythene bags that may be contaminated. More

than two-third of the vendors interviewed did not use apron. Slightly above all 17% of the participants kept their finger nails clean.

In a related development, Danikuu, Baguo and Azipala (2015) in a survey revealed that, absence of evidence of relationship ($p= 0.05$) between the level of education of vendors and sanitation of vending sites was observed. This suggests that the education of the vending sites was not related to the practice of good hygiene among the participants. This suggests that the education of the vendors may not impact the sanitary practices of the vendors. On the knowledge acquisition of food vending practices, the results indicated that majority of the food vendors lacked basic training on hygiene and about 45% had formal training on food preparation. Studies also revealed that others street food vendors acquired skills from parents and other vendors while 23% acquired skills by self-practice (Tessema, Gelaye & Chercos, 2014)

On the part of street food vendors rubbish storage, the method of waste disposal used by the food vendors is deplorable because less than one-quarter of the vendors used waste bin to keep their waste while the rests used gutters along the streets, majority used the roads and gutters as their waste disposal points (Elvis & Henry, 2016). On the relationships between personal hygiene practices, food handling practices and surrounding of vending sites, waste disposal methods and locations of vendors, a statistical association was obtained p-values of 0.867, 0.054, 0.412 and 0.151 respectively, which revealed that, absence of evidence of relationship ($p=0.05$) between personal hygiene practice, food handling practices, surrounding of vending sites waste disposal methods and locations of vendors and demographic data of participants were seen (Oghenekohwo, 2015)

Studies also revealed that, street food vendors were observed to be serving food with bare hands which could promote contamination and introduction of pathogenic

microbes on foods if their hands were not properly washed (Azanza, Gatchalian & Ortega, 2000). Vendors that were chewing and talking while serving foods stood the risk of introducing harmful microorganisms that can trigger food-borne infections especially if the vendor is already a carrier of such organisms like tuberculosis bacteria (Jiao & Zheng, 2017).

Similarly, money exchanges a lot of hands and as such may be carriers of harmful organism. The vendors were observed handling money while serving food and this may introduce contaminants through hand contact with the food (Makwande & Moyo, 2013). The presence of undressed skin lesion possessed by some food vendors especially those with discharges are important risk factors in food contamination and occurrence of food poisoning (Samapundo et al., 2015). This is because discharge from this lesion can easily come in contact with the food or utensil that are used to serve foods. The surrounding flies can transfer pathogens from the infected lesion unto food utensils also (Boateng, 2014)

Also, the WHO has reported that one of the most critical challenges in street food vending is the supply of water of acceptable quality and sufficient quantity for drinking, washing of raw food materials, cleaning of utensils and surrounding sites (WHO, 2012). Studies carried out by Paola, and Allan (2010) revealed that, street food vending in various parts of the world particularly in developing countries where epileptic water supply is usually observed reported wash water reuse. The oily appearance of water used for washing the utensils confirms the wash water reuse practice amongst the street food vendors surveyed.

Workers of street food vending sites who fail to follow sanitary practices contaminate food that they touch, with spoilage and pathogenic microorganisms that they come in contact with through work and other parts of the environment. The hands, hair, nose,

and mouth harbor microorganisms that can be transferred to the food during processing, packaging, preparation, and service by touching, breathing, coughing and sneezing (Nurudeen, Lawal and Ajayi, 2014)

Similarly, studies revealed that, food safety rating revealed that both informal and formal categories of restaurants are employing effective food safety practices. However, others researchers revealed that, visual assessments are not entirely reliable, laboratory results showed pathogenic contamination of a number of food handlers' hands; kitchen equipment and utensils such as cutting boards and plates as well as cooked or raw food like salads. This demonstrates that both registered and unregistered street foods need to improve on their workers' personal hygiene and sanitation of kitchens and eating areas (Liu, Guangyi & Zhang, 2014)

In Cameroon, a study found that, an assessment of hygienic practices and health status of street food vendors in Yaounde was basically showing that personal hygiene of street food vendors was low. In Ghana, studies revealed that, the hygienic practices among food vendors in the educational institutions in Ghana was found to be good as 78% served food properly, 89% had good hygiene while 90% had personal protective clothing (Obi-Nwosu et al., 2013; Offei-akoto, 2015)

In a study carried out in in Shijiazhuang city, China by Liu et al. (2014), findings from the study revealed that street food vendors served consumers using a spoon. It was showed that the relevant authorities ensured that all the necessary food practices were held in high standard. In Nigeria, Obi-Nwosu et al. (2013) revealed that sampled street food vendors indicated they washed food stuff before cooking to ensure that they were neat for consumption. Also, in Tainan City, Shu-ai et al. (2012) found that street food vendors were wearing scarf before serving food to consumers. More so,

Singh et al. (2017) revealed that in Mohali street food vendors were not allowed to talk while serving food to consumers.

However, a study found that, in Zimbabwe, majority of the street food vendors in the urban towns had clean workplace, 45% had vendors handled money and food indiscriminately, about 67% had dustbins while 78% of the vendors seldom had their hair covered with scarfs (Makwande & Moyo, 2013). Also, every cutting surface used in the preparation of food should be free from cracks and crevices, with only reasonable wear and tear, and should be cleaned at least on the following occasions: Before and after daily operations; and especially after having put unclean material or food on it if the surface is subsequently to be used to cut street foods or foods to be consumed raw. Cooked and uncooked food should be handled with separate utensils (Alamo-Tonelada, Silaran & Bildan, 2018)

Every restaurant should ensure that all defective, damaged, cracked, rusted, chipped and unsuitable appliances and crockery are removed from use and discarded (Mensah et al., 2002). The general advice is that, all utensils should be regularly cleaned thoroughly washing them in warm water containing adequate amount of soap or other suitable detergents and then either immersing them for half a minute in boiling clean water and draining them or, for two minutes in potable water at a temperature of not less than 77°C and draining them (Tessema, Gelaye & Chercos, 2014)

The food should at all times be kept clean and free from contamination, and be adequately protected from pests, environmental contaminants and stored at proper temperatures where appropriate. Readily perishable food should be placed or stacked so that it is not likely to be contaminated by contact with raw food, toxic materials or any other materials which may cause contamination (Von & Makhoane, 2006). The bulk of readily perishable foods should be stored in clean containers placed in a clean

ice box or refrigerator in which the food should not exceed a temperature of 10°C (Omemu & Aderoju, 2008)

Also, all non-perishable food should be stored in clean, protected and closed container/cupboard to prevent cross contamination by pests. Once cleaned, the bulk of perishable raw food including wet cereals or pulses should be stored in clean separate containers preferably placed in a clean ice box, a refrigerator or a freezer to prevent spoilage (Rane, 2011). Empirical studies also showed that, every food handler, during the conduct of the business, shall observe the following; wear an identification tag if issued and required by the relevant authority (Kubde, Pattankar & Kokiwar, 2017). Dress in clean and proper attire. Wash hands thoroughly with soap and clean water before and after handling food, after visiting the toilet, after handling unsanitary articles, touching animals, touching raw food, after handling toxic and dangerous materials as and when necessary (Odonkor et al., 2011)

Also, Elvis and Henry (2016) revealed that majority of sampled street food vendors (987%) were females and these had a predominantly poor level of food safety knowledge. The practice of steering and reheating left over was a very low and was practiced by few (21.1%) of the respondents, which was low. Frequent hand washing was poor. Inspection of food handlers showed a low level of personal hygiene. Only (42.3%) had pre-employment medical examination and 45,7% had received any form of health education.

In Dunkwa-On-Offin, Upper Denkyira, Boateng (2014) found that street food vendors were using dirty water to wash their bowls. Majority of the street food vendors were not frequently changing the water used for washing bowls. In the Tamale metropolis, Dwumfour-Asare and Agyapong (2014) found that street food vendors were handling money while serving food to consumers.

2.6 How consumers of street food vendors handle food before eating

The discipline of food epidemiology has proved that the majority of foodborne disease outbreaks reported in various parts of the world emanate from unsafe handling and preparation of food in various eating houses which include street foods, hostels, and canteens among consumers (Janie & Marie, 2010). Food safety is a priority for consumers and customers as they want safe health food, which keeps them strong and healthy. Major case for food contamination with pathogens is unsanitary practices during product handling, processing and distribution and even among food consumers (Manko, 2018; Janie & Marie, 2010). Empirical studies have tried to link consumers food handling practices to food borne illness. For example, a study by Bernardo et al. (2015) which was conducted to assess the healthy dietary diversity of a main meal in a self-service restaurant revealed that, consumers sometimes are to be blamed for some foodborne illnesses. The study revealed that, majority of the study participants, never washed their hands properly under running water with soap before eating. It was however observed that, consumers rather washed their hands with water thoroughly after eating. The study further revealed that, majority of the consumers never worried that, food vendors were talking while serving them.

In a related development, Mensah et al. (2002) revealed that, consumers in Ghana, never bothered about whether the food vendor was neat or not while serving them food. The study further revealed that, majority of the participants never washed their hands properly before eating while others even ate the food under unhygienic conditions at their workplace. Sometimes too, the diversity among consumers; purchasing trend is based on a variety of factors, including socio-demographics and socio-economic status. Consumers knowledge of food safety is largely influenced by socio-economic characteristics (Ababio & Lovatt, 2015).

Hand of consumers can be an important vehicle for transmitting microorganism to food due to poor personal hygiene (Buted & Ylagan, 2014). Poor hand washing practices of the food handlers often contribute to food borne-illness outbreaks and it shows that improvement of consumers hand washing practice is needed before eating. Eating a safe food will help people avoid food-borne illness and financial burdens, such as loss of production owing to sickness-related absences from work that ultimately affect individuals and families (Chukwuezi, 2010)

Danikuu, Baguo, and Azipala (2015) in a survey revealed that, about 56% of street food consumers washed their hands with dirty water which is recycled and used severally by the street food vendors. The results revealed that, few of the vendors usually complaint to the operators while others did not complain about the dirty water. Similarly, it has been revealed that, consumers of street food vendors handle food poorly before eating. Hygiene practices of vendors during handling, cooking and serving of foods were monitored. It was observed that about 78% of the people did not wash their hands well before eating whilst few washed their hand before eating. Even among those who washed their hands before, eating, the portability of the purity of the water they used could not be guaranteed (Liu, uangyi & Zhang, 2014; Obi-Nwosu et al., 2013)

Opoku-Boateng (2016) revealed that, street food vendors were never bordered about the nature of the plates consumers were served to eat from. The results further revealed that, majority of the consumers used unclean bowls and the street foods operators served them with fried yam, plantain and chips on plates that were not properly washed (Oghenekohwo, 2015). It is important to state that, consumers should be informed of their responsibility in ensuring that they do not contaminate, dirty or litter street food vending sites. The health and nutritional status of people is largely

depended on the quality of food they eat. It is therefore, essential to ensure that the food they consume is safe and wholesome (Sarkodie et al., 2014)

Nurudeen, Lawal and Ajayi (2014) revealed that, when hygiene is highly demanded among consumers of street food vendors, market forces will prevail and hygiene will be supplied by the operators of these businesses. In other words, customer awareness of food hygiene will drive a better hygienic food service business. However, in the Tamale metropolis of Ghana, the majority of participants who were consumers of street food vendors and street food vendors themselves, were aware of that food borne illness could be transmitted through consumption of unclean food. More than half, about 57% were often concern over food safety issues of street foods.

Similarly, Paola and Allan (2010) revealed that, food handlers and consumers mostly involved directly or indirectly in food handling, usually have very poor knowledge of personal hygiene and are not exposed to appropriate hygienic methods of food processing and food handling. The survey revealed that, about poor storage facilities may enhance contamination by pathogenic micro-organisms. Consumers often get infected with street food vendors easily accessible to them. Consumers food safety concerns are magnified when an outlet prepares foods from raw materials and points out foods mostly involved in the outbreaks of diseases include milk and milk products, vegetables, salads and puddings, meat and meat products among others (Shu-ai, Yi-Mei & Kuo-Wei, 2012). Therefore, trends in global food production, processing, distribution and preparation are creating an increasing demand for food safety research in order to ensure a safer global supply (WHO, 2012)

As such, Chukwuezi (2010) revealed that in assessing the factors affecting the safety and quality of street foods in several areas in Nigeria, it was revealed that knowledge of both street food vendors and consumers demonstrated little knowledge regarding

the proper preparation and storage of food as well as environmental conditions that may be detrimental to health. The results revealed that about 34.2% of the study participants, confirmed that street food is sold under unacceptable conditions and this needed improvement.

However, in Zimbabwe, Makwande and Moyo (2013) revealed that food handlers were adhering to food safety as they ensured food was safe before they bought. In Ghana, Omari et al. (2018) found that consumers used clean bowls to be served with food from street food vendors.



CHAPTER THREE

METHODOLOGY

3.1 Study Setting

The study was conducted in the Sagnarigu Municipality in the Northern region of Ghana. The Sagnarigu district with its capital at Sagnarigu is one of the six newly created districts in the Northern region in the first half of 2012. It was carved out of the Tamale Metropolis by Legislative Instrument (LI) 2066. The district was inaugurated on 24th June, 2012. One of the reasons for the creation of the district was to redirect developmental projects to the community's north and west of the Metropolis (now Sagnarigu) which were relatively less developed as compared to the urban areas in the Tamale Metropolis. The Sagnarigu district has 79 communities, comprising of 20 urban, 6 peri-urban, and 53 rural areas (GSS, 2010)

3.2 Research Design

The study employed a descriptive cross-sectional design. This type of study design involves the collection of data from one point in time. This design used described and interpreted the relationship among the variables in the study setting at a single point in time. The advantages of this study design are that it is relatively inexpensive, takes up little time to conduct and it can estimate the prevalence of an outcome of interest because sample is usually taken from the whole population. However, the study design cannot establish causality (Bernard, 2000).

3.3 Population

The population included street food vendors and consumers of street food vendors in the Sagnarigu Municipality who were available at the time of the study, be 18 years or more and was willing to take part in the study.

3.4 Sampling Techniques and Sample Size

The study employed purposive sampling technique to sample street food vendors and consumers. It is a sampling technique in which the researcher relies on his/her own judgement when choosing study participants to participate in a study. This sampling technique was used because it is widely used in research for the identification and selection of information-rich participants for the most effective use of limited resources. The sample size involved twenty food street vendors and thirty consumers of street food vendors from the sample size of twenty-nine street food vendors.

3.5 Data Collection Instrument

The study used a structured questionnaire to gather the data. The questionnaire was made of closed ended questions that was put in the form of a Likert scale of five using 'strongly agree', 'agree', 'neutral', 'disagree' and 'strongly disagree'. The questionnaire was structured according to the specific objectives. The first part of the questionnaire collected data on the bio data of respondents whilst the rests of the sections collected data on the specific objectives in relation to knowledge of street food vendors on food hygiene and hygienic practices during food preparation. The variables that assessed the knowledge of respondents were computed and the results

rated. And among the consumers, the variables were also computed to rate their level of adherence.

3.6 Data Analysis

The completed questionnaires obtained from the study participants were coded for entry and analysis. The data was summarized in Microsoft Excel 2016 and then entered for descriptive analysis using the Statistical Package for Social Science (SPSS) software package (version 21.0). The findings were presented using simple frequencies and percentages tables.

3.7 Ethical Considerations

All the study participants' informed consent was obtained first before the administration of the questionnaires. This was done through the written information, and all the study participants were given the opportunity to ask questions and time for consideration. Participation in this study was voluntary and the study participants were allowed to withdraw from the study without any penalty imposed on them. Study participants privacy was protected as their names were not written on the questionnaires.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

The results of the data gathered from the field are presented below. The presentation was done based on sub headings as they relate to the study objectives.

4.2 Demographic Data of Respondents

The demographic data of study participants were presented according to the various categories of sampled. The first part presents that of the street food vendors and the second part presents that of the consumers.



Table 4.1: Demographic data of food vendors

Variable	Frequency (30)	Percent
Age		
18-25	2	6.7
26-30	6	20.0
31-35	4	13.3
36-40	11	36.7
41+	7	23.3
Sex		
Male	5	16.7
Female	25	83.3
Education		
None	9	30.0
Primary	6	20.0
JHS	7	23.3
SHS	6	20.0
Tertiary	2	6.7
Marital		
single	11	36.7
Married	15	50.0
separated	3	10.0
Divorced	1	3.3
Category		
Stationary	24	80.0
Mobile	6	20.0

From the results in Table 4.1, it was revealed that, 6 (20%) of the respondents were aged between 26-30 years and 11 (36.7%) were aged between 36-40 years. Assessing age as a demographic variable was to assist the researcher to know the levels of maturity of the study participants in their responses to the questions therefore making the research findings more reliable. Majority of the respondents, 25 (83.3%) were

females who were engaged in street food vending. Sex composition of the study participants would provide a balance in terms of how they responses were distributed according to both males and females.

Whilst 9 (30%) of them did not have any form of formal educational training. The educational background of the respondents is very important as it contributes to study participants understanding of the variables that were asked. From the results, half of the respondents were married. It was further revealed that, 24 (80%) of the respondents were engaged in a stationary street food vending. The nature of street food operation could enhance respondents understanding of certain variables that were asked especially with respect to how they handle their customers daily.

Table 4.2: Demographic data of consumers

Variable	Frequency	Percent
Age		
18-25	10	33.3
26-30	10	33.3
31-35	5	16.7
36-40	3	10.0
41+	2	6.7
Sex		
Male	20	66.7
Female	10	33.3
Education		
None	3	10.0
Primary	8	26.7
JHS	10	33.3
SHS	5	16.7
Tertiary	4	13.3
Occupation		

Non salaried worker	7	23.3
Salaried worker	11	36.7
Petty trader	9	30.0
Student	3	10.0
Marital		
single	3	10.0
Married	7	23.3
separated	12	40.0
Divorced	5	16.7
Widowed	3	10.0

From the results in Table 4.2, it was revealed that, most of the respondents, 10 (33.3%) were aged between 26-30 years whilst few 2 (6.7%) were aged above 41 years. Age is very important in research as it takes different values for different people and could influence how well people respond to the study questions. It was further revealed that, majority of the consumers, 20 (66.7%) were males. Knowing the sex composition of the respondents was a way of determining how often people patronize street food in terms of their sex and 10 (33.3%) had no formal education. Education as a variable was considered to know if it could enhance consumers way of handling street food before eating. The results also showed that, most of the consumers, 11 (36.7%) were salaried workers. Knowing the occupational status of respondents could enhance the way they often go in to purchase these street food vendors especially among those who are non-stationary and 12 (40%) were married people. Married could influence respondents way of eating outside and the need to consider this variable among consumers at the time.

4.3 Knowledge of Street Food Vendors on Food Hygiene

The current study sought to ascertain respondents knowledge concerning food hygiene practices within the Sagnarigu Municipality in the Northern Region of Ghana. All respondents stated they have heard of food hygiene at the time of the study. The study participants identified various sources as the source of their knowledge concerning food hygiene. Figure 4.1 shows the various fora respondents obtained their knowledge from. Hygiene during handling and cooking of street foods is very important. According to FAO (1997), food handlers should have the necessary knowledge and skills to enable them to handle food hygienically.

From the results, it was revealed that, all the study participants said they had ever heard about food hygiene at the study. This study agrees with the study done by Samapundo et al. (2016) where in Vietnam street food vendors had knowledge concerning food hygiene. The result is not surprising as these were engaged in food vending and were mindful of food hygiene. The results revealed that, respondents obtained their knowledge from varied sources. This finding from the study agrees with the study done by Osei-boateng, (2012) where in Ghana, where street vendors had received their sources of knowledge from the media. The street food industry plays an important role in developing countries in meeting the food demands of the urban dwellers. Street foods feed millions of people daily with a wide variety of foods that are relatively cheap and easily accessible among people.

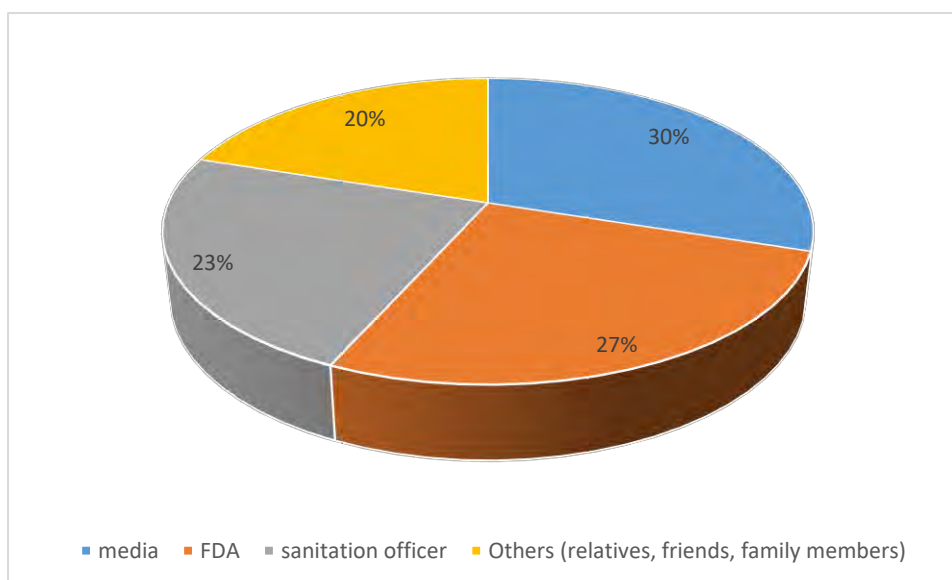


Figure 4.1: Sources of knowledge of food hygiene among respondents

4.3.1 Practices to Ensure Food Hygiene among Respondents

This part of the study considers how street food operators at the study setting with knowledge of food hygiene ensured good food hygiene. The purpose of this was to know if the basic food hygienic practices were ensured always and respondents were adhering to it at the study setting.

Table 4.3: Practice to ensure food hygiene among respondents at the study setting

Statement	1	2	3	4
Wear a scarf before serving food	4.7±3.4	3.36±1.19	0.0±0.0	5.28±.849
Had a long finger nails	2.91±1.28	3.31±1.43	4.28±.849	4.28±.849
Worn apron before serving food	0.0±0.0	0.0±0.0	3.31±1.79	4.00±1.45
Worn a jewelry while serving food	3.31±1.43	4.62±1.19	3.20±1.16	3.56±1.26
Chewed/talked while serving food	4.00±1.45	3.92±1.15	3.36±1.19	0.0±0.0
Brushed my teeth every morning	4.00±1.45	3.38±1.14	4.06±1.98	3.56±1.26
Bathed properly before serving food	3.30±1.27	4.62±1.19	3.38±1.14	3.30±1.27

Performed religious rituals and serve food	3.92±1.15	3.36±1.19	2.82±1.12	3.56±1.26
Availability of toilet facility at site	0.0±0.0	0.0±0.0	4.28±.849	3.20±1.16
Washed hands after visiting the toilet	3.31±1.43	3.31±1.79	4.06±1.98	4.62±1.19
Washed hands properly after urinating	3.20±1.16	3.31±1.79	5.28±.849	3.31±1.43
Presence of undressed skin lesion	0.0±0.0	2.82±1.12	3.92±1.15	4.28±.849
Screened before by medical team	0.0±0.0	3.20±1.16	3.36±1.19	5.28±.849

1 = Strongly agree, 2 = Agree, 3 = Disagree 4 = Strongly disagree

From the results in Table 4.3, the mean score for washed hands properly after urinating are 3.31±1.43, 3.31±1.79, 5.28±.849 and 3.31±1.43. Also, the mean score for participants ever been screened before by medical team are 0.0±0.0, 3.20±1.16, 3.36±1.19 and 5.28±.849. The results also showed that, the mean score for study participants wearing a scarf before serving food 4.7±3.4, 3.36±1.19, 0.0±0.0 and 5.28±.849. According to Oghenekohwo (2015) food vendors in Niger Delta University, were wearing jewelry while serving food to consumers at the time of the study. It is important to add that, the street food industry plays an important role in developing countries in meeting the food demands of the urban dwellers. Street foods feed millions of people daily with a wide variety of foods that are relatively cheap and easily accessible

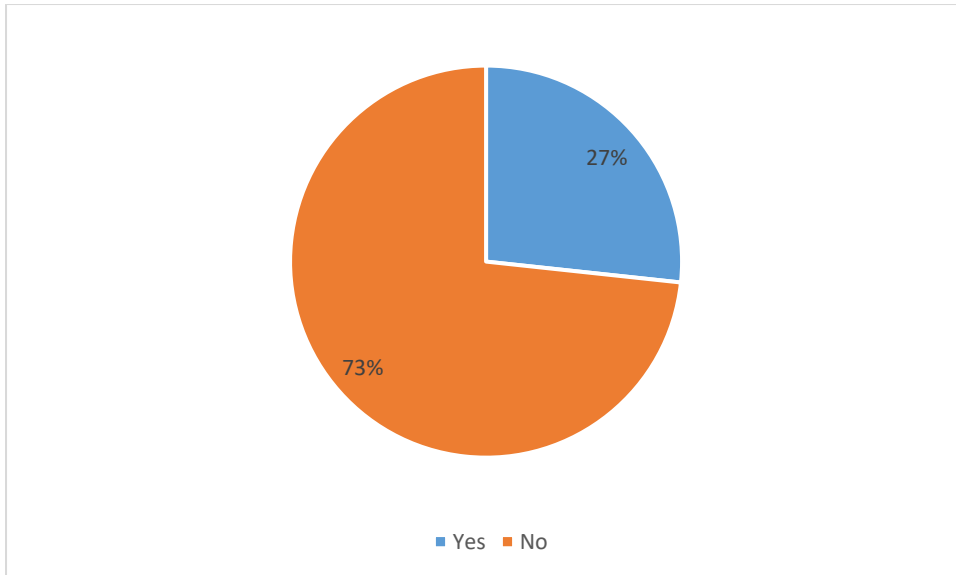


Figure 4.2: Assessment of hygienic practice among respondents

From the results, it was revealed that majority of the respondents representing 73% said they were not ensuring hygienic practices of food vendors because they had inadequate sanitation equipment available to them at their vending sites.

4.3.2 Level of Food Hygienic Adherence among Food Vendors

This part presents how respondents rated their level of food hygienic adherence at the study place. The results as self assessed by respondents are illustrated below;

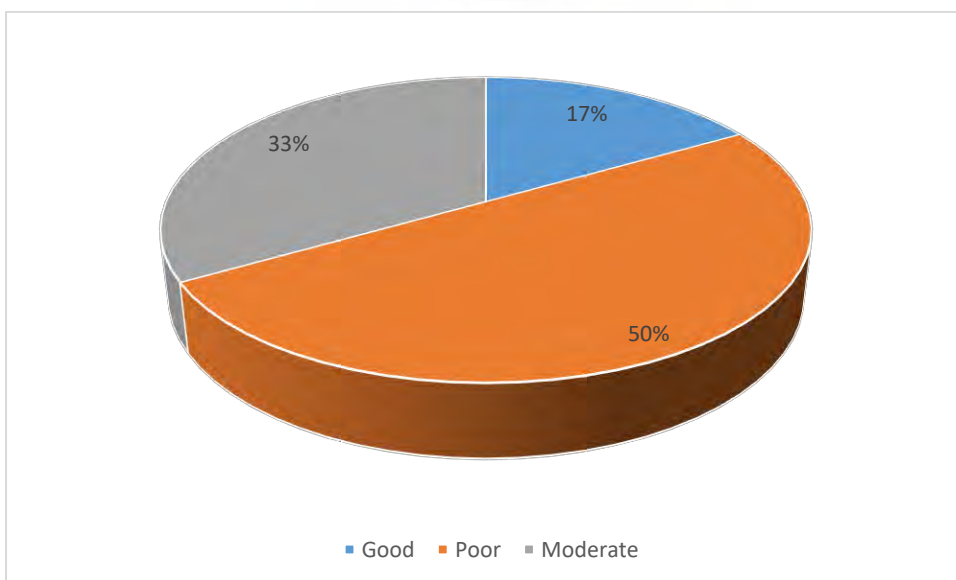


Figure 4.3: Respondents rating of the level of hygiene

From the results presented in Figure 4.3, it was revealed that, majority of the respondents rated their level of hygienic practices as food vendors to be poor.

4.4 Hygienic Practices during Food Preparation

The study presented the hygienic practices of study participants during food preparations and selling at the study setting to consumers at their vending sites.

Table 4.4: Practices observed during food preparation and selling among respondents

Variable	1	2	3	4
Food preparation				
Washed food stuff before cooking	5.92±1.38	2.69±1.17	0.0±0.0	0.0±0.0
Chopped food stuff before washing	3.92±1.38	3.47±1.21	3.69±1.17	0.0±0.0
Washed foodstuff before chopping	1.44±1.19	3.69±1.17	5.92±1.38	3.47±1.27
Availability of a chopping board	3.47±1.27	3.47±1.27	3.47±1.27	2.69±1.17
Used a grinding stone for grinding	7.22±1.19	0.0±0.0	3.44±1.19	0.0±0.0
Selling				
Handle prepared food with bare hands	4.92±1.38	3.44±1.19	3.22±1.19	0.0±0.0
Handled money while serving food	2.69±1.17	3.47±1.27	3.47±1.27	2.69±1.17
Served food with a spoon	2.69±1.17	5.92±1.38	4.22±3.19	2.69±1.17
Blown air into polythene bag before use	3.44±1.19	3.22±1.19	3.47±1.27	3.92±1.38
Heated food before serving	2.69±1.17	2.69±1.17	5.22±1.19	2.22±1.19
Presence of food debris on hands	4.22±1.19	3.47±1.27	3.47±1.27	3.22±1.19
Food is exposed to flies while serving	5.92±1.38	5.22±2.19	0.0±0.0	0.0±0.0

1 = Strongly agree, 2 = Agree, 3 = Disagree 4 = Strongly disagree

In Table 4.4, the results revealed that, the average means of study participants who chopped food stuff before washing were 3.92 ± 1.38 , 3.47 ± 1.21 , 3.69 ± 1.17 and 0.0 ± 0.0 . The findings also showed that, study participants who used a grinding stone for grinding were 7.22 ± 1.19 , 0.0 ± 0.0 , 3.44 ± 1.19 and 0.0 ± 0.0 . From the results, it was showed that, study participants who handle prepared food with bare hands during the selling process were 4.92 ± 1.38 , 3.44 ± 1.19 , 3.22 ± 1.19 and 0.0 ± 0.0 . According to Obi-Nwosu et al. (2013) in Nigeria, sampled street food indicated they washed food stuff before cooking. Liu et al. (2014) revealed that in Shijiazhuang city, China, street food vendors served consumers using a spoon. The study generally revealed that street food vendors in the study setting were only concerned with profit making at the expense of standard food hygiene and sanitary practices. The findings of the study generally suggest non-compliance with the Codex Alimentarius Commission guidelines for street food control in Ghana among street vendors.

Therefore, the practice proper personal hygiene was observed to be low. Personal hygiene was said to be one of the core areas that food vendors failed to measure up to. The street food industry has become an area of global concern because of the high health risk associated with the highly patronized street foods among low income earners in developing countries. Poor environmental, personal and food hygiene practices are responsible for the high rate of food borne illness in developing countries. Street food vendors in developing countries are often ignorant about standard hygiene practices and serve as vehicle for the dissemination of pathogenic microbes and mycotoxins through contaminated foods.

4.4.2: Processes Ensured During Food Storage by Respondents**Table 4.5: Processes during food storage by respondents**

Variable	1	2	3	4
Food was stored openly in the stalls	5.47±1.27	5.60±.54	4.60±.54	0.0±0.0
Food was stored in plastic container	3.10±1.25	3.92±1.38	3.10±1.25	3.47±1.27
Food was stored in a cupboard	0.0±0.0	0.0±0.0	5.40±2.18	4.40±2.18
Food was stored in a refrigerator	3.10±1.25	3.92±2.38	3.10±1.25	4.92±2.38
Stored food was left over for use	4.60±.54	4.40±2.18	0.0±0.0	0.0±0.0
Covered utensils/warmers always	0.0±0.0	4.47±2.27	5.40±2.18	0.0±0.0

1 = Strongly agree, 2 = Agree, 3 = Disagree 4 = Strongly disagree

From the results presented in Table 4.5, study participants who food was stored openly in the stalls average means were 5.47±1.27, 5.60±.54, 4.60±.54 and 0.0±0.0. Similarly, study participants who food was stored in a cupboard average means included 0.0±0.0, 5.40±2.18 and 4.40±2.18. The results revealed that, the average means of the study participants who covered utensils/warmers always were 0.0±0.0, 4.47±2.27, 5.40±2.18 and 0.0±0.0.

4.4.3: Practices Related To the Washing of Bowls among Respondents

From the results presented in the table, the practices of street food vendors in relation to the way they washed their bowls were assessed. as these could enhance the safety of consumers at the time of the study.

Table 4.6: Practices in relation to washing of bowls among respondents

Variable	1	2	3	4
Cleaning of utensils				
Clean utensils with warm soapy water	0.0±0.0	0.0±0.0	3.10±1.25	4.44±1.19
				9
Clean utensils with clean water	1.14±1.1	2.6±.54	3.33±1.21	0.0±0.0
	9			
Clean utensils with cold soapy water	3.44±1.1	3.33±1.21	3.84±1.50	3.55±1.1
	9			7
Clean utensils with dirty water	3.33±1.2	3.84±1.50	3.84±1.50	3.10±1.2
	1			5
How many times water is used before replacment				
Once	0.0±0.0	3.18±1.05	3.10±1.25	3.18±1.0
				5
Twice	2.6±.54	3.55±1.17	3.84±1.50	3.55±1.1
				7
Severally	0.0±0.0	24 (80.0%)	6 (20.0%)	0.0±0.0

1 = Strongly agree, 2 = Agree, 3 = Disagree 4 = Strongly disagree

From the results presented in Table 4.6, the averages of participants using clean utensils with warm soapy water are; 0.0±0.0, 3.10±1.25 and 4.44±1.19. It was also showed that, the averages of study participants using clean utensils with cold soapy water are; 3.44±1.19, 3.33±1.21, 3.84±1.50 and 3.55±1.17. The findings also showed that, study participants used water once with averages as; 0.0±0.0, 3.18±1.05, 3.10±1.25 and 3.18±1.05. According to Boateng (2014) street food vendors used dirty water to wash their bowls. Therefore unhygienic practices by food vendors during their activities is a results of factors including but not limited to, inadequate training sections, not enough health services officers to embark on regular inspections to make

sure vendors are adhering to proper hygiene and refusal of some vendors to put what they have learnt into use even though they have acquired knowledge about hygiene practices.

4.5 How Consumers of Street Food Vendors Handle Food before Eating

This part of the study examines consumers of street food handling behaviours before eating.

Table 4.7: How consumers of street food vendors handle food before eating

Variable	1	2	3
Wash my hands before eating food	3.63±1.05	4.05±1.49	3.92±1.38
Use a spoon to eat food every time	2.87±1.12	4.05±1.49	3.33±1.21
Ensured food is served to me on a clean bowl	2.44±1.19	6.37±1.27	0.0±0.0
Make sure the food vendor is neat	3.92±1.38	3.33±1.21	4.05±1.49
Do not allow vendor to chew and serve food	2.87±1.12	3.63±1.05	2.37±1.27
Wash hands properly before eating	3.33±1.21	5.40±1.18	4.37±1.27
Eat under a hygienic environment	3.40±1.18	2.44±1.19	4.37±1.27
Package food well before removing to eat	4.40±1.18	2.87±1.12	2.44±1.19
Do not expose food to flies before eating	1.37±1.27	3.63±1.05	2.37±1.27
Can eat under dirty environment	2.44±1.19	3.92±1.38	5.37±1.27

1=Strongly agree, 2= Agree, 3= Disagree

From the results presented in Table 4.7, it was showed that, the averages of consumers who washed their hands before eating food were; 3.63±1.05, 4.05±1.49 and 3.92±1.38. The findings also showed that, the averages of consumers using a spoon to eat food every time were 2.87±1.12, 4.05±1.49 and 3.33±1.21. It was also showed that, consumers who did not expose food to flies before eating averages were

1.37±1.27, 3.63±1.05 and 2.37±1.27. According to Von and Makhoane (2006) in South Africa, consumers ensured that good practice was observed before eating. The vendors that were observed to be serving food with bare hands could promote contamination and introduction of pathogenic microbes on foods if their hands were not properly washed.

4.5.1: Consumers Adherence to Food Hygiene

The results revealed that, majority of the respondents in terms of adherence to food hygiene was poor. The results showed the responses of the respondents in the figure as such.

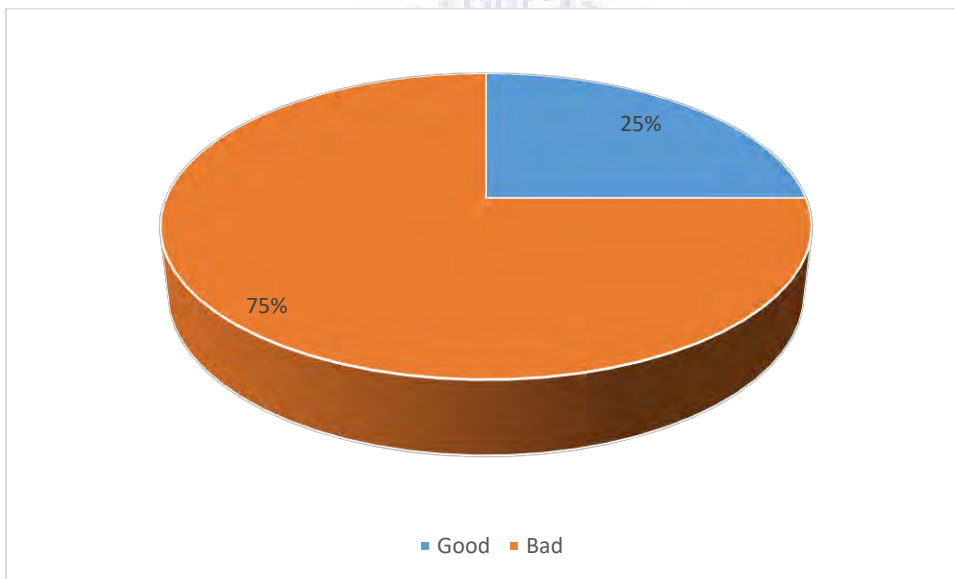


Figure 4.4: Level of adherence to food hygiene among consumers

From the results presented in Figure 4.4, it was revealed that majority of the respondents rated their level of adherence to food hygiene as bad in the context of consumers. This finding from the study disagrees with the study done by Makwande and Moyo (2013) where in Zimbabwe food handlers were adhering to food safety. This study has shown that the street foods in the Sagnerigu Municipality have become popular amongst the urban dwellers because of easy access and their affordability when compared to hotels and restaurants.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings, conclusion and recommendations.

5.1.1 Summary of the Findings, Conclusion and Recommendations

From the reviewed studies, there has been marked food born illness associated with consumers of street food vendors. And this is thought to be the source if not the cause of increase in foodborne diseases outbreak. In most jurisdictions, street foods raise concern with the issue of their potential for serious food poisoning outbreaks in most parts of the world including Ghana. While consumers may be blamed for poor adherence to food bought from street food vendors, food vendors themselves may contaminate food by poor personal hygiene, cross-contaminating raw and processed food, as well as inadequate cooking and improper storage of food. Therefore, maintaining high food safety levels on the street for consumers is very important because any incidence can affect a high number of people.

The study participants were made up of both street food vendors and consumers. Concerning the demographic data of street food vendors, it was revealed that, 20% of the study participants were aged between 26-30 years and 36.7% were aged between 36-40 years. Majority of the respondents, 83.3% were females whilst 30% of them did not have any form of formal educational training. It was also showed that, 20% of the respondents had Senior Secondary School education and half of the respondents were married. From the results, 80% of the respondents were engaged in a stationary street food vending.

On the part of the consumers of street food, most of the respondents, 33.3% were aged between 26-30 years whilst few 6.7% were aged above 41 years. It was further revealed that, majority of the consumers, 66.7% were males and 33.3% had no formal education. The results also showed that, most of the consumers, 36.7% were salaried workers and 40% were married people. Concerning the knowledge of street food vendors on food hygiene, findings revealed that, all the respondents had ever heard of food hygiene before at the time of the study. Respondents identified various sources as their knowledge concerning food hygiene.

It was further revealed that, majority of the respondents, 63.3% strongly disagreed with the statement that they worn a scarf before serving food to consumers whilst most, 30% of the respondents however revealed that, they worn a scarf whilst serving food to consumers. The study also showed that, most of the respondents, 26.7% agreed with the statement that, they had long finger nails whilst 23.3% disagreed with the statement that they had long finger nails. From the results, respondents representing 73% said they were not ensuring hygienic practices of food vendors because they had inadequate sanitation equipment available to them at their vending sites.

Concerning the hygienic practices during food preparation among street food vendors, the results revealed that, study participants, 83.3% strongly agreed with the statement that, they washed their food stuff before cooking them. Half of the respondents agreed with the statement that, they reused oil for frying at the time of the study and most of the respondents, 30% disagreed with the statement that they chopped food staff before washing. It was further revealed that, majority of the respondents, 66.7% disagreed with the statement that, there was availability of chopping board at the vendor site

whilst nearly all the respondents, 80% strongly agreed with the statement that, they used grinding stone for grinding ingredients.

The results also showed that, majority of the respondents, 80% disagreed with the statement that food was stored in cupboards whilst 43.3% of the respondents agreed with the statement that food was stored in refrigerators. It was further revealed that, most of the respondents, 12.4% strongly agreed with the statement that, stored food was left over for use the next day and majority of the study participants, 76.7% disagreed with the statement that, utensils were always covered.

From the results presented, it was showed that, majority of the respondents, 73.3% disagreed with the statement that, they used warm soapy water to clean their utensils whilst 23.3% of the respondents used clean water to clean their utensils. It was also showed that, 60% of the study participants, used cold soapy water to clean their utensils and 76.7% disagreed with the statement that they used dirty water to clean their utensils. Based on the results, 80% used water once before replacement and 83.3% used water twice before replacement.

On the part of how consumers of street food vendors handle food before eating, it was showed that, majority of the respondents, 56.7% strongly agreed with the statement that, they ensured that food was served to them on a clean bowl by street food vendors. Majority of the respondents, 63.3% agreed with the statement that they washed their hands properly after eating street food. Most of the respondents, 23.3% disagreed with the statement that they eat under a hygienic environment at the street food vendors. The results further revealed that, most, 36.7% of the respondents disagreed with the statement with that they packaged food well before removing to eat and 30% strongly agreed with the statement that they do not expose food to flies before eating.

There was an association between age grouped of consumers and adherence to good food hygienic practices ($\chi^2 = 16.22$, $p < 0.001$, $\alpha = 0.05$). Also, there was an association between educational level and consumers adherence to good food practices ($\chi^2 = 30.69$, $p < 0.001$, $\alpha = 0.05$). The occupational status of consumers and adherence to good hygiene practices was also found to be associated ($\chi^2 = 56.29$, $p = 0.098$, $\alpha = 0.05$)

5.2 Conclusions

Based on the results, the study was concluded on each of the research questions as follows;

5.2.1 Knowledge of Street Food Vendors on Food Hygiene

Based on the results, it was found that, street food vendors had moderate knowledge on food hygiene. The study participants identified various sources as their knowledge concerning food hygiene. Food handlers should have the necessary knowledge and skills to enable them to handle food hygienically. This is because the street food industry plays an important role in Ghana in meeting the food demands of the urban dwellers most especially.

5.2.2 Hygienic Practices Of Street Food Vendors during Food Preparation, Selling Process and Storage

Despite the moderate knowledge of respondents concerning street food vendors, the practices of these people well not impressive. Majority of the study participants did not engage in safe and hygienic food practices which could lead to reported incidences of food borne related diseases especially among consumers. Therefore, by practicing proper personal hygiene food vendors can reduce the risk of transmitting pathogens into food from their skin. But better and efficient hygienic practices can prevail among street food vendors if authorities ensured effective training.

5.2.3 How consumers of Street Food Vendors Handle Food before Eating

The study found that, consumers of street food were not also ensuring effective handling of food before eating. Majority of the respondents rated their level of adherence to food hygiene as bad in the context of consumers. There was an association between educational level and consumers adherence to good food practices. The occupational status of consumers and adherence to good hygiene practices was also found to be associated

5.3 Recommendations

Based on the findings, the following recommendations were suggested to help policy makers improve the weaknesses identified especially among street food vendors in relation to hygienic practices in the study setting.

- The Sanitization Unit, the Municipality Assembly, health authorities in the Sagnerigu Municipality should engage street food vendors, food handlers on food hygiene practices that would help reduce the poor practices and food safe for human consumption
- Relevant authorities should conduct periodic training at no cost to street food vendors to enhance good hygiene practices.
- Strict compliance of getting a sanitary permit by street food vendors doing business set up should be regularly monitored by the authorities. The imposition of sanitary permits ensures inspection of the quality of food served by street vendors

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APPENDIX I

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY, KUMASI

DEPARTMENT OF HOSPITALITY AND TOURISM EDUCATION

Informed consent

My name is Katumi Al-hassan a Master's student of University of Education, Winneba currently undertaking a research. Participation in this study requires that I ask you some questions whose answers I will record in the questionnaire. You have the right to refuse to participate in this study. Participation is voluntary and you may ask questions related to the study at any time. You may refuse to respond to any question, and you may also stop the interview at any time without any consequences to you.

Section A: Demographic data of respondents

1. Age.....(years)
2. Sex a. male () b. female ()
3. Educational level a. none () b. primary () c. JHS () d. SHS () e. tertiary ()
4. Marital status a. never married () b. married () c. separated () d. divorced () e. widowed ()
5. Type of vendor a. stationary () b. mobile ()

Section C: Knowledge of street food vendors on food hygiene

6. Have you ever heard about food hygiene? a. yes () b. no ()
7. If yes from where? a. media () b. FDA () c. sanitation officer () d. others (specify)
8. Indicate the extent to which you assess the following statements as processes you practice as a food vendor to ensure food hygiene

Variable	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Wear a scarf before serving food					
Have a long finger nails					
Wear apron before serving food					
Wear a jewelry					
Chewing/talking while serving food					
Brush the teeth every morning					
Bath properly before serving food					
Perform only religious rituals before serving food					
There is availability of toilet facility at site					
Wash hands properly after visiting the toilet					
Wash hands properly after urinating					
Presence of undressed skin lesion					
Screen before by medical team					

9. Are you satisfied with the hygiene practice in this place? a. yes () b. no ()
10. How would you rate the level of hygiene in this place? a. good () b. very good () c. excellent () d. poor () e. moderate ()

Section C: Hygienic practices during food preparation

11. Indicate the extent to which you assess the following statements as processes you observe during food preparation and selling

Variable	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-----------------	-----------------------	--------------	----------------	-----------------	--------------------------

Food preparation

I wash food stuff before cooking

I reuse oil for frying

I chop food stuff before washing

I wash foodstuff before chopping

I have a chopping board

I use a grinding stone for grinding

Selling

I handle prepared food with my bare hands

I handle money while serving food

I serve food with a spoon

I blow air into polythene bag before use

I heat food before serving

Presence of food debris on hands after serving

Food is exposed to flies while serving



12. Indicate the extent to which you observe the following statements as processes during food storage

Variable	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-----------------	-----------------------	--------------	----------------	-----------------	--------------------------

Food is stored openly in the stalls

Food is stored in a plastic container

Food is stored in a cupboard

Food is stored in a refrigerator

Stored food is left over for use next day

I covered utensils/warmers/coolers always

13. Indicate the extent to which you observe the following statements during washing of bowls

Variable	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-----------------	-----------------------	--------------	----------------	-----------------	--------------------------

Cleaning of utensils

I clean utensils with warm soapy water

I clean utensils with clean water

I clean utensils with cold soapy water

I clean utensils with dirty water

How many times water is used before replacement

Once

Twice

Severally

APPENDIX II

QUESTIONNAIRE FOR CONSUMERS

Informed consent

My name is Katumi Al-hassan a Master's student of University of Education, Winneba currently undertaking a research. Participation in this study requires that I ask you some questions whose answers I will record in the questionnaire. You have the right to refuse to participate in this study. Participation is voluntary and you may ask questions related to the study at any time. You may refuse to respond to any question, and you may also stop the interview at any time without any consequences to you.

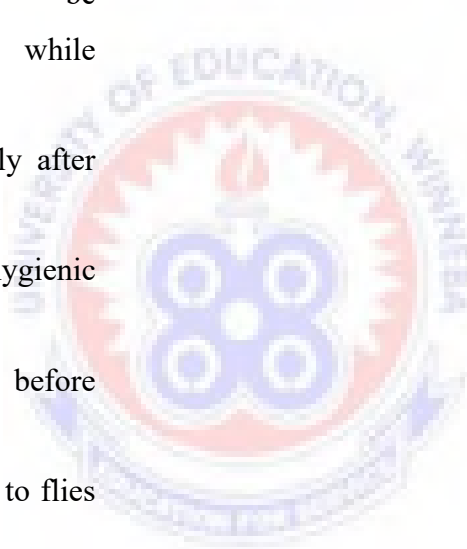
Section A: Demographic data of respondents

1. Age.....(years)
2. Sex a. male () b. female ()
3. Educational level a. none () b. primary () c. JHS () d. SHS () e. tertiary ()
4. Occupation a. non salaried worker () b. salaried worker () c. petty trader () d. student ()
5. Marital status a. never married () b. married () c. separated () d. divorced () e. widowed ()

Section B: How consumers of street food vendors handle food before eating

14. Indicate the extent to which you assess the following statements as processes you practice as a consumer of street food

Variable	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I wash my hands before eating food					
I use a spoon to eat food every time					
I ensured food is served to me on a clean bowl					
I make sure the food vendor is neat					
I don't allow the food vendor to be chewing/talking while serving food					
Wash hands properly after eating					
Eat under a hygienic environment					
Package food well before removing to eating					
Do not expose food to flies before eating					
I can eat under dirty environment					
Others					



15. How would you rate your level of adherence to hygienic practices?
a. good () b. bad ()

Thank you very much!