SCHOOL OF PUBLIC HEALTH

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THE DETERMINANTS OF ADHERENCE TO ENVIRONMENTAL SANITATION AMONG FOOD VENDORS AT KPANDO MUNICIPAL, GHANA

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTERS IN OCCUPATIONAL HYGIENE

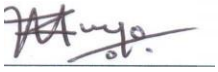
MARCH, 2022

DECLARATION

I declare that except for references made to other people's work that have been duly cited, this dissertation is the result of my research and that this dissertation either in whole or in part has not been presented for another degree elsewhere.

Jacqueline Botchway Date: 14th March 2022

(Student researcher)



Professor Mawuli Dzodzomenyo Date: 14th March 2022

(Supervisor)

DEDICATION

This work is dedicated to my parents, Ransford and Margaret, my son Jojo and my siblings Eugene, Patrick, and Aba for their prayers and support. Thank you all.

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ABSTRACT

Introduction: Environmental sanitation is a set of procedures aimed at improving and controlling the quality of the environment and its elements to protect the public's health and welfare, hence lowering disease rates. As the adage goes, “Cleanliness is next to Godliness”. Poor environmental sanitation has been a perennial problem that has confronted the government since Ghana’s Independence.

Aim of The Study: The study examined the determinants of adherence to environmental sanitation among food vendors at Kpando Municipal.

Methods: The study employed a cross-sectional design, with opened and closed ended questionnaires being distributed. Using Yamane's approach, a total of 135 food vendors were proportionally selected from the suburbs within the Kpando municipal for this study. The data collected from the respondent were processed and analyzed using STATA 16 and Microsoft Excel. The data was analyzed using descriptive statistics (percentages and frequencies) as well as inferential statistics chi-squares are and principal component analysis).

Results: Most of the food vendors were stationed at a particular vending site within the Municipal. The chi-square value of ($\chi 2$= 1.9; p=0.023) indicated that food sellers awareness on environmental sanitation was only influenced by their educational background. Regarding the hygienic practices of food vendors, 63% rarely provided disposable tissues or hand towels to customers and hence opt for the use of shared or reusable napkins. They were adamant with the covering of their hair whiles selling and as such they were doubtful of the importance of such standard hygienic measures. The KMO value of 0.715 and the

Bartlett's test p value of 0.000 highlighted seven (7) determinants of adherence to environmental sanitation among food vendors.

Conclusion: Food vendors' level of knowledge on environmental sanitation was high, and this was mainly influenced by their educational background.

Despite their high knowledge level on environmental sanitation practices, food vendors' adherence to these practices was low.

Most of the propelling factors influencing the adherence to environmental sanitation practices among food vendors at the Kpando Municipal emphasized on personal hygienic practices expected from individuals in the quest to achieve a healthy environment and functions of local institutions in achieving good environmental sanitation.

Recommendations: Food vendors should be properly educated on the essence of observing hygienic practices. Local assemblies should continuously tighten alliances among the various units tasked to regulate the street food sector to promote effective street monitoring and regulation.

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LIST OF ABBREVIATIONS

CSIR	Council for Scientific and Industrial Research
CSD	Commission on Sustainable Development
EPA	Environmental Protection Agency
GES	Ghana Education Service
GHS	Ghana Health Service
MEST	Ministry of Environment Science and Technology
MLGRD	Ministry of Local Government and Rural Development
MoH	Ministry of Health
MMDAs	Metropolitan Municipal and District Assemblies
NESPoCC	National Environmental Sanitation Policy Coordinating Council
NGOs	Non-Governmental Organization
UNCED	United Nations Conference on Environment and Development
UNICEF	United Nations International Children's Emergency Fund
UN MDG	United Nations Millennium Development Goals
UN	United Nations

CHAPTER ONE

INTRODUCTION

1.1 Background

Environmental sanitation is a series of measures aimed at improving and controlling the quality of the environment and its elements to protect the public's health and welfare hence lowering disease rates. Over the last few years, the World Health Organization has been at the vanguard of environmental sanitation and hygienic efforts, developing some crucial publications aimed at policymakers and technical experts dealing with these issues. Guidelines, best practice guides, and promotion materials are among the things available. (WHO, 2013). There has been a tremendous statistic globally about poor environmental sanitation and how it has affected people worldwide. Around 4.2 billion people use sanitation that do not treat human waste, exposing human and environmental health at risk. These highly unsanitary conditions have exposed humans to risks of incidence and the spread of infectious diseases which are enormous. (UNICEF, 2020). Poor water management in households commonly contaminates water stored at home. These issues are gaining more attention, but considering the massive backlog in the sector, there is still a need for further resource mobilization and involvement of decision-makers at all levels. Some of the causes of poor environmental sanitation includes improper disposal of refuse, urinating and defecating around, poor housing settlement, improper washing of hands, choked gutters among others. Poor environmental sanitation has been a perennial problem that has confronted government since Ghana's Independence. It is one of the many problems buyers and sellers overlook especially when food is not prepared at the location of sales (food vending site).

In Ghana, people usually live by a perception derived from a popular saying in Akan, “eni enhu a, 3ny3 tan” (meaning if not seen, then it’s not disgusting). Hence, they overlook this as a problem. Most people assume that once the vending site is neat, the place of food preparation is neat as well, which is often not the case. This study aims to examine the determinants of adherence to environmental sanitation among food vendors.

Food sellers in Ghana appear to have been permitted to operate without being subjected to regular inspections to verify whether they are adhering to food hygiene standards (Odonkor et al., 2014). According to their findings, just three (1.85 percent) of the 160 street food stall owners in Ghana satisfied the minimal cleanliness criteria based on a five-point check-list. Food-borne microbial infections that cause diarrhea are one of the primary causes of sickness and death in underdeveloped nations, killing an estimated 1.9 million people per year. Another study in Malaysia found that food handler contamination is responsible for 10-20% of food-borne illness outbreaks (Mudey, 2015).

Food-borne pathogens are recognized as a major health risk associated with street foods, with the risk being primarily dependent on the type of food and the method of preparation and storage. A major risk factor is street food vendors' lack of knowledge about the causes of food-borne disease.

The public health risks associated with street foods are exacerbated by poor hygiene, insufficient access to potable water and garbage disposal, and unsanitary environmental conditions (such as proximity to sewers and garbage dumps). Additional hazards in street foods include improper use of additives (often unauthorized colorants), mycotoxins, heavy metals, and other contaminants (such as pesticide residues). Although many consumers value hygiene when choosing a street food vendor, they are frequently unaware of the health risks associated with street foods (Monney et al., 2013).

Food vendors provide most indigents meals in the Kpando. Customers can choose from a wide

range of reason priced and easily accessible foods at street food stands. As a result, it's important to investigate food vendors' operations to see if they are following sanitary guidelines. The goal of this research is to assess the hygienic practices and sanitary conditions of food vendors in the Kpando municipality.

1.2 Problem Statement

Street foods can pose significant public health problems. The lack of knowledge by most food vendors on safe food handling, the difficulty in controlling the large number of street vending operations and the lack of enforcement of public health laws contributes greatly to this problem. The food vending sub-sector has received lot of attention recently from public health practitioners, domestic and intern science researchers. Although, the food chain industry is an important part of the economies of many developing countries because it offers opportunities and low-cost cooked meals however, there have been serious concerns about vendors' hygienic practices (Zeru et al., 2007). Despite its nutritional, economic, social and cultural importance, street food in Africa is undermined by food safety issues, poor nutritional variety, widespread informality of vendors and policy gaps. Major findings provided by Stefano and Mohamed in 2016 over the last two and a half decades are analyzed, along with the recommendations that the authors made to key stakeholders to improve street food safety and nutrition quality, as well as vendors livelihoods and working conditions. Unhygienic practices among food vendors have been associated with numerous factors including inadequate or lack of education, food vendor training in health and hygiene, a lack of basic infrastructure, and municipal authorities' failure to supervise and enforce by-laws governing street food vending (ISSER, 2002;Wuliyeng,2013).

The people of Kpando, a town in South Dayi district in the Volta Region, are noted for selling foods such as banku with okra soup, fufu, cooked noodles, kenkey and akple. Food vending is the order of the day at Kpando municipal due to the establishment of schools, health facilities and other business centers which are highly populated. Foods sold at Kpando are usually sold from vending sites which includes kiosks, sheds, tabletops, trays and other temporary structures. A cursory investigation showed that food is usually cooked in unsanitary conditions, with wastewater and food waste disposed nearby, providing breeding grounds for flies and rodents. In most cases, running water is not available at vending sites. Washing of hands, bowls and plates are often done in basins and/or in buckets and sometimes they are cleaned even without soap.

In 2019, the statistics of the Margret Marquart Catholic Hospital, one of the largest health facilities in the Municipal revealed that the emergency unit recorded about 60% of patients who were reactive to foodborne pathogens such as Salmonella typhi and also patients who suffered from gastroenteritis (MMCH, Emergency Ward Report, 2019). On direct interview with some of the patients upon discharge, they stated that they typically consumed street foods with little regard for how or where the food is prepared, the vendor's personal hygiene, or the surroundings. Given the scope and complexity of the problem, this study intends to examine determinants of adherence to environmental sanitation among food vendors at Kpando municipal.

1.3 Justification

The environment is the foundation of all living things' existence; at the same time, all living things, including humans, establish their own environment. As a result, the living world and

the environment are mutually dependent. In this setting, environmental sanitation management is key, and it includes strategic planning that are specific to the sanitation problem, identifying priorities, implementing them, and ensuring that they are properly directed and regulated. Proper environmental sanitation management is vital. The ramifications of mismanagement or no management are severe. With increased habitat fragmentation comes the risk of loss of the benefits the natural environment provides such as the aesthetic value of being outdoors and being able to experience a hygienic urban environment with no sight of filth and squalor.

Most of the studies have been focusing on a wide range of environmental issues including sanitation, water use and pollution, the disease burdens associated with poor environmental conditions and the effects of waste disposal and other human activities on natural resource management, topics that are somewhat related to the urban solid waste problem. However, none of these studies has investigated the issue of people's attitudes and practices towards poor environmental sanitation in market centers in sufficient detail to create an adequate understanding of the problem even though it remains one of the most visible and nerve- racking problems in urban cities. Thus, the poor sanitation situation in Ghanaian urban centers remains under-researched and hence poorly understood. This situation creates aknowledge gap and makes it difficult to find solutions to the worsening environmentalsanitation situations in the country. Food vendors have a high risk of contaminating street vending foods; this is often dependent on the food handler's health as well as their hygienic activities and practices. Food-borne sickness is a major public health concern; in developing nations, for example, food-borne diseases cause an estimated 1.9 million deaths per year. (WHO, 2013). In light of the foregoing, this study can be justified on the grounds that it will contribute to a better understanding of food vendors' attitudes and practices toward sanitation, which is a problem in Ghanaian cities, and will serve as a useful starting point for

tackling an otherwise ongoing issue. The study's findings will be used to help the Municipal Assembly and agencies in responsible for environmental sanitation in the Kpando Municipality develop measures. It will contribute to a better understanding of the poor sanitation status in urban areas in general. The study will also provide information that can beused to expand the knowledge into similar concerns.

1.4 Conceptual framework

The conceptual framework below Figure 1, indicates factors which have eminent effect on environmental sanitation observed by food vendors at Kpando. These factors have been grouped into three i.e. individual factors, environmental factors and institutional factors. Individual factors, environmental factors, and institutional factors all influence the outcome or dependent variable, which is adherence to environmental sanitation.

Individual Factors:

The behaviors of the food vendors can either add to or detract from good sanitary procedures. It has been observed that food vendors that practice good hand hygiene, such as using gloves when serving food and ungloved hands when receiving money, can reduce the spread of illnesses. Food vendors can also aid in illness prevention by washing their hands with soap and water before serving food. Their knowledge and understanding about food hygiene and food safety issues will have a long-term influence on the community's sanitation issues.

Institutional factors

Without good social amenities like potable water and toilet facilities, vendors with good hygiene and safety abilities will find it difficult to apply their knowledge to their operations. In order to ensure the safety of street-vending food for consumers, these organizations should be in charge of teaching, monitoring, and controlling vendor operations. Institutions such as the Municipal Environmental Unit, the Health Service Unit, and the Food and Drugs Board

are expected to provide capacity building, issue licenses, and set criteria for food vending control. Local authorities are also expected to provide the infrastructure and services needed for food vendors.

Environmental factors

Clogged drains, haphazard waste disposal, and overflowing central waste containers plague the majority of Ghanaian communities, which can be attributed to a variety of factors, including poor sanitation conceptualization, a lack of adequate sanitary facilities, authorities' ignorance and irresponsibility, as well as the rapid emergence of unauthorized temporary structures.

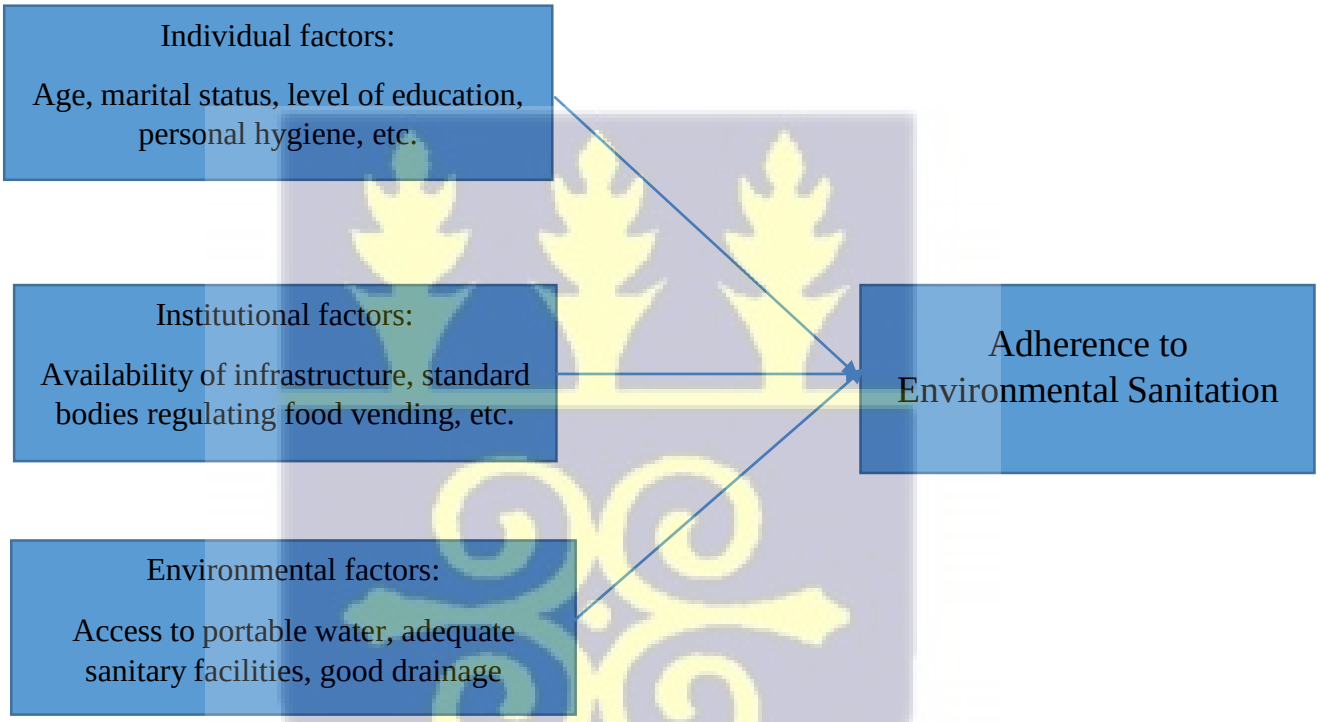

Figure 1: Conceptual framework

1.5 Study Objectives

1.5.1 General Objective.

To examine the determinants of adherence to environmental sanitation among food vendors at Kpando municipal.

1.5.2 Specific Objectives

1. To assess the level of knowledge of food vendors on environmental sanitation.
2. To assess the level of adherence to hygienic practices among food vendors.
3. To identify the determinants of environmental sanitation situation among food vendors.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Poor environmental quality is becoming widely acknowledged around the world as a major threat to social and economic growth, even to human existence. Environmental destruction has serious repercussions in developing countries, delaying and undermining theirdevelopment. Environmental sanitation includes the disposal and treatment of human excreta, solid waste, and wastewater, the control of disease vectors, and the provision of personal and domestic hygiene sanitary facilities, all of which work together to create a cleanenvironment. (Bello, 2007). Environmental sanitation comprises of the disposal and treatment of human excreta, solid waste and wastewater, control of disease vectors, and provision of washing facilities for personal and domestic hygiene which work together to form a hygienic environment. Food vending poses a significant riskto public health and safety, according to literature from a variety of sources around the world,particularly in Africa and other poor nations where these foods are popular. This chapter evaluates the available literature linked to the topic of interest, as a literature review is required for every investigation. It reviewed empirical studies relative to the followingtopics:

2.1 Environmental Sanitation

Environmental sanitation aims at enhancing people's quality of life while also contributing to social progress. Environmental sanitation is defined by the Water Supply and Sanitation Collaborative Council (WSSCC, 2010) as "interventions to limit people's exposure to disease by providing a clean environment in which to depart, including steps to break the disease cycle". Environmental sanitation entails both a change in behavior and the provision of facilities to create a sanitary environment. (Acheampong, 2012). Environmental sanitation,

according to MLGRD, refers to efforts or actions targeted at building and maintaining a clean, safe, and pleasant physical environment in all human communities. It encompasses a wide range of activities such as the construction and maintenance of sanitary infrastructure, service provision, public education, community and individual action, regulation, and legislation. As a result, environmental sanitation entailslimiting the types of waste that can lead to disease spread. The phrase "environmental sanitation" is used by the International Water and Sanitation Centre to cover a broad idea of regulating all variables in the physical environment that may have an impact on humanhealth and well-being. (Acheampong, 2012). Environmental sanitation is critical in every country, and we must commit to a more collaborative and regular effort to clean our homes, markets, and entire communities if we are to live in a disease-free environment. It entails reducing disease-causing environmental elements as well as ensuring commercial food safetyin places like restaurants, marketplaces, and farms. The goal is to enhance living conditions and reduce health difficulties as a result of this effort. Water, solid waste, and industrial waste management, as well as pollution and noise control, are all aspects of environmental sanitation.

2.2 Knowledge on Sanitation

Source separation and resource recovery are widely acknowledged as key waste management techniques (Fobil, 2001). As there is no such thing as waste on this planet, this is the fact. Discharged wastes may be useful in some other circumstances, but they are useless to the owner who wants to get rid of them. According to Tsiboe and Marbel (2004), waste

management processes developed in Austria, the Netherlands, and Denmark to efficiently solve the waste disposal problem by essentially persuading their citizens to separate their domestic solid waste into glass, paper, and plastic categories, allowing for easy collectionand subsequent reuse. One strategy to efficiently manage solid waste, as stated by the three writers, is to decrease solid waste generation through source reduction. Support for behavior change reduces when it becomes more difficult or costly (O"Connor et al., 2012). Actions that threaten lifestyles or demand personal time (such as spending extra time sorting rubbish) are unlikely to be widely supported (O'Connor et al., 2012). In order to develop a sustainable policy, behavior change measures that are consistent with the public's awareness and understanding of enhanced environmental sanitation are necessary (Plotnikoff,et al., 2007). People defecate in public when they do not have access to sanitation facilities todispose of their waste. According to the most current UN Millennium Development Goals report, 18% of the world's population defecates openly. In developing countries, this amounted to about 1.2 billion people out of a total population of 2.5 billion who did not have access to basic sanitation. (UN Millennium Development Goals, 2009). The increase in flood severity in Accra could be due to a variety of factors, including insufficient flood management methods and poor waste management. During severe rains, drainage systems, gutters, and other storm-control devices spilled over the plains and overflowed into flood- control devices, resulting in urban floods. Drains, as well as rivers and streams near urban areas, were frequently clogged or silted up with trash. As a result, the flow of river andstream channels was reduced, leading to floods (Sam, 2009). The uncontrolled disposal of both industrial and domestic garbage caused problems in the collection and disposal ofhuman waste in the metropolis, resulting in environmental pollution (Domfeh, 2015). Food - borne disease transmission was a major concern, resulting in high morbidity and mortality.

Traders played a critical in ensuring food safety during the manufacturing, processing,storage, and preparation processes. (Abanobi, Dozie, Ukaga et al., 2019)

2.3 Hygienic Practices among Food Vendors

Bacterial translocation, as well as the development and survival of bacteria and other diseases, is common in meals prepared in filthy conditions. The most significant concern that could have a negative impact on food quality is hygiene and sanitation. (Gordon, 2011). According to Kok & Balkaran (2014), street food stands are made up of simple structures with limited access to running water, toilets, and basic sanitation in most nations. Hands, utensils, and dishes are routinely cleansed in large bowls or pans of water. It's interesting to note that disinfection is done occasionally, which attracts pests to vending sites, especially when waste disposal is poor (Kok & Balkaran, 2014). Moreover, foods made at theselocations are unsafe to consumers' health because they are often not kept at the right temperatures. According to Annor and Baiden (2011), despite government's efforts to regulate the activities of vendors and other catering institutions, certain hotels in Accra were not cooperating. The microbial count from these hotels with the worst food hygiene checks, that is, no hair nets or gloves worn by food handlers, was the highest, while the microbial count from the hotel with the best food hygiene checks was the lowest. This finding implies that if food hygiene checks are properly performed, contamination can be reduced, therefore the government's efforts in this area can be beneficial if followed. The majority of research undertaken in Ghana over the last decade on various aspects of food hygiene have shown thatinadequate food hygiene knowledge and attitudes amongst street food vendors, with personal hygiene typically observed by the least educated (Acheampong, 2012). Since most of the sellers have either no formal education or only a few years of schooling, they are simply

unaware of proper food handling and so have a higher risk of spreading germs (Ghosh et al., 2017).

It's difficult to establish the exact causes of food contamination-related incidents. According to Annor (2011), vendors are responsible for 70% of all bacterial food poisoning cases. Thisis far more than any other food industry has revealed. The majority of these food poisoning events are caused by insufficient food time and temperature management, with cross- contamination accounting for the remaining 30%. (Annor & Baiden, 2011). According to several studies, such foods are sometimes kept at unsuitable temperatures, or are mishandled by food vendors and sold in dirty surroundings (Bowen, 2017). All of these factors contribute to disease-causing organisms infecting seemingly delicious meals. Foods exposed to busy streets have indeed been found to be contaminated by spoilage or pathogenic microorganisms, according to multiple lines ofevidence (Ashenafi & Mehari 2017). The hygienic practices of food handlers, particularly those of food vendors and caterers, have been shown to be inadequate. Hotels, restaurants, and street food vendors in Accra, Ghana's capital, have all been studied in the hospitality business. Levels of total bacterial counts in street vendered foods are significantly beyond the acceptable reference levels set by the Ghana Standards Authority forReady to Eat Foods (Foriwaa & Lovatt, 2015). In Ghana‟s capital, the Greater Accra Region,it is estimated that there are about 60,000 vendors of ready-to-eat foods (Odonkor et al., 2014). In a related study by King et al. (2000) results indicated that, among 160 street food stalls in Ghana, only three (1.85%) of the proprietors met the requirements for basic hygiene based on a five-point check-list.

2.4 Factors that influence adherence to environmental sanitation practices

2.4.1 Individual factors:

The actions or inactions of the food vendor and the consumer can either contribute toexcellent hygiene practices or not. It has been discovered that food vendors who maintain regular hand hygiene, such as wearing gloves when serving food and ungloved hands when accepting money, can minimize the transmission of infections. Consumers can also help to prevent disease spread by cleaning their hands with soap and water before eating. The population's understanding and awareness of food hygiene and safety issues would enable them to demand safe food from vendors. Some believe that once people are aware of the health concerns of eating unclean street food, they will demand better meals from vendors. As a result, enhancing street food cleanliness necessitates the collaboration of food vendors, consumers, and regulatory agencies.

2.4.2 Institutional factors

Local institutions such as the Municipal Environmental Unit, the Health Service Unit, and the Food and Drugs Board are required to provide capacity development, issue licenses, and establish standards to control food vending. Local authorities are also expected to provide the infrastructure and services which food vendors will need to operate. It will be difficult for vendors with good hygiene and safety skills to apply their understanding to their activities without sufficient social amenities such as potable water and toilet facilities. These agencies are also in responsible of educating, monitoring, and managing the operations of vendors in order to guarantee that the food sold on the street is safe for consumers.

2.4.3 Environmental factors

Poverty is a major influence in the consumption of contaminated food in Africa. Lack of access to safe drinking water, inadequate infrastructure, communicable diseases, and undesirable environmental conditions are some of the primary causes. According to AMA (2006) and Ayee and Crook (2013), sanitation in Ghana is unsatisfactory, with drainage problems, inappropriate waste management, and overflowing central waste containers, particularly in poorer communities. This issue is caused by a number of factors, including a misconception of sanitation, a lack of proper sanitary facilities, authorities' ignorance and irresponsibility, and the rapid development of illegal temporary structures. Other issues include an increase in squatters, a lack of consistent budget allocation for sanitation, and the near absence of fee-based service provision in low-income communities. As a result of these challenges, a large amount of the waste produced goes uncollected, ending up in drainage systems, water bodies, and open places.

2.5 Environmental Sanitation Polices in Ghana

Since the mid-1990s, civil society engagement in environmental issues has grown considerably in Ghana (UN report, Ghana Country Profile, 2016). This surge in activities has been particularly noticeable at the community level. Since the mid- 1990s, Ghana's political stability, rule of law, freedom of speech, and democracy have allowed the civil society space to grow slowly but surely, permitting some environmental NGOs and groups to establish, institutionalize, form networks and coalitions, and carry out some remarkable community projects. People must be enlightened about the environmental implications of their everyday activities in order to participate meaningfully. This, I believe, is what the Ghanaian government began when it adopted Agenda 21. The United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 adopted Agenda 21,

which highlight the role of states at the national level. It was recommended that states consider developing national reports and presenting them to the Commission on Sustainable Development (CSD), outlining their efforts in achieving Agenda 21, barriers and challenges they face, and other environmental and development issues they find important (UN report, Ghana Country Profile, 2002). As a result, Ghana began putting in place necessary national policies, regulatory, and institutional frameworks to demonstrate its dedication to the implementation of Agenda 21. The Environmental Protection Agency (EPA) was founded in 1994 under the Environmental Protection Agency Act (Act 490 of 1994) to enforce the country's environmental laws, and an Environmental Sanitation Policy was established in 1999. The EPA is responsible for enforcing environmental policy and legislation, prescribing standards and guidelines, inspecting and regulating businesses and responding to emergency incidents (EPA Legal and Policy Framework-2.1, 2009). The Environmental Protection Agency (EPA) is in charge of providing environmental licenses and pollution abatement notices for the control of waste discharges, emissions, deposits, and other pollutant sources. According to the Sanitation Country Ghana Profile report (2004), National Environmental Sanitation Policy Coordinating Council (NESPoCC) has been put in place since 2000 to expedite the implementation of the National Sanitation Policy. The membership includes the Ghana Health Service /Ministry of Health (GHS/MOH), Ministry of Environment Science and Technology (MEST), Ghana Education Service (GES), The Environmental Protection Agency (EPA), the Council for Scientific and Industrial Research (CSIR), representatives from Metropolitan, Municipal and District Assemblies (MMDAs), the private sector, and non-governmental organizations are among the participants. The different relevant waste- control legislation has also been passed (CSD Report, 2010).

The District Assemblies have been given the authority to become the principal institutions for the management of cleanliness and waste at the local and community level, with the aid

of the EPA and other institutions. The Revised Bye-laws of all MMDAs, as well as the Criminal Code (Act 29 of 1960), provide sufficient measures to make environmental sanitation service delivery and enforcement easier. MMDAs, on the other hand, are ineffectual in ensuring a clean, safe, and healthy environment due to insufficient deterrence and practical challenges. (2004, Sanitation Country Profile). Various capacity-building programs, seminars, and workshops were held to increase environmental education andawareness in order to provide practical solutions to the waste management problem. As a result of raising environmental consciousness among Ghanaians, a National Environmental Sanitation Day was formed and marked annually to educate the general public on the need of maintaining a healthy and clean environment (CSD Report, 2010).

CHAPTER THREE

METHODS

3.1 Study design

A cross-sectional study design was adopted to collect data for analysis. Quantitative approach with closed and open-ended questionnaires were used to elicit information from respondents after they gave their consent. This allowed the researcher to ask questions that revolved around food vendors' cleanliness, knowledge, awareness, attitudes, and practices.

3.2 Study area

Kpando, the municipal district capital, is about 70 km from Ho, the regional capital. Ewe-speaking people, who make up more than 90% of the population, dominate the area ethnographically. The population of the Municipality according to 2010 population andhousing census stands at 53,736 with 25,904(48.2%) males and 27,832(51.5%) females. In the Volta region, there are approximately 9 large markets, with their operating days rotating every 4th or 5th week. Currently, the Kpando market center is one of the region's economic hubs. There are about 14 suburbs in Kpando of which Kpando Tokor is the largest. The suburb is a fishing community along the Lake Volta. It also serves as a point to crossing the Lake Volta to Afram plains and other nearby villages. Margaret Marquart Catholic Nursing Training College is one of the tertiary institutions in the municipal. There are 2 major hospitals and 3 senior high schools in the municipal. Also, there are two major banks in the municipal. Food and beverage services, tailoring and stitching, small-scale repair businesses, and roadside food selling account for the majority of economic activity. The impact of migratory inflows is the primary driver of population expansion and with an average household size of 6.2 persons (Ghana Statistical Service, 2012).

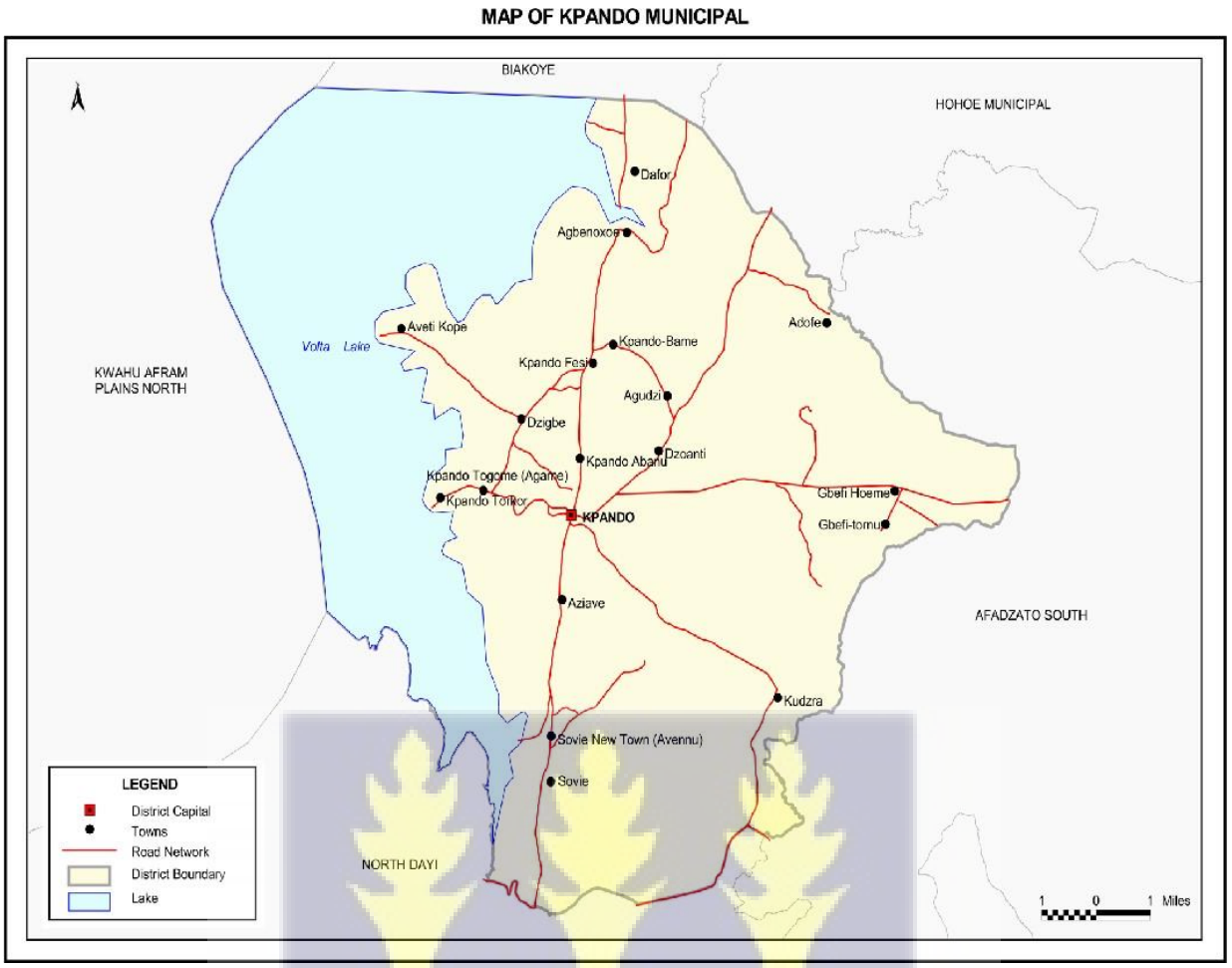

Figure 3.1: Map of Kpando Municipality showing some communities within the study area.

Source: Ghana Statistical Service (GSS, 2010).

3.3 Study population

The population of the study constituted all food vendors (who sold ready-to-eat foods) in the Municipal.

3.4 Inclusion criteria

The study comprised food vendors who sold ready-to-eat foods and had direct contact with food and food contact surfaces. These vendors were either stationed at a particular place, mobile or had both characteristics.

3.5 Exclusion criteria

The study excluded managers of restaurants, pubs, and big chop bars, as well as people who did not have direct contact with food or food contact surfaces.

3.6 Sampling

A multi-stage sampling technique was used to select respondents for the study. Prior to data collection, a register of food vendors was collected from the Municipal Assembly with number of vendors from each suburb attached. Study subjects were selected randomly using a weighting procedure. The number of people in each subgroup is determined by their proportion in the overall population. (Tongco, 2018). A total of 135 food vendors were proportionally chosen from the communities within the Kpando municipal for this study using the Yamane's formula.

3.7 Population and Sample size calculation

According to the Kpando Municipal Assembly, there are approximately 400 registered food vendors in the Municipal who actively offer ready-to-eat foods. Most researchers (Bryman, 2016; Creswell, 2014; Malhota & Birks, 2014; Zikmund, 2015) are of the opinion that the most appropriate method used in a survey to decide the sample size is to define the accuracy of the estimate required and then to determine the sample size needed to insure it. Zikmund (2015) believes that the most appropriate method used in a survey to decide the sample size is to define the accuracy of the approximation expected and then to determine the sample size

needed to insure it. As a result, a sample size of 135 was obtained using the Yamane's prescribed formula below which was considered acceptable, Galero-Tejero (as cited in Malhota & Birks, 2014). Where **n** is the sample size, **N** is the population size, and **e** is the level of precision.

$$n = \frac{N}{1 + N(e^2)}$$

Thus, N= 400, and e = 0.07

$$n = \frac{400}{1 + 400(0.07^2)}$$

$$n = 135.13$$

In this regard, a total sample size of 135 food vendors will be selected for the study.

3.8 Variables

The variables of interest in this study were Environmental Sanitation and the factors i.e. Individual, Institutional and Environmental factors.

Dependent variable

Level of adherence. A Likert scale from 1 to 5 was used to classify the possible ratings for food vendors' environmental sanitation adherence. This scale was then divided into three levels: high, moderate, and low. High score received a score of 2, Moderate received a score of 1, and Low received a score of 0.

Independent variables

The independent variables of interest was divided into three categories;

- **Individual factors:**

Age of food vendor

Level of education

Marital Status

Length of service as a food vendor

Personal hygiene

Environmental settings

- **Institutional factors**:

Type of standards regulating food vending

Availability of infrastructures

- **Environmental factors:**

Infrastructural structures

Access to portable water

Drainage systems

Lack of adequate sanitary facilities

3.9 Data collection tools & techniques

A structured closed and open-ended questionnaire was the main tool employed to gather data in this study. The researcher administered the questionnaires to the respondents in order to collect data on socio-demographic characteristics, level of environmental sanitation knowledge, and some factors that influence environmental sanitation. At the moment where the questionnaires were given to the respondents, the researcher personally collected all completed questionnaires. In cases where the responder was unable to complete the surveys on the first attempt, the survey was postponed and rescheduled for a later date. However, the researcher respected the rights of respondents who reluctantly participated in the study. During the interview, the researcher also presented the technical aspects of the questionnaire to the respondents in order to obtain honest and correct responses.

The questionnaire was divided into four parts. Section A discussed socio-demographic characteristics such as age, gender, marital status, and so on. Section B discussed the

vendors' environmental sanitation knowledge, Section C discussed hygienic practices, and Section D discussed some of the aspects that contributed to environmental sanitation.

3.10 Data quality control

3.10.1 Pre-testing

The data collection tool was pre-tested prior to data collection to guarantee that high-quality data was captured for analysis. In Kpando Aloye, ten food vendors were interviewed. This was done to determine the clarity of the questions as well as any potential issues that might arise during the main study. The questionnaire was then fine-tuned before the study's actual data gathering began.

3.10.2 Training of Research Assistants

Two research assistants from the environmental sanitation department were trained for two days. The training covered the study's purpose and objectives, data gathering methodologies and tools, the start date for data collection, and ethical issues. Also, translations of questionnaire in the local language of subjects was agreed upon to be in Ewe and Twi. The ability of research assistants to correctly record participant replies were also evaluated.

3.10.3 Supervision

At each stage of the study, the principal researcher was present for clarification, assistance and general supervision. At every set of data collection, questionnaires were checked for completeness.

3.11 Data processing and analysis

The data entering process began shortly after the data gathering was completed. The obtained data was examined and validated before being entered into the computer. With the use of STATA and Microsoft Excel, descriptive statistics such as frequency/contingency tables, charts, graphs, and other relevant charts were used to evaluate the data for easy comprehension and interpretation. To examine factors accounting for the environmental sanitation status in Kpando, factor analysis, specifically Principal Component Analysis, was utilized. A set of parameters (scores) were designed to guide in the interpretation of variables in the results.

Socio-Demographic characteristics

Simple descriptive statistics were used to analyze the data based on socio-demographic factors. The percentages were shown in frequency tables and graphs.

- **Knowledge on Hygienic**

The level of knowledge on hygienic practices among food vendors was measured using bar charts, cross tabulations, and chi-squared tests (5% significant level). Knowledge levels were categorized into three (high, moderate and low). The cut-off point for 'high knowledge' was greater than 60%, moderate knowledge being 40% to 60%, and low knowledge less than 40%.

- **Adherence to hygienic practices among food vendors**

Similarly bar charts, cross tabulations and chi-squared tests (5% significance level) was used to measure the level of adherence to hygienic practices among food vendors. The adherence level was also classified into three levels. The cut-off point for high level of adherence= greater than 60%, moderate = 60% to 400%, low = less than 40%.

- **Factors that contribute to the current environmental sanitation situation.**

Principal component analysis (PCA) was used to solicit the most pressing factors contributing to the environmental sanitation. Under the PCA, the Kaiser-Meyer-Olkin (KMO) and the Bartlett‟s Test of Sphericity was used as a measure of sampling adequacy for the data used.

3.12 Ethical approval

In studies involving human participants, ethics is a critical factor to consider. It refers to a researcher's appropriate behavior based on cultural standards (Zikmund, 2015). The Institutional Review Board of the Noguchi Memorial Institute for Medical Research at the University of Ghana granted ethical permission. The university also issued a letter of introduction to the Kpando Municipal authorities, requesting permission. The environmental sanitation department was informed about the study's goal. Academic honesty, plagiarism, and recognition of copyrighted resources used were all dealt according to the norms of the University's ethical protocol. Individual consent was sought from respondents, and confidentiality was ensured. The purpose of the study and the goal it aimed to attain were explained to the participants. The instructions and questions were also read to them, and where necessary, clarifications were provided in the most appropriate language.

CHAPTER FOUR
4.0 RESULTS

This chapter presents the results of the study. The chapter flow assumes the sequence in which designated objectives and research questions of the study were ordered.

4.1 Demographic characteristics of food vendors in the Kpando Municipal

The socio-demographic characteristics of respondents who participated in the survey are shown in Table 1 below. Out of the total of 135 food vendors interviewed, 8 representing 6% were males and majority 127(94%) were females. Also, 51 (38%) of the vendors were within the ages of 19-30 years followed by 77 (57%) within the ages 31-40 years. Few of them 7 (5%) were 41 years and above. Regarding the educational background of the respondents, majority of them 47 (35%), had basic educational background followed by 45 (33%) vendors who apparently had not received any formal education. Also, a total of 39 respondents representing 29% were graduates with secondary school certificates. Few of the respondents 3% had received some form of vocational training and tertiary education.

Majority of the respondents 52% were married followed by 45 (33%) single parents. A few of the respondents 10% were divorced and 5% of the respondents were separated from spouse. Most of the respondents 76% were Christians whilst 19% of them were Muslims. Six respondents were traditional believers followed by a respondent who had his own beliefs. Moreover, 43 (32%) out of the total respondents sampled do have been engaged in this food vending business for less than a year. Most of the respondents (59%) had been selling foods to customers for 2-5 years followed by 12(9%) respondents with more than five years working experience in the food vending business.

Table 1: Demographic Characteristics of Respondents

Characteristics		Responses	Percent
Gender	Male	8	6
	Female	127	94
	Total	**135**	100
Age	19-30 years	51	38
	31-40years	77	57
	41-50years	6	4
	Above 50 years	1	1
	Total	**135**	100
Educational background	None	45	33
	Basic	47	35
	Secondary	39	29
	Commercial or Vocational training	1	1
	Tertiary	3	2
	Total	**135**	100
Marital status	Married	70	52
	Single	45	33
	Divorced	13	10
	Separated	7	5
	Total	**135**	100
Religion	Christian	102	76
	Muslim	26	19
	Tradition	6	4
	Others	1	1
	Total	**135**	100
Number of years in business	Less than a year	43	32
	2-5years	80	59
	6 years and above	12	9
	Total	**135**	**100**

Source: Field survey, (2021).

From figure 1, sixty-one percent (61%) of the food vendors are stationed at a particular vending site where they sell foods to customers. Also 29% of the food vendors sampled provide direct delivery services to customers upon contact. A few of the food vendors (10%) at Kpando have both stationed operational site and mobile services for customers.

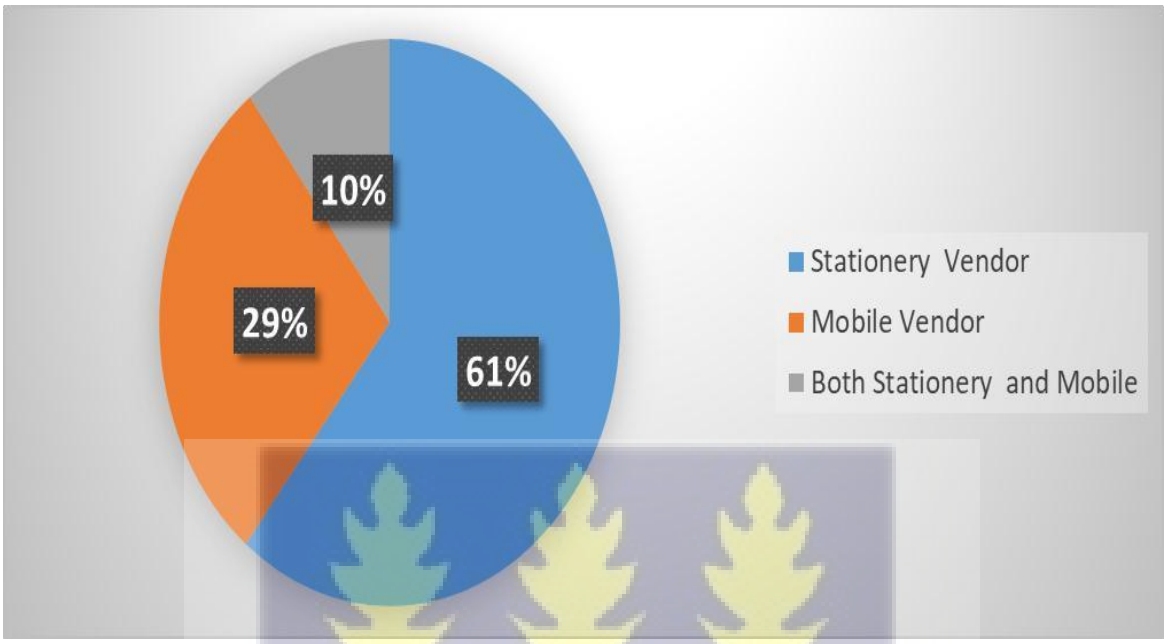

Figure 1: Type of Vending.

4.2 Knowledge on Hygienic Practices among Food Vendors in Kpando.

This section presents the result of the analysis to assess the level of knowledge on hygienic practices among food vendors in Kpando. Figure 2 depicts the level of knowledge on environmental sanitation among food vendors in Kpando. One hundred and thirty-two (132) vendors were aware that a clean environment is likely to prevent the transmission of food borne diseases such as dysentery and cholera whilst few of them (2) were indecisive. On the other hand 31 respondents representing 23% had low knowledge on whether disease-causing bacteria can also enter food through dirty equipment. A total number of 65 food vendors representing 48.1% knew that disease-causing bacteria can survive in open wounds and blisters whilst 37% of them where uncertain on suchassertion. Twenty food vendors representing 18.8% did not

believe that and this was very frightening as much of these food vendors were skeptical that disease-causing bacteria which cause food poisoning can survive in open wounds and blisters. Most of the vendors 81 (60%) were conversant that disease-causing bacteria can also enter food through dirty equipment whilst 17% of them were indecisive. On the other hand, 31 respondents representing 23% had low knowledge on whether disease-causing bacteria can also enter food through dirty equipment. A total of 65 food vendors, responded that it was not appropriate to keep waste products in the same area as foodstuffs, while 37% were unsure. The data also found that 81 respondents agreed there is a risk of food poisoning if the food preparation area is not clean, while 28 food merchants disagreed. Most respondents were aware of standard sanitation practices for a healthy environment.

As a result of the foregoing findings, most food vendors' scores on knowledge of food hygienic practices were greater than 60%, suggesting that food vendors in Kpando havea good level of knowledge.

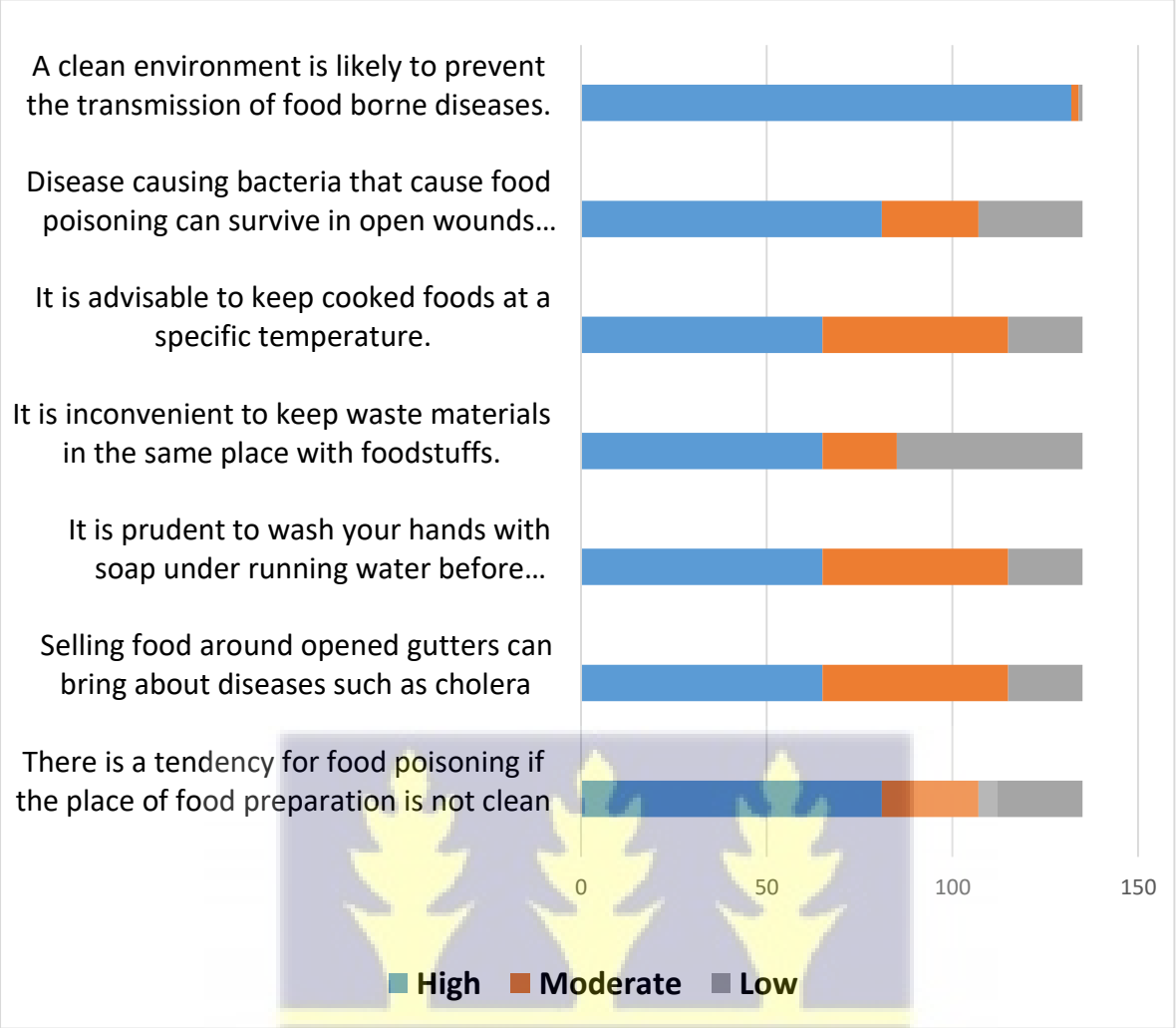

Figure 2: Knowledge on Environmental Sanitation

Test of association between food vendor's level of knowledge and socio- demographic Characteristics.

Respondents' level of knowledge on environmental sanitation was assessed with respect to their demographic characteristics and their responses were summarized in Table 2 above. It was observed from the previous findings most food vendors are aware of the standard practices for healthy environment sanitation. These were highly rated on issues such as "A clean environment is likely to prevent the transmission of food borne diseases", "It is inconvenient to keep waste materials in the same place with foodstuffs", "It is prudent to wash your

hands with soap under running water before starting work" and "Disease causing bacteria that cause food poisoning can survive in open wounds and blisters".

The findings in Table 2 further reveals that, food vendors gender, and marital status has no relationship on the knowledge of food vendors on environmental sanitation. Also the chi-square value of ($\chi 2$= 1.9; p=0.03) shows that there is a significant relationship with the educational background of food vendors and on issues such as "A clean environment is likely to prevent the transmission of food borne diseases", "It is inconvenient to keep waste materials in the same place with foodstuffs", "It is prudent to wash your hands with soap under running water before starting work" and "Disease causing bacteria that cause food poisoning can survive in open wounds and blisters".

Hence the findings confirm that the knowledge of food vendors on environmental sanitation is only influenced by their educational background and other socio-demographic characteristics such as gender, age, marital status and religion has no influence.

Table 2: Test of association between food vendor's level of knowledge and socio-demographic characteristics.

Variables	A clean environment is likely to prevent the transmission food borne diseases.			It is inconvenient to keep waste materials in the same place with foodstuffs.			It is prudent to wash your hands with soap under running water before starting work.			Disease causing bacteria that cause food poisoning can survive in open wounds and blisters.			**Chi-Square**
	High	Moderate	Low	High	Moderate	Low	High	Moderate	Low	High	Moderate	Low	P-value
Gender													
Male	5	3	0	2	6	0	2	0	6	0	1	7	**80.1**
Female	41	83	3	54	68	5	54	5	68	27	20	80	(0.763)

Age													
19-30 years	17	33	1	38	11	2	32	35	3	21	47	2	
31-40years	28	47	2	16	61	0	15	28	2	17	28	0	**44.1** (1.03)
41-50years	1	5	0	2	1	3	6	7	0	5	7	1	
Above 50 years	0	1	0	0	1	0	3	4	0	3	4	0	
Educational Level													
None	14	30	1	20	24	1	10	15	20	7	20	17	
Basic	19	27	1	21	23	3	7	21	19	11	21	15	
Secondary	12	26	1	14	24	1	8	9	22	7	11	21	
Commercial or Vocational training	0	1	0	0	1	0	0	0	1	0	1	1	**1.9** (0.03)
Tertiary	1	2	0	1	2	0	2	1	0	2	1	0	
Marital Status													
Single	27	41	3	1	30	40	21	47	2	21	48	2	
Married	14	29	0	1	26	16	17	28	0	17	26	0	**34.1** (1.32)
Divorced	4	9	0	0	9	4	5	7	1	5	7	1	
Widowed	4	4	0	0	5	3	3	4	0	3	5	0	

Source: Field survey, (2021)

4.3 Adherence to hygienic practices among food vendors

This section presents the result of the analysis to determine the adherence level of hygienic practices among food vendors.

The adherence level to hygienic practices among food vendors is presented by Figure 3 above. Fifty food vendors regularly go through the necessary medical examinations followed by 25 vendors who were uncertain as to whether the regular medical examinations were necessary. Interesting, 60 food vendors were skeptical about the regular medical examinations.

Also, most of the food vendors (56) rarely observe the Covid-19 protocols at their vending sites

whilst 45 vendors were indecisive as to whether to adhere to the Covid-19 protocols at their vending sites.

Fifty percent of these food vendors sampled disregarded that washing of plates and spoons before and after vending prevent some diseases. Hence their adherence to the washing of plates and spoons before and after vending was very low.

From the findings most of the vendors (60) were skeptical that the regular change of water for washing plates within the period of sales is not important.

Moreover, there was a low adherence (68) to the wearing of aprons while selling among food vendors as only 50 vendors observe such practice.

Regards to the use gloves while selling, most of the food vendors (78) do wear gloves during selling foods followed by 40 vendors who uncertain about the importance of wearing gloves.

The findings above revealed that most of the food vendor's skeptically overlook the practices standard of hygienic measures. Hence their adherence level to these hygienic practices is low.

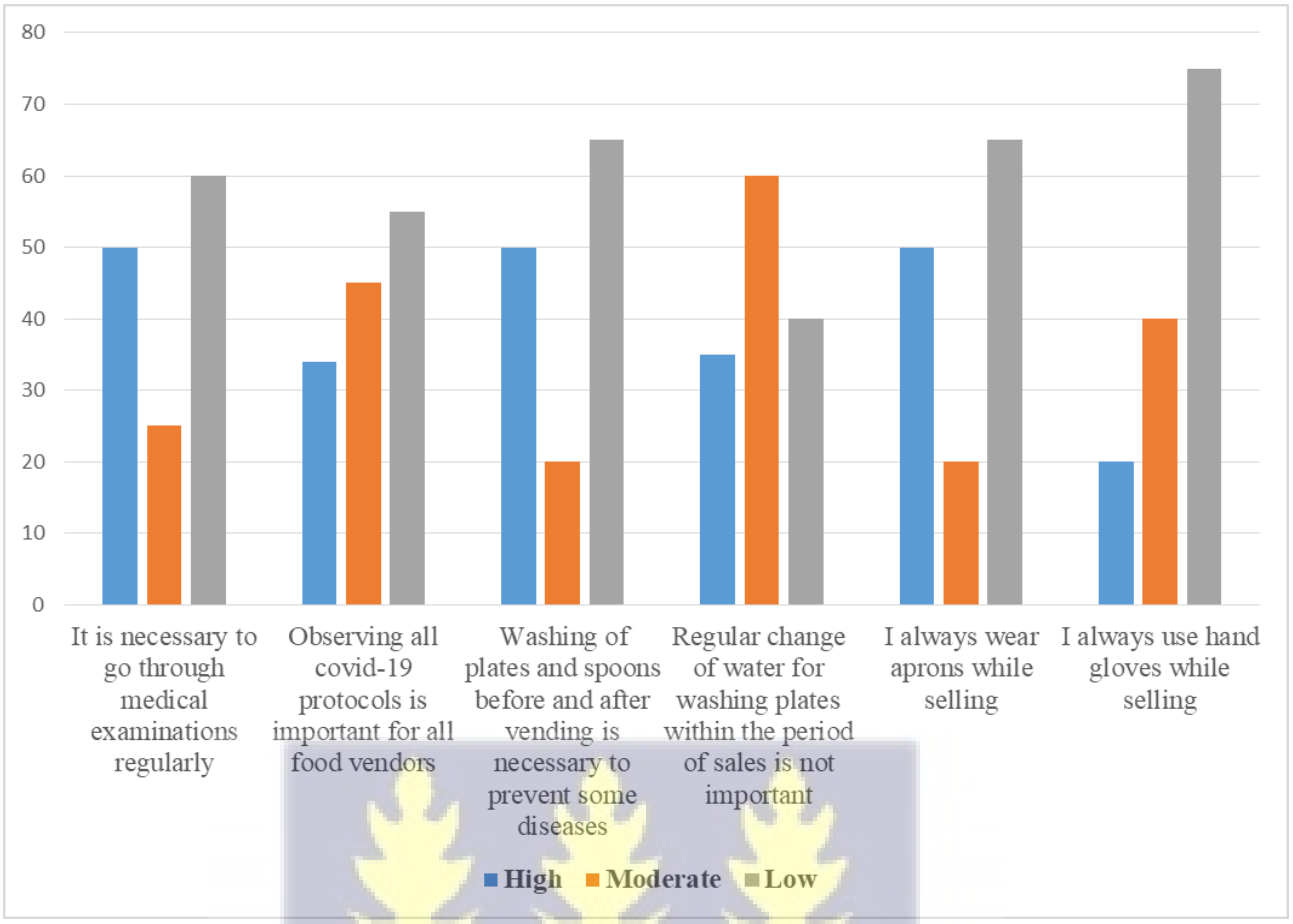

Figure 3: Adherence level (high, moderate or low) to hygienic practices among food vendors.

Test of association between food vendor's level of adherence and socio-demographic characteristics

Table 3 shows a cross tabulation between some socio-demographic data and food vendor's level of awareness on hygienic practices.

The Chi-square values (χ 2 = 3.1; p=0.860), (χ 2 = 80.1; p=0.763) revealed that some socio-demographic characteristics such as gender and age have no influence on food level of awareness to hygienic practices.

It can be seen from the Table 5 that, there is a significant relationship between food vendors educational level and hygienic practices such as; I properly cover my hair whiles selling food, I provide water for customers to wash their hands before and after eating, wear a nose mask to prevent body fluids such as saliva from contaminating food I sell and Preservation of leftover cooked foods should not exceed a period of time. Thus Chi-square value (χ 2 = 1.9; p=0.03) confirms that the educational background of food vendors influences their level of awareness to hygienic practices in Kpando.

Table 3: Test of association between food vendor's level of adherence and socio-demographic characteristics.

Variables	It is necessary to go through medical examinations regularly			Observing all covid-19 protocols is important for all food vendors			Washing of plates and spoons before and after vending is necessary to prevent some diseases			I always wear aprons while selling			Chi-Square
	High	Moderate	Low	High	Moderate	Low	High	Moderate	Low	High	Moderate	Low	**P-value**
Gender													
Male	1	2	5	2	1	5	2	0	6	0	1	7	3.1
Female	37	23	67	24	27	76	54	5	68	27	20	80	**0.860**
Age													
19-30 years	6	20	28	3	33	25	20	20	11	11	25	12	
31-40years	20	15	35	32	20	12	15	25	35	13	23	5	80.1 **0.763**
41-50years	3	0	2	0	3	3	3	1	3	5	30	10	

Above 50 years	0	1	5	1	0	3	1	1	0	0	1	0	
Educational Level													
None	11	20	14	15	24	1	10	15	20	7	20	17	
Basic	11	20	16	23	23	3	7	21	19	11	21	15	
Secondary	3	23	13	57	24	1	8	9	22	7	11	21	1.90 **0.03**
Commercial or Vocational training	0	0	0	0	1	0	0	0	1	0	1	1	
Tertiary	1	1	2	1	2	0	2	1	0	2	1	0	

Source: Field survey, (2021).

4 .3 Factors that contribute to the current environmental sanitation situation.

This section presents result of the analysis on factors that contribute to the current environmental sanitation situation. A cursory summary of previous findings revealed that even though food vendors have knowledge on hygienic practices, their level of adherence is quite low.

Hence there is a need to analyze the major factors influencing their adherence to hygienic practices affecting the current environmental sanitation. With the factors relating to environmental sanitation situation and hygienic practices among food vendors in Kpando, Factor Analysis specifically Principal Component Analysis (PCA) was used. For PCA, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett‟s Test of Sphericity decides whether to use factor analysis for the data or not. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value should be greater than 0.5 for the factor analysis to proceed. Also, the p-value for the Bartlett‟s Test of Sphericity should be less than

0.05 for the data to be considered worthwhile for the analysis.

Table 4 below presents the statistics that are needed in deciding whether to use factor analysis for the data or not. For the analysis above, both the KMO value of 0.715 and the Bartlett‟s test *p* value of 0.000 affirm that the data is appropriate for factor analysis.

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.715
Bartlett's Test of Sphericity	Approx. Chi-Square	1965.686
	Df	253
	Sig.	0.000

Source: Field survey, (2021).

Table 5 of appendix IV, represent the descriptive statistics of factors contributing to the current environmentsanitation situation. The mean and standard deviation ratings depicted, measures the level of awareness on hygienic practices by food vendors. With reference to the scales of 1 to 5 where 1= High 2= Moderate and 3= Low.

The initial and extracted communalities was represented in Table 6. Principal components analysis works with the assumption that all the original variables have an initial variance of one apiece. The communalities in the column labelled extraction shows how much of the variancein the original variables have been accounted for by the extracted factors. Seventy-two percent (72.3%) of the variance in item 1 is accounted for. Also 56.8% of the variance in item2 is accounted for and so on. Actually, the study is interested in high communalities (greater than 0.5), on the extraction part of the communalities table. Twenty-three (23) variables remained in the final factor solution out of the forty-six (46) variables at the start of the analysis. The other twenty-three (23) variables were removed from the analysis because

their communalities were less than 0.5. The chosen factor solution account for at least 50% of the variance of the original variables.

For this study, there were seven (7) factors with eigenvalues greater than 1. The rest of the components were excluded because they had eigenvalues less than 1, which indicates the factors obtained were considered important as compared to the others which were not retained. Factor one (1) explains 21.57% of the variance, factor two (2) explains more of the variance, factor three (3) explain 46.36% and also factors 4, 5, 6 and 7 accounted for 54.45%, 62.49% , 70.02% and 76.33% respectively of the remaining variance not accounted for. The first seven factors extracted from the analysis accounted for a cumulative of 76.33% of the total variance in the data. In conclusion these seven (7) factors explained 76.33% of the total variance in the data. The rotated matrix contains the loading of each variable or item onto each factor which is depicted in Table 8 of appendix IV. The researcher suppresses all loadings less than 0.3 in the output. Seven items loaded on Factor 1 and these items are strongly correlated among themselves. These first seven items (the unavailability of public waste bins is a contributing factor, lack ofadequate education on sanitation for food vendors is a major factor in the current environmental sanitation, the municipal assembly provides regular in-service training for food vendors, there is a standard regulating body in charge of proper food vending in the municipal, how often do waste collectors come for waste around the vending sit, how often is communal labor organized in your municipal and it is prudent to wash your hands with soap under running water before starting work) loaded highly on Factor 1.All these factors are characterized functions of local institutions in achieving good environment sanitation. Thus, municipal authorities such as the Municipal Environmental Unit, the Health Service Unit, and the Food and Drugs Board are expected to providecapacity building, grant licenses, and establish rules to govern food vending. Local authorities are also expected to provide the infrastructure and services that food vendors will need to operate.

Also, four items (selling food around opened gutters can bring about diseases such as cholera, cooked and uncooked foods should be prepared and stored separately, it is necessary to go through medical examinations regularly and disease-causing bacteria that cause food poisoning can survive in open wounds and blisters) loaded highly on Factor 2.

Factor 3 had four items successfully loading and they include: washing of plates and spoons before and after vending is necessary to prevent some diseases, regular change of water for washing plates within the period of sales is not important, do cultural beliefs and perceptions be a contributing factor to hygienic practices amongst food vendors and i properly cover my hair whiles selling food.

Items under factor 3 unfolds the personal hygienic practices expected from individuals in quest to achieve a healthy environment.

Two items (how do you keep food at preferred temperature and how often do you clean your vending site and its environs) also loaded on factor 4.

Items such as: there is an assessment tool to assess if vendors are working under hygienic conditions and the presence of special courts to deal with unhygienic sanitation practice culprits is of essence to the vending business loaded successfully loaded on factor 5.

Also, items such as: I wear a nose mask to prevent body fluids such as saliva from contaminating food I sell and it is prudent to organize a thorough cleanup of the vending site at least twice every month loaded on factor 6. These items under factor 6 can be categorized as personal factors since they are line with personal hygienic practices.

Finally, two items "It is appropriate to keep waste materials in the same place as foodstuffs and there is no harm in using the same hands to serve food and in collecting monies" loaded highly on factor 7. All these items load highly on their respective factors which represent the most significant trait to consider when identifying factors relating to contributing to the current environmental sanitation at Kpando.

CHAPTER FIVE

5.0 DISCUSSION

The study aims to assess factors influencing adherence to environmental sanitation practices among food vendors at the Kpando Municipal. Hence the possible factors that contribute to the current environmental sanitation situation and this was achieved by using factor analysis specifically principal-component analysis.

A total number of 135 food vendors who sell ready to eat direct contact with food and contact surfaces in the municipal were sampled for the study. From the analysis, it was found out that most of the food vendors were females below the age of forty years. Thirty- five percent of these food vendors have no formal education of any sort and also most have more experience in the food vending business. The findings revealedthat most of the food vendors in Kpando are stationed at particular sites where they sell readyto eat ready-to-eat direct contact with food and contact surfaces in the municipal.

5.1 Knowledge on Hygienic Practices among Food Vendors in Kpando.

Twenty percent food vendors disagreed with the statement that disease-causing germs can persist in exposed wounds and blisters. This was alarming since many of these food suppliers were unconvinced that disease-causing germs that cause food poisoning could survive in exposed wounds or blisters. Table 3 found that most of the food vendors were unaware of the following issues: "Disease-causing germs can also infiltrate food through dirty equipment" and "Cooked and uncooked foods should be prepared and stored". Most of the vendors at the time of the study had either no formal education or only a few years of schooling and thus were

simply unaware of safe food handling, exposing themselves at a higher risk of spreading pathogens. (Ghosh et al., 2017). It's difficult to ascertain the actual cause of food contamination-related incidents. According to Annor (2011), there is strong statistical

evidence that 70% of all bacterial food poisoning is caused by caterers. The findings further revealed that, food vendors' gender, age, marital status and religion had no relationship on issues such as "Disease-causing bacteria can also enter food through dirty equipment and "Cooked and uncooked foods should be prepared and stored". Also, the chi-square value of ($\chi 2$= 1.9; p=0.023) showed that the knowledge of food vendors on environmental sanitation was only influenced by their educational background and other socio-demographic characteristics such as gender, age, marital status and religion has no influence.

The findings from figure 3 revealed that most of the vendors 132 were aware that a clean environment is likely to prevent the transmission of food borne diseases such as dysentery and cholera whilst few of them (2) were indecisive. On the hand 31 respondents representing 23% had low knowledge on whether disease-causing bacteria can also enter food through dirty equipment. The result accords in line with Acheampong's findings on environmental sanitation management. According to him, environmental sanitation is very vital for any nation and to live in a world free from diseases and a clean environment is the first step (Acheampong, 2012). With the study findings, most of the food vendors believed that; it is prudent to wash hands with soap under running water before starting work and selling food around opened gutters can bring about diseases such as cholera. The findings above revealed that most of the food vendors are aware of the standard practices for healthy environment sanitation and hencetheir level of knowledge on hygienic practices is high.

The findings further revealed that, food vendor's views on issues such as whether it is prudent to wash your hands with soap under running water before starting work, selling food around opened gutters can bring about diseases such as cholera, there is a tendency for food poisoning if the place of food preparation is not clean, whether it is advisable to keep cooked foods at a specific temperature and infectious diseases can contaminate food if the place of

food preparation is dirty depends on their educational background. Thus, their level of education had a relationship with these variables.

5.2 Adherence to hygienic practices among food vendors

The adherence level to hygienic practices among food vendors presented by Figure 4 revealed that 60 food vendors were skeptical about the regular medical examinations. Also most of these food vendors (56), rarely observed the Covid-19 protocols at their vending sites. Findings further revealed that food vendors adherence to certain hygienic practices such as washing of plates and spoons before and after vending, change of water for washing plates, wearing of aprons while selling and the use gloves while selling were very low. Hence, most of them skeptically overlooked the practices standard of hygienic measures. This confirms the findings of Foriwaa and Lovatt on food hygienic practices among food vendors in Ghana. According to them, food handlers' hygienic practices, especially those of streetfood sellers, are poor. The hospitality industry has been studied mostly at hotels, restaurants, and street food vendors in Accra, Ghana's capital. Total bacterial counts in street foods are much higher than the Ghana Standards Authority for Ready to Eat Foods' acceptable standardlimits. (Foriwaa & Lovatt, 2015).

With respect to the observance of proper hand hygiene after the use of public toilets during vending is important to prevent food contamination, most of the vendors adhered to such practice. However, 33% were adamant observing such practice. Also, with help of the local authorities, most of the food vendors 59 (43.7%) organize a thorough cleanup of the vending site at least twice every month. The findings also revealed that there is a high tendency of improper waste management amongst mobile vendors in Kpando municipal and this is confirmed by 60% of the total food vendors sampled. Also, majority of the food vendors 70% were uncertain that separating waste materials prevent decomposing of some waste e.g.

leftover foods are not necessary and hence were inconsistent observing it. This was same for the cleaning tables which customers eat on after every use.

It was also revealed that socio-demographic characteristics such as gender and age have no influence on food level of awareness to hygienic practices. However, there is a link between food vendors educational level and hygienic practices such as; I properly cover my hair whiles selling food, I provide water for customers to wash their hands before and after eating,wear a nose mask to prevent body fluids such as saliva from contaminating food I sell and preservation of leftover cooked foods should not exceed a period of time. The Chi-square value (χ 2 = 1.9; p=0.03) confirms that the educational background of food vendors influences their level of awareness to hygienic practices in Kpando. Food vending is frequently seen as unsanitary and of bad quality, sometimes as a result of poor environmental circumstances in which food is cooked or sold, but also as a result of food vendors lack of education in food safety relating to food preparation and handling (Rheinlander, 2006; FAO, 2009; Annan-Prah et al., 2011).

5.3 Factors that contribute to the current environmental sanitation situation.

Factor Analysis specifically Principal Component Analysis was used to solicit factors relating to environmental sanitation situation and hygienic practices among food vendors in Kpando. The research revealed seven main components as the most pressing factors influencing food vendors' adherence to environmental sanitation practices among food vendors at the Kpando Municipal. All these items load highly on their respective factors which represent the most significant trait to consider when identifying factors relating to contributing to the current environmental sanitation at Kpando. Ineffective or lack of proper education, training of food vendors on hygiene and sanitation, non-provision of basic infrastructure, and non-regulation and enforcement of by-laws governing street food vending by local authorities have all been linked to unhygienic practices among food vendors.(ISSER, 2002; Wuliyeng, 2013).

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the findings of study and further offers a summary of conclusions and recommendations relating to the study objective. It also provides appropriate recommendations that would be needed for future research based on the data analysis.

6.1 Conclusion

Using the findings of the study the following conclusions can be made:

Generally, the level of knowledge of food vendors on environmental sanitation is high and this only influenced by their educational background. The majority of food vendors are awareof the needed hygienic standards for a clean environment.

Despite understanding environmental sanitation practices, food vendors' adherence to these practices was low. The consistent unhygienic standards practiced by food vendors have a direct impact on the existing environment sanitation in Kpando.

Most of the propelling factors influencing the adherence to environmental sanitation practices among food vendors at the Kpando Municipal emphasis on; personal hygienic practices expected from individuals in quest to achieve a healthy environment, functions of local institutions in achieving good environment sanitation.

6.2 Recommendations

The study recommends the following based on the findings and conclusions of the study;

1. Food vendors need to be properly educated on the essence of observing hygienic practices and hence how infectious disease-causing bacteria's can cause food poisoning. The study has proved that food vendors were skeptical that disease-causing bacteria

   which cause food poisoning can survive in open wounds and blisters. This education could be done through durbars, workshops, market activations, etc.

2. The evidence from the findings revealed that the hygienic practices among food vendors are quite below standard and hence most of these food handlers are very skeptical about certain key hygienic practices. For this reason, sanitary officials should inspect food vending sites on a regular basis to ensure compliance with safe hygienic practices.
3. The Kpando municipal assembly should set up food vending locations with appropriate social amenities and infrastructure such as access to portable water, modern toilet facilities, waste management services, and electricity. The study found out that, some of these food vendors are found around open gutters which could be the breeding grounds for disease outbreak.
4. Finally, in order to promote effective street monitoring and regulation, municipal authorities must work to enhance cooperation among the various entities tasked with supervising the street food sector.

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SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

APPENDIX I: QUESTIONNAIRE

Most of the propelling factors influencing the adherence to environmental sanitation practices among food vendors at the Kpando Municipal emphasis on; personal hygienic practices expected from individuals in quest to achieve a healthy environment, functions of local institutions in achieving good environment sanitation.

Research Title: Factors Influencing Adherence To Environmental Sanitation Practices Among Food Vendors At Kpando Municipal, Ghana.

Date: …… Unique ID No.: …….

Dear respondents,

This research seeks to study factors influencing adherence to environmental sanitation practices among food vendors at Kpando Municipal. Please indicate your responses by ticking against your preferred choice(s) or fill in the boxes where required. It is of utmost importance that you give clear and concise responses that would facilitate smooth data analysis. All information provided will be treated as confidential.

Section A: Socio-demographic characteristics of respondents

1. Gender: (a) Male [ ] (b) Female [ ]

2. Age: (a) 19-30years [ ] (b) 31-40years [ ] (c) 41-50years [ ]

(d) Above 50years [ ]

3. Educational background: (a) Basic Level [ ] (b) Secondary Level [ ] (c) Commercial or Vocational training (c) Tertiary Level [ ]

4. Marital Status: (a) Married [ ] (b) Single [ ] (c) Divorced [ ] (d) Separated [ ]

e) Others (specify)……

5. Religion (a) Christian [ ] (b) Muslim [ ] (c) Traditionalist [ ] (d) Others (specify)

6. Type of Vendor (a) Stationary Vendor [ ] (b) Mobile Vendor [ ] (c) Both stationary and mobile [ ]

7. How many years have you been engaged in this business?

(a) Less than a year [ ] (b) 2-5 years [ ] (c) 6 years and above [ ]

8. Which kind of food(s) do you sell? ……..

Section B: Knowledge of food vendors on environmental sanitation

The questions below refer to the level of knowledge and awareness of food vendors on environmental sanitation. Pleases indicate the extent to which you agree with the following statements. Use the scales of 1 to 5 where 1= Strongly Agree 2= Agree 3= Neutral 4= Disagree and 5 = Strongly Disagree.

Section C: Adherence to hygienic practices among food vendors

SN	Statements	SA	A	N	D	SD
9	A clean environment is likely to prevent the transmission of food borne diseases such as dysentery and cholera.					
10	It is appropriate to keep waste materials in the same place with foodstuffs.					
11	It is prudent to wash your hands with soap under running water before starting work.					

12	Disease causing bacteria can also enter food through dirty equipment.					
13	Cooked and uncooked foods should be prepared and stored separately.					
14	Disease causing bacteria that cause food poisoning can survive in open wounds and blisters.					
15	Selling food around opened gutters can bring about diseases such as cholera					
16	There is a tendency for food poisoning if the place of food preparation is not clean					
17	It is advisable to keep cooked foods at a specific temperature.					
18	Infectious diseases can contaminate food if the place of food preparation is dirty					
19	There is no harm in using the same hands to serve food and in collecting monies					
20	Stored water used for food preparation if not preserved well can be a source of contamination					
21	Bacteria multiply rapidly in foods stored at room temperature and can cause food poisoning.					

The questions below refer to the level of adherence to hygienic practices among food vendors. Pleases indicate the extent to which you agree with the following statements. Use the scales of 1 to 5 where 1=Strongly Agree 2= Agree 3= Neutral 4= Disagree and 5 = Strongly Disagree

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S/N	Statements	SA	A	N	D	SD
22.	It is necessary to go through medical examinations regularly					
23.	Observing all covid-19 protocols is important for all food vendors					
24.	Washing of plates and spoons before and after vending is necessary to prevent some diseases					
25.	Regular change of water for washing plates within the period of sales is not important					
26.	I always wear aprons while selling					

27.	I always use hand gloves while selling					
28.	I properly cover my hair whiles selling food					
29.	I provide water for customers to wash their hands before and after eating					
30.	I wear a nose mask to prevent body fluids such as saliva from contaminating food I sell					
31.	Preservation of leftover cooked foods should not exceed a period of time					
32.	Performing proper hand hygiene after the use of public toilets during vending is important in order to prevent food contamination					
33.	It is prudent to organize a thorough cleanup of the vending site at least twice in every month					
34.	Covering food with sieves does not prevent contamination by flies.					
35.	There is a tendency for improper waste management amongst mobile vendors					
36.	Regular washing of dustbins does not prevent offensive smell from garbage.					
37.	Separating waste materials to prevent decomposing of some waste e.g. left over foods is not necessary					
38.	The use of disposal tissues or hand towels after proper hand washing is more efficient than the use of shared or reusable napkins					
39.	Cleaning tables which customers eat on after every use prevents flies					
40.	Trimming of finger nails amongst food vendors is of no relevance					

Section D: Factors that contribute to the current environmental sanitation.

Please indicate your responses by ticking against your preferred choice(s) or fill in the boxes where required. It is of utmost importance that you give clear and concise responses that would facilitate smooth data analysis.

41. How often do you clean your vending site and its environs?
(a) Weekly [ ] (b) Monthly [ ] (c) Quarterly (d) Yearly [ ]

42. The cultural beliefs of a vendor is a contributing factor to the current practices
(a) True [ ] (b) False [ ] (c) Others (specify)

43. How do you shield your food from flies?
(a) Use of glass wear [ ] (b) Sieved with food net [ ] (c) Others, please specify……

44. How do you keep food at preferred temperature? (a) Use of microwaves and ovens [ ]
(b) Use food warmers [ ] (c) Use of rubbers (d) Others, please specify……

45. How often do you educate your buyers on proper hand washing?
(a) Very Often [ ] (b) Once a while [ ] (c) Not regularly (d) other (specify)

46. Do the cultural beliefs and perceptions be a contributing factor to hygienic practices amongst food vendors?
(a) Yes [ ] (b) No [ ] (c) Neutral

47. Do taboos hinder hygienic practices amongst food vendors?
(a) Yes [ ] (b) No [ ]

48. How often do waste collectors come for waste around the vending site?
(a) Regularly [ ] (b) Daily [ ] (c) Weekly [ ] (d) Monthly [ ]
(e) Others, please specify……

49. How often is communal labor organized in your municipal?
(a) Regularly [ ] (b) Daily [ ] (c) Weekly [ ] (d) Monthly [ ] (e) others

50. The lack of adequate education on sanitation for food vendors is a major factor to the current environmental sanitation? (a) Yes [ ] (b) No [ ]

51. The unavailability of public waste bins is a contributing factor?
(a) Yes [ ] (b) No [ ]

52. There is a standard regulating body in charge of proper food vending in the Municipal.
    (a) Yes [ ] (b) No [ ]

53. The municipal assembly provides a regular in-service training for food vendors?
    (a) True [ ] (b) False [ ]

54. There is an assessment tool to assess if vendors are working under hygienic conditions?
    (a) True [ ] (b) False [ ]

55. The presence of special courts to deal with unhygienic sanitation practice culprits is of essence to the vending business.
    (a) True [ ] (b) False [ ]

APPENDIX II: INFORMED CONSENT FORM

Project Title: The Determinants of Adherence to Environmental Sanitation among Food Vendors at Kpando Municipal, Ghana.

Principal Investigator: Jacqueline Botchway, 0549501598, jacqueline.botchway@yahoo.com

Address: University of Ghana, P. O. Box LG 13

General Information about Research

The above research title is undertaken in partial fulfilment for the award of a Master of Occupational Hygiene.

Background of study:

Receive warm greetings! I‟m Jacqueline Botchway a student from the school of public health (university of Ghana, legon). I‟m conducting a research on the topic above. This research and purely academic in order for a student to acquire a degree in Masters of Public health.

Nature of research:

The study will deploy quantitative cross-sectional design to evaluate factors influencing environmental sanitation amongst food vendors at Kpando municipal, Ghana. A well-structured pre- tested questionnaire with both open and close-ended questions will be used to collect data from food vendors. A non-probability sampling technique specifically randomized sampling technique will be used to select 200 participants to be interviewed by researcher. For easy understanding and interpretation of results, descriptive statistics such as frequency/contingency tables, graphs and other essential charts will be used to analyze the data with the help of SPSS (Statistical Product for Service Solutions) and Microsoft Excel. Factor analysis specifically Principal Component Analysis will be carried out to assess factors accounting for the environmental sanitation situation in Kpando.

Participants' involvement: Participants are required to be above 18 years of age. Your participation in the study will require you to answer certain questions on socio-demography (age, gender, marital status, level of education, religion and occupation), the knowledge you have on environmental sanitation and adherence to hygienic practices. No samples of your food will be taken to be tested at the laboratory. Approximately 15 minutes of your time will be required

either by the Principal Investigator or Research Assistants in the administration of the questionnaire.

Possible Risks and Discomforts: Minimal risk is anticipated since some questions might be uncomfortable to you. You may however choose not to answer questions that appear uncomfortable to you.

Possible Benefits*:* There is no direct benefit participating in this study. The findings from this study will however contribute to knowledge on factors that influence environmental sanitation in food vending.

Alternatives to Participation: Not applicable

Confidentiality: We will protect information about you and your participation in this research as much as possible. The information will purposely be used for research and will not be used against you. Your name will not be captured on the questionnaire and neither will you be named in any of our reports. Apart from the principal investigator, the research assistants and supervisorof this research, no one else will have access to information provided whether in part or whole.

Compensation: There is no compensation for participating in this study.

Additional Cost: Not applicable

Voluntary Participation and Right to Leave the Research: Your participation in this research is voluntary and you are at liberty to withdraw from the study at any time without it affecting your further medical care in any way. During the interview, you also have the right not to answer questions that appear uncomfortable to you.

Termination of Participation by the Researcher: Not applicable

Notification of Significant New Findings: Not applicable

Contacts for Additional Information:

If you have further questions or issues regarding this study, which require clarification, you may contact:

Jacqueline Botchway (Principal Investigator), student at School of Public Health-University of Ghana, Legon, 0549501598,

Email: jacqueline.botchway@yahoo.com OR

Professor Mawuli Dzodzomenyo, University of Ghana (Supervisor), School of Public Health-

University of Ghana, Legon – Telephone: 0208376845

Email: mDzodzomenyo@ug.edu.gh

Your rights as a Participant

This research has been reviewed and approved by the Institutional Review Board of Noguchi Memorial Institute for Medical Research (NMIMR-IRB). If you have any questions about your rights as a research participant you can contact the IRB Office between the hours of 8am-5pm through the landline 0302916438 or email addresses: nirb@noguchi.ug.edu.gh

APPENDIX III: ETHICAL CLEARANCE

UNIVERSITY OF GHANA

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH (NMIMR)
COLLEGE OF HEALTH SCIENCES
INSTITUTIONAL REVIEW BOARD

12th January 2022

ETHICAL CLEARANCE

FEDERALWIDE ASSURANCE FWA 00001824 **IRB 00001276**

NMIMR-IRB CPN 022/21-22 **IORG 0000908**

On 12th January 2022, the Noguchi Memorial Institute for Medical Research (NMIMR) Institutional Review Board (IRB) at a full board meeting reviewed and approved your protocol titled:

TITLE OF PROTOCOL : **Factors influencing adherence to Environmental Sanitation Practices amongst Food Vendors at Kpando Municipal**

PRINCIPAL INVESTIGATOR : **Jacqueline Botchway, MPh Cand.**

Please note that a final review report must be submitted to the Board at the completion of the study. Your research records may be audited at any time during or after the implementation.

Any modification of this research project must be submitted to the IRB for review and approval prior to implementation.

Please report all serious adverse events related to this study to NMIMR-IRB within seven days verbally and fourteen days in writing.

This certificate is valid till 11th January 2023. You are to submit annual reports for continuing review.

Signature of Chair: .....
Dr. Abraham Hodgson
(NMIMR – IRB CHAIR)

INTEGRI PROCEDAMUS

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APPENDIX IV
(DESCRIPTIVES OF FACTOR ANALYSIS)

Table 5: Descriptive Statistics of factors

Factors	N	Mean	Std. Deviation
Cooked and uncooked foods should be prepared and stored separately.	135	3.04	1.56
Disease-causing bacteria that cause food poisoning can survive in open wounds and blisters.	135	2.58	0.50
Do cultural beliefs and perceptions be a contributing factor to hygienic practices amongst food vendors?	135	3.10	1.52
How do you keep food at preferred temperature?	135	3.10	1.52
How often do waste collectors come for waste around the vending site?	135	3.04	1.56
How often do you clean your vending site and its environs?	135	3.04	1.56
How often is communal labor organized in your municipal?	135	2.12	0.65
I properly cover my hair whiles selling food	135	3.04	1.56
I wear a nose mask to prevent body fluids such as saliva from contaminating food I sell	135	3.02	1.56
It is appropriate to keep waste materials in the same place as foodstuffs.	135	2.52	0.54
It is necessary to go through medical examinations regularly	135	3.42	0.65
It is prudent to organize a thorough cleanup of the vending site at least twice every month	135	3.40	0.71
It is prudent to wash your hands with soap under running water before starting work.	135	2.42	0.65
Regular change of water for washing plates within the period of sales is not important	135	3.04	1.56
Selling food around opened gutters can bring about diseases such as cholera	135	3.10	1.52
The lack of adequate education on sanitation for food vendors is a major factor in the current environmental sanitation?	135	3.42	0.65
The municipal assembly provides regular in-service training for food vendors?	135	3.58	0.50
The presence of special courts to deal with unhygienic sanitation practice culprits is of essence to the vending business.	135	3.56	0.58
The unavailability of public waste bins is a contributing factor?	135	3.67	0.58
There is a standard regulating body in charge of proper food vending in the Municipal.	135	3.10	1.52
There is an assessment tool to assess if vendors are working under hygienic conditions?	135	3.41	0.68
There is no harm in using the same hands to serve food and in collecting monies	135	3.10	1.52
Washing of plates and spoons before and after vending is necessary to prevent some diseases	135	3.10	1.52

Source: Field survey, (2021).

APPENDIX IV (CONTINUED)

Table 6: Communalities on Factors

Factors	Initial	Extraction
It is appropriate to keep waste materials in the same place as foodstuffs.	1	0.72
It is prudent to wash your hands with soap under running water before starting work.	1	0.57
Cooked and uncooked foods should be prepared and stored separately.	1	0.84
Disease-causing bacteria that cause food poisoning can survive in open wounds and blisters.	1	0.55
Selling food around opened gutters can bring about diseases such as cholera	1	0.88
There is no harm in using the same hands to serve food and in collecting monies	1	0.71
It is necessary to go through medical examinations regularly	1	0.73
Washing of plates and spoons before and after vending is necessary to prevent some diseases	1	0.77
Regular change of water for washing plates within the period of sales is not important	1	0.76
I properly cover my hair whiles selling food	1	0.54
I wear a nose mask to prevent body fluids such as saliva from contaminating food I sell	1	0.84
It is prudent to organize a thorough cleanup of the vending site at least twice every month	1	0.81
How often do you clean your vending site and its environs?	1	0.82
How do you keep food at preferred temperature?	1	0.83
Do cultural beliefs and perceptions be a contributing factor to hygienic practices amongst food vendors?	1	0.67
How often do waste collectors come for waste around the vending site?	1	0.75
How often is communal labor organized in your municipal?	1	0.65
The lack of adequate education on sanitation for food vendors is a major factor in the current environmental sanitation?	1	0.86
The unavailability of public waste bins is a contributing factor?	1	0.86
There is a standard regulating body in charge of proper food vending in the Municipal.	1	0.77
The municipal assembly provides regular in-service training for food vendors?	1	0.87
There is an assessment tool to assess if vendors are working under hygienic conditions?	1	0.90
The presence of special courts to deal with unhygienic sanitation practice culprits is of essence to the vending business.	1	0.88

Extraction Method: Principal Component Analysis.

Source: Field survey, (2021).

APPENDIX IV (CONTINUED)

Table 7: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.226	22.720	22.720	5.226	22.720	22.720	4.961	21.567	21.567
2	3.555	15.457	38.177	3.555	15.457	38.177	2.965	12.890	34.458
3	2.484	10.802	48.979	2.484	10.802	48.979	2.739	11.907	46.365
4	2.087	9.076	58.055	2.087	9.076	58.055	1.860	8.086	54.451
5	1.755	7.632	65.687	1.755	7.632	65.687	1.850	8.043	62.494
6	1.253	5.446	71.133	1.253	5.446	71.133	1.731	7.527	70.022
7	1.196	5.200	76.332	1.196	5.200	76.332	1.451	6.311	76.332
8	.776	3.372	79.704						
9	.640	2.782	82.487						
10	.624	2.711	85.198						
11	.580	2.520	87.718						
12	.509	2.212	89.931						
13	.392	1.703	91.634						
14	.340	1.478	93.112						
15	.287	1.248	94.360						
16	.236	1.025	95.385						
17	.221	.960	96.345						
18	.215	.933	97.278						
19	.186	.807	98.085						
20	.177	.768	98.853						
21	.128	.555	99.408						
22	.097	.420	99.828						
23	.039	.172	100.000						

Extraction Method: Principal Component Analysis.

Source: Field survey, (2021).

APPENDIX IV (CONTINUED)

Table 8: Rotated Component Matrix[a]

Variables	Component						
	1	2	3	4	5	6	7
The unavailability of public waste bins is a contributing factor?	0.92						
The lack of adequate education on sanitation for food vendors is a major factor in the current environmental sanitation?	0.91						
The municipal assembly provides regular in-service training for food vendors?	0.90						
There is a standard regulating body in charge of proper food vending in the Municipal.	0.86						
How often do waste collectors come for waste around the vending site?	0.81						
How often is communal labor organized in your municipal?	0.72						
It is prudent to wash your hands with soap under running water before starting work.	0.66						
Selling food around opened gutters can bring about diseases such as cholera		0.92					
Cooked and uncooked foods should be prepared and stored separately.		0.89					
It is necessary to go through medical examinations regularly		0.84					
Disease-causing bacteria that cause food poisoning can survive in open wounds and blisters.		0.69					
Washing of plates and spoons before and after vending is necessary to prevent some diseases			0.86				
Regular change of water for washing plates within the period of sales is not important			0.85				
Do cultural beliefs and perceptions be a contributing factor to hygienic practices amongst food vendors?			0.76				
I properly cover my hair whiles selling food			0.70				
How do you keep food at preferred temperature?				0.88			
How often do you clean your vending site and its environs?				0.87			
There is an assessment tool to assess if vendors are working under hygienic conditions?					0.94		
The presence of special courts to deal with unhygienic sanitation practice culprits is of essence to the vending business.					0.92		
I wear a nose mask to prevent body fluids such as saliva from contaminating food I sell						0.89	
It is prudent to organize a thorough cleanup of the						0.87	

vending site at least twice every month							
It is appropriate to keep waste materials in the same place as foodstuffs.							0.82
There is no harm in using the same hands to serve food and in collecting monies							0.75

Source: Field survey, (2021).