KNOWLEDGE, ATTITUDE AND PRACTICE OF ENVIRONMENTAL SANITATION AMONG HOUSEHOLDS IN BAUCHI STATE, NIGERIA

BY

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MARCH, 2021

DECLARATION

I declared that the work in this dissertation entitled **'' KNOWLEDGE, ATTITUDE AND PRACTICE OF ENVIRONMENTAL SANITATION AMONG HOUSEHOLDS IN BAUCHI STATE, NIGERIA''** has been performed by me in the Department of Human Kinetics and Health Education. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

_____
Name of Student

_____
Signature

_____
Date

CERTIFICATION

This dissertation entitled **'KNOWLEDGE, ATTITUDE AND PRACTICE OF ENVIRONMENTAL SANITATION AMONG HOUSEHOLDS IN BAUCHI STATE, NIGERIA''** by **Ahmed MOHAMMED** meets the regulations governing the award of **Master's Degree in Health Education** of the Ahmadu Bello University and is approved for its contributions to knowledge and literacy presentation.

Professor (Mrs.) M. A. Suleiman Chairman, Supervisory Committee	Date
Professor Umaru Musa Member, Supervisory Committee	Date
Professor Umaru Musa (Head of Department HK&HE)	Date
Prof. S. Ibrahim (Dean School of Postgraduate Studies)	Date

DEDICATION

The research work is dedicated to the entire households of Bauchi State Nigeria. May Almighty Allah's protection, guidance and Mercy be with them all.

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Abstract

This study was conducted to assess the knowledge, attitude and practice of environmental sanitation among households in Bauchi state, Nigeria. To achieve this purpose, an ex-post-facto research design was used. A total number of 810 households from three (3) senatorial zones of Bauchi State were selected out of the projected population of 1,113,240 households in the state through multi-stage sampling technique consisting of simple random sampling; stratified sampling; proportionate sampling and systematic sampling techniques.Cronbach's alpha of .82, .84 and .86 were obtained for reliability on knowledge, attitude and practice of household towards environmental sanitation respectively. Out of 810 copies of a questionnaire distributed, only data from 780 were valid for analysis. Inferential statistics of one sample t-test and Pearson Product Moment Correlation (PPMC) were used to test the hypotheses. The result revealed that households in Bauchi State are knowledgeable about environmental sanitation (t-cal = 197.876; p = 0.00) and households have positive attitude and good practice of environmental sanitation (t-cal = 204.617; p = 0.000 and t-cal = 189.110; p = 0.00 respectively). Knowledge of environmental sanitation significantly influences the attitude among households in Bauchi state (r = 0.685; p = 0.00). Moreover, the study shows that knowledge of environmental sanitation significantly influences the practice among households in Bauchi state with (r = 0.714; p =0.00). Based on the findings, it was concluded that households in Bauchi State are knowledgeable about environmental sanitation, their attitude of environmental sanitation was positive, environmental sanitation practice was good among households in Bauchi State, Nigeria. Existing knowledge influences the attitude towards environmental sanitation among households in Bauchi state and existing knowledge influences the practice of environmental sanitation among households in Bauchi state. Based on the conclusion made, it was recommended among others that policymakers in government and non-governmental organizations should redesign a plan of

action on how to maintain the knowledge, attitude and practice of environmental sanitation among households in Bauchi State.

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LIST OF ABBREVIATIONS

AAHPE: America Association for Health and Physical Education

AD: Anno domini

CLTS: Community-led total sanitation

EPA: Environmental Protection Agency

MDGs: Millennium Development Goals

NEST: Nigerian Environmental Study Team

NPC: National Population Commission

UN: United Nations

UNDP: United Nations Development Programme

UNEP: United Nations Environment Programme

UNESCO: United Nations Educational, Scientific and Cultural Organization

UNICEF: United Nations International Children's Emergency Fund

WHO: World Health Organization

OPERATIONAL DEFINITION OF TERMS

Environment: Are all the external factors influencing the life and activities of Households in Bauchi state

Sanitation: Is the maintenance and cleanness of the environment among household in Bauchi state.

Households: Are People living together in a single home the same inBauchi State.

Knowledge: Is awareness or possession of information on environmental Sanitation among household in Bauchi State

Attitude: is a view or option of household on environmental sanitation in Bauchi State

Practices: is an act of environmental sanitation according to the belief of Household in Bauchi State

URBAN: Is a busy and crowded community in which more households are Living together and they are the most central location in Bauchi state.

RURAL: Is a community in which the forest, plains, deserts and some animals can be found and also, few buildings, business places and people are living far apart from one another.

Environmental Sanitation: is a set of activities which aim at maintenance, protection and promotion of the health of the household in Bauchi State.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Environmental sanitation is becoming a major threat to the health of households due to poor maintenance of the environment. It is recognized as a major threat to the promotion of hygiene among households in Bauchi State and even the survival of the households. Environmental sanitation is a set of actions or a fundamental process of collecting and safely disposing all kinds of waste within the environment with the intention of protecting and promoting the individual quality of life in communities. Environmental sanitation generally includes the provision of facilities and services for the safe disposal of waste, the maintenance of hygienic conditions and the prevention of diseases (World Health Organization, 2017). Knowledge of environmental Sanitation is one of the basic determinants of quality of life and human development index (Sheethal & Shashikantha, 2016). Controlling environmental sanitation plays a key role in improving human health and environmental pollutants that have specific diversity which can put at risk all physical, mental and social health of the human being. Given to the personal hygiene and environmental sanitation has particular importance (Almasi, Dargahi, Mohammadi, Asadi, Porsadeghiyan, Mohammadi & Rostam, 2017).

Mohamad, Muhamad and Gufran (2017) stated that less knowledge about environmental sanitation management can affect the lifestyle of the households which will be reflected in their attitude. Hence more The attitude of households who do not care about the environment will affect the behavior of a clean and healthy lifestyle of the community. Environmental Sanitation is not just limited to cleanliness and proper waste disposal or management,it is rather multifaceted proper housing, food handling, portable water, drainage systems, and hygiene education among others. Therefore, with all these counted strategies, the environment could be

free of wastes pollutants (Anthony, 2017). The key to human health lies largely in his environment. In fact, much of human illness can be traced to adverse environmental factors such as water, soil and air pollution, poor housing conditions, presence of animal reservoir and insect vectors of diseases which pose threats to human health (Ibanga, 2015). Often, man is responsible for the pollution of his Environment through urbanization, industrialization and other human activities (Ekong, 2015). The word sanitation is defined as a way of life that is expressed in the clean home, farm, business, neighborhoods, and community (Park, 2011).

Sanitation is one of the basic factor which decisively affects the nature or outcome of quality life of human development (Sheethal & Shashikantha, 2016). It is a fundamental requirement to ensure safe health, environment and the overall wellbeing of the society unless proper functional sanitation facilities are in use complemented with the right types of hygiene behaviours, communities will be vulnerable to recurrent incidences of environmental sanitation-related diseases (Chariar & Sakthivel, 2011).

World Health Organization (2012) also defined sanitation as the provision of facilities and services for the safe disposal of human urine and feces. Alabi (2010) on the other hand refers to the word 'sanitation' to the maintenance of hygienic conditions through services such as garbage collection and waste-water disposal. Poor sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. In addition, environmental sanitation is the control of all those factors in man's physical environment which exercise or may exercise a deleterious effect on his physical development, health, and survival. It could also be seen as the principle and practice of effecting healthful and hygienic conditions in the environment to promote public health and welfare improve quality of life and ensure a sustainable environment (Alabi, 2010). Environmental Sanitation practice is heavily influenced by the household's knowledge and

attitudes towards it (Mohd &Malik, 2017). Lack of appropriate information on knowledge attitude and practices of environmental sanitation is an impediment to identify priority needs (Rafiq & Itrat, 2017).The term environment comprised both physical and socio-cultural components. The physical components include non-living (land, water, and air), living things (plants, animals, human beings, micro-organisms) and man-made features which include human settlement and all associated infrastructures such as roads, footpaths, farms, and buildings. The socio-cultural components include social, economic, cultural, educational, religious, relationships among others. The physical environment is where human beings live as household and provide the resources and ecological processes which make life possible (Ukwe, 2008).

Households are a group of people living together in a common residence or apartment as consuming units in a physical environment. The daily household activities and consumptions practice are bases of waste generation. Wastes are consequences of human activities which involves the production of goods and services and the consumption of natural resources (Ukwe, 2004). The wastes are discarded as useless and unwanted. Two major types of wastes commonly generated in Nigerian households are decayed organic wastes such as food remnants, leaves and animals. Non-decayed inorganic wastes such as tins, cans, synthetic wrappings plastic containers, glasses and cellophane bags (Ahia, 2000). Sanitation is a serious issue that is affecting most parts of the world especially the developing countries. On a global scale, the most affected are children who in most cases lose their lives due to diseases caused by poor sanitation. It is expected that when the environmental sanitation standards of a nation improve, there will be upliftment in the living condition, health and security for the inhabitants. Thus, there will be an improvement in the quality and aesthetic of the environment at large thereby making it habitable (Owoeye, 2013).

A pleasant environment promotes healthful living and hazards free is a fundamental right of every human being. However, disposal of faecal matter near homes, contaminating the sources of drinking water, poorly designed sewage system, dumping of refuse and sweeping into the gutters, defecating and disposing of faeces by the street corners and waterways and selling of foodstuffs and cooked food by the roadside are all unwholesome practices that pose potential risk to the development of diseases. Washing of hands after defecation and before preparing food is of particular importance in reducing disease transmission, Poor housing also contributes to poor environmental health and its consequent input in the health of the household (Ekong, 2015).

Control ofwaste is part of the important service which is the basic rightof every household to sustainthe society. This basic human right involves ensuring proper sanitation, solid waste management, provision of potable water, shelter, food, energy, transport, and communications which are all beneficial to society and the economy as a whole. (UNEP, 2015). In Nigeria, Environmental sanitation has remained a problem in the urban areas for a long time (Badejo, 2009). Knowledge, attitude, and practice of environmental sanitation management are important for quality living. It would be expected that households should be conversant with them (Florence, Gifty & Juliana, 2013). This factual information necessitates continuous demand for researches in the area of sanitation which trigger the need to conduct this research.

1.2 Statement of the Problem

Inadequate knowledge, poor attitude and practice of environmental sanitation have been recognized as a public health hazard worldwide. In recent times there have been concerns about the sustainability of the environmental health is increasing due to environmental degradation and occurrence of diseases associated with poor waste management (Ekong, 2015). Environmental sanitation involves the waste collection, segregation, storage, transportation, safe disposal and reused (Albert, 2012). This is to protect and promote human health by making the environment clean for habitation and breaks the cycle of disease transmission (Sanni, 2015). However, the issue of poor environmental sanitation practice seems to exist right from the collection, storage, transportation and disposal of household's waste. It has also been discovered that it has a strong relationship with the knowledge and the attitude of households (Daramola & Olowoporoku, 2016).

Safe waste disposal and hygienic behaviours are essential for the dignity, status, and wellbeing of every household, irrespective of whether they are rich or poor, live in rural or urban areas, small towns or cities (Abogan, 2014). The Federal Ministry of Environment enacts and enforces environmental sanitation laws in Nigeria through the National Environmental Standards Regulations and Enforcement Agency (NESREA) (Babanyara, et al. 2010). Moreover, very laudable arrangements and efforts were put in place by Bauchi State Environmental Protection Agency (BASEPA) on proper environmental sanitation and waste management. However, Ogwuche (2013) documented that only 40% of the solid wastes generated are managed by the Agency, 30% are indiscriminately dumped in unauthorized spots all around the metropolis constituting risks to both human health and the environment. The intensity of the waste management problem increases with increased population due to the increased human activities and the wastes to be transported for disposal (Safiuddin, Jumaat, Salam, Islam & Hashim,

2010).Even though dumpsites are good sources of polluting soil, land, air, and surface water (Kassenga & Mbuligwe, 2009).

Despite all these efforts makes by the government, the researcher observed that many areas around the homes are indiscriminately littered with domestic refuse, sewage, Sullage, garbage, and other wastes. And it is believed that improper wastes management leads to the multiplication of pathogens causing diseases like cholera and diarrhea, it will also provide a good breeding site for disease vectors like mosquitoes (which may cause malaria fever), flies (which may transmit diarrhea infection) and rodents that can easily cause food contamination illnesses such as Lassa fever, salmonella species (bacteria of typhoid fever) among others. Furthermore, the household's socioeconomic background, household's characteristics and access to environmental sanitation facilities and services could be strong predictors of environmental sanitation behavior in Bauchi state. It is based on this that this study intended to assess the knowledge, attitude and practice towards environmental sanitation among households in Bauchi state Nigeria.

1.3 Purpose of the Study

The main purpose of this study was to assess knowledge, attitude and practice towards environmental sanitation among households in Bauchi state. The study will specifically seek to assess:

1. Knowledge of environmental sanitation among households in Bauchi state.
2. Attitude towards environmental sanitation among households in Bauchi state.
3. Practice of environmental sanitation among households in Bauchi state.
4. Relationship between knowledge and attitude towards environmental sanitation among households in Bauchi state.
5. Relationshipbetween knowledge and practice of environmental sanitation among households in Bauchi state.

1.4 Research Questions

The following research questions were formulated to guide the study.

1. Do households have knowledge of environmental sanitation in Bauchi state?
2. What is the attitude of households towards environmental sanitation in Bauchi state?
3. What are the practices of environmental sanitation among households in Bauchi state?
4. Is there any relationship between knowledge and attitude of households towards environmental sanitation in Bauchi State?
5. Is there any relationship between knowledge and practice of environmental sanitationamong households in Bauchi State?

1.5 Significance of the Study

This study provides information on the knowledge, attitude and practices of environmental sanitation among households in Bauchi State. The finding of this research will be beneficial to the researcher, research assistance, households, policymakers in governments and non-governmental organizations, health educators, public health educators, researchers and readers on environmental sanitation in the following ways:

- ✓ This research defined the researcher's career and personal interests to expand the knowledge and understanding of a chosen field and it has developed one-on-one connections with distinguished households of Bauchi state in the field. The research assistance has fostered critical thinking and analytical skills through hands-on learning.
- ✓ It will assist the policymakers in governmental, non-governmental organizations to design a plan of action on how to address the issue related to the knowledge, attitude, and practice of environmental sanitation among households in Bauchi State.

- ✓ It will also contribute to the existing knowledge on environmental sanitation particularly in the area of physical and health education.
- ✓ It will be beneficial to future researchers and readers on environmental sanitation.

1.6 Basic Assumptions

The following basic assumptions were formulated by the researcher:

1. It is assumed that if households in Bauchi state have adequate knowledge of environmental sanitation it will improve the environment.
2. It is assumed that households in Bauchi state have a positive attitude towards environmental sanitation.
3. It is assumed that households in Bauchi state have a good practice of environmental sanitation.
4. It is assumed that there is significant relationship between knowledge and attitude towards environmental sanitation among households in Bauchi state.
5. It is assumed thatthere is significant relationship between knowledge and practiceof environmental sanitation amonghouseholds in Bauchi state.

1.7 Hypotheses

The research was aimed to assess knowledge, attitude and practice towards environmental sanitation among households in Bauchi state; the following hypotheses were formulated to guide the researcher to conduct the study:

Major hypothesis:

Household's knowledge, attitude, and practices of environmental sanitation in Bauchi state are not significant.

Sub-hypotheses:

Ho_1 The knowledge of environmental sanitation among households in Bauchi state is not significant.

Ho_2 The attitude towards environmental sanitation among households in Bauchi state is not significant.

Ho_3 The practice of environmental sanitation among households in Bauchi state is not significant.

Ho_4 There is no significant relationship between Knowledge and attitude towards environmental sanitation among households in Bauchi state.

Ho_5 There is no significant relationship between Knowledge and practiceof environmental sanitation among households in Bauchi state.

1.8 Delimitation of the Study

This study was delimited to the knowledge, attitude, and practice of environmental sanitation among households in Bauchi state, Nigeria.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

The research work aimed to assess the knowledge, attitude and practice of environmental sanitation among households in Bauchi state. This is indispensable because it has determined whether the influence of knowledge towards environmental sanitation on the attitude and the practice of households are efficient or available in Bauchi State. The chapter focuses on the review of literature in the following areas:

2.1 Concept of Environment

2.2 Concept of Environmental Sanitation

2.2.1 An overview of Environmental Sanitation in Nigeria

2.3 Sanitation Problems in Nigeria

2.4 Environmental wastes

2.5 Strategies to Improve Environmental Sanitation

2.5.1 Refuse Collection and Refuse Disposal

2.5.2 Refuse and toxic wastes

2.5.3 Dumps and sanitary land-fill

2.6 Importance of Environmental Sanitation

2.7 Knowledge of Environmental Sanitation among households in Nigeria

2.7.1 Attitude towards Environmental Sanitation among households in Nigeria

2.7.2 Practiceofenvironmentalsanitationamong households in Nigeria

2.8 Relationship between knowledge, attitude and practice of environmental sanitation

2.9 Empirical studieson knowledge, attitude and practice of environmental sanitation

2.10 Summary

2.1 Concept of Environment

According to Aleng (2005), environment is defined as man's immediate surroundings. The Oxford Advanced Learners English Dictionary (2001) defines environment as conditions, circumstances affecting peoples' lives. The encyclopedia Britannica (1998) vol. 4 sees environment as a "complex of physical, chemical and biotic factors that act upon an organism or an ecologic community and ultimately determines its form and survival". (Uchegbu 1998), defines environment as the sum total for all conditions that surround man at any point in time on the earth's surface. However, the environment as a community of organisms is not the sum total of the participating members but a dynamic nature at complex levels of interactions, unfolding in drama sketches, stretching between the remotest past at creation and the enforceable future.

The term 'environment' implies "the eternal factors living and non-living, materials, and non-materials which surround man".The environment provides all life support systems with air, water andland as well as the materials for fulfilling all developmental aspirationsof man(Park 1998&Theresa, 2012).

In its modern concept, the environment includes not only the water, air and soil that form our surrounding but also those social and economic conditions under which we live. Viewing the human environment from the economic point, Uchegbu (1998) and Fenichel and Hashida (2019)describes it as natural capital and analogous to financial capital assets. they further explained that any damage is done to the environment run-down capital which sooner or later reduces the value of its recumbent services. For residential ideals situation puts the health of its residents at stake. The residents as well can be psychologically affected when any little damage (or disturbance from its ideal condition) is done to residential housing environment. Nest (1991) and Jacqueline (2017)defined environmental health as the control of those factors in man's physical environment which exercises or may exercise deleterious effects on man's physical

mental and social wellbeing. According to WHO (1977) and Musoke, Ndejjo, Atusingwize and Halage(2016), the objective of environmental health is to crane and maintain conditions in the environment that will promote health and prevent diseases. Man's eternal environment contains elements that are essential for life and/or the maintenance of good health such as air, food, water, etc. in addition the environment contains potential hazards. Many have a wide range of tolerance of environmental conditions because of his ability to adapt and is able to withstand harmful conditions such biological adaptation has its limits and disease represents the breakdown of adaptation. For instance, a man can tolerate wide fluctuations of environmental temperature and he has various mechanisms (sweating to lower the temperature and shivering to increase heat) for coping with these changes. If however, the heat stress is excessive i.e. beyond his ability to cope, then adaptive mechanisms break down and disease result, perhaps in the form of heat stroke or some other heat disorder. Health can, therefore, be viewed as a successful adaptation to the environment whereas disease represents a breakdown of adaptation.

According to the Institute of Education, University of Ibadan (1983) and Chigbo, Chidozie and Chekwubechukwu(2016), conditions of the modern way of life have created many problems relating to man's environment. They identify three sub-factors of the environment which affect human health, namely; physical factors and biological factors. Examples of physical factors, weather, climate, housing, soil, water and food supply, air (clean or polluted) and other physical things surrounding us. Examples of biological factors were given as germs, insects, rodents, plants, animals and even human beings.

According to Umoh (2002) physical environment refers to the non-living part of the environment: air, water, soil, waste, mineral salts, furniture, housing, food items, and climatic factors such as temperature, humidity, sunshine, rainfall, among others.Air is essentially

necessary for life to exist. This is the reason why adequate ventilation is a fundamental consideration in the design of residential housing. Air is polluted when there is the presence of substances there in quantities, characteristics of duration, such that may affect health of human beings, animals, plants, properties and structures.Water bodies from the home of fishes and some other aquatic life, our water environment must be clean if these life forms will function most effectively. To reduce water-related infections, water required for domestic use must be wholesome or pure.

The land is very vital natural resources, which is the home of our mineral resources, terrestrial animals, valuable forestry resources and important factors for our physical development, etc. It is therefore very necessary that the soil is protected. The Institute of Water and Environmental Management underscored the need to protect our land from pollution through effective waste management. Umoh (2002) classified physical environment factors as follows: climate, soil, air, chemical, radiation. WHO (1974) and Bloom& Cadarette (2019) described infectious diseases as only one type of health threat, During the last 25 years, citizens have become more aware of health problems in the environment. The environment is made up of all the living and men living things surrounding an individual of a community. Environmental health problems are often caused by pollution (the dirtying of the air, water, or soil by chemicals, disease, or waste products). Many forms of pollution have been linked with diseases, including cancer. Since the 1960s local, state and national governments have passed many laws to clean up and protect the environment. Despite much progress, pollution continues to be a health problem today.

According to WHO (1974); Ebele (1993) and Yoada, Chirawurah& Adongo (2014), environmental sanitation is the process of keeping the environment free of dangers of hazards to man. It deals with:

a) Disposal of wastes (refuse and sewage),
b) Air hygiene and prevention of atmospheric pollution,
c) Control of vectors, pests, and rodents.

2.2 Concept of Environmental Sanitation

Environmental sanitation is an often-misconstrued subject matter. It is usually understood as an exercise rather than a practice (Daramola, 2016). According to Park (2011) inadequate environmental sanitation has been recognized as a public health hazard worldwide. In some Nigerian cities, living with waste as part of the natural environment has become a way of life. In its modern concept, the environment includes not only water, air, and soil but also the social and economic conditions under which we live.

Agbaje (2006) defined environmental sanitation as the science of formulation and ensuring for effective implementation of measures designed to facilitate the promotion of hygiene and prevention of diseases and hygienic disposal of waste materials. Sanitation in the present study refers to the science and act of promoting hygiene, prevention of diseases and waste management so that wastes do not constitute a hazard to man and other creatures in an environment. It is evident that the provision of adequate environmental sanitation facilities and services could at best be referred to as a means to an end. The attitude and behavioral practices of the stakeholders determine the end (Bello, 2007). Proper sanitation is a key development intervention as having access to it increases health, well-being and economic productivity (WHO, 2004).

The ultimate goal of environmental sanitation; according to WHO (2013) is to ensure that measures are designed for the prevention of diseases and promotion of health. According to UNICEF (1998) program guideline, sanitation reduces environmental health risks through appropriate measures for safe disposal of human excreta, vector control; personal, food and environmental hygiene. Allen, et al. (2017) conceptualized sanitation as the maintenance or

improvement of sanitary conditions to promote hygiene and to prevent diseases. According to Robinson and Davidson (2006), sanitation refers to measures taken to promote and to preserve public health. Sanitation is a way of life, quality of living expressed in a clean home, clean businesssurroundings, clean neighborhood, clean environment, and clean community (Park 2007). In this connection, Water Aid Nigeria is providing potable water supply and creating access to adequate sanitation in urban and rural communities in line with the millennium development goal of poverty reduction and environmental sustainability. Access to sanitation refers to the population with adequate means of sanitation facilities and services for safe excreta and other waste disposals to prevent human contact with excreta and other infectious wastes. Indicators of these include a number of the latrine, refuse and sewage systems especially the number of people that can access safe excreta disposal facilities. Water supply and Collaborative Council (2000) conceptualized sanitation facilities as hardware as for evacuation of excreta, refuse, and wastewater. Examples are household and communal latrines. According to Lucas and Gilles (2006), poor sanitation gives rise to a number of health consequences. UN (1990) stated that lack of excreta disposal; improper drainage and inadequate hygiene in a community contribute to morbidity and mortality. Water Aid Nigeria adopted a new approach to sanitation known as community-led total sanitation. community-led total sanitation (CLTS) as a concept is behavior centered; which can be inculcated in people all over the World. According to Orji (2007), CLTS refers to a process whereby a community is empowered to identify their health risk practices such as indiscriminate defecation and jointly discussed to the people's shame and disgust that they voluntarily take collective decision to end indiscriminate defecation. He maintained that when a community participates in a program such as this; such community makes an informed choice(s) by adopting from among sanitation technology option(s) in respect of latrine, refuse collection/storage and sewage systems in the conveyance of refuse and

wastewater to end disposal sites. Orji further stated that CLTS in co-operate child stool management. Management of child stool refers to a process whereby older child, caregiver or parent park child's feces and logged into a latrine and immediately wash the child and their hands with water and soap or with water and ash to prevent faeco-oral route of disease transmission.

An improved environmental sanitation facility is one that hygienically separates human excreta from human contact. Improved environmental sanitation facilities are used by less than two-thirds of the world population. The global picture masks great disparities between regions. Virtually the entire population of the developed regions uses improved environmental sanitation facilities, but in developing regions only around half the population uses improved environmental sanitation facilities (WHO, 2011). Moreover, WHO, (2011) reported that among the 2.6 billion people in the world who do not use improved sanitation facilities, by far the greatest number are in Southern Asia, but there are also large numbers in Eastern Asia and Sub-Saharan Africa, in which Nigeria is one of them.

2.2.1 An overview of Environmental Sanitation in Nigeria

Environmental sanitation conditions in many areas threaten to reverse the gains made in the environment over the last several decades" Every human should have a healthy and productive life in harmony with nature (Olawale & Olatunji, 2014). In a tragically degraded environment, human life is threatened. Most Nigeria cities are faced with problems of growth that results in environmental pollution which is an important challenge to society. Environmental sanitation declined in Nigeria as a result of poor managerial skills and many more which thus, deteriorate the maintenance of good sanitation". Poor sanitation and unhygienic behavior led to the launching of the "war against indiscipline" by late Major General Tunde Idiagbon, who said

that slums and ghettos were the incubators of epidemic diseases that pose a serious danger to human health World Health Organization, (2010). Environmental sanitation stresses the price of the development; in fact, widespread environmental damage is likely to hinder developmental efforts and worsen the plight of people living in acute poverty (WHO & UNICEF, 2009). The relationship of humans to the environment is reciprocal in such that the environment has a profound influence on humans and, at the same time, humans extensively alter the environment to suit their needs and desires. Some of these changes created new hazards. The humans' attitudes toward the environment are still negative and are often contrary to the concept of sustainable development, which recognizes that economic growth and environmental protection are inextricably linked and the quality of present and future life rests on meeting basic human needs without destroying the environment on which all life depends. Despite various programs by different tiers of governments to address the issue of environmental sanitation, many Nigerians still have negative attitudes toward environmental sanitation and do not value personal or environmental sanitation (WHO & UNICEF, 2009). A well-known fact to many United Nations specialized agencies such as the World Health Organization, UNICEF, UNESCO, UNDP, and world bank is that the single most significant cause of morbidity and mortality in Sub-Saharan Africa and other third world countries is a poor standard of environmental sanitation. Most of the tropical African countries do not have adequate facilities to achieve ideal environmental sanitation. This predicament has significantly been contributory to the perennial high incidence of such communicable diseases as dysentery (Bacillary and Amoebic) cholera (Vibrio), typhoid (Salmonella typhi and paratyphi), hepatitis (Viral) meningitis (meningococcal), Malaria and tuberculosis (Nwankwo, 2004). Hence, experience from Nigerian environmental policies and implementation has shown that the traditional command-and-control system to pollution abatement had not produced the desired result both economic and environmentally

wise. There is hence the need to examine the potential of mixed monthly environmental policies involving the use of market-based instruments to complement the traditional command-and-control system in achieving economic efficiency in the use of the resource. On the other hand, environmental sanitation is an often-misconstrued subject matter environmental sanitation have improved living conditions, enhanced health and well-being and economic productivity (Oluwaseun, 2017). The average person on the street and even in government circles understands it as no more than the routine evacuations of municipal waste. As long as refuse is removed from the streets, the average individual seems completely satisfied with the state of the environment, not wanting to be bothered by other aspects of life that might be infringing on the wellbeing of the individual in the household's neighborhoods or the society at large (Olawale, & Olatunji, 2014). To assess environmental sanitation, knowledge, attitude and practice study tell us what households know about environmental sanitation, how they feel about the environmental sanitation and how they respond to it. The knowledge possessed by the household refers to their understanding of the topic of interest for example for this study it is an environmental sanitation. Attitude refers to their feelings toward environmental sanitation, as well as preconceived ideas they may have towards it. Practices refer to the ways in which they demonstrate their knowledge and attitude through their actions (Eckman, 2008).

It is expected that when the environmental sanitation standards the city will improve, there will be upliftment in the living condition and health security for the inhabitants. Thus, there will be an improvement in the quality and aesthetic of the environment at large thereby making it habitable (Owoeye, 2013).

Amoran(2013) showed that regularly cleaning house surroundings is associated with decreased levels of malaria infection in rural areas in Nigeria and the sources of the disease must also be removed through proper environmental sanitation. Amoran, et al, (2014) study revealed

that regular cleaning of house surroundings was associated with the prevalence of malaria infection in rural areas in Nigeria. They further added that the most significant cause of morbidity and mortality in sub-Saharan Africa and other third world countries is the poor sanitary condition. Environmental management is a promising technique for vector control, as it alters these micro-environmental conditions in order to decrease the available breeding habitat for mosquitoes by removing stagnant or slow-moving water sources.

2.3 Sanitation Problems in Nigeria

Households activity in the environment has tended to degraded and make the environment untidy and unlit for human habitation because of its poor environmental sanitation nature.According to WHO (2017) Environmental Sanitation problems refer to the conditions in our environment which affect our health especially those which have to do with dirt and infections. If we look around us in our cities, towns, and villages, we see several conditions which encourage dirt and the spread of infections, environmental sanitation can be seen as the policy and practice of protecting health through hygienic measures of households. Environmental sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces, it has been realized that improving sanitation is known to have a significant impact on health both in households and across communities (WHO, 2007).

Okpara (2010) comprehends Environmental sanitation as the process of keeping places clean and hygienic especially by providing a sewage system and a clean water supply to households. Environmental Sanitation refers to all conditions that affect people's health in the same geographical area. The word sanitation operationally refers to the maintenance of hygiene conditions, through services such as garbage collection and wastewater disposal so as not to endanger the health and welfare of people and also for the social and environmental effects, it may have on people. Throughout the world, an estimated 2.5 billion people lack basic sanitation

(more than 35% of the world's population) (World Health Organization & UNICEF, 2012) Basic sanitation is described as having access to facilities for the safe disposal of human waste (feces and urine), as well as having the ability to maintain hygienic conditions, through services such as garbage collection, hazardous waste management, and wastewater treatment and disposal (WHO & UNICEF, 2012). Public health intervention in sanitation activities is very essential for social and economic development especially in developing countries like Nigeria. This leads to the improvement of health, well-being, and economic productivity and benefits the individual, household and community through the provision and practice of adequate environmental sanitation, good hygiene and the use of safe water (Mara, et al 2010).

According to Duru, et al (2017) in 2012, a study conducted by World Health Organization reported that there was a return of 5.5 USD with respect to lower health costs, more productivity and fewer premature deaths for every 1 USD invested in sanitation (WHO, 2017). Though, since 1990, there has been an improvement in sanitation with the proportion of people having access increasing from 54% to 68%, the Millennium Development Goal target by 2015 was not achieved, as up to 700 million people remaining to attain the target, were still without adequate sanitation (WHO, 2017). About 10% of the global burden of disease and one-third of all annual deaths in low- and middle-income countries resulting from inadequate water, sanitation, and hygiene is believed to be due to poor sanitation(Mara, 2010 & WHO, 2017). Furthermore, a correlation has also been observed between poverty, child infancy and diseases that are associated with poor sanitation; hence, especially in developing countries with inadequate sanitation which poses a significant public health risk, particularly children are most vulnerable to ill health (Prüss-Üstün, et al 2008). Therefore, interventions targeted at sanitation improvements can significantly enhance health and wellbeing of the population by preventing,

reducing the severity and impact of diseases associated with poor environmental sanitation (Duru et al, 2017).

According to Uchegbu (2000), sanitation is said to be the state of cleanliness, it is a broad concept and connotes the process of keeping the environment clean. Sanitation is the arrangement for protecting the health, especially the removal of the human, industrial and household's wastes, Sanitation is also a process embarked upon to keep the total of man's environment hazard-free (Hussaini et, al 2018).

According to WHO (2010), infectious diseases are only one type of health threat. During the last 25 years, citizens have become more aware of health problems in the environment. The environment is made up of all the living and men living things surrounding an individual of a community. Environmental health problems are often caused by pollution is the dirtying of the air, water, or soil by chemicals, disease, or waste products. Many forms of pollution have been linked with sties diseases, including cancer, since the 1960s local, state, and national governments have passed many laws to clean up and protect the environment. Despite much progress, pollution continues to be a health problem today.

According to WHO and UNICEF (2012), without an immediate acceleration in progress, the world will not achieve the united nations' millennium development goal (MDG) sanitation target (that is, to halve the proportion of people without sustainable access to basic sanitation by 2015). Basic Sanitation is very important in all places and environments; environmental sanitation refers to hygienic practices that occur in households. Coppens (2005) consider Sanitation and Hygiene Education as a combination of hardware and software components that are necessary to produce a healthy environment to develop or support safe hygiene behavior.

Environmental sanitation is defined as the cleanliness of the environment, the removal of refuse and anything that is injurious both liquid and solid waste, purification of air, the supply

and protection of portable water, good housing, streets, and environmental noise control(Yoada, Chirawurah, & Adongo 2014). Ahmed and Adewale (2004) defined environmental sanitation as the process of cleansing, tidying and beautifying the environment for the purpose of controlling, communicable diseases and promotes optimal health.World Bank, (2016) expressed Access to water supply, sanitation, and hygiene (WASH) services are limited in Sub-Saharan Africa: 319 million people in the region did not have access to improved water, and 694 million lacked access to improved sanitation facilities in 2015. Alarmingly, a large body of evidence suggests that limited or no access to WASH services adversely impacts development outcomes such as health, limits access to educational and economic opportunities, and hampers work efficiency and labor productivity. Improved environmental sanitation condition affects positively a wide range of development indicators. Thus, environmental sanitation is a channel to improved quality of life of the individuals and a contributor to their social, economic and physical development (Olowoporoku, 2014).

2.4 Environmental Wastes

The term waste also known as rubbish, trash, refuse, garbage, junk, and other litters has been defined by The European Environmental Agency [EEA] (2009), under the Waste Framework Directive 75/442/EEC as an object the holder discards, intends to discard or is required to discard. Items considered as waste according to the same document include household rubbish, wastes from manufacturing activities, packaging items, discarded cars, old televisions, garden waste, and old paint containers. Consequently, all our daily activities can give rise to a variety of wastes arising from different sources (EEA, 2009). Environmental Wastes are typically classified as solid, liquid and gaseous waste which could be bio-degradable, semi-biodegradable and non-biodegradable. Solid waste is any non-liquid and non-gaseous product of

human activities, regarded as being useless. It could take the form of refuse, garbage, and sludge (Leton & Omotosho, 2004).

Environmental wastes comprise all the organic and inorganic waste materials that are normally not free-flowing produced as a result of human and animal activities and have lost their value to the user, hence discarded as useless or unwanted(Chengula, Lucas & Mzula 2015). Discarding the waste generated by the daily activities is very important in order to minimize the risk to environmental degradation, human and animal health (Mahar et al 2007). Inadequate collection and improper disposal of environmental wastes facilitate the multiplication of pathogens causing diseases like cholera and diarrhea and provide a good breeding site for disease vectors like mosquitoes (malaria), flies (diarrhea) and rodents (Abul, 2010). Dumpsites are good sources of environmental sanitation (polluting soil, ground and surface water) due to the fact that they usually contain almost all types of pollutants from the initial collection sources (Kassenga &Mbuligwe, 2009). Proper environmental waste disposal is a big problem in urban cities and more so in developing countries. The intensity of the waste management problem increases with increased population due to the increased human activities and the solid wastes to be removed for disposal. Industries and urban management systems generate a massive amount of wastes and most often dumping them in open fields posing serious detrimental effects on the environment (Safiuddin et al 2010). The main causes of improper waste disposal in urban centers are due to lack of good and enough infrastructures, non-implementation of existing environmental sanitation laws, irregular and unplanned dumping of environmental wastes, population and urban growth due to rural-urban migration, insufficient capital to run environmental waste management process and lack of new technology in waste disposing (Momodu, 2011).

The insufficient coverage of the collection system and methods, lack of institutional arrangement and information resources, inflexible work schedule and insufficient information on quantity and composition of waste have been reported as the major problems facing the environmental wastes management systems (Ogwueleka, 2009). Moreover, lack of awareness and active involvement of the households as the key stakeholders in service provision, delay of households to pay collection fees to the organizations concern with collection of wastes and bad relationship between the households and the collectors of environmental wastes are other factors hindering the process of proper solid wastes management (Kassim & Ali, 2006). In order to overcome the greatest problem facing many urban and semi-urban areas in many countries during solid waste management, several methods have been suggested including creation of special agencies for the collection, solid wastes incineration, recycling and conversion of Municipal Environmental Waste (MEW) to wealth (Awopetu, et. al, 2014; Oloruntade et al 2014). Also launching of an emergency city clean-up campaign, privatization of solid waste management services, and composting will ensure good management of solid wastes in the urban settings (Skat Foundation, 2003). This should be accompanied by educating households, providing good services, creating a good relationship with the households and collecting fees for the service at the light time (Augustino et al, 2015).

The improper disposal of Environmental wastes in Bauchi state can lead to the occurrence of health hazards to the households living and or working near the disposal sites. There was considerable public concern over the possible effects emanating from the improper disposal of Environmental wastes in the disposal site in Bauchi state prior to this study. The aim of this study, therefore, is to investigate the knowledge attitude and practices towards Environmental sanitation among households in Bauchi state. The information obtained in this

research will be useful to the administration for proper planning and monitoring of environmental sanitation and waste disposal activities in the state.

2.5 Strategies to Improve Environmental Sanitation

According to WHO (2006), the consequence of poor environmental sanitation behavior leads to an increase in water and sanitation-related diseases. According to Lucas & Gilles (2006), poor sanitation gives rise to a number of health consequences. The ultimate goal of sanitation; according to WHO (2000) is to ensure that measures are designed for the prevention of diseases and promotion of health. Allen & Graham (2002) conceptualized sanitation as the maintenance or improvement of sanitary conditions to promote hygiene and to prevent diseases.

According to Essien (2002), the strategies to improve environmental sanitation are as follows:

1. Sanitation needs to be addressed as a whole including improvement of facilities, environmental conditions, and behavioral change.

2. Sanitation programs should be demand-based and the community should be fully involved in the process. High-risk group should be identified for better targeting of funds and efforts.

3. Sanitation should be a component of other health-promoting or disease control programs.

4. Awareness needs to be raised and sanitation set as a priority in national and local government and also in the population at large. Systems have to be sustainable cost sharing and cost recovery need to be addressed carefully.

Sanitation is the protection and improvement of society by organized community effort. It is a broad field employed not only the medical personnel's such as doctors, nurses, medical laboratory scientist but sanitary engineers, veterinarians, industrial chemist, microbiologists, statisticians, behavioral scientists, economists, educations, nutritionists and laboratory technicians. Many areas of research are involved in the field of sanitation including vital statistics, epidemiology social analysis and health economics (Adewole, 1999). Akinjide (1997) defined "environmental sanitation as the control of all those factors which may contribute to disease transmission and or causation. Environmental sanitation is essential because it is a means by which man tries to overcome the effect of his activities in his environment. It is a process of taming the environment so that it can no longer constitute a hazard to man. The main objective of environmental sanitation is to create or maintain conditions in the environment that will promote health and prevent diseases.

According to Robinson & Davidson (2006), sanitation refers to measures taken to promote and to preserve public health. Sanitation is a way of life, quality of living expressed in a clean home, clean business, clean neighborhood, clean environment, and clean community (Park 2007). In this connection, wateraid Nigeria is providing potable water supply and creating access to adequate sanitation in urban and rural communities in line with the millennium development goal of poverty reduction and environmental sustainability. Access to sanitation refers to the population with adequate means of sanitation facilities and services for safe excreta and other waste disposals to prevent human contact with excreta and other infectious wastes. Indicators of these include a number of the latrine, refuse and sewage systems especially a number of people that can access safe excreta disposal facilities.

Sanitation further involves a process of sorting out refuse from re-useable ones. The provision of refuse bins, refuse pits, refuse vehicles, sewage systems and final disposal sites are

part of the management of waste materials in order to attain sound sanitation. Agbaje (2006) defined sanitation as the science of formulation and ensuring for effective implementation of measures designed to facilitate the promotion of hygiene and prevention of diseases and hygienic disposal of waste materials. Sanitation in the present study refers to the science and act of promoting hygiene, prevention of diseases and waste management so that wastes do not constitute a hazard to man and other creatures in an environment. According to Selanders, (2010) the importance of environmental theory is to Disease control, Sanitation and water treatment, Utilization of modern architecture in the prevention of "sick building syndrome" applying the principles of ventilation and good lighting, Waste disposal, Control of room temperature and Noise management.

2.5.1 Refuse Collection and Refuse Disposal

Refuse disposal and Collection in an ideal situation, waste is collected from the source of generation and taken to disposal sites but in Nigeria, waste is dumped off by horst generators before they are collected and disposed off by sanitation agencies. Momodu,(2011) stated that the main causes of improper waste disposal in Bauchi state are due to lack of good and enough infrastructures, non-implementation of existing environmental sanitation laws, irregular and unplanned dumping site for environmental wastes from households, population and urban growth due to rural-urban migration, inadequate knowledge to practice environmental waste management process and lack of new technology in waste disposing of households in the state.

The waste storage and collection receptacles used at generation site are old buckets, basket, cartons, plastic bag/containers tin/can in most cases. However, providing sanitation to households requires a systematic approach rather than only focusing on the toilet or water waste

treatment plan (Tilley et al, 2014). Waste is collected and disposed off in open dumps, drainage channels, and few designated collection centers, from these orthodox and unorthodox collection centers, waste is packed and transported using tippers vehicles, wheelbarrows and few specialized covers topped environmental sanitation vehicles, the benefits of suitable vehicles for conveying refuse, Park (2005) advocated the use of modern dustless vehicles. According to him, the use of covered vehicles will control liters and exposure of refuse to flies, promotes sound and safe environment as well as prevent the outbreak of diarrheal diseases.

Institute of Education University of Ibadan (2003) stressed that refuse includes all the solid waste materials from human habitations except sewage primarily ashes, rubbish, and garbage. Refuse also accumulates from industrial establishments. Ashes are now of minor importance in household wastes of many cities due to the use of oil, gas, and electricity for the heating of dwellings. Garbage is the refuse (vegetable, animal and food waste) resulting from the preparation cooking and serving of food. Rubbish includes oil household and business refuse like rags paper, excelsior and other packing materials, wood, grease, crockery, metals, plastics, and other solid wastes.

Most cities in advanced countries collect refuse at regular intervals. In some cities, all types of refuse are mixed and collected together. In other cities, garbage and rubbish are kept in separate containers and collected separately. In some cases, there is a separation of the noncombustible from the combustible rubbish. Nkom & Essien (2002) stressed that the government has the responsibility both for the collection and the disposal of garbage and refuse Government here implies State government, Local government or their agencies, whatever, the government agency is charged with the job; the health authority must shoulder the responsibility for proper sanitation relating to refuse. There will be a need for the Health Ministry of a State or Health Committee of a Local Government to work in collaboration

with the government agency and assigned the duty of refuse collection and disposal. Waste management is an important part of the urban infrastructure that ensures the protection of the environment and human health (World Bank 2003). The accelerated growth of urban population with unplanned urbanization, increasing economic activities and lack of training in modern waste management practices in developing countries complicate the efforts to improve waste services. The changes in consumption patterns with alterations in the waste characteristics have also resulted in a quantum jump in a waste generation (Ludwig et al. 2003). In addition, environmental waste management is hampered by a lack of data at all levels from the ward, district, and household where available is generally unreliable, scattered and unorganized (World Bank 2002).

According to WHO (2010), various household waste bins or bins used in markets and offices are stall emptied. In most Nigerian urban centres, since the institution of sanitation authorities, collection points have been provided along the streets and in some cases, Collection services workers move around with their vehicles with bells in their hands for every household to empty their bins into their collection vehicles. In most rural Communities Collection Service is not available. Though Household bins are emptied by the roadside and carelessly spilled even on the premises as the government intensifies proper collection of refuse the urban areas, towns union and village health communities should embark on sound Collection in Our Communities.On final disposal of refuse, Park (2007) stated that to dispose of large quantities of refuse requires the use of different methods of waste disposal such as sanitary landfill, incineration or cesspit for each category of refuse disposal. Nwanta&Achi (2012) stated that there are several methods of refuse disposal used by many of the advanced countries of the world. These include the open

dumps, sanitary landfill, incineration (burning) hog-feeding (feeding garbage to pigs) reduction and grinding. We shall discuss those methods that are more common in Nigeria.

a. Sanitary landfills
b. Controlled tipping
c. Pulverization
d. Incineration
e. Burning
f. Dumping in the sea or river
g. Composting or decomposition
h. Open dumping.

The first four methods above (a-d) are recommended while we discourage the use of the last four methods (e-g),

a. Sanitary landfills According to Park (2007) this is a method whereby refuse is tipped into a hole and it is covered by topsoil. According to him, the method should be about 30 meters away from sources of drinking water supply and sanitary facilities(Nwanta&Achi, 2012).
b. Controlled tipping. Pits or dry land may be used in this method. The rubbish is tipped each day in a planned manner and covered with a layer of Soil. The earth Cover is compacted. If pits are used instead of dry land as explained above, the pit should have a cover and in an enclosed place with a door leading to the pit.
c. Pulverization: This is a method whereby refuse is broken into pieces by machines. It is recommended because it is sometimes used as a preliminary to controlled tipping. It may also serve a useful mixture for fertilizing and lightening heavy soil. Above all, it is incombustible.
d. Incineration: This is a method whereby solid refuse is burnt in an incinerator. The rubbish is put inside the incinerator and burnt. The ash formed is removed to make room

for another burning. This seems the most hygienic method of disposal (Nwanta&Achi, 2012).

e. Burning: Burning is the same as the burning described in incineration except that burning in incineration is controlled while in this, burning is the open type in this type of burning cans and broken bottles litter the place while Smoke and odors pollute the air it is also a fire risk.

f. Dumping in the river or sea. This, as the name implies, is collecting all the rubbish and dumping it into the river. It soils the rivers and litters the shorelines to the extent of constituting an accident hazard to users of such a river… Composting or Decomposing: This is not easy because all bottles, tins, ashes, etc. must be removed first which require further disposal. A large pit is made and the rubbish Collected into it is then covered to allow the action of bacteria. It requires frequent tuning.

g. Open dumping: a good number of rural communities practice this. It simply means dumping refuse in any open space which is not covered. They are worst if they are close to houses. It provides ideal breeding places for vectors, pests, and rodents (Nwanta&Achi, 2012).

NTI (2000) stated that at the final disposal sites, methods used include open dumping, composting, sanitary landfill, and incineration. Lucas and Gilles (2006) refer to open dumping as a process whereby refuse is piled in open land and left to decompose or consumed by birds or rodents and rain erodes it causing land, water or air pollution. They noted that the method is often used in Nigeria because it is less expensive. They maintained that the method is detrimental to human health and the environment. Another method of refuse disposal is composting. Lucas and Gilles (2006) refer to composting as a process of speeding aerobic degradation of the organic part of refuse. They emphasized that it is purely biological involving growth of biomass by

conditioning refuse with moisture or heat. Another way refuse can be managed is by sanitary landfill. According to Park (2007), this is a method whereby refuse is tipped into a hole and it is covered by topsoil. According to him, the method should be about 30 meters away from sources of drinking water supply and sanitary facilities. They also advocated that final refuse disposal sites should be fenced and locked, and opened for authorized persons only. They maintained that refuse handler should wear protective devices such as face masks, hand gloves and boots to prevent health hazards. Incineration is another method of final refuse disposal. According to Lucas and Gilles (2006) incineration is a process of controlled burning of combustible refuse which is changed into gases and residues. According to them, the incinerator has inbuilt magnetic separators which remove metal objects before the rest is burnt. They maintained that the method helps to control rats and rodents. They emphasized that the method is desirable because it offers total destruction of refuse and that it is costly and beyond the reach of most urban and rural communities.

2.5.2 Refuse and Toxic Wastes

Refuse according to Achalu & Achalu (2004) is valueless and unwanted materials. Refuse consist of solid waste which occupy space in an environment and it is hazardous to household's health. They classified solid refuse into two categories municipal and rural wastes. They further identified municipal refuse to include worn out types, broken bottles, empty cans, industrial chemical, gas emission, and abandoned vehicles. Rural refuse comprised yam, cassava and groundnut peels, excreta, fallen leaves, and garbage. Park (2007) saw refuse as hazardous which should be sort, stored properly, collected and transported to dump or end disposal sites. Park further stated that refuse must be sort and managed according to sanitary regulations to

enhance a clean and safe environment. Namani (2000) saw waste as material which the owner or possessor considers worthless to retain. Urbanization and industrialization lead to new lifestyles and behavior which also affects waste composition from mainly organic to a synthetic material that lasts longer such as plastics and other packaging material (Idris et al., 2004).

According to WHO (2004) each year the average American produces up to one ton of waste materials, most of the waste produced is not harmful. However, some of the waste, especially materials produced by factories, is toxic. Toxic is a term that means deadly or poisonous. For many years, toxic wastes were just buried in the ground in dumps around the country. Often they were not even put in protective containers. Some of these wastes have leaked into the soil and into water supplies. Some of the toxic wastes that were stored in containers have begun to leak out in the 1970s, people living near the Love Canal in Niagara Falls, New York, found out how dangerous toxic waste could be. Toxic waste that has been dumped in the Love Canal leaked into the ground and into the community's Water supply. People became sick. Some of the waste seems to have been mutagenic. A mutagenic substance (Myoo tuh JEN IK) is one that causes changes in genes leading to birth defects or miscarriages. In 1979, only two of the twelve babies born to women living near the Love Canal were normal. People had to move from their homes to avoid further poisoning. Despite efforts to clean up the toxic wastes, some of the poison remains in the water supply.

Chemicals found in a toxic waste can cause many health problems. Many are carcinogenic or cause cancers. Scientists and public health officials are working to find safer ways of getting rid of toxic wastes. Cleaning up the most dangerous of the oil dumps will also be necessary. The Environmental Protection Agency (EPA) estimates that it will cost over 11 Billion dollars to clean up 2000 of the worst toxic waste dumps in the United States (Rodríguez-Eugenio et al. 2018).

2.5.3 Dumps and Sanitary Land-Fill

According to Tse & Adamu, (2012) Dump is defined as a site used to dispose household wastes without environmental controls while Landfill is defined as a facility in which environmental waste from households, municipal or industrial sources is disposed, sanitary landfills are those that are operated in accordance with environmental protection standards (USEPA, 2010) where wastes are spread, compacted and covered with a layer of earth daily. Dumps and landfills are a threat to water quality when rainfall percolates through waste, leaching out a variety of pathogens such as parasites, bacteria's and other toxic materials. The leachate produced can eventually contaminate groundwater and infect the people's health in a given community (Rao & Shanataram, 2003).

Sanitary Landfill is a site where waste is isolated from the environment until it is safe. It is considered when it has completely degraded biologically, chemically and physically, it can manage by the following steps:

i. Air Quality: The ambient air quality should be analyzed regularly within the landfill, and the mean concentrations of gaseous emissions should conform to United State Environmental Protection Agency (USEPA, 2004) ambient air quality standard.

ii. Landfill Gas Monitoring: In order to manage landfill gas and minimize greenhouse gas emissions, appropriate landfill gas containment (for example, landfill cap, basal and side liners) and landfill gas collection systems must be developed, implemented and monitored. The landfill gas management system should be designed prior to design the landfill and should be progressively installed during the operational period of the landfill.

iii. Landfill Leachate Control: Leachate from landfills must not be allowed to seep into the waterways, rivers, aquifers, etc, by installing a good bottom liner and plumbing system to channel leachate to the treatment facility. The selection of the liner material must take

into account the stabilization period and should last throughout this period. Once the landfilled waste has stabilized over a period of time, the effects on the surrounding environment due to leachate and gases will be lesser (Bogner, et. Al, 2007).

iv. Landfill Odor management: Landfill odor is a key consideration in landfill siting. Landfill odors have two main sources; odor from the aerobic decomposition of freshly

v. Deposited wastes and odor from landfill gas generated by the anaerobic decomposition of wastes. Leachate ponds can also be a source of offensive odors. Good operation and adequate buffers are essential in odor management. These buffers are set to account for upset conditions and are not a substitute for best-practice management at the landfill or for normal operating conditions. The key means of managing landfill gas odor is to manage the landfill gas in general by oxidizing it. Odour from aerobic waste deposition is managed by minimizing the exposure of these wastes to the atmosphere (Warith, 2003).

vi. Landfill fire prevention and control: landfill fires are difficult to extinguish, so the primary objective should be to prevent a fire from starting. This is done by removing potential ignition sources, such as hot coals, from the tipping area. Other measures include not burning waste and not lighting fires on or near areas where wastes have or are being deposited. Finally, wastes should be covered with non-combustible material. The level of carbon monoxide in landfill gas provides some indication whether there is or has been a subsurface landfill fire. Carbon monoxide levels in excess of 1,000 ppm strongly indicate that there is a fire burning within the landfill. Levels above 100 ppm are not as conclusive but should be investigated as part of the fire investigation plan with further gas and temperature measurements to determine if and where there is or was a fire (Aderemi & Falade, 2012).

vii. Disease vector control: The main mechanisms for the control of disease vectors are the use of cover material to cover waste daily and eliminating any water bodies that are not required for fire, sediment and leachate control. Other measures, such as scare devices and traps, can also be used to reduce or control infestations. Professional pest exterminators should be employed to reduce problem infestations of vermin.

viii. Contingency plan: Contingency planning should form part of the site environment management system. All staff at the landfill must be trained in the implementation of the contingency plan. The contingency plan must encompass all impacts, such as; the detection of contamination of surface or groundwater, detection of landfill gas, blockage of leachate and landfill gas collection pipes, a landfill fire, deposit of unauthorized waste, offensive odours or dust beyond the boundary of the premises, litter beyond the boundary of the premises, equipment breakdown, flare or power outage (Kenneth et. al, 2015).In view of Mshelia, (2015)the crude form of sanitary landfills usually large open-pit (mine ponds in some cases) and set ablaze.

2.5.4 Incineration (Burning)

Oloruntade, et. al, (2014) stated that the garbage and refuse are put into the well-equipped incinerator; magnetic separators remove cans, tins and other metal objects. Oil, gas or Coal is sometimes used to help in maximum burning of the garbage and refuse. This is the most acceptable method of disposal, but it is the most expensive method that Nigeria can least afford. But we can continue to use the improvised incineration method often seen around. This is made of mud or cement wall with an opening at the top like chimney outlet for smoke and a square or rectangular passage at the base through which the rubbish is shovelled into the incinerator. However, this method has the terrible smoke and smell problem, like the open dump discussed

first. Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials (Andrew, 2008).

In terms of waste treatment, landfilling is still the most common method of solid waste disposal, although there have been discussions about alternative solutions, including various waste treatment options. Among the alternatives, incineration technology is the most mature (Lombardi, Carnevale & Corti, 2015).In accordance with growing concern over the treatment of environmental waste disposal practices are becoming more prominent in the field of waste treatment today involves the incineration of environmental waste, This practice decreases both the amount of environmental waste from households must deal with Incineration, however these practice faces criticism regarding the pollution that it creates, particularly the pollution resulting from exhaust gases that are by-products of the process (Andrew, 2008).

2.5.5 Reduction of Litters

Nneoma et.al, (2018) indicated that Reduction of litters, reuse, and recycling of bio-degradable and non-biodegradable waste is very essential in waste management because it reduces the number of wastes that is finally disposed of in the landfill site.

Sustainable Waste Management at several stages in the life cycle of a product, materials efficiency can be increased by more efficient design, material substitution, product recycling and quality cascading (Bogner et al., 2007).Population and urbanization are the two main drivers of production and consumption, which consequently result in waste the generation (Asikhia&Olaye, 2011). Population growth results in increased demand for goods and services and consequently waste generation. Urbanization, on the other hand, highlights the need for proper land use management due to growing infrastructural demand and development, thereby resulting in a reduced tolerance for improper waste disposal in residential areas (Momodu et al, 2011).Ubani

(2003) notes that in many cities and rural areas in Nigeria, the menace of waste has posed great environmental problems due to the inability of the waste management agencies to carry out their responsibility. This is evidenced by the indiscriminate disposal of refuse on the streets, drainages and water bodies in Nigeria cities.

According to Ladan (2009), Garbage and refuse are things we cannot run away from, and efforts must be made by our government to contain the situation. But what can we do as individuals? Has it ever occurred to us that we can help to keep our environment clean and healthy by not littering things about? How many times have seen passengers in commercial vehicles throw orange or banana peel out of the vehicle? Every woman is anxious to keep her immediate surroundings clean even though it means that she has to sweep the rubbish made by her into the passageway. When everyone on both sides of the passageway does the same thing it is little wonder that the passage becomes a little ridge which customers try to stride over. While the collection and disposal of garbage and refuse are the responsibility of the government agencies, it is necessary as citizens for us to contribute our quota by trying to maintain an attractive environment.

2.5.6 Disposal of Garbage and Refuse

According to Nneoma et. al, (2018) Lack of sanitary landfills in developing and underdeveloped countries has led to indiscriminate waste disposal in open dumps. Indiscriminate waste disposal has been one of the major problems facing Nigeria as wastes are dumped in an unauthorized and uncompromising manner. Waste is indiscriminately dumped along streets, roads, market places, etc. and this exposes the environment to all kinds of hazards such as erosion, flooding, depletion of the Ozone layer and natural resource, as well as a health hazard.

Ladan (2009) noted that garbage can be disposed off by burying it at designated locations on the site or removing it from the site. Open dumping of garbage onsite should be avoided if garbage has to be dumped; it should be dumped far from the displaced people. The ashes should be covered with a layer of soil after each burning.

2.6 Importance of Environmental Sanitation

EnvironmentalSanitation is one of the most important aspects of households well-being because it protects human health, extends life spans and provides benefits to the economy (Naughton & Mihelcic, 2017). EnvironmentalSanitation is defined by the Joint Monitoring Programme (JMP) as one that separates “human excreta from human contact” in a hygienic manner (WHO/UNICEF JMP, 2017).Yusriani & Deni (2019) opined that The health of households depends largely on the conditions of their environmental sanitationand low level of health of households can be traced by looking at environmental related factors such as the presence of polluted water sources, soil and air pollution, poor house condition, the presence of vectors of diseases and insects that threaten the health of households. WHO (2012) defines sanitation as the facilities and services that can be used to dispose of human waste safely. Therefore, poor sanitation can cause various diseases, while healthy environmental sanitation has a significant impact on health, social, and economic life in households and in society because the environment includes not only water, air and land but also conditions the social and economic place in which we live (Park, 2011)

One of the key goal of environmental sanitation is to safely reduce human exposure to pathogens, Pathogens are excreted by infected individuals and if not properly contained or treated may present a risk to humans who come in contact with them. These households can also be exposed to pathogens through drinking water or eating food contaminated with pathogens found in human excreta (WHO, 2017).The earth is the only planet known to support life, as we

know it. It supplies us with all the resources, the materials we use and the food that we eat or drink. All living organisms have a specific surrounding or medium with which they continuously interact, from which they derive substance and to which they are fully adopted. EnvironmentalSanitation means the prevention of contact with wastes, for hygienic purposes. It also means promoting health through the prevention of households contact with the hazards associated with the lack of healthy food, clean water and healthful housing, the control of vectors and a clean environment. It focuses on management of waste produced by household's activities (Lukkumanul Hakkim, 2019).

According to Yoada, Chirawurah& Adongo(2014)The most important aspect of controlling waste is educating households on how to collect, segregate, store, transport and safe disposal of domestic waste which are the components of waste management that mainly pertains to local authorities this involves increasing awareness on pandemic preparedness, adaptation to climate change, animal control and vaccination requirements, transportation and land use planning affecting public wellness, water quality protection, waste management, energy choices, food safety and systems, and ecological protection and restoration.Facilitating communication among increasingly specialized experts improves health outcomes for communities. However, if the OneHealth approach is to be implemented effectively, there is need for amore community based means of health educating the public so as to achieve increased awareness of connections between food production, infectious diseases, human and animal health conditions (Musoke, Ndejjo, Atusingwize & Halage2016).

2.7 Knowledge of Environmental Sanitation among Households in Nigeria.

All over the world, poor environmental sanitation quality is increasingly recognized as a major threat to social and economic development and even to human survival. (Acheampong, 2010).That is unless our households have adequate knowledge of how one's carelessness could

endanger self and others, the above problem as it is manifested now in our unhygienic environment, will increase our being engulfed in the trash. In Nigeria, adequate environmental sanitation knowledge has not been ensured. They are characterized by a lack of basic amenities and poor sanitation habits (Afon, 2013). Disposal of waste by means of landfills is done with technically complex systems specifically designed to protect the environment (Daramola et. al, 2016).

In an effort to improve household's hygiene, children's knowledge of personal hygiene is very important as knowledge plays a major role in determining a household's action, the poor household's hygiene or practice such as not washing hands before eating and after defecation, eating contaminated food, defecating not in the toilet, as well as the availability of clean water and a bad household sewage drainage system will highly contribute to environmental pollution (Dewi & Hans 2017). Environmental conditions in many areas threaten to reverse the gains made in public health over the last several decades; every human should have a healthy and productive life in harmony with nature (Ayres, 2000). Environmental stress is the price of development; in fact, widespread environmental damage is likely to hinder developmental efforts and worsen the plight of people living in acute poverty (WHO & UNICEF, 2009). The relationship of humans to the environment is reciprocal in such that the environment has a profound influence on humans and, at the same time, humans extensively alter the environment to suit their needs and desires. Some of these changes created new hazards. The humans' attitudes toward the environment are still negative and are often contrary to the concept of sustainable development, which recognizes that economic growth and environmental protection are inextricably linked and the quality of present and future life rests on meeting basic human needs without destroying the environment on which all life depends. "Despite various programs by different tiers of governments to address the issue of environmental sanitation, many Nigerians still have negative attitudes toward

environmental sanitation and do not value personal or environmental sanitation" (WHO & UNICEF, 2009). Many United Nations specialized agencies such as WHO, UNICEF, UNESCO, UNDP, and world bank is that the single most significant cause of morbidity and mortality in Sub-Saharan Africa and other third world countries is a poor standard of environmental sanitation. Most of the tropical African countries do not have adequate facilities to achieve ideal environmental sanitation. This predicament has significantly been contributory to the perennial high incidence of such communicable diseases as dysentery (Bacillary and Amoebic) cholera (Vibrio), typhoid (Salmonella typhoid), hepatitis (Viral) meningitis (meningococcal), Malaria and tuberculosis, (Olawale & Olatunji, 2014).

According to WHO & UNICEF (2010), the sanitation situation of some countries, especially in the developing world, has raised alarming concerns and the international community has over the years responded appropriately by several declarations. For example, in 1977, the United Nations declared 1980 - 1990 as the "International Drinking Water and Sanitation Decade". The aim of this proclamation was to provide safe water and sanitation for all in a suitable and sustainable manner by the year 1990. However, these achievements were not attained during the international drinking water supply and sanitation decade. The international effort on sanitation was intensified in September 2000 by the United Nations' declarations known as the millennium development goals (MDGs) and targets. The MDGs and targets represent a partnership between developing and developed countries to create an environment which is conducive to development and elimination of poverty. Goal 7 focused on ensuring environmental sustainability. Target 10 of Goal 7 was aimed at reducing to halve, by 2015, the number of people without sustainable access to safe drinking water and basic sanitation. As at 2008, an estimated 2.6 billion people all over the world still lack access to improved sanitation,

884 million people are without access to improved sources of drinking water and 1.1 billion people practice open defecation.

2.7.1 Attitude Towards Environmental Sanitation among Households in Nigeria.

Proper waste management is a major concern of public health. It is necessary to create positive behavioral changes towards waste management among households in order to control diseases (Kaithery & Karunakaran, 2019). The attitude towards environmental sanitation improvements can significantly enhance health and wellbeing of the households by preventing, reducing the severity and impact of diseases associated with poor environmental sanitation (Duru, Iwu, Diwe, Uwakwe, Merenu, Madubueze, Okedo-Alex, Ndukwu, Ohale, & Nwaigbo 2017).Furthermore,improvements in one or more of these components of good health can substantially reduce the rates of morbidity and the severity of various diseases and improve the quality of household's life in developing countries like Nigeria (Mara, Lane, Scott & Trouba2010).

According to Adelakum (2003), promotion of environmental sanitation quality depends on how households and community see themselves in relation to their attitude in the environment. It is the ways people perceive the environment that they will treat it. And it is the way the environment is treated that it will in turn support life. He believes that illiteracy, ignorance, poverty, and greediness are some of the major contributions of environmental degradation because of each influence people's behavior and attitudes towards the environment. A person who is ignorant of his action on his/her environment will likely have the wrong perception about the effect of that on his health. A community that understands the link between a healthy environment and good health can save money and avoidable agonies.

Environmental sanitation comprises 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 (Schertenleib, 2015). Purdom & Anderson (2003) state that the way a person perceives the environment reflects his or her previous experience, education, lifestyle, and interest. In another word, the way a person treats the environment depends on his/her knowledge or level of awareness about the environmental sanitation. Despite the low level of formal education most especially in the villages, various communities managed the waste generated properly. In the past, people lived in harmony with their environment and they enjoyed good health. There were few medical experts, if any, in many towns and villages dumpsites are far away from the hearts of the village where people live, and they occasionally burnt these sites. Villagers whose environments were dirty were often penalized by elders-in-council. Human fasces at the center of the city was regarded as sacrilege. People immediately removed carcasses of an animal from the village any time there was one. Trees were planted to provide fresh air and shades for relaxation. Community's sources of water guarded against pollution.

2.7.2 Practice of Environmental Sanitation

Poor environmental sanitation is a serious health risk and an affront to human dignity. Adequate environmental sanitation practices are more than just an inconvenience. It allows households knowledge and experience to design and manage the facilities and services and to increase the likelihood that the services will be used sustainably(Sadiq, Ezeamaka, Daful, Anjide, Sani & Ogbole,2018). In Nigeria general access to environmental sanitation practice facilities and services by citizens remains very poor (Akpabio, 2012). Nigerian cities are characterized by rapid population growth which is not accompanied by a corresponding increase in the delivery of environmental sanitation facilities and services capable of enhancing environmental sanitation practices. The resultant effects of these are unsanitary and unhealthy environmental conditions that are prevalent in Nigerian urban center's (Daramola, 2012).

Poor environmental sanitation practice exhibited in the disposal of solid waste, wastewater, and excreta, cleaning of drainage including personal, household and community hygiene significantly contribute to infant and child mortality (Daramola & Olowoporoku 2016)Safe waste disposal and hygienic behaviors are essential for the dignity, status and wellbeing of every household, irrespective of whether they are rich or poor, live in rural or urban areas, small towns or cities. The primary direct impact of sanitation and hygiene promotion is on health, and its impacts; the most significant is probably the prevention of disease. The primary barriers to the transmission of diseases include both infrastructures such as household sanitation and hygiene practices (Abogan, 2014). In the words of Wright (2010), there is various hygiene of the communities, basic practical's, knowledge, skills and human behaviors as well as social and cultural factors concerning health, lifestyles and environmental sanitation awareness. These include:

- Household cleanliness (Kitchen, bathroom cleanliness, etc)
- Personal hygiene (washing, dressing, eating hygienic food, etc)
- Community cleanliness (waste collection, common places among others)

According to Oluwaseun (2017)it was attributable to the idea that brought environmental sanitation into the limelight during the military regime of Buhari/Idiagbon in 1984. The regime instituted the mandatory monthly environmental sanitation exercise to be carried out from 7 to 10 am of every last Saturday of the month. With the advent of the current democratic dispensation and renunciation of the military rule in 1999, the Federal Government of Nigeria rescinded the monthly environmental sanitation exercise on the basis that it is an offspring of a military junta.

WHO (2010) stated that Poor sanitary conditions of our environment provide a good breeding ground for disease-causing organisms (pathogens). This situation leads to the spread of disease especially in tropical areas like Nigeria. Some of the tropical diseases that have become

difficult to control due to the filthy conditions of our environment are malaria, cholera, diarrhea, Ascaris, lower respiratory infections, and unintentional injuries. In some adults and children under the age of five, one-third of all disease is caused by environmental factors such as unsafe water and air pollution.

Tochukwu et. al, (2017) opined that the major way of solving environmental sanitation issues is the encouragement of research on environmental sanitation. However, providing sanitation to households requires a systematic approach rather than only focusing on the toilet or water waste treatment plan (Tilley, Lüthi, Morel, Zurbrügg & Schertenleib,2014).

Environmental Sanitation system generally involves waste Collection, segregation, storage, transportation, Safe Disposal, and some waste can be reused (Albert, 2012). The main objectives of a sanitation system are to protect and promote human health by providing a clean environment and breaking the cycle of disease. In choosing a particular system to use, a lot of factors have to be considered. The factors to be considered include; experience of the households, methods of waste collection, segregation, storage, transportation or conveyance of waste, treatment, and reuse or safe disposal of wastes (Sanni, 2015). Water Aid Uganda (2013) discovered that diarrhea which is caused by poor environmental sanitation kills 1.5 million children each year. Practices related to those basic aptitudes, abilities or the technical competence to handle, in a very sensitive practical way, the problems, situations, emergencies, and needs which exist or may arise with respect to sanitation including the ability to teach or impact these skills to others. Some of these skills would also encompass the ability to design, construct, build, repair and maintain sanitation related infrastructure, installations, and mechanisms, (Nkom & Essien, 2002).

2.8 Relationship between Knowledge, Attitude and Practice of Environmental Sanitation

Environmental sanitation is aimed at developing and maintaining a clean, safe and pleasant environment in all human settlements, to promote the socio-cultural, economic and physical well-being of all sections of the population.Poor sanitation is linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and poliomyelitis(UNICEF & WHO, 2017)

A study conducted by Safo-Adu and Hanson (2019) on Practices and Knowledge about Environmental Sanitation and Hygiene among urban dwellers in Gomoa East District. The finding of study showed that a significant number of respondents (80.8%) had high knowledge about environmental sanitation and hygiene than respondents (2.5 %) with low knowledge. Respondents who had good standard practices regarding environmental sanitation and hygiene were 43 % greater than respondents with poor standard practices. Chi-square test results showed that no association exist between sex and knowledge and age and knowledge. However, there was significant association between attitudeand knowledge. A Pearson product-moment correlation result showed that there was no relationship between standard practices and knowledge about environmental sanitation and hygiene.

A study conducted by Adeolu, Enesi and Adeolu, (2014) on Assessment of Secondary School Students' Knowledge, Attitude and Practice towards Waste Management in Ibadan, Oyo State, Nigeria Inappropriate solid waste management practices in schools in developing countries constitute one of the major factors leading to declining environmental health conditions. A proper waste management is needed to ensure the protection of the environment and human health. Few studies have captured waste management problems in Nigerian educational institutions, particularly the views of students. Findings revealed the level of knowledge, attitude and practice of waste management was relatively moderate in secondary schools in Ibadan, the percentage of those who used indiscriminate solid waste disposal methods like open dumping

and open burning was higher. Educational status, age and gender, among others, were factors influencing solid waste management in secondary schools in Ibadan. Significant relationships were observed between students' knowledge attitude and practices of waste management.

A study of Sah, Bhattarai, Baral and Pokharel (2014) on Knowledge and Practice towards hygiene and sanitation amongst residents of Dhankuta Municipal Poor hygiene practices and inadequate sanitary conditions play major roles in the increased burden of communicable diseases within developing countries. Chi-square test was applied to find out the hygienic practices with selected variables. Results: Most of respondents believed that hand washing reduces diseases. They knew that diarrhoea is spread by dirty environment and drinking unsafe waterand unhygienic food. Majority of respondents washing hands with soap and water after defecation.Ladies were found to have better hygienic practices than men's. Conclusion: The knowledge and practice on hygiene and sanitation among the households of Dhankuta municipality was found to be fair.

2.9 Empirical Studies

Mohd and Malik (2017) conducted a study on sanitation and hygiene knowledge, attitude and practices in the urban setting of Bangalore: using a cross-sectional survey study. The study reviews unsafe drinking water, poor hygienic conditions, improper disposal of human excreta and refuse is one of the prime concerns in India. The study was undertaken among 480 households in Hegganhalli locality of Bangalore city from January 2016 to December 2016. Systematic random sampling technique was applied to obtain the desired sample size. Information on socio-demographic characteristics and existing knowledge, attitude and practices regarding sanitation and hygiene were gathered by using pretested, semi-structured questionnaire. SPSS 15.0 software was used for data analysis. The data on knowledge revealed that 88.3% of respondents attributed sanitation and hygiene to hand hygiene followed by safe

disposal of feces (57.7%). Majority of respondents had adequate knowledge about sanitation and hygiene. A study found a significant association between knowledge and socio-economic status ($\chi 2=8.40$, $p=0.01$). The data on practices revealed that 55.6% of respondents were not following any methods of drinking water treatment. Only 11% of respondents clean their water storage containers daily and 53.8% dispose off solid waste daily. A significant association was found between sanitation and hygiene practices and socio-economic status ($\chi 2=18.31$, $p=0.001$), and family size ($\chi 2=13.00$, $p=0.01$).

The finding of the study leads us to conclude that existing knowledge of respondents regarding sanitation and hygiene was satisfactory but there was a clear gap between knowledge and actual practices. Hence, the implementation of an effective behavior change communication strategy is a prerequisite to translate knowledge into actual practice.

Florence (2013) conducted a research on knowledge, attitude and practice on waste management of people living in the University area of Ogbomoso. A descriptive survey design was adopted. Multistage sampling technique was used to select 200 respondents. Data collection was carried out using questionnaire, the questionnaire was constructed and validated using construct validity while test-retest reliability was used for consistency (p 0.86) Descriptive statistics were used for data classification and simple percentages and frequency count was used for data analysis. The result indicated that the respondents are knowledgeable in refuse management but the knowledge is not adequate, Observation from the responses shows that respondents have a positive attitude toward waste management. The findings revealed that there was an improper practice of refuse management. In conclusion, this study showed that the knowledge, attitude, and practice of people were not appropriate, hence it is necessary to embark on the development of long-term refuse management awareness programs.

Komolafe (2014) carried out a study on household environmental sanitation practices in Katsina Metropolis. The findings of the study revealed that households in Katsina metropolis dispose their solid wastes in vacant or unused plots, back of homes, along the road and drains among others. Some strategies such as the implementation of national environmental sanitation policy, Provision and use of waste disposal facilities, inculcation of right attitudes in householders/homemakers on waste disposal through the introduction of environmental education in primary and post-primary school's curriculum, were identified to improve environmental sanitation practices. The study adopted a survey research design and the population of the study was all the households in Katsina metropolis. There are 4,987 registered housing units in Katsina metropolis (Katsina State Ministry of Works, transport and housing, 2009). Multistage sampling techniques were used in the selection of 50 households which randomly selected from each of the five wards to make a total of 250 households. One homemaker in each household was selected to respond to the questionnaire.

Duru et al (2017) studied on environmental sanitation practices using a case study of solid Waste Management in Semi-Urban Communities in Orlu, Imo State Nigeria. The results revealed that the mean age of the respondents was 37.0 ± 2.2 with a male to female ratio of 1:1.2. Despite high awareness about environmental sanitation (95.0%) reported among the respondents, the proportion of them with good knowledge about environmental sanitation (22.9%), attitude (38.6%) and practice (20.8%) towards environmental sanitation was low. The mean quantity of waste generated per week per household or business premise was 14.1 ± 0.94 kg with a majority of the respondents (80.0%), not separating their waste before disposal. The commonest solid waste component generated was organic/perishable materials (74.8%) and the commonest disposal practice reported was open dumping (49.8%). The study population comprised of households and business premises within the semi-urban communities in Orlu LGA. The study

was a descriptive cross-sectional type. a sample size of 426 participants was studied. The sampling technique used to select the participants for this study was the multistage random sampling technique and 420 questionnaires were administered and the finding of this study established that the levels of sanitation knowledge, attitude and practice was poor to moderate as a good level of knowledge and practice of environmental sanitation was only observed in less than one quarter of the respondents with just above one third of them having a good level of attitude and close to half having an erroneous perception that their level of environmental sanitation is good. A lot of attention is still required in the area of environmental sanitation especially in developing countries like Nigeria.

Ekong, (2015) in his study on an assessment of environmental sanitation in an urban community in Southern Nigeria This study examined the sanitary condition of an urban community in Akwa Ibom State, Nigeria. It used a cross-sectional survey design for a population of 123,033 inhabitants of four villages in North Eastern Akwa Ibom. Multi-stage sampling was used in selecting 237 inhabitants in this community and a structured questionnaire was used for data collection. Data were analyzed using frequencies, percentages, Chisquare test and multiple logistic regressions. Results showed that tap water was the major source of water, usually disinfected by boiling. Moreover, the results of multiple logistic regressions showed a significant association between gender and their participation in environmental sanitation with males showing 9 times more odds of participation than females. Unwholesome practices like open refuse dumping and building of pit latrines close to the house were prevalent in this community.

Jatau (2013) in his study determined the knowledge, attitudes, and practices associated with waste management in Jos south metropolis. A cross-sectional survey design was employed for the study. A self-developed knowledge, attitudes, and practices associated with waste management questionnaire (KAPQ) was the instrument used for data collection. Data collected

were analyzed using frequency distribution, percentages, means, chi-square and t-test statistics. The findings of the study revealed that respondents with higher level of education (N.C.E/B.Ed) possessed corrected level of knowledge of the impact of improper waste management on health than those with a lower level of education (TCII/SSCE). Age 31+ exhibit positive attitudes associated with waste management than age 15-30. Both TCII/SSCE and NCE/B. Ed holders exhibit positive practices associated with waste management. Level of education had a statistical significant influence on knowledge of waste management. Age has no statistically significant influence on attitudes associated with waste management. Level of education had a statistical significant influence on practices associated with waste management.

Ige & Adetunji (2014) investigated some socio-economic factors affecting household sanitation in Ado-Ekiti, Ekiti State, Nigeria. This study examines the relationship of some socio-economic factors and house sanitation in Ado-Ekiti. Using simple bar chat and Chi-Square test of independence, the research reveals that though there seem to be variations among various socio-economic classes in relation to waste household sanitation technique, the relationship is found not to be statistically significant.

Daramola & Olowoporoku (2016) Environmental Sanitation Practices in Osogbo, Nigeria: Assessments of residents' sprucing-up of their living environment, a total of 194 residents were selected for survey using the systematic sampling technique. The study revealed that residents' socio-economic characteristics varied significantly with different residential zones. Findings revealed that there is a low level of access to environmental sanitation facilities across the residential zones. Similarly, the proportion of residents with environmental sanitation facilities in their homes was low. The study established poor environmental sanitation practices among the residents in terms of utilization of available amenities across the residential zones.

2.10 Summary

In this chapter, the related literature of knowledge, attitude, and practice towards environmental sanitation among households were reviewed. Environmental Sanitation involves the control of adequate cleanness of the environment without littering with domestic refuse, sewage, Sullage, garbage, and other wastes. However Improper wastes management leads to the multiplication of pathogens causing diseases. Protection of food we eat, housing, the control of insect vectors, rodents and pollution. These control functions constitute a major aspect of the environmental sanitation program, the responsibility for such controls rests with each member of every household.

A pleasant environment promotes healthful living and hazards free is a fundamental right of every human being. Disposal of fecal matter near homes, contamination the sources of drinking water, poorly designed sewage system, dumping of refuse and sweeping into the gutters and disposing of waste by the street corners and waterways are all unpleasant practices that poses a potential risk to the development of diseases. Washing of hands after defecation and before preparing food is of particular importance in reducing disease transmission, Poor housing also contributes to poor environmental health and its consequent input in the health of the household.

Other problems include inappropriate design, operations, and maintenance of dumps and landfills which have led to increased indiscriminate disposal of waste and lack of expertise and manpower to run waste management programs in Nigeria. There is inadequate service coverage in most urban areas and in rural areas, rural households in Nigeria have no access to waste collection service, they dump waste at any vacant plot, public space, and river or burn it in their backyard, thereby polluting the air. the overall problem of environmental sanitation and waste management is multifaceted, many organizations, including the United Nations (UN) and various governmental and non-governmental organizations (NGOs), advocate an integrated approach to

environmental sanitation and waste management. In conclusion, when the environment is clean the household lives and the citizenry are not threatened by illness and diseases. Proper environmental sanitation management which involves the cleanness, proper dumping of wastes from our homes at a specific place or in government-provided containers and the control of litters and removal of refuse from places where they can cause hazards to a place where they are less hazardous to public health. These control functions constitute a major aspect of the environmental sanitation program, the responsibility for such controls rest in each member of every household, federal, state and local government authorities at large.

CHAPTER THREE

METHODOLOGY

3.0 Introductions

The purpose of this study was to assess the knowledge, attitude and practice towards environmental sanitation among households in Bauchi state Nigeria. To achieve this purpose, the methodology is organized and presented under the following sub-topics: Research Design, Population of the Study, Sample and Sampling Procedure, Research Instrument, Validity of the Instrument, Administration of the instrument and Statistical technique were employed in this study.

3.1 Research Design

The study adopted ex-post facto research design since it is concerned with the investigation of past occurrences, ex-post-facto research is ideal for conducting social research when it is not possible or acceptable to manipulate the characteristics of humans. According to Simon and Goes (2013), the ex-post-facto research design is a method of testing out antecedents of events that have happened but cannot be manipulated by the investigator. The choice of this design was made based on the nature of the topic under study, and the fact that the design will help the researcher attempts to establish the cause or reason for existing differences in the behavior or status groups of people (Oranu, 2005). The data on the knowledge, attitude, and practices of environmental sanitation among households were collected for the study. The justification for the use of this research design is due to the fact that the knowledge, attitude and practice of environmental sanitation already exist among households of Bauchi state. Furthermore, ex-post-facto research deals with conducting social research when is not possible or acceptable to manipulate the characteristics of human participants. This study deals with the

facts that already exist and determine the reasons for the existing differences in behaviour or status groups of individuals (Asika, 2001).

3.2 Population of the Study

The population of the study comprised the entire households in Bauchi state which was 847,731 based on the 2006 census figure (National Bureau of Statistics, 2011). This includes the entire households in all the three (3) senatorial districts in the state, Bauchi North, Bauchi South, and Bauchi Central. Neuman (2007) defines the population as the large general group of many cases from which a researcher draws a sample. The projected population of the study as at 2018 for the state was computed using an exponential method with 2.61% as the annual growth rate for Nigeria which was estimated at 1,113,240 (NBS, 2018).

$$G = \sum \left(\frac{r}{100} B\right)^{n} + B$$

Where:

G = Population at the future date (2018)

B = Base year population (2006)

r = growth rate (2.61%)

n = interval between the base year and future year (12 years)

Table 3.1 Population of the Study According to Senatorial Zones and their political Wards

S/No	Zone	Total population Census 2006	Projected Population 2018	POLITICAL WARDS
1	Bauchi North	273,817	359,577	74
2	Bauchi South	311,117	408,559	75
3	Bauchi Central	262,797	345,104	62

TOTAL	**847,731**	**1,113,240**	**211**

3.3 Sample and Sampling Technique

A sample of 810 households were selected to serve as a representative of the population. This is in line with Israel (2013) who stated that for the population of more than 100, 000 the sample size for the study should not be less than 400 at 0.05 level 5% precision level and the researcher decide and adjust the sample size up to 810 to have equal distribution in the state. For the purpose of this study a Multi-stage sampling procedure was used to select the sample in the following stages:

Stage I: Simple random sampling technique was used to select two (2) local government areas in each of the senatorial zone namely Bauchi north, Bauchi south and Bauchi central. Bauchi North senatorial zone comprises seven (7) LGAs and seventy-four (74) political wards. Bauchi South senatorial zone consists of seven (7) LGAs and seventy-five (75) political wards while Bauchi central senatorial zone has six (6) LGAs and sixty-two (62) political wards. The researcher wrote the names of the Local Government areas according to senatorial zones. The pieces of folded papers in their respective box were shake thoroughly. The researcher further invited another research assistant and picked two (2) from each box to representative LGA in each of the three (3) senatorial zones in the state and a total number of six (6) LGAs Gamawa,Katagum, Alkaleri,Bauchi, Misau and Ningi LGAs were selected respectablyfor the research. Simple random sampling technique was also used to select the political wards in every LGA selected in the state. The researcher wrote down the names of the political wards of each of the selected LGA separately in a pieces of paper and put into an appropriate box labelled with the name of the picked or selected LGAs. The pieces of folded paper in their respective box were shake vigorously. The researcher further invited another research assistant and randomly picked

five (5) each from the box labelled as Bauchi North LGA I and LGA II each respectively and five (5) each from Bauchi south LGA I and LGA II each respectively while for Bauchi central LGA I and LGA II was (5) from each box labeled respectively, each box had representative of all political wards in the respective Local Government Area. The political wards are Alkaleri, Pali, Gar, Maimadi, Futuk, Majidadi 'A', Majidadi 'B', Makama/Sarki Baki, Kangyare/Turwun, Dawaki, Gamawa, Gololo, Alagarno/Jadori, Tumbi, Raga, Tsakuwa Kofar Gabas/ Kafin Kuka, Nasarawa Bakin Kasuwa, Madara, Buskuri, Bulkachuwa/Dagaro, Zadawa, Kukadi/Gundari, Hardawa, Sarma/Akuyam, Gwaram, Ningi, Nasaru, Jangu, Kudu/Yamma and Kurmi respectably.

Stage II: Stratified sampling technique was used to group the target population into already existing strata in both rural and urban households in Bauchi north, Bauchi south and Bauchi central senatorial zones that already exist in the State. Each zone forms a stratum of two (2) LGA selected the selection was made by blindfold to have an equal representation of all type of people in the state.

Stage III: Proportionate sampling technique were used to selectthe sample of respondents in each political ward that was selected. By using total population of each senatorial zone divided by total population of the study area multiplied by sample size. The choice of the proportional procedure enablesfurther randomization of the respondent so as to give equal participation opportunity to all respondent.

Stage IV: Systematic sampling technique was used to select the respondents from each of the political wards in all the selected LGAs in Bauchi State. The researcher started randomly, the researcher used the already existing polio house numbered and used the even numbers. According to Heubner et al. (2018), even number is a number that can be divided into

two equal groups, even numbers are more familiar and people tend to respond faster to even numbers than to odd numbers, even number ends in 0, 2, 4, 6, or 8. Which was being the process of sampling until the target population were reached. All population of the study had an equal participation opportunity in the study through proportional sampling technique.

Table: 3.2 Population and Sample of the Study

S/N	Senatorial Zone	Households Projected Population (2018)	Sample
1	Bauchi North	359,577	262
2	Bauchi South	408,559	297
3	Bauchi Central	345,104	251
	Total	**1,113,240**	**810**

(NBS, 2018)

3.4 Instrument for Data Collection

The instrument used for this study was a researcher-developed questionnaire titled: Questionnaire on Knowledge, attitude and practice towards environmental sanitation among households in Bauchi state Nigeria (QOKAPTESAH). The questionnaire consisted of four (4) sections.

Section A: contained four (4) items on the demographic characteristics of the respondents.

Section B: contained thirteen (13) items on knowledge of environmental sanitation among households in Bauchi state Nigeria.

Section C: contained thirteen (13) items on attitude towards environmental sanitation among households in Bauchi state, Nigeria.

Section D: also contained thirteen (13) items on practice towards environmental sanitation among households in Bauchi state, Nigeria.

Apart from the demographic variables of the respondents, all items were measured along the 4 points Likert Scale. With points assigned as stated below.

Strongly Agree	-	4 points	
Agree	-	3 points	(4+3+2+1=10/4 =2.5)
Disagree	-	2 points	
Strongly Disagree	-	1 point	

This was used to score questions on knowledge, attitude and practice towards environmental sanitation among households in Bauchi state, Nigeria. The mean score for the Likert scale is 2.5, hence the mean score of any response was considered positive if it is 2.5 and above, while any mean score of less than 2.5 was regarded as negative or not acceptable.

3.5 Validity of the Instrument

In validating the research instrument, the researcher presented a draft copy of the questionnaire designed to his supervisors and some other experts in the field of Health Education for validation. The prepared questionnaire was distributed to the experts within and outside the Faculty of Education, Ahmadu Bello University, Zaria. These experts served as jurors for vetting and assessing the face, content and construct validity of the instrument. Their comments and suggestions were taken into consideration and reflected on the final draft of the questionnaire.

3.6 Reliability of the instrument

In order to ascertain the reliability of the research instrument, a pilot study was conducted using (40) copies of the questionnaire which were distributed purposivelyto forty (40) respondents in jama'are LGA which is not part of the study area but with similar characteristics. The instrument was given to the households and retrieved at the point of administration. The collected instruments were subjected to SPSS version 25 to determine the reliability coefficient of the instrument. The Cronbach's alpha of .82, .84 and .86 were obtained for knowledge, attitude and practice of environmentalsanitation among household respectively indicating that the

instrument is reliable. It has been affirmed by Pallant (2011) who suggested that Cronbach's Alpha coefficient of .7 is considered acceptable but .8 is preferable.

3.6 Procedure for Data Collection

Letter of introduction was collected from the Department of Human Kinetic and Health Education, Ahmadu Bello University Zaria. Two (2) Males and Two (2) Females were Trained as research assistants on how to distribute, administer and retrieve the research instrument. The researcher visited the ward traditional heads and obtain permission from the traditional rulers the process gave easy access to the households. The instruments were administered. The households were properly guided on how to fill the instrument and they were oriented to understand the purpose of the study and the need for them to fill the questionnaire appropriately. They were also asked to give honest responses to the questionnaire as their responses will be treated with confidentiality. The instrument was administered by using already existing polio house number and started randomly with even number until the target population was reached. The households filled the questionnaire at the spot and retrieved immediately. Data collection phased last for three weeks.

3.7 Procedure for Data Analysis

Data collected for this study were subjected to statistical analysis using descriptive statistics of frequencies, percentage means, standard deviation and standard error in describing the responses of households to the various items in the questionnaire. In the test of the hypotheses postulated, one-sample t-test was used to test hypotheses one to three (1-3) and

Pearson Product Moment Correlation (PPMC) for hypotheses four and five (4 & 5) at 0.05, level of significance.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This study assessed the knowledge, attitude, and practice of environmental sanitation among households in Bauchi State, Nigeria. The Statistical Package for Social Sciences (SPSS) Version 25.0 was used to analyze the data obtained from the respondents. The demographic characteristics of the respondents were computed using frequencies and simple percentages. The research questions were answered using frequency, percentage, mean, standard deviation and PPMC matrix while one sampled t-test and Pearson Product Moment Correlation (PPMC) was used to analyze the hypotheses. All the hypotheses were tested at 0.05 alpha level of significance.

4.2 Results

Demographic Characteristics of the Respondents

Table 4.1: Description of Demographic Characteristics of the households

Variable		Frequency	Percentage
Age	18-25yrs	281	36.0%
	26 - 30yrs	236	30.3%

	31-40yrs	147	18.8%
	41yrs and above	116	14.9%
	Total	**780**	**100%**
Gender	Male	445	57.1%
	Female	335	42.9%
	Total	**780**	**100%**
Marital status	Married	407	52.2%
	Single	278	35.6%
	Divorce	58	7.4%
	Widow	37	4.7%
	Total	**780**	**100%**
Location	Urban	360	46.2%
	Rural	420	53.8%
	Total	**780**	**100%**

Table 4.1 shows the description of the demographic information of the respondents. The table revealed that 36.0% of the respondents were within the age range of 18-25years, followed by those in the age range between 26-30years (30.3%), 31-40years (18.8%) while those in 41years and above were least (14.9%). Furthermore, based on gender, 445 respondents equivalent to 57.1% were male households while 335(42.9%) of the respondents were female. The table also revealed that majority of the respondents were married (407; 52.2%), followed by singled (278; 35.6%), divorced (58; 4.7%) and the least were widows (37; 4.7%). Finally, 53.8% of the respondents were from the rural area while 46.2% of the respondents were from the urban area. Figures 1 - 4 show the bar charts of demography characteristics of the households on the environmental sanitation.

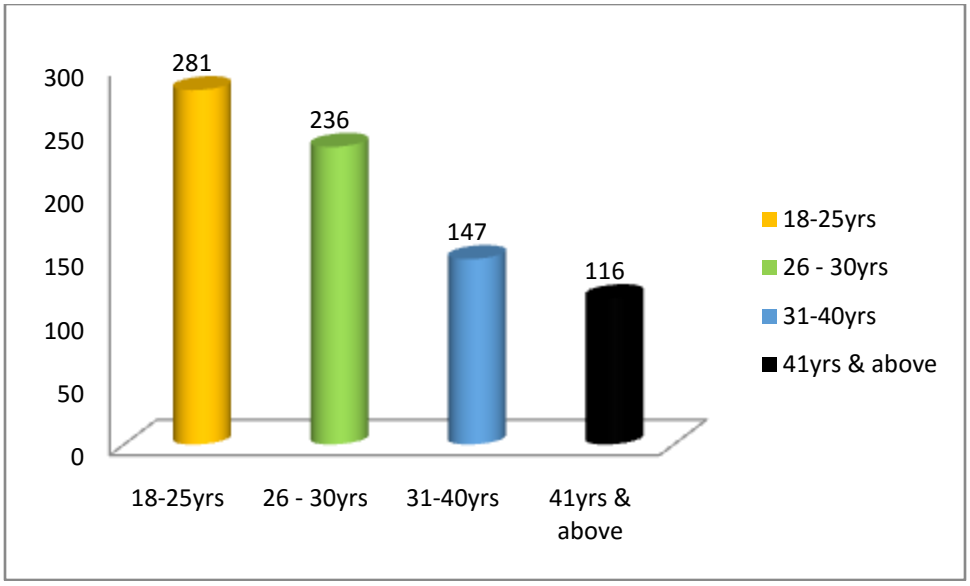


Fig. 1: Proportion of respondents by age

Figure 1 shows that majority of the respondents were within the age range of 18-25years, followed by those in the age range between 26-30years, 31-40years while those in 41years and above were the least.

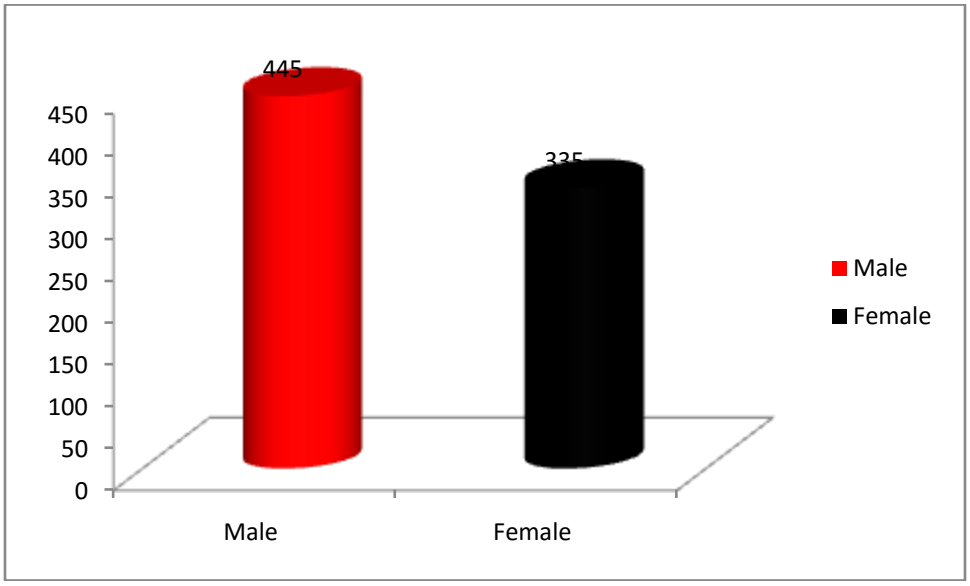


Fig. 2: Proportion of respondents by gender

Figure 2 reveals that445 respondents were male households while 335 of the respondents were female.

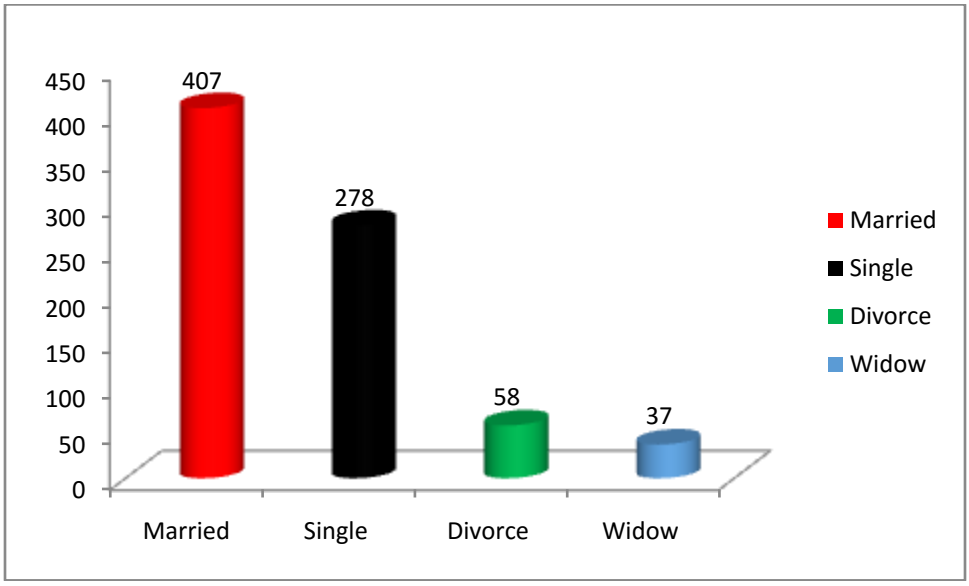


Fig. 3: Proportion of respondents by marital status

Figure 3 indicates thatthat majority of the respondents were married (407; 52.2%), followed by singled (278; 35.6%), divorced (58; 4.7%) and the least were widows (37; 4.7%).

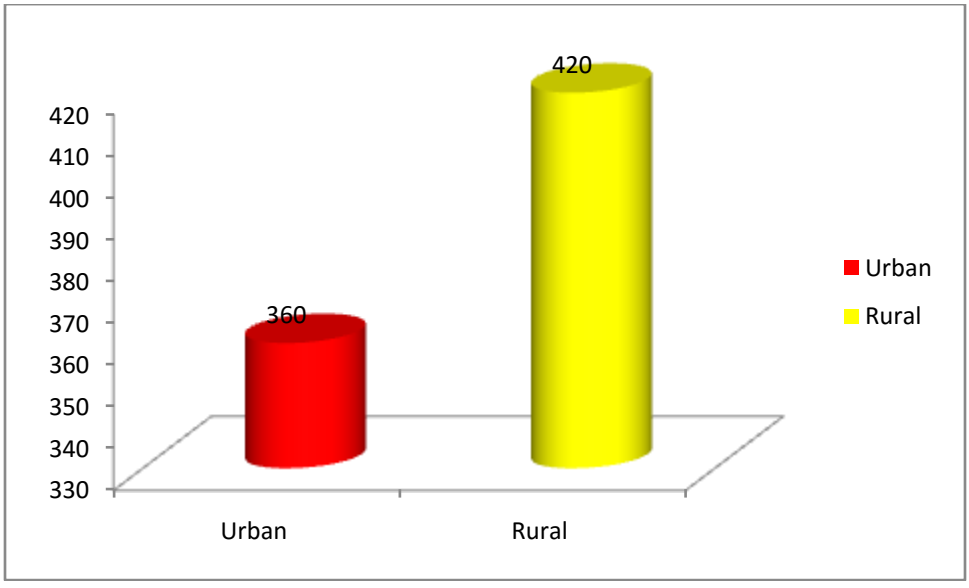


Fig. 4: Proportion of respondents by location

Figure 4 shows that 53.8% of the respondents were from the rural area while 46.2% of the respondents were from the urban area.

4.2.1 Answering of Research Questions

Research Question 1

Do households have knowledge of environmental sanitation in Bauchi state?

Table 4.1: Frequency, Percentage, Mean and Standard Deviation of knowledge of Households on Environmental Sanitation

S/N	**Statement:** I know that	Mean	Std.Dev
1.	Environmental sanitation among household can help to protect the household against diseases.	3.75	0.452
2.	Refuse are collected in a waste bin after cleaning.	3.27	0.654
3.	Waste can be stored before transportation.	3.03	0.667
4.	Household wastes are separated before disposal.	2.81	0.834
5.	Households Sewage, garbage and excreta are treated before proper disposal.	2.65	0.912
6.	All household wastes are transported to dump site for safety.	2.97	0.959
7.	Household wastes are to be dumped in government provided dump site.	2.79	0.931
8.	Household waste can be recycled or re-used	2.67	0.953
9.	Household are to have safe and proper drinking water with regular water quality monitoring.	3.19	0.690
10.	Household have appropriate and proper sanitation of toilet facilities.	3.15	0.642
11.	Waste from houses are compose	2.90	0.767
12.	Land are fill with household waste	2.23	0.991
13.	Incinerator machine is used to burn household waste	1.85	0.914
	Decision mean = 2.50	Aggregate mean = 2.87	

Table 4.1 shows the frequency, percentage, mean and standard deviation of knowledge of households on environmental sanitation. The table revealed that only items 12 (I know that Land are filled with household waste) and 13 (I know that Incinerator machine is used to burn household waste) with the mean scores of 2.23 and 1.85 respectively had the mean scores less

than 2.50 of the decision mean. However, the aggregate mean score of 2.87 is greater than the decision means a score of 2.50; therefore, this implies that the households in Bauchi State have a good knowledge of environmental sanitation.

Research Question 2

What is the attitude of households towards environmental sanitation in Bauchi state?

Table 4.2: Frequency, Percentage, Mean and Standard Deviation of the Attitude of Households on Environmental Sanitation

S/N	Statement	Mean	Std.Dev
1.	I believe that environmental sanitation among household help to protect diseases.	3.55	0.688
2.	I believe that household waste is to be collected before storing.	3.13	0.606
3.	I believe that household waste are first to be stored before transportation.	3.17	0.767
4.	I desire the segregate of household waste before disposal.	3.20	0.742
5.	I believe that households Sewage, garbage and excreta are treated before proper disposal.	2.82	0.810
6.	I thought that All household wastes are transported to dump site.	3.04	0.789
7.	I believe that household wastes are dumped in government provided dump site.	2.66	0.960
8.	I thought that Some household waste are recycled or re-used	2.62	0.959
9.	I believe the Household has safe and proper drinking water with regular water quality monitoring.	3.18	0.761
10.	I feel that Household has appropriate sanitation of toilet facilities.	3.10	0.761
11.	I believe that waste from houses are compose	2.99	0.715
12.	I thought that Land are fill with household waste	2.47	0.797
13.	I believe that Incinerator machine is used to burnt household waste	1.91	0.977
	Decision mean = 2.50	Aggregate mean = 2.91	

Table 4.2 shows the frequency, percentage, mean and standard deviation of attitude of households towards environmental sanitation. The table revealed that only items number 12 and 13 with the mean scores of 2.47 and 1.91 respectively had the mean scores less than 2.50 of the decision mean. The table also revealed that the aggregate mean score (2.91) is greater than the decision mean score of 2.50; this implies that the households in Bauchi State have a positive good attitude towards the environmental sanitation.

Research Question 3

What are the practices of environmental sanitation among households in Bauchi state?

Table 4.3: Frequency, Percentage, Mean and Standard Deviation of Practices of Households on Environmental Sanitation

S/N	Statement	Mean	Std.Dev
1.	Households use to sanitize their environment to promote healthy condition of the environment.	3.65	0.561
2.	I use container to collect refuse.	3.14	0.623
3.	I use refuge container to store the waste.	3.08	0.708
4.	I use to segregate household waste before disposal.	2.81	0.876
5.	I use to treat Sewage, garbage and excreta before proper disposal.	2.61	0.866
6.	I transport the wastes to dump site.	2.95	0.904
7.	I use to dump the wastes in government provided dump site.	2.70	0.950
8.	I recycle or re-use my household waste by decomposing.	2.51	0.983
9.	I have safe and proper drinking water with regular water quality monitoring.	3.22	0.732
10.	I appropriately sanitize my toilet facilities.	3.09	0.703
11.	I compose waste from my house	2.92	0.751
12.	I fill land with household waste.	2.27	1.072
13.	I use Incinerator machine to burnt household waste	1.72	0.799
	Decision mean = 2.50	Aggregate mean = 2.82	

Table 4.3 shows the frequency, percentage, mean and standard deviation of practices of households on environmental sanitation. The table revealed that only items number 12 and 13 with the mean scores of 2.47 and 1.91 respectively had the mean scores less than 2.50 of the decision mean and item 8 (2.51) which is slightly greater than the decision mean. The table also revealed that the aggregate mean score (2.82) is greater than the decision mean score of 2.50; this implies that the households in Bauchi State have a good practice towards the environmental sanitation.

Research Question 4

Is there any relationship between knowledge and attitude of households towards environmental sanitation in Bauchi State?

Table 4.4: Influence of Knowledge on the Attitude of Households towards Environmental Sanitation

Variable	N	Mean	Std. Dev	r-value
Knowledge	780	37.27	4.907	0.685
Attitude	780	37.83	4.823	

Table 4.4 shows the influence of knowledge on the attitude of households towards environmental sanitation. The table revealed that knowledge has a positive influence on the attitude of households towards environmental sanitation. This is because the strength of the relationship between the knowledge and attitude is high (r-value = 0.685). This shows that knowledge influences the attitude of households towards environmental sanitation.

Research Question 5

Is there any relationship between knowledge and practice of environmental sanitationamong households in Bauchi State?

Table 4.5: Influence of Knowledge on the Practices of Households towards Environmental Sanitation

Variable	N	Mean	Std. Dev	r-value
Knowledge	780	37.27	4.907	0.714
Practice	780	36.66	5.044	

Table 4.5 shows the influence of knowledge on the practices of households towards environmental sanitation. The table revealed that there is a positive relationship (r-value = 0.714) between knowledge and practices of households towards environmental sanitation in the study area. This shows that the knowledge of environmental sanitation has a strong influence on the practice among households in the study area (r-value = 0.714).

4.3 Testing of Hypotheses

Hypothesis 1

The knowledge of environmental sanitation does not significantly differ among households in Bauchi State.

Table 4.6: One Sampled t-test Analysis on the Knowledge of Environmental Sanitation among Households in Bauchi state

Variable	N	Mean	Std. Dev.	df	t-cal	t-crit	p-value	Remark
Knowledge	780	37.27	4.907	779	197.876	1.962	0.000	Significant

Significant at $p<0.05$

Decision mean = 2.50

Table 4.6 shows the summary of one sampled t-test analysis on the knowledge of environmental sanitation among households in Bauchi state. The table revealed that the p-value (0.000) is less than 0.05 alpha level of significant. In other words, the t-cal of 197.876 is greater than t-crit of 1.962. Therefore, the hypothesis is rejected. This implies that the knowledge of

environmental sanitation among Households in Bauchi state is statistically significant. This means that the households in Bauchi State have a good knowledge of environmental sanitation.

Hypothesis 2

The attitude towards environmental sanitation among households in Bauchi state is not significant

Table 4.7: One Sample t-test Analysis on the Attitude of Environmental Sanitation among Households in Bauchi state

Variable	N	Mean	Std. Dev.	df	t-cal	t-crit	p-value	Remark
Attitude	780	37.83	4.823	779	204.617	1.962	0.000	Significant

Significant at p<0.05
Decision mean = 2.50

Table 4.7 shows the summary of one sample t-test analysis on the attitude of environmental sanitation among Households in Bauchi state. The table revealed that the p-value (0.000) is less than 0.05 alpha level of significance. In other words, the t-cal of 204.617 is greater than t-crit of 1.962. Therefore, the hypothesis is rejected. This implies that the attitude towards environmental sanitation among households in Bauchi state is statistically significant.

Hypothesis 3

The practice of environmental sanitation among households in Bauchi state is not significant.

Table 4.8: One Sample t-test Analysis on the Practice of Environmental Sanitation among Households in Bauchi state

Variable	N	Mean	Std. Dev.	df	t-cal	t-crit	p-value	Remark
Practice	780	36.66	5.044	779	189.110	1.962	0.000	Significant

Significant at p<0.05
Decision mean = 2.50

Table 4.8 shows the summary of one sample t-test analysis on the practice of environmental sanitation among households in Bauchi state. The table revealed that the p-value (0.000) is less

than 0.05 alpha level of significance. In other words, the t-cal of 189.110 is greater than t-crit of 1.962. Therefore, the hypothesis is rejected. This implies that the practice of environmental sanitation among households in Bauchi state is statistically significant.

Hypothesis 4

There is no significant relationship between knowledge and attitude of households towards environmental sanitation in Bauchi State?

Table 4.9: Summary of Pearson Product Moment Correlation (PPMC) on the Relationship between Knowledge and Attitude of Households towards Environmental Sanitation in Bauchi State

Variable	N	Mean	Std. Dev	df	r-value	r-crit	p-value	Remark
Knowledge	780	37.27	4.907	778	0.685	0.087	0.000	significant
Attitude	780	37.83	7.823					

Table 4.9 shows the relationship of knowledge of environmental sanitation on the attitude of households towards environmental sanitation. The table revealed that (r-value = 0.685) which means that there is a positive relationship between the knowledge and attitude of households towards environmental sanitation in the study area. The table also revealed that the p-value of 0.000 is less than 0.05 level of confidence. Since the r-cal (0.685) is greater than r-crit (0.087), the hypothesis is, therefore, rejected. This implies that knowledge of environmental sanitation significantly influences the attitude among households in Bauchi state.

Hypothesis 5

There is no significant relationship between knowledge and practice of households towards environmental sanitation in Bauchi State?

Table 4.10: Summary of Pearson Product Moment Correlation (PPMC) on the Relationship between Knowledge and Practice of Households towards Environmental Sanitation in Bauchi State

Variable	N	Mean	Std. Dev	df	r-value	r-crit	p-value	Remark
Knowledge	780	37.27	4.907	778	0.714	0.087	0.000	significant
Practice	780	36.66	5.044					

Table 4.10 shows the relationship of knowledge of environmental sanitation on the practice of households towards environmental sanitation. The table revealed that (r-value = 0.714) which means that there is a positive relationship between the knowledge and practice of households towards environmental sanitation in the study area. The table also revealed that the p-value of 0.000 is less than 0.05 level of confidence. Since the r-cal (0.714) is greater than r-crit (0.087), the hypothesis is therefore rejected. This implies that knowledge of environmental sanitation significantly influences the practice among households in Bauchi state.

4.4 Discussion

The purpose of this study was to assess the knowledge, attitude and practice of environmental sanitation among households in Bauchi state, to achieve this purpose, the data on knowledge, attitude and practice of environmental sanitation was computed and results discussed. Five hypotheses were formulated and tested for this study.

Concerning knowledge of environmental sanitation, the result of the study revealed that Households in Bauchi state are knowledgeable about environmental sanitation with the p-value (0.000) is less than 0.05 alpha level of significant. In other words, the t-cal of 197.876 is greater

than t-crit of 1.962. Therefore, the hypothesis is rejected. This implies that the knowledge of environmental sanitation among households in Bauchi state is statistically significant. This means that the households in Bauchi State have a good knowledge of environmental sanitation.

The finding of this study is in line with the study of Olawale and olatunji (2014), on their study which was carriedout in Osun State, Nigeria on knowledge and attitudes of people on monthly environmental sanitation programme. The finding revealed that knowledge pattern of people on monthly environmental sanitation programme in Osun state is significant. Rafiq and Itrat (2017) concluded a study on sanitation and hygiene knowledge, attitude and practices in urban setting of Bangalore the study reveals that existing knowledge of respondents regarding sanitation and hygiene was satisfactory. Florence et al. (2013) conducted a research on knowledge, attitude and practice on waste management of people living in the University area of Ogbomoso, the findings revealed that there was improper knowledge hence it is necessary to embark on the development of long-term refuse management awareness programs which contradicts this study. The findings of Iwu et al, (2017) on knowledge, attitude and practices of food hygiene among food vendors in Owerri, Imo State, Nigeria the study revealed that majority of the respondents had a good level of knowledge is in line with this study. Whereas Daramola, Ojo, and Joel (2016), conducted study onenvironmental sanitation perception and practices of the disposal of the dead in the Ile-Ife City, Nigeria the findings revealed that most of the residents did not have knowledge about the polluting effects of disposal of the dead on the nearby water sources it is contrary to this study.

The result of hypothesis two revealed the attitude towards environmental sanitation, the result of the study revealed that households in Bauchi state has positive attitude towards environmental sanitation with the p-value (0.000) is less than 0.05 alpha level of significance. In other words, the t-cal of 204.617 is greater than t-crit of 1.962. Therefore, the hypothesis is

rejected. This implies that the attitude towards environmental sanitation among households in Bauchi state is statistically significant. The finding of this study is in line with the study of Kaithery and Karunakaran, (2019) who conducted their study on attitude of household waste management in a rural area of northern Kerala the study population had positive attitude. Similarly, in a study conducted by Duru et al, (2017), on environmental sanitation practices: A Case study of solid waste management in semi-urban communities in Orlu, Imo State Nigeria found that the participants had good level of attitude towards environment sanitation.

Abogan (2014) conducted research on appraisal of existing sanitation technology in Nigeria; A critical review in ten states of the country and the results from the communities revealed that backwardness in the provision of sustainable sanitation technology which indicates the whole Nigeria is still having problem of sustainable sanitation which is contrary to these research findings.

Mohd and Malik (2017) conducted study on sanitation and hygiene knowledge, attitude and practices in urban setting of Bangalore: A cross-sectional study reveals that significant association was found between sanitation and hygiene practices and socio-economic. Sanitation and hygiene was satisfactory but there was a clear gap between knowledge and actual practices. Hence, implementation of an effective behavior change communication strategy is a prerequisite to translate knowledge into actual practice,this is not in line with this study.

The result of the tested hypothesis three revealed the practice of environmental sanitation, the result of the study revealed that households in Bauchi state has positive practice towards environmental sanitation with the p-value (0.000) is less than 0.05 alpha level of significance. In other words, the t-cal of 189.110 is greater than t-crit of 1.962. Therefore, the hypothesis is rejected. This implies that the practice of environmental sanitation among households in Bauchi state is statistically significant.The finding of this study is contrary with the findings of Ekong

(2015) who conducted study on an assessment of environmental sanitation in an urban community in southern Nigeria the finding reveals that unwholesome practices like open refuse dumping and building of pit latrines close to the house were prevalent in this community. though Daramola (2016) conducted his study onconceptual modelling of residents' environmental sanitation behaviour in a Nigerian metropolis the findings revealed that environmental sanitation exercise was a strong and statistically significant predictor of environmental sanitation behaviour in Ibadan metropolis while other factors were trailing behind with 2.9% contribution. These findings suggest that environmental sanitation in Ibadan metropolis was mainly an exercise rather than a practice.

The result of tested hypothesis four showed that knowledge of environmental sanitation significantly influences the attitude among households in Bauchi state.Becausethe table revealed that (r-value = 0.685) which means that there is a positive relationship between the knowledge and attitude of households towards environmental sanitation in the study area. The table also revealed that the p-value of 0.000 is less than 0.05 level of confidence. Since the r-cal (0.685) is greater than r-crit (0.087), the hypothesis is, therefore, rejected. This implies that Knowledge of environmental sanitation significantly influences the attitude among households in Bauchi state.The findings 0fthis study is in line withthe study of Laor, et al.(2018), who conducted the study on knowledge, attitude and practice of municipal solid waste management among highland residents in northern Thailand the finding revealed the respondents who have good knowledge also have a good level of practice; and those who have good attitude also have a good level of practice. Socio-demographic factors and suitable way to promote an effective municipal solid waste (MSW) management should be consideredand Knowledge of MSW significantly influences the attitude. Contrary to the findings of this study.Aswathy (2015) conducted studyon knowledge and practice regarding environmental sanitation and hygiene among general

population. The finding reveals that there is a weak positive correlation between level of knowledge and standard of practice regarding environmental sanitation and hygiene.

The result of the tested hypothesis five which implies that knowledge of environmental sanitation significantly influences the practice among households in Bauchi state. The table revealed that (r-value = 0.714) which means that there is a positive relationship between the knowledge and practice of households towards environmental sanitation in the study area. The table also revealed that the p-value of 0.000 is less than 0.05 level of confidence. Since the r-cal (0.714) is greater than r-crit (0.087), the hypothesis is therefore rejected. This finding is in lines with the findingof Anijaobi-Idem, et al. (2015) who conducted studyon environmental awareness and school sanitation in Calabar metropolis of Cross Rivers state, Nigeriathe result indicates that the calculated value for environmental awareness and classroom sanitation is .719, which implies that there is a positive relationship between environmental awareness and classroom sanitation. The positive relationship means that as environmental awareness increases, classroom sanitation also increases and vice versa, it means that the observed positive relationship between environmental awareness and classroom sanitation is statistically significant. Also Safo-Adu & Hanson (2019) conducted study of Practices and knowledge about environmental sanitation and hygiene among urban dwellers in Gomoa east district, Ghana and the finding is not in line with the finding of this study,their study revealed that A Pearson product-moment correlation result showed that there was no relationship between standard practices and knowledge about environmental sanitation and hygiene ($r = 0.058$, $p = 0.274$). Major findings of the study lead to a conclusion that even though inhabitant's knowledge about environmental sanitation and hygiene was high there was a clear gap between knowledge and actual practices hence the district environmental health and sanitation department in collaboration with environmental protection

agency should implement effective behavioural change communication strategy among the urban dwellers to translate knowledge into actual practice.

Duru, Iwu, Diwe, Uwakwe, Merenu, Madubueze, Okedo-Alex, Ndukwu, Ohale& Nwaigbo (2017)conducted study onenvironmental sanitation practices: A case study of solid waste management in semi-urban communities in Orlu, Imo state Nigeria.The results revealed that the mean age of the respondents was 37.0 ± 2.2 with a male to female ratio of 1:1.2. Despite high awareness about environmental sanitation (95.0%) reported among the respondents, proportion of them with good knowledge about environmental sanitation (22.9%), attitude (38.6%) and practice (20.8%) towards environmental sanitation was low this is also not in line with findings of this study.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATION

5.1 Summary

The purpose of this study was to assess knowledge, attitude and practice towards environmental sanitation among households in Bauchi state. Five (5) objectives, research questions, and hypotheses were formulated and tested respectively for this study. Related literature was reviewed under the concept of environment**,** concept of environmental sanitation, knowledge of environmental sanitation among households in Nigeria**,** attitude toward environmental sanitation among households in Nigeria**,** practices of environmental sanitation, history of environmental sanitation in Nigeria**,** sanitation problems in Nigeria**,** environmental wastes**,** strategies to improve environmental sanitation**,** refuse collection and refuse disposal**,** garbage and toxic wastes**,** dumps and sanitary land-fill**,** empirical reviewandsummary. The ex-post facto research design was adopted for this study. The population of the study comprised the entire households in Bauchi state which were 847,731 based on the 2006 census figure but the population of the study was projected to 2018 which was computed using an exponential method with 2.61% as the annual growth rate for Nigeria which was estimated at 1,113,240. The three (3) senatorial districts in the state are Bauchi north with a projected population of (359,577), Bauchi south (408,559) and Bauchi central (345,104). A sample of 780 households was drawn from the population using a multi-stage sampling procedure consisting of simple random sampling, stratified sampling, proportionate sampling, and systematic sampling techniques.

The instrument for data collection was a researcher developed questionnaire which was validated by five (5) experts within and outside the department of human kinetics and health education, Ahmadu Bello University, Zaria.

The data, thus, collected was analyzed to assess:

1. Knowledge of environmental sanitation among households in Bauchi state.
2. Attitude towards environmental sanitation among households in Bauchi state.
3. Practice of environmental sanitation among households in Bauchi state.
4. Influence of knowledge on attitude towards environmental sanitation among households in Bauchi state.
5. Influence of knowledge on practice towards environmental sanitation among households in Bauchi state.

5.1.1 The findings of this study were summarized as follows;

i. The households in Bauchi State have a significant knowledge of environmental sanitation ($t = 197.876$; $p = 0.000$).
ii. The attitude towards environmental sanitation among households in Bauchi state is statistically significant ($t = 204.617$; $p = 0.000$).
iii. The practice of environmental sanitation among households in Bauchi state is statistically significant ($t = 189.110$; $p = 0.000$).
iv. Knowledge of environmental sanitation significantly influences the attitude towards environmental sanitation among households in Bauchi state ($r = 0.685$; $p = 0.000$).
v. Knowledge of environmental sanitation significantly influences its practice among households in Bauchi state ($r = 0.714$; $p = 0.000$).

5.2 Conclusion

Based on the findings of this study, it was concluded that adequate and positive knowledge of environmental sanitation while attitude and practice exist among household in Bauchi State, but specifically, the following conclusions were drawn:

1. Households in Bauchi state have knowledge of environmental sanitation.

2. Households in Bauchi state have positive attitude towards environmental sanitation.
3. Households in Bauchi state Practice environmental sanitation.
4. The household's knowledge about environmental sanitation influences their attitude towards environmental sanitation in Bauchi state.
5. The household's knowledge about environmental sanitation influences the practice of environmental sanitation among households in Bauchi state.

5.3 Contributions to Knowledge

This study contributes to knowledge and existing literature that;

1. Households in Bauchi State have a good knowledge of environmental sanitation ($p = 0.000$)
2. Attitude towards environmental sanitation among households in Bauchi state is positive ($p = 0.000$).
3. Environmental sanitation among Households in Bauchi state is been practice ($p = 0.000$).
4. Knowledge of environmental sanitation positively influences the attitude towards environmental sanitation among households in Bauchi state ($p = 0.000$).
5. Knowledge of environmental sanitation positively influences its practice among households in Bauchi state ($p = 0.000$).

5.4 Recommendations

Based on the conclusions of this study, the following recommendations are made; Since it has been recognized that adequate and positive knowledge of environmental sanitation and household attitude and practice exist in Bauchi state, and therfore the researcher made the following recommendations;

i. Policymakers in government and non-governmental organizations should redesign a plan of action to maintain the positive knowledge, attitude, and practice of environmental sanitation among households in Bauchi State.

ii. Household Activities that can improve practice such as health education intervention program (in print media, radio jingles, and video play) should be made available by Bauchi State environmental protection agency (BASEPA) through health education programme for the populace (households) to maintain and improve attitude and practice towards environmental sanitation.

iii. Adequate interventions program by the ministry of health such as health education and inform of radio jingles programme should be provided for the maintenance and improvement of practice of environmental sanitation for households in Bauchi state.

iv. Government,Stake holders and non-governmental organizations should redesign a plan of action to sensitize the households about theimportance of proper waste disposal so as to maintain their positive attitude in Bauchi State.

v. Modern sanitary equipment should be provided by the government so as to encourage the positive practice of environmental sanitation among households in Bauchi State.

5.5 Implication of the study

Waste generation is a major cause of pollution in the environmentif not properly manage it may cause a lot of harms than good, wastes are generated on daily basis through different activities of human being and if not disposed properly it lead to environmentalpollution.

The findings of this study revealed that households in Bauchi State have proper knowledge, significantattitude and good practice of environmental sanitation, this implies that, they know how to collect, handle, segregate, store, transport and safedisposal of any type of domestic waste in a proper and hygienic manner in such a way that it will not become harmful

to their life's. It is interesting to found that, because of this perfection many diseases would be prevented andthrilled the beauty of the environment and the eco-system would also be maintained. The implication of this study to public and environmental health managers to encourage, educate and support households to maintain the knowledge, attitude and persist practice of the environmental sanitation in the state. Failure to comply will easily affects the land, air and water which will encourage food, air and water borne diseases like cholera, typhoid, malaria and many others will set in. many vector of medical importance like rats, cockroaches, flies would have a favorable environment for breeding ground thereby leading to epidemics.

5.6 Suggestions for Future Research

Further studies should be conducted on the following:

i. Knowledge of environmental sanitation among bakery workers in Bauchi state.

ii. Knowledge, attitude and practice towards environmental sanitation among restaurants in Bauchi state.

iii. Knowledge, attitude and strategies of BASEPA towards environmental sanitation waste disposal and incineration process in Bauchi state, Nigeria.

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APPENDICES

Appendix 1: LETTER OF INTRODUCTION

DEPARTMENT OF HUMAN KINETICS AND HEALTH EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA - NIGERIA
OFFICE OF THE HEAD OF DEPARTMENT
VICE CHANCELLOR: Professor Ibrahim Garba, B.Sc, M.Sc., (ABU); Ph.D. (London); D.I.C.
HEAD OF DEPARTMENT: Professor M. A. Suleiman, N.C.E. (OYSCE); B.Sc. (UNICAL); M.Sc, Ph.D. (ABU)

Our Ref. No.: HKHE/I-4 Date: ----------

Dear Sir/Madam,

LETTER OF INTRODUCTION FOR DATA COLLECTION

Mohammed Ahmed with Reg. No. P15EDPE8023 is a Post Graduate student of the above named Department. He is conducting research in the area of **"Knowledge, Attitude and Practice Towards Environmental Sanitation among Households in Bauchi State, Nigeria"**

He solicits for information from your reputable organization. Please assist him to collect relevant information for his research work.

Thanking you.

Yours faithfully,

Prof. M.A. Suleiman
Major Supervisor

Appendix 2: QUESTIONAIRE

Department of human kinetics and
health education
Faculty of education
Ahmadu Bello University Zaria,

Dear respondent,

I am a postgraduate student in the department of human kinetics and health education, Faculty of education Ahmadu Bello University Zaria carrying out an investigation on the knowledge, attitude and practice of environmental sanitation among households in Bauchi state as part of the requirement for master's degree award in health education. The questionnaire will require only ticking along the rate of four likert scale type. Your contribution is greatly appreciated and if you have any question during administration of the questionnaire please do not hesitate to ask.

Your kind response to the attached questionnaire would be treated with utmost confidentiality and all personal and office privacy are assured.

Thank you

Sincerely Yours

Ahmed Mohammed

QUESTIONNAIRE ON KNOWLEDGE ATTITUTE AND PRACTICE TOWARDS ENVIRONMENTAL SANITATION AMONG HOUSEHOLDS IN BAUCHI STATE, NIGERIA (QOKAPTESAH)

INSTRUCTION: Please respond by ticking (√) the appropriate box.

SECTION A: Demographic information of the respondent.

1. Age range (in years):

(a) 18-25 years [ ]

(b) 26-30 years [ ]

(c) 31-40 years [ ]

(d) 41 years and above [ ]

2. Gender:

(a) Male [ ]

(b) Female [ ]

3. Marital Status:

(a) Married [ ]

(b) Single [ ]

(c) Divorce [ ]

(d) Widow [ ]

4. Location:

(a) Urban [ ]

(b) Rural [ ]

SECTION B: **KNOWLEDGE OF ENVIRONMENTAL SANITATION AMONG HOUSEHOLDS IN BAUCHI STATE, NIGERIA**

The following statements relating to knowledge of Environmental Sanitation among Households are based on a four-point scale.

Key: Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD)

KNOWLEDGEOF ENVIRONMENTAL SANITATION

S/N	I know that:	SA	A	D	SD
1.	Environmental sanitation among household can help to protect the household against diseases.				
2.	Refuse are collected in a waste bin after cleaning.				
3.	Waste can be stored before transportation.				
4.	Household wastes are separated before disposal.				
5.	Households Sewage, garbage and excreta are treated before proper disposal.				
6.	All household wastes are transported to dump site for safety.				
7.	Household wastes are to be dumped in government provided dump site.				
8.	Household waste can be recycled or re-used				
9.	Household are to have safe and proper drinking water with regular water quality monitoring.				
10.	Household have appropriate and proper sanitation of toilet facilities.				
11.	Wastes from houses are composed in a waste bin container.				
12.	Land are fill with household waste				
13.	Incinerator machine is used to burnt household waste				

SECTION C: ATTITUDE TOWARDS ENVIRONMENTAL SANITATION AMONG HOUSEHOLDS IN BAUCHI STATE, NIGERIA

The following statements relating to attitude towards environmental sanitation among households are based on a four-point scale.

Key: Strongly Agree (SA), Agree (A), Disagree (D) and strongly Disagree (SD)

ATTITUDE TOWARDS ENVIRONMENTAL SANITATION

S/N	STATEMENT	SA	A	D	SD
1.	I believe that environmental sanitation among household help to protect diseases.				
2.	I believe that household waste is to be collected before storing.				
3.	I believe that household waste are first to be stored before transportation.				
4.	I desire the segregate of household waste before disposal.				
5.	I believe that households Sewage, garbage and excreta are treated before proper disposal.				
6.	I thought that All household wastes are transported to dump site.				
7.	I believe that household wastes are dumped in government provided dump site.				
8.	I thought that Some household waste are recycled or re-used				
9.	I believe Household has safe and proper drinking water with regular water quality monitoring.				
10.	I feel that Household has appropriate sanitation of toilet facilities.				
11.	I believe that wastes from houses are composed in a waste bin container.				
12.	I thought that Land are fill with household waste				
13.	I believe that Incinerator machine is used to burnt household waste				

SECTION D: PRACTICE TOWARDS ENVIRONMENTAL SANITATION AMONGHOUSEHOLDS IN BAUCHI STATE, NIGERIA.

The following statements relating to practice towards environmental sanitation among households are based on a four-point scale.

Key: Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD)

PRACTICE TOWARDS ENVIRONMENTAL SANITATION

S/N	STATEMENT	SA	A	D	SD
1.	Households use to sanitize their environment to promote healthy condition of the environment.				
2.	I use container to collect refuse.				
3.	I use refuge container to store the waste.				
4.	I use to segregate household waste before disposal.				
5.	I use to treat Sewage, garbage and excreta before proper disposal.				
6.	I transport the wastes to dump site.				
7.	I use to dump the wastes in government provided dump site.				
8.	I recycle or re-use my household waste by decomposing.				
9.	I have safe and proper drinking water with regular water quality monitoring.				
10.	I appropriately sanitize my toilet facilities.				
11.	I compose waste from my house				
12.	I fill land with household waste.				
13.	I use Incinerator machine to burnt household waste				

Appendix 3: SAMPLE SIZE

Required Sample Size†

Population Size	Confidence = 95% Margin of Error				Confidence = 99% Margin of Error			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75
100	80	89	94	99	87	93	96	99
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	475	285	365	421	485
600	234	340	432	565	315	416	490	579
700	248	370	481	653	341	462	554	672
800	260	396	526	739	363	503	615	763
1,000	278	440	606	906	399	575	727	943
1,200	291	474	674	1067	427	636	827	1119
1,500	306	515	759	1297	460	712	959	1376
2,000	322	563	869	1655	498	808	1141	1785
2,500	333	597	952	1984	524	879	1288	2173
3,500	346	641	1068	2565	558	977	1510	2890
5,000	357	678	1176	3288	586	1066	1734	3842
7,500	365	710	1275	4211	610	1147	1960	5165
10,000	370	727	1332	4899	622	1193	2098	6239
25,000	378	760	1448	6939	646	1285	2399	9972
50,000	381	772	1491	8056	655	1318	2520	12455
75,000	382	776	1506	8514	658	1330	2563	13583
100,000	383	778	1513	8762	659	1336	2585	14227
250,000	384	782	1527	9248	662	1347	2626	15555
500,000	384	783	1532	9423	663	1350	2640	16055
1,000,000	384	783	1534	9512	663	1352	2647	16317
2,500,000	384	784	1536	9567	663	1353	2651	16478
10,000,000	384	784	1536	9594	663	1354	2653	16560
100,000,000	384	784	1537	9603	663	1354	2654	16584
300,000,000	384	784	1537	9603	663	1354	2654	16586

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Determining Sample Size for Research Activities" (*Educational and Psychological Measurement*#30, pp. 607-610). Paul C. Boyd (2006)

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Appendix 4: BLIND FOLD SELECTED LGAs OF BAUCHI STATE ACCORDING TO SANETORIAL ZONE

S/No:	Bauchi North	S/No:	Bauchi South	S/No:	Bauchi Central
1.	Gamawa	1.	Alkaleri	1.	Dambam
2.	Giade	2.	Bauchi	2.	Darazo
3.	Itas-Gadau	3.	Bogoro	3.	Ganjuwa
4.	Jama'are	4.	Dass	4.	Misau
5.	Katagum	5.	Kirfi	5.	Ningi
6.	Shira	6.	Tafawa- Balewa	6.	Warji
7.	Zaki	7.	Toro		

Appendix 5: FEDERAL REPUBLIC OF NIGERIA INDEPENDENT NATIONAL ELECTORAL COMMISSION (INEC)

List of wards in twenty (20) local Government area in Bauchi state (INEC, 2015)

S/No:	ALKALERI	S/No	BAUCHI
1	ALKALERI	1	MAJIDADI 'A'
2	PALI	2	MAJIDADI 'B'
3	GAR	3	MAKAMA /SARKI BAKI
4	GWARAM	4	ZUNGUR /LIMAN KATAGUM
5	MAIMADI	5	MUN /MUNSAL
6	DAN KUNGIBAR	6	DANDANGO /YAMRAT
7	BIRIN / GIGARA/ YANKARI	7	BIRSHI /MIRI
8	YULI / LIM	8	KUNDUM /DURUM
9	FUTUK	9	KANGYARE /TURWUN
10	YALO	10	GALAMBI /GWASKWARAM
11	GWANA / MANSUR	11	DAN'IYA HARDO
12		12	DAWAKI

S/No:	BOGORO	S/No	DASS
1	BOGORO "A"	1	BAGEL /BAJAR
2	BOGORO "B"	2	BUNDOT
3	BOGORO "C"	3	BUNUNU CENTRAL
4	BOGORO "D"	4	BUNUNU SOUTH
5	B O I "A"	5	BARAZA
6	B O I "B"	6	DOTT
7	B O I "C"	7	DORR
8	LUSA "A"	8	POLCHI
9	LUSA "B"	9	WANDI
10	LUSA "C"	10	ZUMBUL /LUKSHI

S/N	KIRFI
1	BADARA
2	BARA
3	BENI "A"
4	BENI "B"
5	DEWU CENTRAL
6	DEWU EAST
7	KIRFI
8	SHANGO
9	TUBULE
10	WANKA

S/N	TORO
1	TORO / TULAI
2	TILDEN FULANI
3	RIBINA
4	MARA / PALAMA
5	RAUTA / GEJI
6	JAMA'A / ZARANDA
7	LAME
8	WONU
9	ZALAU / RISHI
10	TAMA
11	RAHAMA

S/No	GIADE
1	CHINKANI
2	SABON SARA
3	DOGUWA CENTRAL
4	DOGUWA SOUTH
5	GIADE
6	ISAWA
7	UZUM "A"
8	UZUM "B"
9	ZABI
10	ZIRRAMI

S/N	TAFAWA-BALEWA
1	KARDAM "A"
2	KARDAM "B"
3	LERE NORTH
4	LERE SOUTH
5	TAPSHIN
6	WAI
7	BALL
8	BULA
9	DAJIN
10	DULL
11	BUNUNU

S/N	GAMAWA
1	GAMAWA
2	KAFIN ROMI
3	GOLOLO
4	KUBDIYA
5	ALAGARNO/JADORI
6	TUMBI
7	UDUBO
8	TARMASUWA
9	RAGA
10	GADIYA
11	ZINDI

S/No	ITAS/GADAU
1	ITAS
2	MASHEMA
3	GWARAI
4	ABDALLAWA /MAGARYA
5	BUZAWA
6	BILKICHERI
7	BAMBAL
8	GADAU
9	KASHURI
10	ZUBUKI

S/No	JAMA'ARE
1	JAMA'ARE 'A'
2	JAMA'ARE 'B'
3	JAMA'ARE 'C'
4	JAMA'ARE 'D'
5	DOGON JEJI "A"
6	DOGON JEJI "B"
7	DOGON JEJI "C"
8	HANAFARI
9	GALDIMARI
10	JURARA

S/No	KATAGUM
1	TSAKUWA KOFAR GABAS/ KOFAR KUKA
2	NASARAWA BAKIN KASUWA
3	MADANGALA
4	MADARA
5	BUSKURI
6	RAGWAM /MAGONSHI
7	GAMBAKI /BIDIR
8	CHINADE
9	BULKACHUWA /DAGARO
10	YAYU
11	MADACHI /GANGAI

S/No	SHIRA
1	ANDUBUN
2	SAMBUWAL
3	BUKUL /BANGIRE
4	DISINA
5	FAGGO
6	BELI /GAGIDABA
7	KILBORI
8	SHIRA
9	TSAFI
10	TUMFAFI
11	ZUBO

S/No	ZAKI
1	BURSALI
2	KATAGUM
3	TASHENA / GADAI
4	MAKAWA
5	SAKWA
6	GUMAI
7	MURMUR NORTH
8	MURMUR SOUTH
9	ALANGAWARI / KAFIN / LARABAWA
10	MAIWA
11	MAINAKO

S/No	DAMBAM
1	GARUZA
2	GURBANA
3	DAMBAM
4	YANDA
5	YAME
6	DAGAUDA
7	GARGAWA
8	ZAURA
9	JALAM CENTRAL
10	JALAM EAST

:

S/No	DARAZO
1	DARAZO
2	TAUYA
3	GABARIN
4	KONKIYAL
5	LAGO
6	SADE
7	LANZAI
8	YAUTARE
9	GABCIYARI
10	WAHU
11	PAPA

S/No	GANJUWA
1	GANJUWA
2	GUNGURA
3	KAFIN MADAKI
4	KARIYA
5	KUBI EAST
6	KUBI WEST
7	MIYA EAST
8	MIYA WEST
9	NASARAWA NORTH
10	NASARAWA SOUTH
11	YALI

S/No	MISAU
1	ZADAWA
2	BETI
3	JARKASA
4	KUKADI /GUNDARI
5	AJILIN /GUGULIN
6	TOFU
7	HARDAWA
8	SARMA /AKUYAM
9	SIRKO
10	GWARAM

S/No	NINGI
1	NINGI
2	DINGIS
3	NASARU
4	JANGU
5	BALMA
6	KUDU / YAMMA
7	TIFF / GUDU
8	BURA / KYATA
9	SAMA
10	BASHE
11	KURMI

S/No	WARJI
1	BAIMA NORTH / WEST
2	BAIMA SOUTH/EAST
3	DAGU EAST
4	DAGU WEST
5	GABANDA
6	KATANGA
7	RANGA
8	TIYIN
9	TUDUN WADA EAST
10	TUDUN WADA WEST

Source: Adopted and Modified from (INEC, 2015).

Key to color shaded for LGAs and wards

S/No:	Color	Blind fold selected
1.	Yellow	LGAs
2.	Ash	Wards

Appendix 6:ANSWERING OF RESEARCH QUESTIONS

Research Question 1

Do households have knowledge of environmental sanitation in Bauchi state?

Table 4.1: Frequency, Percentage, Mean and Standard Deviation of knowledge of households on environmental sanitation

S/N	**Statement:** I know that	SA	A	D	SD	Mean	Std.Dev
1.	Environmental sanitation among household can help to protect the household against diseases.	588 (75.4%)	188 (24.1%)	3 (0.4%)	1 (0.1%)	3.75	0.452
2.	Refuse are collected in a waste bin after cleaning.	294 (37.7%)	415 (53.2%)	62 (7.9%)	9 (1.2%)	3.27	0.654
3.	Waste can be stored before transportation.	170 (21.8%)	484 (62.1%)	109 (14.0%)	17 (2.2%)	3.03	0.667
4.	Household wastes are separated before disposal.	154 (19.7%)	377 (48.3%)	193 (24.7%)	56 (7.2%)	2.81	0.834
5.	Households Sewage, garbage and excreta are treated before proper disposal.	160 (20.5%)	260 (33.3%)	285 (36.5%)	75 (9.6%)	2.65	0.912
6.	All household wastes are transported to dump site for safety.	254 (32.6%)	339 (43.5%)	95 (12.2%)	92 (11.8%)	2.97	0.959
7.	Household wastes are to be dumped in government provided dump site.	195 (25.0%)	308 (39.5%)	198 (25.4%)	79 (10.1%)	2.79	0.931
8.	Household waste can be recycled or re-used	146 (18.7%)	350 (44.9%)	163 (20.9%)	121 (15.5%)	2.67	0.953
9.	Household are to have safe and proper drinking water with regular water quality monitoring.	263 (33.7%)	419 (53.7%)	85 (10.9%)	13 (1.7%)	3.19	0.690
10.	Household have appropriate and proper sanitation of toilet facilities.	221 (28.3%)	460 (59.0%)	93 (11.9%)	6 (0.8%)	3.15	0.642
11.	Waste from houses are compose	166 (21.3%)	398 (51.0%)	188 (24.1%)	28 (3.6%)	2.90	0.767
12.	Land are fill with household waste	104 (13.3%)	183 (23.5%)	284 (36.4%)	209 (26.8%)	2.23	0.991
13.	Incinerator machine is used to burn household waste	52 (6.7%)	119 (15.3%)	268 (34.4%)	341 (43.7%)	1.85	0.914
	Decision mean = 2.50		Aggregate mean = 2.87				

Research Question 2

What is the attitude of households towards environmental sanitation in Bauchi state?

Table 4.2: Frequency, Percentage, Mean and Standard Deviation of the Attitude of Households on Environmental Sanitation

S/N	Statement	SA	A	D	SD	Mean	Std.Dev
1.	I believe that environmental sanitation among household help to protect diseases.	491 (62.9%)	249 (31.9%)	16 (2.1%)	24 (3.1%)	3.55	0.688
2.	I believe that household waste is to be collected before storing.	195 (25.0%)	493 (63.2%)	88 (11.3%)	4 (0.5%)	3.13	0.606
3.	I believe that household waste are first to be stored before transportation.	278 (35.6%)	391 (50.1%)	80 (10.3%)	31 (4.0%)	3.17	0.767
4.	I desire the segregate of household waste before disposal.	298 (38.2%)	355 (45.5%)	115 (14.7%)	12 (1.5%)	3.20	0.742
5.	I believe that households Sewage, garbage and excreta are treated before proper disposal.	160 (20.5%)	353 (45.3%)	230 (29.5%)	37 (4.7%)	2.82	0.810
6.	I thought that All household wastes are transported to dump site.	236 (30.3%)	366 (46.9%)	154 (19.7%)	24 (3.1%)	3.04	0.789
7.	I believe that household wastes are dumped in government provided dump site.	155 (19.9%)	317 (40.6%)	192 (24.6%)	116 (14.9%)	2.66	0.960
8.	I thought that Some household waste are recycled or re-used	147 (18.8%)	307 (39.4%)	207 (26.5%)	119 (15.3%)	2.62	0.959
9.	I believe the Household has safe and proper drinking water with regular water quality monitoring.	287 (36.8%)	374 (47.9%)	95 (12.2%)	24 (3.1%)	3.18	0.761
10.	I feel that Household has appropriate sanitation of toilet facilities.	223 (28.6%)	434 (55.6%)	103 (13.2%)	20 (2.6%)	3.10	0.761
11.	I believe that waste from houses are compose	219 (28.1%)	357 (45.8%)	180 (23.1%)	24 (3.1%)	2.99	0.715
12.	I thought that Land are fill with household waste	130 (16.7%)	249 (31.9%)	256 (32.8%)	145 (18.6%)	2.47	0.797
13.	I believe that Incinerator machine is used to burnt household waste	67 (8.6%)	116 (14.9%)	274 (35.1%)	323 (41.4%)	1.91	0.977
	Decision mean = 2.50	Aggregate mean = 2.91					

Research Question 3

What are the practices of environmental sanitation among households in Bauchi state?

Table 4.3: Frequency, Percentage, Mean and Standard Deviation of Practices of Households on Environmental Sanitation

S/N	Statement	SA	A	D	SD	Mean	Std.Dev
1.	Households use to sanitize their environment to promote healthy condition of the environment.	537 (68.8%)	219 (28.1%)	19 (2.4%)	5 (0.6%)	3.65	0.561
2.	I use container to collect refuse.	206 (26.4%)	486 (62.3%)	80 (10.3%)	8 (1.0%)	3.14	0.623
3.	I use refuge container to store the waste.	206 (26.4%)	451 (57.8%)	101 (12.9%)	22 (2.8%)	3.08	0.708
4.	I use to segregate household waste before disposal.	184 (23.6%)	314 (40.3%)	228 (29.2%)	54 (6.9%)	2.81	0.876
5.	I use to treat Sewage, garbage and excreta before proper disposal.	123 (15.8%)	302 (38.7%)	279 (35.8%)	76 (9.7%)	2.61	0.866
6.	I transport the wastes to dump site.	227 (29.1%)	357 (45.8%)	124 (15.9%)	72 (9.2%)	2.95	0.904
7.	I use to dump the wastes in government provided dump site.	170 (21.8%)	303 (38.8%)	208 (26.7%)	99 (12.7%)	2.70	0.950
8.	I recycle or re-use my household waste by decomposing.	129 (16.5%)	293 (37.6%)	208 (26.7%)	150 (19.2%)	2.51	0.983
9.	I have safe and proper drinking water with regular water quality monitoring.	302 (38.7%)	365 (46.8%)	99 (12.7%)	14 (1.8%)	3.22	0.732
10.	I appropriately sanitize my toilet facilities.	202 (25.9%)	434 (55.6%)	155 (19.9%)	33 (4.2%)	3.09	0.703
11.	I compose waste from my house	158 (20.3%)	434 (55.6%)	155 (19.9%)	33 (4.2%)	2.92	0.751
12.	I fill land with household waste.	142 (18.2%)	156 (20.0%)	254 (32.6%)	228 (29.2%)	2.27	1.072
13.	I use Incinerator machine to burnt household waste	34 (4.4%)	67 (8.6%)	322 (41.3%)	357 (45.8%)	1.72	0.799
	Decision mean = 2.50		Aggregate mean = 2.82				

Research Question 4

Does knowledge of households influence their attitude about environmental sanitation among households in Bauchi State?

Table 4.4: Influence of Knowledge on the Attitude of Households towards Environmental Sanitation

Variable	N	Mean	Std. Dev	r-value
Knowledge	780	37.27	4.907	0.685
Attitude	780	37.83	4.823	

Table 4.4 shows the influence of knowledge on the attitude of households towards environmental sanitation. The table revealed that knowledge has a positive influence on the attitude of households towards environmental sanitation. This is because the strength of the relationship between the knowledge and attitude is high (r-value = 0.685). This shows that knowledge influences the attitude of households towards environmental sanitation.

Research Question 5

Will the household's knowledge about environmental sanitation influence its practices among households in Bauchi state?

Table 4.5: Influence of Knowledge on the Practices of Households towards Environmental Sanitation

Variable	N	Mean	Std. Dev	r-value
Knowledge	780	37.27	4.907	0.714
Practice	780	36.66	5.044	

Appendix 7: **OUTPUT FROM SPSS**

```
   FREQUENCIES VARIABLES=Know1 Know2 Know3 Know4 Know5 Know6 Know7 Know8
Know9 Know10 Know11 Know12 Know13
     /STATISTICS=STDDEV MEAN
     /ORDER=ANALYSIS.

   FREQUENCIES VARIABLES=Age Gender Marital Location
     /ORDER=ANALYSIS.
```

Statistics

		Age	Gender	Marital	Location
N	Valid	780	780	780	780
	Missing	0	0	0	0

Frequency Table

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25yrs	281	36.0	36.0	36.0
	26-30yrs	236	30.3	30.3	66.3
	31-40yrs	147	18.8	18.8	85.1
	41yrs & above	116	14.9	14.9	100.0
	Total	780	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	445	57.1	57.1	57.1
	Female	335	42.9	42.9	100.0
	Total	780	100.0	100.0	

Marital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Married	407	52.2	52.2	52.2
	Single	278	35.6	35.6	87.8

	Divorce	58	7.4	7.4	95.3
	Widow	37	4.7	4.7	100.0
	Total	780	`100.0	100.0	

Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Urban	360	46.2	46.2	46.2
	Rural	420	53.8	53.8	100.0
	Total	780	100.0	100.0	

	Know1	Know2	Know3	Know4	Know5	Know6	Know7	Know8	Know9	Know10	Know11	Know12	Know13
N	780	780	780	780	780	780	780	780	780	780	780	780	780
Mean	3.75	3.27	3.03	2.81	2.65	2.97	2.79	2.67	3.19	3.15	2.90	2.23	1.85
Std. Dev	.452	.654	.667	.834	.912	.959	.931	.953	.690	.642	.767	.991	.914

Frequency Table

Know1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	1	.1	.1	.1
	D	3	.4	.4	.5
	A	188	24.1	24.1	24.6
	SA	588	75.4	75.4	100.0
	Total	780	100.0	100.0	

Know2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	9	1.2	1.2	1.2
	D	62	7.9	7.9	9.1
	A	415	53.2	53.2	62.3
	SA	294	37.7	37.7	100.0
	Total	780	100.0	100.0	

Know3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	17	2.2	2.2	2.2
	D	109	14.0	14.0	16.2
	A	484	62.1	62.1	78.2
	SA	170	21.8	21.8	100.0
	Total	780	100.0	100.0	

Know4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	56	7.2	7.2	7.2
	D	193	24.7	24.7	31.9
	A	377	48.3	48.3	80.3
	SA	154	19.7	19.7	100.0
	Total	780	100.0	100.0	

Know5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	75	9.6	9.6	9.6
	D	285	36.5	36.5	46.2
	A	260	33.3	33.3	79.5
	SA	160	20.5	20.5	100.0
	Total	780	100.0	100.0	

Know6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	92	11.8	11.8	11.8
	D	95	12.2	12.2	24.0
	A	339	43.5	43.5	67.4
	SA	254	32.6	32.6	100.0
	Total	780	100.0	100.0	

Know7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	79	10.1	10.1	10.1
	D	198	25.4	25.4	35.5
	A	308	39.5	39.5	75.0
	SA	195	25.0	25.0	100.0
	Total	780	100.0	100.0	

Know8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	121	15.5	15.5	15.5
	D	163	20.9	20.9	36.4
	A	350	44.9	44.9	81.3
	SA	146	18.7	18.7	100.0
	Total	780	100.0	100.0	

Know9

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	13	1.7	1.7	1.7
	D	85	10.9	10.9	12.6
	A	419	53.7	53.7	66.3
	SA	263	33.7	33.7	100.0
	Total	780	100.0	100.0	

Know10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	.8	.8	.8
	D	93	11.9	11.9	12.7
	A	460	59.0	59.0	71.7
	SA	221	28.3	28.3	100.0
	Total	780	100.0	100.0	

Know11

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	28	3.6	3.6	3.6
	D	188	24.1	24.1	27.7
	A	398	51.0	51.0	78.7
	SA	166	21.3	21.3	100.0
	Total	780	100.0	100.0	

Know12

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	209	26.8	26.8	26.8
	D	284	36.4	36.4	63.2
	A	183	23.5	23.5	86.7
	SA	104	13.3	13.3	100.0
	Total	780	100.0	100.0	

Know13

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	341	43.7	43.7	43.7
	D	268	34.4	34.4	78.1
	A	119	15.3	15.3	93.3
	SA	52	6.7	6.7	100.0
	Total	780	100.0	100.0	

FREQUENCIES VARIABLES=Atti1 Atti2 Atti3 Atti4 Atti5 Atti6 Atti7 Atti8 Atti9 Atti10 Atti11 Atti12 Atti13
/STATISTICS=STDDEV MEAN
/ORDER=ANALYSIS.

Statistics

	Atti1	Atti2	Atti3	Atti4	Atti5	Atti6	Atti7	Atti8	Atti9	Atti10	Atti11	Atti12	Atti13
Valid	780	780	780	780	780	780	780	780	780	780	780	780	780
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	3.55	3.13	3.17	3.20	2.82	3.04	2.66	2.62	3.18	3.10	2.99	2.47	1.91
Std. Deviation	.688	.606	.767	.742	.810	.789	.960	.959	.761	.715	.797	.977	.948

Frequency Table

Atti1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	24	3.1	3.1	3.1
	D	16	2.1	2.1	5.1
	A	249	31.9	31.9	37.1
	SA	491	62.9	62.9	100.0
	Total	780	100.0	100.0	

Atti2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	.5	.5	.5
	D	88	11.3	11.3	11.8
	A	493	63.2	63.2	75.0
	SA	195	25.0	25.0	100.0
	Total	780	100.0	100.0	

Atti3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	31	4.0	4.0	4.0
	D	80	10.3	10.3	14.2
	A	391	50.1	50.1	64.4
	SA	278	35.6	35.6	100.0
	Total	780	100.0	100.0	

Atti4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	12	1.5	1.5	1.5
	D	115	14.7	14.7	16.3
	A	355	45.5	45.5	61.8
	SA	298	38.2	38.2	100.0
	Total	780	100.0	100.0	

Atti5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	37	4.7	4.7	4.7
	D	230	29.5	29.5	34.2
	A	353	45.3	45.3	79.5
	SA	160	20.5	20.5	100.0
	Total	780	100.0	100.0	

Atti6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	24	3.1	3.1	3.1
	D	154	19.7	19.7	22.8
	A	366	46.9	46.9	69.7
	SA	236	30.3	30.3	100.0
	Total	780	100.0	100.0	

Atti7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	116	14.9	14.9	14.9
	D	192	24.6	24.6	39.5
	A	317	40.6	40.6	80.1
	SA	155	19.9	19.9	100.0
	Total	780	100.0	100.0	

Atti8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	119	15.3	15.3	15.3
	D	207	26.5	26.5	41.8
	A	307	39.4	39.4	81.2
	SA	147	18.8	18.8	100.0
	Total	780	100.0	100.0	

Atti9

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	24	3.1	3.1	3.1
	D	95	12.2	12.2	15.3
	A	374	47.9	47.9	63.2
	SA	287	36.8	36.8	100.0
	Total	780	100.0	100.0	

Atti10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	20	2.6	2.6	2.6
	D	103	13.2	13.2	15.8
	A	434	55.6	55.6	71.4
	SA	223	28.6	28.6	100.0
	Total	780	100.0	100.0	

Atti11

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	24	3.1	3.1	3.1
	D	180	23.1	23.1	26.2
	A	357	45.8	45.8	71.9
	SA	219	28.1	28.1	100.0
	Total	780	100.0	100.0	

Atti12

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	145	18.6	18.6	18.6
	D	256	32.8	32.8	51.4
	A	249	31.9	31.9	83.3
	SA	130	16.7	16.7	100.0
	Total	780	100.0	100.0	

Atti13

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	323	41.4	41.4	41.4
	D	274	35.1	35.1	76.5
	A	116	14.9	14.9	91.4
	SA	67	8.6	8.6	100.0
	Total	780	100.0	100.0	

```
   FREQUENCIES VARIABLES=Prac1 Prac2 Prac3 Prac4 Prac5 Prac6 Prac7 Prac8
Prac9 Prac10 Prac11 Prac12 Prac13
     /ORDER=ANALYSIS.
```

Frequencies

Statistics

		Prac1	Prac2	Prac3	Prac4	Prac5	Prac6	Prac7	Prac8	Prac9	Prac10	Prac11	Prac12	Prac13
N	Valid	780	780	780	780	780	780	780	780	780	780	780	780	780
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0

Frequency Table

Prac1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	.6	.6	.6
	D	19	2.4	2.4	3.1
	A	219	28.1	28.1	31.2
	SA	537	68.8	68.8	100.0
	Total	780	100.0	100.0	

Prac2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	8	1.0	1.0	1.0
	D	80	10.3	10.3	11.3
	A	486	62.3	62.3	73.6
	SA	206	26.4	26.4	100.0
	Total	780	100.0	100.0	

Prac3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	22	2.8	2.8	2.8
	D	101	12.9	12.9	15.8
	A	451	57.8	57.8	73.6
	SA	206	26.4	26.4	100.0
	Total	780	100.0	100.0	

Prac4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	54	6.9	6.9	6.9
	D	228	29.2	29.2	36.2
	A	314	40.3	40.3	76.4
	SA	184	23.6	23.6	100.0
	Total	780	100.0	100.0	

Prac5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	76	9.7	9.7	9.7
	D	279	35.8	35.8	45.5
	A	302	38.7	38.7	84.2
	SA	123	15.8	15.8	100.0
	Total	780	100.0	100.0	

Prac6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	72	9.2	9.2	9.2
	D	124	15.9	15.9	25.1
	A	357	45.8	45.8	70.9
	SA	227	29.1	29.1	100.0
	Total	780	100.0	100.0	

Prac7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	99	12.7	12.7	12.7
	D	208	26.7	26.7	39.4
	A	303	38.8	38.8	78.2
	SA	170	21.8	21.8	100.0
	Total	780	100.0	100.0	

Prac8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	150	19.2	19.2	19.2
	D	208	26.7	26.7	45.9
	A	293	37.6	37.6	83.5
	SA	129	16.5	16.5	100.0
	Total	780	100.0	100.0	

Prac9

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	14	1.8	1.8	1.8
	D	99	12.7	12.7	14.5
	A	365	46.8	46.8	61.3
	SA	302	38.7	38.7	100.0
	Total	780	100.0	100.0	

Prac10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	27	3.5	3.5	3.5
	D	81	10.4	10.4	13.8
	A	470	60.3	60.3	74.1
	SA	202	25.9	25.9	100.0
	Total	780	100.0	100.0	

Prac11

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	33	4.2	4.2	4.2
	D	155	19.9	19.9	24.1
	A	434	55.6	55.6	79.7
	SA	158	20.3	20.3	100.0
	Total	780	100.0	100.0	

Prac12

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	228	29.2	29.2	29.2
	D	254	32.6	32.6	61.8
	A	156	20.0	20.0	81.8
	SA	142	18.2	18.2	100.0
	Total	780	100.0	100.0	

Prac13

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	357	45.8	45.8	45.8
	D	322	41.3	41.3	87.1
	A	67	8.6	8.6	95.6
	SA	34	4.4	4.4	100.0
	Total	780	100.0	100.0	

```
T-TEST
  /TESTVAL=2.50
  /MISSING=LISTWISE
  /VARIABLES=Knowledge Attitude Practice
  /CRITERIA=CI(.95).
```

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Knowledge	780	37.27	4.907	.176
Attitude	780	37.83	4.823	.173
Practice	780	36.66	5.044	.181

One-Sample Test

	Test Value = 2.50					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Knowledge	197.876	779	.000	34.765	34.42	35.11
Attitude	204.617	779	.000	35.333	34.99	35.67
Practice	189.110	779	.000	34.156	33.80	34.51

```
CORRELATIONS
  /VARIABLES=Knowledge Attitude
  /PRINT=TWOTAIL NOSIG
  /STATISTICS DESCRIPTIVES
  /MISSING=LISTWISE.
```

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Knowledge	37.27	4.907	780
Attitude	37.83	4.823	780

Correlations[b]

		Knowledge	Attitude
Knowledge	Pearson Correlation	1	.685**
	Sig. (2-tailed)		.000
Attitude	Pearson Correlation	.685**	1
	Sig. (2-tailed)	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=780

```
CORRELATIONS
  /VARIABLES=Knowledge Practice
  /PRINT=TWOTAIL NOSIG
  /STATISTICS DESCRIPTIVES
  /MISSING=LISTWISE.
```

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Knowledge	37.27	4.907	780
Practice	36.66	5.044	780

Correlations[b]

		Knowledge	Practice
Knowledge	Pearson Correlation	1	.714**
	Sig. (2-tailed)		.000
Practice	Pearson Correlation	.714**	1
	Sig. (2-tailed)	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=780

Reliability test

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.820	13

Item Statistics

	Mean	Std. Deviation	N
Know1	3.80	.405	40
Know2	3.48	.599	40
Know3	2.93	.616	40
Know4	2.58	1.107	40
Know5	2.63	.952	40
Know6	2.83	1.152	40
Know7	2.78	.862	40
Know8	2.63	.807	40
Know9	3.13	.648	40
Know10	3.30	.648	40
Know11	3.10	.744	40
Know12	2.80	1.018	40
Know13	2.10	1.057	40

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Know 1	34.25	37.628	.093	.826
Know 2	34.57	37.994	-.013	.834
Know 3	35.13	34.522	.464	.809
Know 4	35.47	27.384	.833	.769
Know 5	35.43	29.584	.749	.781
Know 6	35.22	30.025	.547	.801
Know 7	35.28	30.666	.717	.786
Know 8	35.43	35.276	.243	.823
Know 9	34.93	32.328	.747	.791
Know 10	34.75	33.526	.574	.802
Know 11	34.95	32.254	.644	.795
Know 12	35.25	29.936	.654	.790
Know 13	35.95	38.972	-.139	.862

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
38.05	38.254	6.185	13

```
RELIABILITY
  /VARIABLES=Atti1 Atti2 Atti3 Atti4 Atti5 Atti6 Atti7 Atti8 Atti9 Atti10
Atti11 Atti12 Atti13
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.835	13

```
RELIABILITY
  /VARIABLES=Prac1 Prac2 Prac3 Prac4 Prac5 Prac6 Prac7 Prac8 Prac9 Prac10
Prac11 Prac12 Prac13
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability
Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.864	13

```
RELIABILITY
  /VARIABLES=Know1 Know2 Know3 Know4 Know5 Know6 Know7 Know8 Know9 Know10
Know11 Know12 Know13 Atti1 Atti2 Atti3 Atti4 Atti5 Atti6 Atti7 Atti8 Atti9
Atti10 Atti11 Atti12 Atti13 Prac1 Prac2 Prac3 Prac4 Prac5 Prac6 Prac7 Prac8
Prac9 Prac10 Prac11 Prac12 Prac13
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE
  /SUMMARY=TOTAL.
```

Reliability
Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded[a]	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.941	39

Item Statistics

	Mean	Std. Deviation	N
Know1	3.80	.405	40
Know2	3.48	.599	40
Know3	2.93	.616	40
Know4	2.58	1.107	40
Know5	2.63	.952	40
Know6	2.83	1.152	40
Know7	2.78	.862	40
Know8	2.63	.807	40
Know9	3.13	.648	40
Know10	3.30	.648	40
Know11	3.10	.744	40
Know12	2.80	1.018	40

13	Know	2.10	1.057	40
	Atti1	3.85	.362	40
	Atti2	3.23	.698	40
	Atti3	3.25	.670	40
	Atti4	2.98	.800	40
	Atti5	2.65	.736	40
	Atti6	3.20	.758	40
	Atti7	2.38	.979	40
	Atti8	2.35	.949	40
	Atti9	3.05	.876	40
0	Atti1	3.38	.628	40
1	Atti1	3.03	.947	40
2	Atti1	3.00	.906	40
3	Atti1	2.40	1.172	40
1	Prac	3.75	.588	40
2	Prac	3.13	.607	40
3	Prac	3.20	.648	40
4	Prac	2.80	.966	40
5	Prac	2.45	.783	40
6	Prac	2.98	1.121	40
7	Prac	2.65	1.075	40
8	Prac	2.35	.834	40
9	Prac	3.25	.707	40
10	Prac	3.38	.667	40
11	Prac	3.00	.816	40
12	Prac	2.90	1.105	40
13	Prac	1.95	.986	40

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Know1	110.75	331.115	.108	.941
Know2	111.08	328.789	.171	.941
Know3	111.63	322.138	.469	.940
Know4	111.98	301.102	.795	.936
Know5	111.93	308.276	.708	.937
Know6	111.73	311.333	.497	.940
Know7	111.78	311.307	.684	.938
Know8	111.93	320.994	.388	.940
Know9	111.43	315.225	.749	.938
Know10	111.25	318.910	.585	.939
Know11	111.45	315.331	.643	.938
Know12	111.75	309.013	.638	.938
Know13	112.45	334.408	-.069	.945
Atti1	110.70	329.241	.267	.941
Atti2	111.33	317.866	.584	.939
Atti3	111.30	319.856	.524	.939
Atti4	111.58	311.379	.738	.937
Atti5	111.90	316.862	.591	.939
Atti6	111.35	317.515	.547	.939
Atti7	112.18	308.610	.677	.938
Atti8	112.20	315.549	.487	.939
Atti9	111.50	317.333	.473	.939
Atti10	111.18	318.507	.623	.939

Atti11	111.53	309.128	.686	.938
Atti12	111.55	314.305	.552	.939
Atti13	112.15	323.721	.184	.943
Prac1	110.80	324.728	.368	.940
Prac2	111.43	321.122	.523	.939
Prac3	111.35	317.669	.639	.938
Prac4	111.75	304.962	.799	.936
Prac5	112.10	315.323	.609	.938
Prac6	111.58	310.712	.529	.939
Prac7	111.90	302.605	.778	.937
Prac8	112.20	312.113	.681	.938
Prac9	111.30	321.549	.427	.940
Prac10	111.18	318.404	.589	.939
Prac11	111.55	311.433	.721	.937
Prac12	111.65	311.772	.509	.939
Prac13	112.60	323.785	.229	.942

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
114.55	332.869	18.245	39