ASSESSMENT OF WATER SUPPLY AND SANITATION FACILITIES IN EKOSODIN COMMUNITY OF OVIA – NORTH EAST LOCAL GOVERNMENT AREA, BENIN CITY, EDO STATE, NIGERIA

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BENIN CITY

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CERTIFICATION

This is to certify that this project was carried out by **OMOGBEHIN TEMITOPE MICHEAL** with matriculation Number **ENG1603985** in the department of Civil engineering, Faculty of Engineering, University Of Benin, Benin City.

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DEDICATION

I dedicate this project to God Almighty my creator, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this program and on its wings only have I soared. I dedicate this work to my dad, Omogbehin Adetayo, my siblings, friends and relative who has encouraged me all the way to make sure that I give it all it takes to finish that which I have started. To my late mother, my love for u can never be quantified. God bless you.

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ABSTRACT

The aim of this study is to assess water supply and sanitation facilities in Ekosodin community, Ovia north East Local Government Area, Benin City, Edo State, Nigeria.

A descriptive cross-sectional survey was adopted for the study. Data were generated through the use of a semi-structured questionnaire from three hundred and ninety-seven (397) respondent using a simple random sampling technique. An observational checklist was used in conducting an assessment of the availability, functionality and use of WASH facilities. Data generated were synthesized, entered and analyzed using Statistical Package for Social Sciences (SPSS, Version 26.0) and the outcomes were presented in tables. Cronbach Alpha was used to determine the reliability index of the questionnaire. A reliability index of 0.716 was obtained indicating that the questionnaire is good.

The result obtained from the survey showed that 374 (94.2%) households have access to improved water supply and borehole was the main source of water supply for households. Type of toilet facilities use in households were mainly; water closet 245(61.7%) pit latrine 88 (22.2%) and swat flush 53 (13.4%). Method of solid waste disposal were mainly; open dumpsite 224 (56.4%), burning 150 (37.8%) and throwing into the bush 150 (37.8%). Most respondents practice handwashing at every other time 94(23.7%), 82 (20.7%) after using the toilet, 79(19.9%) practice hand washing before cooking. It was also observed that 243 (57.8%) houses had no drainage system, 237 (56.4%) have no waste storage facility, and 312 (74.28%) have refuse dumpsite and 354(84.3%) did now not have odour of excreta in the surrounding. Results also shows that household have access to proper handwashing practices but lack when to practice at critical time. Hence, Ekosodin community has poor access to adequate WASH facilities. It is recommended that rural communities should synergize with authorities at all degrees to make certain adequate provision of WASH amenities and a proper awareness in their communities.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Water is precious for the life of humans and ecosystems. Safety of drinking water is currently one of the most crucial topics, since a number of natural and artificial risks could endanger human health. The World Health Organization has discovered 27 different waterborne diseases and other water related hazards. Drinking water safety is becoming more and more acknowledge as a problem. Contaminated water can cause epidemics, disrupt the economic life and spark severe fear. Water distribution systems (WDSs) are intricate networks of pipes, pumps, valves, storage tanks, fittings, meters, etc., most of them buried below the ground surface, are made of different kind of materials and diameters, with a length up to several hundreds of kilometers. The system's complexity makes it susceptible to many dangers. Although the institutional structure created for water quality is continuously being enhanced, it has been observed that the procedure used to deal with occurrences have a detrimental impact on water quality have a temporal lag.

The provision of Water, Sanitation and Hygiene (WASH) facilities in their correct quantity and quality are amongst the five key approaches aimed at combating Neglected Diseases (NTDs) and other fecal-oral transmitted diseases WHO, (2015) and UNICEF, (2015). Access to WASH facilities has greatly increased in many Low and Middle-income Countries (LMICs), but is still far from meeting the Sustainable Development Goal (SDG) objectives. For instance, global report showed that the use of improved drinking water sources increased from 76 percent in 1990 to 91% in (2015), use of improved sanitation increased from 54 percent in (1990) to 68% in (2015) and the global prevalence of hand-washing with soap after contact with excreta is 19 %, rates are lower in Sub-Saharan Africa 14% and South-East Asia 17% (WHO and UNICEF, 2015b).

Water purification processes leave behind certain natural and microbial contaminants in addition to the nutrients that were removed. Water quality declines from its initial state at the treatment facilities as a consequence of biological and physicochemical processes that occur throughout distribution. There are certain technology and risk management approaches that must be used to get drinking water from its origins to its final destination for consumption.

Statistics show that more than 1.8 billion people globally drink water that has not been treated, increasing their risk of contracting diarrhea, polio, dysentery, typhoid, and cholera according to r eports from the World Health Organization and the United Nations Children's Fund (2015). Additional literature suggests that a lack of access to WASH facilities accounts for 10% of all illnesses and 94% of the burden of diarrhea. The 2019 Nigeria Health Demographic Survey (NDHS) data for Edo - State show that 46.4% of the population still uses unimproved sources of drinking water and 42.1% of the population still does not have access to improved sanitary facilities.

Humans rely on water for survival, and the quality of this precious resource is inextricably linked to human activities such as domestic ones, as well as those in the industrial, commercial, mining, and agricultural sectors. In a nutshell, the state of human contentment is inextricably linked to the availability of freshwater. However, environmental pressures have put a strain on the bulk of the world's surface and underground water systems. Environmental stress is exacerbated by human population growth, urbanization, and industry. Therefore, there is a significant possibility that percolation and surface runoff may pollute the water supply. Due to factors like excessive fertilizer usage and unsanitary conditions, agricultural development projects in general present a threat to human health. About 80% of global illnesses are water-related, according WHO (2019). It is impossible to restore water quality by eliminating the source of the pollution after it has been polluted. There must be constant vigilance in terms of water quality monitoring and the development of

safeguards to ensure its safety. Indices based on the following categories may be used to determine the water's quality.

i. Human well-being, includes health and population

ii. Ecosystem well-being – includes assessment of air and water quality

In Nigeria, increased rates of sickness and mortality among children under the age of five in 2018 have been linked to inadequate WASH infrastructure. Over 70,000 children under the age of five die every year from complications related to their increased susceptibility to water-borne diseases (UNICEF, 2018). Over 73% of the world's enteric illness and diarrheal disease burden is estimated to be caused by a lack of access to water, sanitation, and hygiene (WASH) facilities (UNICEF, 2018). Due to a lack of better options, many people still defecate in the open or use unsanitary community latrines. These actions put women and girls at greater risk of sexual assault and abuse in their local environments, especially in more isolated areas. Without proper waste management or sewage treatment, communities risk ecological decline and disease epidemics (UNICEF, 2015). About 892 million people are estimated to still defecate in the open, and 61.5% of the world's population relies on unimproved sanitation methods including the usage of a bucket, hanging latrine, pit latrine without slabs, open pit, or pit latrines (WHO and UNICEF, 2017).

Access to improved WASH facilities do not only improve the health condition of the people, but also positively affects the economy of a country as ill-health drastically affects labor, productivity and earning potential of individuals. For instance, in India, water borne diseases cost $600 million loss annually due to loss of production and medical treatment (WHO and UNICEF, 2012). Aside, diarrhea and cholera, other WASH related diseases that contribute significantly to Indian’s disease burden include malaria, hookworm diseases, trichuriasis, ascariasis, schistosomiasis, trachoma and Japanese encephalitis. Additionally, statistics also show that children bearthe greatest share of this health

burden where WASH accounts for 7% of total disease burden and19% of child morbidity and mortality globally (Bartram and Cairncross, 2010).

(Orimoloye et al., 2015) asserted that separating issues related to WASH from health and overall wellbeing of individuals is practically impossible. The sustenance of life and promoting of health is significantly reliant on access to improved WASH facilities to meet the benchmark of the Sustainable Development Goal target by 2030. This therefore, necessitated the assessment of Water supply and sanitation facilities in Ekosodin Community in Ovia North East Local Government Area (LGA) of Edo State, Nigeria.

1.2 Statement of Problem

Water-borne illnesses such as diarrhea, dysentery, polio, typhoid, and cholera affect nearly 1.8 billion people worldwide, according to data (WHO and UNICEF, 2015). In addition, the World Health Organization (2015) estimates that a lack of access to WASH facilities accounts for 94% of the burden of diarrhea and 10% of all illnesses.

Researchers in Nigeria found a correlation between the country's high child mortality rate and the lack of access to water, sanitation, and hygiene (WASH) facilities for the population. More than 70,000 children younger than five die annually from water-related infections because of their heightened vulnerability. As much as 73% of the global burden of enteric illness and diarrhea may be attributed to insufficient WASH services, according to recent estimates (UNICEF, 2018).

The importance of clean water and toilets to a child's health and education cannot be overstated. Cleanliness and health in schools and universities can only be ensured by providing enough water and sanitation services to all buildings.

1.3 Aim and Objectives

The aim of this study is to assess the water supply and Sanitation Facilities among households in Ekosodin Community in Ovia North East Local Government Area (LGA) of Edo - State, Nigeria.

The specific objective includes,

i. Identify sources of water supply among household in Ekosodin Community.
ii. Determine the water treatment methods used among household in Ekosodin Community, types and availability of toilets facilities used by households in the study area.
iii. Determine the methods of solid waste disposal among households in the study area.
iv. Determine the level of hand washing practice among household respondents in the study area.

1.4 Scope of Works

i. Data collection using questionnaire survey method (with the aid of simple random sampling technique) and an observational check list.
ii. Analysis of data using statistical package for the social science (SPSS) software.

1.5 Justification of the Study

The availability of water as well as good hygiene are important, Given the importance of wash in controlling Neglected Tropical Diseases (NTDs) and in order to assess the baseline for future cross – cutting intervention.

The outcome of the study will educate the general public on need for assessment of water supply and sanitation facilities.

The research will also serve as a base to other scholars and researchers interested in carrying out further research in this field subsequently which is very essential as a guide to reconstruct system of water supply and provision thus make a contribution to nation water management

CHAPTER TWO

2.0 LITERATURE REVIEW

Water and sanitation services are crucial to human health and self-respect, and everyone should have access to them. Children have a right to a basic education that includes access to schools with safe and appropriate water and sanitation facilities (Mooijman, 2012). A reliable source of clean water is more important than any other factor in the nutrition and upkeep of human life. A healthier population is a direct result of better water infrastructure (Inah et al., 2020). Various groups must collaborate on several fronts to improve children's health (Durosaro, 2008).

About 47% of children between the ages of 5 and 6 are infected with worms, most of them living in developing countries. Worm cysts are readily transmitted from humans to open defecation, leading to a long-term infection of the afflicted areas. Young people are particularly vulnerable since they often play and roam about barefoot. Nearly a third of the helminth load transmitted via soil in the globe may be attributed to these 400 million individuals. Infant and child mortality rates are disproportionately high in regions with poor sanitation, water shortages, poor water quality, and improper hygiene behavior (Mooijman, 2012). Children of school age are especially vulnerable to water, sanitation, and hygiene (WASH)-related diseases such diarrhea and soil-transmitted helminths and trachoma because of these circumstances (Trinies et al., 2016).

Malaria transmission, morbidity, and death rates are disproportionately high in low and middle-income nations because of poor environmental sanitation practices (Inah et al., 2017). Over 10% of all worldwide disease burden may be attributed to improper sanitation, and about 2.6 billion people still lack access to basic sanitation, which includes methods for properly disposing of human waste (Mara et al., 2010). In an ideal setting for education, there would be enough WASH (water, sanitation, and hygiene) facilities and a reliable water supply to fulfill all of the needs of the institution, especially those associated with personal

hygiene. Every student and faculty member should be able to use clean, private, and sex-segregated restrooms that meet health and safety standards (UNDP, 2006).

Proper sanitary infrastructure addresses one of humanity's most essential need. The detrimental effects on one's physical, mental, and emotional health caused by a lack of sanitary education and inadequate facilities are substantial. Every child suffers, but kids with specific needs, kids with bladder problems, and bullied kids are more at risk (Burton, 2013). There is a higher risk of spreading germs that might make someone sick for a few days and keep them out of school if certain conditions are present, such as when there is a lack of cleanliness or when restroom hygiene and use are subpar. However, for others, it plays a role in the development of long-term problems that might have severe consequences later in life (Trinies et al., 2016).

Lack of access to private facilities during menstruation is a major reason why girls in developing countries skip school. Students who seek solitude away from the classroom setting risk encountering snakes and other wildlife. Refusing to use dirty, distasteful, or unsuitable facilities might have negative effects on your health in the short and long term. Both boys and girls may react by drinking less water during the day, either to prevent the onset of the need to use the restroom or to stifle it. This behavior may lead to medical and psychological issues with waste management (Burton, 2013).

Almost 40% of the world's population, or 2.6 billion people, do not have access to modern sanitary facilities. One of the leading causes of diarrhea is open defecation, which results in the deaths of more than 750,000 children younger than five every year. One youngster loses their life due to unsanitary conditions every 20 seconds (United Nation, 2015).

Millions of kids in third-world countries have to go to school without access to basic amenities like toilets or water fountains. Every child has the right to an education at an institution where they may drink safe water and learn about proper sanitary practices. The World Health Organization and the United Nations

Children's Fund estimate that each year, water and sanitation-related illnesses kill 1.5 million children under the age of five.

Forty million more Nigerians lack access to improved sanitary facilities and twelve million more individuals are without safe drinking water since 1990. About 65% of the world's population of 150,000,000 does not have access to safe drinking water. More than 100 million people worldwide do not have regular access to improved sanitation facilities like toilets, and as a result, many resort to open defecation. Providing communities with access to potable water and toilets is just the first step in reducing the prevalence of waterborne illnesses. As a result, encouraging better hygiene is crucial. Children's cases of diarrhea may be reduced by as much as 44 percent just by teaching their parents to wash their hands with soap regularly (UNICEF, 2010).

The annual loss of 272 million school days is attributed to infections that may be prevented with better sanitary facilities and services (WHO/UNICEF, 2010). As a result, it promotes long-term healthful habits (UNICEF, 2010). In addition, it safeguards girls' right to an education by reducing dropout rates (WHO/UNICEF, 2010) caused by the lack of privacy and convenience of toilets and handwashing facilities. Illnesses caused by a lack of clean water and proper sanitation are a primary cause of mortality for children younger than five. More than eight hundred children under the age of five die every day from diarrhea-related illnesses that might be avoided if only they had regular access to safe drinking water and proper sanitation. Diarrhea and malnutrition form a vicious cycle, especially for youngsters. They become more susceptible to diarrhea when exposed to human waste because they are less able to swallow and absorb nutrients from diet. One-quarter of the world's children under the age of five were stunted in 2014. That's 159 million kids (UNICEF, 2010).

According to the World Health Organization and the United Nations Children's Fund in 2015, an estimated 1.7 billion children worldwide suffered from diarrhea. Worldwide, 1.7 million children under the age of

five died each year from diarrhea in the previous decade. Numerous reports came from Africa and certain parts of Asia, both of which have relatively low per capita incomes (Walker, et al., 2013). In addition, 842,000 people lost their lives due to lack of access to clean water, adequate sanitation, and hygiene education and practices (Mills and Cummings, 2016). Due to the elimination of vectors and potential entry points for illness, WASH has the potential to save the lives of 361,000 children under the age of five (Clasen et al., 2014).

Millions of additional children become sick, weak, or disabled due to water and sanitation-related diseases and infections include typhoid, cholera, malaria, poliomyelitis, dysentery, worm infestation, and acute respiratory infections. While one-sixth of the world's population—about 1.1 billion people—have access to an abundant supply of clean drinking water. More than 80% of all infectious diseases are spread via contaminated water. It is predicted that clean drinking water availability in Bangladesh, especially in its more rural parts, may decrease as a result of climate change. The paucity of sweet water in the highlands of Bangladesh during the dry season has been exacerbated by climate change. In rural areas, women have far to go only to fill a water pitcher. Many preventable diseases and deaths may be traced back to a lack of access to safe water, sanitation, and hygiene (WASH), particularly in underdeveloped nations where this problem is extremely severe (The Water Project, 2016).

Many efforts have been launched on a global scale to ensure that everyone has access to safe drinking water and sanitation over the long haul. Despite the progress that has been made, reports show that many people still lack access to clean water and sanitation facilities due to differences in their location, socioeconomic status, or culture. In some cases, these inequalities have even grown among the most marginalized and at-risk populations (WHO & UNICEF, 2014).

Despite falling short of its sanitation goal, the world met its drinking water MDGs five years early in 2010, instead of the originally predicted year of 2015. However, by 2015, the area of Sub-Saharan Africa has

failed to meet its water and sanitation targets. This proves that the big picture does not fairly depict the possibilities available throughout the globe. This explains why the area has such a high occurrence of waterborne infections, particularly diarrhea in children under the age of five (Black et al, 2010).

In spite of falling short of the sanitation target, the global drinking water MDGs were accomplished in 2010, five years ahead of the original 2015 deadline. In spite of this, by 2015, Sub-Saharan Africa still had not accomplished its water and sanitation goals. This demonstrates that broad strokes do not accurately depict global feasibility. Primary schools and day care facilities saw a 30% decrease in diarrhea incidence and a 25% decrease in respiratory diseases like pneumonia when hand washing became standard procedure (Ejemot-Nwadiaro et al., 2015).

There has been an increase in the number of children enrolled in Nigeria's elementary schools since the UBE was first implemented there in September 1999. Due to an increase in students, schools' water and sanitation systems have become inadequate, putting students at danger of contracting various illnesses (UNICEF, 2008). The long-term effects include cognitive impairment and poor academic performance, whereas the short-term effects are infections and illnesses (Gottfried, 2010). The effects are not the same, leading to disparities in educational opportunities between boys and females. Due to a shortage of menstrual hygiene facilities, females are often disproportionately impacted (WHO, 2009). Absenteeism in elementary school is a predictor of academic failure. A youngster who is ill may, for instance, struggle in school because of diminished academic performance (Lau et al., 2012). Almost 1.3 percent of Nigeria's GDP was lost due to the effects of inadequate sanitation and hygiene, and the issue is exacerbated by war and natural catastrophes (UNICEF, 2018).

The Millennium Development Goal (MDG) objectives and coverage estimates for Bangladesh's water and sanitation infrastructure are difficult to assess because of the country's inconsistent application of terminology and priorities. Based on the goal of halving the percentage of people without access to water

and sanitation in 1990, the MDG objectives for 2015 are for 89 percent and 70 percent of the population to have access, respectively. Water is often equated with life since all known forms of life need it for survival. In addition to being used for drinking, farming, and cleaning, water is essential for many of life's most pleasurable leisure pursuits. The tremendous susceptibility of Bangladesh to the impacts of climate change, high levels of poverty, microbiological groundwater pollution, iron (Fe), and arsenic (As), and as are only some of the problems that limit development in the WASH sector in Bangladesh. Several particularly vulnerable regions, including port areas, need immediately. Monitoring and assessing water quality are the bedrock of water management. Consequently, there is a growing requirement to routinely assess a variety of water quality parameters to monitor both surface and subsurface water quality. The global public health community has focused on HIV/AIDS, TB, and malaria, although it has been proved that diarrhea kills more young children each year than these three diseases together (Boschi-Pinto et al., 2008).

Despite the reported progress made on water and wastewater coverage during the MDGs period, diarrhea remains a serious health challenge in sub-Saharan Africa. This is despite the fact that diarrhea can be easily controlled by adequate water provision, sanitation, and hygiene (Bartram and Cairncross, 2010). (2000-2015). The lack of individuals with access to adequate WASH services is likely to blame for this problem. Some of the authorized recipients of improved water express dissatisfaction with the water's quality and report having to go more than 30 minutes each way to refill their containers.

However, the classification of such water sources as "improved" or "unimproved" is not affected by this delay, as noted in the joint monitoring programme (JMP) report by UNICEF and WHO (2010). Inadequate maintenance and simple deterioration can expose the users of some of the upgraded sources or facilities to avoidable health hazards. Acceptable levels of water supply, sanitation, and hygiene must be given at schools in order to accomplish the UN's Millennium Development Goals (MDGs) of establishing universal primary education, encouraging more equality, and reducing child mortality. It also helps in the fight against major illnesses and child mortality (WHO, 2009). The purpose of this paper is to describe the

study's objectives so that people in Ekosodin Community, Ovia North east loca government area, Benin City, Edo State, may better understand why it's important to invest in water and sanitation facilities.

Public health concerns related to water, sanitation, and hygiene are of special importance to international development programs (WASH). The spread of illness and premature mortality may be mitigated by improving access to safe water, adequate sanitation, and sound hygiene practices. Bacterial water contamination has been linked to epidemics like cholera outbreaks. Purification techniques and healthy hygiene routines may lessen the number of impacted persons. The WASH infrastructure in Nepal was also severely damaged by the 2015 earthquake. A sustained recovery phase may be greatly aided by ensuring that schools have access to water and sanitation facilities and by supporting the implementation of hygiene promotion programs, which should include a disaster risk preparation strategy (Giardina et al., 2013).

Improved cleanliness and hygiene in surrounding neighborhoods may be influenced by setting a good example in schools (SACOSAN-V, 2013). There are several quality standards that must be reached before water may be utilized for human consumption. The potential for harm caused by polluted groundwater is proportional to the kind and quantity of the contaminants present (Al Qawati et al., 2018).

It's possible for dirty surface water to seep into the groundwater system (Shaltami et al., 2017). Ajdabiya's water resources face a number of issues, both in terms of quantity (such as a lack of clean water) and quality (such as a chemically polluted, biologically polluted, or physically polluted water source), particularly in areas with higher densities of people and/or closer proximity to water sewage systems. Kourgialas, et al. (2017).

The provision of clean water and proper sanitary facilities are the cornerstones of every functional household. Sanitation is the provision of services and infrastructure for the hygienic disposal of human waste. It has long been recognized that provision of basic amenities like potable water and sanitary facilities is a prerequisite for human settlement. However, safeguarding scarce water resources and

minimizing the effect of germs from dangerous household waste are often overlooked. The main purpose of sanitation is to break the transmission cycle of disease-causing organisms so that they cannot infect humans and wildlife (Jones and Silva, 2009).

One of the Millennium Development Goals (MDGs) is to ensure that half the world's population has access to clean water supply and sanitation facilities by the year 2015. This objective was established during the World Summit on Sustainable Development in Johannesburg in 2002. Meanwhile, as of the year 2000, only 50.35 percent of Indonesians had access to basic safe sanitation, meaning that they had access to toilets fitted with latrines or septic tanks. This left 49.65 percent without access to suitable sanitation facilities. The health, ecology, education, and economics of a community are all directly affected by its citizens' access to waste water infrastructure (Abeysuriya et al., 2007).

There are environmental contamination issues related to home wastewater that must be taken into account while dealing with sanitation. The public's access to clean water supplies may be compromised by the pollution level generated by home wastewater. Water bodies in densely populated metropolitan areas often have significant levels of pollution. Preventing the spread of waterborne illnesses (diseases transmitted by water) is of utmost importance in protecting the public's health, and the dilemma is how to lower pollution levels or at least preserve the current water pollution situation (Avvannavar et al., 2008).

Bandung is one of Indonesia's fastest-growing cities, and its 2.4 million residents in 2008 highlighted problems with the city's water and sewage systems. Bandung's population growth between 2007 and 2009 was mirrored by a small improvement in the city's water supply and sanitary infrastructure, according to statistics collected by the Bandung City Health Department. Furthermore, in Bandung City, water supplies and proper sanitation were not uniformly accessible across all districts. There are places with low rates of water and sanitation availability that dump their trash into nearby bodies of water. It might cause more rivers to be classified as "D" rivers, which indicate that they contribute significantly to the high pollution in the Citarum River Basin (Tjokronegoro, 2010). So, it's fair to say that places like Bandung City,

Indonesia, which have had issues with their water and sewage systems, still need immediate and focused attention.

There are both immediate and long-term advantages to enhancing the quality of existing infrastructures. There will be a direct influence on public health, a reduction in water pollution, and indirect stimulation of macroeconomic development via better water supply and sanitation facilities. These factors, in addition to effective pollution reduction measures, would propel a region toward sustainable growth (Warner, 1984).

Existing water and sewage systems have an important influence on pollution prevention, and this must be taken into consideration when assessing and monitoring the performance of waste water management approaches in this region. Epidemics of water-related diseases are recurring issues in developing nations when both clean water and adequate sanitation are in low supply. All individuals should be assured regular access to clean water because of its critical importance to human health (Mmuoegbulam et al., 2017).

Over 80% of all diseases worldwide may be traced back to poor sanitation and water quality (Bedada et al., 2018). More than a billion people worldwide rely on rivers, lakes, and open wells for their drinking water. Multiple studies have demonstrated that not only are diseases caused by microorganisms in water remain among the leading causes of death across the world, but that their incidence is increasing and their disease spectrum is extending (Duressa et al., 2019).

It is estimated that 80% of all illness in underdeveloped countries is linked to water and sanitation, and that 15% of all child deaths under the age of five are caused by diarrheal diseases (Kassie and Hyelom, 2017; Malhotra et al., 2015).

Human pathogens including Salmonella, Shigella, Yersinia enterocolitica, Campylobacter, as well as viruses and parasites like Entamoeba histolytica and Giardia lamblia, offer a serious health risk when they are present in drinking water (Agbo et al., 2019).

Without consistent availability of clean water, it is hard to provide basic human needs including survival, health, nutrition, and economic growth. Since water scarcity is becoming a serious problem in many third-world countries, it is of great concern to families and communities who depend on alternative water sources (Okonko et al., 2008). As the global population has grown, so has the need for safe drinking water, especially in poor areas.

Water may be found both on Earth's surface and deep inside the planet. Groundwater, surface waterways (including rivers, streams, and ponds), rain-water, and springs provide the bulk of Ghana's rural people with their water supply. About 56.0% of the population of Ghana lives in rural regions, and for them, groundwater is their major source of water. Ghana's Central Bureau of Statistics Subsurface water found below the water table in completely saturated soils and geologic formations is often referred to as groundwater (Chanda, 1999). Ground water is crucial to the growth of dry and semiarid regions, as stated by a group of researchers (Arya et al., 2012). It's assumed to be far less dirty and contaminated than surface water (Dahiya and Kaur, 1999; Agbaire and Oyibo, 2009; Efe, 2002).

However, it is easily contaminated, and cleaning it up requires extensive effort and time (Henry and Heinke, 2005). The danger of contamination to Ghana's groundwater resources is growing as a result of urbanization, industrial expansion, agricultural, and mining (Oluseyi et al, 2011). Sewage runoff, organic and inorganic industrial and agricultural waste, mining, cement production, dredging, and china day waste, leaching fertilizers and pesticides from the soil, oil spills, radioactivity, atmospheric fallout, acid rain, and irrigation are all major contributors to aquatic pollution (Nwanjei et al., 2012).

The collection, storage, management, and choosing of storage containers or vessels are all critical components of providing clean, drinkable water to homes (Kassie and Hyelom, 2017). There are several potential entry points for contamination of household water, including collection, storage, service, and handling (Bedada et al., 2018). In addition to the collection and use of collected and stored domestic water, microbial contamination may also result through the use of unsanitary and inadequately protected (open,

uncovered, or poorly covered) containers for collecting and storing water. Dispensing water from domestic storage containers using unsanitary practices, such as contaminated hands and dippers, and poor cleaning of vessels, leads to sediment and pathogen buildup (Tambekar et al., 2008).

Direct identification of dangerous bacteria needs pricy, labor-intensive, and expensive procedures. These conditions led to the notion of indicator organisms of fecal contamination (WHO, 2006b) (WHO, 2006b). Indicator bacteria are employed to assess the potability of drinking water since it would be difficult to fully enumerate all harmful organisms that are transmitted by water (Bedada et al., 2018). (Bedada et al., 2018).

Indicator organisms, including coliform in particular, are essential for detecting the likely presence of waterborne infections and protecting the public's health. Since coliform bacteria are the most sensitive indicator bacteria for demonstrating contamination, their presence in drinking water is used as a proxy for fecal contamination (Bedada et al., 2018; Nourani et al., 2007).

It's been pointed out every once in a while, that cement factories typically produce a lot of dust that gets released into the air (Schuhmacher et al., 2002). Dusts released into the atmosphere are eventually deposited on Earth's surface, either dryly or wetly, as a result of precipitation (Olaleye, 2005; Asubiojo et al., 1991). Dust storms are particularly harmful because they include high concentrations of hazardous heavy metals such arsenic, lead, nickel, chromium, copper, zinc, manganese, and cadmium, according to studies by Adejumo et al. (1994) and Schuhmacher et al (2002).

According to the World Health Organization (WHO), Ethiopia has the lowest water supply coverage (24%) and the second lowest sanitation coverage (15%) in all of sub-Saharan Africa (WHO, 2006a). The low standard of life, poor environmental conditions, and lack of social services are all caused by the country's lack of progress in terms of socioeconomic development (UN WATER/WWAP, 2004). In Ethiopia, just

52% of the population has access to clean water, and only 28% of the population has access to proper sanitation. This explains why water-related illnesses affect between 60% and 80% of the population.

Ethiopia's Ministry of Water Resources reports that treating the country's large population for these debilitating diseases is a significant economic and social burden. About three-quarters of pediatric health problems in Ethiopia are attributable to water and sanitation-related disorders. In children less than five, diarrhea is the leading cause of mortality (46%). The Ethiopian Ministry of Health (MoH) reports that every day, 6,000 children die as a result of dehydration and diarrhea. Diseases caused by a lack of clean water and proper sanitation kill ninety thousand children under the age of five every year in the Amhara area (WHO, 2006a).

The town of Woreta's potable water supply is threatened by many sources of pollution. According to the Woreta Town Water Supply Office WWSO, the main sources of drinking water pollution in the town are open defecation, agricultural activities close to the water source, improper garbage disposal in fields and streets, poorly built pit latrines, the construction of waste storage pits and latrines close to water distribution pipe lines, the unsanitary conditions of water storage containers, and issues with personal hygiene (2015). Protecting against and managing waterborne infections requires a combination of proper treatment and sanitary survey (Eliku and Sulaiman, 2015).

There are a number of significant physico-chemical characteristics and commonly used bacterial indicators that may be used to determine the safety of drinking water (WHO/UNICEF, 2010). Woreta town's drinking water's bacteriological and physicochemical quality in relation to consumer hygiene practices has not been studied. The study's goals were to determine the bacteriological and physicochemical quality of drinking water from its place of origin to its final destination in the homes of Woreta town's residents throughout the months of January and March (2016). The findings of this research will provide stakeholders with essential water quality baseline data for use in planning and implementing future projects and interventions.

The availability of at least 20 liters of water per person, per day from a source no more than one kilometer from the user's residence became widely recognized as "access to water." Tanker vans and bottled water (which became now no longer regarded "advanced" owing to reservations about the quantity of offered water, now not the water's quality) had been excluded since they did no longer provide inexpensive and prepared gain entrance to to water for domestic hygiene functions (Adeleye et al., 2014).

Access to safe drinking water is correlated with the population's reliance on modern drinking water sources, which are defined as "family connection, public standpipes, boreholes, covered wells, and springs" (Oyeniyi and Oloyede, 2016). In 1990, 50% of the population used water from a progressed supply, but by 2006, that number had dropped to 47%, according to data from the Joint Monitoring Program (JMP). The same data set also showed moderate growth in the percentage of the population with access to safe drinking water from progressed reassets between 1990 and 1996. (Oyeniyi et al., 2016).

Even though Nigeria's government has made measures to ensure water delivery, as of 2008, just 47% of the country's population have access to a modern water system. While 54% of urban households in Nigeria had access to clean water in 2010, fewer than 50% of those in rural areas did, falling short of the country's aim of 65%. When water is supplied by the government, it is assumed to be safe for consumption. However, from 14% in 1990 to 6% in 2008, the proportion of Nigerians with access to public water distribution has drastically dropped. It has been shown (Akeju et al., 2018) that....

Humans still depend heavily on hand-dug wells, ponds, streams, rivers, and shallow wells (Akeju et al., 2018) and other reassets for their water requirements. Many of these reserves run dry during the dry season, forcing families to spend a considerable amount on questionable water.

Planning access to improved water is a daily task for most Nigerians, as stated by the USAID in (Adeleye et al., 2014). The situation is especially dire in the rural areas of Northern Nigeria, where only about 30% of the population has access to clean water. This condition causes an increase in water-related diseases,

threatens the livelihoods of small-scale farmers, and causes a general decline in college attendance, particularly among women.

There are several degrees of water scarcity/deficiency, including permanent, potentially fatal, temporary, cyclical, and seasonal. A water shortage occurs when there is not enough of the resource to meet even the most basic needs (Okoye in Chukwu, 2015). On the other hand, water security means that people can always find enough clean, appealing water to satisfy their basic requirements. They provide equitable redress and safety from water-related hazards when water-related conflicts arise. Water shortage is often characterized in terms of city morphology from a local planning viewpoint.

According to the UN Habitat declaration, water use is one of a city's ecological footprints (Chukwu, 2015). The agreement's development, dissemination, and control are often influenced by, and influenced by, the agreement's bureaucracy and institutions, which may take the shape of the illegality and informality of metropolitan areas. Densely populated metropolitan regions, which are notoriously impoverished and notoriously difficult to reach, sometimes lack water supplier networks altogether. This results in chronic water scarcity for the poor who call urban slums home. It would be hard to exaggerate the significance of water or its controllability. Poor water quality and a lack of available water lead to health issues, hamper agricultural output and economic growth, and put national security at risk. There is a need to take sustainable measures, such as fee recovery, in order to harness and manipulate water in an efficient manner.

Treating water as a financial accurate improves economic viability by including investment, operation, and maintenance costs in price lists. Chukwu, who highlighted the FRN perspective, reasoned that water can only be considered as a financial accurate, tied to the connection between supply and demand, if widespread and sustainable water delivery services are to be provided. Humans' thirst is, therefore, a feature of water movement. Their willingness to pay for water is affected by their chosen service level and the quality of the service they get. The health and way of life of thousands of people are put in jeopardy

due to insufficient and polluted water because of bad governance that prevents the regulation of water and other natural resources. These issues have a disproportionate impact on poorer countries whose citizens rely heavily on foreign handouts. Water management is politically fraught and technically complex. Therefore, a strong institutional strategy is required to balance conflicting water-use interests and deal with water scarcity (Chukwu, 2015).

CHAPTER THREE

3.1 Study Area

Ekosodin Community is situated in Ovia North East Local Government Area (LGA) of Edo State, Nigeria. It is located in the central province of Edo state and lies between latitudes 5^0 15' and 6^0 45' north and longitudes 5^0 45' and 6^0 15' east. It has a mean annual rainfall ranging from 1500 to 2500 mm and mean monthly temperatures between 25 and 28 °C . Dry and wet(rainy) season are the two seasons in the study area. The wet(rainy) season last from April to October, after is an August break. Meanwhile, dry season last from December to January where harmattan is experienced December and January. The Local Government Area has an area of 1,241km^2. All the settlements of the Ovia North East Local Government Area are traversed by the Ovia River, which is the primary river.

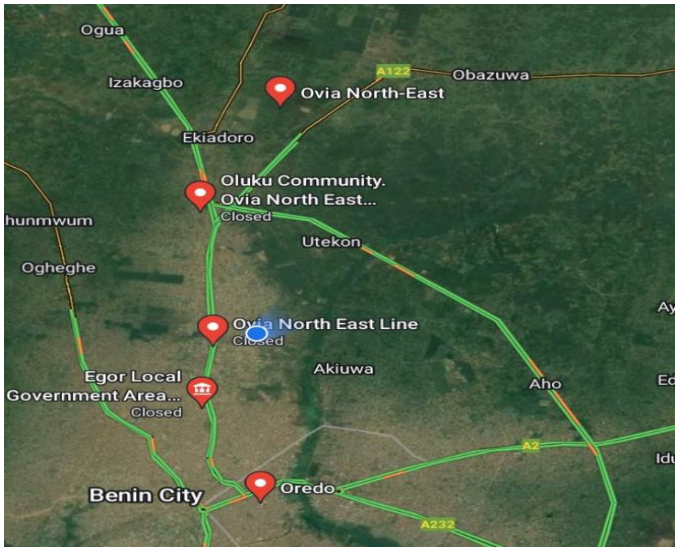

Fig 3.1: Location of Ovia North East LGA , Benin City, Edo state, Nigeria.

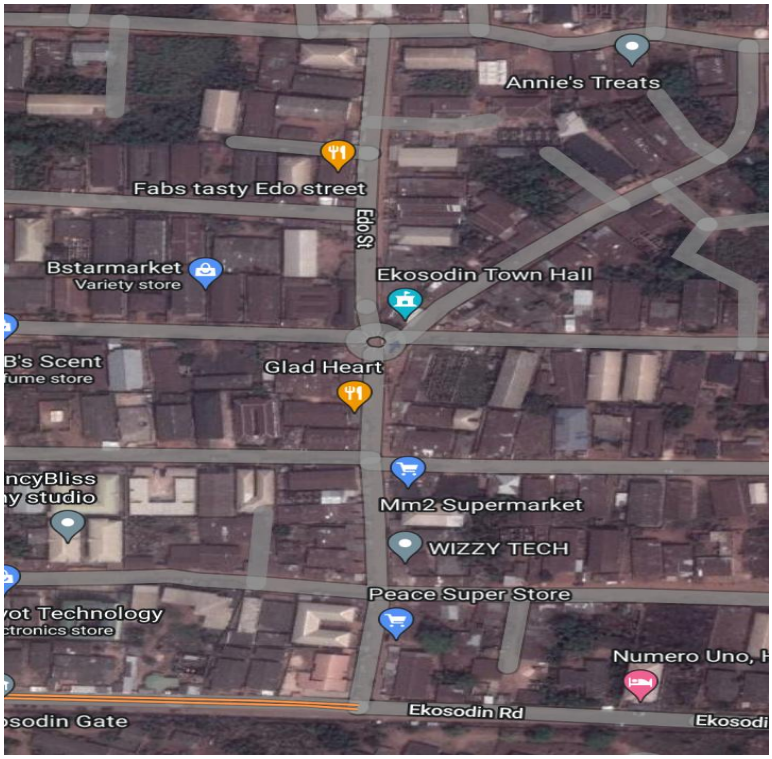

Fig 3.2: Map of Ekosodin in Ovia North East LGA, Benin city, Edo state.

The village was established as a farm settlement. As at 1963, the population of Ekosodin was 177 (NPC, 1963). In 1991 with the influx of students, the population rose to 1811 (Ogeah and Ajalaye, 2011). In 2003, the population of Ekosodin rose to 7,000 (Ekosodin Youth National Development Association, 2003). Between 2003 and 2019, Ekosodin's population increased tremendously. Due to the students' presence, who do not want to live in a subpar home without working toilets and baths, the village's original housing patterns have also been replaced with more contemporary ones. Hostels for students have received significant investment from local developers. The main highway connecting Ekosodin to the Lagos-Benin Express Road was built together with the university's foundation. This encouraged the development of more homes along this route. As the number of students looking for housing in the hamlet increased over time, more spaces became available. Today, the area of Ekosodin is home to hundreds of hostels. The Ekosodin community now has utilities like power and pipe-borne water thanks to the students who live there. However, 60% of the students voiced their dissatisfaction with the erratic delivery of these

services. Since there aren't enough facilities for garbage disposal in the hamlet, the number of students has a negative impact on the village's environmental cleanliness.

55% of the students dumped their waste in the bush, 28% burned it, and 12% dumped it in a public container that wasn't frequently picked up by the appropriate authority. Consequently, 82% of the students were dissatisfied with the environmental condition of the village (Ogeah and Ajalaye, 2011).

According to a personal discussion with the traditional head and his chiefs, students were primarily to blame for the area's poor hygiene. They asserted that when the students were on vacation, the village's physical environment was more orderly. The presence of students at Ekosodin has converted the community from a farming community into one where practically every household engages in some type of business activity. Many individuals have moved into the village of Ekosodin as a result of the influx of students. These people offer the students one kind of service or another. 90% of the homes in the hamlet that are not residence halls for students are residential commercial structures.

3.2 Methodology

397 respondents (18 years and over) were chosen from 397 households using a straightforward random selection approach. An observational checklist was utilized to assess the availability, functionality, and use of WASH facilities in the study region, while a pre-tested, semi-structured questionnaire was employed to collect data from the respondents. A small portion of the questionnaire—about 10%—was tested for reliability and validity using Cronbach's Alpha statistics. The data collected from the respondents was examined using descriptive statistics.

The answers were coded, then examined. The statistical package for social sciences (SPSS, version 26.0) was used to analyze the data, and frequency tables and a chart were used to display the findings. The Ekosodin town hall, which oversees the administration of the village, granted permission for the research to be carried out. The responders and participating community leaders gave their informed consent after

being properly requested and obtained. Throughout the research period, information was acquired in a confidential and anonymous manner.

3.2.1 Population of the Study

Geometric Method

The sample size used for the study was determined using the following formular ( )

$In\ P_f = In\ (P)\ \sqrt{kg\ (t_f - t_i)}$ ……. *(3.1)*

P_F = Final or projected Population, P_i = Initial or present Population, K_g = Constant, t_f = Final or projected year, t_i = Initial or Present year.

$Kg = \frac{In\ (Pf) - In\ (Pi)}{T_f - T_i}$ ……*(3.2)*

$kg_1 = \frac{In\ (1811) - In\ (177)}{1991 - 1963} = 0.083$

$kg_2 = \frac{In\ (7000) - In\ (1811)}{2003 - 1991} = 0.1126$

Kg (average) = $\frac{0.083 - 0.1126}{2} = 0.9785,$

In P (2022) = In P (2003) + Kg(average) (Tf-Ti)

In P (2022) = In (7000) + 0.09785 (2022-2003)

P (2022) = 44927.70 = 45000 persons.

Geometric Result = 45,000

The targeted population for the study comprises all Civil servant/public workers, Private workers, Self-employed, Unemployed, Farmer and Business/trader in Ekosodin community.

3.2.2 Sample and Sampling Technique

For sample size selection Yamane Formula was used (Yamane,1967). It is given as:

$$n = \frac{N}{1+Ne^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(3.3)$$

n=Sample Size, N = Population Size, e = acceptable sample error (0.05^2)

Hence, 450 copies of questionnaire were distributed to random people per each household.

Three Hundred and ninety-seven (397) completed copies of questionnaire were retrieved and analyzed.

3.2.3 Data collection and Analysis

Data used for the study were collected via questionnaires using a cross sectional descriptive survey method, observational checklist and interviews. The interviews were conducted during the visits in order to accomplish the research project objectives to ensure that the respondents input the right details

3.2.4 Research Design

A descriptive cross sectional study design method was adopted for this study. A simple random sampling technique was considered appropriate to select 397 respondents (18 years and above) from 397 households in assessing the water supply and Sanitation Facilities among households in Ekosodin Community in Ovia North East Local Government Area (LGA) of Edo.

3.2.5 Validity of the Questionnaire

Questionnaire Pretesting (Pilot study) seeks to ascertain whether there are any confusing or biased questions, as well as whether respondents have any trouble understanding the questionnaire. Pre-testing the questionnaire allows for the correction of errors, the deletion of unnecessary questions, the

improvement of unclear language and wording, and the improvement of errors. The research instrument was validated using the expert judgment approach.

3.2.6 Reliability of the Questionnaire

A test-retest approach was used to assess the instrument's reliability was adopted. The instrument was administered to 397 respondents and reliability test was carried out on it using the SPSS (version 26). Cronbach Alpha was used to determine the reliability index of the questionnaire. A reliability index of 0.716 was obtained which suggest that the questionnaire's questions were all comparable and pertinent to the survey's topic.

3.2.7 Administration of the Questionnaire

The copies of the research instrument were personally administered by the researcher with some research assistant that were resident in the state of the study. Where necessary explanation was offered to respondents to enable them react to items in the questionnaire.

3.2.8 Software Used for Data Analysis

Utilizing the statistical software for the social sciences, the recovered questionnaires and Cronbach's alpha reliability were calculated (SPSS version 26, 2016). Results were presented using descriptive tables.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Presentation of Results

The results obtained from the study are presented in Table 4.1 to Table 4.5

4.1.1 Socio-Demographic Characteristics of the Respondents.

The results of the social demographic characteristics of the respondents are presented in table 4.1

Table 4.1: Socio-Demographic Characteristics of The Respondents (N=397)

VARIABLES	NUMBER OF RESPONDENTS	PERCENTAGE
Sex		
Male	271	68.3
Female	126	31.7
Total	397	100
Age		
18 – 25	134	33.8
26 – 34	121	30.5
35 – 44	89	22.4
45 and above	53	13.4
Total	397	100

Marital Status		
Single	168	42.3
Married	193	48.6
Divorce	8	2.0
Widow/Widower	28	7.1
Total	397	100
Type Of Household		
Family	216	54.4
Non-Family	181	45.6
Total	397	100
Household Head		
Male Head	322	81.1
Female Head	75	18.9
Total	397	100
Household Size		
Less than 5	148	37.3
Between 5 and 15	162	40.8
Above 15	87	21.9
Total	397	100

Occupational Status		
Civil Servant / Public Workers	52	13.1
Private Workers	40	10.1
Self Employed	94	23.7
Unemployed	140	35.3
Farmer	20	5.0
Business Trader	51	12.8
Total	397	100
Educational Status		
No Formal Education	33	8.3
Primary Education	12	3.0
Secondary Education	65	16.4
Tertiary Education	268	67.5
Adult Education	19	4.8
Total	397	100

A total of 397 copies of the survey were distributed, yielding a response rate of 100%. The statistics indicate that 271 (68.3%) were men and 126 (31.7%) were women. 134 (33.8) were aged 18 -25, 121 (30.5%) were aged 26 – 34, 89 (22.4 %) were 35 – 44, 53 (13.4 %) were 45 and above. 168(42.3%) were married, 193 (48.6 %) were single, 8 (2%) were divorced, 28 (7.1 %) were widow/widower, 65 (16.4%) had secondary education, 20 (5.0%) were farmers (Table 4.1). 216(54.4%) were Families, 181 (45.60%) were Non - Families, (Table 4.1). The analysis also shows that 322 (81.1%) houses were govern by a male head, and 75(18.9%) were also govern by female head. The male head having the highest percentage to female head as showed from this analysis, means houses are headed by the male in Ekosodin community.

The analysis result shows that the number of each family size which is between the range of less than 5 people in a house, statistically, the result shows they are 148 response which is (37.3%), between 5 and 15, the number shows the response rate of 162 (40.8%), above 15 result shows 87 response (21.9%). The analysis result also shows that from the result the number of civil servant/ public workers is 52(13.1%), private workers 40(10.1%), self-employed 94 (23.7%), unemployed 140(35.3%), farmer 20 (5.0%) and business trader 51 (12.8%). analysis from the result also shows educational qualification of respondents the number of no formal education is 33(8.3%), primary education 12(3.0%), secondary education 65(16.4%), tertiary 268(67.5%), adult education 19 (4.8%).

4.1.2 Source of Water Supply, Water Storage and Water Treatment for Households.

The result for sources of water supply, water storage and water treatment for household are presented in table 4.2

Table 4.2: Source Of` Water Supply, Water Storage and Water Treatment For Households

Variables	Number of respondents	Percentage
Have access to potable water		
Have access	374	94.2
Do not have access	23	5.8
Total	397	100
Source of water supply		
Public stand pipe	60	15.1
Borehole	280	70.5
Protected well and spring	9	2.3
Rainwater	38	9.6
Tankers	6	1.5

Other	4	1.0
Total	397	100
Distance of water source from premises		
1 – 10m	267	67.3
11 – 20m	94	23.7
Above 20m	36	9.1
Total	397	100
Method of water treatment		
Coagulation (uses of alum)	56	14.1
Filtration	45	11.3
Sedimentation	9	2.3
Chlorination	87	21.9
Boiling	52	13.1
No treatment method	130	32.7
Others	18	4.5
Total	397	100
Method of water storage used in Household		
Plastic container (Gee Pee, Tank, Drum, Bucket, (e.t.c)	270	68.0

Metal container (tank, drum, bucket,)	37	9.3
Clay pot	7	1.8
Reservoir well	79	19.9
Others	4	1.0
Total	397	100
Frequency of cleaning water storage container		
do not clean at all Every week Every	33	8.3
two weeks	109	27.5
Every three weeks	94	23.7
Other times (monthly and above,	14	3.5
annually, etc.)	147	37.0
Total	397	100

Out of the 397 respondents, 374 (94.2%) indicated to have access to portable water. According to the interviewees, the primary source of water supply includes, public standpipe 60 (15.1%), borehole with hand pump 280 (70.5%), well 9 (2.3%) and rainwater 38 (9.6%), tanker 6 (1.5%), others 4 (1%). While 270 (68.0%) respondents indicated that water is mainly stored in plastic container, metal container (tank, Drum, Bucket etc.) 37(.3%), Clay pot 7 (1.8%), reservoir well 79 (19.4%), others 4 (1.0%). The analysis also revealed that from the result, 33(8.3%) household responded they don't clean their water storage container, 109(27.5%) household responded that they clean their water container every week, 94(23.7%) every two weeks,14(3.5%) every three weeks, other times monthly and above 147(37%). The analysis result shows that from the results, 56(14.1%) households treat their water through coagulation use of alum,

filtration 45(11.3), sedimentation 9 (2.3%), chlorination 87 (21.9), Boiling 52 (13.1%), No treatment 130 (32.7%) and others18(4.5%). This result clearly shows that statistically, majority of people in Ekosodin community don't treat their water.

4.1.3 Types of Toilet Facilities Used Among the Respondents

The result for type of toilet facilities used among the respondents are presented in table 4.3

Table 4.3: Types Of Toilet Facilities Used Among The Respondents

Variables	Number of respondents	Percentage
Present of toilet facility		
Yes	383	96.5
No	14	3.5
Total	397	100
Type of toilet facility use in Household		
Pit latrine	88	22.2
Swat flush latrine	53	13.4
Water system closet	245	61.7
Bucket	2	5
Total valid	388	97.7
Missing system	9	2.3
Total	397	100
Alternative place of defecation for households without toilet facilities		

Bush	6	1.5
Neighbor's latrine/ water closet	3	0.8
Polythene bag	1	0.3
Prefer not to say	4	1.0
Total valid value	14	3.5
Missing system	383	96.5
Number of toilet facility in household		
Below 3	188	47.4
3 and Above	206	51.9
Missing system	3	0.8
Total	397	100

Type of toilet facilities use in households as indicated by the respondents mainly include pit latrine 88 (22.2%), swat flush latrine53(13.4%), water closet 245(61.7) and bush 2 (0.5).

4.1.4 Method of Solid Waste Disposal Among Respondent

The result for method of solid waste disposal among respondents are presented in table 4.4

Table 4.4: Method Of Solid Waste Disposal Among Respondents

Variables	Number of respondents	Percentage
Existence of hand washing practice among household		
Available	382	96.2
Not available	15	3.8
Total	397	100

Period when hand washing is usually practice		
Before cooking	79	19.89
After cooking	19	4.78
Before eating	55	13.85
After eating	8	2.01
After going to toilet	82	20.65
After handling children's faeces After daily	7	1.76
activities	53	13.35
Every other time	94	23.67
Total	397	100
Method of hand washing practice		
Water only	86	21.7
Water with soap or detergent	300	75.6
Hand sanitizer	11	2.8
Total	397	100
Method of solid waste disposal among household		
Open dumpsite	224	56.4
Burning	150	37.8
Throwing into bush	19	4.8
Others	4	1.0
Total	397	100

Regular/ periodic disposal of solid waste Yes No Total	 392 5 397	 98.7 1.3 100

According to the respondents, the most common methods of disposing of solid waste were: open dumpsites 224 (56.4%), burning 150 (37.8%), dumping into the bush 150 (37.8%), and others 4 (1.0%). Results on hand washing practice demonstrates that a reasonable percentage of responses 79(19.9%) practice hand washing before cooking, 19(4.8%) after cooking, 55(13.9%) before eating, 8(2.01%) practice hand washing mostly after eating, 82(20.7%) after using the toilet,7(1.8) after handling children's faeces, 53(13.4%) after daily activities and 94(23.7%) every other time.

Method of hand washing practice was mostly with only water 86 (21.7%), while 300 (75.6%) indicated that they wash their hands with water and soap or detergent, 11(2.8%) hand sanitizer (Table 4.4).

4.1.5 Observational Checklist

The result for the assessment of water supply, sanitation and hygiene facilities in households are presented in table 4.5

Table 4.5: Assessment Of Water Supply, Sanitation And Hygiene Facilities In Households

Variables	Number of respondents	Percentage
Type of housing	No of respondents	Percentage
Mud	77	18.3
Mud plastered with cement	92	21.9
Block	237	56.4
Wooden made	14	3.3

Total	420	100
Presence of drainage system		
Available	177	42.1
Non available	243	57.9
Total	420	100
Sanitary condition of drainage		
Sanitary	119	28.3
Unsanitary	301	71.7
Total	420	100
Availability of waste storage facility		
Available	183	43.6
Non available	237	56.4
Total	420	100
Sanitary condition of waste storage facility		
Sanitary	157	37.4
Unsanitary	263	62.6
Total	420	100

Type of toilet facility available		
Pit latrine with cover	50	11.9
Pit latrine without cover	35	8.3
Swat flush	54	12.9
Water system closet	273	65.0
No toilet	8	1.9
Total	420	100
Sanitary condition of toilet facility		
Sanitary	253	60.2
Unsanitary	167	39.8
Total	420	100
Location of bathing facility		
Outside the house	79	18.8
Inside the house	341	81.2
Total	420	100
Sanitary condition of bathing facility		
Sanitary	241	57.4
Unsanitary	179	42.6
Total	420	100
Availability of water supply		
Available	279	66.4
Not available	141	33.6
Total	420	100

Status of water source		
Improved	278	66.2
Unimproved	142	33.8
Total	420	100
Present of refuse dump		
Present	312	74.3
Absent	108	25.7
Total	420	100
Odour of excreta in the surrounding		
Present	66	15.7
Absent	354	84.3
Total	420	100

Assessment of WASH facilities in households, indicated that 237(56.4%) houses were mainly made of blocks, 243(57.9%) houses had no drainage system, 237(56.4%) have no waste storage facility, 273(65%) mostly have water closets,279(66.4) have access to improved water source, 312(74.3) have refuse dump site and 354(84.3%) did not have odor of excreta in the surrounding.

To promote health, raise hygiene standards, and quicken socioeconomic development, WASH facilities are crucial. over the past decade, but significant challenges still exist regarding the maintenance, standard requirements, functionality of WASH facilities in households (Orimoloye et al, 2015; Girsha et al, 2016; Kaoje, et al, 2019). Due to the current difficulties, people are frequently at risk of getting infectious diseases linked to WASH, which raises the rate of disease morbidity and mortality. More over half of the respondents in the current study said they have access to drinkable water. This result contradicts that of Eneh (2007) where access to potable water was perceived to be the greatest problem in the study. This

demonstrates unequivocally that while access to potable water is not an issue in Ekosodin, it is still a significant issue, particularly in rural areas. More than two thirds of the respondents primarily store their drinking water in plastic containers, and just one third said they clean their water storage container every two weeks, according to the data. This suggests that households have inadequate hygiene habits. To prevent water pollution and advance illness prevention, water storage containers must always be cleaned. Despite the fact that one third of respondents said they don't treat water before using it, 45 (11.3%) of them utilize the filtration method to prepare water for home use. This finding agrees with that of Venkatashiva et al (2017) where two- third of the households surveyed did not treat their water before use. Because responders may have already deemed the water source acceptable for consumption, the complete lack of a water treatment plan may be related (e.g water from borehole with hand pump). This was supported by a recent study by Kaoje et al (2019), where 97% of respondents believed that source of their water was safe to consume. Another reason why water is not treated before use could be a lack of awareness about the various water treatment options. The most widely used method for treating water, though, was chlorination. Due to its simplicity, convenience, and low cost of execution, this method of water purification has become one of the most popular in Ekosodin areas. More than half of the households use mostly water closet, followed by pit latrine and then by swat flush. This finding contradicts a study conducted in Ibadan which documented that pour flush toilet was the most used type of toilet facility (Orimoloye et al, 2015). This outcome is not unexpected because metropolitan regions have high rates of water closet usage, primarily because of exposure. However, it was found that most homes had very low standards for toilet hygiene. Families without access to toilets urinate outside in public spaces (i.e., bushes). The widespread habit of open defecation continuously harms the environment, taints water sources, and speeds up the spread of illness. Although it was determined that more than two-thirds of households have a waste storage facility, the stated methods of disposing of solid waste were primarily open dump sites, burning, and dumping into the bush. This finding is in accordance with that of

Girsha et al (2016) where over two-third of the households dispose their waste at open dumpsite. Open dumpsites for trash disposal frequently promote environmental contamination, the release of objectionable odors, rat infestation, and littering of rubbish around them. To avoid the negative health effects associated with the careless disposal of garbage, it is imperative that households adopt a more appropriate way of waste disposal. When it comes to hand washing, a larger percentage of respondents wash their hands mostly after eating, before eating, and after touching children's feces. This is largely related to the perception that spreading infections may be stopped by keeping hands clean. Because they are typically used for eating or feeding, the hands must constantly be clean. This could explain why most people wash their hands before and after eating. This outcome is consistent with that of Orimoloye et al. (2015), who found that hand washing was primarily done after meals. More over 50% of respondents said they wash their hands with water, soap, or detergent, and 86 people (21.7% of the sample) said the same. This finding contradicts with those of Orimoloye et al. (2015) and Kaoje et al. (2019), who found that hand washing behavior was underreported. This suggests that urban residents place a greater emphasis on the proper hand-washing technique using soap and water. Their poor handwashing habits may be due to ignorance of the health benefits of appropriate technique. Additionally, it was noted that more than two thirds of the respondents lacked a drainage system. This greatly encouraged the careless disposal of waste waters, which led to an infestation of flies, the release of unpleasant odors into the environment, and the attraction and growth of insects, mosquitoes and rodents.

CHAPTER FIVE

5.1 Conclusion

Having sufficient WASH facilities available and easily accessible is essential for improving environmental sanitation. In any policy, a lack of access to WASH facilities feeds the cycle of poverty, disease outbreaks, and underdevelopment. The results of study carried out in Ekosodi community shows that there is access to water supply but no proper water treatment, improved toilet management, poor waste management, inadequate drainage system and poor handwashing practices at promiscuous time. Hence, Ekosodin Community do not have access to Adequate WASH facilities.

5.2 Recommendation

In regard to the above research findings, this study made the following recommendations;

i. Finance to improve infrastructure and continuous maintenance of boreholes, WASH facilities in Ekosodin community. Thus, to ensure efficiency.

ii. Ensure that regular treatment of water source as some source of water source takes a long period of time for treatment.

iii. Adequate waste management facilities should be provided in Ekosodin for proper disposal of wastes.

iv. There should be an awareness program to educate the people of Ekosodi on proper hand washing practices at critical time.

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APPENDICES

DEPARTMENT OF CIVIL ENGINEERING

FACULTY OF ENGINEERING

UNIVERSITY OF BENIN, BENIN CITY, NIGERIA

Dear Respondent,

`This questionnaire is solely for the purpose of a research the researcher is working on, which is titled: "Assessment of water supply and sanitation facilities using Ekosodin Benin City, Edo -State as a Case Study".

You are therefore requested to kindly help as much as possible to supply the needed information as accurate as possible. Your response shall be treated with utmost confidence.

Please read the questions carefully and tick (√) in the box provided that corresponds to the answer of your choice.

SECTION A (DEMOGRAPHICS DATA)

1. Sex: Male [ ] Female [ ]

2. Age: 18- 25 [ ] 26-34 [ ] 35-44 [ ] 45 and above [ ]

3. Marital Status: Married [ ] Single [ ] Divorced [ ] Windowed [ ]

4. Type of Household: Family [ ] Non Family [ ]

5. Household Head: Male Head [ ] Female Head [ ]

6. Household Size: less than 5 [ ] Between 5 and 15 [ ] Above 15 [ ]

7. Occupation: Civil servant/ public Workers [ ] Private Workers [ ] Self Employed [ ]

Unemployed [ ] Others [ ]

8. Educational Qualification: No Formal Education [ ] Primary Education [ ]

Secondary Education [ ] Tertiary Education [ ] Adult Education [ ]

SECTION B: (SOURCE OF WATER SUPPLY, WATER TREATMENT AND WATER STORAGE FOR HOUSEHOLDS)

9	Access to portable water? Yes [ ] No [ ]
10	Source of Water Supply? Rain water [ ] Tanker Truck [ ] Unprotected well or Spring [ ] protected well or Spring [ ] Borehole [ ] Public stand pipe [ ] Others [ ]
11	Distance of water source from premises? 1 - 10m [ ] 11 – 20m [ ] Above 20m [ ]
12	Water treatment method used in household? No treatment [ ] Coagulation (use of alum) [ ] Filtration [ ] Sedimentation [ ] Boiling [ ] Chlorination [ ] Others [ ]
13	Method of water storage used in household? plastic container (Gee pee tank, Drum, Bucket etc.) [ ] Metal container (Tank, drum, Bucket etc.) [ ] Clay Pot [ ] Reservoir well [ ]
14	How often do you clean your water storage container? Every week [ ] Every two weeks [ ] Every three weeks [ ] Other times (Monthly and above, annually etc.) [ ] Do not clean at all [ ]

SECTION C: TOILET FACILITIES/ HANDWASHING PRATICE/ SOLID WASTE MANAGEMENT

15	Present of a toilet facility in household? Yes [ ] No [ ]
16	If no, alternative place of defecation? Bush [ ] Polythene Bag [ ] Container (plastic or metal etc.) [ ] Neighbour's Latrine/ Water system Closet [ ] Prefer no to say [ ]
17	If yes, types of toilet facility used in household Pit latrine [ ] Swat flush latrine [ ] Water closet system [ ] Bucket [ ]
18	Number of toilet facility in household? Below 3 [ ] 3 and above [ ]
19	Existence of handwashing practice among household? Yes [ ] No [ ]
20	Period when handwashing is usually practice? Before cooking [ ] After cooking [ ] Before eating [ ] After eating [ ] After using toilet [ ] After handling children's faeces [ ] After daily activities [ ] every other time [ ]
21	Method of handwashing practice? Water only [ ] water with soap or detergent [ ] Hand sanitizer [ ]
22	Method of solid waste disposal among household? Throwing into bush [ ] Open dumpsite [ ] Burning [ ]
23	Regular/ periodic disposal of solid waste? Yes [ ] No [ ]

OBSERVATIONAL CHECKLIST

ASSESSMENT OF WATER SUPPLY, SANITATION AND HYGIENE FACILITIES IN HOUSEHOLDS

1	Types of Housing (a) Mud (b) Mud plastered with cement (c) Block (d) Wooden- made
2	Presence of drainage system (a) Available (b) Not available
3	Sanitary condition of drainage (a) Sanitary (b) Unsanitary
4	Availability of waste storage facility (a) Available (b) Not available
5	Sanitary condition of waste storage facility (a) Sanitary (b) Unsanitary
6	Type of toilet facility available (a) pit latrine with cover (b) Pit latrine without cover (c) Swat flush (d) water system closet (e) No toilet
7	Sanitary condition of toilet facility (a) Sanitary (b) Unsanitary
8	Location of Bathing Facility (a) Outside the house (b) inside the house
9	Sanitary condition of bathing facility (a) Sanitary (b) Unsanitary
10	Availability of water supply (a) Available (b) Not available
11	Status of water source

	(a) Improved (b) Unimproved
12	Present of refuse dump (a) Present (b) Absent
13	Odour of excreta in the surrounding (a) Present (b) Absent

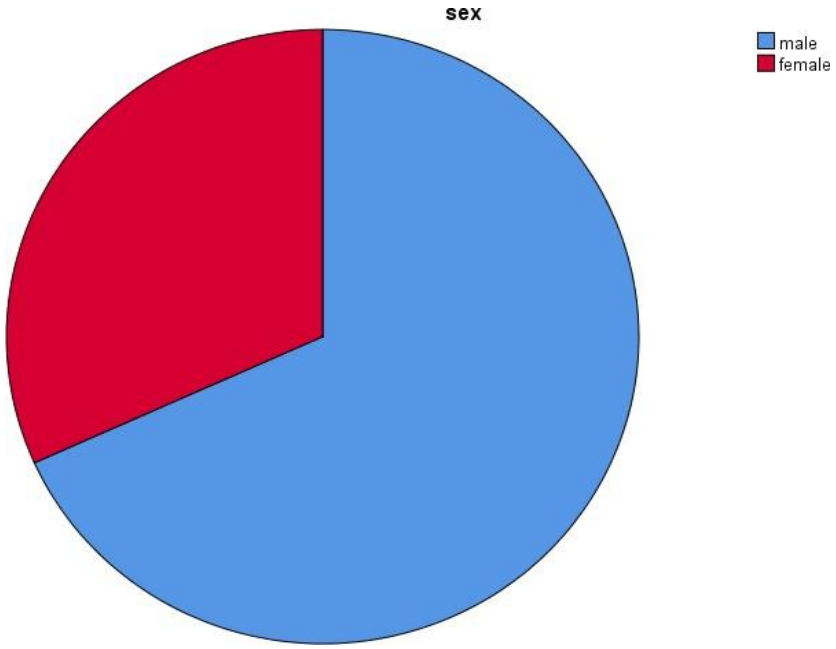

Fig 4.1: Chart Showing Sex Of People In The Household

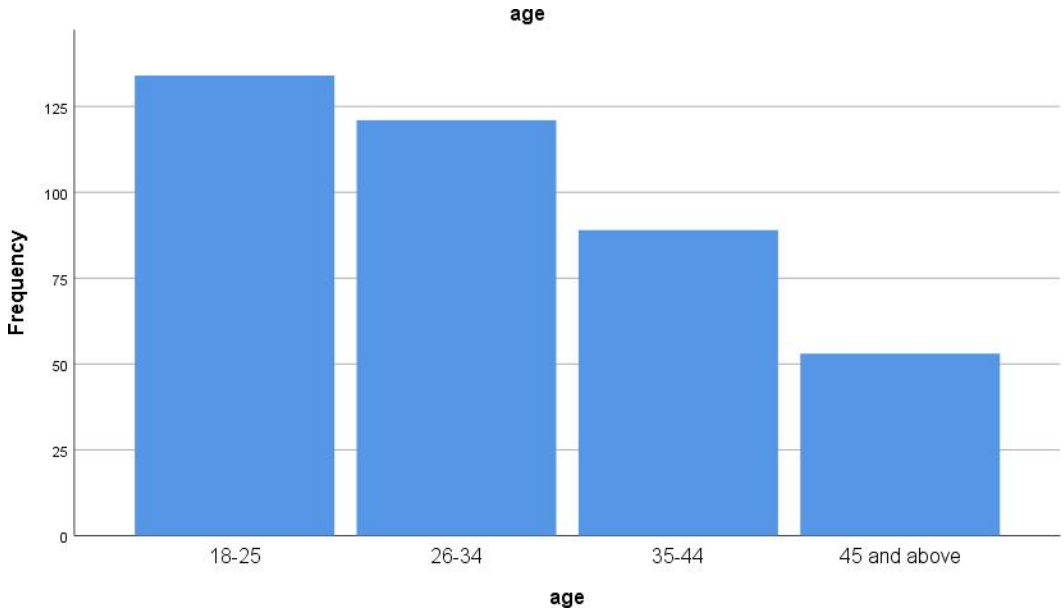

Fig 4.2: Chart Showing The Age of People In The Household

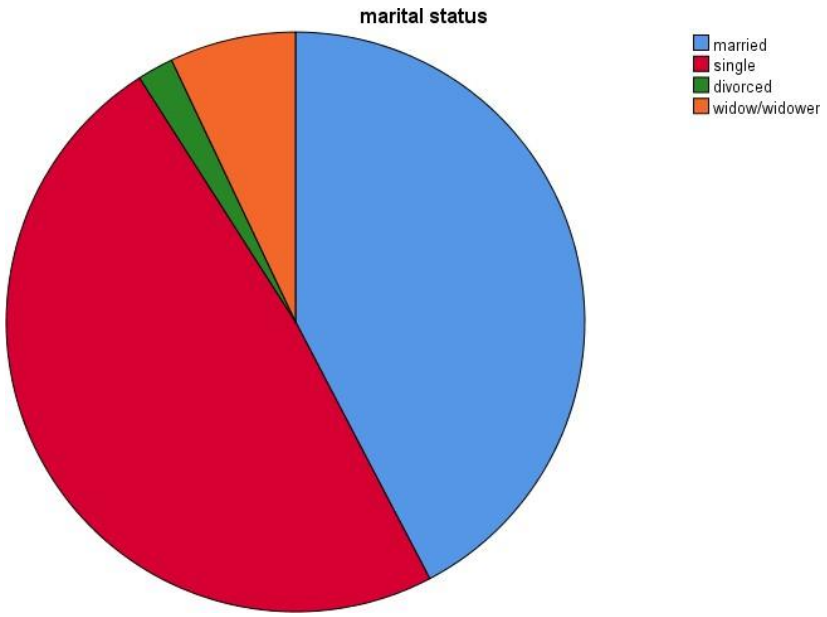

Fig 4.3: Chart Showing The Marital Status Of People In the Household

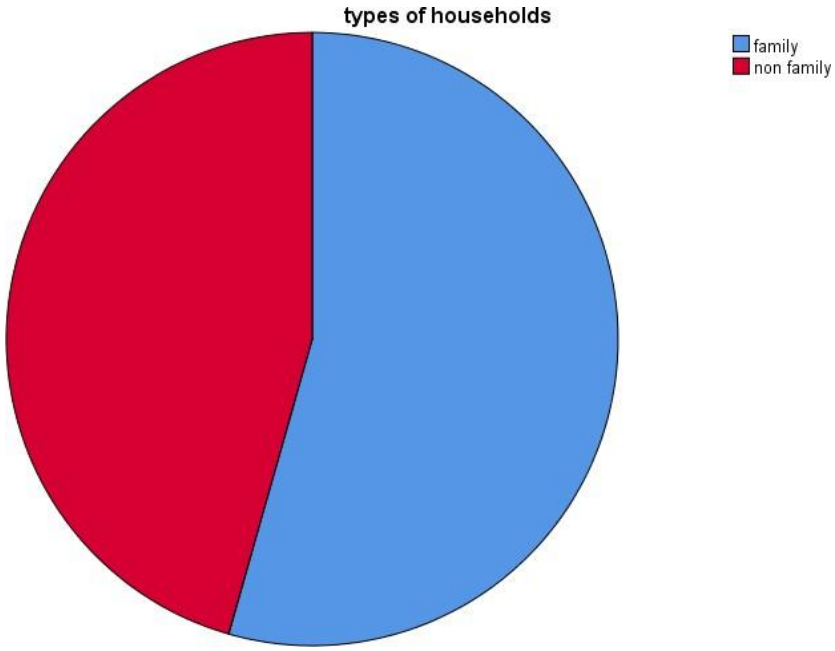

Fig 4.4: Chart Showing Type Of Household

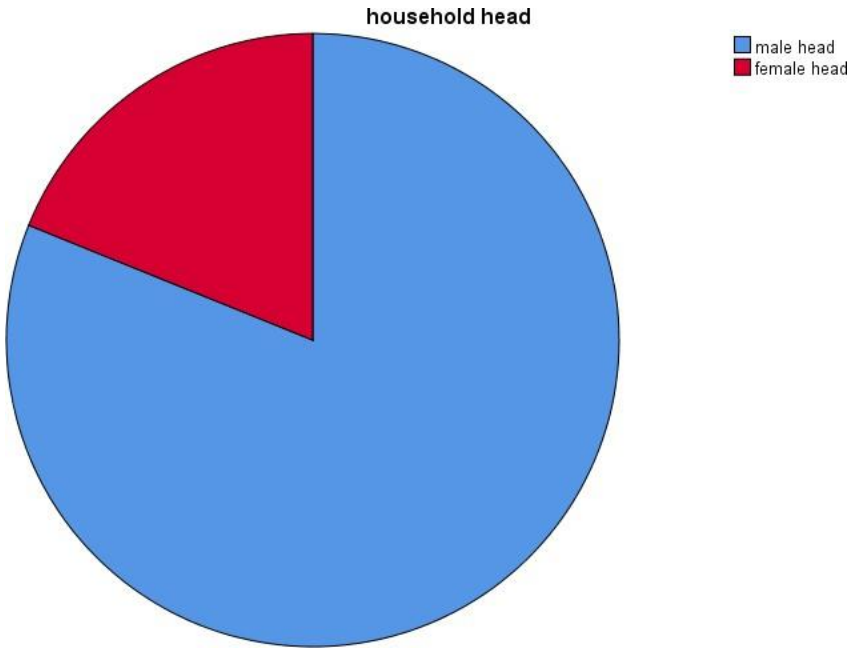

Fig 4.5: Chart Showing Household Head

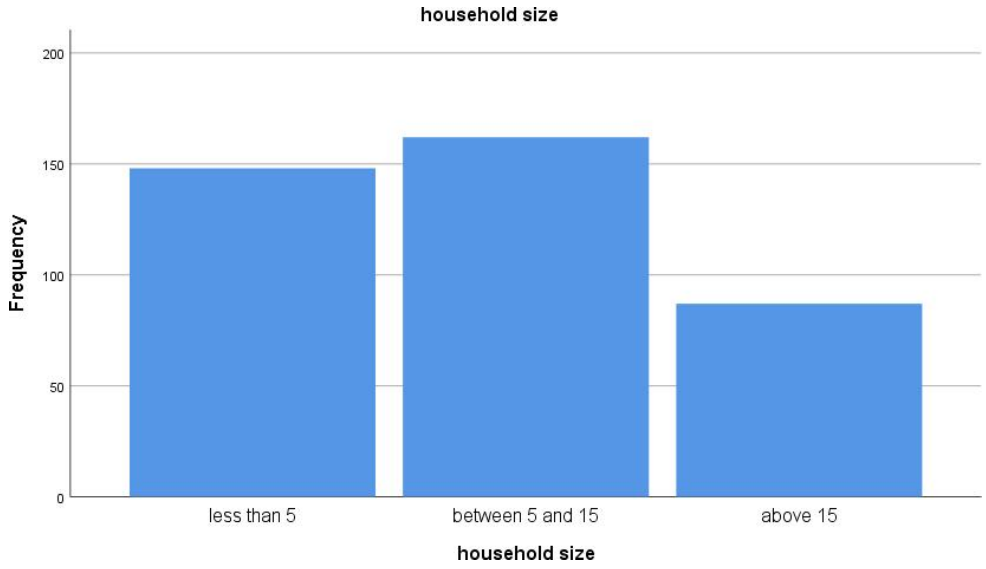

Fig 4.6: Chart Showing Household Size

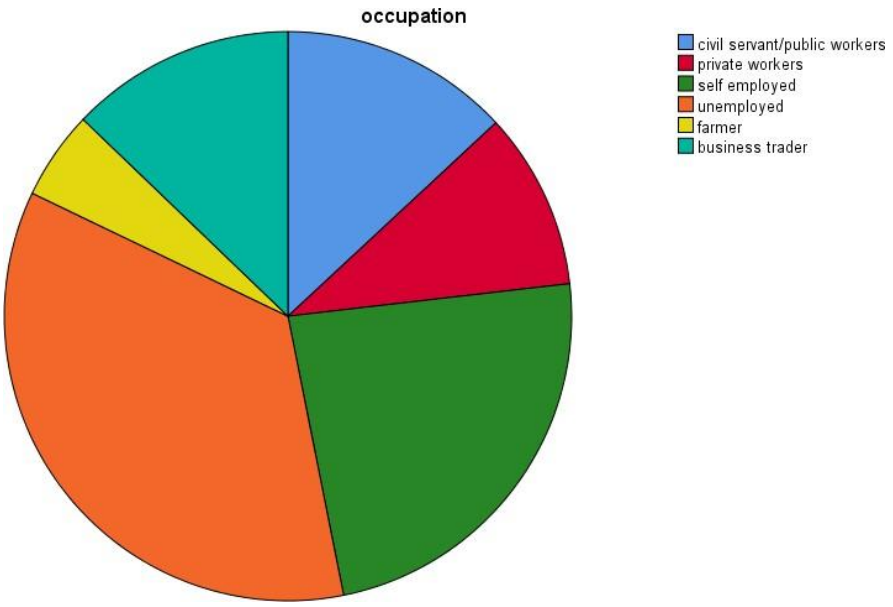

Fig 4.7: Chart Showing Occupation Of People In Household

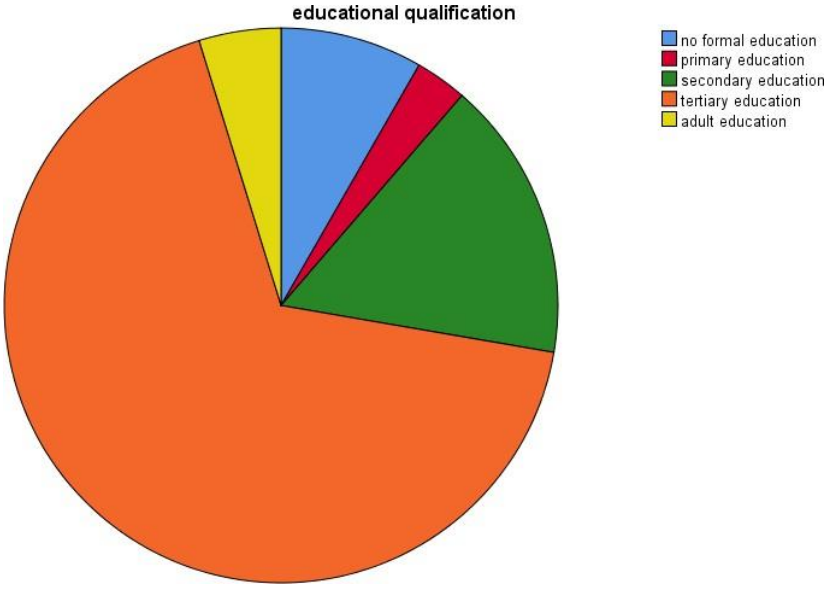

Fig 4.8: Chart Showing Educational Qualification Of People In Household

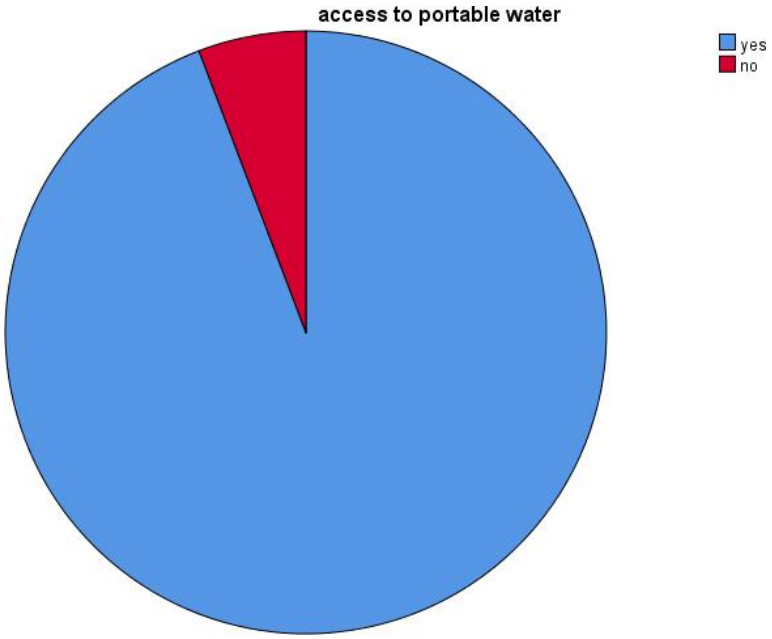

Fig 4.9: Chart Showing People Having Access To Portable Water

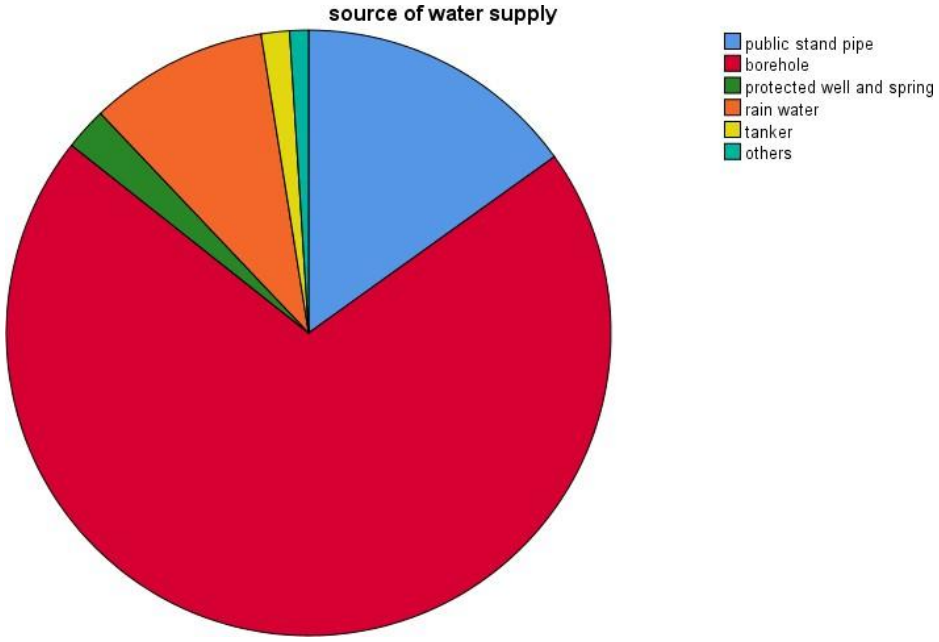

Fig 4.10: Chart Showing Source Of Water In The Household

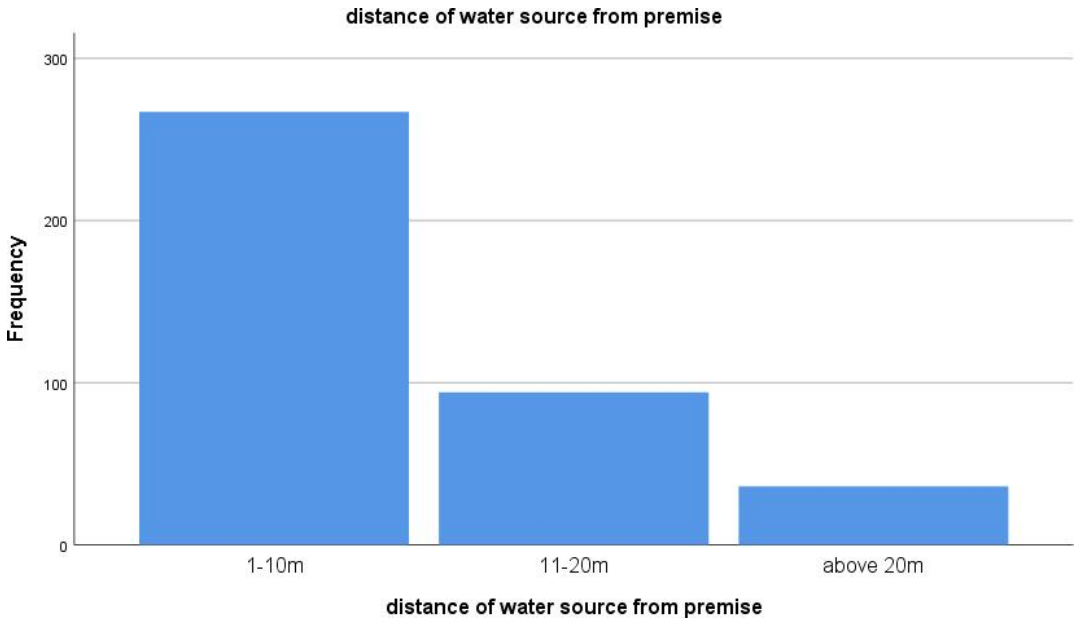

Fig 4.11: Chart Showing The Distance Of Water Source From Premise

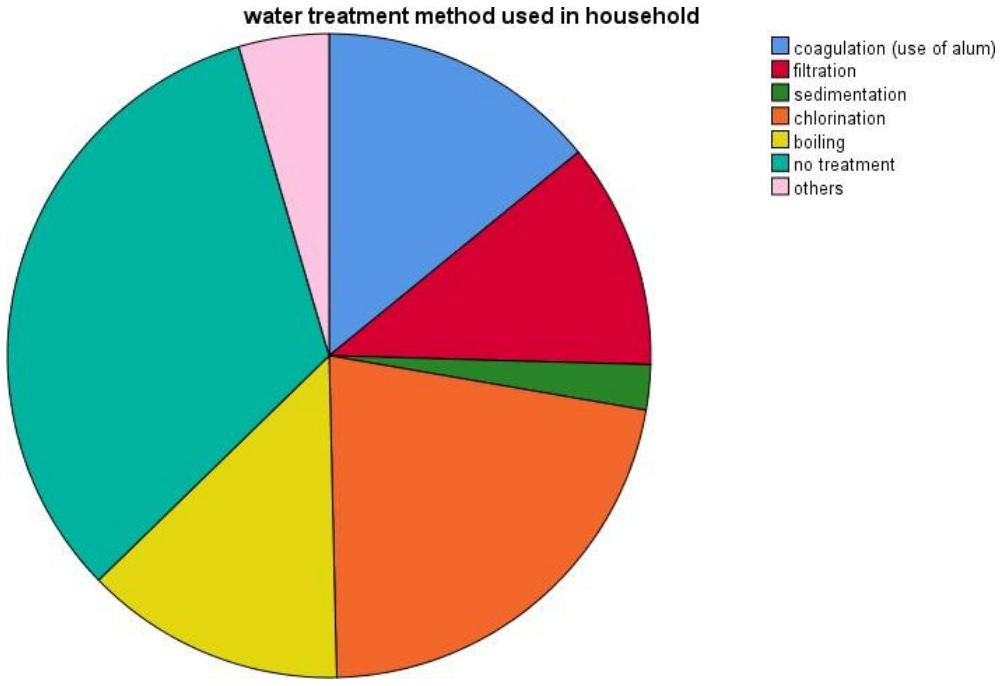

Fig 4.12: Chart Showing Water Treatment Method Used In Household

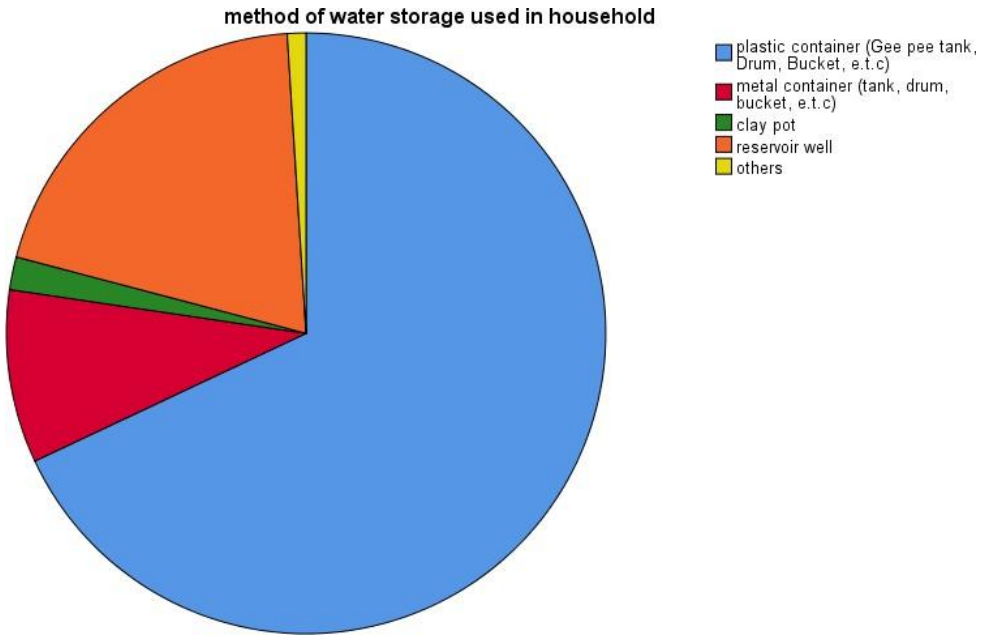

Fig 4.13: Chart Showing Method Of Storage Used In The Household

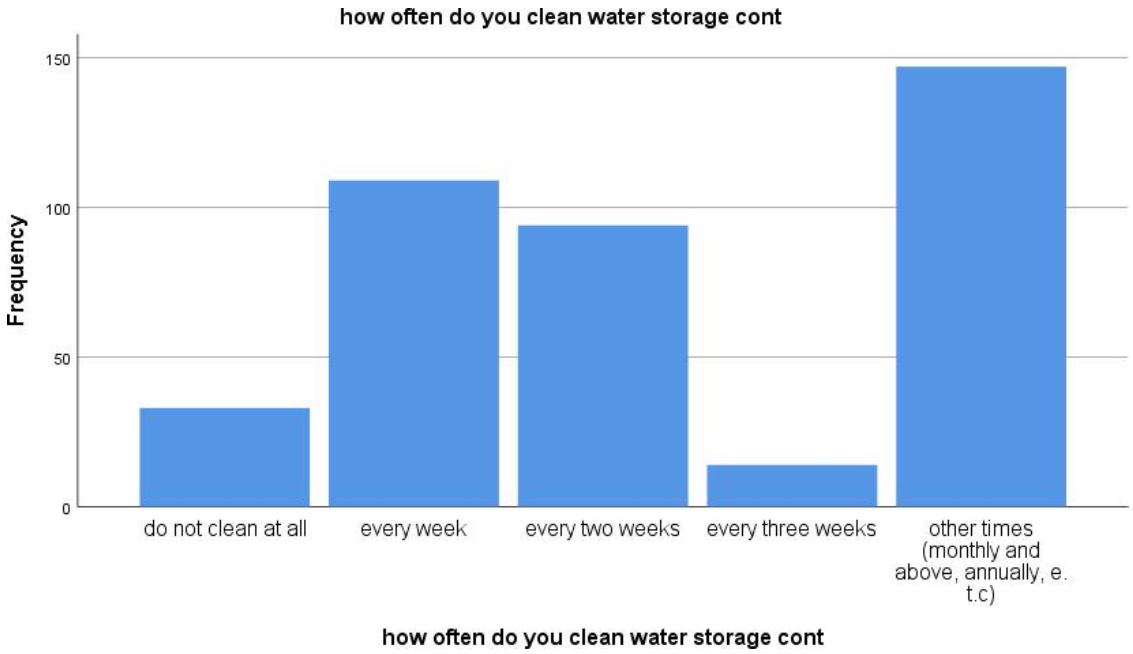

Fig 4.14: Chart Showing Cleaning Of Water Storage Container

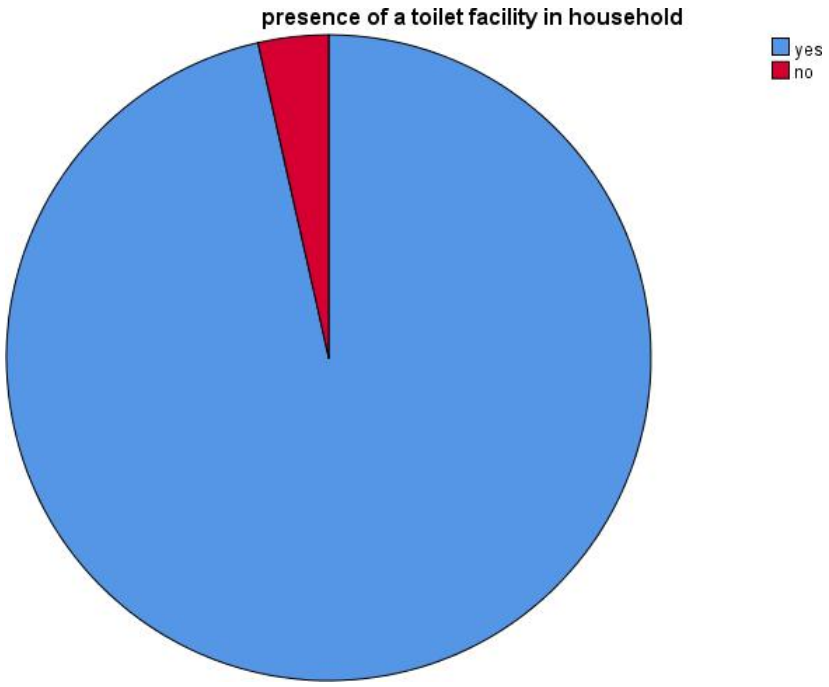

Fig 4.15: Chart Showing Presence Of Toilet Facility In Household

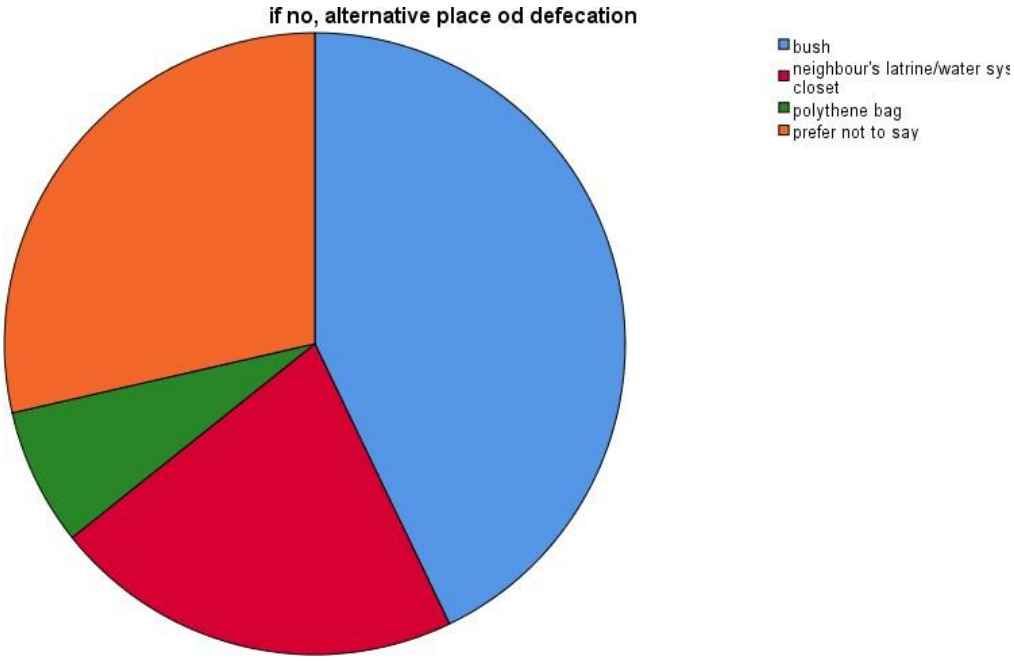

Fig 4.16: Chart Showing Alternative Place of Defecation In Household

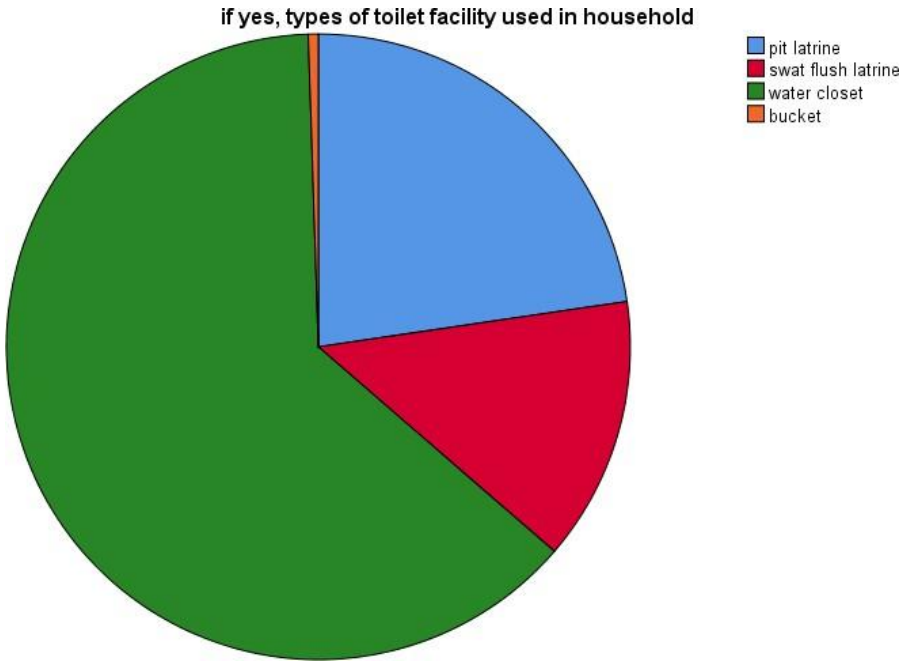

Fig 4.17: Chart Showing Types Of Toilet Facility Used In Household

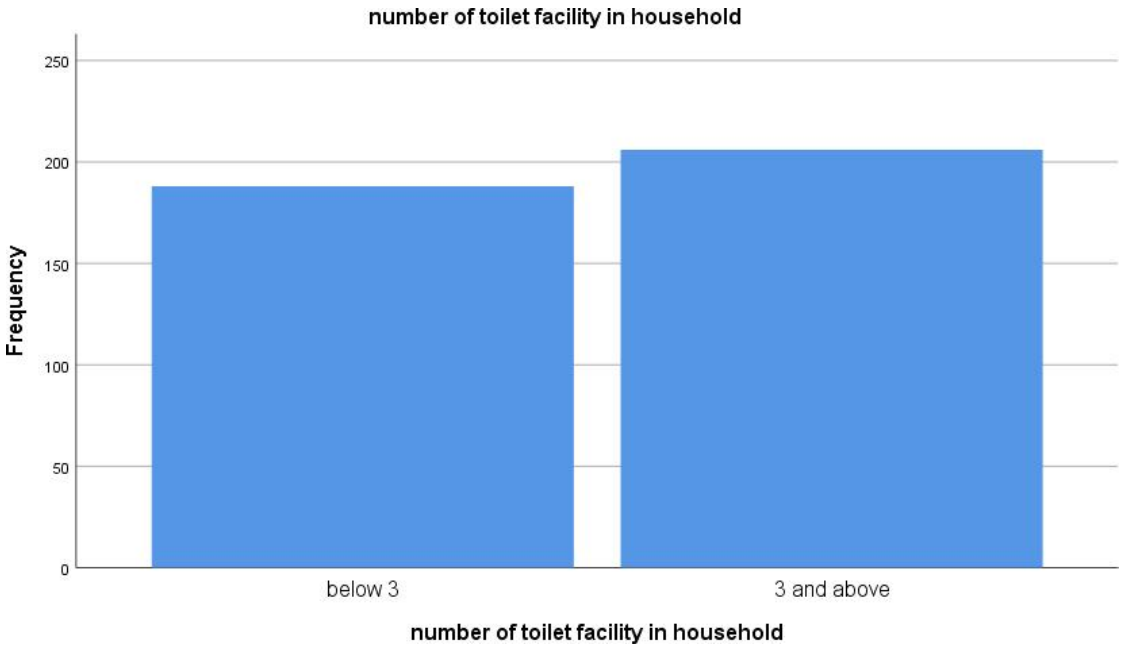

Fig 4.18: Chart Showing Number Of Toilet Facility In Household

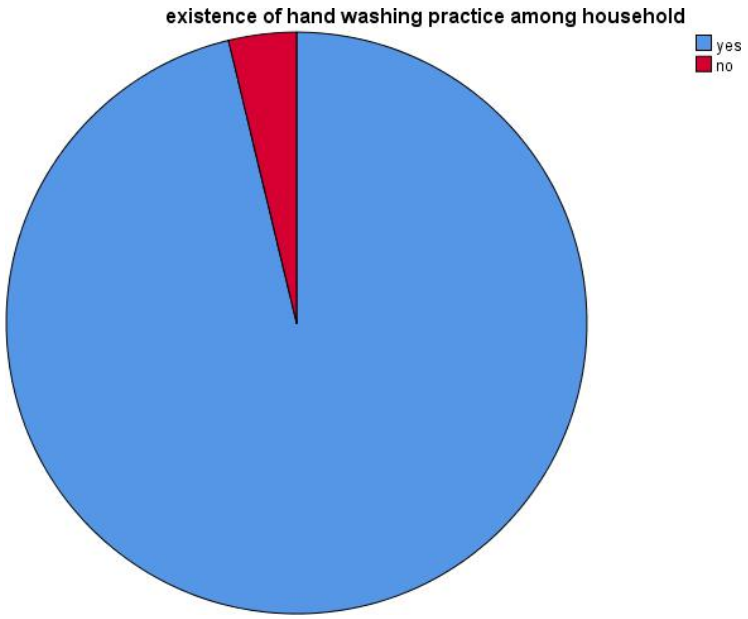

Fig 4.19: Chart Showing Existence Of Hand Washing Practice In The Household

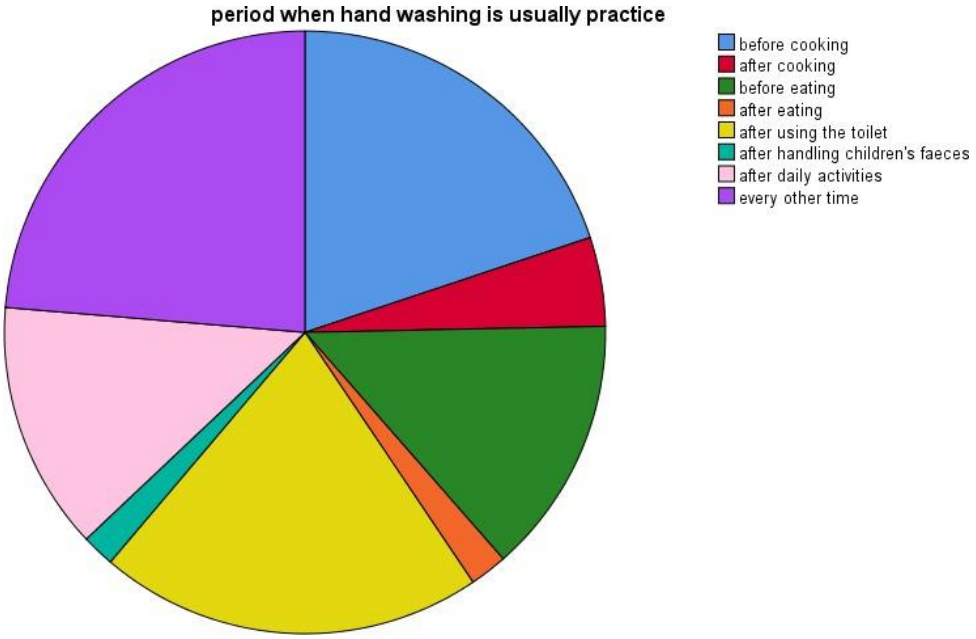

Fig 4.20: Chart Showing Period Of Handwashing Practice

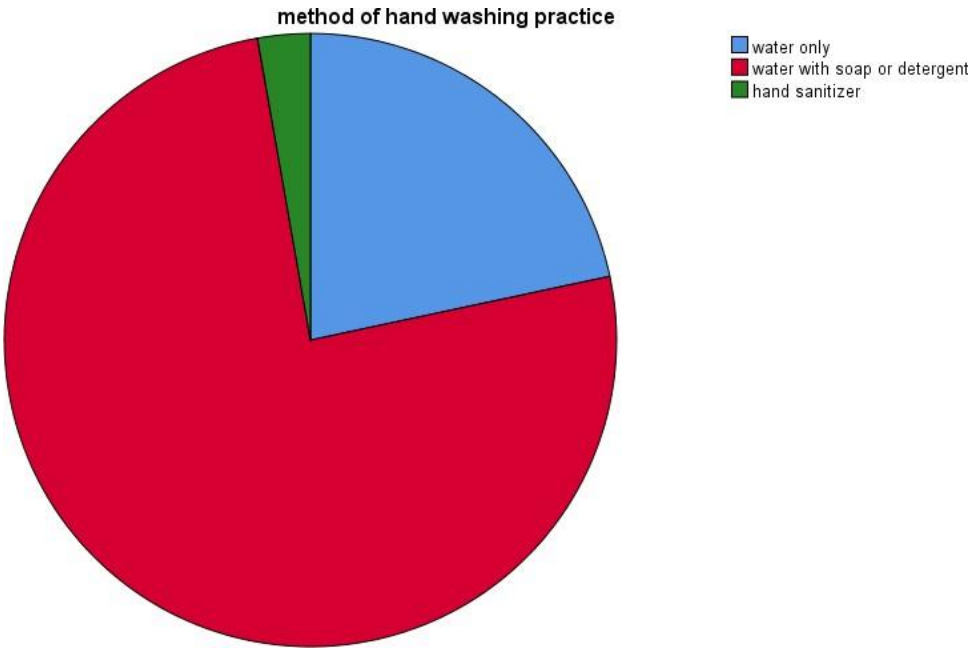

Fig 4.21: Chart Showing Method Of Handwashing Practice

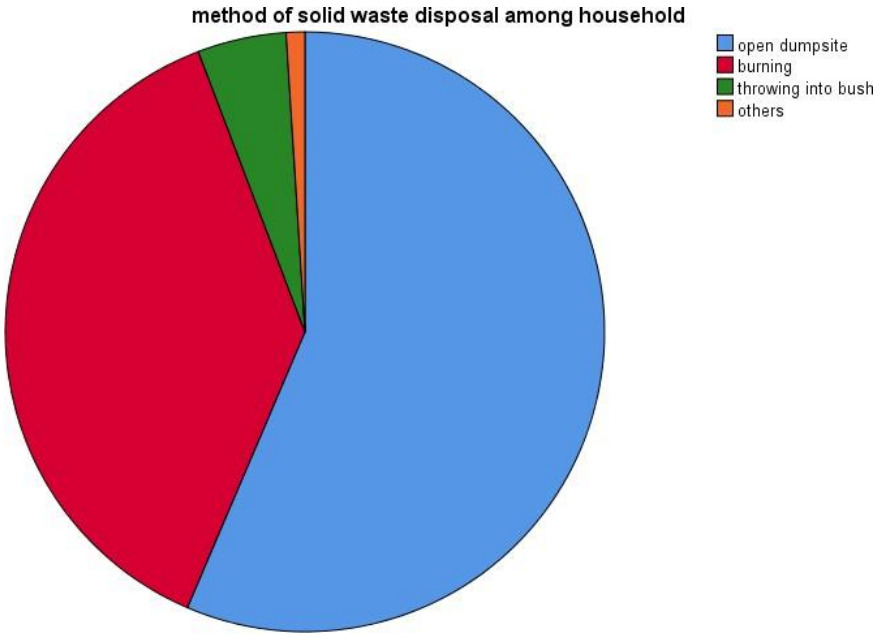

Fig 4.22: Chart Showing Method Of Solid Disposal Among Household

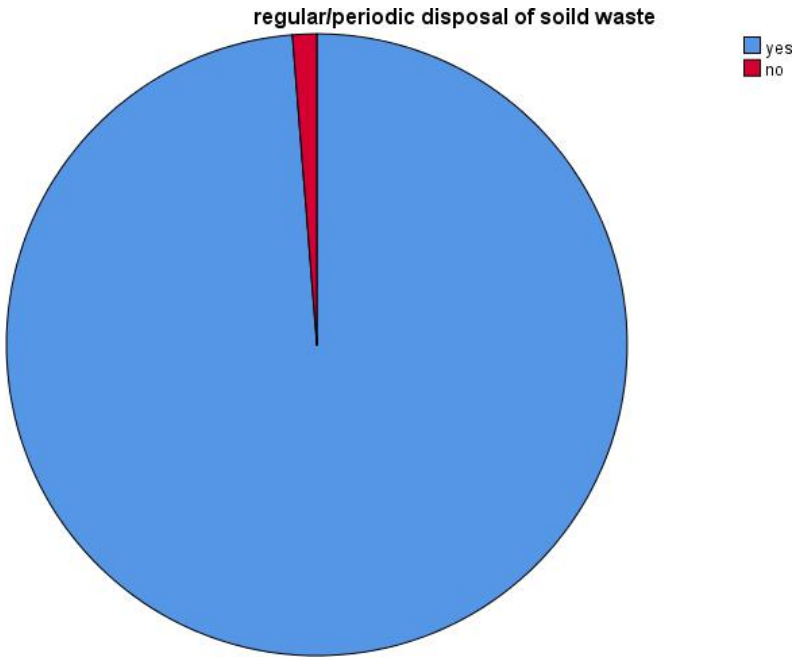

Fig 4.23: Chart Showing Periodic Disposal Of Solid Waste

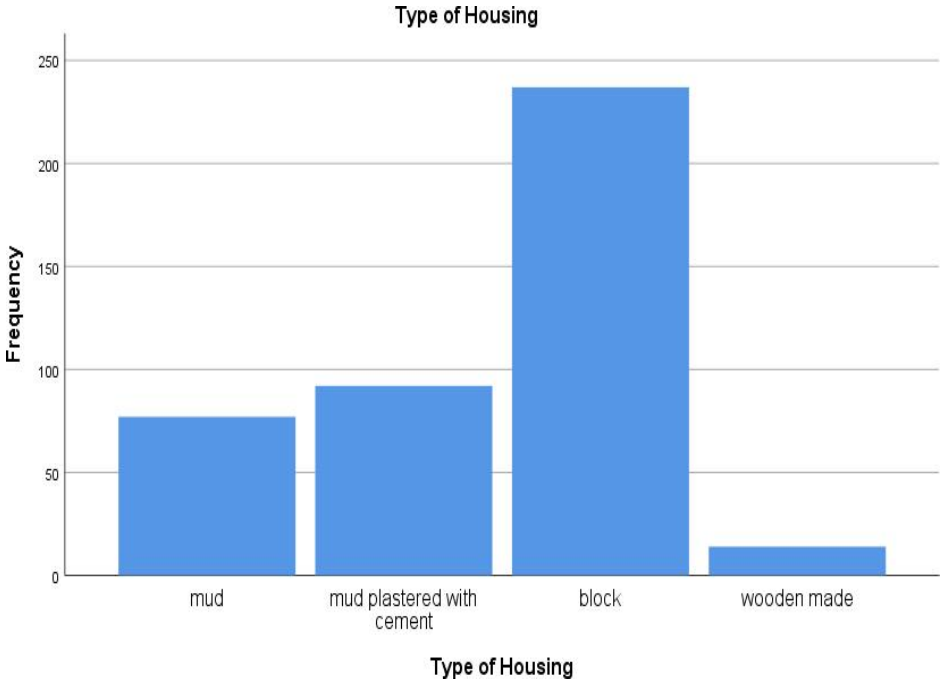

Fig 4.24: Chart Showing Type Of Household

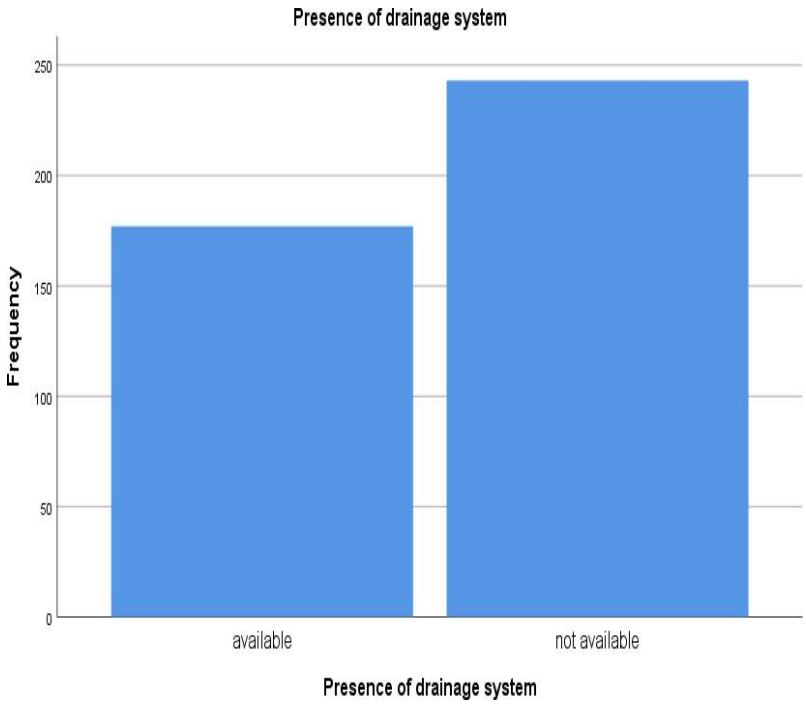

Fig 4.25: Chart Showing Presence Of Drainage System

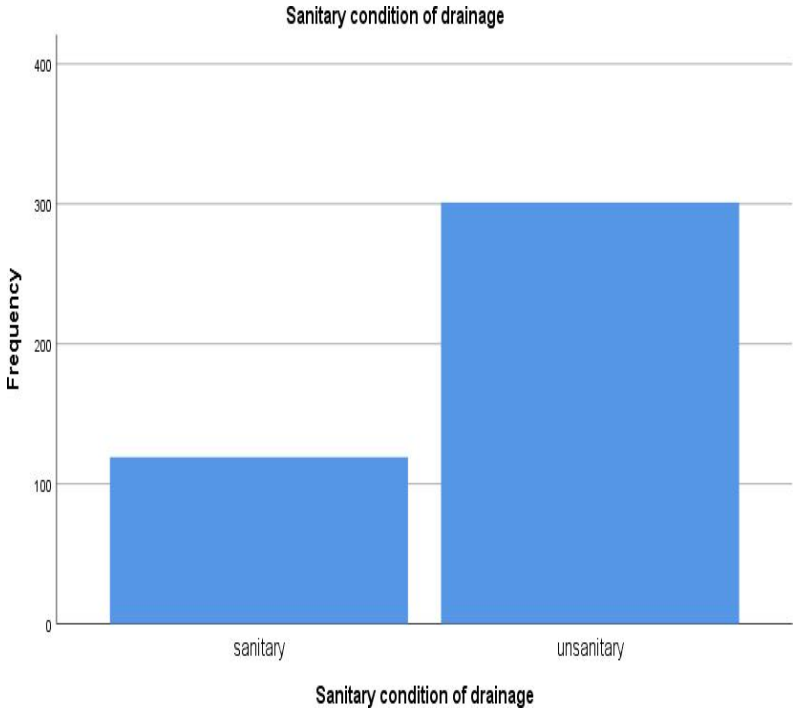

Fig 4.26: Chart Showing Sanitary Condition Of Drainage

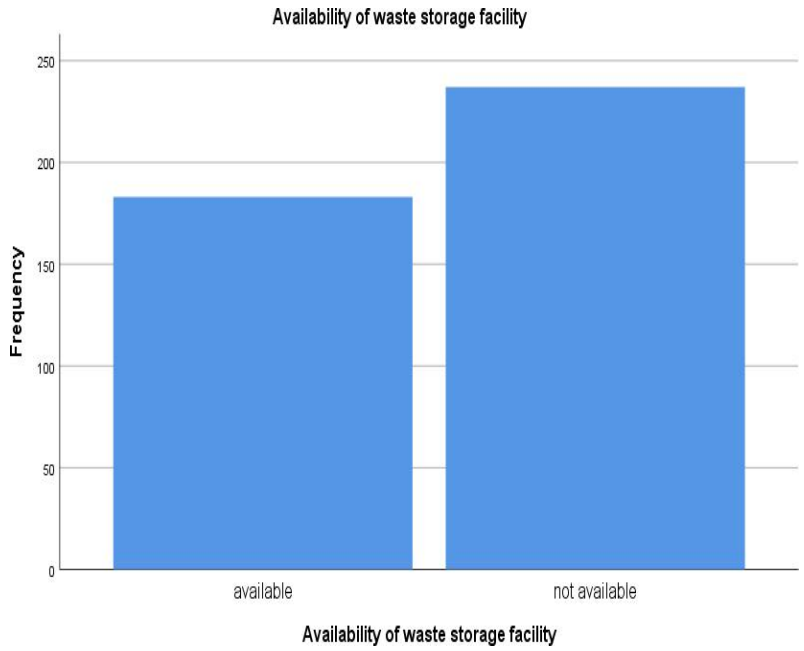

Fig 4.27: Chart Showing Availability Of Waste Storage Facility

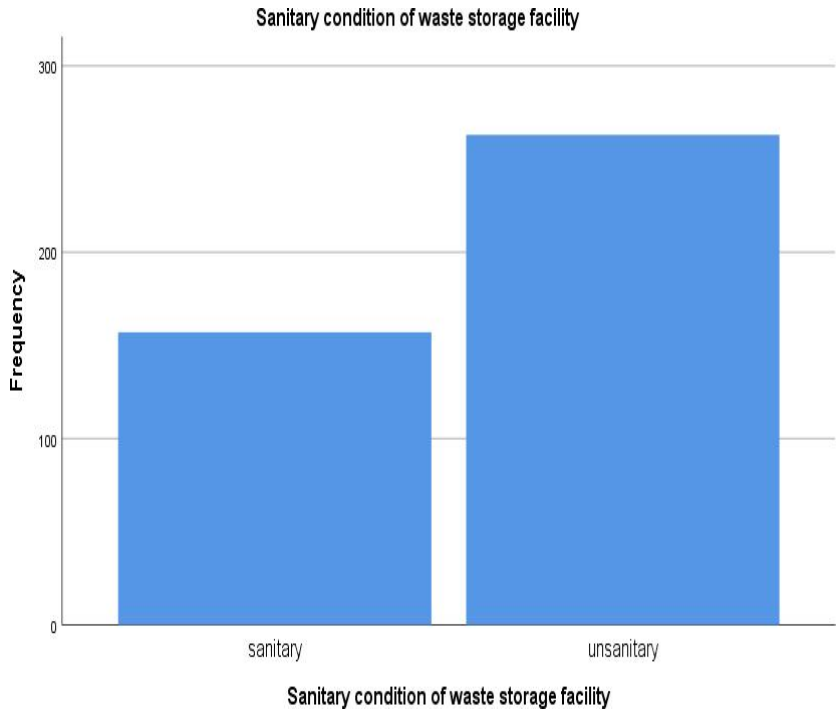

Fig 4.28: Chart Showing Sanitary Condition Of Waste Storage Facility

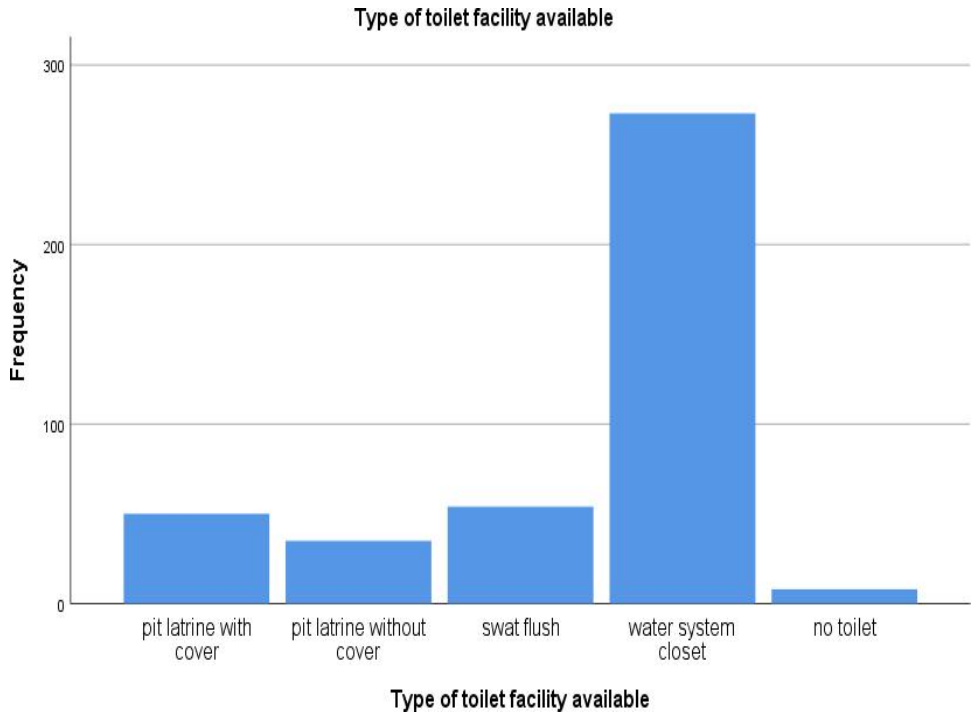

Fig 4.29: Chart Showing Type of Toilet Facility Available

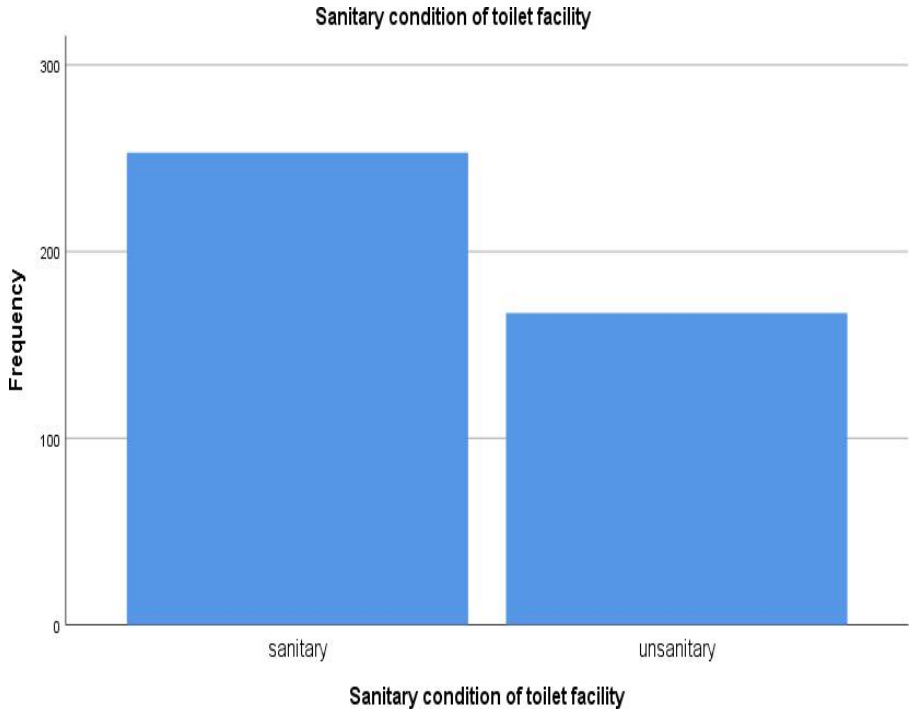

Fig 4.30: Chart Showing Sanitary Condition Of Toilet Facility

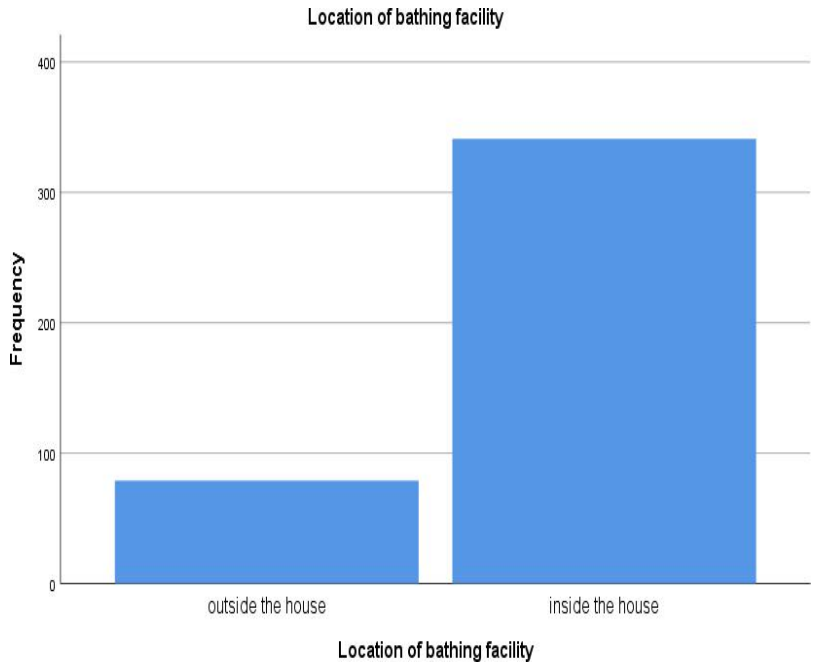

Fig 4.31: Chart Showing Location Of Bathing Facility

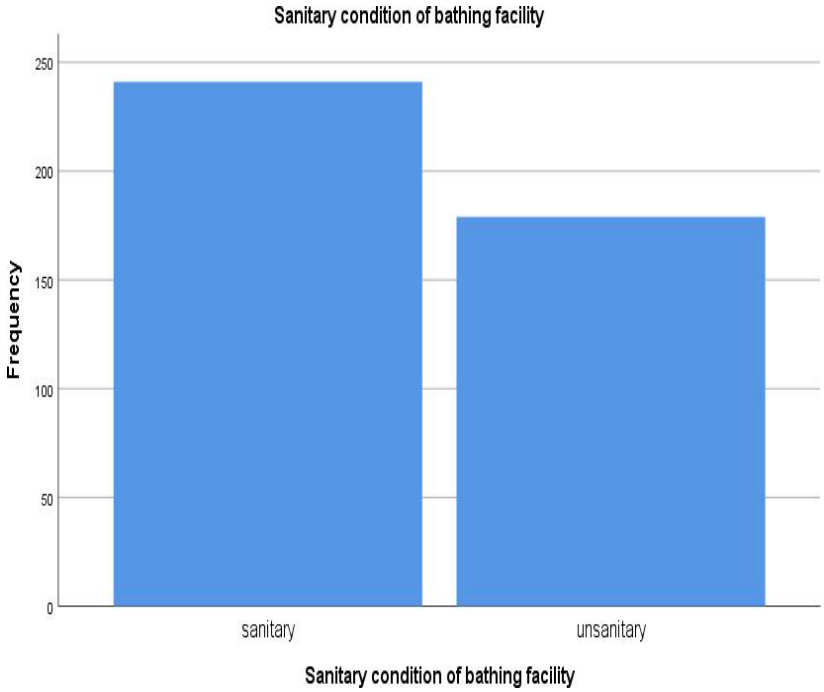

Fig 4.32: Chart Showing Sanitary Condition Of Bathing Facility

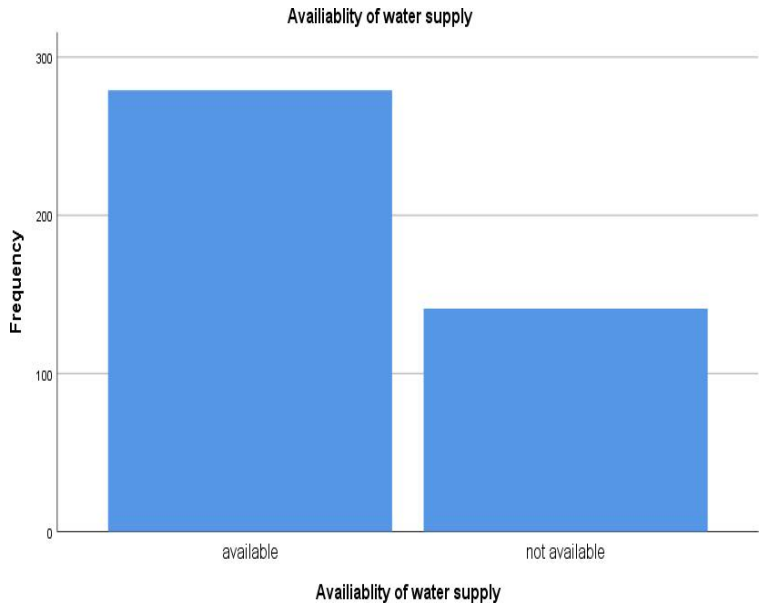

Fig 4.33: Chart Showing Availability Of Water Supply

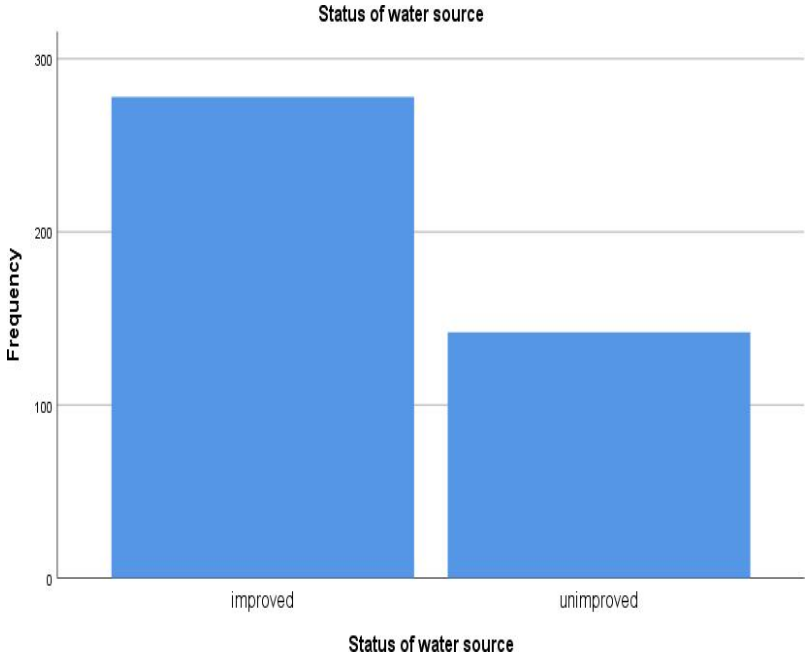

Fig 4.34: Chart Showing Status Of Water Source

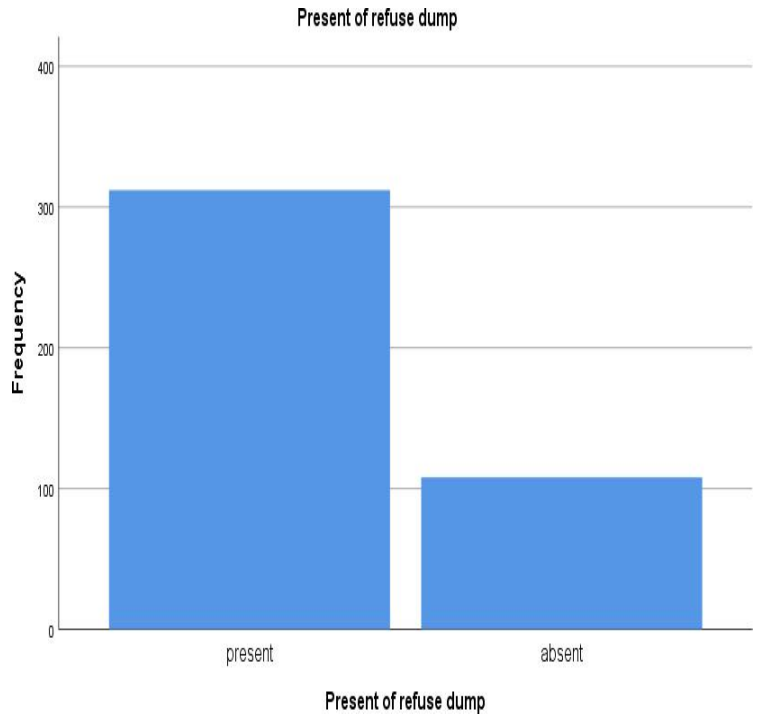

Fig 4.35: Chart Showing Present Of Refuse Dump

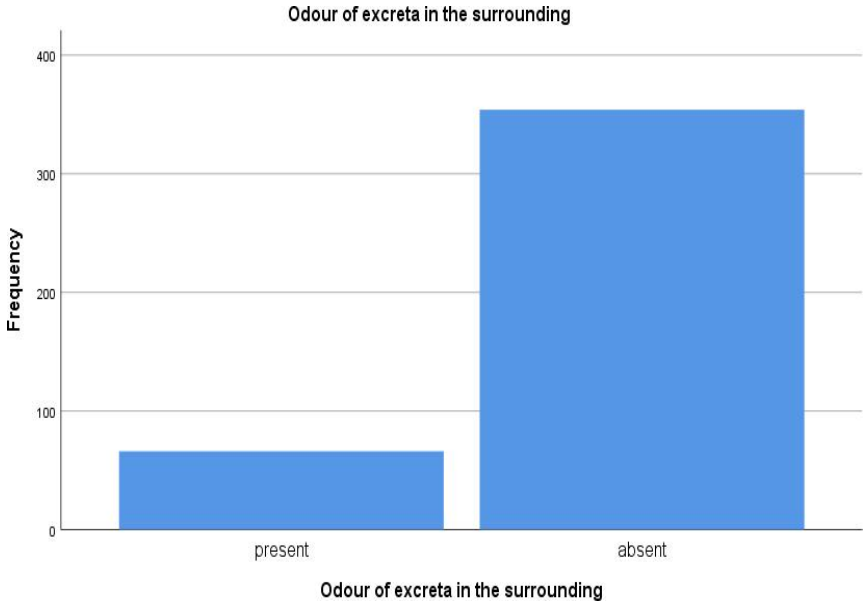

Fig 4.36: Chart Showing Odour Of Excreta In The Surrounding