Assessment of Sustainable Sanitation and Health Issues in Nigeria: Trends on Diarrheal, Typhoid and Soil Transmitted Helminth Infection

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Declaration of Authenticity by Student.

I Victoria Omeche Emanche hereby declare that I am the legitimate author of this dissertation and that it is my original work.

No part of this work has been submitted in support of an application for another degree or qualification of this or any other university or institution of higher education.

Any literature date or work done by others and cited within this thesis has given due acknowledgement and listed in the reference section.

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Abstract

Access to safe and sustainable sanitation and hygiene is a critical precondition for providing a safe environment that supports socio-economic development, quality education, healthy development and prevention of disease.

Based on the sustainable development goals, the United Nations plans to achieve access to adequate and equitable sanitation and hygiene for all and to these extents, sanitation is at the core of sustainable development. Achieving a disease-free generation will require the adoption and implementation of critical health policy reforms. However, countries with high disease burden resulting from poor sanitation often have low policy development, advocacy, and monitoring capacity.

To create a sustainably friendly and safe environment, issues relating to inadequate sanitation and poor hygiene need to be addressed.

This research examined residents' environmental sanitation practices across different cities in Nigeria by means of questionnaires and interviews. The study revealed that respondents' socio-economic characteristics varied significantly in different residential zones. Findings revealed that there is 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 residents in terms of accessing basic amenities across different cities. To involve households at all level, it was suggested to increase awareness about sustainable sanitation and its impact on health through media and by using various campaigns in schools and across the Nation, which will help strengthen community participation and implementation of policies that will promote sanitation, health and wellbeing of the population in accordance with Good health and wellbeing for sustainable development.

Key words: Health, environmental sanitation, assessment, Sustainability, hygiene, attitudes, practices.

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Chapter 1:
Introduction

1. Introduction

1.1 Background to the study

The environment can be termed as the surroundings of living organism, the environment includes not only water, air and soil but also the social and economic conditions under which we live (Park 2011), and it is that one thing we all share. Man's health lies largely on his environment and man's ill-health can be traced to adverse environmental factors such as water, soil, air pollution, poor housing conditions, solid waste and biological vector which poses threat to man's health.

Health as defined by World health organisation (WHO) is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity (WHO 2006).

Health is the level of functional and metabolic efficiency of a living organism with the environment as an integral part of human development (Hancock 1993).

Sanitation can be defined as the promotion of hygiene and prevention of infection and disease. Sanitation can be described as having access to facilities for the safe disposal of waste(sewage) as well as having the ability to maintain hygienic conditions, through services such as garbage collection, industrial/hazardous waste management, and wastewater treatment and disposal (CDC 2017).

Environmental sanitation is aimed at developing and maintaining a clean, safe and pleasant physical environment in all human settlements, to promote the social, economic and physical well-being of all sections of the population.

Environmental sanitation envisages promotion of health of the community by providing clean environment and breaking the cycle of disease (Pandve 2008).

Sustainable sanitation considers the entire "sanitation value chain", from the experience of the user, excreta and wastewater collection methods, transportation of waste, treatment, and reuse or disposal. The term is widely used. In 2007 the Sustainable Sanitation Alliance defined five sustainability criteria to compare the sustainability of sanitation systems. In order to be sustainable, a sanitation system has to be economically viable, socially

acceptable, technically and institutionally appropriate, and it should also protect the environment and the natural resource (World bank 2002).

Sanitation and hygiene are critical to health, survival, and development and issues on water, sanitation and hygiene (WASH) still pose a great challenge to many countries around the world.

Adequate sanitation, good hygiene and safe water are fundamental to good health and to social and economic development. To this end, the importance of water, sanitation and hygiene (WASH) is reflected on the Sustainable Development Goal (SDG) 6. Sanitation is seen to have an important role in any sustainable development agenda, crucial for national development, promoting general wellbeing and making progress across the Sustainable Development Goals (WHO 2015).

In order to meet the Sustainable Development Goals (SDG) 6, Target 6.1 and 6.2 by 2030,the United Nation has planned to achieve access to adequate and equitable sanitation and hygiene for all and to end open defecation by paying special attention to the needs of women and girls and those in vulnerable situations(David D, Macharia K, 2015).

Worldwide, 55 per cent of people do not use a safely managed sanitation facility and sanitation coverage is low in many developing countries and millions of people still engaged in waste dumping and practice of open defaecation.

Nigeria is the most populous country in sub-Saharan Africa With a population of 206 Million(Worldometer/UN,2019), the country is failing when it comes to progress on delivering sanitation to its citizens, and it is only one of a handful of countries around the world where access to basic sanitation is falling rather than rising (WHO/UNICEF, 2015).

Although rapid urbanisation and an increasing population has placed a major strain on the existing infrastructure. Nigeria ranks as one of the top three countries in the world in number of people living without access to safe water and sanitation(UNICEF 2019) and ranks second after India on a list of top 10 countries(WHO/UNICEF; 2015) for the number of people practicing open defecation(OD).

According to water, sanitation and hygiene national outcome data from 2018, 68per cent of the population nationally have access to basic water supply, and progress towards achievement of universal and equitable access to basic water supply has been slow. Only

19per cent of the national population use safely managed sanitation services,24per cent are still practicing OD in Nigeria and 30per cent in rural areas (UNICEF 2019).

Nigeria as a country has seen an overall decline in access to sanitation and there is slow progress in expanding improved sanitation coverage and policy makers and to a great extent the general public have not fully understood the importance and the need for improved sanitation solutions (UN/WHO, 2015) .

Inadequate sanitation is responsible for some of the existing disease burden worldwide. The diseases associated with poor sanitation and unsafe water account for about 10% of the global burden of disease (Mara D, Lane J, et.al 2010). Diseases associated with poor sanitation are diarrhoeal diseases, acute respiratory infections, undernutrition and other Neglected tropical diseases such as helminthiasis and schistosomiasis infections (Fewtrell, L Kaufmann RB et.al 2005).

In the year 2016, unsafe water, inadequate sanitation and hygiene was responsible for 829 000 annual deaths from diarrhoea, and 1.9% of the global burden of disease (WHO; GHO data 2016). According to Pruss—Ustun A, Bos R, et.al (2008), 88% of the cases of diarrhoea globally are attributable to unsafe water, inadequate sanitation and insufficient hygiene.

Inadequate access to clean water and proper sanitation therefore increases the risk of a range of health problems for both children and adults in Nigeria, but young children are particularly vulnerable due to their less developed immunity.

According to the latest WHO data published in 2018 Diarrhoeal diseases deaths in Nigeria reached 178,438, and it is ranked as the 3rd leading cause of death in the country.

In this dissertation, the focus is on assessment of Sanitation practice among households and trends in diarrhoea, soil transmitted helminths and typhoid disease prevalence in Nigeria. Poor sanitation, inadequate water and hygienic (WASH) conditions are among the major causes of public health issues in Nigeria affecting majority of the population (WHO 2015), and environmental sanitation has remained consistently poor in Nigeria for a long time coupled with the increasing population. However inadequate sanitation is a major cause of disease affecting people and improving sanitation is known to have a significant beneficial impact on health both on households and across communities.

Figure 1: The Map of Nigeria

Nigeria lies on the west coast of Africa between 4- and 14-degrees North latitude and between 2- and 15-degrees east longitude.

With an approximate area of 923,768 sq. kilometres, the country is bounded by Benin on the west, Cameroun on the east, Niger on the north, and lake chad on the north east region. Benue and Niger are the major rivers in the country. By virtue of its regional extent, Nigeria encompasses multiple climatic regimes and various ecological zones that influence the intensity of human activities and this has implications on waste generation patterns, environmental degradation and pollution.

With an estimated population of about 206 million people (www.worldometers.info; UN, 2019). Nigeria has had a great leap in human population that has virtually doubled within 40years. This rapid population growth without commensurate provision of infrastructure and services has led to poor Environmental sanitation characterised by increased urban

slums and IDPs camps, overstretched sanitary facilities, the generation of enormous waste and general reduction in the quality of life of the people (World bank 2015).

Over the years, poor environmental sanitation condition has contributed significantly to the high prevalence of communicable diseases in the country. Most of these diseases include malaria, cholera, typhoid, diarrhoea, Hepatitis A, acute respiratory infections, tuberculosis, helminthic infections and most currently the outbreak of Lassa fever which account for a significant percentage of morbidity and mortality

(WHO/ UNICEF;2018). Consequently, despite increased efforts by various successive Governments at improving public health and quality of life, basic health indicators have remained poor and environmental sanitation issues has not been addressed.

Chapter 2:

Literature Review

2. Literature Review

We shall not finally defeat Hepatitis, tuberculosis, malaria, or any of the other infectious diseases that plague the developing world until we have won the battle for safe drinking water, sanitation and basic health care." Kofi Annan, United Nations Secretary-General (1997 –2006).

2.1. Sanitation…. a Definition

Sustainable sanitation is a basic human need and it is important to health and development. Many countries most especially, developing countries are challenged in providing adequate sanitation for their entire populations, leaving people at risk for sanitation, and hygiene related diseases.

However, an estimated 4.2 billion people or half of the global population and 2.4 billion people of the developing world still lack safely managed sanitation services and Unsafe hygiene practices are widespread, compounding the effects on people's health (WHO/UNICEF 2019).

Basic sanitation is described as having access to facilities for the safe disposal of human waste (faeces and urine), as well as having the ability to maintain hygienic conditions, through services such as garbage/waste collection, industrial/hazardous waste management, and wastewater treatment and disposal(CDC 2017).

Improved health may seem to be the most obvious benefit of sanitation.

A sanitation system considers all components required for the adequate management of human wastes.

The essential components of environmental sanitation include:

i. Solid waste management
ii. Medical waste management
iii. Excreta and sewage management
iv. Food sanitation
v. Sanitary inspection of premises
vi. Health checks and screening of food handlers
vii. Market and abattoirs sanitation
viii. Adequate portable water supply
ix. School sanitation
x. Pest and vector control

xi. Management of urban drainage
xii. Control of reared and strayed animals
xiii. Disposal of the dead (man and animals)
xiv. Weed and vegetation control
xv. Hygiene education and promotion

Improvements in any of the various components of good health can substantially reduce the rates of morbidity and the severity of various diseases and improve the quality of life of many people particularly children, in developing countries (WHO, UNICEF 2010).

Sanitation is not only about hygiene and disease but also about dignity, and it is a fundamental right of all.

The year 2008 was declared the **International Year of Sanitation** by the united Nations (UN 2009). The goal is to help raise awareness of the need and access to sustainable sanitation and to accelerate progress towards reaching SDG 6 by 2030.

The human right to sanitation entitles everyone to sanitation services that provide privacy and ensure dignity, and that are physically accessible, affordable, safe, hygienic, secure, socially and culturally acceptable. Human rights principles must be applied in the context of realising all human rights, including the human right to sanitation (UN 2015).

The normative content of the human right to sanitation is defined by its:

1. **Availability**: Enough sanitation facilities must be available for all individuals.
2. **Accessibility**: Sanitation services must be accessible to everyone within, or in the immediate vicinity, of household, health and educational institution, public institutions, places and workplace. Physical security must not be threatened when accessing facilities.
3. **Quality**: Sanitation facilities must be hygienically and technically safe to use. To ensure good hygiene, access to water for cleansing and handwashing at critical times is essential.
4. **Affordability**: The price of sanitation and services must be affordable for all without compromising the ability to pay for other essential necessities guaranteed by human rights such as water, food, housing and health care.
5. **Acceptability**: Services, sanitation facilities, have to be culturally acceptable. This will often require gender-specific facilities, constructed to ensure privacy and dignity.

The 2030 Agenda for Sustainable Development also recognizes the importance of effective sanitation and good hygiene (WASH) both by themselves and as necessity for achieving other SDGs related to health, nutrition, education and gender equality; with several of the 17 SDGs and 169 targets relating to WASH.

Target 6.1 aims to achieve universal and equitable access to safe and affordable drinking water for all, while 6.2 aims to achieve access to adequate and equitable sanitation and hygiene for all and to end open defecation.

Other SDG goals and targets related to WASH include SDG target 1.4 on universal access to basic services, nutrition, education, gender equality, economic growth, reduction in inequalities and sustainable cities.

SDG target 3.9 on the disease burden from inadequate WASH, SDG14.1 on reduction in marine pollution of all kinds, particularly from land-based activities, and SDG target 4a on basic WASH in school.

Box 1.

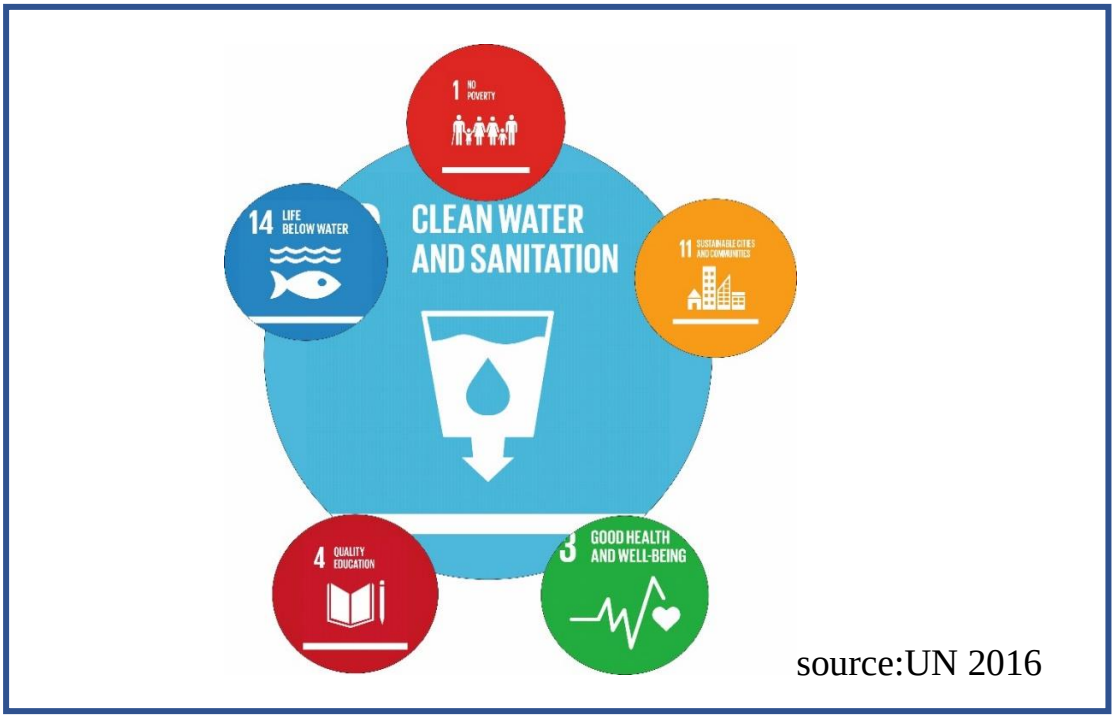


Figure 2: **Graphical illustration on the Interrelationship between the sustainable development goals (SDGs) on Sanitation and Good Health, quality education, sustainable cities and communities, Poverty and land activities which affect the marine system.**

Improved sanitation has significant impacts not only on health, but on social and economic development, particularly in developing countries.

2.2. Health impacts of sanitation

Lack of sanitation leads to disease the diseases associated with poor sanitation are particularly correlated with poverty and infancy and alone account for about 10% of the global burden of disease.

The World Health Organization estimates that roughly 25 percent of the disease burden in the developing world is due to environmental factors resulting from inadequate access to clean water and sanitation (Prüss-Üstun 2008).

2.2.a. Diarrhoeal Diseases

Worldwide, 18% of all deaths in children under five are due to diarrhoea diseases, accounting for approximately 1.4 million deaths per year. This makes diarrhoea diseases a leading cause of child death globally (Bryce J, Boschi-Pinto C, et.al 2005; Merchant AT, Jones C, et.al 2003).

Diarrhoeal disease is an established risk factor for acute weight loss, malnutrition and stunting (Guerrant RL,1992), and poor sanitation, unsafe access to water, and hygiene (WASH) plays a key role in the transmission of diarrheal disease (Fewtrell L, Kaufmann RB, 2005).

Diarrhoea continues to be an important health problem in developing countries especially among preschool children (Luby SP, Agboatwalla M, et al.,2004).

Socioeconomic factors, household sanitary conditions, neighbourhood basic sanitation infrastructure, and childcare-related variables (e.g., hygiene behaviour, nutritional status, breast-feeding, or intestinal parasitic infections) have been identified among others, as the major diarrhoea determinants (Checkley W, Gilman RH, et.al, 2004)

The most common cause of diarrheal diseases results from gastrointestinal infections since diarrheal diseases are primarily spread through the faecal-oral route, preventive measures include improving access to safe drinking water and adequate sanitation (e.g., safe water storage of potable water, latrines for sanitation, and soap for hygiene/hand washing) to reduce diarrhoea (Schmidt WP, Cairncross S,2009) .

Diarrhoea disease could be substantially decreased by interventions designed to improve the sanitary and general living conditions of households.

Table 2.1: Diarrheal Disease Mortality Attributed to Poor Water Supply, Sanitation, and Hygiene around the world.

Region	**Sanitation**	**Hygiene**
Africa	126,294	122,955
America	2,370	5026
Eastern Mediterranean	24,441	28,699
Europe	352	1972
South & Southeast Asia	123,279	131,519
Western Pacific	3709	6,690
world	280,443	296,860

Source: Prüss-Ustün A, Bartram J, et al.,2014.

2.2.b. Undernutrition

The interaction between undernutrition and infection (particularly diarrhoeal diseases) creates a potentially vicious cycle of worsening illness and deteriorating nutritional status (Black et.al 2013).

Undernutrition is a major cause of disease and death, affecting billions of people worldwide, especially women and children in impoverished communities (WHO/ UNICEF 2015).

Globally, in 2014, an estimated 159 million children under 5 years of age were stunted, and 50 million were wasted. The highest rates of undernutrition are reported in Africa, Asia and Oceania (UNICEF/WHO, World Bank, 2015), Undernutrition in all its forms is estimated to contribute to 3.1 million child deaths each year, accounting for 45% of all deaths of children under 5 years of age (Black et al., 2013).

Undernutrition is directly caused by inadequate dietary intake and/or disease and indirectly related to many factors, including contaminated drinking-water and poor sanitation and hygiene.

Poor sanitation, hygiene, and water are responsible for about 50% of the consequences of childhood and maternal underweight, primarily through the synergy between diarrhoeal diseases and undernutrition whereby exposure to one increase vulnerability to the other (world Bank 2008).

Optimal nutritional status results when children have access to foods that are Balanced and meet dietary needs (e.g. sufficient, safe and nutritious); appropriate maternal and childcare practices; and a healthy environment including safe water, sanitation and good hygiene practices.

2.2.c. Neglected Tropical Diseases

Neglected tropical diseases (NTDs), affect more than a billion of the worlds most impoverished and marginalized people although not commonly fatal, but

causes substantial disability-adjusted life year (DALY) losses in developing countries (Hotez PJ, Molyneux DH, 2007) of which they are associated with chronic disability, malnutrition, stigma and social exclusion, poor mental health, and lost educational and employment opportunities (Ziegelbauer K. et.al, 2012) .

Many of these diseases have a faeco-oral transmission pathway. Thus, improved sanitation could contribute significantly to a sustained reduction in the prevalence of

many of the diseases, including trachoma, soil-transmitted helminthiases, and schistosomiasis.

Soil-transmitted helminths such as the large human roundworm, the human whipworm, and the human hookworms cause many millions of infections every year and many individuals are infected (de Silva NR, 2003).

More than 1 billion people of the world population are infected with Soil transmitted helminthiases. Infections can lead to learning disabilities, massive diarrhoea, growth faltering in young children and anaemia (WHO 2018).

Soil transmitted helminthiases are associated with at least 12,000 deaths each year (WHO 2002).

Trachoma is the leading cause of preventable blindness and It is caused by the bacterium *Chlamydia trachomatis* and is endemic in many of the world's poorest countries (Resnikoff S, et al., 2004). Almost 8 million people worldwide have been blinded by trachoma, and an estimated 84 million people need trachoma treatment (WHO 1996). The spread of trachoma is strongly related to overcrowding, lack of water for washing faces and hands, and inadequate disposal of human and animal waste.

Improving sanitation can reduce Trachoma.

Globally, about 200 million people are infected with **schistosomiasis**(WHO 2017), which can result in chronic debilitation, haematuria, impaired growth, bladder and colorectal cancers, and essential organ malfunction(Hotez PJ.et,al 2006) which causes tens of thousands of deaths every year, mostly in Sub-Saharan Africa (WHO 2002).

Schistosomiasis results from the unhealthy disposal of human waste and the lack of nearby sources of safe water, cercariae are discharged into the water where they meet and infect their human hosts through their skin. Adult schistosomes live in the portal veins where they pass their eggs into the environment via the urine (*Schistosoma haematobium*) or faeces (Hotez PJ.et al,2006).

Basic sanitation can reduce this disease by 77% (Esry SA, et al., 1991).

Improved sustainable Sanitation is essential to prevent majority of this diseases in developing countries by;

i. Increasing access to healthy and safe water
ii. Managing human waste

iii. Improving hygiene and environmental management

These improvements can lead to better health, poverty reduction, and socio-economic development (Esry SA, et al. 1991).

Table 2.2: Sanitation related burden of disease

Direct impact(infections)	Conditions caused by infections
Faeco-oral infections • Diarrhoeas • Dysentery • typhoid	cause a substantial disability-adjusted life year (DALY) losses
Insect vector disease Trachoma	Leading cause of preventable blindness
Helminth infections • Human roundworm • Human whipworm • Human hookworms	• Growth faltering in young children • Anaemia particularly in pregnant women

Collated from: Hotez PJ, Fenwick A et.al 2007; Resnikoff, Pascolini et.al 2002

2.3. Economic and social benefit of sanitation

Improved sanitation generates both social and economic benefits in addition to its impact on health. The social welfare impacts are difficult to quantify with certainty, given their subjective nature. Nevertheless, these benefits are consistently cited as among the most important for beneficiaries of water supply and sanitation (Cairncross, S. (2004).

Access to improved WASH services in schools and workplaces contributes to school attendance and performance and may influence decisions of where to work, especially for girls and women (Jasper C, et al.,2012).

Poor sanitation causes economic losses associated with the direct costs of treating sanitation-related illnesses and lost income through reduced or lost productivity.

Investments in improved sanitation, water supply facilities and promotion of improved hygiene behaviours are both cost-beneficial and cost-effective, comparing favourably with other primary health interventions (world bank 2008).

Improved water and sanitation facilities and better hygiene practices result in significant health gains and economic benefits for individuals and their families.

These benefits contribute towards national economic growth, the time benefits associated with improved water and sanitation facilities result in the main economic benefit for society especially for urban communities (Hutton G, et al., 2007).

Sanitation and hygiene have a larger development benefit which are classified under health, convenience, social, educational, reuse, water access, and other benefits.

Table 2.3: Benefits of improved sanitation.

Benefits	**Sanitation**
Health: disease burden	Averted cases of diarrheal disease; Averted cases of helminths, polio, and eye diseases; Reduced malnutrition, enteropathy, and malnutrition-related conditions (stunting); Less dehydration from insufficient water intake due to poor latrine access.
Educational benefits	Improved educational levels due to higher school enrolment and attendance rates from school sanitation; Higher attendance and educational attainment due to improved health
Social benefits	Safety, privacy, dignity, comfort, status, prestige, aesthetics, gender impacts
Economic impacts	Incomes from more tourism and business investment; Employment opportunity in sanitation supply chain
Health: economic savings	Costs related to diseases, such as health care, productivity losses, and premature mortality

Reuse	Safe use of wastewater, Soil conditioner and fertilizer, Energy production.

Source: Hutton G, 2012.

2.4. The Local Scenario: Sanitation system in Nigeria

Over the years, poor environmental sanitation condition has contributed significantly to high prevalence of diseases in Nigeria. Most of these diseases include; malaria, cholera, typhoid, diarrhoea, helminth infections and most currently the outbreak of Lassa fever which account for a significant percentage of morbidity and mortality.

Low sanitation coverage in Nigeria is primarily due to insufficient motivation/awareness by people and a lack of affordable sanitation technology. Most of these people are from lower socio-economic groups and are not aware of the health and environmental benefits of sanitation. For most of the population, sanitation is not seen as a high priority, thereby resulting in absence of people's participation.

Consequently, despite increased efforts by various successive Governments at improving public health and quality of life, basic health indicators have remained poor since sanitation related diseases still play a large role in creating ill health and poverty.

The Nigerian environment is richly endowed with abundant and diverse resources that are vital for the survival, health and quality of life of the populace. However, the efforts of past governments have achieved minimal success because of absence of an appropriate policy instrument to provide focus and direction for planning and implementation of Environmental sanitation programmes in the country.

Historical Perspective of Environmental sanitation in Nigeria

Environmental sanitation has remained consistently poor in Nigeria for a long time. Consequently, there is high morbidity and mortality from sanitation related diseases. This scenario, which is associated with impoverishment and poor standard of living among the populace has been of great concern.

During the pre-independence era, (1900-1960), several legislative controls were put in place to address the problem Environmental sanitation. Among these were;

i. Public Health Act of 1909 on Environmental sanitation,
ii. Township Ordinance No,29 of 1917 on sanitation and Environmental management
iii. Lagos colony ordinance of 1928 outbreak of Bubonic plague
iv. Mineral Act of 1945 Trench and Drainage pollution
v. Building lines regulation of 1948
vi. Public Health laws of 1957 to combat overcrowding, diseases and squalor.

During this era, adequate sanitation was maintained by enforcement of public Health laws through routine house to house inspection. The benefits of the legislative and other measures at this time were however not universal because they were restricted to privileged areas. However political interference with the statutory role of sanitary inspectors has led to the collapse of the house to house inspection programme and contributed to the poor sanitary conditions in the country (Official Gazette of the federal Republic of Nigeria [FGN (2009)].

Sanitation has been a major challenge in Nigeria especially since post-independence era, this is due to the rapid increase in population over the years as well as increase in socio-economic development, industrialization, technological advancements, changing lifestyles and consumption patterns. Consequently, this has led to a poor state of the environment as all manner of wastes clog the drainages, litter the streets, highways, market environment, public places and in fact most open places.

Solid Waste management in Nigeria is at the lowest level in most towns and communities and it is characterized by inefficient collection methods, insufficient coverage of the collection system and improper disposal.

Disposal methods in most Nigeria cities include, co-disposal of hazardous and municipal waste in open places, burying, open burning of municipal solid wastes, dumping on water bodies and in other unauthorized places.

The Local Government Authorities are statutorily charged with the primary responsibility of municipal Solid waste management. However, the present state of the environment has shown that this tier of government lacks the capacity and capability to fulfil this obligation. In most cities and peri-urban centres, refuse heaps are left unattended and where the local government authorities do the collection, it is often

irregular and sporadic and the various State governments are not left out of this problem.

The unsanitary practices have led to adverse health and environmental consequences including negative impact on tourism in Nigeria.

2.5. Health issues associated with poor sanitation practice in Nigeria

The disease burden caused by poor sanitation and hygiene in most Nigeria states is significant. Inadequate sanitation is mostly responsible for diseases which are transmitted via the faecal-oral route which include and not limited to cholera, diarrhoea, dysentery, hepatitis A, typhoid, polio and exacerbates stunting, intestinal nematode infection, schistosomiasis, Trachoma, Lassa fever and guinea worm infection.

Diarrhoea Disease

Diarrhoea disease represent the most significant health impact of unimproved sanitation, and disproportionately impact upon children. infectious diarrhoeal diseases include other severe diseases such as cholera, typhoid and amoebic dysentery. Diarrhoea can be caused by bacterial (e.g. Vibrio cholerae; viral e.g. Rotavirus and protozoa e.g. Giardia) organisms most of which are found in water or food contaminated by faecal material and is transmitted via the faecal-oral pathway.

The WHO estimates that 88% of cases of diarrhoea can be attributed to unimproved water and sanitation (Black et al., 2010).

Diarrhoeal diseases are the second leading cause of death in children under the age of five, estimated at 1.5 million child deaths every year globally. Severe diarrhoea may be life threatening due to fluid loss, particularly in infants, young children, the malnourished and people with impaired immunity such as those living with HIV/AIDS (Keusch 2001).

According to the latest WHO data published (WHO, 2018) diarrhoeal disease deaths in Nigeria reached 178 438, and ranked as the 3rd leading cause of death in the country. The age adjusted Death Rate is 146.53 per 100,000 of population and ranks Nigeria #6 in the world.

However, since the causative factors are identified, improved sanitation can contribute to an approximate one third reduction in diarrhoea (Keusch et al.,2006).

Typhoid Fever infection

Typhoid fever is a major cause of mortality and morbidity worldwide.it is a systemic disease caused by *Salmonella enterica* serovar Typhi, which is acquired by ingestion of contaminated food and water (crump JA, 2004).

It occurs predominantly in association with poor sanitation and lack of clean drinking water, in both urban and rural settings. Every year, an estimated 11–20 million people get sick from typhoid and between 128, 000 and 161, 000 people die from it worldwide.

Poor communities and vulnerable groups including children are at highest risk (WHO 2018). Typhoid and paratyphoid infections are relatively common in countries with poor sanitation and water supply and they are a major cause of death and disability, especially among children (Buckle GC et al.,2012).

However, urbanization with associated overcrowded populations and inadequate water and sanitation systems as well as climate change have the potential to further increase the global burden of typhoid.

In Nigeria, typhoid fever remains a major disease because of factors such as increased urbanization, inadequate supplies of portable water, inadequate facilities for processing human waste, overburdened health-care delivery systems, and overuse of antibiotics that contribute to the development and spread of antibiotic-resistant *S.* Typhi.

However, the true incidence of typhoid fever is difficult to evaluate in Nigeria because of the lack of a proper coordinated epidemiological surveillance system (Akinyemi KO et al.,2005).

Typhoid fever contributes significantly to the disease burden in Nigeria but unfortunately the true burden of typhoid is likely underreported because ill individuals do not always seek health care at hospitals due to financial constraint rather they seek the services of nearby Chemist and pharmacist by buying antibiotics medication and majority of households in rural settlements seek the services of herbalist who prepares herbs.

A barrier to reducing typhoid fever incidence in Nigeria is the lack of access to safe drinking water and improved sanitation facilities.

Investigations and reviews from other studies highlights the importance of ensuring access to affordable, safe, treated drinking water and improved sanitation, hygiene among food handlers and waste management systems for resource-constrained urban populations are effective in preventing typhoid fever (WHO 2003).

Lassa fever Disease

Lassa fever is an acute viral illness and a viral haemorrhagic fever caused by Lassa virus, a member of the arenavirus family of viruses. The disease is associated with high morbidity and mortality and an estimated 300,000-500,000 cases worldwide and 5,000 related deaths occur annually in West Africa.

Lassa fever is endemic in Nigeria, it is transmitted to humans via contact with food or household items contaminated with the urine or faeces of rodent. Secondary human-to-human transmission can also occur through direct contact with blood, secretions, organs or other body fluids of infected persons, especially in health care settings (WHO 2020).

In 2018, the Nigerian centre for disease control (NCDC) reported the largest ever number of cases in Nigeria, with over 600 confirmed cases and over 170 deaths (Ilori EA et al.,2019).

Humans usually become infected with Lassa virus through exposure to food or household items contaminated with urine or faeces of infected Mastomys rats. The disease is endemic in the rodent population in parts of West Africa.

Prevention of Lassa fever relies on promoting good "community hygiene" to discourage rodents from entering homes, effective storage of household items, disposing of garbage far from the home and maintaining clean households (WHO 2020).

Soil transmitted Helminths infection

Soil-transmitted Helminths (STH) are among the most common infections worldwide which heavily affect the poorest and most deprived communities with inadequate sanitation and unsafe water supplies.

Approximately 1.5 billion people are infected with soil-transmitted helminths worldwide (WHO 2020)

STH infections refer to a group of parasitic diseases caused by nematode worms that are transmitted to humans by faecal-contaminated soil. The STH of major concern to humans is the roundworm (Ascaris lumbricoides), the whip- worm (Trichuris trichiura), and the hookworms (Necator americanus and Ancylostoma duodenale).

Soil-transmitted helminths are transmitted by eggs that are passed in the faeces of infected people. Adult worms live in the intestine where they produce thousands of eggs each day. In areas that lack adequate sanitation, these eggs contaminate the soil, and this can happen when;

- eggs that are attached to vegetables are ingested when the vegetables are not carefully cooked, washed or peeled,
- eggs are ingested from contaminated water sources,
- eggs are ingested by children who play in the contaminated soil and then put their hands in their mouths without washing them.

Soil-transmitted helminths impair the nutritional status of those infected thereby causing symptoms including intestinal infestations (diarrhoea and abdominal pain), malnutrition, general malaise and weakness, and impaired growth and physical development.

According to the WHO data on STH, the number of children(pre-school aged children and school aged children) in Nigeria requiring preventive chemotherapy for soil transmitted helminths is estimated at 48,112 349, and the number of school aged children in need and receiving preventive chemotherapy for STH is estimated at 21 254 380 respectively (WHO 2019).

To this end, WHO has outlined six 2030 global targets for soil-transmitted helminthiases of which include; To Ensure universal access to at least basic sanitation and hygiene by 2030 in STH-endemic areas.

Intervention aimed at reducing the disease burden include; encouraging healthy behaviours through health and hygiene education and most importantly the provision of adequate sanitation.

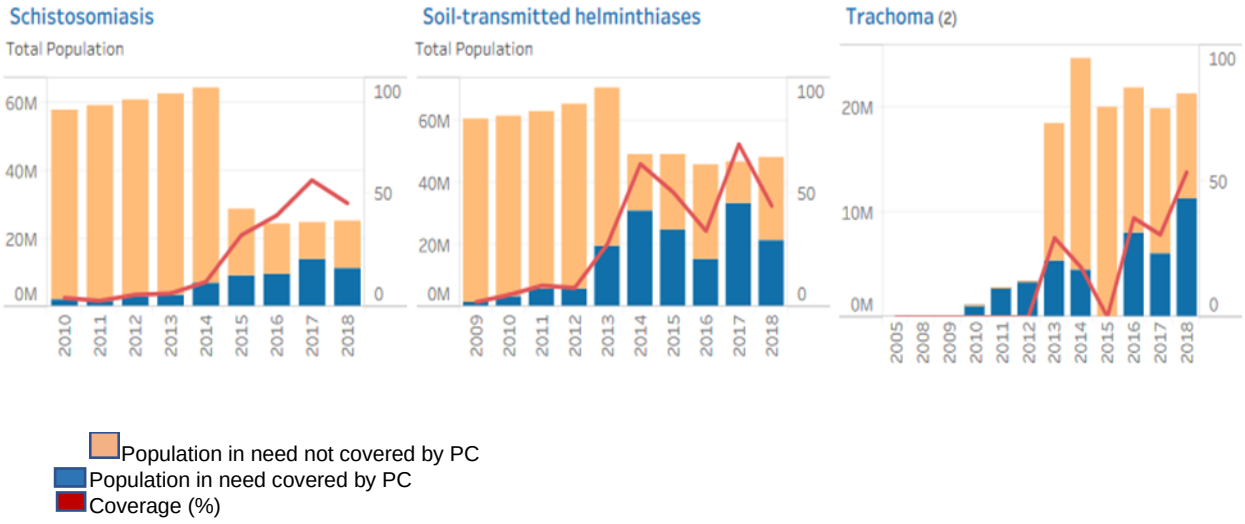
Table 2.4: Some selected west African countries Requiring Preventive chemotherapy for control and elimination of the Neglected Tropical Diseases.

country	Number of children requiring preventive chemotherapy for soil transmitted Helminthiasis	schistosomiasis	Trachoma
Benin	2,101,153	2,272,045	1,237,030
Burkina Faso	No PC required	9,906,142	0
Cape Verde	125,137	Non endemic	No intervention req
Cote d`Ivoire	2,352,122	4,454,931	2,665,715
Gambia	82,299	134,990	0
Ghana	10,403,126	10,471,366	0
Nigeria	**48,112,349**	**25,070,925**	**21,243,693**
Niger	9,846,230	3,681,910	9,201,358

Selected country: **Nigeria**

Source: WHO, 2019.

Figure 2.3: Graphical illustration of the population in Nigeria requiring and receiving preventive chemotherapy for the control of the Neglected Tropical Disease



(1) Population requiring and receiving (individuals in need) PC for at least one disease - schistosomiasis, soil-transmitted helminthiases and trachoma (from 2015).
(2) Estimated population requiring Preventive Chemotherapy for Onchocerciasis and Trachoma was reported starting 2013. For years before 2013 the charts display only population covered with PC.
World Health Organization 2020 **| Source: Global Health Observatory.**

Hepatitis A infection

Hepatitis A virus is transmitted from person-to-person through the faecal-oral route primarily by ingestion of contaminated food or water and/or contact with infectious persons. Poor hygiene and sanitation pose the greatest risk for Hepatitis A infection, particularly in Low and Middle-Income Countries and Nigeria inclusive (Aggarwal R, Goel A, 2015).

An estimated 1.5 million cases of hepatitis A occur globally each year (Mahboobi N et al.,2010). Hepatitis A virus circulates widely in populations living in areas with poor sanitation infrastructure and can occur when proper food handling or proper hygiene practices are not maintained including in daycare centers, prisons, or mass gatherings.

Common clinical symptoms of hepatitis A infection include jaundice, fever, malaise, anorexia, nausea and abdominal discomfort.

About 15% of patients experience prolonged jaundice and/or relapses over several months. Some develop cholestatic hepatitis, in which the bile duct leading from the liver to the intestine becomes blocked. A few suffer from fulminant (acute) liver failure that may require a transplant or resulting to death (Aggarwal R, Goel A, 2015). Although Hepatitis A is a vaccine preventable disease.

Risk factor of infection with hepatitis A virus include low household socioeconomic status (low income, wealth, and/or educational level), a larger household size and crowding, residence in a rural area, limited access to improved water sources, and limited access to sanitation facilities (Jacobsen, 2004).

Prevention requires frequent hand washing with soap and water and/ or an alcohol-based hand sanitizer, eating well cooked food as well as drinking boiled or treated water and proper disposal of sewage within communities.

Improved sanitation, food safety and immunization are the most effective ways to combat hepatitis A.

2.6. Conclusion

Through this chapter, various studies regarding sanitation in general and its health and social and economic impact were analysed and reviewed providing a framework for this dissertation.

Local studies also served to provide a foundation for this research study while international papers provided a benchmark allowing for the comparison of the situation in Nigeria.

Some salient points included the lack of clear-cut definitions for certain aspects of sanitation and health in different studies and also the attitudes, behaviours and practices that exist around the world.

Literature also showed a catalogue of differences between demographic parameters and the respective attitudes, behaviours and practices of people towards sanitation.

The following chapter discusses the research questions, hypothesis, objectives and methodology employed in this research study in order to meet the aims of this dissertation.

Chapter 3:

Research Question, Strategy and Objectives

3.1. Research Question, Strategy and Objectives

The research question is a particularly significant step in research as it narrows the research aim and objective down to specific areas the study will address (Creswell 2014, Johnson and Christensen 2014).

In qualitative research study, the intent is to explore the complex set of factors surrounding the central phenomenon and present the varied perspectives or meanings that participants hold. In a qualitative study, inquirers state research questions (i.e., specific goals for the research) or hypotheses i.e., predictions that involve variables and statistical tests (Miles and Huberman 1994).

Whereas, in quantitative studies, investigators use quantitative research questions and hypotheses, and sometimes objectives, to shape and specifically focus the purpose of the study. Creswell (2005) explains that qualitative research is best used for "research problems in which one does not know the variables and need to explore.

Burck (2005) adds that qualitative methodologies and quantitative methodologies were created for various audiences and the determination of which type to use depends on the desired quality of information or desired quantifiable relationships.

Research questions can be developed from theoretical knowledge, previous research or experience, or a practical need at work (Parahoo 2014).

For a Mixed-methods studies, Researchers conducting research studies can choose to develop separate quantitative questions and qualitative questions or develop a mixed methods question depending on the study (Creswell 2009). Separate quantitative and qualitative questions are appropriate when the approaches, not the mixed methods or integrative component of the study, are the focus (Tashakkori and Teddlie 2010). This identifies the significance of the qualitative and quantitative phases of the study and their collective power (Creswell and Plano Clarke2011).

For this study, the following research questions were posed to help address the objectives as it tends to ask;

> What factors influences inadequate sanitation practice in Nigeria, and what are the effect of unimproved sanitation on the health of the population?

In this dissertation, the strategy employed will be that of a cross-sectional survey for household. The study will be that of a mixed method research consisting of two parts which will have both quantitative and qualitative aspects, which will help to triangulate and corroborate results.

A questionnaire in English was distributed among participants which include households and representatives of some civil service institutions (state and federal ministries). All participants are adult members working and residing in different states in Nigeria. For the purposes of this dissertation, the target number of individuals Is 130.

Questionnaires are of great advantage in conducting this type of research as they are practical, it can be analysed more scientifically and objectively, and Large amounts of information can be collected from many people in a short period of time and in a relatively cost-effective way.

The first part of the questionnaire is on socio economic attributes while the other sections of the questionnaire is used to gather information on household practice of sanitation, disease prevalence caused by poor sanitation among households as well as information about the knowledge and attitude of the public regarding hygiene, waste disposal and management.

In the second part of the study, the research will take on a more qualitative aspect of a semi-structured interviews carried out with various members of the public who replied to the questionnaire. Interviews are an interpretative practice in which what is said is inextricably tied to where it is said. Interview studies, by their very nature, produce detailed accounts of issues (C Seale, G Gobo, et al.,2004). In this way, the study will be able to focus on feelings and emotions and possibly understand reasons to any findings resulting from the questionnaire directly and in the words of the respondent. Having questionnaires and interviews enables findings to be made via a quantitative and qualitative route. However, each method has its own level of bias and inherent limitations. Nonetheless, when combined to assess a given phenomenon, and the results of the methods converge or corroborate one another, then the validity or credibility of findings is enhanced (Greene,2007).

In order to answer the Research question, the following hypotheses were tested to find the relationship between the variables.

H_0 No significant relationship between unimproved water and soil transmitted helminth infection.

H_1 Unimproved sanitation was significantly associated with diarrhoea and typhoid infection.

Thus, to summarize, this dissertation aims to examine resident's environmental sanitation practice. In achieving this, the objectives are outlined which include:

- Assessing the socioeconomic characteristics of residents in different states in Nigeria;
- Assessing the availability and accessibility of environmental sanitation facilities and services and residents' environmental sanitation practices across residential cities in Nigeria;
- Assessing Government effort in meeting the needs of residents by providing basic amenities and sanitation facilities;
- Assessing the level of awareness and community participation on sustainable sanitation practice;
- To identify the burden of disease caused by inadequate sanitation and hygiene and to investigate the occurrence of diarrhoea among young children and adults in the households.
- Providing recommendations to the government on sustainable sanitation intervention programmes to improve health.

Chapter 4:

Methodology

4.Methodology

4.1. Measuring Attitudes and Practices

An attitude is "a relatively enduring organization of belief's, feelings, and behavioural tendencies towards socially significant objects, groups, events or symbols" (Hogg and Vaughan 2005). "A settled opinion" and "behaviour reflection" (Abate, 1999). Although attitude has been defined by various authors in many different ways, various definitions seem to imply the same idea that attitudes are the "overall evaluation of an object that is based on Affective, Behavioural and Cognitive information" (*ABC model of attitude*) (Maio and Haddock, 2010).

Some synonyms to the term attitude include orientation, approach, outlook, manner, stance, position, feelings, thoughts, mindset, way of thinking, opinion and way of behaving.

Maio and Haddock (2010) further explained that attitudes vary in "valence" and "strength" with many attitudes being positive, negative or neutral in various degrees depending on individual's perception. They also explain how attitudes influences behaviour since although many attitudes particularly strong ones predict behaviour, this is very circumstantial and other factors can affect certain actions.

Personality and situation are two other factors that alter altitudes and affect behaviour (Maio and Haddock,2010). Behaviourists introduce a variation by saying that changing attitudes may be a way to change behaviour, but it is more cost effective to influence behaviour by changing the consequences (Geller, 1992).

Those who hold to a psychological definition of attitude recognize that social structure is important in creating and maintaining social order. But they claim that if behaviour is to change, attitude change must come first (Lewin, 1999).

Some individuals tend to present themselves in a different light depending on the social situation and such individuals are easily influenced by the company they find themselves and their surroundings and they tend to modify their behaviour to fit in well with their environment(Maio and Haddock 2010).

The strength with which an attitude is held is often a good predictor of behaviour. Therefore, attitudes and all its effects are essential instigators of actions and behaviour and need to be studied to obtain a picture of what needs to be done to affect change. In many cases, attitudes and behaviours are best measured directly. In this way, participants are explicitly asked to "respond to direct questions about their opinions"

using research techniques such as questionnaires and interviews (Maio and Haddock, 2010).

4.2. Surveys

Surveys are useful in describing the characteristics of a large population.

The term "population survey" is given to a form of data collection in which a sufficiently large number of respondents (but usually a small sample of the total population), representing the target population is questioned in a systematic and structured way. It is used to collect data at a point in time in order to describe the current situation amongst a group of people (Cohen, Manion and Morrison, 2011).

Surveys comes both in terms of *time*—when or with what frequency a survey is administered—and in terms of *administration*—how a survey is delivered to respondents. In terms of time, there are two main types of surveys: cross-sectional and longitudinal survey.

Cross-sectional surveys are those that are administered at just one point in time (Cohen et al.,2011; Kezdy A; Martos T, et al., 2011).

When it comes to administration, Surveys vary not just in terms of when they are administered but also in terms of how they are administered.

One common way to administer surveys is in the form of self-administered questionnaires. This means that a research participant is given a set of questions in writing, to which he or she is asked to respond (Babbie E,2010).

In this research study, the strategy employed a cross sectional organisational and household survey designed to assess sustainable sanitation practice and its resultant effect on the health of households in Nigeria.

Organisational survey is conducted to assess government roles and intervention in provision of infrastructures for safe sanitation practice, and household surveys is conducted to collect detailed and varied data relating to how people live, their wellbeing, activities engaged in, demographic attributes and more so, the cultural factors that influence their behaviour (united nations statistics Division [UNSD], 2008).

Household surveys are an important source of socio-economic data. Important indicators that are used to inform and monitor development policies are often derived from such surveys.

In this research study, one of the aims was to examine the behaviour, attitude and practices on sanitation among individuals spread across the various states in Nigeria

and the prevalence of diseases caused by inadequate sanitation. assess sanitation practice and the occurrence of certain health issues(diseases) in Nigeria. The methodology was deemed to be an organisational and household survey since such a survey allowed for the measurement of both attitudes and practices quantitatively and qualitatively using questionnaires and interviews respectively.

4.3. Questionnaires

Questionnaires are a method of obtaining information from people and hence, some potential answers to research questions. They provide a relatively cheap, quick and efficient way of collecting large amounts of information from a large sample of people (Gilham,2007; McLeod, 2004).

Questionnaires are either deductive or inductive. In deductive questionnaires, questions are used to test hypothesis, prove literature or confirm a theory while inductive questionnaires are described as emergent since results are made following the analysis of the questionnaire (Gilham, 2007). In this research study, the questionnaire had both deductive and inductive elements with an aim of assessing household practice on sanitation and its resultant effect on health.

Questionnaires are advantageous for respondents as they can be filled at their convenience with no direct pressure for a prompt response as is the case with an interview (Gillham,2007).

Questionnaires are also an effective way of targeting many people without the researcher been directly involved with participants as in face to face interview. Other advantages are anonymity of the respondents, standardization of questions and the relative ease of analysis once all the data is collected (Cohen et al.,2011).

Some limitations are however evident. A major limitation is the fact that before answering questions, respondents must interpret and understand the questions and determine the attitude and evaluate what dimension the researcher has in mind (schwarz and Bohner, 2001). Following this may require them to remember certain information from memory and then communicate to the researcher. Such tasks are difficult for some and others may not respond honestly due to social desirability or self-presentation (schwarz and Bohner,2001).

Finally, response rates can be quite low, and many respondents are simply not motivated enough to reply to questionnaires. Literacy is an issue since those having

difficulties in reading may have problems in responding to the questionnaire (Gilham,2007).

For the purpose of this research study, questionnaires were an important tool as many of the population residing in most of the states in Nigeria needed to be contacted within a limited period. Also, the data required was of quantitative nature in order to be able to objectively compare various factors that characterised the respondents.

4.3.1. Preparing the questionnaire

Gillham (2007) explained that drafting the questions and designing the layout are the two key stages in questionnaire construction. Drafting deals with the actual questions being asked in the questionnaire while designing deals with its appearance and workability.

The questionnaire was introduced by means of a cover letter which aimed to introduce the topic being discussed. This was deemed necessary in knowing what the questionnaire seeks to establish and for the reason, respondents are more likely to respond appropriately (Gillham, 2007). With regards to questions, the practice of asking facts related to demographic data first was utilized for this study. Questions relating to gender, age, educational status, household size, type of residential building and income level of household were all asked at the start of the questionnaire. These questions were essential as they provided all the information necessary for comparisons of various factors.

Subsequent questions dealt with opinions, attitudes and behaviours and were used to collect data about the knowledge of the public regarding sanitation practice and its impact on health.

Questions used throughout the questionnaire were mainly closed ended since such questions are more direct, yield better response rates and are easier to analyse and draw comparisons or differences amongst respondents (Williams, 2003; Cohen et al.,2011).

Another benefit is that, since fluency in written expression is a minority skill, selecting an answer is easier for respondents when compared to open questions. problems however may arise as respondents may select a response that they might not have given simply because the answer is available on the list (Williams, 2003). Thus, an “other” option was included for such questions to minimise risk (Williams,2003; Gillham,2007).

When designing the questionnaire, the length was kept as short as possible to maximize the response rate (Edwards et al,2002; Adams & Cox,2008).

Care was taken to make the wording as straightforward as possible to avoid incorrect responses or respondents abandoning the questionnaire (Adams & Cox,2008; Williams,2003). Efforts were also made to keep questions as neutral as possible without introducing bias towards a particular answer (Dolle, 2001; Adams & Cox,2008).

The questionnaire used in this research study is in English; as English is the official language in Nigeria. The questionnaire can be found in Appendix I.

4.3.2. Study Area and Research Methodology

This study focuses on the Nigerian population as the questionnaires targeted individuals living and residing in the various states in the country.

From the aim of this study, the research was designed to assess, examine and provide meaning to data on general sanitation practice as it concerns household waste management, access to and utilization of sanitation facilities, sewage management and hygiene practice, and its impact on the health of households.

A convergent parallel mixed method where both quantitative and qualitative approaches employed in a single enquiry was adopted for this study. The purpose was specifically for triangulation, while data were collected once(cross-sectional).

The research design followed the concurrent triangulation design that was recommended by Creswell et al., (2003)

Data were collected and analysed simultaneously, and the results were compared. For this study, quantitative data were collected and analysed through survey questionnaire and descriptive statistics, while qualitative data employed semi-structured in-depth interview.

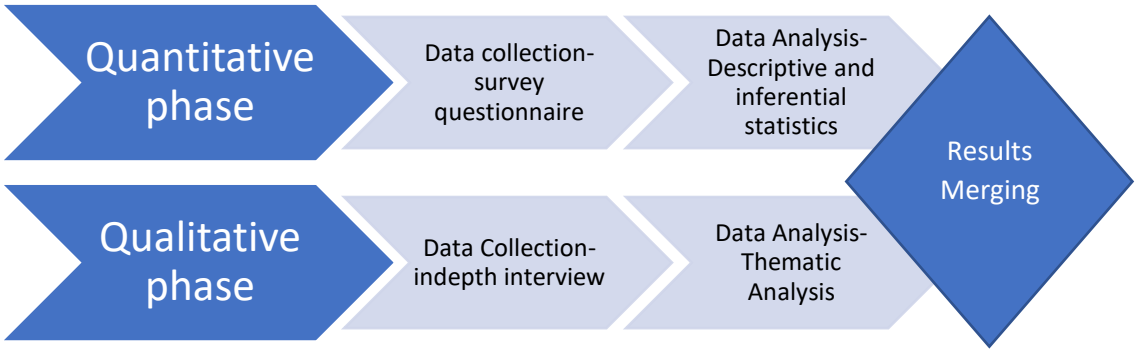


Figure 4.1: Concurrent triangulation design adapted from Creswell et al.,2003.

4.3.3. Selecting Participants

The participants selected in this study were individuals living and working in Nigeria, they include students, Housewives, self-employed, working in a private organisation as well as civil servants. The participants were selected through a simple random sampling To achieve the sample size (130), 300 questionnaires were emailed to participants. The questionnaire survey included closed-ended questions that were administered online through a web link to the online form. Data collected through the questionnaire survey were socioeconomic attributes of the residents and those pertaining to environmental sanitation practices, hygiene, availability of environmental sanitation facilities and state of their health.

For the purpose of privacy and confidentiality, the participants were de-identified, and codes assigned. The quantitative data were analysed by means of descriptive statistics, such as frequency and percentages via the Statistics Package for the Social Sciences SPSS v.24. analysis of the data was done using cross tabulation, and Analysis of Variance (ANOVA).

The sample size for the quantitative phase of this study was 130, however 300 questionnaires were administered and 180 were returned, and only 110 were duly completed and found to be usable which represents a response rate of 33.7%.

Generally, a low response rate is common with surveys involving households as some may not want to disclose private and sensitive information about their behaviour, as stated by some researchers analysing 20-30% as the norm. For example, a study that was conducted by Chinowsky and Meredith reported 26.5% (Chinowsky, P.S; Meredith, J.E. 2000), while Tam, V.W(2007) reported a response rate of 31.2%

For the qualitative phase 20 interviews were conducted with participants residing in a densely populated area.

4.4. Interviews

Interview as a tool of data collection is very important, Interviews are a method of data collection that involves two or more people exchanging information through a series of questions and answers. The questions are designed by a researcher to elicit information from interview participant(s) on a specific topic or set of topics. Typically interviews involve an in-person meeting between two people, an interviewer and an interviewee (Blackstone 2014).

Interviews allow for participants to discuss interpretations of their surroundings and express feelings towards various situations.

Cohen et al., (2011) also highlight the centrality of human interaction for the generation of knowledge and stress the importance of the "social situatedness of research data" when conducting interviews and using such data to draw conclusions.

Interviews are beneficial as they allow researchers to capture emotions, behaviours and many verbal and non-verbal cues such as body language and posture. Interviews can be used to gather new information directly and use the data to draw conclusions, to test hypotheses or suggest new ones (Cohen et al., 2011).

As with any data collection method, drawbacks are also present. Velez (2008) claimed that error can and will occur in all stages of qualitative research. One of such error is related to language and meaning since a word or phrase might mean one thing to one participant but something else to another participant (Gall, Gall & Borg,2003).

Krantz (1995) explains that interviews are very often quite subjective and context rich since each interview is normally done face to face or in small groups. Another drawback regards time and sample size as the more insightful and qualitative research is, the more time consuming it becomes (Atkinson & Delamont, 2006). Albeit rewarding, the research and preparation required for the interview, selecting the respondent, performing the interview and analysing the data is very time consuming for a sample of respondents that is usually small.

For the purpose of this research study, interviews were beneficial since this permitted a more in-depth analysis for some results derived. The data collected was of a qualitative nature in order to be able to compare various factors such as opinions, attitudes and feelings that characterised the respondent. The questionnaire was structured into sections on respondents' sociodemographic characteristics, drinking water source and quality, sanitation and hygiene, and the health status of households.

4.4.1. preparing the interview

Gaskell (2000) and Cohen et al., (2011) explain that a whole spectrum of interviews exists, from the very rigid and restrictive to the more flowing and unique. When a researcher requires comparable data, the interview tends to become more standardized and quantitative, but when the researcher requires personalized information that is unique to the participant the interview tends to be qualitative, open ended and unstructured (Cohen et al.,2011).

In this study, a structured interview was used with pre-determined questions in which all interviewees answer in the same order. An unstructured interview tends to be least reliable from research viewpoint, because no questions are prepared prior to the interview and data collection is conducted in an informal manner (Boyce, C. & Neale, P. (2006). Unstructured interviews can be associated with a high level of bias and comparison of answers given by different respondents tends to be difficult due to the differences in formulation of questions.

Thus, a structured interview was ideal as Data analysis usually tends to be more straightforward since researchers can compare different answers given to the same questions (Connaway, L.S.& Powell, R.P (2010).

Regarding the interview questions, prior reading about sanitation and underlying health issues amongst individuals was the first step.

This generated more ideas that were later analysed in detail of which series of meaningful questions and probes for a 45minute interview were developed. The sequence of topics was then established to serve as an agenda to follow during the interview.

4.4.2. Selecting Participants

For the purpose of this study, potential participants who represent the population to be studied were selected with the aim of talking to a cross-section of people that have the requisite knowledge and understanding about the research topic.

Selection was based on the readiness to participate in research, demographic characteristics and availability to be interviewed. All participants tended to reflect the community from different background and lifestyles.

The first contact to participants (in person) was established by a brief introduction and explanation of the procedure that will be used for the interview. All research aims and methodology, the dissemination of results and the issue of strict confidentiality were explained, as well as explanation for the need for audio recording, access to information and consent to data use.

For the qualitative phase, 20 interviews were conducted with participants from Ministries representing the government (federal and state ministries of Environment and Health) and individuals randomly selected at their places of residence and workplace.

The rational for selecting the participants is to examine governments involvement in sustainable sanitation solutions with more emphasis on the provision and availability of sanitation facilities for residents, as well as households knowledge and practice on sanitation using Semi structured in-depth interviews to uncover rich data in terms of sanitation practice, knowledge and experiences on the subject. As this is the most common method for collecting qualitative data. An analysis of the data was done using MAXQDA.

4.4.3. The interview

The interview commenced with a brief introduction and an explanation of the research study as part of the informed consent process; a short briefing regarding the research aims and methodology, a word of thanks for participating in the research and a verbal reminder and explanation regarding the importance of recording and eventual transcription of the interview.

The participants were made to understand how their comments will be used, especially if it is anticipated that large sections of text will be incorporated into a published work. The brief discussion allowed for the clarification of any doubts, to settle any nerves prior to the interview and to establish a good rapport before the recording of the interview took place. The participants were reminded of their right to withdraw from the study/interview at any time and were informed of measures that will be taken to protect their anonymity at all stages in the process. For example, they will be identified in the transcripts and final publication by a pseudonym and identifying remarks will be changed (such as names or job titles).

The participants were made to know that they are free to make comments without judgment, and that the researcher is interested in their honest opinion.

Crabtree (2006) stressed that a good rapport and positive working relationship based on trust and respect is essential for a successful interview, and without it, even the best phrased questions can fall flat and elicit brief, uninformative answers (Leech,2002).

For most of the interviews, questions asked were mainly open-ended as it permits the respondent to elaborate and explain various insights and opinions towards certain topics. Lamnek (2005) claims that open ended interviews are the best method to unexpected outcomes that can be transformed into hypothesis.

A few closed questions were used when specific information was required, and several probes and prompts were used to clarify some answers or delve deeper into others.

Finally, the interview ended with a word of thanks for participating in the research study. All questions for the interviewed session can be found in Appendix ll.

4.4.4. Technical Details

Interviews were carried out in the participants places of work with consent and permission from respective gatekeepers. The location was chosen to reduce background noise as much as possible and for an uninterrupted experience (Byrne, M. 2001). Electronic devices such as phones, computers, radios and televisions were turned off and other competing distractions minimized as much as possible (Morse, J. M., & Field, P. A. 1995).

The interviews were semi-structured, and the duration was between fifty minutes to one hour and were all conducted in English. All interviews were recorded on audiotape and the subsequent transcripts supplemented with notes taken during the experience. All recording equipment was checked beforehand, and spare tapes and/or batteries were made available should there be need for it. Since the participants are volunteering their own time; there-fore, time was taken into consideration. An e-mail was sent to the participants, thanking them for their involvement.

4.4.5 Analysing interview Data

Data from interviews consist of the transcripts of the proceedings which was augmented by field notes to capture nonverbal communication (Creswell, J. W. 2009).

However straightforward it sounds to make a transcription, 'the "same" stretch of talk can be transcribed very differently' (Riessman 2008).

Following Gillham's suggestion (2005), I included my own speech (including my questions, probes, or emphases) when they seemed important for the interpretation.

I transcribed all the interviews myself, as I agreed with the view that transcription is an interpretive practice (Gillham 2005; Riessman 2008).

After the transcriptions, I listened to the interview again and added interpretative notes using the qualitative data analysis software, MAXQDA.

Transcription is an arduous and time-consuming process (Bell, J. 2009) but essential as it is a powerful act of representation and an excellent way to become very familiar with the data which involved listening to the interview recording in short sequences and typing out what was heard. When all interviews and transcriptions were completed, each was rich in data that is both subjective and contextual (Gaskell, 2000).

Correct analysis was crucial in determining the understanding of the responses and rearranging of external views with the internal views of respondents, failure to do so would have inadvertently biased the results (Rajendran,2001; Hammersley and Atkinson,2007).

Analysis involved categorizing the data into themes or categories (sometimes referred to as coding). This can be done in a variety of ways and was made possible using codes, i.e. ."words or phrases that assign a summative, salient, essence-capturing, and /or evocative attribute to a portion of language based or visual data" (Saldana 2009). Then, following the identification of commonalities and contradictions across responses, themes in interviews were made rather evident.

4.5. Triangulation.

The most common and well-known approach to mixing methods is the Triangulation Design.

Triangulation, also called the mixed method approach involves using more than one method of data collection (Creswell, Plano Clark, et al., 2003). The purpose of this design is "to obtain different but complementary data on the same topic" (Morse, 1991) to best understand the research problem. The intent in using this design is to bring together the differing strengths and non-over-lapping weaknesses of quantitative methods (large sample size, trends, generalization) with those of qualitative methods (Patton, 1990)

Relying on just one research technique will result in studying an aspect of behaviour from only one angle and thus has the potential to bias results due to the inherent limitations of the method itself.

Lin (1976) explains that researchers have to be confident that results are not just a display of the methods used and such confidence can only be gained if more than one research method is employed and each one corroborates the other.

In this research study, the triangulation strategy employed is methodological since both questionnaires and interviews were used on the same object of study (Cohen et al.,2011). These two strategies, however, were not done concurrently as the interviews followed the questionnaires. This design is used when a researcher wants to directly compare quantitative statistical results with qualitative findings or to validate or expand quantitative results with qualitative data.

4.6 Ethics

Informed consent and issues of privacy and confidentiality are basic principles of ethical research conduct (Eysenbach, G., & Till, J. E. (2001). As in all research, the risks and benefits were explained to the respondent, so they can make an informed decision as to whether to participate (or not).

Before collecting the data, the topic, aims and methods of the study were described to participants as well as how the data will be stored and used in order to demonstrate the purpose of participation in research.

Besides this, as recommended by sarantakos (2005), the identity of the researcher, the institution for which the research was being done and relevant contact details were made available.

This information was shown to increase participation (sarantakos 2005) as it helped to establish trust and reason for participation in the study. Access to participants was achieved by brief introduction and by distributing an information sheet, but before this, ethical approval was sought from a few gatekeepers, namely:

1. Ethics committee of the Hochschule für Angewandte Wissenschaften (HAW) Hamburg, Faculty of Life Sciences.
2. Head of the Research and Transfer Centre "Sustainability and Climate Change Management" (FTZ-NK) at the HAW Hamburg, Faculty of Life Sciences.
3. The Head of the Ministry of Environment, federal Republic of Nigeria,
4. Head of the ministry of Health, federal republic of Nigeria
5. Head of the ministry of Environment, Kaduna state, Nigeria
6. Individual/ Respondents consent.

   Participants were not forced or coerced into taking part in any aspect of the study but were asked to voluntarily participate. The data acquired and all personal information were made anonymous as possible (for example, using a code number for each respondent). Participants were also assured of how the data will be kept confidential and/or anonymous (Byrne, M. 2001).

   During interviews, the issue of strict confidentiality was also given paramount importance and identification of participants was only made possible using pseudonyms (Creswell, 2009; Cohen et al.2011).

   Regarding interviewees, a consent form for participation was also created and distributed and this form set the framework for the interviews and included clauses

such as strict confidentiality, the need to record and transcribe data and to use parts of interviews to draw conclusions (Cohen et al., 2011). Interviews were only carried out after participants read and signed the form and agreed to participate.

Following data collection, ethical issues were also taken into consideration during analysis and interpretation. As stated, pseudonyms were always used in order to hide the identity of the participants and all forms of data were stored in a safe place with limited access in order to respect confidentiality. They were destroyed after the study was completed.

Finally, as recommended by the American psychological Association [APA] (2001), an "unbiased language at an appropriate level of sensitivity was used", in the sense that language sensitive to specific labels or descriptions was avoided.

Neumann (2000) also confers the idea of "scientific misconduct" where he argued that fraudulent practices in which participant data is altered, suppressed or falsified to meet the aims of research should be avoided.

4.7. Conclusion

Interviews are used because researchers are interested in the stories people have to tell (Seidman, I. 2006).

Qualitative interviewing is a powerful way of investigating areas of practice in the Health Science and can provide quality and valuable information about the topic.

Throughout this chapter, the approaches taken to reach the aims of this research study were explored and discussed. Interviews allowed for data in assessing Sanitation practice collected from a qualitative angle. Finally, in the following chapters, analysis of data sets will be carried out together with the triangulation of data sets to allow for the corroboration of data and the drawing of relevant conclusions.

Chapter 5:
Findings: Quantitative Analysis

Table 5. 1. Residents socio-economic characteristics

Attribute	Suburban **Frequency (%)**	Transition **Frequency (%)**	Total **Frequency (%)**
Gender			
Male	38(55.8)	10(23.8)	48(43.3)
Female	30(44.1)	32(76.2)	62(56.4)
Total	**68**(100)	**42**(100)	**110** (100)
Age			
Below 20	1 (1.5)	1(2.4)	2(1.8)
21-39	37 (54.4)	11(26.2)	48(43.6)
40-65	20(29.4)	24(57.1)	44(40.0)
Above 65	10 (14.7)	6(14.3)	16(14.6)
Total	68(100)	42(100)	110(100)
Marital status			
Single	27(39.7)	15(35.7)	42(38.2)
Married	41(60.3)	27(64.3)	68(61.8)
Total	68(100)	42(100)	110(100)
Educational status			
Primary	21(30.9)	20(47.6)	41(37.3)
Secondary	30(44.1)	16(38.1)	46(41.8)
Tertiary	17(25.0)	6(14.3)	23(20.9
Total	68(100)	42(100)	110(100)
Occupation			
Student	15(22.1)	8(19.0)	23(20.9)
Housewife	7(10.3)	12(28.6)	19(17.3)
Self employed	26(38.2)	6(14.3)	32(29.1)

Civil servant	10(14.7)	5(11.9)	32(29.1)
Others	10(14.7)	11(26.2)	21(19.1)
Total	68(100)	42(100)	110(100)
Income status			
Below 30,000	20(29.4)	28(66.7)	48(43.6)
31,000 -60,000	29(42.6)	9(21.4)	38(34.6)
Above 60,000	19(28.0)	5(11.9)	24(21.8)
Total	68(100)	42(100)	110(100)
Household size			
1-3	25(36.8)	10(23.8)	35(31.8)
4-7	35(51.5)	28(66.7)	63(57.3)
7 and above	8(11.7)	4(9.5)	12(10.9)
Total	68(100)	42(100)	110(100)
Type of Residential Building			
Maisonette	4 (5.9)	0 (0)	4(3.6)
Flat/Apartment	12(17.6)	7(16.7)	19(17.3)
A compound house(shared)	30(44.1)	26(61.9)	56(51.0)
others	22(32.4)	9(21.4)	31(28.1)
Total	68(100)	42(100)	110(100)

Research Findings:

The profile of the respondents discussed is age, gender, educational attainment, marital status, income status and household size, all these in relation to their residential zones (places of residence). Findings revealed representation of the two categories of gender across the residential zones.

In all, 43.6% were male while 56.4% were female. Amongst some sociocultural groups, the females are traditionally saddled with the responsibility of handling environmental sanitation and with greater sensitivity towards environmental issues were fully involved in the study. Age

is expected to play a significant role as maturity could affect level of environmental awareness. The age of the respondents was grouped into four: teenagers (those with less than 20 years); young adults (21 to 39 years); elderly adults (40 to 65 years) and the aged people 65 years and above). Across the residential zones, majority of the residents (43.6%) were adults (21 to 59 years), 1.8% were teenagers and 14.6% were old people (60 years and above).

Educational level plays a significant role in environmental awareness. Studies from (Briguglio and Pace, 2004; Arbuthnott,2008) opined that educated people are more concerned about the environment and place more emphasis on preserving the environment. Findings on residents' educational qualifications across the residential zones in Nigeria revealed that 37.3%, 41.8% and 20.9% of the residents in the various zones had primary, secondary and tertiary education respectively.

Findings from the study also revealed that majority of the respondents (61.8%) were married, as seen across the residential zones. Closely related to residents' marital and educational status is their income level. For easy analysis, the initial quantitative data on residents' average monthly income were grouped into three: low, medium and high. Incomes below ₦20,000 were categorized as low income. This is based on the prevailing Civil Service Salary Scale in the country. The minimum wage at the federal level in Nigeria is ₦30,000 while it ranges from ₦20,000 to ₦25,000 in different states of the federation. The medium monthly incomes were categorized as from ₦20,000 to ₦60,000 while residents earning above ₦60,000 were categorized as high-income earners. Based on this categorization, variation in income classes existed across the residential zones. Further findings revealed that the average monthly income computed for transition and sub-urban stood at ₦24,890.00, ₦39,210.00 respectively while the overall mean monthly income was ₦28,746. These results revealed that income distribution varied significantly with residential areas.

Another identifiable factor in environmental sanitation practices is household size. A household was defined as a person or group of people with shared cooking and living arrangements. Thus, household size was measured by the number of people living together with common eating arrangement. Based on this, the household size of the residents was categorized into three. The household sizes of one to three members were categorized as small, those with four to seven members as medium while those with more than eight members was categorized as large. Findings revealed that majority of the families in Nigeria (31.8%) had less than three household members. However, the average household size computed for the

transitional and sub-urban zone was five persons and four persons respectively. This result show that household sizes vary significantly with residential areas. The ANOVA results ($F=2.46$; $p < 0.00$) indicates that household size varied significantly with residential zone. One important fact to note is that construction of houses with numbers of rooms is a common characteristics of residential buildings in majority of the states in Nigeria, and as such there might be shared environmental sanitation facilities in their houses thus exerting pressure on available environmental sanitation facilities.

Table 5. 2: Residents access to Environmental sanitation Facilities

Facilities	Suburban **Frequency (%)**	Transition **Frequency (%)**	Total **Frequency (%)**
Availability of Water			
Yes	23(33.8)	12(28.6)	35(31.8)
No	45(66.2)	30(71.4)	75(8.2)
Total	68(100)	42(100)	110(100)
Source of water Supply			
Rainwater	5(7.4)	12(28.6)	17(15.5)
Tap Water	8(11.7)	0(0)	8(7.3)
Well Water	15(22.1)	20((47.6)	35(31.8)
Borehole	20(29.4)	80(19.1)	28(25.5)
Water Vendor	15(22.1)	2(4.7)	17(15.4)
Others	5(7.3)	0(0)	5(4.5)
Total	68(100)	42(100)	110(100)
Availability of Toilets			
Yes	51(75)	14(33.3)	65(59.1)
No	17(25)	28(66.7)	45(40.9)
Total	68(100)	42(100)	110(100)
Availability of Hand Washing Facility			
Yes	43(63.2)	15(35.7)	58(52.7)
No	35(36.8)	27(64.3)	52(47.3)
Total	68(100)	42(100)	110(100)
Types of toilet used			
Flush Toilet	24(35.3)	7(16.7)	31(28.2)
VIP Toilet	20(29.4)	13(30.9)	33(30.0)

Pit Latrine	18(26.5)	12(28.6)	30(27.3)
Others	6(8.8)	10(23.8)	16(14.5)
Total	68(100)	42(100)	110(100)
Shared sanitary Facilities (Toilet and Bathroom)			
Yes	46(67.6)	29(69.1)	75(68.2)
No	22(32.4)	13(30.9)	35(31.8)
Total	68(100)	42(100)	110(100)
Availability of Drains			
Yes	19(27.9)	14(33.3)	33(30.0)
No	49(72.1)	28(66.7)	77(70.0)
Total	68(100)	42(100)	110(100)
Availability of waste storage facilities			
Yes	52(76.5)	14(33.3)	66(60.0)
No	16(23.5)	28(66.7)	44(40.0)
Total	68(100)	42(100)	110(100)
Type of waste storage facility			
Bin bag	21(30.8)	7(16.7)	28(25.5)
Container with Lid	14(20.6)	10(28.8)	24(21.8)
Container without Lid	18(26.5)	7(16.7)	25(22.7)
Waste basket	9(13.2)	5(11.9)	14(12.7)
Others	6(8.8)	13(30.9)	19(17.3)
Total	68(100)	42(100)	110(100)

Information on residents' access to environmental sanitation facilities across the residential zones is presented in Table 5.2. It is also imperative to consider the environmental sanitation facilities available to residents. This is necessary because availability of facilities may influence resident's environmental sanitation practices. Starting with availability of water in residents' homes, findings revealed that 31.8% of the residents had water in their homes while 68.2% did

not have water in their homes. This overall percentage in the study area varies across zones as residents have water supply in the transition zone (28.6%) and sub-urban zone (33.3%) respectively. Findings on water sources revealed that residents in the transition zones do not have access to water supply as compared to residents in suburban population. Thus, those in suburban areas are benefitting more than others in supply of pipe-borne water. As a result of this, other predominant sources in the study area are hand-dug well (31.8%) and bore hole (25.5%) and water vendor (15.4%). This revealed that almost half of the residents with access to water from well (43.3%) might not have access to adequate water availability.

Investigations into availability of toilets revealed that 59.1% of respondents across the study zones have toilets in their homes.

Findings on availability of drains in respondents' homes revealed that 30.0% of the respondents had drains in their various houses, and 70.0% do not have drains. This is because provision for drainages were not available from majority of the residential buildings been constructed, this is the more reason many of the streets, houses and business environment are flooded during the rainy reason.

Table 5. 3: Residents Environmental sanitation practice

Practices	frequency	Percentage	
Household Waste Management			
individually	59(86.8)	36(85.7)	95(86.4)
Collectively	9(13.2)	6(14.3)	15(13.6)
Total	68(100)	42(100)	110(100)
Frequency of Waste Collection			
Once a week	18(26.4)	12(28.6)	30(27.3)
Every Two Weeks	12(17.7)	7(16.7)	19(17.3)
Handle it yourself	38(55.9)	23(54.7)	61(55.4)
Total	68(100)	42(100)	110(100)
Residents Waste Disposal Methods			
Waste Vendors (House to House collection)	19(27.9)	12(28.6)	31(28.2)
Dumping on dumpsites	23(33.8)	18(42.9)	41(37.3)
Burning	12(17.6)	9(21.4)	21(19.1)
Others	14(20.6)	3(7.1)	17(15.4)
Total	68(100)	42(100)	110(100)
Presence of Sewage around Residents surroundings			
Yes	29(42.6)	31(73.8)	60(54.5)
No	39(57.4)	11(26.2)	50(45.5)
Total	68(100)	42(100)	110(100)
Management of Sewage (Cleaning of Drains)			
Weekly	33(48.5	17(40.5)	50(45.5)
Monthly	11(16.2)	8(19.1)	19(12.3)

Every Two Months	6(8.8)	3(7.1)	9(8.2)
Others	18(26.5)	14(33.3)	32(29.0)
Total	68(100)	42(100)	110(100)
Hand Hygiene Practice			
Yes	43(63.2)	15(35.7)	58(52.7)
No	25(36.8)	27(64.3)	52(47.3)
Total	68(100)	42(100)	110(100)
Hand washing Liquid Used			
Soap base hand wash	22(32.4)	8(19.1)	30(27.3)
Liquid Base hand wash	5(7.4)	4(9.5)	9(8.1)
None	23(33.8)	18(42.8)	41(37.3)
Others	18(26.4)	12(28.6)	30(27.3)
Total	68(100)	42(100)	110(100)

On Environmental sanitation practice, Findings revealed that 60.0% of the residents had waste storage facilities in their homes. In other words, majority of the residents had designated containers for dumping solid wastes in their homes.

Further investigations revealed that respondents in the transition and sub-urban who used containers with lid were 20.6% and 28.8% respectively while the proportion of respondents using container without lid to store waste in the transition and sub urban stood at 26.5% and 11.9% respectively. Other prominent waste storage facilities in respondents' homes were polythene bags and baskets. These were used by 25.4% and 12.7% of the respondents in the study area.

The common waste disposal methods in the study area were house to house collection from individual (private) waste vendors, burning, dumping on dumpsite and others (dump in a pit and dump in the open). Findings revealed that 27.9% and 28.6% of the respondents in the transition and sub-urban engage in house to house collection of waste.

From the investigation, the proportion of residents who burn waste in the transition area was 21.4% and in the suburban area 17.6%. Also, the study revealed that rate of dumping of waste in communal waste disposal sites is seen to be the most common waste disposal method across the various zones (33.8% in the suburban and 42.9% in the transition).

The high rate of dumping of waste on dumpsites in the transition areas can be attributed to the unavailability of waste disposal facilities and the presence of undeveloped lands which are converted to communal waste dumpsites, within the residential areas of the transitional dwellers in most Nigerian states.

Also, findings revealed that there is good hygiene practice across the residential zones as 52.7% of residents practice hand washing, while 47,3% do not.

Although from the study, residents who uses soap to wash their hand was 32.4% in the suburban zone and 19.6% in the transition zone, and for those who do not use any soap or handwashing liquid base is 42.9% in the transition zone and 33.8% in the suburban zone. This can be attributed to lack of awareness on the need for proper handwashing and its benefit in preventing disease.

Table 5.4: Residents Knowledge and Attitude on Sanitation and Disease Prevalence

Knowledge and Attitude			
Knowledge and Awareness on Sanitation			
Yes	22(32.4)	13(30.9)	35(31.8)
No	46(67.6)	29(69.1)	75(68.2)
Total	68(100)	42(100)	110(100)
Source of Information on Waste Management			
Internet	0 (0)	0 (0)	0 (0)
Newspaper	9(13.2)	3(7.1)	12(10.9)
Television	28(41.2)	7(16.7)	35(31.8)
Radio	16(23.5)	11(26.2)	27(24.6)
Others	15(22.1)	21(50.0)	36(32.7)
Total	68(100)	42(100)	110(100)
Rating Waste Management Practice			
Well Managed	0(0)	0 (0)	0(0)
Fairly Managed	5(7.4)	2(4.8)	7(6.4)
Not properly Managed	41(60.2)	31(73.8)	72(65.5)
Others	22(32.4)	9(21.4)	31(28.1)
Total	68(100)	42(100)	110(100)
Availability of Community Sanitation Program			
Yes	17(25.0)	8(19.1)	25(22.7)
No	51(75.0)	34(80.9)	85(72.3)
Total	68(100)	42(100)	110(100)
Penalty for Unsafe Sanitary Practice			
Yes	57 (83.8)	28(66.7)	85(77.3)
No	11(16.2)	14(33.3)	25(22.7)
Total	68(100)	42(100)	110(100)
Diarrhoea disease in the community			
Yes	41(60.3)	29(69.1)	70(63.6)
No	27(39.7)	13(30.9)	40(36.4)
Does not apply	0(0)	0(0)	0(0)
Total	68(100)	42(100)	110(100)
Disease Prevalence in the Community			
Yes	46(67.6)	30(71.4)	76(69.1)
No	22(32.4)	12(28.6)	34(30.9)
Total	68(100)	42(100)	110(100)
Disease Prevalent in the Community			
Diarrhoea	21(30.9)	8(19.1)	29(26.4)

Soil transmitted Helminth	13(19.1)	11(26.2)	24(21.8)
Hepatitis A	8(11.8)	5(11.9)	13(11.8)
Typhoid	19(27.9)	14(33.3)	33(30.0)
Others	7(10.3)	4(9.5)	11(10.0)
Total	68(100)	42(100)	110(100)

Knowledge and awareness are vital self-development as well as for socio-economic development. It is imperative to say that resident's knowledge and attitude on Sanitation needs to be worked on. Knowledge about sanitation across both zones is 31.8%, and for residents who do not have any knowledge of safe sanitation practice is 68.2%. this can be attributed to poor information across the states. From residents' sources of information, their behaviours reflect what they see in their environment as regards sanitation practice. Information from sources such as Television and radio are 31.8% and 24.5% respectively, and from other sources, 33.0%. this can be further elaborated from the discussions from other residents who states that they dump their waste on the open places as they see others do. More campaigns, awareness and Education need to be conducted across most states in Nigeria.

It is evident that there is Disease prevalence across residential zones. 69.1% of respondents stated that Typhoid and other sanitation related disease has been a burden on them.

Diarrhoea cases is seen to be 26.4% and Typhoid 30.0%, Soil transmitted Helminth infection 21.8% and Hepatitis A 11.8% respectively.

As stated by (Mara D, Lane J, et.al 2010) that the diseases associated with poor sanitation and unsafe water account for about 10% of the global burden of disease affecting most developing countries. The ANOVA results $p>0.10$ indicates that Unimproved sanitation was significantly associated with diarrhoea and typhoid infection.

In conclusion, the findings from the study revealed that relationship exists between residents' environmental sanitation practices and their place of residence. Also, the environmental sanitation practices are reflections of their socio-economic characteristics such as educational attainment, household size, and income but not with age and marital status in the study area. Other studies have indicated that there is a significant statistical association between characteristics such as education, income, household size and place of residence and residents' environmental practices. Thus, they could serve as predictors of environmental sanitation practices in the study area.

Chapter 6:

Findings: Qualitative Analysis

6.Findings: Qualitative Analysis

From the number of persons that participated in the research, 20 were selected for interviews (household and organisation). The selection of participants was based solely on the readiness to participate in research, demographic characteristics and the availability to be interviewed.

Part 1: Household Interview:

Table 6: Characteristics of Interviewee's and their demographic characteristics

Participants (pseudonyms)	**Location**	**Gender**	**Educational level**	**occupation**	**Number of persons in household**
Sammy	Kaduna	male	tertiary	student	1
Olawale	Abuja	male	tertiary	Civil servant	5
Priscilla	Kaduna	female	secondary	Business-woman	6
Martha	Abuja	female	secondary	Self employed	4
Steve	Kaduna	male	tertiary	Civil servant	5
Nasiru	Kaduna	male	primary	Business-man	2
Adehor	Abuja	male	tertiary	Banker	4
Fatima	Kaduna	female	primary	Housewife	6
Emeka	Abuja	male	primary	Self employed	4
Ifeoma	Kaduna	female	Adult education	Housewife	6
Linda	Abuja	female	secondary	Receptionist	1
Maureen	Abuja	female	secondary	Housewife	5
Sylvia	Kaduna	female	tertiary	Teacher	3
Nelson	Kaduna	male	secondary	Civil servant	4

John	Abuja	male	secondary	Self employed	6
Tony	Kaduna	male	secondary	Businessman	3
Kate	Kaduna	female	secondary	Self employed	5
Michael	Abuja	male	tertiary	Civil servant	3
Okon	Abuja	male	tertiary	Civil servant	5
Hajara	Kaduna	female	tertiary	Civil servant	3

Originally from Maraba Nyanya Area of Abuja and Maraban Rido Area of Kaduna state

In order to avoid selecting participants *based on* their ethnic identifications and thus selecting on dependent variable, the following stakeholders were interviewed; government officials from different ministries, community leader and individuals/ households. The information gathered from these interviews was used to comprehend and confirm the responses from the questionnaires for better understanding of the problems.

6.1 Defining Environmental sanitation

Defining sanitation recalls many facets that are all similar and related to each other. **Martha**, **Kate** and **Steve** described sanitation as activities aimed at improving basic environmental conditions affecting people's wellbeing.

Nasiru further explained that it is the control of the methods for the disposal of community waste to ensure they are adequate and safe.

The relationship of sanitation with health was highlighted with participants explaining that it protects people from diseases, such as water borne diseases and pollution (Tony). Sanitation helps improve our health and living habits (Sylvia), it helps keep our surroundings clean thereby reducing the amount of disease spread (John, Sammy).

Several participants also stated that Sanitation is the promotion of hygienic practices and prevention of disease (Maureen, Emeka, Nelson).

"Sanitation is an important aspect for Living, as it helps to prevent disease"

Linda

Michael further explained that Sanitation systems aim to protect human health by providing a clean environment that will halt the transmission of disease.

> Many illnesses that can be preventable are the result of inadequate sanitation (Olawale). Most of the time, I engage in sanitary activities around my vicinity such as cleaning the surroundings and managing household garbage because of my little children. Sanitation is especially important for children (Ifeoma).

6.2 Household Sources of water

6.2.1. Sources of water supply

In most cases, participants primary source of water was from Boreholes and hand-dug wells. some of the dug wells are individually owned, while others get water from their neighbour's house when theirs eventually "goes dry" i.e., when water levels drop below a pump intake.

Ifeoma and Sylvia, talked about getting water from a borehole in the community, because there is no source of tap water anywhere in the community.

The dug well in my house is dry, we usually have water inside only during the rainy season, other season of the year we get from the community borehole or from my neighbour who made provision for a borehole in his house (Fatima).

Tony gets his water from some water Vendors who usually supplies water by selling to some people in the community daily.

Martha, Priscilla and Olawale sources of water is from dug wells and roof top rainwater collection, water is collected in a big tank which is stored and preserved for future use.

I get my water from the tap, the water flows mostly at night when most people are asleep, so I try my best to ensure that I fill the containers in my house because the water does not flow regularly(Sammy).

6.2.2. Household source of drinking water

There is no portable tap water in my vicinity, we have a hand-dug well which we use for most household chores, but I tend to buy sachet water from a supermarket on my way back from work (Nelson)

For Sammy and Linda their source of drinking water is from the Tap.

Our source of drinking water is from the community bore hole, Ifeoma.

my source of drinking water is from the rain which is stored in my tank, the water is clean and good for drinking because I ensure that the tank is well protected and covered, and I also have a borehole in the house (Olawale).

Other participants attributed their source of drinking water from dug wells and borehole and some have to buy bags of sachet water from kiosk owners living in their neighbourhood.

6.2.3. Household water storage

I have a container(bucket) with which I use to store drinking water, Ifeoma.

Most respondents store their household drinking water in a plastic container, for Fatima she uses a moulded clay pot.

Sammy stores his water in plastic jerry cans and Linda stores her drinking water in water Pet bottles and with plastic containers as well.

6.2.4. Household water storage container

On storage container for household water use;

Fatima explained that her moulded clay pot does not have a cover, so the clay pot is open and not protected.

For Olawale, his water storage tank is protected, while Linda stores her water in plastic buckets which do not have covers but she had to improvise by using a cover from one of her cooking pots.

Kate responded by saying she does not store her water in any container, she gets her water directly from the tap connected to the bore hole in her house.

I store my water in a big plastic drum which does not have a cover because of the size (**Tony**).

Maureen stores her water in plastic cans with covers, the cans are protected.

Due to water scarcity in my community I had to get bigger plastic drums with which I used to store my water; the drums are protected (Sylvia)

Steve does store his drinking water in big plastic Jugs while the water for household chores are stored in big jerrycans.

6.2.5. Household drinking water treatment

On household treatment of drinking water; Olawale, Steve and Sammy do not treat their drinking water because they feel the water is potable for drinking.

While Tony commented that he does boil his drinking water because he doesn't think its potable since he buys it from the water Vendors.

Fatima does not treat her drinking water because she does not see the need to treat it.

Sylvia claims that water treatment is good, but she cannot afford it financially as it will require buying kerosene to use in the stove which will be expensive.

Maureen does boil her drinking water occasionally when she has the means to, as there is no constant electricity power supply.

Kate and **Linda** do not treat their water since they are sure of the supply, for them it is not necessary.

In the case of Martha, **Adehor**, **Emeka** and **Nasiru**, they just store the water in plastic containers and allows it settle before they use.

6.3. Household Toilet Accessibility

All respondents claim to have access to a toilet, but majority having unimproved sanitation facility.

I live in a building with six different tenants, four out of the six tenants are couples with children, and we make use of a public toilet i.e., a single toilet which we share (Tony).

For Sammy there are public toilets in the hostels for students, so we make use of it.

Olawale, Kate and Priscilla said they have access to an improved toilet facility.

There is a public toilet in my house, but I rarely use it (Linda).

Ifeoma said they have a toilet which they are managing although not good for her children and so they resulted to using potty.

For Adehor, Nelson and Nasiru, they live in a shared apartment and they have access to a toilet.

Fatima also claims that they have a toilet but which they have not been using for a long time.

6.3.1. Types of toilet

On the types of toilet being used by respondents; Priscilla and Kate use a shared household toilet.

Olawale does not share toilet with any neighbour as he uses a single toilet constructed for his family alone. The toilets are all flush toilet that is connected to piped water system.

For Fatima, she uses a shared public toilet, it is a pit toilet that is constructed without a slab.

The toilets in the hostels are shared. It is a public toilet as it is constructed for all students to use, the toilets in the hostel are constructed as flush toilet system (Sammy).

Adehor, Nelson and Nasiru uses a shared pit latrine that has a slab.

Ifeoma uses a shared pit toilet constructed for general use for all tenants living together in the building. while Tony, Linda and Sylvia use a shared VIP toilet.

6.3.2. Problems with toilet facility

Majority of the respondents have problems with their toilet facility.

Sammy expressed dissatisfaction as he explained that too many people use the toilet and that the cleaners who work in the hostels do not clean every day and so the toilets are dirty which in most cases makes the students to defaecate in plastic bags and been discarded behind the student hostels.

Linda explains that “the problem I have with the toilet in where I live is that the toilet is always in a mess and due to lack of water supply, some people who are assigned to clean when it is their turn, do not clean and so I resulted to using the toilet at my place of work and open defaecation at night when I am back home and I need to use the toilet.

The toilet in my house is not safe, so most of the time we defaecate in the bush (Fatima).

Olawale talked about not having much problem with his toilet because he does take care of it as it is inside his house. But sometimes it requires using more water and there is scarcity of water in his vicinity. So insufficient water is a major problem.

Adehor and **Nelson** attributed insufficient water supply as the problem they have with their toilet facility.

Ifeoma also talked about too many people using the toilet and so result in the toilet been dirty. She said for her children, their faeces are collected and disposed elsewhere.

6.4. Household hygiene

On household hygiene practice, some of the respondents explained that they have a handwashing facility while others had to devise a means to wash their hands after using the toilet.

Yes, I made provision for a wash hand basin which we make use of it after using the toilet.

Olawale

Ifeoma explainedthat sometimes, she had to improvise a means for washing hands after using the toilet.

Linda also said that she made available a bucket of water at her doorstep to use when the need arises.

There is a facility for hand washing but it's not functioning because there is no water supply. **Adehor and Nelson**

Sylvia and Maureen kept some buckets of water stored outside their homes to use for washing their hands when necessary.

6.4.1. Household challenges in accessing soap for handwashing

In assessing soap for handwashing, respondents explained the challenges they are faced with sometimes.

For me, I make use of water only (**Nelson**).

Fatima said soap is too expensive for her, so she uses just water to wash her hands.

Priscilla, Sammy, Kate and Olawale had no challenges in accessing soap as they said soap was easy to get.

While Ifeoma said for her soap is not available, she sometimes washes her hands with just water only and other times with ashes and water.

Adehor and Nasiru tried to explain that for them other needs are prioritised in terms of buying soap, so handwashing is not always done.

6.5. Household information on waste management

On waste Management, respondents claim that they rarely get information about waste management.

Sylvia explained that there is no constant electricity supply, so there is no way she can get to watch the television or listen to the radio to know about any information.

Emeka said he only saw once on the Television where the minister of Environment was talking about waste management and the need for everyone to participate in proper waste disposal method.

I have seen adverts by a private company on the television on waste management (**John**).

Sammy explained how some students from Environmental science department in his school conducted an awareness campaign on clean environment and waste management.

Ifeoma and **Fatima** said they don't get information on waste management from any source. We rarely have electricity supply because of where we live so we don't really know what is happening in the country.

For me, I don’t get any information on waste management (Nelson, Nasiru and Adehor)

6.5.1. Household waste management practice

On management of Household waste, majority of the respondents claimed to manage their waste themselves(individually).

Ifeoma explains how she do store her household waste in a waste bin which she kept outside her door and she disposes it herself by the roadside in an open field where others do same.

Fatima said she does not have a waste bin, so she throws whatever she uses behind her house, in a big gutter.

For Olawale, I do take care of my waste myself. There is no provision for waste disposal and collection from the state government, most of us living in this vicinity have to take care of our waste ourselves. I employ the services of some private waste collectors who uses private push carts for collection services, they are being paid some money in order to make a living.

Nelson, Nasiru and Linda said they handle their waste individually by throwing it by the roadside close to the market where they see others throwing their own since there are no waste facility around their homes.

Sammy claimed that they manage their waste collectively in the hostel by disposing of their individual waste in a big trash container located outside the hostel building.

I do throw my waste in an open field close to my house (**Sylvia**)

Tony and **Steve** dispose of their waste in a deep pit by the roadside.

All respondents expressed dissatisfaction with the solid waste management in their various communities. They explained how they have to manage their waste themselves without government intervention.

There is no provision of any medium where we can dispose of our waste, the more reason people throw their waste anywhere around the streets and roads (**John**).

6.6. Communal drainage system

On community drainage system, respondents analysed how they take care of drains around their vicinity.

There is poor drainage system (Kate), almost in front of every home you see stagnant water(sewage) with heap of waste inside (Maureen).

Behind my house, there is stagnant wastewater which pollutes the whole surrounding with an offensive odour, some of the water are from people's home, from their bathroom and kitchen. We try to clean from time to time but the neighbours from the other house still dump their waste there. So, there is absolutely nothing we can for now (Emeka).

There is poor drainage system in my community, during the rainy season there is improvement because we try to clean when it rains so that the rain washes away the dirt thrown into the gutter (Ifeoma).

There is no proper drainage system in my community, there is stagnant water everywhere coming from people's houses and not flowing into any pipe because there is no provision for any (Steve).

6.7. Communal sanitation program

The participants responded on how they participate on community sanitation program.

In the past, there was sanitation program conducted on a state level which is done once in a month (the last Saturday of the month from 7:00 am to 10:00am) where every household is expected to participate in cleaning their surroundings (**Tony, Steve, Kate and Martha**).

There used to be in the past, but recently, there is no such thing as general environmental sanitation **(Linda**), each household take care of their immediate environment as they see the necessity to **(Priscilla, Sylvia and Adehor**).

Olawale claims that there is no General environmental sanitation in he community, he further explained how each household takes care of their surroundings in cleaning and managing their waste.

There used to be a general environmental sanitation in the past conducted by the state government, but with the change in government everything seems to change as well (Emeka).

There is no community environmental sanitation, we do individual cleaning (Ifeoma).
Every last Saturday of the month, everyone(Landlords and tenants inclusive) is expected to come out and clean the streets, side-walks, front, back or either sides of their apartment or building, clean the gutters or drains to allow free flow of water and to be free from waste. But that was in the past (John).

6.8. Penalty for inappropriate waste disposal.

All respondents claimed there are penalty for offenders punishable by law according to the constitution of the federal republic of Nigeria.

We try to abide by the laws but there is no provision for waste collection of our household waste, and we have no other option than to dump it on open fields (Nelson).

6.9. Disease prevalence resulting from poor sanitation

Participants talked about disease common in the community and how they seek for treatment.
There has been cases of diarrhoea disease from time to time affecting both adults and children (Ifeoma), another respondent explained that diarrhoea, typhoid and Malaria is common in the community(Fatima) and we get some medications from the chemist which is just around the corner.

Yes, diarrhoea and typhoid disease is common in the community (Sylvia).
Adehor narrated how one of his neighbour's child was sick two weeks ago with a diagnosis of typhoid and worm infestation.
Linda claimed to be having re-occurring urinary tract infection as a result of poor sanitary condition of the shared facilities.

Ifeoma talked about repeated bout/ episodes of worm infestation in her children and that of other neighbours' children too.

Typhoid is a common disease in the community (Nasiru).
My child did complain of stomach pain, dysentery, loss of appetite and fever, when taken to the Primary health care (PHC) centre, diagnosis indicating intestinal worms and worm expeller was prescribed, same with my neighbours' children (Kate).
Maureen, Tony, Steve and Emeka talked about malaria, Hepatitis and typhoid infection which they experience from time to time.

Other participants (Sylvia, Emeka, Sammy and Nelson) all talked about having repeated bouts of typhoid fever.

Part 2: Organisational interview

6.2.a. Understanding of the term "Sustainability"

The term **sustainability** has a multidisciplinary use and meaning, it means that that a process or state can be maintained at a certain level for a long period of time. **Michael and Hajara**

Sustainability is a complex concept and can be described as an effective utilization of available resources.

Okon

6.2.b. Organisational objective for Better Population Health

Respondents explanation on the Ministry of Health objective for Population health;

a) To promote health and prevent disease across population and communities.

b) Increase community-based disease prevention efforts.

c) To achieve health equity and enhance population health.

d) Support community actions that address social determinants of health and improve health-related infrastructure

e) Address emerging community health needs, including public health emergencies, by supporting adaptable and sustainable program.

Okon.

6.2.c. Understanding of Sanitation

Sanitation is an act of maintaining cleanliness (Hajara), it can be said to be the development and application of sanitary measures to attain a state of cleanliness and to protect health by providing a clean environment and by preventing disease (Michael).

Sustainable sanitation includes methods of collecting, transporting, treating and the disposal of waste in order to protect human health (Michael, Okon and Hajara).

6.2.d. State of Environmental waste Management

Improving public access to sanitation services is a challenging issue for the government due to Urbanization, economic growth and industrialization which has resulted in the rapid increase in volume of waste and the government departments concerned with

waste disposal is under-funded and underequipped.

On rating, the state of the environment can be rated to be on average (Michael). Waste management has been an issue for the state, the government is trying all they can, to see that public waste are managed effectively and timely (Hajara).

6.2.e. Organisational sanitation programs

In the past there used to be sanitation programs being conducted by various states but due to the increasing population and the relevant government departments concerned with waste disposal are under-funded and underequipped and as such there has not been much result obtained. **Michael and Hajara**.

Sanitation activities is handled by the ministries of Environment, we are in the health sector, although there are collaborations between both organisations. **Okon**

6.2.f. Availability of waste collection and transportation

As earlier stated, there used to be in the past on a larger scale (coverage) excluding healthcare institutions and other organisations(firms) who take care of their waste transportation.

But recently, waste collection is handled by residents themselves and for those who can afford the services of private waste vendors, makes provisions for it (Hajara).

6.2.g. Availability of Municipal Waste disposal facility

There are provisions for municipal waste collection. More importantly, it Is the duty of every state government to ensure that there are adequate facilities for waste disposal and collection (Michael).

6.2.h. Treatment and Management of Wastewater

For residential and commercial districts, individuals are expected to manage their drainage for their comfort and safety, but in public places, for example the market, there is provision put in place by the state government to manage sewage (Hajara).

6.2.i. Availability of Portable Water Supply

Yes, there are provisions made for water supply in some towns and the ministry of water resources is making efforts to see that a large proportion of the population (with those in the rural areas) have access to portable water supply (Michael, Hajara).

6.2.j. Availability of Sanitary Facilities

There are sanitary facilities in some public institutions such as schools, ministries, airports etc. Although some of these places face shortages of water supply and due to improper management, the facilities are inadequately utilized (Okon, Michael and Hajara).

6.2.k. Accessibility of Sanitary Facilities

To some extent, Yes. (Hajara).

The facilities provide the necessary privacy and access to some extent. Talking about access, for example due to inadequacies in utilization of this facilities, some staffs working in government institutions had to make provision for a lock and key, which must be collected before anyone can have access to the facilities. Same applies to other public places such as shopping malls, market etc, the cleaners who take care of the facilities, fixed a fee to be paid before anyone can have access to the facilities (Michael).

6.2.l. Availability of Institutional Penalties for illegalities

There are laws made to impose sanctions in form of fines, imprisonment or damages which are subsequently enforced against persons (natural or legal) who infringe the provision of these laws.

More so, there are penalties in form of charges. Charges are imposed for inappropriate municipal waste disposal as contained in the constitution of the

Federal Republic of Nigeria[cFRN] 1999 (as amended), National Environmental standard and Regulations Enforcement Agency Act 2007(NESREA Act 2007), and Harmful waste Act.

Michael.

There are charges placed for inappropriate municipal waste disposal, any person or group of persons who commits an offence or violates such laws are made to pay fines/charges as stipulated by the state regulatory Act. **Hajara.**

6.2.m. Need for Public Awareness and Campaign

There is public enlightenment campaign conducted by different sectors to raise public awareness and to promote and encourage individual and community participation in sustainable environmental practice. Some weeks ago, the ministries conducted a campaign tagged "National Environmental sanitation day" and another conducted by the Health ministry" Your Health is your Wealth" where participants were actively engaged in sanitary and hygienic practices in schools, markets, streets and other public places(Michael, Hajara and Okon).

6.2.n. Need for Monitoring and Regulating improper Activities

Yes, there is provision for engagement in field for monitoring and regulating waste disposal and Management in Nigeria, the agencies involved are: The National Environmental Standards Regulatory And Enforcement Agency(NESREA), Federal Ministry of Environment, States' Ministries of Environment, Ministry of Water Resources and Regulations, and at the states level include, the Lagos State waste Management Authority (LAWMA), Ondo State Waste Management Agency (OSWMA) and many others.

Michael

6.2.o. Incorporating Environmental Sustainability in Schools

Not sure, I can't really comment on that

Michael, Hajara

6.2.p. Need for Institutional Research

Yes, Partially with some Non-Governmental organisations
(NGO's)

The ministry of Health does encourage and support Research to foster institutional learning. **Michael and Okon**

6.2.q. Need for Inter-sectoral Collaboration

There is inter-sectoral collaboration, but little is achieved in terms of reporting and feedback. (Michael, Hajara).

6.2.r. Disease Prevalence resulting from Inadequate Sanitation

Yes, there are disease burden linked to poor sanitation (Michael, Hajara)

Yes, and unfortunately, there are no definite figures or estimate due to insufficient data base (Okon)

6.2.s. Need for Organisational Reviews

Reviews are not often made, but to some extent the ministry is making appropriate effort (Hajara)

On the issue of making reviews, the ministry is making progress. Although we know more efforts are needed (Michael and Okon).

6.2.t. Need for Sustainable Environmental Policies

The policy on the state level recognises the need to harmonise all efforts and functions of stakeholders to promote sound environmental sanitation in the state, of which there are visible results in some sectors (Housing and urban development and the state environmental protection Agency) **Hajara**.

There is the National environmental policy drafted to safeguard the health of the population and to promote sustainable environmental practice. The national and state policies to address areas on:

- Housing and urban development
- Adequate portable water supply
- Market and abattoir premises
- Sanitary inspection of premises

  And a lot more.

  Michael and Hajara

To some extent, the ministry's policy functions to address sustainable practices as it recognises the roles and contributions of other ministries (Health, water resources, agriculture, rural development and civil society organisation) in the nations drive towards achieving sustainable development goals. **Michael**

Chapter 7:

Discussion

7.Discussion

This study examines household understanding and practice as well as organisational implementation of sustainable sanitation activities and to determine the type of sanitary facilities available and if fully functional and being utilized. The study also identified attitudes and practice towards waste disposal and established how waste is managed and solutions that may encourage sustainable sanitary and hygienic practice. Finally, the study also attempted to identify disease prevalence resulting from poor sanitation and unhygienic practice.

Definitions for sanitation obtained in this study varies, but all respondent seems to agree that sanitation is an act of maintaining cleanliness in order to protect health and to prevent disease, confirming what was described in the definitions by Cambridge Dictionary(2019) and the centre for disease control CDC(2017). However, as stated by WHO (2018) that sanitation and adequate hygiene is essential for population health, welfare and development.

Participants discussed the health and social benefit of sanitation. Some claimed that sanitation and hygiene reflect their attitude and behaviour as seen in their daily way of life as well as through their community activities. Many of the participants expressed their desire to have improved sanitary facilities but due to unavailability, they consider other options to dispose their waste.

The idea posed by Hutton G, et al.,(2007) that the economic and health benefit of improved sanitation goes far beyond environmental economies was apparent in this study as some participants explained the economic benefit of improved sanitation in terms of lower cost on health services and drugs, others explained the social benefit in relation to their privacy, comfort and to avoid embarrassment from friends and relatives who pays them a visits.

7.1 Respondents Access to Environmental sanitation Facilities

It is important to consider the environmental sanitation facilities available to residents. This is necessary because availability of facilities influences resident's environmental sanitation practices.

According to WHO; UNICEF (2015), access to sanitation is measured by the percentage of the population having access and using improved sanitation facilities with sub Saharan Africa having only 30%.

Starting with availability of water in residents' home, most respondents attributed their source of water from hand-dug wells, tap, rain, community borehole and some from private water vendors. This corroborates the various sources of drinking water and water for household use as described by CDC (2020).

Efficient water supply is very vital to achieving sustainable development within the environment as water supply has link with rural livelihood system (Houweling et al., 2012).

From the availability of water in residents homes, findings revealed that 31.8% of the residents had water in their homes while 62.2% did not have water in their homes but get water for domestic use from water vendors who sells at an affordable price and sometimes, they get from their neighbours house who made provision for a Borehole.

Findings on water sources revealed that majority of residents' sources of household water was from Borehole and hand dug wells.

Also, respondents explained that water level rises during the rainy season from which they store water in larger drums and containers and get water for immediate household use from their individual hand-dug wells. Water shortages during the dry season are quite common as many of these sources dry up thereby making people to source for water from the community bore hole, water vendor, rainwater and private tanker suppliers.

The low level of access to tap water could be attributed to location and the absence of water supply infrastructures, as identified by WHO/UNICEF JMP,

(2015). Residents living in sub-urbans are benefitting more than those in the transition zones in supply of pipe-borne water.

The predominant sources of water supply in the study area is Well water 31.8% followed by borehole 25.5% and from private vendor who sells to households 15.4%. This revealed that the quantity of water consumed by individuals as well as households in the study area is minimal as there is no portable pipe borne water supply rather they have to buy and source for it from other places, these therefore indicates inadequate access to water.

More so, water storage facilities are inadequate in the study population. Majority of respondents agreed that the absence of storage facilities results in lack of water for household use. Storage facilities are indispensable to store up water to be used in the dry season in areas faced with severe water shortage.

It has been observed that non- protection of household water storage container has left most water sources polluted as confirmed by some respondents. Much of the stored water which are left unprotected may have been contaminated as illustrated by FAO (2012) and could contribute to the spread of water-related diseases such as diarrhoea, cholera, malaria, dysentery etc. (Basu et al., 2015).

7.2 Respondents Access to sanitary facilities

7.2.a. Toilet

Analysis into availability of toilets revealed that 59.1% of respondents have toilets in their homes. The results also indicate that a proportion of the total surveyed households 27.3% uses pit latrine.

As expected, respondents living in privately owned houses as well as sub-urban households 28.2% uses the modern sanitation facilities (toilets that flush to sewer systems or septic tanks) compared to household who live in transition zones(remote areas and slums) and uses shared toilet facilities and are unimproved.

A proportion of 14.6% of households still have no access to any sanitation facility thus defecating in the open, this corresponds to the Statement by Coffey

et al., (2014); Desai et al.,(2015) that majority of people in developing countries still practice open defaecation.

Some respondents claimed that though they have toilet but still practice open defaecation due to distance in accessing the facility, as one of the respondents have to further explained that when he is on his way home from his place of work and have the need to make use of the toilet considering the distance to his house, he made use of any available place to urinate or defecate depending on the urge .

Open defaecation prevalence in Nigeria has continued to increase despite the implementation of the community led total sanitation (CLTS) program (UNICEF/ WHO, 2017). According to vast majority of those interviewed, inaccessibility to a sanitation facility was not due to choose but lack of infrastructure and cost for the sanitary improvement and management.

Respondents who use shared facility, attributed lack of water supply as reasons for poor maintenance and poor utilization as explained by DFID (1998).

7.2.b. Hand washing facilities

Hygiene promotion at home, school, social, and workplaces among people is important. A significant proportion of infectious disease burden are hygiene-related that are transmitted via food, water, faecal and other waste material, hands and other dirty surfaces within the home and other settings as well as standards of hygiene, in relation to hand washing, handling of food and water, disposing of faeces and other waste materials. According to a study by Curtis and Cairncross (2003) states that; the interventions promoting the single hygiene practice of washing one's hands with soap tended to achieve greater reductions in disease than those that promoted several different behaviours.

Hygiene as defined by participants in similar terms, as an act that can lead to good health and cleanliness, such as frequent handwashing, face washing, and bathing with soap and water.

Some other respondents went beyond the definition to further highlight that Keeping hands clean is one of the most important ways to prevent contamination.

From this survey, respondents' attitude towards hygiene varied, although they are aware of its importance. While some ensure to uphold their hygiene standard, others explained their inability to access portable water as highlighted by Israel DH (2012); UNICEF/WHO, (2015).

Hand washing with soap, 27.3% and water is ideal, but hand washing with non-soap cleaning agent such as salt, ash or sand 27.3% is an improvement over not using any cleansing agent 37.3% as practiced among some household.

Some respondents living in the transition zone who were interviewed practiced hand washing with soap and water, while majority with water only.

For those who are engaged in business, as well as market women with babies explained their busy schedules and how they forget to wash their hands after use of public toilet or disposing off their baby's faeces.

7.3. Respondents Access to waste management Facilities

Focusing on household waste, reasons for its generation varied with participants highlighting numerous causes.

Findings on resident's environmental sanitation facility revealed that 60% of respondent had waste storage facilities in their homes. In other words, majority of the residents had waste bin containers for disposing waste in their homes. Some respondents revealed that they store their waste in containers with lid, and a vast majority of other respondents uses container without lids to store their waste outside their homes. Other prominent waste storage facilities in respondents' homes were sacks made from polythene and

baskets.

Information on waste disposal methods as highlighted by the residents were house to house collection by private individual waste vendors, burning, dumping on dumpsite and others (dumped in a pit, in gutters/sewer, and dumped in the open on roadside or any available free open site left unattended or not in use) some went further to explain the reasons for their actions; three out of the respondents attributed it to sometimes not having money to employ the services of private waste vendors, and two other respondents explained that they throw away their waste with the hope that whenever it rained, the rain water will wash the garbage away.

However, the practice is different among those in privately owned houses and those in Government Reserved Areas (GRAs) as the study reveals that they engage the services of waste disposal agencies.

Waste dumpsites in most towns are usually designated by the government and are usually distant from residential areas.

Also, the study revealed that rate of dumping of waste in communal waste disposal sites decreases as distance increases from residents' home.

More so, as stated by the government representative, inadequate WASH facilities are as a result of the growing population.

The high rate of dumping of waste on dumpsites as seen to be the common practice among respondents can be attributed to lack of infrastructures, low income status and lack of awareness on safe waste management.

Figure 7.1: Diagrammatic representation of the various sanitation activities using Bar graph

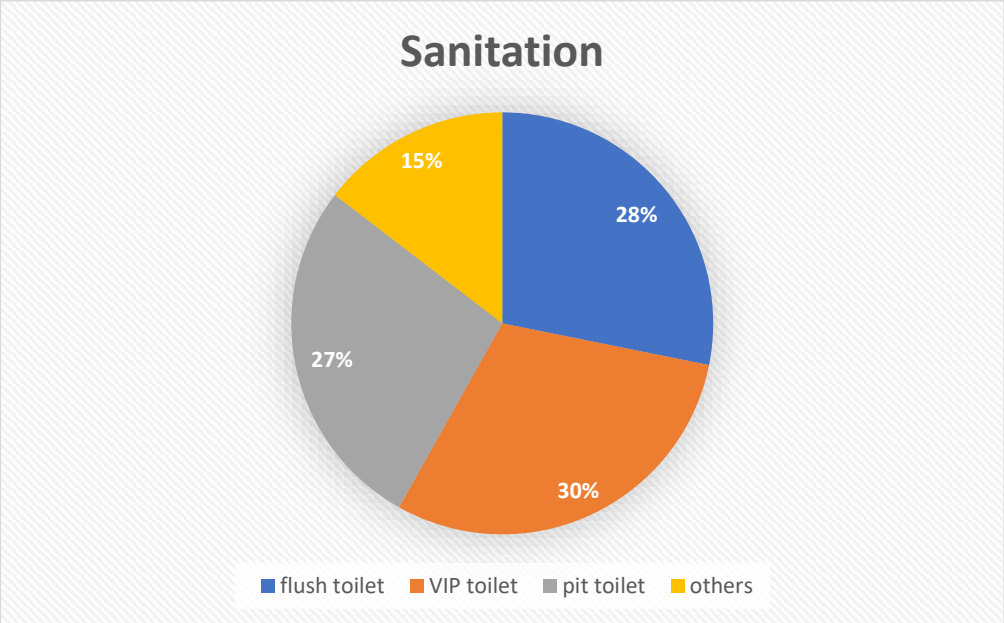


Diagram A: showing types of toilet for household use

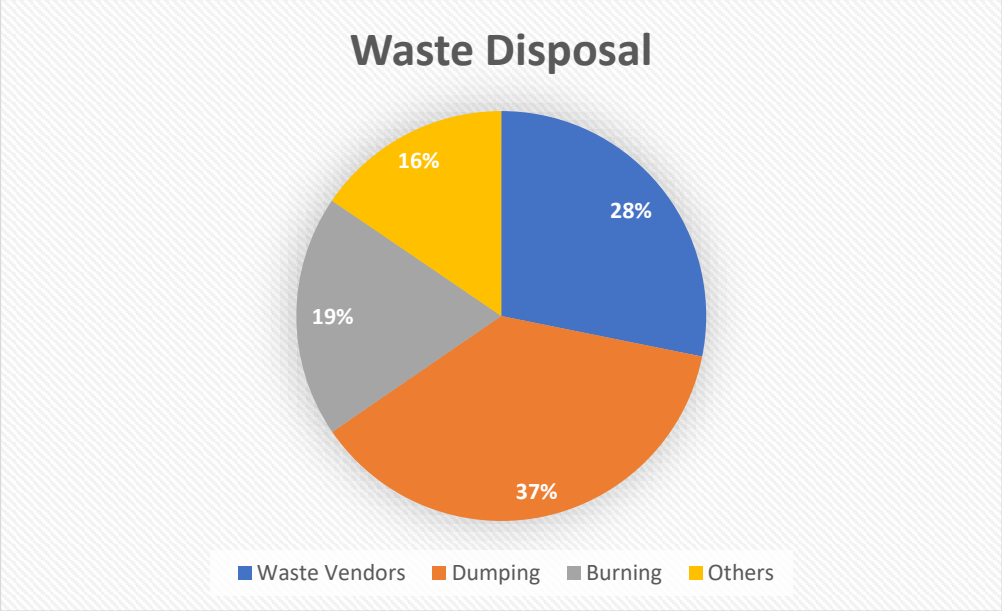


Diagram B: showing the various Waste disposal methods amongst respondents

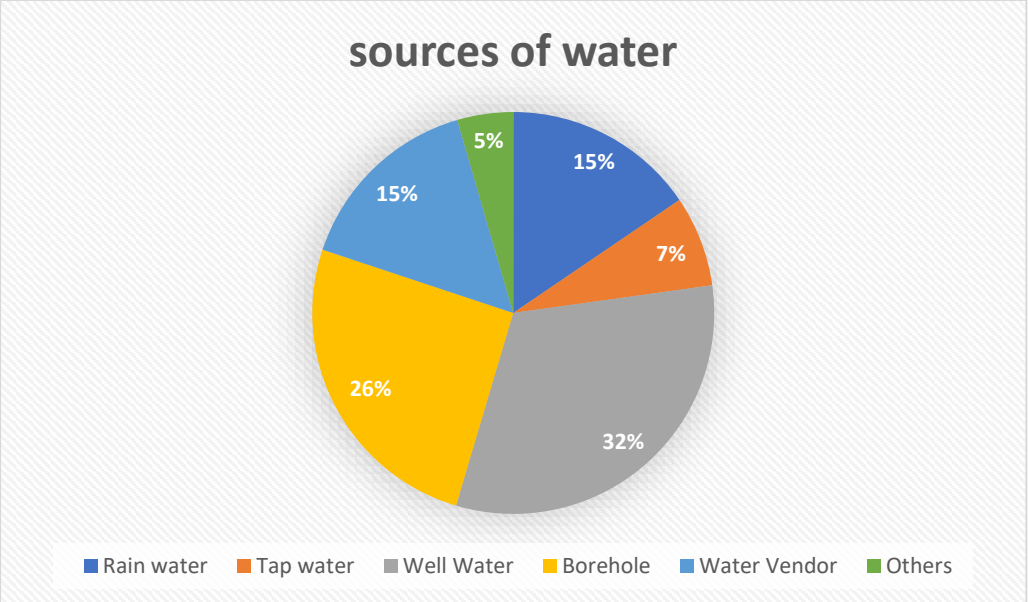


Diagram C: showing sources of Water for household use and consumption.

Diagram D: showing availability of Hand washing facility

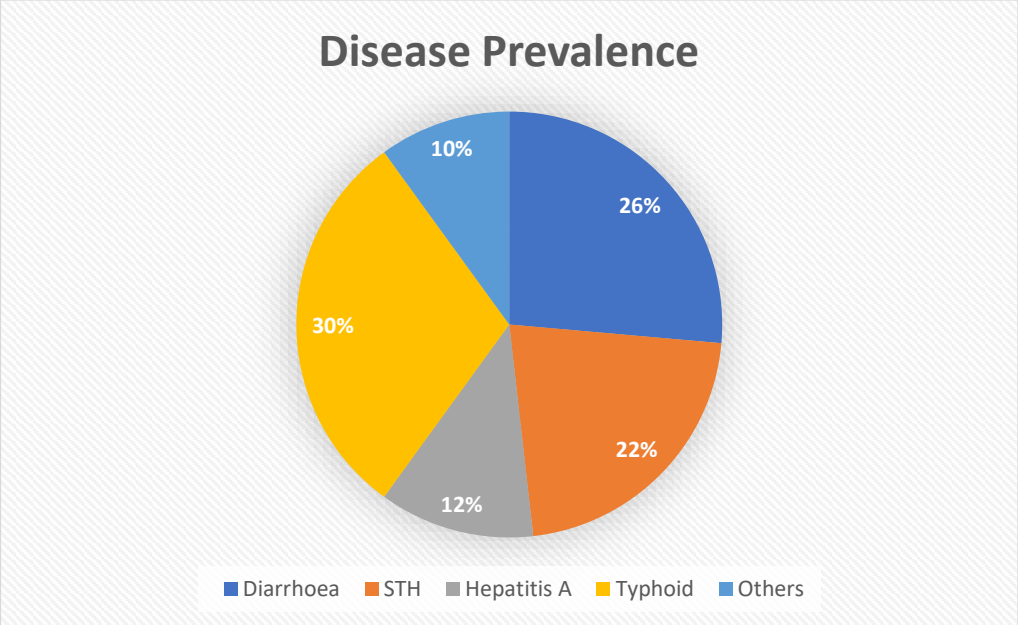


Diagram E: showing Disease Prevalence occurring in the studied population

Distribution of sanitation facilities, water supply, Hand hygiene and Disease prevalence in the study population, **(n=110**).

A) Sanitation Facilities. B) Waste Disposal. C) Sources of Water

D) Hand Washing Facility. E) Disease Prevalence.

7.4. Assessment for Sustainable Sanitation Practice

7.4.a. Assessment of Household Sanitation Practice

Solid waste management is inadequate in majority of the states in Nigeria which has resulted to illegal disposal of solid waste into storm water, drains and next to houses, on the streets, and roadsides thus making the sanitation situation worse. The solid waste is largely organic, comprising of left-over foods, roots and tubers peels, vegetable leaves and household waste, waste from small restaurants and food markets. Also included are plastics, glass, electronics and used polythene bags.

Lack of proper solid waste management is a major problem to the environment and to public health. Most of the solid waste generated in urban areas is collected centrally by individual(private) waste vendors with limited recycling or recovery of recyclable materials.

Despite campaigns on sanitation improvement by some NGOs, the low collection efficiency of waste in urban areas and slums implies that a substantial amount of solid waste remains uncollected. Which most likely results in environmental pollution and negative public health effects resulting to disease prevalence in the community.

Therefore, the issues to address are collection of the increasing volume of solid waste generated, the state of the solid waste characteristics and the treatment and disposal/reuse methods.

Figure 7.2: Scenes from Solid waste disposal in some states in Nigeria.

Dumpsite on a street in Jos, plateau state.

Source: Authors field note

Refuse dump along the road in Owerri, Imo state

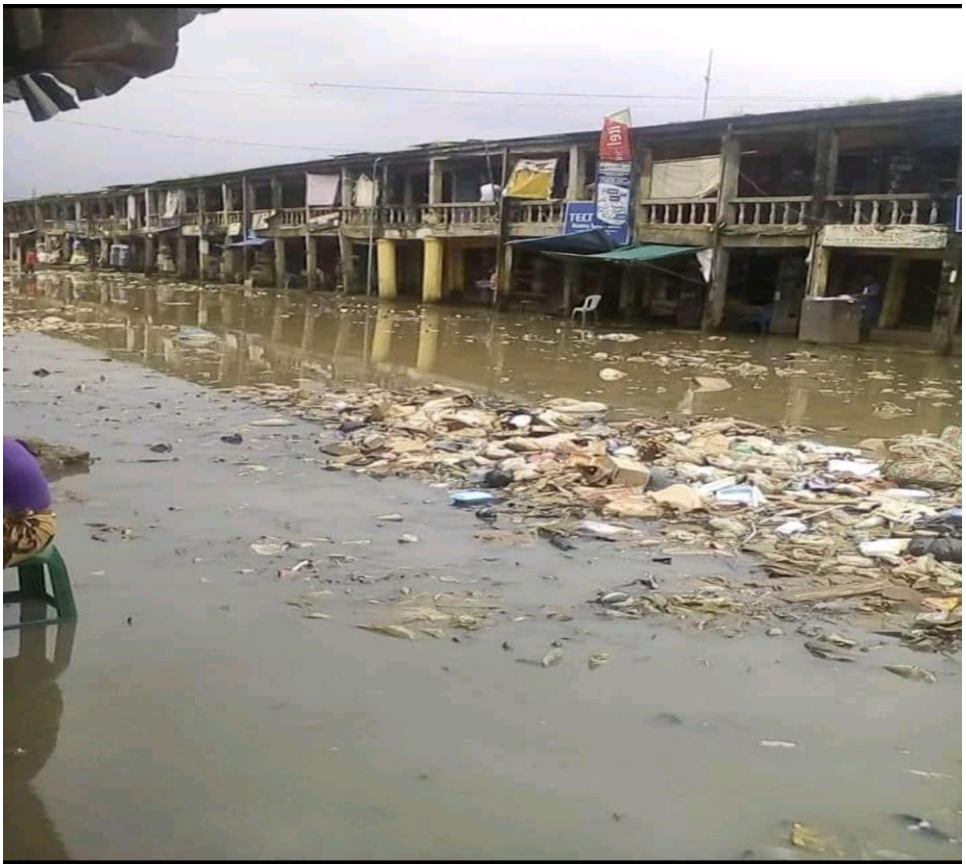
Source: The Premiumtimes.ng (2019)

A Dumpsite on a commercial area/transport park around Maraban Nyanya

Source: Authors Field note

A Residential/commercial area in Lagos.

Source: The Premiumtimes.ng (2019)



Residential/Business Area in Abia state

Source: Premiumtimes.ng (2019)

7.4.b. Assessment of Household water supply

Water is at the core of sustainable development and as such it is as important as providing a sanitation facility to ensure a safe water supply for socio-economic development.

Most residents do not have access to piped water from public standpipes.

There are also a number of water vendors who sell water at an exorbitant price resulting to a number of households as well as slum dwellers who cannot afford this cost to resort to obtaining water for domestic use from nearby protected and unprotected water sources and open shallow wells.

In some states and among some residents, there are infrastructures in place but without water supply to residents homes, resulting in lack of access to piped

water used for domestic consumption such as drinking, bathing, washing hands and for systems such as flush toilets connected to septic tanks.

With the low level of water supply services, household sanitation practice will be limited.

7.4.c. Assessment on Disease prevalence among household

The idea posed by WHO (2017) that a significant amount of disease could be prevented through access to adequate sanitation services, safe water supply and better hygiene practice was apparent in the study as participants identified the importance of sanitation on health.

Diseases prevalent in the community resulting from poor sanitation practice, unsafe water and poor hygiene which the respondents stated included and not limited to; Typhoid fever, malaria, diarrhoea, cholera, intestinal worm infestation, urinary tract infection, Hepatitis and Lassa fever which they described to be a burden to them as stated in a recent review by Coker et.al (2002).

Most participants that were interviewed went further to explain the recurrence of the disease after treatment. The disease burden in the community is seen to affect both children and adults as a result of poor sanitation practice in most communities, and as further illustrated by Nath KJ (2003).

Prevalent disease among the female respondents are recurrent urinary tract infections resulting from poor personal hygiene, this is in line with the idea posed by Bapat M, and Agarwal I,(2003) that poor menstrual hygiene can lead to increased health problems such as vaginal infections and infertility. Some people may also suffer from incontinence resulting from urine retention due to lack of access to latrines. Acute urinary retention is seen to be a potentially life-threatening medical condition that requires emergency treatment.

Malaria, worm infestation and diarrhoea affects majority of the population as stated by the participants and can be seen from the analysis illustrated by water Aid(2009) that Up to two thirds of all school children in some African countries are infected with parasitic worms and diarrhoea which exacerbates malnutrition resulting in stunted growth.

Some of the participants explained how they frequently visit the pharmacy stores in order to buy drugs to treat either malaria, typhoid and/ or diarrhoea.

And from the interview, some respondents further explained how they resulted to ingesting native herbal drinks to treat some diseases since they are unable to seek medical treatment in the hospitals due to cost.

Lassa fever has been prevalent in Nigeria and recently there has been 1046 confirmed cases and 218 deaths across 27 states in the country (NCDC 2020). Some respondents also confirmed to cases in their community. According to WHO, (2020), transmission to humans are through contact with food or household items contaminated with rodent urine or faeces, and prevention relies on promoting good "community hygiene" to discourage rodents from entering homes, disposing of garbage far from the home and maintaining clean households.

However, from the quantitative and qualitative Assessment, it can be deduced that barriers to accessing Sanitation and hygiene was due to;

- Limited knowledge and education of the importance of good hygiene and proper use of sanitation facilities. Households did not understand the importance of accessing basic sanitation and hygiene, and therefore were not motivated to do so.
- Low households' income/ poverty,
- The available and existing infrastructures are weak and not designed to contain the exploding population,
- Sanitation awareness and literacy of majority of households in remote and junky areas is low,
- There are Gaps in institutional capacity at local government level,
- There is a disproportion of expanding population to infrastructure,
- There is limited/slow implementation of national policies at federal level and there is a slow pace of translating policies into actions,
- Inadequate data for planning and needs assessments,
- Poor town planning and requisite drainage systems resulting from weak environmental laws,
- Funds provided under the federal and state budgets are not used effectively because of corruption and mismanagement.

- There is low access to health facilities due to financial constraint and ignorance and as a result, household members resolved to self-medication by patronising drug vendors and herbalist which of course may affect their health.
- There is under reporting and lack of documentation since most household resolved to self-medication, therefore data on the exact figures on disease prevalence in the community and states may be low.

7.5. Interventions to Promote Sustainable Sanitation practice

Successful public health interventions therefore are those that concentrate on improving human environment, and it is a task that can be achievable by both the health and environmental sector. The Interventions should include;

- Education and raising more awareness,
- Institutional strengthening,
- Capacity building and training of government staff in the required sectors,
- Focus and implementation on WASH in schools and other institutions,
- Promoting enabling environment for improved participation of private sector,
- Provision of adequate data for planning and needs assessments,
- Promotion of enabling environment for improved participation of NGOs and private sector.

The public have both a right and an obligation to participate in the implementation of sustainable sanitation practice.

Public participation and awareness are very vital in any campaign, with regards to the reduction of waste, collection and management.

Public participation, however, can be difficult to achieve due to lack of awareness of the public's rights and of the public authorities' obligations, as well as the lack of national legal frameworks and cross-sectoral cooperation. It was observed that there is little or no awareness of good hygiene practices and its importance in reducing the spread of disease. However, it is often the case

that even when people do have knowledge of good hygiene behaviour, they may lack either soap, safe water and/or washing facilities they need to make positive changes to protect themselves and their community.

Household construction of toilets will not make much Impact in improving sustainable sanitation – sanitation must be supported by elementary health education. Most people, particularly those from lower socio-economic groups, are not aware of the health and environmental benefits of improved sanitation.
General awareness and community involvement in social programmes will enable the development of self-reliance and confidence in the community resulting in sustainable benefits.
Education should revolve around the central idea of education for sustainable development since having a good framework in place, is an essential component in a nations effort to achieve sustainability (Briguglio and Pace, 2004; Arbuthnott,2008).
Incorporating sustainable practice in school curriculums is considered as an essential component for a holistic education and can be embedded in different learning areas. By increasing awareness and knowledge about sanitation.

7.6. Limitations, Conclusions and Recommendation for Future Research

Several limitations to any study exist, limitations originate from the sample size of the number of households. The sample selection process is a potential source of bias since the sample size for this study was just over 130 individuals and therefore, a larger sample is necessary to obtain more general insights and conclusions. Moreover, the sample was taken from a few households in the transition zone.

Participants who responded to the questionnaire were also not evenly spread amongst all demographic parameters.

During the qualitative analysis phase, limitations arose due to the lack of availability and readiness of some participants, hence not allowing for a perfect representation of interviewees spread across all demographic parameters such as age, household size and place of residence.

Another limitation of this study is that information regarding availability and characteristics of sanitation facilities at the local schools and working environments were not obtained, and regarding disease prevalence, only a few were selected among the many sanitation and water related disease. Therefore, the results are approximate to the issue of the effect of sanitation and hygiene on the prevalence of typhoid, diarrhoea and soil transmitted helminth infection that needs to be further studied.

Also, worth mentioning is the fact that the results obtained in this study were based on truth and realities derived from a sample of households through both qualitative and quantitative methods. Conclusions and salient points could have been influenced by the norms and values that shaped the respondents of this survey.

It is worth pointing out that every study has its confounding variables and limitations. Confounding effect cannot be completely avoided, Coupled with this is the fact that research itself is always slightly tainted by the role and bias of the researcher who is ultimately directly responsible for all the data, its collection and interpretation (Gardenier JS, Resnik DB,2002).

Bittner(2003), states that there are no facts but only interpretations, since it is the researcher who has the power of being selective in the methodology that will produce results, the actual results that are presented and the conclusions that are drawn for that particular research.

Chapter 8:

Conclusion and Recommendation

8.1. CONCLUSION

Sustainability is a challenge for both WASH behaviours such as proper waste disposal and handwashing with soap, as well as WASH infrastructure. Increasingly, evidence has become available on the extent to which services are not sustained. Achieving full sanitation coverage is minimal in low-income informal settlements in Nigeria.

The existing sanitation systems in major states are unsustainable and are largely unimproved, which lead to ground water pollution and unhygienic conditions. In addition, most residents do not benefit from solid waste services provided by the government due to limited access and low levels of affordability.

Access to improved water and sanitation continue to be a challenge in Nigeria.

This assessment can be used to identify the needs for improvements in sanitation and hygiene, and decide which improvements are the most important. Therefore, making these assessments is important in improving sanitation practice which in turn will improve population health.

To adequately address equity considerations in sustainable sanitation systems, there is a need to understand where the poor live and what their levels of access are. Disaggregated data on the underserved—including slum populations, ethnic groups, women, elderly, and persons with disabilities can also support prioritization. Therefore, reliable data is needed to ensure that interventions properly target populations (especially in slum areas and among disadvantaged groups as well as those internally displaced individuals in IDPs camps and bring about the desired changes).

More so, Sanitation awareness and literacy of citizens in remote and junky areas should be considered and acted upon.

Waste generation increases with population expansion and economic development. Given the continuing rate of rural-urban migration, a better understanding is needed on which Sanitation interventions work in slum areas and low-income neighbourhoods.

The volume of waste generated however does not actually constitute major environmental problems. In reality, what constitute major environmental problem is the inability of governments, individuals and waste disposal agencies to keep up with the task of proper and efficient management of waste. Improperly managed solid waste poses a risk to human health and the environment. Uncontrolled dumping and improper waste handling cause a variety of problems, including contaminating water, attracting insects and rodents, and

increasing flooding due to blocked drainage canals or gullies. In addition, it may result in safety hazards from fires or explosions. Improper waste management also increases greenhouse gas (GHG) emissions, which contribute to climate change.

More so, solid waste has been identified as a primary source of greenhouse gases (GHGs), not only by its relation to production and consumption, but also because of the production of methane (CH4) when disposed in dumps or even in landfills.

it can be concluded that, place of residence, gender, educational attainment, household size and income can be used to explain variance in residents' environmental sanitation practices within residential zones in most cities.

There are poor environmental sanitation practices among residents in terms of utilization of the available environmental sanitation facilities. An instance is the disposal of solid waste in a manner that is not environmentally friendly.

To achieve improved sanitation and hygiene across communities, it is important that authorities act at different levels in addressing gaps in governance, surveillance and implementation by developing tools to improve sanitation in the country.

8.2. Recommendations

In order to fill the overarching gap and promote sustainable solid waste management in Nigeria, the Federal Ministry of Environment should embark on intervention programmes to assist the state and local governments manage their municipal solid waste in an environmentally sound and sustainable manner.

Privatised waste systems should be explored, there should be private sector participation i.e., public private partnership in waste management which can lead to Job creation through waste collection and disposal on a small, medium to large scale basis and in the process reduce waste in the surrounding environment.

In the case of solid waste dumping, inadequate drainage system maintenance and open defecation, public education on its effect should go hand in hand with the provision of adequate sanitary facilities in rural and urban areas.

Pro-environmental sanitation practices depend on effective environmental literacy. Thus, campaign to raise public awareness about environmental sanitation is essential in achieving success in environmental issues.

communal cleaning days should be re-introduced and observed in both rural and urban areas.

Building and construction laws should be amended to mandate the inclusion of improved toilet, sanitary and handwashing facilities in residential and commercial buildings.

Residents should provide household environmental sanitation facilities while the government and Community Based Organizations (CBOs) should provide community environmental sanitation facilities and services. Self-help projects to build wholesome and affordable toilet facilities should also be encouraged.
Community Based Organisations (CBOs), NGOs and the Government should engage in environmental regulation.

There should be reviews on water, sanitation and health policy; the federal ministries (water resources and Environment) need to consider the development of a nationwide rural WASH policy to be implemented at state levels. This would further support the enhancement of an enabling environment to facilitate accelerated progress towards achieving SDG 6 in Nigeria.

Above all, there should be full involvement of the health sector in sanitation. The health sector has a great role for motivation in improving sanitation, and much strength to contribute to achieving the goal of access to adequate and equitable sanitation and hygiene for all.

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Acronyms and Abbreviations

AIDS: Acquired Immune Deficiency Syndrome

CBO: Community Based Organisation

CDC: Centre for Disease Control

CLTS: Community Led Total Sanitation

DALY: Disability Adjusted Life Years

FGN: Federal Government of Nigeria

FRN: Federal Republic of Nigeria

GHG: Green House Gas

GHO: Global Health Observatory

GRA's: Government Reserved Area's

HIV: Human Immunodeficiency Virus

IDPs: Internally Displaced Person's

JMP: Joint Monitoring Programme

LAWMA: Lagos State Waste Management Authority

NCDC: Nigeria Centre for Disease Control

NESREA: National Environmental standard Regulation Enforcement Agency

OSWMA: Ondo State Waste Management Agency

STH: Soil Transmitted Helminths

UN: United Nations

UNICEF: United Nation International Children Emergency fund

WASH: Water, Sanitation and Health

WHO: World Health Organisation

Appendices

Appendix I:

Questionnaire

Assessment of sustainable sanitation and Health issues in Nigeria: Trends on Diarrhoea, Typhoid and Soil transmitted Helminths.

Information Sheet – Questionnaire

Dear Sir/Madam,

My name is Victoria Emanche, I am currently enrolled and studying For a Master`s Degree in Public Health at the Hochschule für Angewandte Wissenschaften (HAW) Hamburg. My dissertation is titled; Assessment of Sustainable Sanitation and Health Issues in Nigeria: Trends on Diarrhoea, Typhoid and Soil transmitted Helminths and will involve the use of questionnaires and Interviews.

The responses gathered will help me understand the various attitudes, knowledge and behaviours of individuals on sanitation practice and the disease prevalence resulting from its effect. In this way, various factors influencing unsanitary practice can be identified and recommendations to address sanitation policies can be made.

Filling this questionnaire may take approximately 10-15Minutes or thereabout of your time.

I may be contacted with any queries or comments regarding this survey via email on [redacted]

Thank you for your time and best regards,

Victoria Emanche.

Questionnaire for Quantitative survey on:

Assessment of sustainable sanitation practice among residents in Nigeria

Part 1: Socio-Economic Characteristics of Interviewee

S/No	Questions	Alternatives	N/A	Code
001	Age	a) Below 20 b) 21-39 c) 40-65 d) Above 65		MN 001
002	Gender	a) Male b) Female		BD 002
003	Educational status	a) Primary b) Secondary c) Tertiary d) Others; please specify		SR 003
004	Occupation	a) student b) Housewife c)Self employed d)Civil servant e) Others; specify		NC 004
005	Place of Residence in Nigeria	a) Suburban b) Transition zone(underdeveloped)		DD 005
006	Marital status	a) single b) Married c) Others; please specify		TM 006
007	Household size	a) 1-3 b) 4-7 c) 7 and above		YL 007
008	Type of residential building	a) Maisonette b) flat/Apartment c) A Compound house(shared) d) Others; specify		HP 008
009	Monthly income level (in Nigerian Naira #)	a) below 30,000 b) 31,000-60,000 c) Above 60,000		AK 009

PART II: Household Questionnaire to assess Environmental facilities, Sanitation Knowledge, Practice and Disease prevalence

S/N	Questions	Alternative	N/A	Code
010	Do you know about sanitation?	a) Yes b) No		TD 010
011	What is your main source of information regarding waste management?	a) Internet b) Newspaper c) Television d) Radio e) Others……..		AW 011
012	How would you rate waste management in Nigeria?	a) Well managed b) Fairly managed c) Not properly managed d) Others……..		TE 012
013	Are there waste disposal facilities in your vicinity?	a) Yes b) No		MM 013
014	What medium is available for waste storage?	a) Bin bags b) container with lid c) container without lid d) waste basket e) others		WQ 014
015	Do you manage your waste individually or collectively?	Please specify …….		IE 015
016	How frequently is solid waste collected from outside your house?	a) collected once every week b) collected every two weeks c) we handle it ourselves by……		HD 016
017	How do you dispose your waste?	a) waste vendors b) Dumping on dump sites c)Burning d) Others; specify		XX 017
018	What is your source of water supply?	a) Rainwater b) Tap water c)well water d)Borehole		PS 018

		e) water vendor d) Others; specify		
019	Do you have toilet?	a) Yes b) No		MQ 019
020	If yes, for Q 019 what type of toilet do you have?	a) Pit latrine b) Water closet/flush System c) VIP d) Others; specify		AX 020
021	Do you share toilet with others who are not members of your household?	a) Yes b) No		ZB 021
022	Are there drainage facilities	a) Yes b) No		OB 022
023	Are there sewage water around your house or surroundings?	a) Yes b) No		FN 023
024	If Yes, for Q 023 why is it so and how do you manage it?	Please briefly explain		TM 024
025	Do you wash your hands after using the toilet or when soiled?	a) Yes b) No		BV 025
026	If Yes, for Q 025 what do you use to wash your hands?	a) Soap base b) Liquid handwash c) None d) Others		RT 026
027	If No, for Q025 Why?	Please explain …….		SK 027
028	Is there any community sanitation program?	a) Yes b) No		VM 028
029	Is there any penalty for offenders who practice unsafe sanitary activities?	a) Yes b) No		RK 029

030	Has anyone in your household or neighbourhood had diarrheal in the past 3weeks?	a) Yes b) No c) Does not apply		SL 030
031	Has there been any disease prevalence in the community?	a) Yes b) No		QT 031
032	If Yes, for Q 031 Kindly Indicate?	a) Diarrhoea b) Cholera c) Malaria d) Hepatitis A e) Typhoid f) Others		HI 032

Appendix II:

Interviews

Part A: Household interview on Sustainable sanitation Practice and Health issues in Nigeria: Trend on Diarrhoea, Typhoid and Soil Transmitted Helminths infection

A. Basic information

Age……

Place of residence (Location) …….

Educational level…….

Occupation……

Number of persons in household…….

B. Environmental sanitation characteristics of Household

1. Can you please briefly explain your understanding of Environmental sanitation?

2. What is your source of water supply?

3. What is the primary source of drinking water for your household?

4. How do you collect and store water for your household use, do you make use of a container or other storage items?

5. Is the container protected?

6. Do you treat water before drinking?

7. If yes, how do you usually treat your drinking water?

8. Do you have access to a toilet?

9. What type of toilet do you have?

10. Do you share the toilet or other sanitary facilities like bathroom? If yes, how many households make use of the sanitary facility?

11. Do you have any problems with the toilet?

12. Is there any hand washing facility?

13. Do you and other members of your household have soap for handwashing?

14. Do you face any challenges in accessing soap, if yes, what are the challenges?

C. Household waste management practice

15. What is your main source of information regarding waste management?

16. How would you rate waste management in Nigeria?

17. Do you manage your waste as an individual or collectively as a community?

18. Where do you or other members of your household dispose your waste?

19. Are you satisfied with the solid waste management system in your area/community?

20. Is there wastewater around your house? If yes, why is it so and how do you manage it?

21. How is the drainage system in your community?

22. Is there any community sanitation program? If yes, how is it conducted and how often is it done?

23. Is there a penalty for offenders of inappropriate waste disposal?

4. On Disease prevalence in the community

24. Has anyone in your household or neighbourhood had diarrhoea or reported sick in the last three weeks?

25. is there been any recurring disease recently or the in past in your community? If yes, can you please discuss about it?

Thank you very much for your time and attention.

Part B: Organisational interview

Part l: Basic information

Name of Respondent ……

Gender ……

Educational level …….

Occupation …….

Institution……..

Position …….

Location……

Part ll: Organisational structure and activities

1. Are you familiar with the term "Sustainability", what does it mean?
2. As an organisation, what are your key objectives to "Health for All" irrespective of socio- economic status?
3. Can you briefly explain in your own terms your understanding of sanitation?
4. What is your perception on the state of the Environment in relation to waste management?
5. Are there sanitation programs and/or activities enforced by your organisation?
6. Are there provisions for waste collection and transportation?
7. Are Municipal refuse container available for waste collection?
8. How do you treat, manage sewage water?
9. Are provisions made for portable water supply?
10. Are there available sanitary facilities (including hand washing) in schools and other organisations?

11. How convenient are the facilities? Do they provide the necessary access, privacy and preserve dignity?

12. Are there penalties set for improper refuse disposal that threatens the health of the population?
13. What awareness, network or campaign does your organisation have in place to enlighten the population of better sanitation practices?
14. Does your organisation engage in field work to monitor and regulate activities relating to improper waste disposal?
15. Do you incorporate environmental health practice and education at your colleges and/or universities?
16. Does your organisation invest in Research projects aimed at health education and promotion?
17. Is there a form of collaboration with other ministries and agencies to promote better sanitation practice for better health?
18. Is there disease prevalence linked to poor sanitation, and what effort is your organisation doing to reduce the spread?

19. Does your organisation make reviews, and are there standard tools for checking and rating your organisational performance towards attaining set goals for health promotion and disease prevention?
20. Are there effective policies to address sustainable environmental Practice?

    Thank you for your time and attention.