CHAPTER ONE
INTRODUCTION

1.1 Overview

The sustainability of water, sanitation and hygiene intervention forms one of the Sustainable Development Goals (SDG) targets that stand as important issues that cannot be overlooked but rather focused on in countries around the world. Most developing countries around the globe, Nigeria inclusive faces problems with the supply of quality water, good sanitation and adequate hygienic practices which poses high risk to healthy living by the people. One of the major challenges confronting Nigeria as a developing country is the issue of sustainability in tackling the menace.

However, there are there is cogent need for sustainability of water, sanitation and hygiene intervention to be addressed so there could be sanity and the overall health of the people both young and old across the country can get better and the nation's economy could as a result become better. The overall aim of this project is to examine sustainability of water, sanitation and hygiene intervention in the North East of Nigeria; to help reduce the occurrence of health challenges and mortality caused by intake of contaminated water, inadequate sanitation and poor hygiene across the country to an outstanding level which should eventually lead to sustainability. To validate and authenticate this study for a better generalization as regards the phenomenon, primary data would be substantially explored. This study will focus on the North East part in Nigeria as a study and comparison of developing countries.

1.2 Background to the Study

Water, sanitation and hygiene forms part of the basic needs of human in any nation, serving the purpose of enhancing people's quality of life. Water, sanitation and hygiene bears huge significance to the people and cannot be ignored in ensuring his safety, health and comfort; a necessity for the existence of man. According to Muta'aHellandendu, (2012), water, sanitation and hygiene are of supreme importance to man and constitutes a vital component of man's welfare, life sustenance and survival. Access to appropriate water, sanitation and hygiene therefore is a fundamental human need which is essential for individual, family and community wellbeing, improving their standard of living as advocated by the Millennium Development Goal (MDG) target (Aremu, 2013). The need for water, sanitation and hygiene by the people of the

country has always necessitate that sustainability been imbibed as a concept that ensure consistent and improved intervention in the supply of safe water, adequate sanitation and proper hygiene. Been part of the most important basic needs of mankind that impacts on man's health, wellbeing, productivity and consequently economic growth; water, sanitation and hygiene has always drawn attention.

According to Szinnai, Schachinger, Arnaud, Linder, and Keller (2005), sustainability of water is often undertaken to ensure the provision of sufficient and safe supply of water, made accessible by the people within a jurisdiction, absorbing the relative issues of increased need for safe and clean water by the population. WHO and UNCF (2000) pointed out that water forms an essential requirement by human which impact on his existence and standard of living per time. Howard and Bartram (2003) added that it is the fundamental right of every human to have unrestricted access to clean and safe water for use at any time required; thereby living healthy and free from diseases. The need for water is embedded in the maintenance of human health, survival and growth. Beyond access to water, quality of water in terms of been clean and safe for use; is what gives value to water and makes it useful to human when used; beneficial to their health, safety and well being. According to WHO, (2010) water becomes useful when it is clean, free from contamination, pollution, chemicals and dirt; also water becomes unsafe for use by human when it is not clean while survival becomes impossible for human in the absence of clean water for use.

Sanitation however forms an added basic requirement that informs on the health and wellbeing of the people generally. As indicated by Mtwalib, (2009) access to clean and safe water can only be achievable when due attention is paid to sanitation. Sanitation occupies a significant place in ensuring access to clean and safe water and influences on the health and wellbeing of human. WHO and UNICEF, (2012) portrayed sanitation as the measures put in place to ensure proper disposal of human waste (sewage and/or dirt) in a way that poses no threat to human wellbeing, and ensuring a clean and tidy environment. However, implementing a sustainable sanitation plan requires that certain facilities be put in place to drive the notion. According to Hutton and Haller (2004), sanitation facilities are facilities dedicated to the management collection and transport of waste product such as faeces and urine from human for the safe disposal; thereby avoiding human contact.

The prevalent environmental situation in developing countries such as Nigeria, has consistently require the establishment and implementation of effective sanitation measures and programmes to be able to absorb the gravity of waste (feaces and dirts) been generated and disposed on daily basis and from time to time. This approach towards sustainability of water sanitation therefore necessitates the integration of appropriate channels in instilling efficiency and effectiveness in disposal of waste all across the country; thereby guiding against unnecessary contamination and pollution of water that renders it dangerous to human health. The essentiality of sanitation cannot be quantified in terms of the potential impact it could make on water for the safe use of human. Adukia (2013) identified that sanitation has a dynamic way of ensuring a prompt and efficient way of disposing waste in a way that fully align with environmental sustainability. Poor sanitation therefore bears a huge consequence on human health with resultant effect been such health issue as diarrhea, cholera, trachoma and more (Mensah, 2002).

The efficacy of clean, safe water and adequate sanitation notwithstanding, one important concept that bears the paucity to prevent human from contacting diseases and/or infection through the use of water, is hygiene. Fewtrell, Kaufmann, Kay, Enanoria, Haller, and Col-ford (2005) defined hygiene as the act engage in by human, as a way of maintaining cleanliness with the intent to mitigate the spread of diseases. As posited by Bartram and Cairncross, (2010) the move towards sustainability of water sanitation requires proper and rigorous hygiene to be continually imbibed by the people, for the underlying goal of health and wellbeing to be realized in any human setting. The prevalence of hygiene safeguards people from the spread of infection, disease and keep people especially the young ones safe from germs. The need for hygiene to be prioritized cannot be overemphasized in ensuring the safety of human generally. Garn et al., (2017) opined that sustainability of water and sanitation becomes achievable when integrated with the practice of hygiene by the people at large.

In the North Eastern part of Nigeria, the essential of sustainability of water, sanitation and hygiene is such that has increasingly drawn attention, going by the prevalence of the pathetic situation the people in the said region are been subjected to. Ajao, Obafemi and Ewumi, (2011) described the situation in the North East of Nigeria such that requires intervention pertaining to the state of the water in use, the sanitation which bothers on the environment and the need for hygiene by the people who resides therein. It is highly needful that the water, sanitation and

hygiene move be extensively extended towards the North Eastern part of Nigeria thereby ensuring the wellbeing of both young and old people who are living in the region; contributing to their existence, wellbeing and longevity. Waddington, Snilstveit, White, Fewtrell (2009) emphasized the essential need for sustainable water, sanitation and hygiene intervention in ensuring the wellbeing of the dwellers.

With the use of the right sustainability practices through the integration of a systematic and sustainable clean water, sanitation and hygiene intervention in the North East f Nigeria, which is highly fundamental to human health, safety, wellbeing, comfort and also social and economic development; a significant level of rescue from health issues such as diarrhea, cholera, and other water borne diseases and infection would have been accomplished. With growing number of water borne disease and infection cases in the North East of Nigeria, and the prevalent deterioration of the environment and poor standard of living of the people. It therefore becomes important to incorporate sustainability of water, sanitation and hygiene throughout the life-cycle. Currently, available literature is still lagging behind the efforts of emphasizing on the concept of sustainability in the intervention approach that bothers on the water supply, sanitation and hygiene with focus on the North East of Nigeria. The purpose of this study therefore is to examine the sustainability of water, sanitation and hygiene interventions in north east of Nigeria. This study therefore bridges the gap.

1.2 Statement of the Research Problem

Water, sanitation and hygiene are essential elements required for the survival humans across the globe. Hence, the need for clean water safe for human consumption/use, well sanitized environment and proper hygienic practices cannot be undermined in fostering health and safety for human. However, as evidence by the situation prevalent in the north east of Nigeria, poor attention has been channeled to the need for sustainable water, sanitation and hygiene intervention. In Nigeria, access to clean and safe water is critically low, beyond the reach of many; sanitation facilities are not in use by many while a few who have access share the facilities; there is yet the practice of open defecation (WHO and UNICEF, 2013). Most of the communities in the North East of Nigeria are in their highest level of deplorable state, evidenced by the extent of decadence in water been consumed and used by both young and adult; the poor environment where people live in and the poor hygienic practices imbibed by the people.

Lack of access to clean and safe water, inadequate provision of sanitation facilities that allows for indiscriminate disposal of waste of all types, and poor hygienic measures have always bear its consequences on human health mostly children underage, serving as one of the primary causes of high mortality rate. Montgomery and Elimelech, (2007) indicated that shortfall in ensuring proper sanitation measures and facilities bring about the prevalence of contamination in varied forms, and contributes to the spread of diseases and undue exposure to infections that poses risk to human health in developing countries around the world. Poor access to safe and drinkable water denies the people of their right to healthy living exposing them to contaminations that spurs health challenge and can fast track mortality rate or lead to stunted growth.

Brown, Cairncross, and Ensink (2013) emphasized that contaminated water been consumed and used by the people; poor sanitation and disregard for hygienic practices are the major factors contributing to stunted growth of children and can also result in malnutrition in children. Lack of water quality, inadequacy of sanitation and proper hygiene therefore serves as issues exposing the people in the North East of Nigeria to poor healthy living. Sewage contamination of water been used for drinking, cooking, bathing, washing are direct disease transmission routes that calls for attention in the need for sustainability of water sanitation and hygiene intervention in the North east of Nigeria's one of the millennium goals on human health and survival. Against this background forms the basis of the study. It is on this premise that the study examines sustainability of water, sanitation and hygiene interventions in north east of Nigeria.

1.3 Aim and Objectives of the Study

The aim of this study is sustainability of water, sanitation and hygiene interventions in North East of Nigeria.

To achieve this aim, the following specific objectives of the study are as investigated;

1. To investigate the situation of water, sanitation and hygiene in North East of Nigeria
2. To identify different kind of water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria
3. To assess the people perceptions towards water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria
4. To examine the impact of water, sanitation and hygiene interventions programme on the people wellbeing in North East of Nigeria

5. To identify factors that affects the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria
6. To identify ways to mitigate the factors that affects the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria

1.4 Research Questions

The research questions for this study are as follows:

1. What is the situation of water, sanitation and hygiene in North East of Nigeria?
2. What is the different kind of water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria?
3. What are the people perceptions towards water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria?
4. What is the impact of water, sanitation and hygiene interventions programme on the people wellbeing in North East of Nigeria?
5. What are factors that affect the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria?
6. What are ways to mitigate the factors that affects the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria?

1.5 Research Hypothesis

Hypothesis 1

H_0: There is no significant difference in the perceptions towards water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria

H_1: There is a significant difference in the perceptions towards water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria

Hypothesis 2

H_0: There is no significant impact of water, sanitation and hygiene interventions programme on the people wellbeing in North East of Nigeria

H_1: There is a significant impact of water, sanitation and hygiene interventions programme on the people wellbeing in North East of Nigeria

1.6 Justification of the study

This study is such a sensitive one that looked into such areas of sustainability of water, sanitation and hygiene intervention as regards the people living in the North East of Nigeria and the need to consistently mitigate the use of contaminated water, inadequate sanitation and poor hygiene in respect of their wellbeing, health and safety in the country. The outcome of this study therefore will be of great benefit to policy makers, the government, stakeholders at the helms of decision making and intervention and others who would be well served with the information water, sanitation and hygiene effect. The study is able to establish the fact that contaminated water, poor sanitation and poor hygiene are threats to the human healthy living, thereby sensitizing the public and all stakeholders on the effect of continuous intake of contaminated water, poor sanitation and hygienic practices to the people and also the nation at large.

The study also enlightened the public along sides the people living in the North East of Nigeria on the efficacy of proper sanitation and good hygiene practices as measures to proffering solution to the menace of spread of diseases and infection among the young and old in the study area in the country. By this study, stakeholders are better enlightened on the need for sustainability of water, sanitation and hygiene intervention to curbing the menace of water borne diseases and infections been suffered by the people in the study area and its socio economic effect. Moreover, relevant stakeholders furnished with the result of this study can predict the possibility of healthy living, and eradication of spread of infection among the people at any point in time and be able to determine the extent of intervention yet neededin water quality, adequate supply of sanitation facilities, and level of hygiene embraced by the people; given current trend of events and taking necessary proactive steps channel towards sustainability. The study is also a way of contributing to the existing literature, with the academic sector standing to benefit immensely from the study as an added knowledge.

1.7 Rationale of the Study

Water, sanitation and hygiene is become a critical concept that cannot be ignored in the day to day living and activities of the people; forming a necessity for man's existence and considered a vital human need. It impacts the life of individuals and the nation; a great importance is therefore ascribed to the role sustainability of water, sanitation and hygiene plays in creating human comfort.

Water, sanitation and hygiene been fundamental human right which is essential for individual, family and community wellbeing, there is always the need to safeguard the quality of water, provide adequate sanitation and ensure proper hygiene; especially in affected paces in the developing countries such as the North East of Nigeria. As such inculcating sustainability as an efficient way of intervention in water, sanitation and hygiene spurs this study.

The knowledge passed by this study is thus significant to all stakeholders in diverse ways. More importantly, the knowledge on the essential need for sustainability of water, sanitation and hygiene intervention becomes highly crucial in the North East of Nigeria where there have been experiences of water borne diseases and infection traceable to the continuous use of contaminated water, poor sanitation and poor hygiene as a prevalent practice among the people.

This study therefore is carried out with the view that it should spur the concerned parastatals and policy makers in the country into taking proactive measures to ensuring that there is urgent and sustained intervention regarding water, sanitation and hygiene in the study area.

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CHAPTER TWO
LITERATURE REVIEW

2.1 Preamble

This chapter focuses on relevant literature that supports the phenomenon been studied with theoretical concepts reviewed to juxtapose the findings of previous empirical studies pertaining to sustainability of water, sanitation and hygiene interventions in North East of Nigeria. In view of this, the review categorically gives critical and in-depth information gathered from the thoughts of previous researcher on the subject matter. Therefore, the chapter is grouped into the following sub-headings:

2.2 Conceptual Framework

2.2.1 Overview of Water, Sanitation and Hygiene

There has not been a progressive move towards the supply of safe water, and sanitation as different concepts that are interlinked and need be considered together. According to 2014 estimates, only an aggregate of 89% of the world population have access to quality water (safe for use) (WHO/UNICEF, 2014). Comparing this figure with proceedings years dated as far as in the 1990s, only about 13% of the population have access to water that is safe for use and do not pose a health risk as one of the Millennium Development Goal (MDG) goals stipulated to have been achieved by 2015. Many countries in Sub-Saharan Africa however, are on the low key and struggling to meet up with the target highlighted by the SDG targets. On the overall and on a global level, a total of 64% of the population can freely access adequate sanitation while this is much below the standard set by the MDG target of 75% by the year 2015. There has been a slow pace actualization at meeting up with the MDG targets set in this regard in the Sub-Saharan Africa and South Asia (WHO/UNICEF, 2014).

WHO/UNICEF (2015) overtime the report gathered regarding the provision of useable water safe for human consumption and other uses, and also proper sanitation facilities and measures portrays a definite extent of actualization and attainment of goal. Year 200 has witnessed a prevalent situation of access to good water supply and apropritae santaion infrastructures which is a fast tracked attainment as against the 2015 date limit set for the actualization of such goal. Nonetheless, meeting this goal has been challenging for the sub-Saharan Africa while they are

far below standard compared with other developing countries. Many of the countries in the sub-Saharan Africa and Oceania are yet struggling to achieve the goal of clean water and sanitation while majority of the countries yet have less than 50% of their population lacking access. As gather from the data of 2015, a high number and an approximate of 2.4billion of population do not have proper sanitation facilities for use (Adopted from the WHO and UNICEF 2015)..

According to Gleick (2002), poor attention channeled towards water and sanitation need of human bears the consequence of mortality of about 135 million lives by 2020. Global report depicts a total of 663 million people not having access to safe and clean water however this challenge was overcome to a significant extent in 2010 before the 2015 target as an edge. From the 2006 report, 30% of the sub-Saharan Africa population does not have access to clean and safe water for use and drinking (UNICEF (2015). On a global rating also, 40% which represent 2.6Billion people lacks proper sanitation measures (UNICEF (2015); however, there has been a reduction in the level, evidenced by the improvement witness; resulting in only a total of 2.4billion people in 2015, nonetheless as against the MDG goal of total population having proper sanitation measures in place. The practice of indiscriminate defecation in the environment is yet prevalent in India rating 60% of the global population that practices indiscriminate defecation in the open (WHO & UNICEF, 2014). Only a minute number of people among the rural setting had access to sanitation facilities in 2004, while over 2billion lacked access (WHO & UNICEF, 2006). Estimates proffer that the challenge would mingle to 2015 with 1.7 billion populations in the rural lacking access to sanitation facilities. However, the prevalent situation in the US and Central Europe differs with almost the total population been equipped with adequate station facilities (Mara, 2003). The sub-Saharan Africa countries therefore are yet lingering and facing the challenge of acess to safe and clean water and adequate sanitation facilities.

In the sub-Saharan Africa, such diseases as Diarrhea-related deaths are very rampart when compared with other regions (WHO & UNICEF, 2006). According to Daley et al. (2015) quality water supply, combined with the provision of proper sanitation facilities to discourage open defecation and contamination of water in use, bears beneficial values to the health and contribute immensely towards healthy living by the people; increasing life span and mitigating the prevalence of mortality among children in communities. Having produced positive result in other

region, attention of water and sanitation aimed at healthy living bears a higher possibility of positive impact in the sub-Saharan African countries.

Water, sanitation and hygiene are topmost in the SDG highlights spread towards 2015 and beyong. One of the justification for the WASH initiative was basically vested on combating diarrhoea-related mortality among the children who five years of age and below and has witnessed a decrease in number featuring 700,000 deaths in 2011 (Walker et al., 2013). Diarrhoea among children under the age of five witnesses a drastic reduction to the barest minimum when attention is focused on water, sanitation and hygiene (Freeman et al., 2014; Wolf et al., 2014). Failure to ensure access to clean water and proper sanitation leaves both women and children most vulnerable as they are regarded responsible for finding solution to contaminated water and providing adequate sanitation for their households most often (Pearson and McPhedran, 2008; Sorenson et al., 2011).

The intervention foster by water, sanitation and hygiene which most time feature practices as proper hand washing can be profitable in overcoming such disease as cholera and dysentery, infections in babies and/or pregnant mothers, mostly among the people who lives in poor environment and also in refugee camp (Dunkle et al., 2011; Tappero and Tauxe, 2011; Mahamud et al., 2012; Edmond and Zaidi, 2010; Vergnano et al., 2005; van Dillen et al., 2010). The WASH move can more so proffer solution to pandemic influenza (Aledort et al., 2007). In the recent, researchers have advocated the need for environmental clean up from pollutants and contaminating substances and municipals: to avoid continuous exposure to the health risk been posed such as stunted growth, poor mental alertness in children, and anemia (Korpe and Petri, 2012; Lin et al., 2013; Ngure et al., 2014). This was supported by Keusch et al. (2013) who emphasized on the adverse effect of poor environment stressing that it results in health related issues as identified.

Water, sanitation and hygiene intervention basically provides a strategic rescue from the risk factors embedded in poor sanitation, consumption of bad water and poor hygiene in communities (Arnold et al., 2013; Ngure et al., 2014). As a form of intervention on water, sanitation and hygiene, facilities as ceramic filters can be provided to discourage unnecessary exposure to faeces (Ngai et al., 2007; Shafiquzzaman et al., 2011). Researcher overtime has come to the

knowledge that human fundamental right to water, sanitation and hygiene (Gleick, 1998; Hunt, 2006),.

2.2.2 Water, Sanitation and Hygiene in Nigeria

Nigeria as a country planned on massive intervention of WASH mostly focused on the rural dweller, achieving a 100% rating in ensuring the supply of clean water for use, sanitation facilities and instilling proper hygiene practices by 2030 (FGN, 2016). Achieving this goal as identified bears a cost implication of US$2.74 billion been incurred on the WASH initiative on a yearly basis. However, there has been a gap in investment into the plan projected at $106 million. There is utmost need for intervention in the rural settings in Nigeria as many of the population yet engage in the practice of open defecation (FGN, 2018). Nigeria as a developing country is also faced with por access to cthe use of safe water by the rural dwellers majorly and also among the low class category. The practice of open defecation which is not ideal for water safety is common among the poor in the country who lack basic sanitation facilities (Nigeria MICS Report, 2011). WASH intervention is lower in the rural and higher in the urban with the North East been affected more (Nigeria DHS, 2013).

To actualize the SDG for Nigeria, increasing attention on the WASH drive becomes a critical need. It is expected that a percentage of the budget (1.7 per cent of the current Gross Domestic Product) be separated to accommodate the requirements that can facilitate the WASH move in Nigeria as projected by the World Bank estimates (UNICEF, 2016). The evidence of the investment gap however is more in the rural settlement recording 64.1% lapses in funding; contributing to the challenge is the inability of the poor to fund sanitation facilities; hence the continued practice of open defecation in Nigeria (World Bank, 2017). Mortality rae and morbidity rate is increasingly increasing in nigerai, traceable to lack of safe and clean water for the use of the people and also poor sanitation. Many of thepeople are yet vulnerable to the adverse effect of the use of contaminated water and porr sanitation and also bad hygiene. The low class category of the peope is more vulnerable (World Bank, 2016). As more people especialy children become more vulnerable, it affects their wellbeing and education. In Nigeria, clean water and sanitation facilities are only accessible by a total of 26.5% population while 23.5% yet engage in open defecation in the open.

In Nigeria, the goal of WASH has been achieved to a 69% level in water intervention and 29% level in sanitation in the year 2015; gradually reaching the SDG target. However, Nigeria is targeting reaching a 100% level in WASH inactive by year 2030 (Nigeria DHS, 2016). There has been a total neglect in providing sanitation facilities and ensuring supply of quality water for drinking to the low class across the country (Nigeria MICS Report, 2011). The challenge of water, sanitation and hygiene is more prevalent in the North where majority live on contaminated water and without sanitation facilities, the need for WASH intervention is less prioritized in Nigeria coupled with high level corruption among facilitators, government failure to incorporate WASH programme in budget (Nigeria MICS Report, 2011).

The Nigerian government has failed in ensuring the fundamental right of its people to safe drinkable water and provision of sanitation facilities and also ensuring proper hygienic measures (World Population Review, 2014). This has contributed to the low life expectancy in nigeriawhich is classified as 47 years of age for adults. Poor access to drinkable water, sanitation facilities and bad hygiene, as rampart in Nigeria leads to several health issues (AfDB, OECD, UNDP, 2014). According to World Population Review, (2014) and World Bank, (2013) Nigeria had been rated on a scale of 13% among countries experiencing WASH challenges where children who are underage are more affected with the menace and experience high mortality rate and health risk. Nigeria therefore requires high level of water, sanitation and hygiene aim at improving the health and safety of the people generally.

The problems of population explosion and continuous influx of people from the rural to the urban centres as another challenge in Nigeria have compounded the WASH intervention over the years. The access to this basic need by the poor who constitute the largest percentage of the nation population has more so remained a mirage. According to Hunter et al.,(2010) there are several issues that affects access to quality water, sanitation and also hygiene, such as poor investment, population sprawl. Meeting the water sanitation ang hygiene need of increasing population has been challenging within the Nigeria context while people are left to sort the need without any intervention (Akanbang et al., 2008, Davis et al. 2008). Very few facilities channeled as intervention measures are functioning in Nigeria and are far beyond the reach of many above 80% (FGN, 2000).

35% of population in Nigeria, totaling 70 million depend on water from well dug by themselves among which 18% drink from the well without proper treatment and 11% fair treat theirs (World Population Review, 2014). However, intervention by the government in providing water facilities for the use of the public spread across various regions would make a significant impact and reduce the intake of unsafe water for the use of people.

2.2.3 Sustainability in water, sanitation and hygiene interventions

Globally, the need for sustainability had been advocated and has increasingly draw attention. Sustainability as a concept however can be applied in diverse scenarios as applicable in the need for its use. An application of sustainability to water sanitation and hygiene intervention implies conformity with the SDG goal and the need for consistence in attaining the goals, meeting up with the deadline and achieving purpose. It is in the SDG to have water made accesible to people between the year1990 to 2015 and must be sustainably pursued (Lenton et al., 2005).

WASH intervention need be consistent to make an impact on healthy living. Wood et al. (2002) sustainability informs on haitual dealings. This is what makes a lasting impact in the water sanitation and hygiene intervention for the people of the nation.

2.2.4 Sustainability of Water, Sanitation and Hygiene Interventions

According to the Humanitarian Charter and Minimum Standards in Humanitarian, the need for water, sanitation and hygiene cannot be jettisoned in sustaining man and ensuring his health and safety in life. Water and sanitation are highly needful by human for survival. The lack of these basic needs of human susceptibly result in diverse forms of diseases and sickness been suffered by the people; while more people are yet going through this ordeal with more also preparing to join.

Sustainability of water sanitation and hygiene should promote the use of clean water, provide the channels by which clean water can be accessible to the teeming population; ensure proper and adequate sanitation facilities while putting in place different measures to promote hygienic living (Sphere Project, 2011). The imperative of imbibing the concept of sustainability lies in taking steps and rapidly profiteering solutions to the issues regarding water sanitation and hygiene.

The essence of intervention regarding water is to critically look into the areas of challenges posing difficulty in gaining access to useable water, supplying safe water that is ideal for

consumption by both the young and old and without any adverse effect; also supplying sufficient quantity to reach the populace. Sanitation intervention is dependent on providing support in making available facilities that are useful in channeling the proper disposal of feaces by human, such that disallow unnecessary exposure that can cause health problems. Hygiene intervention features practices such as bathing daily with clean water, washing of the hands before and after eating, drinking clean water, washing the hands after toilet use and the likes. These measures discourage any risk on health attributed to water, sanitation and hygiene issues. `` `

The impact of sustainable water sanitation and hygiene is yet to be felt in places dominated by the low income class in the developing countries (Blanchet et al., 2013; Ramesh et al., 2015; Brown et al., 2012a; Taylor et al., 2015). The underlying causative factors are identified as gap in research before taking steps and indifference attitude that has always shifted attention for the need for research (Spiegel et al., 2007). There is also the problem of poor data base (Vujcic et al., 2015).

However, intervention of WASH is highly imperative among the low and middle class more (Darcy et al., 2013; Loo et al., 2012; Steele and Clarke, 2008). Research gives a critical overview on the need for intervention, how the intervention can be ensured and the procedures needful to meet the demand with the available resources (Bastable and Russell, 2013; Loo et al., 2012; Parkinson, 2009). There has been increasing need for such initiative as sustainable water, sanitation and hygiene intervention by the people in the developing countries across the globe (Samarasekera and Horton, 2017; Hawkins and Pérache, 2017; Waldman and Toole, 2017; Kayabu and Clarke, 2013; Cairncross et al., 2013).

2.2.4.1 Water Intervention

Water interventions comes a diverse categories however among all the commonly used and accepted intervention focused on disinfection of water coming out of the well been dug, pumping of water from ground floor, treatment of water with the use of chlorine-based HWT, and HWT and/or filtering.

Saltwater pumping

Pumping of water through the use of machine built for the purpose is a common practice by people, as an acceptable way of sieving water from dirts in form of dust, sand and other water particles; for the safe use of human (Vithanage et al., 2009). This process at completion is belived to have purified the water been fetched such that all the unnecessary must have been separated before accessing by human; this . Six evaluations of well pumping were identified with low (4) and high (2) risk of bias (Lytton, 2008; Villholth, 2007; Vithanage et al., 2009; Saltori and Giusti, 2006; Fesselet and Mulders, 2006; Lipscombe, 2007). This was deemed a safe avenue for providing drinkable water for the people in communities in the developing countries (Villholth, 2007; Lipscombe, 2007; Saltori and Giusti, 2006). This is mostly faced with the challenge of people acceptability of the idea as majority prefer for the direct supply of water rather than pumping (Villholth, 2007; Lipscombe, 2007).

Disinfection of well water can be considered in cases of contamination of water so as to separate the water from destructive particles and to purify it for safe consumption (Rowe et al., 1998; Libessart and Hammache, 2000; Garandeau et al., 2006; Guevart et al., 2008; Cavallaro et al., 2011; Luby et al., 2006). A type of chlorination known as shock instantly dissolves in well water and perform its function of purification whereas another usually referred to as three pot chlorinator takes a gradual process and last longer in use (CDC, 2012). Commonly used and most acceptable among various classes of chlorine is the three pot chlorine which takes about 1-4days to dissolve in water and purifies it (Libessart and Hammache, 2000; Garandeau et al., 2006). The use of chlorine in disinfecting well water was found to have no adverse effect (Luby et al., 2006).

Dispensers

This is equipment known as dispenser, built to accommodate the treatment of water with the use of chlorine; usually installed and connected to a water source. The practicality of its applicability in disnfection of water had been tested and proven in a situation of cholera and found to be useful inpurifying water for drinking without any adverse health condition in Haiti, Sierra Leone, and Democratic Republic of Congo (DRC) and in Senegal (Yates et al., 2015b). Results varied over two acute evaluations (2–8 weeks after installation) and three sustained evaluations (4–7 months after installation) for reported use (26–75 per cent acute, 31–75 per cent sustained), confirmed use (11–34 per cent acute, 5–18 per cent sustained), and effective use (10–28 per cent

acute, 0–10 per cent sustained) metrics. However, the usefulness of the dispenser in purifying the water from infection, is on the basis of appropriate source selection; chlorine solution quality and supply chain; proper installation of dispenser hardware, timely maintenance; competent programme staff; partnering with local organizations; conducting ongoing monitoring; and having a sustainability plan.

Household water treatment

HWT water treatment are treatment measures provided on home level usually applied at the point of use to purify water and improve its quality for safe consumption by human (Lantagne and Clasen, 2012). HWT include boiling of water, use of filter and dispenser, application of chorine, and more to purify water from infectious particles. Chlorine products form most common disinfectant for HWT solution used in water purification in homes (Lantagne and Clasen, 2012) Chlorine products as HWT comes in different forms as chlorine tablets, liquid chlorine, and flocculants/disinfectants.

Chlorine tablets

According to ACF, (2014c); Lantagne and Clasen, 2013) "Sodium dichloroisocyanurate chlorine tablets (e.g. Aquatabs®) were evaluated in 12 contexts; half (six) were low risk of bias, one medium risk and five were high risk of bias. The tablets (33–167 mg) were freely distributed through hygiene kits and intended to treat 5–20 L of water. The reported use ranged between 1 and 84 per cent (n = 9), while confirmed use ranged between 1 and 87 per cent (n = 11). Effective use ranged between 5 and 63 per cent (n = 4). The highest rates were reported in South Sudan and Haiti where 92 per cent of households reported recent household promotion and 75–82 per cent of households knew the correct use because of a long-running treated water campaign". However what discourages the use of chlorine table is the accompanying smell (ACF, 2009; Lantagne and Clasen, 2012; Imanishi et al., 2014; Ruiz-Roman, 2009; Johnston, 2008). Most often the use of two much quantity is what spur the after smell been perceived by people (Imanishi et al., 2014; ACF, 2009; Johnston, 2008; Varampath, 2008). There is a significant relationship in the knowledge ofchlorine and the right application in Zimbabwe (Imanishi et al., 2014) also Nepal (Lantagne and Clasen, 2012). Appropriate application yield a

positive outcome in Bangladesh; a 55% diarrhoea reduction was recorded in children under five (Johnston, 2008).

Liquid chlorine

Liquid chlorine need be applied with all carefuleness as a means of water intervention on home level such is the use of waterguard that should be applied in small quantity and had been put to test in about 6countries, and found highly useful and easy to apply. Reported use ranged between 6 and 88%, and confirmed use ranged between 1 and 69% (Tokplo, 2015) and Madagascar (Mong et al., 2001). The use is low in Madagascar most likely on cost consideration (Dunston et al. 2001) however when given free, there is high rate of use by the people (Mong et al., 2001). Excessive dose however affects the taste of water in Madagascar (Mong et al., 2001; Lantagne & Clasen, 2012; Plan, 2013). The use however is on the low key in Kenya as a result of poor awareness and the affordability by the people Kenya, where only 2.3% of households uses the solution (Lantagne and Clasen, 2012). Issue with the change in taste was affirmed in both Haiti and Liberia (Doocy and Burnham, 2006; Colindres et al., 2007) and Bangladesh and Vietnam (Hoque and Khanam, 2007; Handzel and Bamrah, 2006). Another issue of concrn raised is on the time it takes to dissolve and perform its function on water (Hoque and Khanam, 2007). The use of this water intervention was found impactful on health combating cholera and diarrhoea in Liberia and Bangladesh by 67% and 77% respectively (Doocy and Burnham, 2006; Johnston, 2008).

Filters

Filters used as HWT has been beneficial in ensuring the safety of water been consumed, having all forms of protozoa, viruses and bacteria removed from the water. Filters is time saving and water can be consumed almost immediately after application; giving no side effect tested in five countries (Palmer, 2005; Clasen & Boisson, 2006; Lantagne & Clasen, 2013; Ensink et al., 2015; Cressey, 2015). Filters however are susceptible to certain challenges such as it gets stocked on time and result in low drop of water, also is limited in the quantity of water it can accommodate at a time (Clasen & Boisson, 2006). It may be difficult meeting the needof many people at a time

and as required, using the filter (Cressey, 2015), the filter however does not pose a change in taste of water (Clasen & Boisson, 2006; Ensink et al., 2015; Palmer, 2005).

2.2.4.2 Sanitation Intervention

The basic objective that underlines the sanitation intervention bothers on sperating faeces from the environment to prevent the spread of diseases (Sphere Project, 2011), sanitation intervention comes in form of latrine construction and alternatives (Bastable and Lamb, 2012) community-led total sanitation (CLTS)) (Majumdar and Coonrod, 2010).

Latrines

The use of latrine, common among the poor in the urban and mostly in use in the rural, forms a sanitation built facility that could serve as intervention however is use makes the people more vulnerable to spread of infections of every kind when proper care is not inculcated therefore require thoughtful consideration for use and sludge disposal (Eyrard, 2011); been used overly in Haiti and Bolivia (Bastable and Lamb, 2012; Kinstedt, 2012); Pakistan (Singh, 2012; Bastable and Lamb, 2012). Latrine only decomposes waste, it does not desludge waste.

Females in South Sudan use more of latrines and also get involved in the design and construction (de Lange et al., 2014). However, use of latrine has been found to contribute towards the spread of disease in China and Nepal but sanitation interventions were carried out with other interventions simultaneously, with unknown spillover effects (Lin et al., 2008; Puddifoot, 1995). In cases where proper hygiene practices are embraced, use of latrine was found to produce no health effect.

Latrine alternatives

This isa system of waste collection used as an alternative to the usual latrine construction, however involve the use of biodegradable bags strategically placed in well stipulated locations for easy access and use by the people in collecting waste; had been used in Haiti and Philippines (Patel et al., 2011; Coloni et al., 2012; Parsa, 2014). There is more use in Philippines, than the Haiti, as a result of proper monitoring mounted by NGO.

2.2.4.3 Hygiene Intervention

The importance of Hygiene is vested on appropriate mechanism to mitigate the spread of infection or diseases; keeping a clean environment and maintain a proper self care. Hygiene intervention features such measures as washing of the hands when need be (Vujcic et al., 2015) awareness on the need for hygiene can focus on schools, markets, neighborhood, large gatherings, and household level aimed at social mobilization

Hygiene promotion

An evaluation on the concept of conducted focusing on the approach embraced in disseminating hygiene related information to the public with emphasis on the one who disseminate the information who could be community health worker, NGO, friend, neighbor, family member, local leader; means of communication through radio, TV, posters/pamphlets, face to face; and point of information dissemination ranging from home, to school, religious centres and within the community. In all, face-to-face approach was found most impactful (Williams et al., 2015; Matemo, 2014; Contzen & Mosler, 2013; Date et al., 2013; Einarsdbttir et al., 2001; Wall & Chéry, 2011; Khan & Syed, 2008).

Other measures and approaches found to be impactful in installing the need for hygienic practices are the use of publications; follow up by volunteers and health workers, personal conversations with friends and family and educating people in large gatherings. The use of media was also reported to have been helpful in the push towards the practice of hygiene by the people. However, there are challenges in the mode of communication engaged in the Haiti cholera and Liberia Ebola responses raisning conflict of opinion (Wall and Chéry, 2011; Meyer Capps and Njiru, 2015) also, information passed via the media cannot be said to be well understood and implemented by the targets (Wall and Chéry, 2011). There were also challenges of language spoken (Einarsdbttir et al., 2001) also misinformation in printed media (Neseni and Guzha, 2009).

The hygiene intervention is found most responsible for the drastic reduction of morbidity and diarrhoea rates (WHO, n.d.; Williams et al., 2015), more use in for of HWT (Date et al., 2013), attitudinal reformation in the way people relate to themselves in terms of handshake, hugs, touch and other forms of physical contact in a season of outbreak cholera (WHO, n.d.). Handwashing

is highly needful in hygiene (ACF, 2015a; Plan, 2013; Visser, 2012; Varampath, 2008; Singh, 2009; Fortune and Rasal, 2010).

Social mobilization

Social mobilization are locally initiated hygiene practices usually spurred by community leaders aimed at cleaning up the environment to foster neatness and cleanliness; guiding against the spread of germs, infections and other diseases and keeping the environment health friendly (Majumdar & Coonrod, 2010). A type of social mobilization is all round sanitation where communities come together for a total clean up exercise in the premises, construct useful latrines where need be using available local materials. Social mobilization had been adopted in seven countries and found effectual in reducing disease risk such as ebola contact and/or spread (Meyer Capps & Njiru, 2015); reduces indiscriminate spead of disease outbreaks (ACF, 2015a; Rees-Gildea, 2013; Neseni & Guzha, 2009). This form of mobilization proved worthwhile in countries like Community Uganda, Pakistan, and Zambia in a space of four months interventions (Waterkeyn et al., 2005; Miziniak, 2007; Khan, 2012).

Hygiene kit distribution

The circulation of Hygiene kit has been evaluated in relation to WASH interventions. The kits that registered increased awareness are detergent, buckets for holding water, disinfectants; distributed as a way of supporting the hygiene intervention move (Mountfield, 2013; Hayden, 2012; ACF, 2015b). Kits were of varied types and functions, therefore, spurs confusion (Varampath, 2008; Imanishi et al., 2014). Some of the kits are programmed to accommodate a define level of substance and cannot meet the requirement Standard-sized kits may not address the needs of larger families or those with different preferences (Gauthier, 2014; Simpson et al., 2009; Ruiz-Roman, 2009). Hygiene kits were found to be very useful in tolerating the health situation and preventing further spread of infection, also mitigates the undue contact with infection; and alos are well acceptable by the people and easy to apply (Simpson et al., 2009; DeGabriele and Musa, 2009; Neseni and Guzha, 2009; Ruiz-Roman, 2009; Lantagne and Clasen, 2012; Varampath, 2008),

There is the Menstrual hygiene management (MHM) interventions direceted at ensuring proper hygiene in the way and manner women disposes off their menstral pads, and also making

available clean and safe sanitary pads for the use of the less privilege; more so, underwear which are regularly distributed (Khan & Syed, 2008; ACF, 2014a; Singh, 2009; Baker & Mbogha, 2009). There are some of the hygiene kits that are mnot culturally acceptable in some instances posing a challenge to distribution and acceptance by the people (Khan & Syed, 2008; ACF, 2014a) to support the kits distribution, private and safe places for washing are designed for use, water provided for washing, while this measures are inculcated by giving the people orientation on the benefits (Parker et al., 2014; Hayden, 2012; Wickramasinghe, 2012).

Environmental hygiene

Environmental hygiene interventions goes beyond the home view but serves as a step further in maintaining hygiene, covering the immediate environment; while this allows for clean up of the environment form dirt, provision of waste facilities where waste can be easily droped and neatly covered, disinfection, and fumigation. There is also vector control, site drainage, solid waste management (Sphere Project, 2011) this bears such merit as improved garbage practices, rather than littering the environment and making it look very untidy (Dinku, 2011), also, construction of solid waste areas and drainages (Pennacchia et al., 2011; Plan, 2013), and decongestion and maintenance of the sewer pipes (Neseni and Guzha, 2009).

2.2.3.4 Factor affecting the sustainability of Water, Sanitation and Hygiene Interventions

Ademiluyi and Odugbesan (2008) conducted a research on sustainability and how itimpacts of consistent water supply to ensure safe drinkable water, adequacy of sanitation materials and facilities and also, hygienic measures and practices in Nigeria with the use of primary data. The findings revealed thet there are diverse issues that affects sustainability in the move towards ensuring safe water supply, sanitation and hygiene among the peolep as applicable in the context of Nigeria. Among the issues combating sustainability is the lack of conviction demonstrated by communities and households about the safety of water supplied for use and the source of the supply; the need for sanitation to be consistent; and possibility of the hygiene practices impacting

positively on health and safety. Also the cost implication affects the sustainability idea in water, sanitation and hygiene intervention; it is expected that a certain amount is contributed towards sustainability by the community while affordability poses limitation as most of the beneficiaries in this regards are unemployed and living in abject poverty with no source of income; the few who could contribute a little are also unwilling to contribute any fund. Overtime, the intervention begins to dwindle and at the long run, experience a total halt. Most often the need for routine maintenance to keep facilities functioning is regarded as government responsibility after huge investment sunk into installation and construction; maintenance and repairs of facilities are therefore abandoned and overtime affects the performance. Achieving sustainability goes beyond initial investment but requires continued evaluation of the state of facilities to determine the need for maintenance and repairs; thereby effecting necessary corrective measures. This need be fully embraced by the government as a way of intervention fostered in the sustainability of water, sanitation and hygiene.

2.3 Theoretical Framework

Arjzen (1991) advocates the theory of behavior that is planned and programmed. Armitage and Connor (2001), Grizzell (2005) agreed with the fact on the need for personal conviction in relation to how behaviours are channeled. The possibility for a change in behavior is dependent on personal intention which is influenced by resources, opportunities and skills to change. The Health Belief Model (Nisbet & Gick 2008) spurs the need for change on what seems an issue that bothers on health of the individuals coupled with the knowledge that prevalent situation may result in severe health cases, and that a change in behaviour can foster a positive change that impacts positively on health; thereby, reducing the risk considerably.

According to Gelaw et al. (2013), the theoretical foundation in the Health Belief Model (HBM) considers important factors that propel in change in the behaviours of people towards ensuring healthy living to include knowledge, information, cost, features, and consequence of potential disease. Jones et al. (2015) emphasized that information that is channeled on the need for resolving a definite issue attracts attention and spurs a positive change beneficial to the affected. The communities been targeted had been plagued severally by diseases and have also been

educated overtime on necessary precautions required in such environment they have found themselves, by health practitioners on diverse levels.

There is high tendency for a change in behavior of community members towards water, sanitation and hygiene; having experienced what consequences accrue from the use of contaminated untreated and unsafe water; refusal to use sanitation facilities and poor attention on hygiene practices. Change in behavior therefore is related to the information and knowledge recived on health risk and the treats to health in place of non compliance. According to Orji et al. (2012) the HBM is centered on evaluating the possibility of change inbehaviour towards healthy traits and access to information on public health giving an overview on behavior towards prevention of barriers.

Rationale of the Theory

The essential of the theory is on the bais that information available to people is what determines the extent to which their behavior is changed and reformed towards definite circumstance or situation. Information coupled with adequate knowledge of consequences, cost implication and severity spurs an acceptable behavior by the people in a given situation. The research is assessing the community attitudes to water, sanitation and hygiene and the best model to look at is the health belief model on this case.

Strengths of the Health Belief Model

Community participation is emphasized been the targeted audience to be rescued. It has an advantage of communication which keeps the community well informed and updated on prevalence of disease, the possibility of spread, the consequence on health and the environment and more importantly the beneficial effect of compliance; keeping the people abreast of information and influencing on their behavior.

Weaknesses of the Health Belief Model

The theory was basically focused on the need for change in behavior withoutconsidering other factors that can help sustain the change in behavior by the people. A change in behavior tht is not supported bythe needed materials, facilities and other provision however will not yield a positive

result in helth (Mubarak et al 2016) for water, sanitation and hygiene to be sustainable as a merit to a change in behavior, there need be appropritate measures put in place to ensure access by people, continuity of supply, and consistence in quality. Else people gradually resume the behavior druoppped while it becomes almost impossible for a rethink as a result of lapses entertained in supplying needed facilities and requirements.

2.5 Empirical Review

According to Aremu (2013) water and sanitation are basic needs for human that draws a global attention. According to WHO (2004) an ideal environment where people live in should be that which is free of any form of pollution, contamination and other issues that poses risk to health; requiring for supply of safe water, adequate sanitation and appropriate hygiene practices to mitigate water borne diseases and other environmental diseases. Akoteyon (2016) examined access to water made available to certain region in Lagos State, Nigeria, in a study conducted using an interactive survey method; and findings revealed the prevalent use of water sources as rain fall, wells, borehole, and buying of water from sellers.

A similar study conducted in Madagascar revealed that considerable time is spent in collecting water for the use of households while those most often affected are the female gender such as the girls, women, mothers in the families who go to fetch water for use (Boone, Glick & Sahn, 2011). Also, Ashaolu and Onundi, (2014) investigated how households in Irepodun Local Government Area of Kwara State, Nigeria uses water; using a modified water diary method and findings revealed that most time, women are the ones to take up the responsibility ofproviding water for use in the family while water is fetched from wells that are dug, bore holes, pipe borne water provided and from the rivers around their communities long distance away from the dwellings.

Spencer (2012) carried out a study on sanitation as it applies to practices by people of peri-urban Ghana using questionnaire to obtain data on the phenomenon. Findings from revealed that the most common practice in the region is open defecation with many of the people getting involved in such act; while this is followed by the use of dilapidated public toilets by a few who can access it. However, this bears high level consequence on health and contributes largely to the spread of infection and diseases in the area. Also, Garba et al (2014) in the study conducted in Chikun and Kaduna South Local Government areas of Kaduna state focusing on children; found

unhealthy practices leads to infection among children in schools while proper sanitation bears positive impact on health when obliged to.

Idogho, Olotu and Dagona (2013) examined the context of water supply and in relation to sanitation measures in Edo state, Nigeria using primary and secondary data. Findings revealed there is relationship between water and sanitation in relation to health as unsafe water or contaminated water as a result of poor sanitation poses increasing hazards to health of the people in Edo state. It was also found that sanitation facilities are on the low key in Edo where the people are under supplied contributing to the poor water quality accessible to the people. . Hutton and Haller (2004) however found that water and sanitation are beneficial in terms of attributed cost should water and sanitation b neglected; cost of resultant effect on health can be very enormous and unable to be provided by those affected.

A study was also conducted on varied level of access by household to clean water and adequate sanitation in Kenya using primary data and discovered that there are varied levels of access the people have in getting clean water for use and using sanitation facilities (Koskei et al., 2013b). Olajuyigbe, et.al. (2012) examined how water been taken by people could result in such sickness as typhoid fever in Ejule LGA of Kogi State, Nigeria using Geospatial-Temporal analysis. Result revealed that the consumption of contaminated water by people can subsequently result in such ailment. Sarmento (2015) conducted a study emphasizing the need to ensure access to clean drinkable water and appropriate sanitation facilities for the use of people to prevent infection such as cholera and diarrhea. However the findings revealed that access to safe water is determined by geographical locations of the people.

Cosgrove and Rijsberman (1999) evaluated the essential of access to quality water, sanitation and need for hygiene with the use of secondary data. From the findings adjudged, it is deduced that access to clean water reduces the stress been experienced by women in searching for water that is safe and drinkable. Consequently, rather than spending time in search of water, better activities can be engaged in to keep the women productive, contributing towards economic growth. The research was however carried only in Africa and may not be application to other countries in the developed world.

Ajao, Obafemi and Ewumi (2011) employed the data retrieved from an hospital to carry out a research on effect of sanitation on mortality in Nigeria with the use of secondary data. From the findings arrived at, it is made clear that sanitation issues inform of Bad Refuse Disposal Method, contribute to Crude Death Rate (CDR); however, the findings was limited to sanitation and mortality while concentration was just on data retrieved from the hospital; which may not be reliable. Mulenga, Manase and Fawcett (2004) examined the need for improved sanitation among the low class in southern Africa while study was conducted with the use of Primary data. It was deduced that the communities are unwilling to incur cost from their end on improving the quality of water accessible to them, but solely depending on free access to quality water circulation. Further, tenants who rented apartment and could afford installation of sanitation facilities declined from doing so for fear of losing the property and not getting a refund of their money.

Saidou and Devi (2013) examined access to clean water, sanitation and hygiene in urban centre of selected African countries using secondary data. It was found that access to clean water without appropriate sanitation provided and proper hygiene maintained would yield no good result; hence poses risk to health. Access to quality water therefore must be ensured in consonance with appropriate use of sanitation facilities well circulated to accommodate ta discrete disposal of waste from human; also ensuring consistent hygienic practices. This way, there can be a productive outcome nonetheless, measures must be consistently pursued. The study been limited to just selected countries in Africa and therefore may not be applicable to other countries in other continents.

In another study, Alkali et al (2014) conducted study on sustainability of water supply as it relates to Wennune, Benue state, Nigeria; while he made use of existing system assessment. From the study findings depict that sustainability can only be achieved when proper maintenance and repairs are consistently ensured. Failure to ensure proper maintenance result in decadence setting in; consequently results in fetching ater from an affected source; which also depicts bad sanitation and poor hygiene in a way. Therefore, Schwartz (2007) suggest that sustainability is faced with the challenge of funding which most often is viewed as the sole responsibility of the government owed to the citizens. However, the research was based on secondary data, thus not reliable.

WaterAid (2009), examined sanitation in view of socio-cultural barriers and what spurs certain cultural behaviour in West Africa using primary data. It was found that socio cultural behavior is influenced by the mentality imbibed by people on certain issues and the belief on the right to enjoying certain privileges. From the findings of the study, it was deduced that the use of latrine or other sanitation facilities is meant only for the elites or the high class and not for those living in slum or low class people. It is rather acceptable that the low class settle for open defecation in the farm and/or forest. This socio-cultural behavior therefore poses challenge to sanitation which affects the water quality accessible to the people and influence also on their hygiene practices.

Koskei et al (2013a) carry out an analysis using primary data, on the effect of Socio-economic Factors on Access to Improved Water Sources and Basic Sanitation in Bomet Municipality, Kenya. The findings revealed that the socio- economic level of households and individuals varies and influence on their environment and life style, determining the kind of water made available for drinking. Factors such as income level, number of household, occupational status, all have a way of determining access to quality water due to cost implication. The study further affirms tha application of the finding in relation to use of sanitation facilities. However, the study focuses on effect of socioeconomic factors. Ndiyo, Okon and Olumide (2013) in their study bridging domestic water supply and basic sanitation gap in Local Government Areas in Cross River state, using secondary data from Cross River state water supply and sanitation department. From the reliable data collected, it was found that attention was mainly focused on the urban and the rural neglected.

Arokoyo and Ukpere (2014) study conducted using primary data however suggested that the main source of challenge regarding access to quality water lies in environmental pollution, water contamination, poor attention on sanitation facilities, poor hygiene awareness and unwillingness to fund the initiative. The study however focus on constrain and not coverage. Alkali et al (2014) studied provision of sustainable water supply system in Wamnune, Benue State, Nigeria using existing system assessment and provisional design of water supply system. The study showed a complete relapse in the water supply accessible by people in the area as a result of poor maintenance practices been fostered. However, the study was limited to the supply of water without giving attention to the need for sanitation.

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CHAPTER THREE
RESEARCH METHODOLOGY

This chapter outlines the intended method that was used to collect and analyze the raw data needed to achieve the aims and objectives of this study and to make sound judgment. The topic that was discussed in this chapter includes the philosophical paradigm, study design, study site, research approach, research method; data needs types and sources, population, sampling procedure and data collection, data presentation, validity and reliability and ethics.

3.1 Philosophical Paradigm

Lincoln (2000), portrayed paradigms as human definition of events which is usually a built up of the perspective with which issues and gives a critical view of the researchers understanding of phenomenon and how the researcher categories them. The importance of Paradigms therefore lies in its paucity to describing events appropriately such that inform on acceptable norms, which, for scholars in a particular discipline, spurs the focus area of the interpretation ascribed also. The paradigm defines a researcher's philosophical orientation and this influence on the process engaged in drawing a conclusion on the phenomenon been studied, which also informs on the methodological tools adopted. Paradigm therefore revolves around our reflective mode of viewing issues in relation to the information gathered, and using that coupled with our experiences to reach a generalization. According to Lincoln and Guba (1985), there are four different approaches to a paradigm which includes: epistemology, ontology, methodology and axiology. This we shall explore in this study.

3.1.1 Epistemology of a Paradigm

Epistemology has its rooting in Greek which basically connotes knowledge (Cooksey and McDonald 2011). Epistemology bothers on the authenticity of the knowledge passed, as a way of validating the reality of the conclusion reached on phenomenon studied (Schwandt, 1997). Relating this concept to my study, knowledge was considered as a phenomenon to be studied allowing for facts to be drawn to reach an acceptable conclusion useful for generalization and beneficial for application in events.

From a critical view therefore, as regards this study, the concentration was on the fact that should knowledge be described as a fact drawn from a phenomenon or an experience while I try put myself in the position of the ones affected so as to rightly position myself in the research context

thereby discovering new things without bias. Subject my findings in the study to this procedures helps in arriving at a valid conclusion on the phenomenon been studied (Davidson, 2000), on the basis of epistemology therefore, important questions are raised with the purpose of contributing to knowledge.

In arriving at a valid conclusion with regard to questions raised there are four different source that can be drawn from namely: intuitive knowledge, authoritative knowledge, logical knowledge, and empirical knowledge (Slavin, 1984). This gives basis to the research, depicts where the body of knowledge is drawn from.

3.1.2 Ontology of a Paradigm

Ontology forms one of the branches in philosophy which spell out the reality perspective of the researcher in relation to been objective on the study conducted (Scotland, 2012). Ontology evaluates the beliefs underlying findings of the researcher as it relates to various happenings. These are built up assumptions considered as relative to the phenomenon been discussed, helping to visualize events from diverse perspectives such that affords the researcher a more comprehensive details on phenomenon thereby helping to conceptualize the form and nature of reality and what you believe can be known about that reality.

Assumptions are very important and forms the basis of the information gathered or arrived at in the study; helping to view issues from different perspectives (Scott & Usher, 2004). Ontology unfolds the reality and nature of the data gathered which in turn orientate my thinking about the research problem, its significance, and how I could approach them all, so as to answer the research question, understand the problem investigated and contribute to its solution. The fundamental of objectivity and reality was therefore imbibed in this study using that as a concrete guide all through. More so, the objectivity imbibed was on the reality of the opinion expressed by the respondents sampled, which also allows for a bit of subjectivity.

3.1.3 Methodology of a Paradigm

Methodology implies series of procedures and tools used in gathering data, and analyzing the data s as well as designing the research to arrive at definite outcome/findings (Keeves, 1997). In view of this, methodology involves the collection of data, the use of instrument data analysis. Methodology therefore bothers on the use of acceptable procedures, approaches, plan and more

importantly recognized tools in research, aimed at collection of reliable data. Attention is therefore paid to the methodology all through the conduct of the study.

3.1.4 Axiology

Axiology informs on the procedures that guides conduct in a most discrete manner such that allows for decency and professionalism on data been gathered and collated for the study. It guides aright the decision making in handling data all through the study helping to determine which approach is wrong or write so the researcher could attempt issues with discretion. (Finnis, 1980). This determines the value placed on the participants and the information released to researcher all through the conduct conduct of the study. Beyond that it portrays a high level of discreteion, professionalism and confidentiality displayed in gathering data used for the study which most often are always helpful in gathering valid opinion useful for generalization.

It makes the respondents from whom opinions are draws feel safe to release important information on phenomenon raised. This aspect therefore considers the ethical behavior of the researcher in carrying out this study. The conduct of the study therefore is meant to be on the basis of well evaluated ethical factors in compliance with acceptable ethical procedures. On the basis of the sensitivity of the entities involved and the need for their interest to be protected; ethical standards are not to be compromised but complied with as information are been retrieved from the selected respondents all through the study (ARC, 2015).

In this wise, ethics are best guided by the following concepts: teleology, deontology, morality and fairness (Mill, 1969). Nonetheless, the need for ethical behavior in the conduct of the study bears the need for fairness in dealing with the participants. In carrying out the survey as regards this study therefore, the consent and approval of the respondents is to be sort before the administration of questionnaires. The respondents also need be enlightened on the purpose and significance of the research to avoid any misconceptions on the study. To gain their confidence however, the respondents would be treated as anonymous, and assured of privacy and confidentiality all through the conduct of the study. Researcher however would strictly adhered to the necessary regulatory points with the lines of communication left open between the researcher and the respondents throughout the study.

3.2 Study Design

According to Cooper and Schindler (2008), research design defines the tenets on which the whole of the research is vested on covering all aspects of the research in a unified manner; giving direction to the general conduct of the research from the initial to the completion and helping to arrive at a valid conclusion (Ghauri & Gronhaug, 2010).

Survey method is of two types thus: cross-sectional and longitudinal surveys. The main instrument required in Cross- sectional surveys is the questionnaires tailored towards retrieving information in a discrete manner. Ticehurst and Veal (2000) portrayed cross- sectional survey as an approach adopted by researcher in collecting data through the use of structured questions directed at a selected participants regarding particular phenomenon. However, Longitudinal surveys functions in cases where the research is going to last for a long period of time with the aim of examining the variability in data as they are gathered (Mugenda & Mugenda 2003).

For this research, the cross- sectional survey method is considered most appropriate. Respondents can be reached easily and questions can be raised and information retrieved in line of current/recent feedback on phenomenon been studied and from people directly concerned; adequately addressing the research problem. It is also cost beneficial, time saving, and gives an edge in gathering large data and the use of statistical techniques in analyzing the data collected (Saunders, Lewis & Thornhill 2007).

3.2.1 Study Site

The study site is Borno State in the northeast of Nigeria. Of recent, the state has been much disturbed by the Boko Haram insurgency and military counter-insurgency operations which has been on since the year since 2009. The insurgency and counter-insurgency activities therefore have affected the environmental makeup of the state making the dwellers highly vulnerable to cholera. A very huge number of the population needs medical attention while almost all the health facilities are malfunctioning in Borno state (Daura, 2018). Also, the water and sanitation situation is in a pathetic state and has continuously resulted in poor access to clean water to drink and poor sanitation that allows for increase water contamination which consistently has been responsible for the spread of infection and diseases in the vicinity.

Estimate given as at January 2017, totaled 8.5 million of the population who are needful of humanitarian assistance, while the number of the people in IDPs has totaled 1.78 million. Health facilities have been shattered, about 75% water has become contaminated, sanitation is in bad

state and there is no hygiene. Waziri, (2009)emphasized that "3.6 million people lack access to safe water, 1.9 million people lack access to basic sanitation and 6.2 million people are without proper hygiene due to the high rate of open defecation and low rates of hand-washing". At present, the persistence of the unrest situation makes it difficult for proper arrangement in delivering intervention programmes and with increasing number of population in the IDPs; facilities are no more functioning; water, sanitation and hygiene intervention is very much on the low level despite the overcrowded camps. This situation however has continually contributes towards the spread of diseases such as cholera; consequently leading to high mortality rate among the people.

3.2.2 Research Approach

The research approach adopted for this research is the quantitative research design. Quantitative research relies on numerical evidence to test hypotheses and draw conclusion in meaningful way usually involves statistical analysis (Morgan, 2007; Creswell, 2009a; Collis and Hussey, 2009). It often garners related to social and physical activities and uses statistical measurement in the analysis of such data. (Given, 2008; Grinel 2012). A qualitative research design however are not arrived at by statistical methods or other procedures of qualification but engage already existing information by other researchers while there could be some certain degree of errors involved the course of the research work.

The reason for choosing quantitative research for this study is because it can provide a wide coverage of the range of situation and it is fast and economical. According to Ticehurst and Veal's study (2000), data collecting through a questionnaire surveys, will be more reliable and can be collect from a huge numbers of people for easy analysis using statistical tools. Besides, for quantitative research, the data can be analyzed and collected in quick way when the survey involves a convenience sample. In addition, the results from the sample can be comprehensive to the total population if the response rate is high enough when the survey involves a statistically valid random sample (Creswell, 2014), which in the case of this research that deals on WASH, also because;

- It questions why, how many, how much and what is happening?
- The study of interest is in its natural scenery.

- The research study is presently or just recently occurred.

This helps arrive at a good iterative discussion juxtaposing with literature. The data analysis will give an explanatory and descriptive account on the following ways research is conducted, data coded using the SPSS software.

3.2.3 Research Method

Descriptive research method is considered for use in this study. Descriptive research is a way of representing and describing a phenomenon with the use of visuals that can easily be understandable, interpreted and comprehended such as the graphs, tables and other charts (Glass & Hopkins, 1984). It functions when dealing in quantitative data and are very important in reducing large data to manageable form.

3.2.4 Data Needs Types and Sources:

The type and source of data for this study is through primary and secondary data. According to Hair & Babib (2003), primary data are information newly gathered from the field used in analyzing issues related to completing the research project and meeting the specified purpose. Primary data been newly gatherer has not be priorily adopted by any researcher In this research project, primary sources of data featuring the use of survey questionnaires method,is considered applicable. Questionnaires were shared among respondents based on acceptable ethical standards, giving room for communication (Zikmund, 2003). According to Ghauri and Gronhaug‘s study (2010), the use of primary data, makes it easier for data to be collected by researchers based on questions raised and in line with the objective formulated.

Secondary data is additionally considered in this study which is usually historical and do not require further analysis but can be adopted as a supportive view (Hair, Money, Samouel & Page, 2007). For this research project, most of the secondary data are collected from various Internet Online journals, case study; online articles to support the research questions. Secondary data was more so, obtained from business research studies text books, e-library or online database to use as references that enhance the reliability and quality of this research. Journals related to the WASH extracted from online database via UTAR online database such as Emerald, ProQuest, Science Direct, EBSCOHost and others online resources. Besides, GOOGLE search engine also

plays an important role in collecting information. All these types of information helped in developing the literature review and questionnaire to gain the knowledge and information of respondents.

3.2.5 Population, Sampling procedure and Data collection

Population of the Study

According to Achumba, (2000), a population is the subject been looked at or considered in the study, and can be represented by events, things and individuals in a research project. In this study, population is made up of all individuals who can give reliable information as far as the topic of this research work is concerned. The study population comprises of people dwelling in Borno State in the North East of Nigeria.

Sampling Procedure

Sampling technique can be described as various means of selecting without bias, from an aggregate number of people eligible to express an opinion about a phenomenon (Malhotra, 2007). The intent of sampling technique is to do away with bias as much as possible. Researcher cannot always gather data from the total population, but from a selected few that could represent the total population in giving the necessary information. Sampling techniques functions in this regard while the type of sampling technique used is determined by the research problem under investigation.

Sampling techniques can be divided into: probability and non-probability. Probability sampling methods give equal chances of selection to the respondents from among the population been studied (Ojo, 2003). Probability sampling methods includes simple random sampling, systematic sampling, stratified sampling, and cluster sampling. Non-probability sampling techniques are those schemes of sampling that do not allow respondents to choose their chances to be selected from the population been studied; however, the researcher engage his intuition using acceptable measures such as quota sampling, judgmental sampling, and convenience sampling in selecting the respondents.

For the sample of this study to be fully and fairly represent the study population without bias, simple sampling technique is employed. Using random sampling techniques therefore, equal chances of selection were accord the population to have the respondents used for this study selected to represent the general view of the total population. Oliver (2006) emphasized that "the researcher usually has one or more specific predetermined groups he is considering for a purpose". This informed on the choice of the respondents selected for this study.

Sample Size Determination

The sample size is the selected number among the population elements chosen to represent the overall (Agboola, Olatubara, Yusuf & Alabi, 2003). There are diverse means by which the sample size can be calculated. Israel (1992) cited in (Sekaran & Bougie 2010) that sample size determination is not limited to an approach but several. "These, include using a census for small populations, imitating a sample size of similar studies, using published tables, and lastly applying formulas to calculate a sample size" (Sekaran & Bougie 2010). In determining the appropriate sample size for this study, the Taro Yamane's formula was adopted denoted with the formula; $n_0 = \frac{N}{1+N(e)^2}$ where N= Population size and e=error term with value 0.05.

Table 3.1: Population (Sampling Frame) of Respondents

States	Local Government	Population (Sampling Frame)
Borno	Maiduguri	540016

To determine the sample size of respondents pertaining to this study, one local government area was randomly selected from the state. It is imperative to calculate the sample size of one (1) randomly picked local government in Borno State in the North East of Nigeria. However, using the proportional stratified allocation technique which makes the sample selected per stratum proportional to the size of the stratum (Fagoyinbo, 2004), the proportional allocation of each of the samples to each of the stratum is done with the formula:

$$n_0 = \frac{N}{1 + N(e)^2}$$

Where

N_h = population size of each selected local government

N = total population size of the 6 randomly selected local governments

$n =$ The total selected sample size obtained using the Taro Yamane formula

e=error term with value 0.05.

Borno (Maiduguri Local Government)

For Maiduguri, the total population size is 540016 which make the sample size (n_0)

$$= \frac{540016}{1 + 540016\ (0.05)^2}$$

$$= \frac{540016}{1 + 540016\ (0.0025)}$$

$$= \frac{540016}{1351.04}$$

≈ 400 people (approximately).

Data collection

Self-structured questionnaire which capture both demographic data and respondents opinions was the research instrument adopted for this study, structured to collect information from the respondents on the phenomenon. The purpose for adopting this approach is because it gives room for recent/current information to be gathered for this research phenomenon. It is also flexible and useful in gathering information from a large or small number of people; also useful in gathering current information and can be engaged in testing hypotheses and establishing the relationship among the variables.

Respondents expressed opinion in relation to the close ended questions structured and based on their understanding of the study. The demographic characteristics of respondents which include age, sex, marital status, and education level and more were considered. As questionnaires were distributed to the respondents, numbers were affixed for easy identification, location and supervision using that to determine the rate of response. Kothari (1990) emphasized that "the advantage of self-administered questionnaires is that they encourage openness in answering questions and minimizes interview biases and subjectivity".

The questionnaire is divided into five sections.

Section A: This is used for the demographic data of respondents while other sections contain items on the variables of interest.

Section B: To investigate the situation of water, sanitation and hygiene in North East of Nigeria

Section C: To identify different kind of water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria

Section D: To assess the people perceptions towards water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria

Section E: To examine the impact of water, sanitation and hygiene interventions programme on the people wellbeing in North East of Nigeria

Section F: To identify factors that affects the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria

Section G: To identify ways to mitigate the factors that affects the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria

Distribution Methods

Questionnaires were distributed to te respondents by reaching out to them one on one, while this affords the researcher physical meeting with respondents to collect the needed data. The exercise however lasted for two week time.

Questionnaire Design

The questionnaires consist of two parts, which are Section A and Section B. In Section A, it requires the information regarding demographic characteristic and personal information of the respondents. The question involves consist of gender, age, ethnic, education, and income level. For Section B, it is related to the independent variables of the research.

Data Analysis

Data analysis is the method adopted in the description of the a body of the phenomenon methods and used to test hypotheses. The relationships between variables are looked into at this juncture, conceptualizing them in the body of literature. This gives a critical overview of the information retrieved (Joseph and Rosemary, 2003).

The various data gathered would be subjected to analysis that is, the data would be computed nd analysed to draw out the valuable information. This would be done through the use of appropriate and acceptable technique known as SPSS package (Scientific Package for Social Scientist). Statistical Package for the Social Science (SPSS) Version 16 and Microsoft Excel 2007 software was deemed suitable for use for in carrying out the data analysis. The essence of Data analysis is to transform the dat collected into useable information, easy to interpret and understood (Zikmund, 2003).

Through the use of Multiple Regression Analysis, percentage and frequency tables were utilized in analyzing the descriptive result. There are three major statistical techniques that use to apply on this research, which are descriptive analysis and inferential analysis.

Descriptive Analysis

Descriptive analysis gives an actual description of event, things and people exactly as they appear using such tool as pie charts, line charts and bar graphs, measure of dispersion, such as variance and standard deviation. However, most commonly used tools are the measures of central tendency, such as mean and median (Hall, 2011).

Inferential analysis

Sekaran (2003) emphasized that "researchers might have inferred from the data through analysis about the relationship between two variables, differences in variables among different subgroups, and how several independent variables might explain the variance in a dependent variable". Inferential analysis therefore is used in drawing a reliable conclusion as an excerpt of volumes of information from a group of statistical techniques and procedures and about a population from quantitative data collected from a sample.

Multiple Regression Analysis

Zikmund (2003) emphasized that "multiple regression analysis is an analysis of association in which the effect of two or more independent variables on as single, interval-scaled or ration-scaled dependent variable is investigated simultaneously". It therefore consideres differences in factors or variables as estimated. The essential of multiple regression analysis lies in determining

the variables that holds the strongest influence on susceptible variables; however in cases where the variables are correlated, it thus implies both can be used to predict the other variables.

3.2.6 Data Presentation

In presenting the data collected, the data were critically checked through, edited and afterwards carefully coded and then transcribed using an applicable data-analysis strategy (Malhotra, 2004).

Step 1: Questionnaire Checking

At this stage, each questionnaire was subjected to critical check to be sure they are rightly completed by respondents and responses given are such that are acceptable. Prior to general administration of questionnaires however, a pilot test had been conducted to ensure the validity and reliability of the questionnaire (Malhotra, 2004).

Step 2: Data Editing

At this stage questionnaires returned from the field exercise are screened to check for accuracy and precision while the questionnaires that are not properly answered or filled are separated and discarded. Reasons for regarding the questionnaires not useful may include unclear response, illegible writing, indirect responses and more (Malhotra, 2007).

Step 3: Data Coding

This stage features the entering of data for computation. According to Malhotra (2004), portrays coding as a way of assigning figures to represent the opinion expressed by each of the respondents selected for the study, such that same response are generally categorized for easy collation. SPSS is used in coding the data collected for this study.

Step 4: Data analysis and Interpretation

At the completion of the coding stage, data are then analyzed appropriately and interpreted into useful information which describe the phenomenon been studied in a way easy to comprehend and applied. In analyzing the data however, Statistical Package for Social Science (SPSS) version 16.0 comes to fore (Malhotra, 2004).

3.2.7 Validity and Reliability

Validity and reliability

Validity is defined by various researchers as;

- A contingent construct that is neither fixed, single nor universal, applies to both quantitative and qualitative researches to describe, interpret and evaluate findings as study progresses (Winter, 2000).
- It is concerned with how data is measured by researchers, the meaningfulness of components and what is intended which in this research is sustainability of water, sanitation and hygiene interventions in North East of Nigeria (Drost, 2011).
- The extent to which the actual test by the researcher measured, show differences among participants selected from a population (Blumberg et al, 2011).
- This is a method of comparing a measurement with one or more standards, that is, measuring what is intended by the researcher and not something else (Acock, 2012).
- A measurement using four constructs namely; construct for multiple sources, internal for building and addressing rival explanations, external for single and multiple case studies and reliability to develop case study database (Yin, 2014).

There are always concerns in every research whether the findings are true, so validity is investigated through several methods by Yin (2014) structured the following validity tests;

- Construct validity – This is used to establish a chain of evidence and depends on multiple sources of data to encourage convergent lines of inquiry, both relevant tactics applied when collecting data. It is a method used to determine if the research findings are based on the present happenings, not bias or based on researcher's sentiments.
- Internal validity – Mainly concerned with explanatory researches to explain how and why event *a* led to event *b*, without knowing that another factor-*c* may have caused *a* to occur. It is not applicable for exploratory and descriptive studies but extends to involving inferences when an event cannot be directly observed. Essential for explanation building, using logic models, pattern matching and addressing rival explanations.
- External validity – This test is used to check if the findings are generalised beyond immediate study regardless of method applied. In this method, if the research contains a

strong ‘what’-questions, arriving at generalised findings becomes difficult. It is best suited for researches based on documentations.

From the above definitions, tests, highlights and considering this research is a survey, the best applied method to test its validity will be construct validity. This is to ensure validity of the hypothesis adopted. It will prove if the research objectives are not, fully, partially or just valid in only 1 or 2 aspects using hypothesis generated from research questions. The validity from using this test method establishes the benefits and functionality of the study, its factors and relevance to the respondents. However, when exploring the data, its validity will be constantly reviewed as research progresses.

Reliability is defined as different individuals repeat measurements under different conditions, with the same or alternative measuring instruments, arrive at the same conclusions with little or no random errors easily cancelled out (Blaikie, 2003; Blumberg, 2011; Acock, 2012; Drost, 2011; Yin, 2014). Consistency to present accurate findings that aligns with research questions to prove authenticity and uniqueness without bias even if it means asking for help to achieve results that accept or reject hypothesis. It is calculated using Cronbach’s alpha and multiple regressions for correlation to achieve internal consistency of content and measure changes in participants (Acock, 2012).

Internal data will be gotten directly from archives’ after approval is granted, direct interviews with key participants and questionnaires to randomly selected participants. This is why reliability of this research will greatly depend on how data is collected to avoid errors. So, a test and retest method is applied throughout where participants have not been consistent with their answers and also helpful for open-ended questionnaires to compare with closed-ended (Blaikie, 2003; Acock, 2012). Before it is run, there have to be one hypotheses; A null hypothesis (H_O) and an alternative hypothesis (H_a) (Acock, 2012).

For instance, 40 sets of questionnaires have been randomly distributed to the respondents to identify for the errors. Through the feedback from the 40 sets of questionnaires, overall of the questionnaires are suitable which are quite easy for the respondents to understand. However, there are some comments such as some grammar mistakes and typing errors in the questionnaire.

Thus, amendments have been made according to the mistakes been pointed out through the pilot testing.

Table 3.2: Cronbach‘s Alpha Reliability Analysis

	Cronbach's Alpha
To investigate the situation of water, sanitation and hygiene in North East of Nigeria	.910
To identify different kind of water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria	.903
To assess the people perceptions towards water, sanitation and hygiene interventions programme frequently adopted in North East of Nigeria	.908
To examine the impact of water, sanitation and hygiene interventions programme on the people wellbeing in North East of Nigeria	.942
To identify factors that affects the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria	.976
To identify ways to mitigate the factors that affects the sustained adoption of safe water, sanitation and hygiene interventions in North East of Nigeria	.910

3.3.8 Ethics

According to Yin (2014), ethics are developed and initiated to govern certain intended action such that allows for decency and professionalism on any subject of interest. Therefore, research ethics are principles that serve as guidelines in the conduct of research. The researcher employed in this study the ethical codes of conduct that regulate researcher’s conduct. The codes of conduct that regulate researcher’s behavior were discuss by the author, this is as a result of rising many issues that may come up in the study. (Max and John, 2011).

Researcher came up with the main key principles and ethical guidelines which included confidentiality, anonymity integrity, informed consent, voluntary participation, avoidance of harm and impartiality. In this study, the respondents consent and approval were sort and their right to decline in filling questionnaires well respected all through the conduct of the exercise. To clear any misconceptions about the intentions of the study, an explicit overview of what the study entails and how the results is to be utilized, was given to the respondents; with the promise to offer privacy and confidentiality; thereby gaining the respondents confidence.

In order to ensure that data are consistent with the researcher‘s conclusions, constant checking with respondents during and after administration of questionnaire were done. To help address

any inconsistencies, lines of communication was left open between the researcher and the respondents throughout the study. Much as there are no perfect measures and principles, the researcher tries to keep all minor issues of concern in check to make the findings authentic. Exercises were therefore streamlined towards adding to knowledge, proffering solution to issues, and developing new ideologies rather than cause chaos or friction in an attempt to carry out an investigation. This governs the conduct from the initial to the completion of project; so as to reach a meaningful conclusion and generalization regarding the study.

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