

PROBLEMS OF WATER SUPPLY AND SANITATION IN KPAKUNGU AREA OF MINNA (NIGERIA)

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Abstract: Access to clean water and adequate sanitation has been a challenging issue in Kpakungu. Due to the unavailability of clean water sources and poor sanitation most of the inhabitants of Kpakungu are threaten with the spread of diseases such as diarrhoea and cholera and this has led to the degenerating situation of Kpakungu. Assessing the problems of water supply and sanitation in Kpakungu area of Minna, Niger State using GIS (Geographic Information System) is aimed at providing access to adequate portable water supply and a better sanitation through the use of research and advocacy. This is achieved by identifying the pattern of access to public water supply and sanitation in Kpakungu and the creation of a database of the existing water source and their yield was determined to enhance planning. This research involved the use of both primary and secondary data to achieve a thorough assessment of the problems of poor water supply and sanitation in the study area. It was discovered that the problems of poor water supply and sanitation often leave most women and children on queues for several hours and those that cannot endure are forced to travel long miles in search for alternative source of water, which may not be fit for drinking. In the light of this, mothers are prevented from domestic work and most children are kept away from school. At the end of the research water and sanitation blue print for the study area was designed and a proposal was sent to relevant government agencies and ministries for the provision of more sources of potable water in the community. In this regard, Public Private Dialogue (PPD) was initiated and adequate follow up process was made until the aim of the research was achieved.

Keywords: water, hygiene, sanitation, cholera, diarrhoea.

INTRODUCTION

Water is life: adequate supply of water is central to life and civilization. The five basic human needs namely air, water, food, light, and heat. Water is common factor to other four. It is therefore not an understatement to say water is life, because it forms an appreciable proportion of all living things including man. In fact, water is very critical to human life. Water constitutes about 80% of animal cells. The human body by weight consists of about 70%

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water and several body functions depend on water (Human development report 2006).

According to the popular Nigerian musician Fela Kuti who in his song “water no get enemy” reiterated that all human activities cling on water and that man will go to any length to search for water in times of scarcity and this has proven the slogan “water is life” right. In the third world countries of the world with Nigeria inclusive, the problem of portable water supply in slum area (Kpakungu, Niger State) have poised a lot of challenges with task of collecting water falling largely on women and children and their journey to collect water is long, tiring and often dangerous, it prevents millions of mothers from working and lifting their families out of poverty. It keeps millions of children out school and from playing, depriving them of the wellbeing and education necessary to become healthy adults. Where there are clean water sources, inadequate sanitation threatens them and spreads diseases such as diarrhoea and cholera. People are forced to walk for water because governments fail to prioritise water and sanitation for all (The World Walks for Water, 2010).

According to the Millennium Development Goals (MDGs) Report 2012, 783 million people, or 11% of the global population, remain without access to an improved source of drinking water. Such sources include household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collections. The world has met the MDGs drinking water target five years ahead of schedule but work is not yet completely done. Also, there are regions particularly delayed such as Sub-Saharan Africa where over 40% of all people without improved drinking water live.

The United Nations has long been addressing the global crisis caused by insufficient water supply to satisfy basic human needs and growing demands on the world’s water resources to meet human, commercial and agricultural needs. The United Nations Water Conference (1977), the International Drinking Water Supply and Sanitation Decade (1981-1990), the International Conference on Water and the Environment (1992) and the Earth Summit (1992) – all focused on this vital resource. The Decade, in particular, helped some 1.3 billion people in developing countries gain access to safe drinking water.



In the general Assembly of the human right to water and sanitation, the Assembly established the right of every human being to have access to sufficient water for personal and domestic uses (between 50 and 100 litres of water per person per day), which must be safe, acceptable and affordable (water costs should not exceed 3% of household income), and physically accessible (the water source has to be within 1,000 metres of the home and collection time should not exceed 30 minutes).

The crucial importance of water to so many aspects of human health, development and well-being led to the inclusion of a specific water-related target in the Millennium Development Goals (MDGs). At the same time, every target of the MDGs depends on the achievement of the water and sanitation target: eradicating extreme poverty and hunger; achieving universal primary education; promoting gender equality and empowering women; reducing child mortality; improving maternal health; combating HIV, AIDS, malaria and other diseases; and ensuring environmental sustainability.

STATEMENT OF PROBLEMS

Minna, the Niger State capital has witnessed remarkable expansion, growth and developmental activities such as buildings, road constructions, deforestation and many other anthropogenic activities. In this regard Kpakungu has been facing a lot of problems such as poor water supply and sanitation, long stay on queues by women and children waiting for hours for water, environmental problems of air and noise pollution, uncollected refuse, flooding due to inadequacy or absence of drainage facilities and rapid and unplanned urbanization which turns the area (Kpakungu) into a slum.

The aim of this study is to providing access to adequate potable water supply and a better sanitation through the use of research and advocacy. The objectives are: 1) to identify the pattern of access to public water supply and sanitation in Kpakungu; 2) to create a database of the existing water source and their yield; 3) to identify the problems of water and sanitation in Kpakungu; 4) to design a water and sanitation blue print for the study area.





Fig. 1. Niger State in national context.

Source: Department of Urban and Regional Planning, FUT Minna.

This study is limited to Kpakungu area located in southwest of Minna, Niger State, Nigeria. Kpakungu is faced with the problem of over-crowding resulting from massive urban influx. Hence, the low income earners of the city that can afford to stay in the city centre has made Kpakungu their habitat due to this reason Kpakungu is forced to grow in an unplanned. However, access to adequate potable water and sanitation situation remained a far cry.

No society can do without access to potable water and sanitation, hence it is essential to always think of ways of dealing with problems of poor water supply and sanitation. It is therefore, pertinent to develop strategies that will ensure access to potable water supply and sanitation services for sustainable clean environment of the study area (Kpakungu). The quality, accuracy and the awareness of stakeholders have tended to be greatly enhanced when geographic information system is used as a tool.

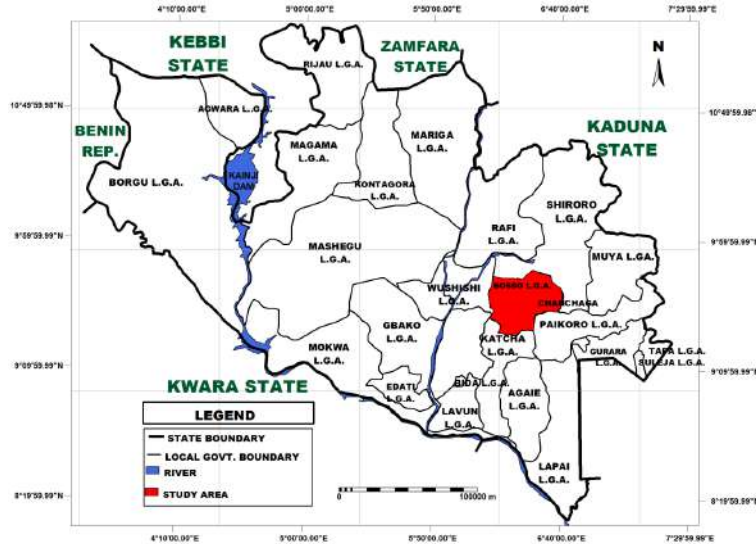


Fig. 2. Bosso local government area in State context.

Source: Department of Urban and Regional Planning, FUT Minna.

LOCATION

Kpakungu is located on latitude 9° 35'55.00" N and longitude 6° 32' 00.00"E. Niger state is located between on latitude 8° 10' N and 10° 30' N and between longitude 3° 30' E and 7° 30' E. Niger State covers an area of 96,363 square kilometres. Minna is located at the north-eastern part of the land that makes up Niger State along the Lagos-Kano railway track. It enjoys a strategic location and relatively easy accessibility from all parts of the country.

Kpakungu has a combination of dry and wet season, a hybrid of northern and southern Nigeria climate. Progressively it has a decreased in length and amount of rainfall from south to north with a mean annual rainfall between 110mm in the north to 1600mm in the south. The wet season has duration, which changes from 150 days in the north to 210 days in the south.

Air temperature in the area is fairly constant during seasonal variables and the mean temperature does not

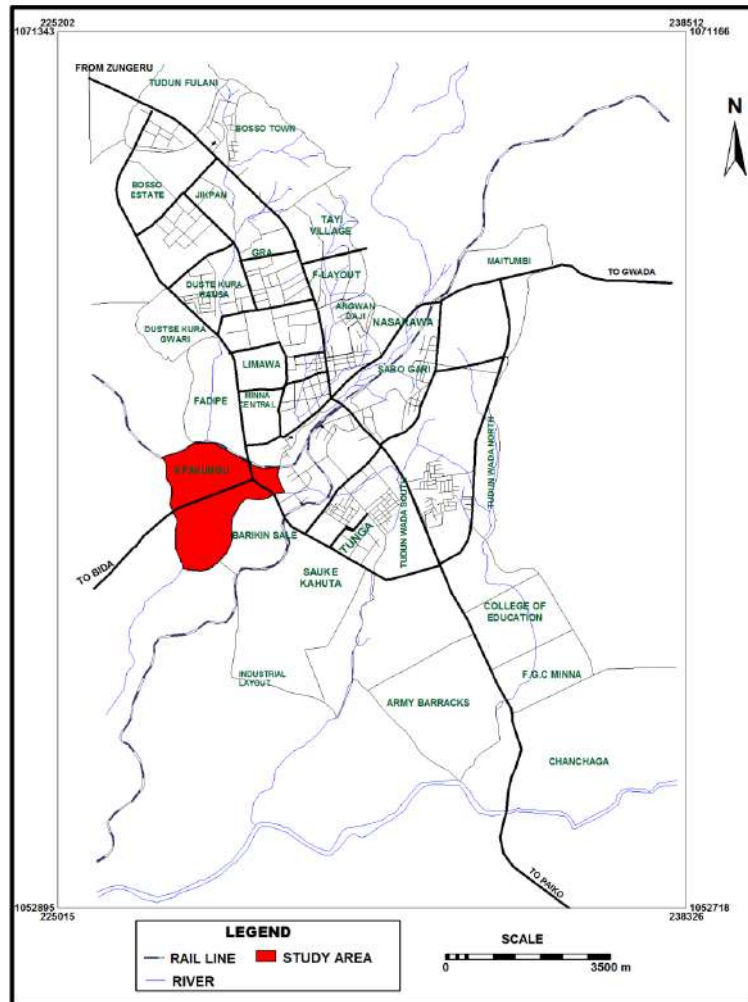


Fig. 3. Street guide map of Minna showing the study area.

Source: Department of Urban and Regional Planning, FUT Minna.

exceed $13,88^{\circ}\text{C}$ which is between March and June with the lowest minimum temperature usually in December and January. In October it experiences dry season with north-east trade winds from Sahara which brings about Hamattan that last between December and February which the relative humidity could be as low as 14°C .

The inhabitants of Kpakungu are mostly traders and farmers who are into production of crops like Maize, Millet, Rice, and Yam. Although some of them are government workers but they still do other things to support themselves and their families.

DEFINITION OF BASIC CONCEPT: WATER, SANITATION AND HYGIENE

“Access to water” was broadly defined as the availability of at least 20 litres per person per day from a source within one kilometre of the user’s dwelling. Types of source that did not give reasonable and ready access to water for domestic hygiene purposes, such as tanker trucks and bottled water, were not included (bottled water was not considered “improved” because of concerns about the quantity of supplied water, not the water’s quality). While “Improved sanitation facilities” was defined as including connection to a sewer or septic tank system, pour-flush latrine, simple (or double) pit or ventilated, improved pit latrine, again allowing for acceptable local technologies. The excreta disposal system was considered adequate if it was private or shared (but not public) and if it hygienically separated human excreta from human contact (WHO 2000).

According to the USAID, planning access to improved water and sanitation is a daily challenge for most Nigerians. The problem is particularly acute in the rural Northern Nigeria, where only about 30% of the population has access to safe drinking water and adequate sanitation. This situation leads to a high prevalence of waterborne diseases, threatens the livelihoods of smallholder farmers, and contributes to low levels of school enrolment, especially among girls.

Water and sanitation is defined as the provision and maintenance of hygiene conditions through services such as garbage collection and waste water disposal (HDR 2006).

The Millennium Task Force (2008) define sanitation as an access to, and use of, excreta and wastewater facilities and services that ensure privacy and dignity, ensuring a clean and healthy living environment for all. All the aspects of sanitation in the above definition are necessary to



Table 1. *Service level descriptors of sanitation in relation to hygiene*

Service level description	Technology	Ease of access	Level of health concern**
No access	Open defecation, 'flying toilets', a hole in the ground, bucket latrine, open latrine or public toilet without adequate levels of hygiene. No water available for washing. *** No wastewater, solid waste or storm water disposal.	Open defecation seldom provides privacy and always is a safety risk, particularly for women and children.	Very high. High likelihood of human contact with faeces, or of contamination via flies or other vectors. No physical security for women and children.
Basic access	Household level standard pit latrine with superstructure or public toilet with adequate levels of hygiene, connected to a pit that is regularly emptied, sewer or septic tank* for all members of a locality. Water available for washing. Wastewater, solid waste and storm water removed from human settlements and drinking water resources.	Access may be adequate. However, public toilets are not always open, can be unaffordable, and/or may not be hygienically managed. Privacy may be ensured.	High, depending on whether toilet is hygienically kept and regularly maintained (e.g. pit emptied regularly) and whether most persons in a locality use sanitation effectively in order to prevent faecal-oral transmission. Where toilets are away from the household, physical security for women and children is significantly reduced.
Intermediate access	Household level pit latrine or toilets connected to a septic tank or sewer*. For all members of a settlement, emptied as necessary. Water available for washing. Wastewater, solid waste and storm water removed from human settlements and water resources.	Privacy assured, access available day or night.	Medium, depending on whether toilet is hygienically kept and regularly maintained (e.g. pit emptied regularly) and whether most persons in a locality use sanitation effectively in order to prevent faecal-oral transmission.

ensure health, privacy and dignity, and therefore constitute a minimum human rights standard. Some definitions of 'sanitation' are accompanied by a definition of 'basic sanitation' that leaves out the treatment and disposal of excreta and wastewater. However, from a human rights point of view, such a level of access to sanitation would not meet the minimum human rights standards. It is therefore proposed that 'basic sanitation', in human rights terms, should simply refer to low-cost technology that provides basic access to sanitation as shown in table 1.

Table 1 describes the impact on health relating to different service levels, suggesting stepping stones towards



Table 1. (Continued)

Optimal access	<p>Low-density areas: Household-level pit latrines* or toilets connected to a septic tank with mechanical emptying services for all residents in a settlement.</p> <p>Dense urban areas: Household toilet, connected to a sewer,* for all residents in the settlement.</p> <p>Water is available for washing.</p> <p>Wastewater, solid waste and storm water disposal is environmentally</p>	Can be used day or night, in full privacy.	Low, but relies upon sewage and faecal sludge being effectively transported, treated and disposed so that wastewater and faeces do not contaminate the environment, including water supplies.
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* Or adequate alternative.

** In order to reap all the health benefits, it is necessary that sanitation be used effectively by at least 75% of the population (JMP).

*** In some cultures, water is not only necessary for hand washing, but also for anal and genital cleansing. Water is also required for menstrual hygiene.

N.B. The technology used is irrelevant in terms of health, privacy and dignity if good hygiene is not practiced.

Source: Adapted from the WHO: Service level descriptors for water in relation to hygiene, table 6, in J. Bartram and G. Howard, *Domestic Water Quantity, Service Level and Health* (Geneva: WHO, 2003), 22.

optimal access to sanitation. Where necessary, facilities and services should include the, collection, transport, treatment and disposal of human excreta, domestic waste-water and solid waste, and associated hygiene promotion (UN Water Task Force for the International Year of Sanitation, 2008) to the extent demanded by the particular environmental conditions.

According to the WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation (JMP), 37% of the developing world's population – 2.5 billion people – lack improved sanitation facilities, and over 780 million people still use unsafe drinking water sources. Inadequate access to safe water and sanitation services, coupled with poor hygiene practices, kills and sickens thousands of children every day, and leads to impoverishment and diminished opportunities for thousands more.

Poor sanitation, water and hygiene have many other serious repercussions. Children – and particularly girls – are denied their right to education because their schools lack private and decent sanitation facilities. Women are

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forced to spend large parts of their day fetching water. Poor farmers and wage earners are less productive due to illness, health systems are overwhelmed and national economies suffer.

STATISTICS FOR DRINKING WATER AND SANITATION

The UN suggests that each person needs 20-50 litres of water a day to ensure their basic needs for drinking, cooking and cleaning (World Water Assessment Program). More than one in six people worldwide – 894 million – don't have access to improved water (WHO, UNICEF, and JMP). The joint monitoring program on water and sanitation noted that diarrhoea is the leading cause of illness and death, and 88% of diarrhoea deaths are due to a lack of access to sanitation facilities, together with inadequate availability of water for hygiene and unsafe drinking water.

According to the Water Supply and Sanitation Collaborative Council 2.5 billion people, including almost one billion children, live without even basic sanitation. Every 20 seconds, a child dies as a result of poor sanitation. That's 1.5 million preventable deaths each year. Also in Sub-Saharan Africa, treating diarrhoea consumes 12% of the health budget. On a typical day, more than half the hospital beds in are occupied by patients suffering from faecal-related disease.

WATER FOR ALL

While over 70% of the Earth's surface is covered by water, most of it is unusable for human consumption. According to the Government of Canada's Environment Department, freshwater lakes, rivers and underground aquifers represent only 2.5% of the world's total water supply. Unfortunately, in addition to being scarce, freshwater is also very unevenly distributed. As many may know, the United Nations has compared water consumption with its availability and has predicted that by the middle of this century between 2 billion and 7 billion people will be faced with water scarcity. Given this emerging reality, it is



little wonder that water has been described as “the oil of the twenty first century”, a scarce commodity that will be a source of conflict between peoples and nations. If you think that is hyperbole, consider this: in addition to such a dire prediction, the United Nations also estimates that 1.2 billion in a world of just over 6 billion people do not have access to safe drinking water and 2.4 billion lack proper sanitation facilities (UN Chronicle 2005).

THE NECESSITY OF ACCESS TO SANITATION FOR ALL

The impact of the sanitation crisis is far reaching, acting as a brake on development efforts and constraining progress across all the MDGs. Sanitation, as a single intervention, has the potential to catalyse a broad range of development outcomes and supports the realization of other human rights, including the rights to education, health, adequate housing, work, food and water. First and foremost, lack of access to sanitation is an affliction of the vulnerable and marginalized. Children under the age of five accounts for almost 90% of all the deaths that occur from sanitation-related diarrhoea, amounting to at least 5.000 children dying each day. Women, more than men, suffer the indignity of being forced to defecate in the open, at risk of assault and rape. Women, generally being responsible for the home and for children and other dependents, are most affected by a lack of sanitation, and by the indignity of living without sanitation. At least 60% of those who lack access to sanitation are from the poorest sections of society living on less than US \$2 a day and the majority live in the poorest regions of the world. Access to sanitation has the potential to catalyse development and improve the quality of life (COHRE, UN-HABITAT, WaterAid, and SDC 2008).



ENSURING THE HEALTH OF CITIZENS AND LIMITING THE BURDEN OF TREATING PREVENTABLE ILLNESS

A lack of sanitation, including the collection, treatment and disposal or re-use of excreta and wastewater can have a severe negative impact on people's health and dignity and on the environment. Just a small number of people practicing open defecation can threaten the quality of water resources, which will in turn infringe the right to water and the right to health. The major burden of a lack of sanitation is borne by the very young. The safe disposal of excreta is one of the strongest determinants of child survival. Evidence suggests that in addition to causing child deaths by diarrhoea, poor sanitation may also contribute to child deaths resulting from other health conditions, including malnutrition and acute respiratory infections. Further to this, millions of children are left physically stunted, mentally disabled and severely malnourished by excreta-related diseases and intestinal worm infections (Geneva, New York: WHO, UNICEF, 2000). Access to sanitation and good hygiene practices give protection from opportunistic diseases infecting people who are already sick. Women in particular suffer from infections caused by lack of access to hygienic facilities and lack of water for washing during menstruation. Improvements in sanitation and hygiene are the most cost-effective health interventions, yet governments have failed to adequately promote these issues. The resulting costs of treatment of sanitation-related disease drain resources from already weak public health systems. At the household level, the poorest families are forced to use scarce financial resources for health services, which would otherwise be allocated to other important needs, including children's education or to save money for emergencies.

INCREASING ACCESS TO EDUCATION FOR ALL

Significant progress has been made in extending primary education, but sick children do not attend school. The World Health Organization (WHO) estimates that meeting the MDG sanitation target would result in a gain of 272 million school days in the developing world



(UNDP Human Development Report 2006). Lack of adequate sanitation in schools, including the separation of girls and boys facilities, is a critical barrier to school attendance of girls, particularly after puberty. A failure to address sanitation in schools, including facilities for menstrual hygiene, perpetuates gender inequality widening the gulf between the opportunities afforded to girls and boys through education. Sanitation-associated parasitic diseases have been shown to impede learning and child development.

PROMOTING ECONOMIC GROWTH IN THE POOREST COUNTRIES OF THE WORLD

It is estimated that lack of access to adequate sanitation, alongside safe drinking water, costs sub-Saharan Africa 5% of its Gross Domestic Product each year (UNDP – Human Development Report 2006). Meeting the sanitation MDG target would yield economic benefits in the region of 63 billion dollars each year rising to 225 billion dollars if universal access to sanitation was achieved (OECD 2004). Notably, the greatest economic benefits would accrue in the poorest regions of the world, in particular in Sub-Saharan Africa. According to the 2006 Human Development Report, meeting the sustained investment of 10 billion dollars per year (UNDP – Human Development Report 2006). Lack of sanitation most affects those struggling to mobilize the means for basic survival, diverting scarce resources from critical areas such as nutrition, health and education. Access to sanitation supports other efforts to assist people find a path out of poverty, particularly by reducing the cost of healthcare and reducing the number of working hours lost to ill-health. Easy access to sanitation also frees time for other activities, including for work and education, or improved care of children or the elderly.



NIGERIA HISTORICAL PERSPECTIVE OF WATER AND SANITATION

Public water supply started in Nigeria early in the twentieth century in a few towns managed at the lowest administrative level. Amongst the early beneficiaries were Lagos, Calabar, Kano, Ibadan, Abeokuta, Ijebu Ode (Ogun State) and Enugu. The schemes were maintained with revenue from water sales with virtually no operational subvention from government. With the creation of regional governments in the early 1950s the financial and technical responsibilities for developing new water schemes were taken over by the regional governments who also assigned supervisory high level manpower to oversee operations and maintenance. The regions were slow to set up independent bodies to develop, operate and manage the water supply. The first water corporation was formed in the western region in 1966, which took over all the assets and liabilities, including the existing staff. The staffs of the Water Division of the Ministry of Works were also transferred to the new corporation. The next corporations were formed in the 1970s. Today, all 36 states and the Federal Capital Territory have water boards/corporations or public utilities boards managing their public water supply. Their efforts are supplemented, in many cases, by local governments who supply water to small villages in their areas of jurisdiction. The Federal Government got involved in the management of water resources in 1976 when the Federal Ministry of Water Resources and the 11 River Basin Development Authorities (RBDAs) were created. The purpose of the RBDAs was to provide bulk water primarily for irrigation.

WATER AND SANITATION IN NIGERIA

The National Economic Empowerment and Development Strategy (NEEDS) [2003-2007] recognized that good health is unobtainable unless the environments in which people live are healthy. Many of the diseases that affect Nigerians, including malaria, tuberculosis, diarrhoea and dysentery, are due to unhealthy environmental conditions (NPC 2004). The NEEDS identified the low



level of sanitation, especially in urban centres and peri-urban slum, as a critical issue in this sector. Environmental health considerations therefore remain vital to achieving the objectives of NEEDS since environment provides the foundation for all development effort in Nigeria. The national water and sanitation strategy under NEEDS recognizes that water supply and sanitation are central to improvements in so many aspects of human development, health, education, urban and rural development, development of industry, and general economic development and thus central to the government's primary mission of poverty reduction. Therefore, the NEEDS proposed that water supply and sanitation should be the primary focus of the government. The national water supply and sanitation programme proposed four sub-sectors for water supply and sanitation: urban areas, small towns rural areas and water resources management and sanitation.

In the urban sub-sector, the Nigerian government has adopted a fundamental reorientation in the concept of provision. By separating infrastructure investment and ownership from service operation, the government expects to introduce competition with significant efficiency gains. The core urban water strategy is to improve service delivery through optimal public private partnerships (PPP) investment, management and delivery of water services. A key focus of development assistance sought by the government, therefore, is in the area of technical and investment assistance to launch PPP as a viable instrument for sector and utility reform.

WATER SUPPLY AND SANITATION COVERAGE IN NIGERIA

Rapid population growth has not been accompanied by an increase in the delivery of essential urban services such as water supply, sewerage and sanitation, and collection and disposal of solid wastes. It is estimated that currently only about 50% of the urban and 20% of the semi-urban population have access to reliable water supply of acceptable quality (i.e. something better than a traditional source). Overall effective urban water supply cov-



erage may be as low as 30% of the total population due to poor maintenance and unreliability of supplies. Rural coverage is estimated at 35%.

Except for Abuja and limited areas of Lagos, no urban community has a sewerage system, with the result that sewage and sullage either lie stagnant or are disposed through the storm water drainage system. The proportion of the population with access to safe facilities for disposal of excreta and waste water is lower than for water supply.

NATIONAL WATER SUPPLY AND SANITATION POLICY IN NIGERIA

A National Water Supply and Sanitation Policy have recently been adopted (January 2000). This has many very positive points, but some weaknesses and inconsistencies. In particular, this policy makes the supply of adequate water supply and sanitation a right of all Nigerians, and gives responsibility to the three tiers of government, the private sector and the beneficiary. It recognizes water as an economic good and the need to run water supplies as businesses, identifies the need for reform and for private sector participation, recognizes the special needs of women and the poor, and the need to link improved sanitation with water supply. At the same time, it promotes unachievable targets for coverage, and recommends free water for the poor. There are inconsistencies in stated targets for level of service, and sanitation policy is insufficiently developed; there are conflicts, for example, with other government actions regarding sanitation in other ministries.

GETTING AFRICA ON TRACK TO MEET THE MILLENNIUM DEVELOPMENT GOALS (MDGS) ON WATER SUPPLY AND SANITATION

In Sub-Sahara Africa, decreasing number of people without access to safe drinking water and basic sanitation has proved to be a significant challenge. The region is lagging behind the rest of the world with respect to achieving the Millennium Development Goals (MDGs) on water supply and sanitation, which aim to halve the pro-



portion of people without access to safe drinking water and basic sanitation by 2015. Most African countries have developed plans to reach the MDGs on water supply documents and are neither country owned, nor actively implemented.

Further, the plans have little consistency between different counties, making it difficult for policy makers to measure and track progress. In response to this gap, an Africa-wide country owned regionally supported water supply and sanitation (WSS) millennium development goals (MDGs) road map process was conceived by the African Ministers' Council on Water (AMCOW) to help support achievement of the targets and to enable more effective learning processes and support mechanisms (WHO 2006).

EVALUATION OF WATER, SANITATION, AND HYGIENE EDUCATION

According to Nanan *et al.* (2003), inadequate water and sanitation services adversely affect the health and socioeconomic development of communities. Lack of safe sanitation is the world's biggest cause of infection. It is the number one enemy of world health. And it deprives hundreds of millions of people not only of health but also of energy, time, dignity, and quality of life. This issue has been shrouded in embarrassment for too long, hygiene helped by safe sanitation and water supply is what transformed health and productivity in this industrialized countries. And it is one of the world's longest running scandals that the same has not happened long ago in the poor world.

Political interference and low tariff policies have led to inefficiency and chronic financial weakness of public utilities. The inability of water supply and sanitation (WSS) utilities to maintain and extend services has led typically to situations where in fact subsidized services are denied to the poor who have to rely on more costly and lower quality alternatives. A well performing utility is a necessary condition for enhancing the economic efficiency of cities and for accelerating the provision of services low-income areas. However, water utilities in Africa



have limited prospects for improving their performance unless they undergo structural reform. Service delivery is not keeping pace with demand especially for fast growing number of low income households living in informal settlements. Many governments across African countries have recognized the necessity of structural reform to improve water and sanitation services and to extend coverage in fast growing urban settlements (Krisp 2002).

Sanitation, faulty plumbing, and the use of human excrement as fertilizer lead to water contamination by range of water borne pathogens causing diseases such as diarrhoea, malaria, schistosomiasis and trachoma. These water-related health diseases may be exacerbated by climate change such as higher temperatures, heavier rainfall and changes in climate variability as revealed by the third assessment report of the inter-governmental panel (Kennedy 2001).

METHODOLOGY

The data for this study were obtained from two different sources that is, primary and secondary sources.

The primary sources of data used include the following. 1) *Physical survey*: A reconnaissance survey Kpakungu was under taken to determine the actual locations of the various sources of water through the use of handheld GPS. The second objective of this reconnaissance survey was to ascertain the area extent of the study area. 2) *Oral interview*: A forum was organized with the community heads and leaders of the various social groups. This is to integrate their views and contributions in the design of the blue print for water supply and sanitation. 3) *Questionnaires preparation and administration*: The questionnaires administration was relied upon to source for information. This was done to ask questions from people (especially the family head). The questionnaire asked questions about the existing situation, areas lacking access to pipe borne water and sanitation, area that have access to public water, water need of each household, amount spent on water daily, alternative sources to public water supply, distance of the source to household, area that have access to good sanitation, assessment of the water



board among other. 4) *Questionnaires analysis*: After the collection of all the necessary data, statistical package of frequencies, percentage, histogram, bar charts were used for the data analysis. The statistical package was able to offer explanation of the data collected from the field survey. 5) *Sample technique*: The cluster sampling technique was used in the administration of the questionnaire. The study area was subdivided into seven clusters (i.e. Tipper Garage, Kpakungu Field, Field area, Tipper Junction, Former Police Station area, Kpakungu Junction and Agape Road) before the administration of the questionnaire. The method used was the systematic random sampling.

The secondary sources of data include the following. 1) *Journals and texts books*: The collection of data through secondary means includes relevant journals, textbooks, magazines, gazette, internet, records and others which are very important to the research work. The other relevant journals were gotten from the Niger state water board and the sanitary department. 2) *Soft wares*: The software used for this research include, Integrated Land Water Information System (ILWIS) and SPSS. ILWIS was used for the digitization and composition of the Maps while SPSS was used to analyse and present statistical data.

DATA PRESENTATION AND ANALYSIS

The identification of the areas with inadequate access to potable water supply, alternative sources of water and sanitation facilities, inhabitants of Kpakungu perception of access to water supply, sources of waste generation and the general perception of inhabitants of Kpakungu on environmental sanitation in are the issues discussed in this section.

Access to pipe borne

Adequate access to potable water is a major requirement for efficient water supply to any community. The study on the access to potable water supply in the study areas shows that 60% of the inhabitants have access but not regular potable water supply.



Table 2. *Access to pipe borne*

Options	Frequency	Percentage
yes	30	60.0
no	20	40.0
total	50	100.0

Source: Field survey 2012.

Table 3. *How often does your tap run?*

Options	Frequency	Percentage
regularly	10	20.0
not regularly	35	70.0
not applicable	5	10.0
total	50	100.0

Source: Field survey 2012.

As indicated in table 60% of the inhabitants of Kpakungu have access to pipe borne water (but this does not mean they have regular supply of potable drinking water) while 40% of the inhabitants do not have access to pipe borne water.

Table 3 shows that only 20% of the inhabitants of Kpakungu have regular supply of pipe borne water and 80% of the inhabitants do not have regular supply of pipe borne water. This indicates that access to potable water supply at Kpakungu neighbourhood is very poor.

Plate 1 and 2 reveal that most of the water pipes located in the area are either busted or laid in drainages. In the light of this the residents are cut off from regular water supply and also exposed to diseases such as cholera and diarrhoea. The residents of Kpakungu are forced to have an alternative source of water supply due to the “epileptic” water supply experienced in the area. 20% of the inhabitants depend on water tankers for their source of water 18% of the inhabitants depend on water vendors for their sources of water, about 36% of the inhabitants have





Plate 1. Busted pipe in the study area.



Plate 2. Water pipes laid in drainage.



Table 4. *Alternative source of water*

Options	Frequency	Percentage
water tankers	10	20.0
water vendors	9	18.0
well	18	36.0
borehole	9	18.0
others specify	4	8.0
total	50	100.0

Source: Field Survey 2012.

Table 5. *Data base of alternative source of water in Kpakungu*

Clusters	Areas	Source of Water	Coordinates N E	Yields (litres)	Type
1	Tipper Garage	Well	1061714.35, 228590.47	60	Private
		Well	1061730.94, 228590.59	45	Private
		Well	1061789.86, 228553.67	60	Private
		Well	1061819.69, 228560.48	45	Private
2	Kpakungu Field	Well	1061990.89, 228603.45	30	Private
		Well	1062057.44, 228581.96	0	Private
		Well	1062124.23, 228527.53	400	Private
		Well	1062140.82, 228528.74	30	Private
		Well	1062149.68, 228527.71	60	Private
3	Field Area	Well	1062136.44, 228829.65	60	Private
		Well	1062133.14, 228826.33	30	Private
		Well	1062110.95, 228834.96	60	Private
		Well	1062102.12, 228831.60	30	Private



Table 5. (continued)

Clusters	Areas	Source of Water	Coordinates N E	Yields (litres)	Type
4	Tipper Junction	Nil	Nil	Nil	Nil
5	Former Police Station area	Well	1062243.41, 228879.85	45	Private
		Well	1062242.70, 228978.69	45	Private
		Borehole	1062017.51, 229056.15	8,000	Public
6	Agape Road	Well	1061987.97, 229009.81	60	Private
		Well	1061909.73, 229119.08	45	Private
		Well	1062265.07, 228945.90	0	Private
7	Kpakungu Junction	Bore hole	1061876.69, 229096.87	20,000	Commercial
		Well	1061821.13, 229129.42	60	Private
		Well	1061854.96, 229041.80	45	Private
		Bore hole	1061822.31, 228964.68	0	Public
		Well	1061777.50, 229041.24	60	Private
		Well	1061734.19, 228909.13	60	Private
Total				29, 330	

Source: Field survey (march 2012).

their sources of water from the wells, while about 18% and 8% of the inhabitants have their sources of water from the boreholes and streams respectively as indicated in the table 4.

Table 5 shows the average (morning and evening) yield of all the alternative sources of water supply in Kpakungu. A total of 22 private dug wells and 2 state governments' and 1 private borehole are in the study area. The private borehole is used for commercial purpose. Most of





Plate 3. A well located at Kpakungu.

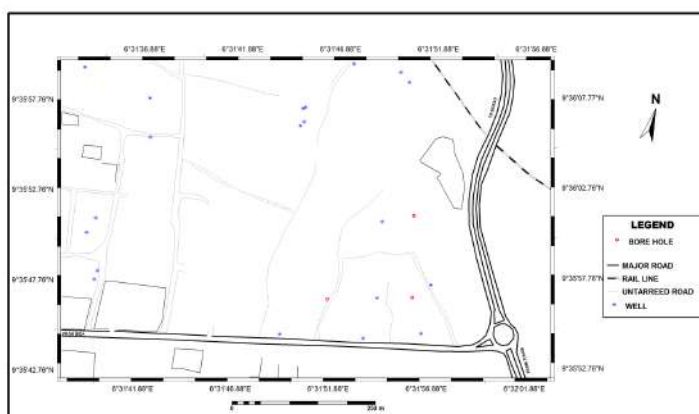


Fig. 4. Locations of wells and boreholes in Kpakungu.

Source: Field survey, 2012.

the wells located in Kpakungu are not fit for drinking but can be used for other domestic purposes because it is always left open and lots of dirt is always deposited in it, as shown in plate 3. As indicated in table 5, the alternative water sources in Kpakungu can yield up to 29, 330 litres.

The distance travelled from dwelling to source of water

The task of collecting water falls largely on women and children and their journey to collect water is long, tiring and often dangerous (The World Walks for Water 2011). Kpakungu is faced with the same dilemma, and as shown in table 6, 24% of the habitants of Kpakungu covers a distance of 0-200m in search for water, 50% of the inhabitants travelled between 201-400 meters to obtain water for their daily use, 4.0% of the households travelled between 401-600 meters to obtain water for their daily use, 10% of the households travelled between 401-600 meters to obtain water for their daily use, 10% and 12% of the inhabitants embark on a tiring journey of 601-800m and 801-1000m respectively in search for water.

Due to unavailability of regular water supply as indicated a table 3 and the long distances covered by the inhabitants of Kpakungu to obtain water. Most of the inhabitants depend on water vendors for their water. Table 7 shows that 88% of the inhabitants patronises water vendors while 12% do not patronize water vendors.

Inhabitants perception of access to water supply

From the inhabitants' perception about water supply in the study area, it could be said that water supply in the Kpakungu is highly inadequate because only 8% of the inhabitants have a satisfactory water supply while 22% are believed to have an unsatisfactory water supply. Majorities (28%) of the inhabitants are highly unsatisfied with the water supply to the area and 22% of the inhabitants tend to have fair supply of water as indicated in table 8.

Sources of waste generation in Kpakungu

From the field survey carried out, as indicated in table 19,54% of the waste generated are domestic due to the fact that Kpakungu is a residential area, 28% of the inhabitants generates their solid waste from commercial activities, 4% of the inhabitants generate their solid waste from industrial activities and 4% generates its solid waste from agricultural activities.



Table 6. *The distance travelled from dwelling to source of water*

Options	Frequency	Percentage
1-200m	12	24.0
201-400m	25	50.0
401-600m	2	4.0
601-800m	5	10.0
801-1000m	6	12.0
Total	50	100.0

Source: Field survey 2012.

Table 7. *Patronage of water vendors*

Options	Frequency	Percentage
yes	44	88.0
no	6	12.0
Total	50	100.0

Source: Field survey 2012.

Table 8. *Inhabitants perception of access to water supply*

Options	Frequency	Percentage
highly satisfactory	6	12.0
satisfactory	8	16.0
fair	11	22.0
unsatisfactory	11	22.0
highly unsatisfactory	14	28.0
Total	50	100.0

Source: Field survey 2012.



Table 9. Sources of waste generation

Options	Frequency	Percentage
Domestic	27	54.0
Commercial	14	28.0
Industrial	2	4.0
Agricultural	2	4.0
Others (specify)	5	10
Total	50	100.0

Source: Field survey 2012.

Table 10. Types of solid waste generated

Options	Frequency	Percentage
Vegetative Waste	15	30.0
Paper	13	26.0
Polythene	10	20.0
Clothing	6	12
Metal Scraps	2	4.0
(Others) specify	4	8.0
Total	50	100.0

Source: Field survey 2012.

Table 11. Access to collection points

Options	Frequency	Percentage
Yes	15	30.0
No	35	70.0
Total	50	100.0

Source: Field survey 2012.



Table 10 shows the types of solid waste generated from the inhabitants of the study area of Kpakungu. It shows that 30% of the inhabitants generate vegetative waste, 26% of the inhabitants generated paper waste, 20% of the inhabitants generates polythene waste, and 12% of the inhabitants generate clothing waste, while 4% of the inhabitants generated metal scraps waste. The solid wastes generated in the study area are disposed indiscriminately, as most of the inhabitants either dispose their waste in drainages, open fields and at the side of the road. This is due to the inadequacy of the waste collection points. Plate 4 and 5 show the indiscriminate waste disposals in drainages and along the major road respectively. Also, it was discovered that only 30% of the inhabitants of Kpakungu have access to refuse collection points while 70% of the inhabitants do not have access to any collection points, as indicated in table 11.

Table 12 shows the presence of drainage channels and canals in the study area. The table shows that only 36% of the inhabitants of Kpakungu have access to drainage channels and canals, while the remaining 64% of the inhabitants do not have access to drainage channels and canals in their area. In this regard, most of inhabitants discharged their waste on open spaces, which often become breeding grounds for mosquitoes and other disease carrying vectors. Table 14 shows that only 20% of the inhabitants of Kpakungu discharge their liquid waste in drainage channels, 40% of the inhabitants discharge their waste on open spaces while 13% of the inhabitants of Kpakungu discharge their liquid waste in their soak away.





Plate 4. Waste disposal in drainages.

Source: Field survey 2012.



Plate 5. Waste disposal along major road.

Source: Field survey 2012.



Table 12. *Drainage channels and canals in Kpakungu*

Options	Frequency	Percentage
Yes	18	36.0
No	32	64.0
Total	50	100.0

Source: Field survey 2012.

Table 13. *Means of liquid waste discharge at Kpakungu*

Options	Frequency	Percentage
to the channel	10	20.0
to the open space	20	40.0
to the soak away	13	26.0
others (specify)	7	14.0
Total	50	100.0

Source: Field survey 2012.

Table 14. *Perception of the sanitary condition of Kpakungu*

Options	Frequency	Percentage
highly satisfactory	7	14.0
satisfactory	9	18.0
fair	11	22.0
highly unsatisfactory	23	46.0
Total	50	100.0

Source: Field survey 2012.



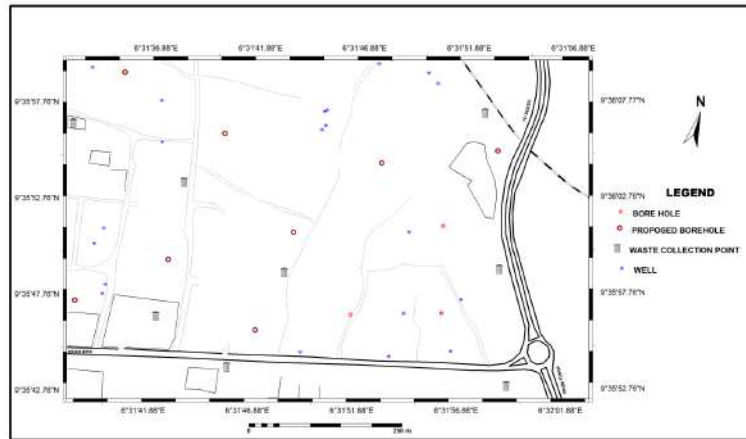


Fig 5. Map showing the proposed boreholes and waste collection points.

Source: Field survey, 2012.

Perception of the sanitary condition of Kpakungu

Table 14 shows how the inhabitants perceive the sanitary condition of their surrounding environment in Kpakungu. It is indicated in the table that only 14% of the inhabitants of Kpakungu are highly satisfied with the sanitary condition of their surrounding environment, 18% of the inhabitants are satisfied with the sanitary condition of their surrounding environment, 22% of the inhabitants are fairly satisfied with the sanitary condition of their surrounding environment, while 44% are highly unsatisfied with the sanitary condition of their surrounding environment. This indicates that the sanitary condition of Kpakungu neighbourhood is rapidly deteriorating and this could lead to outbreak of disease epidemics such as cholera, typhoid and diarrhoea. This calls for urgent attention by the state government and the state environmental agency to look into the problems of sanitation before it deteriorates finally.

FINDINGS

The households connected to public water supply have to complement their water supply with other sources of water supply in which most of them use well and rainwater when available, and some inhabitants do buy water from water vendors. It is also noted that not all the inhabitants that buy water do it on a regular basis but they do buy water if they feel that other sources of water supply is not clean enough for consumption.

The distance to water supply is less than 100 meters for those with home built wells, taps, and bore holes, more than 100 meters for those going to neighbours or streams to fetch water for their daily use, and more than 300 meters for those that cross the streets to fetch water from boreholes.

Children less than fifteen years of age are engaged in the activities of fetching water and this weaken their potentials or output in school. Mothers who are usually responsible for the household up keep and maintenance are also engaged in fetching water and this deprive them from performing their domestic duties.

Also lack of proper waste disposal system in the study area live the inhabitants with no choice than to dispose both their solid and liquid waste either in to water channels or open spaces indiscriminately. Dumping of refuse into water bodies contaminate the water making unsafe for human consumption while dumping in open spaces leave the environment very untidy.

Again the waste disposed in water bodies blocks the water channels giving rise to flooding and on the other hand the stagnant water becomes harbour for breeding mosquitoes.

Pipes are often laid in drainages and whenever there is a linkage on those pipes most inhabitants tends to consume contaminated water and this will give rise to an outbreak cholera and diarrhoea. The people often affected by these water related diseases are mostly children and this weakens their potential to reach a healthy adult age.

The total yield of all the alternative water sources in Kpakungu is 29,379 liters and this cannot cater for the ever increasing population of Kpakungu.



PROPOSALS

To end the water and sanitation problems of Kpakungu the views of the inhabitants of Kpakungu was noted and then integrated into planning. A water and sanitation blue print was designed. This gives room for the provision of 10 additional boreholes and 8 refuse collection points. This will help to curb the problems of travelling long distances by the inhabitants of Kpakungu in search of water and indiscriminate waste disposal in the study area.

In doing this, a proper survey need to be carried out to ensure that the area chosen for drilling of these boreholes is suitable so that the problem of low yield will not arise. Also a site analysis survey should be carried out before sitting the refuse collection points (Figure 5 shows a detail of the proposals). The inhabitants of Kpakungu need to be enlighten on the dangers of poor sanitation in their neighbourhood.

A copy of this blue print would be sent to the state environmental agency and follow up plan would be made. This is to ensure that the proposal is carried out.

CONCLUSION

Water and sanitation are importance to life; the lack of these services is destructive to human health as well as the environmental wellbeing and can reduce a well-planned area into slum. It further pollutes the entire surrounding environment as air is not stagnant it moves and carries particles along. These particles could be harmful to human health when coming from such polluted areas. Also in ability of the urban dwellers to have access to potable water compelled them to purchase water with no proper quality basis. It has some implications for health and the economy of the people as well.



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