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BITING THE BULLET: THE CASE OF HOUSEHOLDS' RESILIENCE TO WATER SUPPLY AND SANITATION DEFICIT IN NIGERIA

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Abstract. This study conceptually assesssed household resilience to water supply and sanitation deficit in Nigeria. It expressed water supply and sanitation situation in Nigeria in terms of historical background and organisation structure of water supply and sanitation and highlighted cases of water supply and sanitation across states and geopolitical zones to reflect the precarious water supply and sanitation condition in Nigeria. Coping strategies that households have adopted in addressing water supply and sanitation deficit were categorised into four: enhancing or supplementing available quantity of water and quality of sanitation facilities; accommodating unreliable water supply supplies and lack of sanitation facilities; improving water and sanitation quality; and collective action and voice. These coping strategies are determined by household socioeconomic status and location (urban or rural) and the extent of unreliability of supply service and their adoption places serious health, financial and social implications on the households. The study concluded that inadequate water supply and sanitation impose significant coping burdens on households, making the household resilience a case of biting the bullet and proffered recommendations that aimed at mitigating water supply and sanitation deficit in Nigeria and other countries with similar background.

Keywords: water supply, sanitation, resilience, coping strategies, Nigeria

1. Introduction

The rate of population growth in cities of the world has witnessed a rapid increase over the years (World Bank, 2015). This growth is also evident in Nigeria, the most populous countries in Africa where her annual population growth is at 2.6 %, and the annual urban growth rate is 4.7 % (World Bank, 2021). This growth when compared with other countries is among the highest urban growth rates in the world. However, this growth poses a significant challenge to city managers and policymakers on the issues of water supply and sanitation at the household level (Daramola, 2012; Akoteyon, 2019; Mobolaji et al., 2022). Globally, about 2.2 billion and 4.2 billion people around the world lack access to clean water and basic sanitation, respectively (WHO & UNICEF, 2019). This inadequate and non-availability of water supply and sanitation pose a severe threat to health and well-being of people (WaterAid, 2008).

Safe water supply is defined according to World Health Organization (2010) based on improved water sources located within house premises (household connection pipe, public standpipe, borehole, and protected well or spring), available regularly and free from microbiological contaminations. On the other hand, adequate sanitation is a hygienic disposal of body waste (excreta) from human contact through the use of improved sanitation facilities such as toilet that flushes to sewer system or septic tank, ventilated improved pit latrine, pit latrine with slab and composting toilet (Daramola, 2012; WHO, 2012; Abubakar, 2017). It has been stated that access to water and sanitation is a basic fundamental human right and vital human needs for healthy living (World Bank, 2017). Clean water is needed domestically for direct

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consumption, food production and sanitation purposes while sanitation is needed for clean environment, good health and well-being. Affordable, clean and safe water and sanitation leads to healthier life, reduces the spread of diseases, and promotes dignity in every home (WHO, 2021). Nevertheless, in many countries, these rights are not respected.

Access to water supply could be measured through the quantity of water used per capita from the water sources such as piped water supply or the proportion of people served with adequate level of water supply (WHO, 2000). A minimum of 20 litres per capita per day is generally recommended while minimum of 50 litres per capita per day is recommended in hot climates (Gleick, 1996; WHO, 2000). The sanitation system is also considered adequate when the facility is available in every home and also functional to use. It includes both 'hardware' (toilets and hygienic latrines) and 'software' (hygiene promotion such as hand washing with soap). In either case of water supply and sanitation, the attached condition is that there must be an income level that allows to meet the bills associated with the services (AWDR, 2006).

Wherever and whenever residents lack access to clean water and sanitation at the household level, the experience constitutes water supply and sanitation deficit which is impoverish the household members. It is an imbalance between the demand and availability of water supply and sanitation emanating from excess of demand over the supply of the services. In Nigeria, water supply and sanitation deficit is common virtually in all urban and rural areas. This is because the ever-increasing population in Nigeria has not kept pace with access to clean water and basic sanitation delivery at the household level (Daramola, 2012; Daramola, 2016; Bature, et. al., 2021). Public water supply is mostly unreliable, intermittent and inaccessible, making many households rely on unsafe sources of water supply and access to hygienic sanitation facilities to many households a mirage. For instance, sequel to the expiration of Millennium Development Goal (MDG), it is estimated that about 71 million Nigerians continue to live without access to clean, safe, and improved water, whereas about 130 million people did not meet the Millennium Development Goal (MDG) standards for sanitation (World Bank, 2017).

The scenario expressed above reflects the daunting challenges confronting Nigerian households across the 36 states of the federation which can be likened to biting the bullet. At the household level, the situation reveals that the vulnerability of household to poor water supply and sanitation is much reflected on women and children. Women primarily are the users of water and sanitation as a result of activities such as cooking, bathing of children, washing, and they spend hours each day carrying heavy water containers to and from limited water sources (WaterAid, 2007). Similarly, water and sanitation deficiency impinge on women's career responsibilities leading to ill-health and at times they face attack and being rape whenever they go out to defecate at night and girls often misses class because of inadequate sanitation facilities or if they spent a long period of time to get water for family consumption (WaterAid, 2008).

In response to these challenges, Nigerian households are expected to be resilient by making efforts to absorb and adapt to the prevailing water and sanitation deficit, and also be able to transform from the impact of this deficit to a sustainable basic household infrastructure delivery. This is done by evolving coping strategies to sustain their living standard in order to achieve a level of access and availability of water and sanitation in their homes. Coping with water supply and sanitation deficit implies living in harmony with the condition created with limited access to water supply and sanitation services based on creation of diverse measures or techniques to meet household water supply and sanitation needs.

This study is an attempt to conceptually assess the resilience of Nigerian households to water supply and sanitation deficit. It addresses the evolved coping strategies as responses of the households to the deficit, the factors responsible for the evolved coping strategies, and the financial, social and health implications of the coping strategies. The study is in four sections starting with this introduction. The second section discusses the water supply and sanitation situation in Nigeria while the third section centres on household coping strategies for water supply and sanitation deficit in Nigeria. The last section contains the conclusion for the study and recommendations.

2. Theoretical part

2.1. Historical background and organisational structure of water supply and sanitation in Nigeria

The origin of public water in Nigeria started as water schemes during the colonial era in the major towns such as Lagos, Ibadan, Abeokuta, Kano, Calabar, Enugu and Ijebu-Ode and the supply was under the management of the city council (lowest

administrative level) (Nwanko, 2015). In 1950s, following the introduction of regional governments in Nigeria, the government started performing technical and financial responsibilities on water schemes. These responsibilities involve the employment of high-level manpower (water engineers and superintendents) whose monthly income was drawn from the revenue generated through water rates, while upholding their employment in the regional service. Furthermore, in 1966, the regional government set up water corporations in every state and the Federal Capital Territory in Nigeria to be in charge of water supply due to the alarming demand and operational cost of water schemes.

Nigeria constitutionally operates federal system of government comprising local, state and federal governments. The role of each tier of government is to provide clean, safe and improved water and sanitation for every citizen in Nigeria (Daramola, 2015; Daramola, Olawuni, 2017). Accordingly, the function of each system or tier of government were formulated through the National Water and Sanitation Policy in the year 2000 (Federal Government of Nigeria, 2000). For Federal Government through Federal Ministry of Water Resources, it is saddled with the responsibilities of ensuring sustainable policy formulation, effective monitoring, coordination, management, financial and technical support towards the provision of clean, safe and improved water supply in the country. The State governments, through water corporations or boards are saddled with the coordination, and management of urban and semiurban water supply systems and ensuring financial and technical support from federal Government (Bello, et. al., 2021). Likewise, the Local governments are saddled with the formation, operation and maintenance of rural water supply schemes. In any case, the efforts of the levels of government are complemented by those of the communities to ensure water supply (Fig. 1).

Despite the elaborate institutional framework for water supply in Nigeria, the water supply activities are not effectively coordinated and harmonized (WHO/UNICEF, Water and Sanitation Monitoring Programme, 2010; WHO, 2017; Bature, et al., 2021). There is institutional weakness characterised with inefficiency and duplication of efforts. For instances, in 1976, the Federal Government got involved in water resources management after the establishment of Federal Ministry of Water Resources and the 11 River basin Development Authorities. Also, there were interventions from several bilateral, multilateral and support agencies such as the UNICEF, the UNDP, the WHO and the World Bank through financial supports to build water supply infrastructure. However, even with these efforts by the government, there is no national law for the regulation of the water sectors. The operational and policy formulation for water sectors were through ministries, agencies and authorities of the Ministry of Water Resources, and Agriculture. Likewise, the River Basin Authorities and National Council on Water Resources in their various ways. As a result, these situations are responsible for the disjointed and duplicated efforts for water supply in Nigeria (Daramola & Olawuni, 2017).

Fig. 1. Example of community-based water supply in Ibadan, Nigeria

2.2. Cases of water supply and sanitation situation in Nigeria

With the availabilities of over 200 dams and storage capacity of 34 billion cubic metres, Nigeria is capable of possessing an estimated 267 billion cubic metres of surface water and 92 billion cubic metres of ground water yearly. Despite this, in developing nations, Nigeria is rated amongst the lowest in water and sanitation supply at household levels (Uche, 2015; Egbinola, 2017). The country experiences water supply deficit for domestic and industrial uses despite the huge water resources. In 2009, The Human Development Report of United Nations Development Programme (UNDP) stated that access to clean and improved water were only available to half of Nigeria population (49.1 %). Likewise, according to the data from the Federal Ministry of Water Resources, only 32 % of Nigerians has access to safe drinking water in 2013 (Egbinola, 2017). This high level of inadequate water supply, added with poor sanitation have grievous effects on Nigerian population. This is evident in the cases of diarrhoea, diseases claiming over 361.900 people's live and over 60,000 children under the age of five yearly (WaterAid, 2017).

As reported by WHO and UNICEF (2013), in Nigeria, access to clean, safe and improved water and sanitation is at the low ebb and the rate of coverage is poor compared to other countries. Despite all the efforts of the various stakeholders, (government, international partners and non-governmental actors), an estimated 26 % of Nigerian population gained access to improved drinking water sources between 1995 and 2011. Also, the number of people with unimproved sanitation increased from 66 % to 69 % and there is 1 % decrease in open defecation between 1990 and 2011. Also, between 1995 and 2011, 6 % of Nigerians had access to improved sanitation, compared to other countries statistics. Therefore, Nigeria is rated top among the nations without access to improved sanitation especially at the household level (WHO, 2015; World Bank, 2017).

Nigeria, one of the most populous nations in Sub-Saharan Africa is divided into six geopolitical zones and with 36 states and the FCT (Fig.2). Issues of water and sanitation deficit is not evenly distributed throughout the country. Some zones are better off than others. The report of Water and Sanitation Monitoring Platform (2008) show regional variation in improved sanitation facilities. For example, 45% of the populace in the North-East had access to improved sanitation facilities, with 61 % had access in the North-West and 46 % of the population in the North-Central used improved sanitation facilities. For southern part of Nigeria, 69 % of the population used improved sanitation in the South-East, 62 % had access to improved sanitation facilities in the South-West while the South-South had 55 % of its population using improved sanitation facilities (WSMP, 2008). These proportion across the geopolitical zones of Nigerian reveal that a large proportion of the population do not have improved water and sanitation facilities.

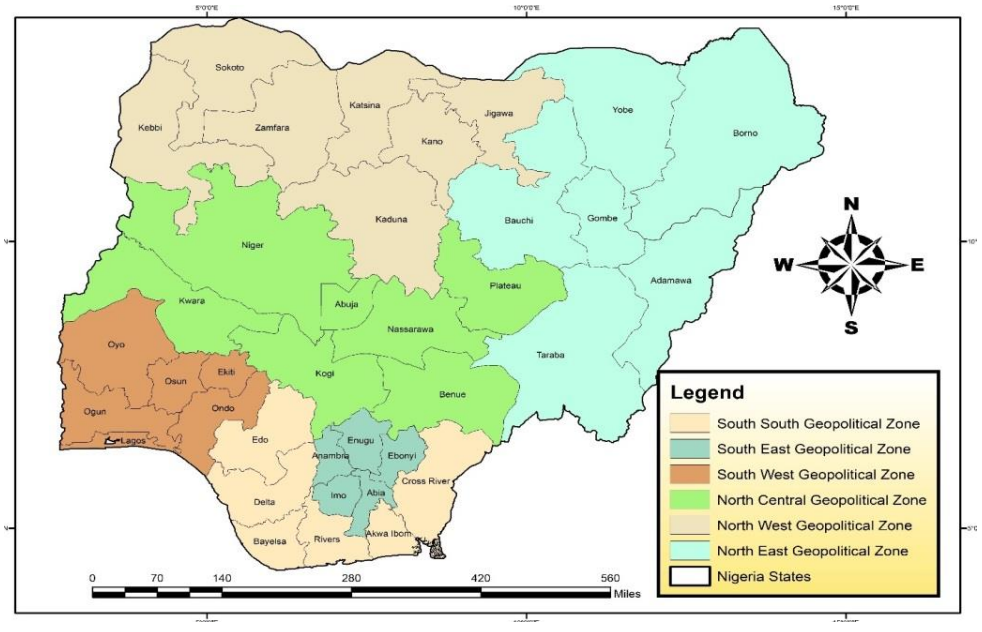

Fig. 2. 36 States of Nigeria and the FCT across their geopolitical zones (National Space Research and Development Agency (NASRDA), 2022)

Across the states of Nigeria, the level of access to improved water supply and sanitation differs from each other. For instance, with over 20 million people in Lagos State, only 10 % of its population being served by public water supply and 24 % of the people has access to adequate basic sanitation (World Bank, 2019). In the metropolitan area of Lagos, the high-income households have resorted to private boreholes for clean water with flush toilet in their homes while the low-income households depend on public water supply which is unstable, and water vendors whose supply is characterised with high cost, unreliable quality and unregulated services (Fig. 3) while open defecation was freely practised (Olawuni, Daramola, 2017; UNICEF, 2020; Mobolaji et al., 2022). In Ibadan, the state capital of Oyo State with over 3.7 million inhabitants, issues of water and sanitation is enormous (CIA World Fact, 2021). Over 60 % of households in this city is attributed to unhygienic toilet, poor water, and inadequate sanitary facilities (Olanrewaju, Afolabi, 2020). Also, in Igbo-Ora, a major agricultural town in Oyo State, ponds, rivers, lakes and rainfall are the most predominant sources of water supply (Ikhile et. al., 2012) and due to lack of sanitary toilet facilities, residents resulted to open defecation.

Kano State, a prominent state in North West region with a population of about 16 million people relied on three main water treatment plants capable of supplying 415 million litres of water to its inhabitant (Bello et. al., 2021). Despite these water schemes, 35 % of the residents do not have access to clean water and sanitation (UNICEF, 2019). Kano State Water Board in a bid to address water deficit devised a means to supply water using vendors to supply water through multiple standing pipes. This makes majority of households in Kano to depend on the government water board authority, water vendors and boreholes to get water for daily needs (Nura et. al., 2020). Nevertheless, the situation has worsened as a result of inadequate electricity which water board and boreholes rely upon (People's gazette newspaper, 2022). In Kaduna State, adequate provision and management of water and sanitation have not kept pace with the burgeoning population. Studies have indicated that 41% of the residents in Kaduna State do not have access to improved water and sanitation in their homes and the situation is attributed to lack of clear sector programme at state and local government levels (Felix, Nan, 2016; UNICEF, 2019). Few households in Kaduna Metropolis have access to water supply through water vendors and standpipe and many households without sanitation facilities in their homes used public latrine facilities constructed by private individuals (Bature et. al., 2021). It was reported that the situation is more precarious in Kaduna South where most households suffer water supply and sanitation deficit and thereby resorted to utilisation of unimproved water sources and sanitation facilities (Dawah, 2016). Fig. 4 is the presentation of women fetching water from a distance of 1.829 kilometres to their homes in Kaduna State, Nigeria.

Fig. 3. Water source in Lagos state

Fig. 4. Women fetching water from a distance of 1.83 kilometres in Kaduna State

In South East and South-South geopolitical zones of Nigeria, the condition of water and sanitation is worse. An instance is the case of Anambra State which had 28 % of its residents defecating openly and 72 % without access to clean water supply (NBS, 2020; UNICEF, 2020). Reports have it that for many years, public pipe-borne water system has deteriorated in Anambra state and access to safe, clean water from the state water corporation is not visible unless there is revitalization of water schemes by the state government (Anarado et al., 2019; Premium's Time Magazine, 2022). In Awka, Onitsha and Nnewi, the three major towns in Anambra State, water schemes have not functional and the staff of water corporation have embarked on incessant strikes over unpaid salaries (Uche, 2015). This has also made households in the state fall back on unimproved water sources and poor sanitation practices (World Bank, 2020).

In the case of sanitation, it was reported that about 46 million people practice open defecation in Nigeria and to ameliorate these challenges, there is a need to build over 20 million and 43,000 toilets at household and public places respectively. Achieving this requires over 100-billion-naira investment (about US$239,338,000) and the funding that would be about 75 % household investment and 25 % government contribution (The Punch, 2020). Fig. 5 is evidence of open defecation in Jos, Nigeria and Fig. 6 is the picture of a household toilet in Ibadan, Nigeria which is typical for toilet facilities available for many low-income earners in the core area of most Nigerian cities.

Fig. 5. Evidence of open defecation in Jos, Nigeria

Fig. 6. A household toilet in Ibadan, Nigeria

2.3. Coping Strategies for Water Supply and Sanitation in Nigeria

In response to the precarious water and sanitation challenges in Nigeria, households are expected to be resilient by making efforts to absorb and adapt to the prevailing deficit, and also be able to transform from the impact of this deficit to a sustainable water and sanitation supply (Graham, Polizzotto, 2013; Majuru, et. al., 2016). Therefore, households in Nigeria evolved some coping strategies to sustain their living standard in order to achieve a level of access and availability of water and sanitation in their homes. In ensuring households cope with water scarcity, they evolved strategies such as the dredging of dry hand-dug wells to ensure water supply mainly in the dry season, storing of water in big containers, buying of water from water vendors (*Mai ruwa*) and tankers, harvesting of rain water, and driving long distance for water supply, and minimising the usage of water in their homes as a way of coping with scarcity. These, among others, are discussed in terms of their categories, determinants and implications.

3. Results and Discussion

3.1. Categorization of coping strategies

In addressing water supply and sanitation deficit, households often employ multiple coping strategies. These are categorised into four based on literature (Cook, et. al., 2016; Majuru, et. al., 2016) and as obtainable in Nigerian situation of water supply and sanitation. The coping strategies are:

Enhancing or supplementing available quantity of water and quality of sanitation facilities: Among the common coping strategies involves storing of water, buying from vendors, drilling of boreholes in homes and community, and digging shallow wells. Storing could be through collecting water whenever the municipal supply becomes available through electric pump connected to an overhead storage tank or in smaller containers. When water supply is available, unstable or limited, households may be deprived of sleeping and waking early to stored water in their homes. Likewise, households may also patronize private water tankers and also collect from neighbours with private wells. For sanitation, the absence of central sewer system in most Nigerian cities lead to on-site sanitation system including the construction of flush toilets, ventilated improve latrine, and compositing toilet.

Accommodating unreliable water supply supplies and lack of sanitation facilities: These strategies include household depending on alternatives water sources, recycling used water from washing cloth, reduction in water intake and use, and reschedule of domestic activities. Household may depend on the shared community tap, burst water pipes and neighbour's borehole as an alternative's sources of water supply. Water supply from these alternatives may take times depending on the distance covered,

trips made and, in some cases, time spent in collecting water. Also, reschedule of domestic activities such as washing cloth, and cooking to when water was available, and also reduction in water intake and frequency of food cooked daily, bathing and flushing of toilet. Households may also recycle water from laundry and bathing to flush toilets and watering vegetable gardens. For sanitation, household members may make use of neighbours' toilet facilities or open defecation in nearby bush and canal or waterways.

Improving water and sanitation quality: In most cases, unreliable water supply leads to poor water quality through contamination when piped water supply is intermittent or with low pressure or when the supply of water from alternative sources is not safe for use or polluted during storing and collection. Households embark on water treatment through filtration and boiling of water. In addition, households may be forced to buy bottled and sachet water for cooking, and drinking. For sanitation, this is in form of provision of sanitary equipment in the toilet for hygiene practices such as hand-washing basin and soap.

Collective action and voice: External support from the government, philanthropists and private organisations for water and sanitation supply to communities so as to enhance adequate provision to household level.

3.2. Determinants and implications of coping strategies

The most significant determinants of coping strategies include households' socio-economic attributes and the level of irregularity of water and sanitation supply (Majuru al., 2016). The high-income earner and more educated household living in their own properties are more likely to engage in capital-intensive strategies such as building of toilets, drilling of boreholes and wells, and installing storage tanks in their homes. Households are more likely to adopt the strategies if the duration of water supply is very limited. In addition, household may increase their water storage capacity with rise in their income. Another determinant of the adopted coping strategies is the location (urban or rural) of the household. The location of household such as urban or rural areas, may determine the sources, treatment behaviour, and hygiene practices.

Adoption of these coping strategies certainly places serious health, financial and social implications on the households. The financial implications include the direct cost of drilling boreholes or septic tanks, and indirect costs of buying water from vendors, and water kiosks. Besides, some strategies compromise water and sanitation safety, and also increase gender inequalities. Poor water storage facilitates lead to breeding of bacteria, and some of hand-dug shallow wells may not be cleaned and disinfect regularly. These facilities may be contaminated by leakages from sewers or surface run-off. Reduction of water for bathing, cleaning, cooking and digging of pit latrines compromised hygiene and sanitation practices. Similarly, drilling of wells may lead to depletion of groundwater quality (Graham, Polizzotto, 2013). For example, it happens, as in the case of Abuja, that vended water which is costlier and less safe than public water supply is available for households in poor districts making the poor households devote a substantial part of their paltry income to meet their needs while rich households have access to public water supply (Abubakar, 2012).

Furthermore, women and children have the greatest share of the burdens associated with these strategies. They bear the primary burden as household water collectors from alternative sources and are most vulnerable when there is lack of adequate sanitation facilities. The implications on women include loss of productive time with complementary sustained poverty, rape, contamination of toilet diseases, and physical weakness due to water collection. Particularly for the children, the burdens negatively impact on their schooling and wellbeing by not attending or being late at schools or having inadequate time to play or to do revisions after school hours.

4. Conclusion

Based on the foregoing discussion on the households' resilience to water and sanitation deficit, it can be concluded that inadequate water supply and sanitation impose significant coping burdens on households, making the household resilience a case of biting the bullet. This particularly affects the poor households because the coping strategies are costly, and labour intensive and household may be missing out on the health, social and economic benefits of access to improved, clean and safe water supply and

sanitation. Therefore, efforts aimed at mitigating water supply and sanitation deficit must focus primarily on the vulnerable (poor). There is considerable heterogeneity in study methods and disciplines from which studies on coping emanate, limiting the ability to draw quantitative patterns. There is therefore the need for stakeholders including all tiers of government, communities and actors in households' infrastructure planning to collaborate in the provision, management and improvement of the quality of water and sanitation service.

The collaboration should be the resuscitation of government agencies for water supply through initiating strategies for cost recovery. Community-based organisations can also collaborate with local government by providing mechanically operated boreholes in order to complement piped water supply, especially in high-density residential areas. For sanitation, government in the state and local level should ensure that house owners are mandated to provide and maintain adequate sanitation facilities in their houses while public toilets can be provided at an affordable rate, especially in high-density areas. There is the need for effective coordination of water and sanitation sector from the federal level by having a national legislation to that effect and an apex body to coordinate the activities. There is also a need to create awareness by stakeholders on the health, social and economic benefit of clean and safe water supply and sanitation in every home. Lastly is the collaboration of local and international stakeholders in providing adequate financial support into water and sanitation sector in order to make the country be on the path to achieve the Sustainable Development Goal for water supply and sanitation.

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