Challenges of public water provision in Nigerian cities: a review
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ABSTRACT

In spite of the importance of adequate water quality and quantity for human health and survival, public water supply coverage in Nigerian cities appears to be decreasing and deteriorating. Hence, this study was designed to assess the challenges of public water provision in Nigerian cities. Some of the reasons for this deterioration include: inadequate water supply policy, lack of autonomy for the various State Water Agencies (SWAs), corruption in the water sector, poor infrastructure investment and maintenance, deficiencies in pipe distribution networks and inadequate power supply. These challenges can be addressed if certain measures are taken to improve the operation, maintenance and sustainability of the various SWAs’ supply networks. Such measures may include the undertaking of routine and preventive maintenance such as leak detection and repair. There should be increased funding by government through adequate infrastructural investment, tackling of corruption and the granting of true autonomy to the SWAs in tariff setting, staff recruitment and discipline, and improvement of electricity supply to the various SWAs in Nigeria. These measures could place public water provision on a sustainable path and help to reduce the burden of water-borne diseases in Nigeria.

Key words | challenges, Nigerian cities, public water, State Water Agencies

INTRODUCTION

The importance of adequate quality and quantity of water supply to biotic organisms and man, in particular, cannot be over-emphasized. Water is needed for domestic, agricultural, industrial and other uses on a daily basis. In fact, without water, man cannot survive. This explains the declaration of water as a basic human right by the United Nations. Progress Update and Millennium Development Goals (MDG) Assessment Progress on Drinking Water, 1990–2015, revealed that sub-Saharan Africa fell short of the MDG target, as 663 million people still lacked improved drinking water sources in 2015. Similarly, the 2014 update to the UNICEF/WHO (2015) Joint Monitoring Programme (JMP) report Progress on Drinking Water and Sanitation, shows that meaningful progress was not attained as access of urban areas in Nigeria to adequate water sources barely changed from 78% in 1990 to 79% in 2012. However, these figures do not suggest that all those with access are directly connected to a State Water Agency (SWA) network. The JMP data also revealed a significant reduction in the number of households with access to piped water to premises, which fell from 33% in 1990 to 6% in 2012. According to Akpabio (2012), this situation represents a serious global health challenge, especially when viewed in terms of the associated consequences of a lack of access to safe drinking water supply. This situation was also echoed by Onabolu et al. (2011), that 37% of the population in sub-Saharan Africa still depends on unreliable sources of water supply. Akpabio (2012) also observed that Nigeria is one of the countries in sub-Saharan Africa with poor records on general access to water supply by the citizens. Many
cases of water-borne diseases, mortality, morbidity and poverty, resulting from lack of access to safe drinking water supplies, have been reported in the literature (Nwankwoala 2011; Ohwo 2012).

The government of Nigeria (federal, state and local) has expressed its intention to improve access to potable water supply in Nigeria. The large gap in service access is partly filled with the support of donors, Non Governmental Organizations (NGOs) and the private sector.

Nigeria is a signatory to the United Nations International Drinking Water Supply and Sanitation Decade, whose objective was to supply potable water to all citizens of the nation between 1980 and 1990. Also, Nigeria is committed to the implementation of the MDGs, whose goal 7, target 10 is focused on halving the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015. In spite of the efforts of various governments at all levels, the water supply coverage in Nigeria is still unsatisfactory. One of the reasons for this deterioration is the enormous socioeconomic rate of development and high population growth in Nigeria, which far outstrips the level of water supply development. Other reasons identified (FMWR 2000) include lack of proper management of the nation’s water resources, and a low level of investment in maintenance and operations, which accounts for observed frequent breakdowns of the production facilities. For instance, about 71% of those living in rural communities do not have access to a safe water supply. In the urban and semi-urban areas, only about 42% of the population have access to safe water supplies (FMWR 2000). The rest of the population is forced to obtain their water supplies from other sources (wells, boreholes, streams, rainwater, etc.) for which quality may not be guaranteed (Ohwo 2011).

In Nigeria, the Federal Ministry of Water Resources (FMWR) at the national level is charged with the responsibilities of policy advice and formulation, data collection, monitoring and co-ordination of water resources development (of which water supply is a component); while the River Basin Development Authorities are charged with the development, operation and management of reservoirs for bulk water supply in their areas of jurisdiction. On the other hand, the State Water Agencies (SWAs) are responsible mainly for urban, semi-urban and rural water supplies, while the local government authorities are responsible for the provision of potable water to the rural communities in their respective areas of jurisdiction. FMWR (2000) however, noted that due to lack of funds and the gross shortage of manpower, this function has not been carried out effectively in some local government areas of the country. This is one of the reasons why potable water supply coverage is low in the rural areas of Nigeria.

In Nigeria, the state governments fund water supply schemes through budgetary allocations to SWAs. The funds provided are especially meant for capital projects, payment of staff salaries and major operations and maintenance of the water schemes, while the SWAs are expected to generate revenue through water rate collection for routine operation and maintenance. Invariably, they do not collect enough revenue, because they have not been allowed to charge economic water rates by government (FMWR 2000). In Lagos, one of the states where public water supply started in Nigeria, the Lagos Water Corporation (LSWC) is charged with the responsibility of providing Lagosians with a potable water supply. However, this mandate has not been carried out effectively and efficiently by the water corporation due to several problems, which include but are not restricted to poor budgetary allocations by the state government, unstable power supply, ageing pipes resulting in frequent breaks, unmotivated staff and a highly politicized tariff setting regime. The rapid rates of population growth and urban expansion of Lagos as the major commercial and industrial state in Nigeria has led to increased demand for services. Preventive maintenance is not a common practice and limited funds have led to under-investment in new and expanded capacity, while preventing the periodic replacement of the ageing components of existing facilities.

Thus, most of the water corporations/agencies in the states in Nigeria are currently unable to meet the existing demand for safe water in their respective states. For instance, Stimson Global Health Security (2012) observed that Lagos state (the former capital city of Nigeria) has not been able to deliver adequate drinking and domestic water supply to meet the growing demand of the inhabitants despite reforms and investments by the state government. The report further revealed that in 2008, the state water board was only able to deliver to consumers 200 million gallons (33%) per day as against a demand of 600 million gallons, which created a demand gap of 400 million gallons
(66%) per day. This demand gap has forced the inhabitants to rely on private wells or street water vendors to meet their drinking and domestic water needs. This dependence has exposed consumers to bacterial and heavy metal contamination, because the quality of water from these sources falls short of local regulatory standards (Stimson Global Health Security 2022).

Many urban inhabitants are unsatisfied with the services provided by state WSAs. There are reported cases of supply of water with high levels of turbidity, intermittent supplies and several days of no supply. These challenges have put increasing pressure on women’s work, health and well-being, and children’s education, given that the principal burden of fetching water continues to be borne by women and girls (World Bank & Federal Ministry of Water Resources 2000).

With rapid urban expansion of most Nigerian cities, coupled with the low level of public water coverage, the population of those without access to public water provision is increasing dramatically, thereby threatening the sustainability of potable water provision in Nigeria. However, there is a dearth of scientific literature to guide policy-makers and the SWAs to effectively manage the various challenges faced by the water sector of the Nigerian economy. It is hoped that by identifying, highlighting and increasing the awareness of the current challenges confronting the water sector, the respective government agencies will take the necessary action, which would help to reposition the water sector of the Nigerian economy on a sustainable path. Hence, this paper is aimed at a review of the scientific body of literature on the challenges of public water provision in Nigerian cities and the recommendation of strategies for a better water delivery in the country. The challenges are discussed under three major subdivisions, which include administrative, technical and commercial challenges.

**STUDY METHOD**

This study is essentially a review of past research efforts directed towards the analysis of the challenges confronting public water provision in Nigeria. To achieve this aim, a comprehensive review of existing literature on the topic was carried out. The major sources of information for this work were obtained from text books, journal articles, research reports, conference proceedings, commissioned studies and the internet. In spite of these sources, it was observed that not much work and data are available on this topic as there is a dearth of information, especially on case studies of the various SWAs in Nigeria.

**ADMINISTRATIVE CHALLENGES**

**National water supply and sanitation policy**

For many years Nigeria lacked a national water supply and sanitation policy (NWSSP), which to a large extent accounted for the uncoordinated, undefined and haphazard development of the water supply and sanitation industry. According to Akpabio (2012), virtually all the policies in the water and sanitation sector were framed between the period of 1989–2007, which coincided with the period when many of the international declarations and policy pronouncements were made. It can therefore be argued that Nigeria’s water and sanitation policies are ad hoc mechanisms which arise basically in response to emergencies and international pressures as well as political efforts by successive leaders to justify existence and perceived performance (Akpabio 2012). Some of the policies that are relevant to the issues of water supply and sanitation, post-independence include: the National Policy on Environment, 1989; NWSSP, 2000; National Rural Water Supply and Sanitation Policy, 2000; National Water Resources Management Policy, 2003; National Water and Sanitation Policy, 2004; National Economic Empowerment and Development Strategy 2003–2007; and National Environmental Sanitation Policy, 2005. It should be noted that these policy documents were designed by different ministries of the federal government, for example, the Ministry of Water Resources and the Ministry of the Environment, which helps explain the lack of integration and coordination, giving room for conflicts of ideas, responsibilities and policy direction. This view is substantiated by Akpabio (2012), who reported that a survey of the contents of the various individual policies shows that most of the policy contents are not significantly different from previous arrangements. The colonial legacy of supplying public drinking water to congested urban areas still
dominates the policy scenes. This can be seen in the large network of urban water corporations in all the 36 states of the Federal Republic of Nigeria and the Federal Capital Territory, Abuja. In spite of the prevalence of such urban-biased policy targets and efforts, water supply coverage in Nigerian cities is still very unsatisfactory. It is estimated that only 48% of the inhabitants of the urban and semi-urban areas of Nigeria and 39% of rural areas have access to a potable water supply. In spite of these low figures, the average delivery to the urban population is only 32 litres per capita per day (lpcd) and that for rural areas is 10 lpcd (FMWR 2000).

The NWSSP 2000, which is one of the most referenced documents, was produced by the FMWR. The policy document provided a blueprint for planning, research and manpower development, a legal framework, financing and shared responsibilities by the three tiers of government, the private sector, NGOs and the beneficiary, in accordance with the socio-economic requirements of the country. The primary objective of Nigeria’s Water Supply and Sanitation Policy (2000) was the provision of adequate potable water and sanitation to all Nigerians in an affordable and sustainable way through participatory investment by the three tiers of government, the private sector and the beneficiary (FMWR 2000). Some of the basic components of the policy objectives are as follows:

1. Increase service coverage for water supply and sanitation nationwide to meet the level of socio-economic demand of the nation in the sector.
2. Ensure good water quality standards are maintained by water supply undertakings.
3. Ensure affordability of water supply and sanitation services for the citizens.
4. Guarantee affordable access for the poor to a basic human need level of water supply and sanitation services.
5. Enhance national capacity in the operation and management of water supply and sanitation.
6. Privatize water supply and wastewater services (where feasible) with adequate protection for the poor.
7. Monitor the performance of the sector for sound policy adjustment and development for water supply and sanitation.
8. Legislation, regulations and standards for water supply and sanitation.
9. Reform of the water supply and sanitation sector to attain and maintain internationally acceptable standards.

For an easy evaluation of the successful implementation of the policy document, quantifiable targets were set based on timelines as follows:

1. The initial target was to meet the national economic target of improving service coverage from 40 to 60% by the year 2003.
2. Extension of service coverage to 80% of the population by the year 2007.
3. Extension of service coverage to 100% of the population in the year 2011.
4. Sustain 100% full coverage of water supply and wastewater services for the growing population beyond the year 2011.

In spite of the well-crafted component objectives of past and current policy documents and the institutional shared responsibilities, Nigeria is still far from achieving the MDG 7 target 10. The targets set by the NWSSP, 2000, as stated above, have largely not been achieved. According to the projected targets, Nigeria was expected to achieve 80% extension of service coverage to the population by the year 2007 and 100% by the year 2011 and beyond. However, the World Bank (2016) statistics from 2011 to 2015 revealed that in 2011 65%, 2012 66%, 2013 67%, 2014 68% and 2015 69% of Nigerians have access to improved water supply sources. These figures are not surprising, because the UNICEF/WHO (2006) joint report stated that drinking water coverage in Nigeria fell from 49% in 1990 to 48% in 2004 as against the expected 65% coverage. These figures are a far cry from the projected figures in the policy document.

The failure of the Nigerian water sector to achieve its set targets for its various policy documents is a pointer to the fact that something is wrong with the policy documents that are intended to provide a road map in water provision and management in Nigeria. This assertion is supported by WaterAid in its briefing note on water and sanitation in Nigeria, where it concluded that the current water and sanitation policies indicate a need for further analysis and reform. Similarly, the World Bank & Federal Ministry of Water Resources (2000) observed that the policy promotes
unachievable targets for coverage and recommends free water for the poor. The achievable targets of 80% and 100% for 2007 and 2011, respectively, have not been achieved because the targets are unrealistic based on the required financial implications, which have not been made available by the government. In the same vein, Akpabio (2012) observed that the water and sanitation sector over the last ten decades in Nigeria has passed through several phases and developments, mostly characterized by: (a) too many short-lived and incoherent policies and very little action; (b) lack of proper coordination mechanisms; (c) excessive politicization of service and corruption; (d) lack of policy continuity; (e) excessive international pressures with poor local institution; (f) very many agencies with no one effectively in charge; (g) unrealistic assumptions of situations; and (h) poor implementation as a result of a lack of political commitment and corruption.

**Lack of autonomy**

In addition to the problem of policy inconsistencies, most of the SWAs do not have full autonomy due to government’s continuous interference. This has limited their capacity and independence in the areas of water pricing, recruitment, training and discipline of staff, among others. These assertions are substantiated by Bello & Tuna (2014) in their study of potable water demand and supply in Kano State, Nigeria, where they stated that the Kano State Water Board and its related agencies, such as WRECA, RUWASA and Ministry of Water Resources, do not have full autonomy, i.e., total freedom to exercise their power in the water sector and recruitment. They also noted that inconsistencies in government policies and political instability cause some problems. They observed that water policies are generally amended by incoming new governments, which has seriously affected the capacity of the water resources agency in Kano State in achieving its goals. Similarly, the Lagos State Water Sector Law of 2004 gives LSWC wide ranging powers to operate and recover its operational costs. However, LSWC, like most other SWAs, has not fully exploited the powers and stipulations of the Water Law as it is still controlled and run through government bureaucracies. The condition of service of its workers is still similar to that of the civil service structure, which has negatively affected motivation. Due to the poor level of service delivery, the Lagos State Government is reluctant to increase water rates. Because of the poor level of service delivery, customers respond poorly to payment of bills, which has consequently led to excessive losses by the LSWC. This results in water supply delivery becoming more expensive and requiring higher capital layout for the rehabilitation of supply infrastructure. Therefore, the intended subsidy by the Lagos State Government to help those who cannot afford the cost of water supply ends up providing free or cheap water to those who can afford to pay higher prices (LSWC 2013).

This scenario is typical of most of the SWAs in Nigeria today, as revealed in a recent study of 20 of the 37 SWAs (Otun 2009). The study revealed that most of the SWAs lack adequate autonomy, which only exists on paper but not in practice. This has made it difficult for the respective managers of the various SWAs to charge appropriate water rates. It stated further that in over 85% of the studied SWAs, water rates reviews are not a common feature, even though the cost of production has continued to rise, which has led to poor recovery of costs. Due to poor cost recovery, the various state governments have subsidized the total cost of water provision in one form or another with revenues from other sources (Otun 2009).

**Corruption**

Corruption has also been identified as a major cause of inadequate water supply worldwide and in Nigeria in particular. According to the Global Corruption Report 2008, cited in the report of the First African Water Integrity Summit (FAWIS 2014), it was revealed that about US$ 50 billion, which represents about 25% of all water investments, is lost every year to corruption.

Stalgren (2007), in his analysis of corruption in the water sector, stated that the main reason behind the inadequate water supply is not the lack of a natural supply of water, nor is it primarily an engineering problem, i.e., stemming from the lack of technical solutions. Instead, this global water crisis is primarily a crisis of governance. As a group of experts working under the UN Millennium Project put it, the problem is ‘the lack of appropriate
institutions at all levels and the chronic dysfunction of existing institutional arrangements'. Stalgren affirms that corruption is at the core of the governance crisis in the water sector. Whereas the scope of corruption varies substantially across the sector and between different countries and governance systems, estimates by the World Bank suggest that 20% to 40% of water sector finances are being lost to dishonest, corrupt practices. The effects of corruption in the water sector are of different dimensions. The ecosystem suffers because bribes are paid to cover up the discharge of wastewater and toxins in water resources, and to allow for excessive abstraction from rivers and groundwater reservoirs, which may increase transaction costs and discourage investments in infrastructures (Stalgren 2007). At the level of household economics, its cost is felt in deficient water service delivery and practices, contributing to the 40 billion working hours lost annually at a global scale due to inefficiency in the water sector. It thereby keeps many children out of school, as they are instead occupied by the time-consuming burden of collecting household water – a burden that traditionally falls largely on females (Stalgren 2007). Also commenting on the causes of inadequate water supply, Asit Biswas, winner of the 2006 Stockholm water prize, stated that there is no water crisis, instead there is water mismanagement, which stems from corruption (Biswas 2009).

Studies have also identified corruption as a major challenge affecting SWAs in Nigeria. For example, Ohwo (2010) in his study of water supply and management in Warri-Effurun metropolis, reported that most interviewed respondents agreed that the current state of water provision in the metropolis would have been better if corruption of government officials was reduced or eliminated. He further reported that corruption was one of the major reasons why the Warri Urban Water Board was moribund, as money usually budgeted for maintenance or facilities’ provisions do not get to the actual sources the funds were meant for. Similarly, Mwanza (2013), cited in Babalobi (2013), described corruption as a ‘big disease’ undermining service delivery in the water sector, and stressed the need for water integrity to reduce or eradicate corruption in the water systems. He noted that unless corruption is effectively tackled and minimized in Nigeria’s water supply and sanitation sector, state water supply utilities may not be able to deliver their mandate of delivering drinking water to Nigerians on a sustainable basis.

**TECHNICAL CHALLENGES**

**Deficiencies in pipe distribution networks**

The public water supply is distributed through water pipe networks, which may affect the quality and quantity of water that gets to the consumers if the integrity of the pipe distribution network is compromised (Ohwo 2014); a distribution system’s pipes and storage facilities constitute a complex network of uncontrolled physical, chemical and biological reactors that can produce significant variations in water quality. ‘In spite of the fact that well maintained modern treatment plants for drinking water and protected water sources can deliver adequate water for human consumption, ageing, stressed or poorly maintained distribution systems can cause the quality of piped drinking water to deteriorate below acceptable levels and pose serious health challenges to its consumers’ (Lee & Schwab 2005). This assertion was confirmed by Ohwo (2014) in a study on the impact of the pipe distribution network on the quality of tap water in Ojota, Lagos State, Nigeria. The study revealed that the quality of water that reaches the consumers from one of the major water schemes (Ojodu Water Scheme) operated by the LSWC can vary significantly from the samples collected at the sampled zones after the water had travelled through the pipe distribution network. For example, the biological parameters of total coliform and faecal coliform bacteria counts show that 30.72% and 23.08% of samples have concentrations above the WHO zero thresholds for total and fecal coliforms, respectively. This shows that the biological quality of the tap water has been compromised, and may portend health risks if consumed without further treatment. These pathogenic bacteria found their way into the water source because of leaky pipes, broken valves and laying of pipes on poorly drained gutters (Ohwo 2014). This situation adequately mirrors the situation in other SWAs in Nigeria.

A number of failures in the distribution system, namely loss of adequate disinfectant residual, low water pressure, intermittent service and ageing infrastructure can result in
the declining quality of the water supply. Pathogens’ intrusion may occur under these circumstances if poor sanitary conditions exist because of improper wastewater collection and leakage in the network (Lee & Schwab 2003). Unfortunately, most of the SWAs are bedevilled by serious deficiencies in their pipe distribution networks, which have resulted in the delivery of water of poor quality and inadequate quantity. The rate of unaccounted for water is very high, due mainly to leakage as a result of burst and broken pipes and valves. For instance, the Lagos Water Corporation (LSWC 2013) stated that it suffers the loss of a large quantity of water through pipe leaks and bursts in the distribution systems, as well as illegal connections and theft, which has increased the rate of unaccounted-for water. The average level of unaccounted-for water in 1999 was about 43%, while in April 2008 the figure was 36.6%. The reasons for this high level of unaccounted-for water are attributed to poor management of leaks in the distribution system, illegal connections, and application of flat rate charges to domestic consumers that do not deter the consumers from wasting water.

This situation was highlighted in the Water Supply and Sanitation Interim Strategy Note on Nigeria by the World Bank & Federal Ministry of Water Resources (2000). The report stated that the State Water Agencies (SWAs) operational efficiency levels are very low as indicated by the monitoring indicators compiled under the National Water Rehabilitation Project. It revealed that many of the SWAs could not provide adequate statistics due to the lack of reliable management information systems, and for those responding, non-revenue or unaccounted-for water was very high, up to 63% reported for 1998 and 39% for 2013 (Macheve et al. 2015). These figures could even be higher given the absence of metering of production and distribution. In addition, the data revealed that frequent breaks, ageing pipes, an unreliable and unstable supply of electricity and inadequate treatment chemicals are common to most systems. Preventive maintenance is hardly practised, and inadequate funds have led to under-investment in new and expanded capacity, while preventing the periodic replacement of the ageing components of existing facilities. Thus, SWAs are currently unable to meet the existing demand for safe water within their respective cities and states (World Bank & Federal Ministry of Water Resources 2000).

Inadequate power supply

Power supply is an important supporting infrastructure for achieving sustainable public water supply anywhere in the world. However, erratic power supply has also been identified as a cause of inadequate public water supply in Nigeria. For instance, Onyekakeyah (2007), in his analysis of national power blackouts and the water supply, noted that Nigerians live in cities without water, and that the absence of power to pump water further compounds the problem. He stated that water supply is directly tied to a regular supply of electricity. Without electricity, there can be no potable water supply, as the piped water supply flows when power is energized. He submitted that in a situation where the entire nation is in blackout, the water supply is drastically reduced and critical. Similarly, Efe (2005) in his study of the water supply in rural communities of Delta State, identified erratic power supply as the highest explanatory factor for inadequate water supply in the studied communities. He stated further, that as the problem of water supply became worsen with increasingly erratic power supply, most of the affected communities resorted to the use of self-generating plants to pump water through self-help efforts. Due to the rise in price of petroleum products, the generating plant was abandoned, thus resulting in a serious and inadequate water supply to the affected communities.

In the same vein, Bello & Tuna (2014) stated that there is irregular electrical power supply from the Nigerian Power Holding Company (PHCN), which hampers the efficient operation of the water supply in Kano. They also noted that the power supply can barely last for 10 hours in spite of the existing arrangement the water board has with PHCN. As a result of the intermittent power supply to effectively drive the installed machinery, pumping installation mechanisms are not functioning well, which has compelled the water board to resort to the use of diesel as an alternative to supplement power supply; however, the high cost of diesel has adversely affected water supply to Kano State. Ohwo (2010) also reported that erratic power supply contributed largely to the moribund state of the Warri Urban Water Board, and has impacted negatively on private borehole operators, as there is no electricity to power the various pumping machines to pump water from the ground. The LSWC (2013) equally reported that power supply has, in
most cases, become worse over the years, thus reducing the utilization capacity of most of the plants, resulting in problems of intermittent water supply, low pressure and revenue generation for the corporation.

The effects of power blackouts (Aderibegbe 2007) have resulted in the shutting down of the public water supply for both domestic and commercial purposes, especially in places where pumping machines are installed, resulting in serious water supply challenges as the machines are incapacitated. This situation has affected the water supply to kitchen sinks, bath tubs and toilets in many homes and business premises. Thus, women and children are forced to carry an assortment of jerry cans, buckets and drums looking for water from hand-dug wells, where the quality is not guaranteed.

FINANCIAL AND COMMERCIAL CHALLENGES

Poor water infrastructure investment and maintenance

One of the major developmental challenges confronting Nigeria is the provision of infrastructural facilities by governments (federal, state and local). Poor water infrastructural investment and inadequate maintenance by SWAs have negatively impacted on capacity utilization and adequate supply coverage of the population, leading to a wide gap between water demand and supply. According to the World Bank, 2015 report on State Water Agencies in Nigeria: A Performance Assessment, less than 40% of Nigerian urban residents are provided with water from the SWAs, while the rest obtain their water supply from other sources at a national cost, which has been estimated at US$ 650–700 million a year, about four times more than the combined revenue of all 35 SWAs (Macheve et al. 2015). In order to bridge this gap, the expected investment cost will be within the range of US$ 600 million each year until 2030, when all Nigerians are expected to have a potable water supply at their homes around the clock. Unfortunately, the current rate of investment, which is between US$ 70 and US$ 80 million a year, is inadequate to maintain the sector’s performance. Moreover, the average age of the most recent SWA investment projects is ten years; meanwhile, 18 SWAs have never had an investment project valued at more than US$ 10 million (Macheve et al. 2015).

Similarly, the African Development Bank Group (ABDG 2013) reported that none of Nigeria’s more than 50 water utilities are able to provide uninterrupted water services to their citizens, and many are among the worst performing on the continent, with rapidly decaying infrastructure due to a weak institutional environment and lack of adequate maintenance systems. The bank cited the situation of Port Harcourt, which it claimed as being representative of the country; here, inhabitants do not benefit from the water utility as infrastructure constructed in the 1950s has depreciated and only 10 km of the 190 km pipe network is usable. This situation has forced the inhabitants to obtain water from private boreholes, shallow wells and water sachets, with varying quality and cost. This probably explains the rising cases of water-related diseases in most parts of the country.

To buttress the ADBG report, the Lagos Water Corporation (LSWC 2015) stated that the existing infrastructure facilities for water supply in Lagos State are far below the requirements for current demand. It estimates the present water demand of Lagos to be about 2,450 million litres daily (mld), while its installed capacity is only 728 mld, which is only 30% of the demand. The 728 mld covers both rural and urban Lagos. Lagos is mainly urbanized with negligible rural areas. The coverage in the city slums and peri-urban informal settlements where most of the poor live is even less known, but figures from studies indicate a much lower level of coverage. Despite the ever increasing rise in the population of Lagos State, there has not been a corresponding increase in the level of public water supply for Lagos metropolis in recent years. The deficiency in the infrastructure is attributed to poor funding, especially during the last two decades. This situation was equally echoed by Adah & Abok (2013), that the low investment level in operation and maintenance accounts for frequent breakdown of the production facilities, which constitutes a challenge for urban water management in Nigeria.

Reports from other SWAs revealed similar situations, earlier reported. For instance, Bello & Tuna (2014) reported that lack of adequate capital to efficiently run the water sector in Kano State has posed serious challenges as the government budgetary allocation to the water sector and the monthly fees paid by consumers to the board are insufficient to cater for the high electricity bill, high cost of chemicals,
routine maintenance and other miscellaneous expenses in the sector. Similarly, Ibrahim & Nmadu (2012) noted that successive governments in Niger State and Nigeria as a whole lack interest in the maintenance culture. Rather than maintain existing infrastructures, they prefer to build new ones. Most often, water is used by the government as a vote catching resource, but the promises made in most cases are not honoured.

Water pricing and cost recovery

As noted earlier, the lack of autonomy of the various SWAs in Nigeria due to their respective governments’ interference, has affected their capacity for adequate water pricing and subsequent cost recovery, which in turn have affected operations and maintenance. In Nigeria, potable water supply is a public service, controlled by the government through its 36 SWAs. As the services rendered by these SWAs are historically considered to be a social welfare service, their charges are usually fixed at uneconomically low rates, which constitute only a fraction of the operational costs. This situation, which similarly occurs year in year out in most SWAs, has significantly shown that the water produced in these utilities is neither priced in accordance with the full-cost recovery theory nor with the requirements of the law or edict establishing most of them, which stipulates and grants autonomy in fixing the price at such a scale or level that is capable of meeting all operating expenses, the repayment of borrowed loans and the cost of executing new and extension works (Otun 2009). Thus, it is not surprising that there are significant variations in water tariffs from state to state in Nigeria. For instance, Macheve et al. (2015) reported that states like Bayelsa, Benue and Zamfara supply free water to residential consumers, while others charge based on customer groupings, which produce different tariff schedules. The report revealed that it was only in Cross River State that consumption metering and billing is operational. In most other areas, a variety of tariffs are set in the form of taxes on specific municipal industries. In addition, less than 20% of water sold is metered; hence, customer bills are not related to the service actually provided.

SWAs nationwide are bedevilled with the problems of billing and collection of water rates. For instance, the Lagos Water Corporation (LSWC 2013) stated that it has not been allowed to charge water rates which would be sufficient to, at the very least, cover their operating costs. In the past, the attitude of the state government to LSWC as well as other SWAs towards upward review of the water rates was to shy away from public opposition as much as possible by evading any substantial increase in domestic rates while continuing to increase the industrial and commercial water rates. Water rate collection for industrial consumers is usually above 40%, while that of domestic is usually below 20%. According to Otun (2009), in all the SWAs the industrial and commercial rates are usually higher than the domestic rate. Based on the presentations by Raji (2001) and KWSB (2001), the average tariff for full cost recovery in all SWAs will be in the range of N75–N120 per m³ ($0.37 to $0.60). However, after due conversion of relevant data obtained from the SWAs, the tariff for domestic consumers in all the SWAs was less than N30 ($0.15) per m³, while that for industries ranges between N60 and N85 ($0.30 and $0.43) per m³. This situation directly points to the fact that the pricing approach in most SWAs remains politically static, low and unrealistically far from recovering their total costs (Otun 2009). It would also have been unfair if the rates were increased without a corresponding improvement in service delivery.

For LSWC, as with most of the SWAs, less than 5% of the domestic connections are metered. The rest are charged flat rates. Invariably this means that the highest subsidy is given to the rich, who live in low density areas and who can afford to pay even higher charges. On average, the houses of people who cannot pay for house connections, are too far from the water mains, or located in areas where water supply is not reliable, have to make do with only a fraction of the volume of water consumed by a household in low density areas like Ikoyi, Victoria Island, Ikeja GRA and Lekki Phase 1, areas inhabited by the relatively wealthy in Lagos State. However, such unfortunate households are charged up to 400% more than those connected to the water supply as they have to pay the water vendors in advance or immediately after delivery (LSWC 2013). The widespread poor pricing mechanism and policy for water services in Nigeria has made it difficult for most of the SWAs to recover operating costs, which has often made the pooling of sufficient funds for adequate maintenance
and expansion of their infrastructures very difficult. This has posed enormous socio-economic and financial difficulties for these SWAs.

PRIVATE–PUBLIC PARTNERSHIP IN WATER PROVISION

The inability of the SWAs to effectively provide an adequate water supply to all customers in their respective areas of jurisdiction has created a wide gap which the private water providers have taken advantage of. The gap between water demand and supply is so great that customers are forced to rely on other sources of water supply (wells, boreholes, rivers/streams, rainwater and water vendors) where quality may not be guaranteed (Ohwo 2011). In addition to the issue of quality is the high cost of obtaining water, most especially from the water vendors, which has been estimated to be between ten and twenty times higher than the public water supply from the SWAs (World Bank & FMWR 2000). Ohwo & Abotutu (2014) also attested to this fact in their study ‘Access to Water Supply in Nigerian Cities: Evidence from Yenagoa’. They reported that households spend an average of N4,500 ($22.60) per month for purchase of water from private providers, which is 25% of the national monthly minimum wage of N18,000 ($90.43).

The 2013 public water coverage in the various states in Nigeria as presented by Macheve et al. (2015) in their report on State Water Agencies in Nigeria: A Performance Assessment, is clear evidence of the poor service delivery of the SWAs. Extracts from the data, as presented in Table 1, reveal that the population coverage of the water supply from the respective SWAs in their respective administrative zones range from 3 to 100%. Imo State has the lowest percentage coverage of 3%, while Jigawa State has the highest coverage of 100%. The data further revealed that only 12 states have above 50% population coverage. This situation has created serious stress on citizens, and may lead to further challenges in achieving adequate hygiene and sanitation.

The existing wide gap in water demand and supply has allowed room for private sector participation (PSP) in Nigeria. The use of private services for water supply in most cities in Nigeria results from necessity rather than government’s deliberate policy, and the experience so far has fallen short of achieving the level of competition and efficiency possible (World Bank & FMWR 2000). In addition, the water quality issue is a major concern with PSP. The major areas of experience of PSP in the Nigeria water sector include: (a) private wells/boreholes – in several cities and communities in Nigeria, household wells are common and industries use their own wells or boreholes as a major source of water supply; (b) water vending – vendors are present in virtually every Nigerian town – in many cases, private investors have provided boreholes and pumps, vending kiosks, and even some individual connections.

Considering the observed limitations of both public and private water provision, operating independently there is the need to encourage and strengthen private–public partnerships (PPPs) in the water sector to consolidate the individual strength of both providers and reduce their limitations. Areas of cooperation may include construction, and operation and maintenance of water supply systems. Some SWAs have already started exploring this option to enhance

Table 1 | SWAs 2013 percentage of population coverage in the administrative zones of responsibility

<table>
<thead>
<tr>
<th>State</th>
<th>Population coverage (%)</th>
<th>State</th>
<th>Population coverage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abia</td>
<td>60</td>
<td>Kano</td>
<td>41</td>
</tr>
<tr>
<td>Abuja</td>
<td>33</td>
<td>Katsina</td>
<td>40</td>
</tr>
<tr>
<td>Adamawa</td>
<td>33</td>
<td>Kebbi</td>
<td>33</td>
</tr>
<tr>
<td>Akwa Ibom</td>
<td>41</td>
<td>Kogi</td>
<td>54</td>
</tr>
<tr>
<td>Anambra</td>
<td>49</td>
<td>Lagos</td>
<td>40</td>
</tr>
<tr>
<td>Bauchi</td>
<td>55</td>
<td>Nassarawa</td>
<td>31</td>
</tr>
<tr>
<td>Bayelsa</td>
<td>99</td>
<td>Niger</td>
<td>13</td>
</tr>
<tr>
<td>Benue</td>
<td>6</td>
<td>Ogun</td>
<td>45</td>
</tr>
<tr>
<td>Cross River</td>
<td>55</td>
<td>Ondo</td>
<td>11</td>
</tr>
<tr>
<td>Delta</td>
<td>27</td>
<td>Osun</td>
<td>37</td>
</tr>
<tr>
<td>Ebonyi</td>
<td>12</td>
<td>Oyo</td>
<td>54</td>
</tr>
<tr>
<td>Edo</td>
<td>64</td>
<td>Plateau</td>
<td>16</td>
</tr>
<tr>
<td>Ekiti</td>
<td>20</td>
<td>Rivers</td>
<td>5</td>
</tr>
<tr>
<td>Enugu</td>
<td>69</td>
<td>Sokoto</td>
<td>65</td>
</tr>
<tr>
<td>Gombe</td>
<td>41</td>
<td>Taraba</td>
<td>36</td>
</tr>
<tr>
<td>Imo</td>
<td>3</td>
<td>Yobe</td>
<td>67</td>
</tr>
<tr>
<td>Jigawa</td>
<td>100</td>
<td>Zamfara</td>
<td>75</td>
</tr>
</tbody>
</table>

Source: Macheve et al. (2015).
their efficiency and service delivery, as the following examples show: the concession contract between the Nasarawa State government and Riveroaks Utilities Limited signed in 1999 for the construction, operation and maintenance of a water supply system within the Karu-Mararaba environs of the state; the operation management contract between ORTECH Nigeria Limited and the Cross River State Water Board, in operation since 2004; the management contract in Kano State, which developed a 150 m³/day water scheme at Tamburawa and engaged the construction contractors to provide operation and management services for three years for the scheme (Tremolet Consulting 2015). In order to achieve the success of a PPP in the water sector in Nigeria, the contract design must include the right balance of incentives for both the private operator and the SWA.

**CONCLUSION**

This paper demonstrates that the various SWAs, which are saddled with the responsibilities of providing potable public water to cities in Nigeria, are faced with several challenges, which are classified as follows: administrative challenges (inadequate NWSSP, lack of autonomy and corruption); technical challenges (deficiencies in pipe distribution networks and inadequate power supply); and financial and commercial challenges (poor water infrastructure investment and maintenance, inadequate water pricing and cost recovery). These challenges have affected the efficiency and capability of the various SWAs to deliver an adequate quality and quantity of potable water to the population of the various cities in Nigeria. The inability of the SWAs to provide an adequate water supply has forced consumers to seek alternative sources (hand-dug wells, private boreholes, streams/rivers and rainwater harvesting), where quality and quantity may not be guaranteed. This explains the rising cases of water-borne diseases in Nigeria.

In order to enhance the effectiveness and efficiency of the SWAs in Nigeria for sustainable service delivery, government should harmonize and integrate the various water policies, bearing in mind local peculiarities, in order to present a realistic water coverage target, which should be supported by adequate funding. Also, corruption in the water and sanitation sector of the Nigerian economy should be tackled. Furthermore, the various state governments should stop unnecessary interference with their respective SWAs’ operations. This measure would guarantee true autonomy of the respective SWAs, which would enhance their efficiency and cost recovery. The idea of flat domestic water billing should stop. Efforts should be directed to metering all consumers so that people are billed according to their consumption, which would help to reduce water wastage. Also, the issue of electricity supply to the various SWAs should be addressed. This can be done through special and committed arrangements with the various electricity providers in the respective states of the federation. Furthermore, the option of the PPP should be encouraged and strengthened. In addition to these recommendations, there is the need for more measures to be taken if the plurality of challenges confronting the sustainable public water supply in Nigeria are to be surmounted. The World Bank (2001), cited in Lee & Schwab (2005), has suggested a number of ways to improve the operation, maintenance and sustainability of a water supply system. These recommendations include: routine and preventive maintenance such as leak detection and repair; maintaining a minimum pressure in the system; adequate pricing through tariff setting; careful billing of users; and monitoring and evaluation of services provided. It is hoped that if these measures are implemented, sustainable public water provision could be achieved in Nigerian cities.

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