

The effects of rapid demographic changes on water, energy, and transport infrastructure in Nigeria

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Question

- *What is the evidence on the effects of rapid demographic changes on water, energy, and transport infrastructure in Nigeria?*

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1. Summary

Nigeria has historically under-invested in its infrastructure. The infrastructure deficit cuts across all sectors, but it is most severe for **access to water and sanitation**. Although Nigeria is expected to improve levels of access to basic infrastructure by 2040, rapid population growth (especially its urban population which is growing much faster than its rural population) will magnify its current infrastructure deficit challenge and access levels will continue to lag behind average levels from its global income peers (Bello-Schünemann and Porter, 2017). On its current development trajectory, it is unlikely that Nigeria will meet universal access for clean water, improved sanitation and electricity, as envisioned in the Sustainable Development Goals (SDGs).

Key findings include:

Water and sanitation:

- Nigeria's significant renewable water resources are generally poorly utilised and managed. In 2015, 69% of Nigeria's total population had access to **safe drinking water**, equating to around 85% of urban and 52% of the rural population (UNICEF/WHO, 2019).
- By 2040, nearly 75% of Nigeria's population will live in urban areas. Accelerated **urbanisation** and migration into the cities is a major issue in the delivery of water supply; although the number of people served continues to grow, on average coverage declines as state water companies cannot keep up with the pace of population growth (Macheve et al., 2015). Much of Nigeria's population get water from private companies.
- Access to improved sanitation in Nigeria has deteriorated over the past decades, mostly due to the rapid population growth, poor awareness and planning, and systematic underinvestment. In 2016, only about 30% of Nigerians had access to **improved sanitation** facilities (Bello-Schünemann & Porter, 2017).
- **Safe water and sanitation** will become an increasing challenge with Nigeria's rapid population growth (Leke et al., 2014). Although the absolute number of people with access to safe water is likely to increase, over 30 million more people (hence a total of over 90 million people) will be without access to improved water sources by 2040. The portion of those with access to improved sanitation will only reach 42% by 2040 due to projected population increases (Bello-Schünemann & Porter, 2017).

Energy:

- In 2017, Nigeria's access to **electricity** was estimated at 54% of the total population, with around 87% of the urban population and 22% of the rural population having access.
- Nigeria's energy sector is characterised by poorly maintained or deficient infrastructure leading to erratic electricity supply and resulting in Nigeria having one of the lowest annual consumption of electricity per capita in Africa (Bello-Schünemann & Porter, 2017).
- There is a **widening generation-demand gap** in Nigeria, with peak demand estimated at 12.8 GW but installed generation capacity estimated at only 10 GW with current operational output at only 3.5-4.5 GW (Leke et al., 2014; Olowosejeje et al., 2019). Demand is expected to continue to increase with increasing population growth.
- **Electricity** access rates are expected to steadily increase, with access rates of about 83% by 2040. A rural-urban divide will remain (Bello-Schünemann & Porter, 2017).

Transport:

- **Transport** infrastructure (roads, rail, ports, airports) is generally poorly developed in Nigeria. Only 16% of **roads** are paved and the road density is low, at 21 km per 100 km² (Federal Republic of Nigeria, 2015). Quality is often poor, with a lack of investment in maintenance. Deterioration is accelerating due to rising traffic volumes resulting from population growth (Leke et al., 2014). The Nigerian **rail** system has less than 5,000 km of rail track, it received little investment during the second half of the 20th century, although the government has recently begun to reinvest in railways (Leke et al., 2014).
- Nigeria is forecast to improve **road** density (per land area), increase road access for rural areas, and improve road quality by increasing the portion of roads that are paved. Nonetheless, Nigeria will continue to lag behind its income peers and its continued population growth and recent economic downturn mean that increases in road access and quality are unlikely to keep up with its needs (Bello-Schünemann & Porter, 2017).

Financing and government plans:

- The Government of Nigeria has recognised its infrastructure deficit and the huge infrastructure financing gap and has introduced a number of ambitious plans and policies in recent years to try to encourage private investment (see Section 4). **Energy and roads** tend to be at the forefront of policy and budgetary allocations, and basic infrastructure (such as sanitation and water) is often overlooked. Furthermore, despite the fact that Nigeria's urban population is growing much faster than the rural population, a recent strategy (the Partnership for Expanded Water Supply, Sanitation and Hygiene (PEWASH)) targets rural areas only (Bello-Schünemann and Porter, 2017).
- There are a variety of estimates projected for **infrastructure funding needs** in Nigeria in the near future. Differences in estimates are due to the methodology, data source, timeframe, assumptions, and definitions of infrastructure used. Estimates of infrastructure investment needs range from USD878 billion between 2017 and 2040 (Oxford Economics, 2017) to USD839 billion between 2013 and 2030 (Leke et al., 2014) up to USD3 trillion over 30 years (Federal Republic of Nigeria, 2017).
- **Gender and disability considerations** will be important in any future infrastructure investments in Nigeria. Nigeria will need to make services not only affordable, accessible and appropriate, but also gender sensitive and appropriate for people with disabilities (Asiyanbola, 2012). Therefore, service provision must recognise the different and specific needs and interests of different people (e.g. women and men, people with disabilities).

This review draws heavily on the report by Bello-Schünemann and Porter (2017), which provides an in-depth look at infrastructure in Nigeria until 2040. This review mostly draws on grey literature from international financial and consultancy institutions such as the World Bank, Deloitte, and McKinsey. This is because much of the information available is angled at promoting investment into Nigeria – especially financing of large-scale infrastructure projects. Academic literature was also included. The literature notes that it is difficult to get hold of reliable data on infrastructure spending in Nigeria. The figures from different sources tend to vary greatly and are often not comparable, as they can be based on different definitions of infrastructure and data sources.

2. Current infrastructure trends and investment

Nigeria has historically under-invested in infrastructure. Hence, infrastructure has been a longstanding issue for the country. Electricity was cited as the second-greatest obstacle to business and transport (rail, roads, airports, and ports) as the fifth-greatest obstacle to business in the World Bank's 2014 Enterprise Survey¹ of more than 2500 local companies. The World Economic Forum's 2019 Global Competitiveness Index² ranked Nigeria 130th out of 141 countries in terms of infrastructure,³ with the poor supply of infrastructure often being cited as one of the largest constraints to doing business in the country. A report for the McKinsey Global Institute estimates that the core infrastructure stock of Nigeria (including roads, rail, ports, airports, power, water, and communication networks) is worth only 35-40% of GDP,⁴ compared with an average of 70% of GDP in other developing economies examined (Leke et al., 2014, p. 44). Nigeria's National Integrated Infrastructure Master Plan (NIIMP – see Section 4 for details) meanwhile, estimated Nigeria's core infrastructure stock to be between 20% and 25% of GDP, or less than USD100 billion in 2012.

Government spending on infrastructure

Ebuh et al. (2019) examined government expenditure on selected components of infrastructure from 2007 to 2016 in Nigeria. They found that ICT had the highest mean investment over this period (₦4,657.53 billion, approximately USD13 billion), followed by the transport sector (₦709.05 billion, approximately USD2 billion), power (₦244.72 billion, approximately USD0.70 billion), and water/sanitation (₦58.64 billion, approximately USD0.16 billion). Investment in these sectors has generally increased year on year over the period 2007-2016. However, they highlight that the rate of increase was not commensurate to the rate of increase in population growth in Nigeria.

According to Global Infrastructure Outlook (see Section 3 for further details), Nigeria's annual average public investment in infrastructure across the sectors of transport, energy, telecommunications, and water between 2007 and 2016 was equivalent to about 3.6% of GDP and did not surpass 4.6% of GDP in any given year during that period. Between 2007 and 2016, annual average investment in transport accounted for 1.6% of GDP, and 1.1% of GDP was spent on energy infrastructure. Spending on telecommunications ranked third – roughly 0.6% of GDP – while spending on water accounted for only about 0.2% of GDP during the same period.

¹ World Bank/IFC. (2014). *Enterprise Surveys: Nigeria Country Profile 2014*. World Bank. <https://www.enterprisesurveys.org/content/dam/enterprisesurveys/documents/country-profiles/Nigeria-2014.pdf>

² Schwab, K. (2019). *The Global Competitiveness Report 2019*. World Economic Forum. http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

³ Infrastructure is one out of 12 pillars that the World Economic Forum (WEF) uses to assess the overall competitiveness of economies in the world. Infrastructure is part of the Sub-index of An Enabling Environment alongside institutions, ICT adoption and macroeconomic stability. Nigeria's overall competitiveness is ranked 116 out of 141.

⁴ Based on pre-rebased GDP.

Water infrastructure

Nigeria has significant renewable water resources; however, it is generally poorly utilised and managed (Momoh, 2019), and many of its water needs (such as water and sanitation, industry, agriculture) are not being met. Leke et al. (2014, p. 45) quote that 61% of the population has access to an adequate drinking water source, and just 31% has access to adequate sanitation. The most recent UNICEF/WHO Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP)⁵ estimates that in 2015, 69% of Nigeria's total population had access to drinking water (safely managed or basic), with around 85% of the urban and 52% of the rural population using improved drinking water sources. This represents a major improvement since 2002, when only 60% of the population had access to an improved drinking water source (UNICEF/WHO, 2019). According to figures in Bello-Schünemann and Porter (2017, p. 15), in 2016, almost 90% of the population of the world's lower middle-income economies had access to clean water compared to 69% of Nigeria's population, meaning 60 million people in Nigeria did not have access to clean water. Furthermore, they highlight that of the overall population in Nigeria with access to clean water in 2016, only 2.5% had access to piped water, with the rest having access to shared pumps and spigots, rainwater, etc.

Leke et al. (2014, p. 45) highlight that **safe water and sanitation** will become an increasing challenge with Nigeria's rapid population growth. According to available data from the Food and Agriculture Organisation (FAO, 2016), the total water withdrawal in Nigeria has been increasing, from 10.31 billion m³ in 2000 to about 12.47 billion m³ in 2010. Total water withdrawal per capita (i.e. the amount of water withdrawal relative to the population or number of inhabitants of a country) in Nigeria decreased from 79.77 billion m³/inhabitants/year in 2000 to 74.12 billion m³/inhabitants/year in 2010. Momoh (2019) related this decrease to the more rapid increase in Nigeria's population during this time. Rapid urban population growth has also made it difficult to meet piped water demand in Nigeria's cities, with many urban water supply systems suffering from extensive deterioration and poor utilisation due to a lack of maintenance, poor operation, and inadequate power supply (Bello-Schünemann & Porter, 2017).

Accelerated urbanisation and migration of population into the cities (especially in large cities, such as Abuja, Lagos) is a major issue in the delivery of water supply, as "although the number of people served continues to grow by millions of customers a year, on average coverage declines by 1 percent annually as urbanization moves too fast for [state water agencies] to cope with" (Macheve et al., 2015, p. 3). Macheve et al. (2015, p. 3) highlight that less than 40% of urban residents in Nigeria get water from state controlled utilities in 2015; they estimate that within the next 10 years less than a third of the municipal population will get water from state water agencies, and the costs will swell to USD1.5–2 billion a year for just basic water services.

Abubakar (2016) emphasises the importance of further quality factors related to water supply other than just 'access', through their study of public water services in Abuja. The study highlights lack of reliability, low water pressure, inefficient billing systems, inadequate facility maintenance, spatial inequality in service delivery, and lack of public involvement as undermining the delivery of water services in the city.

⁵ See <https://washdata.org/data/household#!/> [accessed 07/11/2019]

Bello-Schünemann and Porter (2017, p. 13) highlight that in 2016, only about 30% of Nigerians had access to **improved sanitation** facilities compared to, on average, more than 50% in the country's global income peers. Furthermore, they highlight that access to improved sanitation in Nigeria has deteriorated over the past decades rather than improved. They attribute this "mostly to rapid population growth, but it is also linked to poor awareness and planning as well as severe and systematic underinvestment."

Energy infrastructure

According to Bello-Schünemann and Porter (2017, p. 15), in 2016, almost 58% of Nigerians had access to **electricity** (close to 106 million people), compared to more than 80% of the population living in the world's lower middle-income countries. The World Bank's Development Indicators put Nigeria's access to electricity at 54% of the total population in 2017, with around 87% of the urban population and 22% of the rural population having access.⁶ Demonstrating the urban-rural divide in access.

Poorly maintained or completely dysfunctional plants, as well as grid deficiencies, lead to erratic electricity supply to both households and companies, resulting in Nigeria having one of the lowest annual consumption of electricity per capita in Africa (Bello-Schünemann & Porter, 2017, p. 15). Both the generation and distribution capacity of electricity in Nigeria face challenges and contribute to the unreliability of the supply. The lack of reliable electricity supply is one of the country's biggest weaknesses. Leke et al. (2014, p. 44) put installed generation capacity at 10 GW, but current output at only 3.5-4.5 GW, and highlight that demand is widely expected to dramatically outstrip both. Olowosejeje et al. (2019) also highlight Nigeria's widening generation-demand gap, putting Nigeria's operational generation capacity at approximately 3.9 GW and peak demand estimated at 12.8 GW (a shortfall of 70%). They argue the need for a measurable expansion in grid capacity to avoid bottle necks. Only 45% of Nigeria's population have access to power via the grid, and due to the grid's unreliability, about 42% of Nigerian businesses have a secondary power system (Deloitte, 2018).

The power sector in Nigeria was reformed in 2005 and underwent a privatisation process in 2013 that was intended to improve the operations of both generation and distribution systems. (IMF, 2019). However, according to the IMF (2019), this privatisation process did not succeed in using the private sector to narrow the infrastructure financing gap and improve service. The transmission grid in Nigeria still needs investment; the lack of maintenance has led to transmission losses of as much as 30% (Leke et al., 2014, p. 44). Nigeria's installed generation capacity predominantly depends on fossil (gas) thermal power sources (87.5%) and, to a much lesser extent, on hydro (12.5%). According to Leke et al. (2014), Nigeria has more than 50 GW of gas-fired generation potential, as well as significant hydro and coal resources to augment this capacity.

Transport infrastructure

According to Bello-Schünemann and Porter (2017, p. 2): "Currently only 16% of Nigeria's **roads** are paved, compared on average to half the roads in the world's lower middle-income countries."

⁶ Data taken from World Bank's World Data Indicators for Nigeria. See <https://databank.worldbank.org/reports.aspx?source=world-development-indicators> [accessed 07/11/2019]

The road density of Nigeria, at 21 km per 100 km² (Federal Republic of Nigeria, 2015), is just one-fifth that of India. The quality is often poor, with a lack of investment in maintenance leading to deterioration, which is accelerating due to rising traffic volumes resulting from population growth (Leke et al., 2014, p. 45). Nigeria's road sector accounts for about 90% of all freight and passenger movement in the country. According to NIIMP, Nigeria has a national road network of about 200,000 km. The planning, financing, construction, and maintenance of these different types of roads fall under the separate responsibilities of Nigeria's three tiers of government (i.e. federal, state and local). Federal roads make up only about 18% of this network, but carries about 70% of the vehicular and freight traffic in the country (Federal Republic of Nigeria, 2015, p. 25). They have been subjected to severe pressure as a result of increased vehicular traffic, as well as freight. State roads account for 15%, and local government roads for 67% of the total road network. According to the NIIMP (Federal Republic of Nigeria, 2015, p. 25), in 2012 about 40% of the federal road network, about 78% of the state roads and 87% local government roads were in poor condition and hence in need of rehabilitation.

The Nigerian rail system received little investment during the second half of the 20th century, leaving the country with less than 5,000 km of rail track, although the government has recently begun to reinvest in railways (Leke et al., 2014). The air transportation infrastructure consists of five international and 19 domestic airports; substantial investment is needed to bring them into line with international standards. Nigeria has an inland waterway system and several major ocean ports, most of which are in the hands of private concessions (Leke et al., 2014, pp. 44-45).

3. Future infrastructure investment needs and prioritisation

Population growth

A report on the future of Nigeria's infrastructure until 2040 by Bello-Schünemann and Porter (2017), highlights that rapid population growth will compound the current challenge of inadequate levels of access to basic infrastructure in Nigeria, and levels of access will continue to lag behind average levels from its peers. According to the report: "over the next 23 years, Nigeria's population is expected to increase from its current estimate of 190 million people [in 2017] to almost 330 million, representing a more than 70% increase. Without drastic improvements in Nigeria's basic physical infrastructure, this growth will compound the existing [infrastructure] deficit" (Bello-Schünemann & Porter, 2017, p. 3).

Future infrastructure needs

Bello-Schünemann and Porter (2017, p.3) use the International Futures forecasting system (IFs) to explore Nigeria's likely infrastructure trajectory (Current Path) across the categories of access to clean water and improved sanitation, access to electricity, road density per land area, and share of paved roads until 2040. With the exception of roads, access to infrastructure is used as a proxy for the extent and sophistication of infrastructure in Nigeria. Nigeria's infrastructure access levels are benchmarked against access levels of other lower middle-income economies in Africa as well as lower middle-income economies globally, specifically Pakistan, India and Indonesia. They find that "Nigeria's infrastructure deficit is evident across all categories as the country performs worse than its average African income peer and significantly worse than its average global income peer" (Bello-Schünemann & Porter, 2017, p. 8). Nigeria's urban population is growing much faster than its rural population, and it is estimated that by 2040,

nearly 75% of its population will live in urban areas (however, it is expected to plateau and decline around 2025). Other findings from the report include (Bello-Schünemann & Porter, 2017, pp. 8, 11-17):

- Nigeria is forecast to increase safe **water** access to 72% of the overall population by 2040, less than a 5% improvement over a period of more than 20 years. Even though the absolute number of people with access to safe water is likely to increase from 130 million in 2016 to over 235 million in 2040, over 30 million more people (hence a total of over 90 million people) will be without access to improved water sources by 2040.
- It is projected that access to improved **sanitation** in Nigeria will stagnate for the next few years before steadily increasing out to 2040. However, even with a steady increase from 2024 onwards, the portion of those with access to improved sanitation will only reach 42% by 2040 due to projected population increases. This means that 188 million Nigerians are likely to still be without access to sanitation facilities by 2040.
- On the current development trajectory, IFs forecast a steady increase for **electricity** access rates in Nigeria, with access rates estimated to be about 83% by 2040. Between 2016 and 2040, over 160 million more Nigerians would get connected to the grid. However, the IFs forecast a rural-urban divide, with a 99% urban access rate by 2040 (compared to 84% in 2016), compared to a 37% rural access rate by 2040 (compared to 34% in 2015). The future of electricity supply remains uncertain in Nigeria, as generation, transmission and distribution capacity in Nigeria are seriously compromised.
- Nigeria is forecast to improve **road** density (per land area), increase road access for rural areas, and improve road quality by increasing the portion of roads that are paved. Nonetheless, the gap between Nigeria and its global income peers is likely to remain in place. Nigeria's continued population growth and recent economic downturn mean that increases in road access and quality are unlikely to keep up with its needs.

Gender and disability considerations will be important in any future infrastructure investments in Nigeria. Asiyanbola (2012) examined gender differences in the urban infrastructural poverty experience in Ibadan, Nigeria. Through analysis of a cross-sectional survey of 232 households, it found that there is intra-urban variation in the women and men urban infrastructure experience in Ibadan. They conclude that Nigeria will need to make services not only affordable, accessible and appropriate, but also gender sensitive. Therefore, service provision must recognise the different and specific needs and interests of women and men.

Future funding and financing needs

There are a variety of estimates projected for infrastructure funding needs in Nigeria in the near future. Differences in estimates are due to the methodology, data source, assumptions, and definitions of infrastructure used. Estimates include:

- Based on sector growth strategies, outcome targets, and international benchmarks, the NIIMP estimates total investment needs in energy and transport infrastructure over 2014-2023 of about USD1,000 billion and USD775 billion, respectively (Federal Republic of Nigeria, 2015, p. xi).
- The Economic Recovery and Growth Plan (ERGP – see Section 4) 2017-2020 for Nigeria calls for USD3 trillion of infrastructure (road, rail, power, airports, water, telecoms, and

seaports) investment through to 2044, stressing that the federal government cannot provide these resources without leveraging private sector investment (Federal Republic of Nigeria, 2017, p. 74).

- According to the Minister for Trade and Investment, Nigeria plans to increase infrastructure spending to USD10-20 billion over the next 5 to 10 years and will introduce an infrastructure bond in 2019 to help address challenges in revenue generation.⁷
- A 2011 World Bank publication (Foster & Pushak, 2011, p. 37) assessed that Nigeria needs to increase its spending to USD14.2 billion per annum to meet its most pressing infrastructure needs, with USD10.5 billion per annum needed for federal infrastructure (i.e. ICT, large-scale irrigation, power, primary roads, railways, ports, and airports) and USD3.7 billion for state/municipal-level assets (i.e. water and sanitation, secondary and tertiary road networks, and small-scale irrigation).
- According to the Global Infrastructure Outlook (see sub-section below), Nigeria's cumulative infrastructure spending need (investment need scenario) between 2017 and 2040 is about USD878 billion, while the expected spending would be about USD657 billion, leaving a gap of USD221 billion. Based on what is needed, this translates into an average investment of over USD36 billion per year (Oxford Economics, 2017).
- Leke et al. (2014, p. 46) in a report for McKinsey Global Institute estimate that USD839 billion would need to be invested in infrastructure from 2013 to 2030 to allow the economy to reach its full potential (the bulk of this investment would be in power and transportation systems, but also in telecommunications and water infrastructure). They estimate that use of improved water, electricity, telecommunications, and transportation infrastructure could contribute an additional USD119 billion to 2030 GDP. Their projections assume an ambitious and efficient rollout of projects over the next two decades, but the exact infrastructure requirements are uncertain since they are strongly influenced by the level of growth in other sectors, and the ability to execute projects. Furthermore, they highlight that in some potential scenarios, core infrastructure investment requirements, excluding real estate, could be as much as USD1 trillion between 2013 and 2030 (Leke et al., 2014, p. 46).
- Macheve et al. (2015, p. 6) estimate that to achieve universal water supply in Nigeria, about USD6 billion needs to be invested between 2015-2025.

Global Infrastructure Outlook projections

The Global Infrastructure Outlook⁸ is part of the G20 supported Global Infrastructure Hub. It's an interactive tool that provides forecasts of infrastructure investment needs as well as gaps for 50 countries. Data for Nigeria's infrastructure investment needs is presented below (see Table 1 and Figures 1-3). Three different forecasts are given: a baseline forecast ('current trends') to reflect infrastructure investment based on the assumption that countries continue to invest in line with current trends, with growth occurring only in response to changes in each country's economic

⁷ Bala-Gbogbo, E., & Osae-Brown, A. (2019, March 27). 'Nigeria Wants \$20 Billion Infrastructure Spend Over 10 Years.' Bloomberg News. [News Article]. <https://www.bloomberg.com/news/articles/2019-03-27/nigeria-targets-20-billion-infrastructure-spend-over-10-years>

⁸ See <https://outlook.gihub.org/>

and demographic fundamentals. An ‘investment need’ forecast to demonstrate the investment that would occur if countries were to match the performance of their best performing (income) peers, after controlling for differences in the characteristics of each country. Lastly, a forecast that estimates how much a country would need to spend to achieve the relevant SDGs.

According to the Global Infrastructure Outlook, based on past levels of spending and the assumption that Nigeria is likely to continue to spend in line with current trends, the country is expected to spend on average about 3.3% of GDP on infrastructure per year between 2017 and 2040; breaking down to close to 3.7% of GDP between 2017 and 2030, and about 2.8% of GDP between 2031 to 2040. If, on the other hand, the country was to match the best performing countries in its income peer group (investment need scenario), the Nigerian government would have to increase annual average infrastructure spending to about 4.4% of GDP between 2017 and 2040; breaking down to about 4.8% of GDP between 2017 and 2030, and 3.8% of GDP between 2031 and 2040.⁹

Table 1: Cumulative Infrastructure* Investment trends vs need in Nigeria

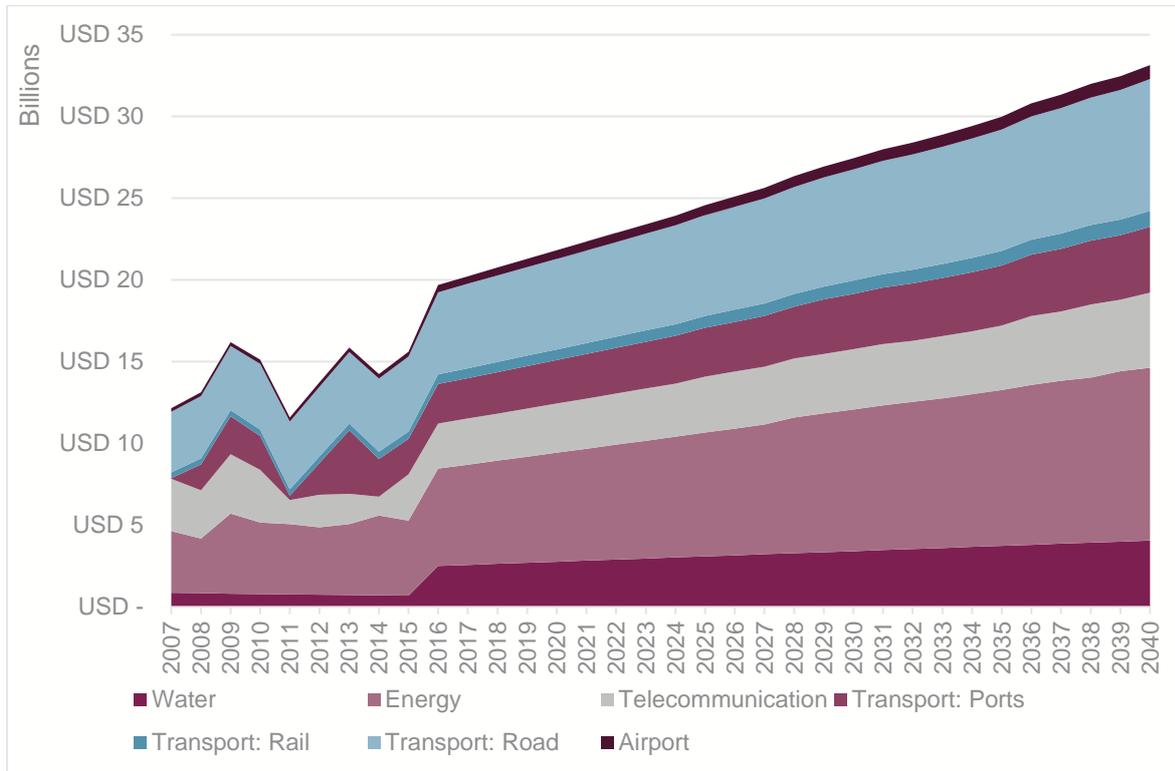
Billion USD (2015 prices and exchange rates, rounded to the nearest billion)	Water	Electricity	Telecoms	Road	Rail	Ports	Airports	Total
2016-2040 (Current trends)	82	205	89	164	20	80	16	657
2016-2040 (Investment need)	82	267	137	248	40	86	19	878
2016-2040 (Gap between Investment needs and Current trends)	0	61	47	84	21	5	3	221
2016-2030 (SDG - requirement over and above Investment need)	97	89	-	-	-	-	-	-

Source: Global Infrastructure Outlook, Country Profile: Nigeria (<https://outlook.gihub.org/countries/Nigeria>) & Oxford Economics (2017). Licensed from the Global Infrastructure Hub Ltd under a [Creative Commons Attribution 3.0 Australia License](https://creativecommons.org/licenses/by/3.0/au/).

* **Energy** - All industries directly related to the delivery of electricity, including Generators, Transmission and Distribution network assets. **Telecommunications** - All infrastructure assets for fixed line, mobile and broadband services. **Airports** - including terminals, runways, aprons and hangars, and dedicated car parks. **Ports** - including container, bulk, break-bulk, non-bulk and commodity ports. **Rail** - All below-rail heavy-rail infrastructure. **Roads** - All paved roads, including highways and motorways. **Water** - Water collection, treatment and processing, transmission and distribution assets, including desalination.

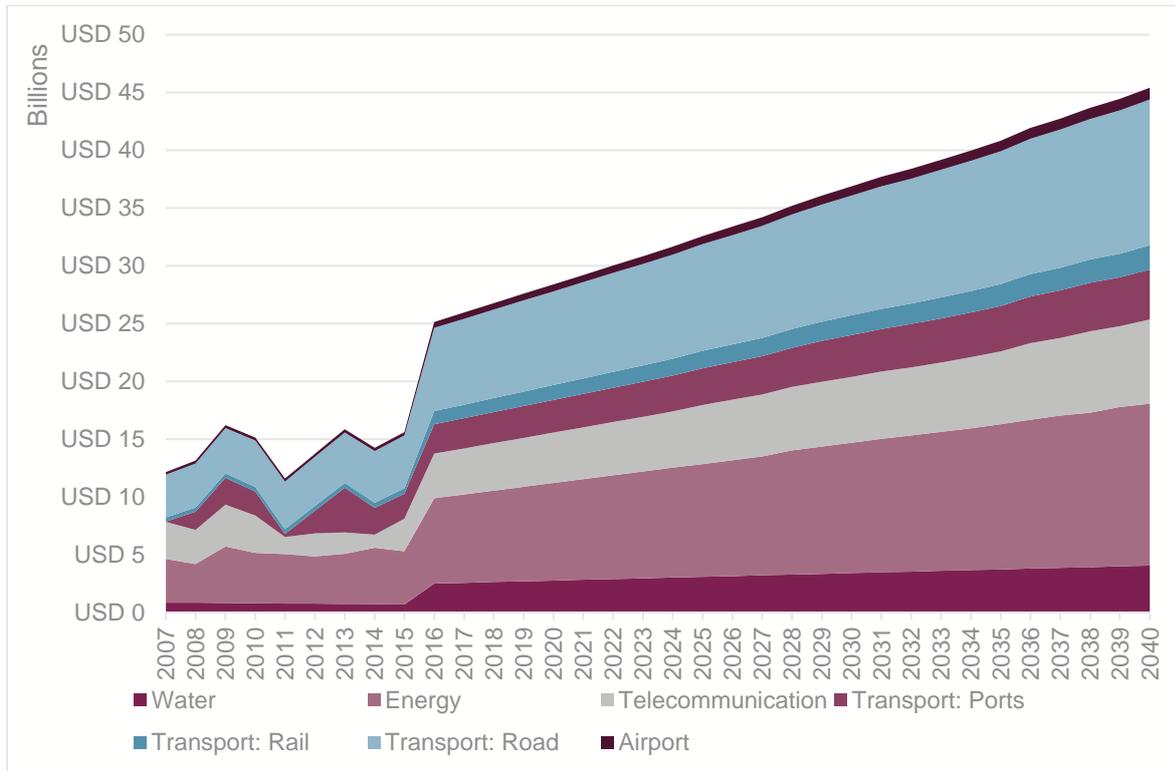
⁹ All figures taken from data from <https://outlook.gihub.org/countries/Nigeria>

Figure 1: Infrastructure investment at current trends for each sector in Nigeria, projections from 2016-2040



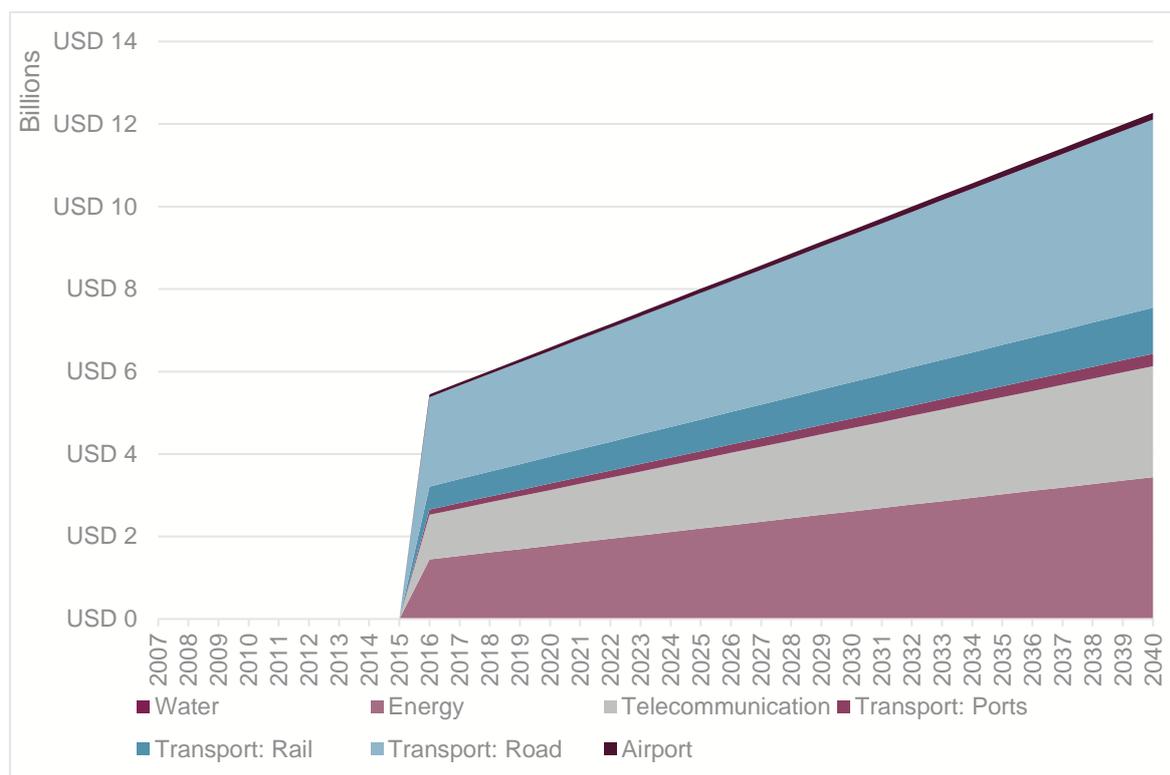
Source: Global Infrastructure Outlook, Country Profile: Nigeria (<https://outlook.gihub.org/countries/Nigeria>) & Oxford Economics (2017). Licensed from the Global Infrastructure Hub Ltd under a Creative Commons Attribution 3.0 Australia License.

Figure 2: Infrastructure investment needs for each sector in Nigeria, projections from 2016-2040



Source: Global Infrastructure Outlook, Country Profile: Nigeria (<https://outlook.gihub.org/countries/Nigeria>) & Oxford Economics (2017). Licensed from the Global Infrastructure Hub Ltd under a Creative Commons Attribution 3.0 Australia License.

Figure 3: Infrastructure investment gaps for each sector in Nigeria, 2016-2040



Source: Global Infrastructure Outlook, Country Profile: Nigeria (<https://outlook.gihub.org/countries/Nigeria>) & Oxford Economics (2017). Licensed from the Global Infrastructure Hub Ltd under a Creative Commons Attribution 3.0 Australia License.

4. Key sectoral plans for Nigeria

National Integrated Infrastructure Master Plan (NIIMP), 2014-2043

Nigeria's National Integrated Infrastructure Master Plan (NIIMP), approved in 2015, provides a strategic framework for transformation of the country's weak infrastructure base. **Energy and roads** tend to be at the forefront of policy and budgetary allocations (Bello-Schünemann & Porter, 2017). According to the NIIMP, implementation of the master plan will require a total investment of USD3 trillion over the course of the next 30 years (Federal Republic of Nigeria, 2015, p. 118). Furthermore, it estimated that annual investments in infrastructure between 2014 and 2018 needed to rise from USD9-10 billion per year to an average of USD33.2 billion annually, the increase coming from a combination of public and private sources (Federal Republic of Nigeria, 2015, p. 118).

Economic Recovery Growth Plan (ERGP) 2017-2020

The Economic Recovery and Growth Plan (ERGP) is a medium-term roadmap for 2017-20, emphasising reform and investment to kick-start economic recovery and support diversification, in order to reduce the country's dependency on oil (Federal Republic of Nigeria, 2017). The ERGP advocates USD30 billion of new borrowing to help finance the short-term gap, while cost-sharing frameworks supported by private investment are heavily emphasised to ultimately attract

the estimated USD3 trillion needed by 2030. Deloitte (2018, p. 10) argues: “To succeed in this target, fixed capital formation (government spending on infrastructure) must outperform analysts’ forecasts and the government needs to ramp up its capacity to manage this massive undertaking.” The current ERGP emphasises investment in infrastructure, especially in power, roads, rail, ports and ICT, however, it fails to acknowledge water and sanitation infrastructure (Bello-Schünemann and Porter, 2017, p. 24). This reflects how access to basic infrastructure in Nigeria (such as sanitation and water) is often overlooked “due to a short-sighted economic focus on energy and transportation infrastructure” (Bello-Schünemann and Porter, 2017, p. 24). Solomon and Fidelis (2018) assessed the level of performance in the implementation of the economic plan. They highlight one key weakness is that the ERGP has no legal framework backing its establishment and execution. Further challenges to its implementation are revenue and political risk (especially during electioneering).

The Partnership for Expanded Water Supply, Sanitation and Hygiene (PEWASH)

According to Bello-Schünemann and Porter (2017, p. 13), the Nigerian government published PEWASH¹⁰ in 2016, which essentially buys into the SDG target of achieving universal access to clean water and improved sanitation by 2030. PEWASH is a 15 year programme, which has been broken down into three phases: phase-I (2016-18) being the preparatory phase; phase-II (2019-2025) being the expansion phase, and finally phase-III (2026-2030) is the acceleration phase. Through this strategy, Nigeria aims to eliminate open defecation by 2025, and achieve 100% access to rural water supply and improved sanitation by 2030. However, despite the fact that Nigeria’s urban population is growing much faster than the rural population, the strategy targets rural areas only (Bello-Schünemann and Porter, 2017).

5. International actors

Chinese Investment

China has become an important source of infrastructure funding in Nigeria, particularly for large, capital-intensive projects that require long-term financing. Oxford Business Group provides the following examples of engagement. In May 2018 the Federal Ministry of Transportation announced it had awarded the China Civil Engineering Construction Corporation (CCECC) a USD6.68 billion contract for the Lagos-Kano Standard Gauge Railway, which will connect the two cities with an estimated 1000 km of new railway track. Under construction since 2006, the project has been heavily backed by Chinese investment. USD40 billion of Chinese investment in Nigeria was announced in January 2017, and it has been estimated by China that it has already invested USD45 billion in Nigeria to finance USD22 billion-worth of completed projects, with an additional USD23 billion of projects ongoing (Oxford Business Group, 2019).

¹⁰ See http://www.washpmp.com/files/report_file/1_583dc3bf-a67c-4793-8b0a-43a2601e0bea.pdf [accessed 07/11/2019]

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