

A Wake Up Call

*Nigeria Water Supply, Sanitation,
and Hygiene Poverty Diagnostic*

NIGERIA



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Please cite the work as follows: World Bank. 2017. *A Wake Up Call: Nigeria Water Supply, Sanitation, and Hygiene Poverty Diagnostic*. WASH Poverty Diagnostic. World Bank, Washington, DC.

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Cover design: Bill Praguski, Critical Stages LLC.

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Acknowledgements

The Nigeria WASH Poverty Diagnostic was written by Luis A. Andrés, Michel Duret, Pier Mantovani, Vasco Molini, and Rachel L. Ort. The team also includes Basab Dasgupta, Dustin Smith, Jonathan Grabinsky, Diana Cubas, Julio Gonzalez, Aroha Bahuguna, and Agustin Echenique. The team gratefully acknowledges the support of Dahiru Abdulkareem, Clare Cummings, Richard Carter, Rick Rheingans, Karoun Bagamian, John Anderson, Sadie Ryan, Lindsey Laytner, Katie McNamara, Julie Watson, Oliver Cumming, Viviana Perego, Pavel Luengas-Sierra, Alona Daniuk, Biva Chapagain, Chai Hapugalle, and Michael Alofe.

The team received valuable feedback through a rich consultation and peer review process. The team also values the ongoing support and technical inputs from members of the Global WASH Poverty Diagnostics, including Craig Kullmann, Emmanuel Skoufias, Vivek Srivastava, Libbet Loughnan, and Shiqing Li. Insightful and constructive comments were also received from peer reviewers Miguel Vargas-Ramirez (Senior Water and Sanitation Specialist, GWASL), Dominick Revell de Waal (Senior Economist, GWASP), Joao Pedro Wagner De Azevedo (Lead Economist, GPV03), and Roland Lomme (Senior Governance Specialist, GGO27).

The team is grateful for guidance provided by Rachid Benmessaoud, Indira Konjhodzic, Jyoti Shukla, Alexander Bakalian, Wambui Gichuri, Maria Angelica Sotomayor, Richard Damania, and Bill Kingdom. The team also appreciates the support and inputs provided by the water team working in Nigeria, including Camilo Lombana, Khairy Al-Jamal, Hassan Kida, Tola Adeleru, and Kabiru Muhammed. Finally, the team wants to also gratefully acknowledge the support and commitment of the Government of Nigeria, in particular to Eng. Benson Ajisegiri (Director of Water Supply) and Mr. Emmanuel Olusola Awe (Director Water Quality Control and Sanitation) at the Federal Ministry of Water Resources.

We are also grateful to our partners at the WASH Development Partner Group: the African Development Bank (AFDB), the Agence Française de Développement (AFD), the Department for International Development (DFID), the European Union (EU), the Japan International Cooperation Agency (JICA), the United Nations Children’s Fund (UNICEF), the United States Agency for International Development (USAID), and WaterAid, who offered constructive feedback and valuable input all throughout the preparation process of this report.

This work was made possible by the Swedish International Development Cooperation Agency (SIDA).

The findings, interpretations, and conclusions expressed in this document are those of the authors and do not necessarily reflect the views of the Executive Directors of the World Bank, the governments they represent, or the counterparts consulted or engaged with during the informality study process. Any factual errors are, as well, the responsibility of the team.

Abbreviations

AFD	Agence Française de Développement
AFDB	African Development Bank
B20	Bottom 20 percent (wealth quintile)
B40	Bottom 40 percent (wealth quintile)
BOF	Budget Office of the Federation
BSWB	Bauchi State Water Board
BSWSC	Bauchi State Water and Sewerage Corporation
CBN	Central Bank of Nigeria
CBO	Community-based organization
CRF	Consolidated Revenue Fund
CSEA	Center for Studies of Economies of Africa
DALY	Disability adjusted life year
DHS	Demographic Health Survey
FCT	Federal Capital Territory (Abuja)
FIB	Freedom of Information Bill
FGD	Focal Group Discussion
FGN	Federal Government of Nigeria
FMoH	Federal Ministry of Health
FMWR	Federal Ministry of Water Resources
FMoF	Federal Ministry of Finance
GBD	Global Burden of Disease Project
GEP	Growth Elasticity of Poverty
GHS	General Household Survey
GDP	Gross domestic product
HFA	Height-for-age
HIA	Health impact assessment
HOI	Human Opportunity Index
HNLSS	Harmonized Nigerian Living Standard Survey
IMF	International Monetary Fund
IBNET	International Benchmarking Networks for Water and Sanitation Utilities
JMP	Joint Monitoring Programme (WHO/UNICEF)
LGA	Local government area
LMIC	Low- and middle income country
NLSS	Nigerian Living Standards Survey

MDA	Ministries, departments, and agencies
M&E	Monitoring and evaluation
MICS	Multiple Indicator Cluster Survey
MDG	Millennium Development Goal
MTEF	Medium-Term Expenditure Framework
NCWR	National Council on Water Resources
NEEDS	National Economic Empowerment and Development Strategy
NBS	National Bureau of Statistics
NGO	Nongovernmental organization
NNPC	Nigeria National Petroleum Corporation
NPC	National Planning Commission
NUWSRP	Nigeria Urban Water Supply Reform Project
NWPD	Nigeria WASH Poverty Diagnostic
NWSP	National Water Supply Policy
NWSS	National Water Supply and Sanitation Survey
O&M	Operations and maintenance
OPEN	Overview of Public Expenditure (NEEDS)
ORT	Oral rehydration treatment
PER	Public expenditure review
PIM	Public investment management
PEFA	Public Expenditure and Financial Accountability
PEWASH	Partnership for Expanded Water, Supply, Sanitation & Hygiene
PPP	Public-private partnership
RCT	Randomized control trial
RIF	Recentered inference function
RR	Relative risk
RBDAs	River Basin Development Authority
RSWRRD	Rivers State Ministry of Water Resources and Rural Development
RUWASSA	Rural Water Supply and Sanitation Agency
SDG	Sustainable Development Goal
SMS	Short message service
SMWRM	State Ministry of Water Resource Management
STH	Soil-transmitted helminth infections
SWB	State Water Board
SWA	State water authorities
STWSSA	Small Town Water Supply and Sanitation Agency
SUWASA	Sustainable Water and Sanitation in Africa
T60	Top 60 percent (wealth quintile)

T40	Top 40 percent (wealth quintile)
T20	Top 20 percent (wealth quintile)
U5MR	Under-five mortality rate
USAID	U.S. Agency for International Development
WASH	Water, sanitation, and hygiene
WASH-PRIM	Water, sanitation, and hygiene poverty risk model
WASHCOM	Community-based water, sanitation, and hygiene committee
WIMAG	Water Supply Investment Mobilization and Application Guidelines
WDI	World Development Indicators
WFA	Weight-for-age
WFH	Weight-for-height
WSP	Water and Sanitation Program
WSS	Water Supply and Sanitation Services
YLL	Years of life lost

A Glimpse at the Water and Sanitation Sector in Nigeria

Nigeria's sanitation sector is in critical condition

Only **29 percent** of Nigerians have access to improved sanitation

130 million Nigerians do not meet the MDG standards for sanitation

Nigeria's water sector faces significant challenges

61 percent of Nigerians have access to improved water, but only **31 percent** have access to improved water on premises

Access to piped water on premises in urban areas declined from **32 percent** in 1990 to **7 percent** in 2015

Poor households are deeply affected by inadequate access to WASH

71 percent of households in the lowest wealth quintile lack access to improved water

Poor children are about **four times** more likely to get diarrheal disease than rich children due to poor access to WASH

Public expenditure in water and sanitation is limited and of poor quality

Nigeria needs to invest at **least three times** more than what it does today to achieve the SDGs in WASH

15 percent of completed works on public water infrastructure are considered of unsatisfactory quality

Water agencies are performing poorly

Across most water-utility indicators, Nigeria **underperformed** in comparison to African and global averages

Nearly **30 percent** of water points and water schemes fail within their first year of operation

Executive Summary

More than 300 million people in Sub-Saharan Africa do not have access to improved water, and close to 700 million lack access to improved sanitation facilities. In Nigeria alone, 71 million people continue to live without access to improved water, while 130 million people do not meet the Millennium Development Goal (MDG) standards for sanitation. A large body of evidence suggests that limited or no access to water supply, sanitation, and hygiene (WASH) services adversely affects individuals' health, hinders their access to educational and economic opportunities, and affects their work efficiency and labor productivity.

As the global community moves toward achieving the Sustainable Development Goals (SDGs), it is necessary to assess the current state of access to water and sanitation in Nigeria so policy makers and key stakeholders can develop effective policies and interventions to address shortcomings in access to WASH. Such efforts should be targeted at the most vulnerable in society, specifically those who experience the greatest burdens of poverty.

This report offers an overview of the state of WASH services in the country. It draws from a number of national data sources, desk reviews, and original research to analyze service delivery in the country and assess the sector's performance. It offers an overview of poverty in Nigeria, considers the relationship between poverty and WASH, explores demographic patterns influencing access to WASH, and analyzes the relationship between WASH and child health outcomes. Further, it evaluates the performance of water agencies, examines and identifies institutional bottlenecks, offers insights on how to make the sector more efficient and sustainable, conducts a public expenditure review (PER) of the WASH sector, and explores the organization of the institutional landscape for urban water supply in Bauchi City. The report concludes with recommendations for tackling the current crisis of WASH services in Nigeria.

The following are the key messages emanating from the report:

Message 1: Nigeria's WASH Sector is in Critical Condition and Requires Immediate Attention

It is imperative for Nigeria to expand its WASH services and emphasize the effective and sustainable management of such services. The analysis throughout this report—especially the mapping techniques—reveal that water supply and sanitation services are systematically scarce throughout the country (except for a few local exceptions, such as Abuja). Those who live in the bottom 40 percent (B40) of the income distribution and those residing in rural areas are particularly disadvantaged. Therefore, policy makers must renew their focus on the management of existing water points and schemes to sustain and expand services—since failure rates for both are particularly pronounced.

Nigeria lags behind other countries in the region. Despite the progress achieved between 1990 and 2015 for access rates to improved water sources, Nigeria has regressed with regard to access to piped water service. Access to piped water on premises in urban areas dropped from three in every 10 persons in 1990, to even less than one in 2015. Indicators for sanitation are not only lagging but suggest that the subsector has been neglected by policy makers and is in an alarming state of dilapidation. Less than one-third of Nigerians have access to improved and unshared sanitation facilities, and only 5.6 percent make use of sewerage systems. Further, there is a clear wealth divide in access to water and sanitation. The richest 20 percent of households in Nigeria have more than 90 percent access to improved water and sanitation while slightly less than 30 percent of households in the poorest quintile have access to

improved water, and only 12 percent of these households have access to improved sanitation. These shortcomings are at least partially the result of deficiencies in the performance of water agencies, water points, and water distribution schemes. Almost half of the existing water points and schemes in Nigeria are nonfunctional. This multidimensional failure has not only fueled mounting water stress in the country but also has created a poverty trap by adversely affecting poverty and human development outcomes.

Analyses conducted for this study confirm with new detail the degree to which Nigeria's WASH sector is underdeveloped in comparison to regional standards, for both water supply and sanitation, and across urban and rural areas, with piped utility service regressing, and significant access gaps for the poor. Nigeria's WASH sector is in critical condition, calling for priority policy attention and bold action by state and federal governments.

Message 2: Improving the WASH Sector Will Have Significant Implications for Poverty Reduction and Human Development Outcomes

In the WASH sector, poor households are constantly being left behind. National survey data indicate that fewer than 30 percent of poor Nigerians have access to improved sources of water. Households in rural locations are also disproportionately impacted. Evidence suggests that 34 percent of the rural population must travel at least two hours round-trip to fetch water from a functioning improved source. When a trade-off between working time and time to fetch water forces households to tilt toward using informal or unimproved proximity water sources, it brings along health hazards and undernourishment.

Undernutrition is a major public health problem in Nigeria. Thirty-seven percent of children under five years of age are stunted, 18.5 percent are wasted, and 29 percent are underweight. Close to half of children in the B40 are stunted, and 37 percent of children in the B40 are underweight. Inadequate WASH increases the risk of contracting neglected tropical diseases, such as soil-transmitted parasitic helminth infections, schistosomiasis, and trachoma—all of which are endemic across Nigeria. In some regions of the country, these diseases are prevalent in more than 50 percent of the population.

Improving access to WASH will help address Nigeria's chronic undernutrition. Unsafe WASH conditions enable the transmission of enteric pathogens that can cause diarrhea and environmental enteropathy, and can lead to chronic problems with absorbing nutrients. This, in turn, can lead to stunting, wasting, and being underweight.

Improving WASH will thus have significant implications for poverty reduction and human development outcomes. In light of the interactions between WASH and other sectors, a multisectoral approach is needed for greater synergy with the public health, education, urban and rural development, and environmental sectors, among others. To generate a sustained impact, WASH must be fully integrated with interventions and other programming in associated sectors. The combination of such interventions will have more impact than the sum of their parts.

Message 3: The Sector is Constrained by Inefficient Service Delivery and Failing Facilities

Shortcomings in the WASH sector are connected in part to deficiencies in the performance of water agencies, water points, and water distribution schemes. More than 38 percent of all improved water points and around 46 percent of all water schemes in Nigeria are nonfunctional (deemed out of service in 2015, at the time of the survey). Further, nearly 30 percent of water points and water schemes appeared to fail in the first year of operation after construction, presumably because of poor build quality. The report finds that several factors—if more

carefully considered during the design, implementation, and operational stages—would drastically decrease the failure rates of water points and water schemes.

When considering most water-utility service indicators, Nigeria underperforms in relation to both African and global averages. Self-reported utility data contributed to the International Benchmarking Network for Water and Sanitation Utilities (IBNET) show that Nigerian state water agencies (SWAs) perform below the average level of performance for utilities in Africa, for the available indicators. The data further indicate that Nigerian SWAs underperform global IBNET averages by a significant margin between 2011 and 2015.

Nigerian SWAs display mixed results and trends in terms of operational efficiency. For example, between 2011 and 2015 the continuity of service increased slightly from 11.9 hours per day to 12.2 hours per day. In the same period, there was a boost in staff productivity across water agencies, in which the average number of employees per 1,000 connections slightly fell from almost 18 to 16.6. The number of samples passing the required number of tests to detect residual chlorine presence also increased slightly from 79.4 percent to 80.9 percent. However, SWAs performed poorly along indicators of financial performance: average revenue fell from US\$0.32 per cubic meter sold to US\$0.26 per cubic meter sold, while the already low cost recovery ratio of 0.63 fell further to 0.58 in the same period.

Message 4: To Achieve the SDGs in WASH, Nigeria Must Invest at Least Three Times More than it Does Today

Nigeria needs to spend more to achieve the SDGs in WASH. Recent estimates produced by the World Bank suggest that Nigeria must invest about 1.7 percent of its current GDP, or US\$8 billion per year (2015 prices), to achieve the SDGs by 2030. Although there are no recent estimates for overall expenditure in the sector, between 2006 and 2010, the Federal Government of Nigeria (FGN) and the states invested close to US\$1 billion per year (0.42 percent of GDP) in WASH. Capital expenditure was close to 0.28 percent of GDP, which is lower than regional levels (0.7 percent of GDP). Overall, these figures are particularly low in light of what is needed to stem the crisis in the sector.

Nigeria also needs to spend more efficiently. For instance, 44 percent of borehole construction projects committed were never started. This ratio is even higher for canal and dam projects—70 percent and 79 percent, respectively. Moreover, only 37 percent of borehole projects, 10 percent of dam projects, and 5 percent of canal projects were fully completed.

Message 5: Sound Sector Institutions Are Needed to Better Sustain Existing and New WASH-Related Efforts

Nigeria's federal system contributes to a diverse institutional landscape for the water sector across 36 states, which is a challenging context for implementing national programs. Within the Nigerian federal system, subnational governments are assigned primary responsibility for water supply and sanitation; in practice the FGN also plays a substantial role in financing capital investments. Coordination of planning and budgeting of investments and of associated operations and maintenance (O&M) is particularly challenging given the number of actors, which each have diverse incentives and priorities for allocating resources to the sector.

State water authorities exercise limited autonomy over fiscal and human resources. All SWAs are public institutions, though some have been established as state-owned corporations with

a degree of autonomy. Yet, even for the latter group of utilities, the collection of tariffs remains low, leaving them dependent on state governments to finance their operations, expenses, and salaries. Further arrangements for human resource management create complex lines of accountability for performance. Limited reliable data exist to inform decision making and performance management—or to contribute toward greater public accountability.

In Bauchi City, the (formal and hidden) costs of connecting to piped water and citizens' negative perceptions of SWA service reliability are significant challenges. Piped water is viewed as being more affordable (on a monthly basis) than other sources of water. While evidence suggests that citizens would be willing to pay official connection fees and tariffs to access piped water service, perceived barriers to connecting are high. These include quotes for connection fees that are higher than official rates; the need to cover material and labor costs; difficulty negotiating access or paying for permission to cross neighboring properties or nearby roads; and terrain issues, such as the need to buy and operate booster pumps in hilly areas.

Needs Looking Forward

Failure to address the current situation will have dire consequences for the nation. Without immediate attention to this sector failure by policy makers and other key stakeholders, the country will at best continue to suffer from the damaging effects of the status quo. At worst, the situation will continue to deteriorate, making it increasingly difficult to recover and establish the policies and programming to rehabilitate the sector in the future. It is thus imperative to take stock of past failings and take decisive action now. Such action must be expanded and sustained as part of a long-term national commitment.

The analysis in this diagnostic suggests seeking opportunities for reform that can deliver better services within the existing political context. The main binding constraints to water sector development pertain to governance, and inadequacies in finance, in an overall context of fragmentation (36 responsible states):

- There must be a long-term governmental commitment to finding pathways for better delivery in Nigeria in the context of a federal system with enormous potential but uneven institutional capabilities. There must be a strengthened long-term commitment to governance and institutional reforms, as well as a push for reforms that better align institutional incentives, offer more robust accountability mechanisms, and prioritize financing and capacity building in the sector.
- The government should invest in closing implementation gaps, supporting service delivery capabilities in the water sector, and promoting greater integration of the private sector into the water and sanitation sectors. As part of scaling up capacity-building programs, the sector requires pragmatic approaches to human resource management to better align incentives, promote greater accountability, and encourage the retention of talent. Moreover, there should be greater, and a more strategic, promotion of private sector involvement in water management, paving the way for the introduction of new methods and skills. The careful introduction of public-private partnerships (PPPs) in the operation and maintenance of selected water systems can be a potentially game-changing opportunity: allowing the sector to replenish its skills and learn from experimentation, while also placing competitive pressure on public operations to offer better, more efficient services. Similarly, the role of the informal water vending, well-drilling, and fecal sludge disposal businesses should be better recognized within the existing legal and political frameworks, and thus better integrated, through regulation, into the water and sanitation service delivery chains.
- The water sector requires greater and more efficient financing and investment—including an upgraded tariff and subsidies structure and a more accountable budget process.

To help attain cost-recovery and affordability objectives, there should be a greater emphasis on decoupling tariffs and subsidies and a better targeting of subsidies. To incentivize better sector performance, it is imperative to push forward on a financing structure that is more accountable and driven by results. The establishment of rules-based funds—to channel federal budget support to state investments in a more transparent manner—would be an important tool for empowering federal leadership, and to guide and incentivize sector development and reform by the states. Renewed emphasis is also needed on a long-term utility credit-worthiness agenda that promotes access to commercial finance.

- In light of the synergies between WASH and other sectors, a multisectoral approach is needed. Access to WASH services in Nigeria is sharply conditioned by differences in levels of poverty, education, wealth, geographic location, and health. To generate a sustained impact, the WASH sector must be fully coordinated with the interventions and programming of associated sectors, such as public health, education, urban and rural development, environment, and governance. The combination of such interventions will have more impact than the sum of their parts. Drawing from the findings of this report, new efforts should consider geographical mapping and targeting to ensure that programs reach populations that are most in need.

The country can and *must* take significant action to improve its water and sanitation sector. With the knowledge put forward in this report, subsequent dialogue, and ample action, it is possible for Nigeria to transcend the current crisis. Achieving the SDGs is still within reach. The costs of *not* moving forward in the sector are simply too great to ignore; the lives of 182 million individuals—and the fate of the nation as a whole—are linked to progress in this sector.

Chapter 1

Introduction

With a population of 182 million, Nigeria is the largest country in Africa. It also has one of the fastest-growing economies in Sub-Saharan Africa: its gross domestic product (GDP) quadrupled between 2005 and 2015. However, Nigeria has been unable to translate its rapid growth into fast poverty reduction. Three key factors have likely contributed to Nigeria's persistently high poverty levels: (a) economic growth has been accompanied by high rates of population growth; (b) economic growth has not led to expanded jobs and other opportunities for all citizens; and (c) there is evidence that inequality has been rapidly increasing. Further, Nigeria is falling behind on several key indicators, including measures of the accumulation of physical and human capital and measures of household access to basic services (Molini et al. 2016).

The entire region has limited access to WASH services. As of 2015, 319 million people in Sub-Saharan Africa did not have access to improved water, and 694 million lacked access to improved sanitation facilities. Alarming, a large body of evidence suggests that limited or no access to water supply, sanitation, and hygiene (WASH) services has a number of deleterious effects on development outcomes. It adversely affects individuals' health, limits their access to educational and economic opportunities, and hampers their work efficiency and labor productivity.

Nigeria's levels of access to WASH are markedly lower than those of other peer countries in the region. Fifty-seven million people in Nigeria continue to live without access to improved water, while 130 million people use unimproved sanitation facilities. According to research conducted by the Water and Sanitation Program (WSP) of the World Bank, the socioeconomic impacts of poor sanitation alone cost the country about ₦455 billion (US\$2 billion) each year. Such a status quo exists even though the country achieved the Millennium Development Goals (MDGs) for water in 2015. Nigeria was, however, unable to achieve the MDGs for sanitation.

Against this backdrop, the *Nigeria WASH Poverty Diagnostic* seeks to assess the dynamic and often deleterious relationship between poverty and access to WASH services. This report draws from a number of national data sources, desk reviews, and primary research to provide insights to help close the gap between poverty and access to water and sanitation.

As Nigeria sets out to achieve the more ambitious SDGs, it is all the more important to assess the current state of the WASH sector so policy makers and key stakeholders can develop effective policies and interventions to address shortcomings in access to WASH. Such efforts should be targeted at the most vulnerable in society, specifically those who experience the greatest burdens of poverty.

This report is part of the broader Global WASH Poverty Diagnostic initiative, led by the World Bank's Water and Poverty Global Practices. The initiative spans 18 countries across multiple regions. At the core of each diagnostic report lie four questions, which help guide the analysis

and conversation toward probing the links between poverty and WASH access; the end goal is to offer insights for improving policy and practice:

Core Question 1: Who are the bottom 40 percent of the national income and/or wealth distribution and where in the country do they live?

Core Question 2: What is the level and quality of WASH services experienced by the bottom 40 percent and absolute poor, as compared to the top 60 percent and non-poor?

Core Question 3: What are the linkages and synergies between WASH and other sectors?

Core Question 4: What are the WASH service delivery constraints and solutions to improving services to the bottom 40 percent?

Under **Core Question 1 (CQ1)**, we will primarily consider trends in poverty reduction that have occurred in Nigeria over the course of the past decade. For **Core Question 2 (CQ2)**, we utilize the 2015 National Water Supply and Sanitation Survey (NWSS) data and the 2011 Multiple Indicator Cluster Survey (MICS) to understand households' access to water and sanitation, as well as to assess the functionality of water points and schemes. Advanced mapping techniques are used to better understand access to water and sanitation services, and to better assess the relationship between access and poverty. We also consider the Human Opportunity Index (HOI) to understand equality in access to WASH services. Further, we look at the NWSS data on public facilities to gain a sense of access to water and sanitation in public health centers and schools. In addressing **Core Question 3 (CQ3)**, we draw from a number of sources to better understand the linkages and synergies between WASH and other sectors. For **Core Question 4 (CQ4)**, we consider a myriad of sources to ascertain service delivery constraints.

By addressing these four core questions, this diagnostic provides a comprehensive picture of access to WASH services and their corresponding relationship with poverty. At each step of the report, we offer critical takeaways. The final section synthesizes all of these takeaways into five core messages and offers comprehensive policy recommendations.

Overall, the findings of the report reinforce the notion that Nigeria's water and sanitation is in critical condition. Failure to address the current situation will have dire consequences for the nation. Considering the well-documented and far-reaching impacts of inadequate access to water and sanitation, and its inequitable impact on the poor, there is little doubt that shortcomings in this sector are severely hindering Nigeria's overall progress. Without immediate attention to this sector from policy makers and other key stakeholders, at best, the country will continue to suffer from the damaging effects of the status quo. At worst, the situation will continue to deteriorate, making it increasingly difficult to establish the policies and programming needed to rehabilitate the sector in the future. As such, it is imperative that action is taken now, and that such actions are sustained.

The report is structured as follows: chapter 2 focuses on the poverty profile of Nigeria. Guided by CQ1, it provides a profile of those residing in the bottom 40 percent (B40) of the national income or wealth distribution, and explores where in the country they live. We consider trends in poverty reduction that have occurred in Nigeria over the past decade. Namely, we use General Household Survey (GHS) panel data to assess changes in poverty rates and describe the characteristics of the poor. Then, using advanced mapping techniques, we look at the geographic distribution of poverty.

Chapter 3 explains the current status of the water and sanitation sector in Nigeria. This chapter aims to understand Nigerian households' access to water and sanitation using the latest data available, the 2015 NWSS. The chapter utilizes advanced mapping techniques to better understand geographical variation in access to water and sanitation services. Finally, it looks

at the NWSS data on public facilities to derive a sense of the current state of access to water and sanitation in public health centers and schools.

Chapter 4 focuses on the synergies between poverty and access to WASH. This chapter analyzes the level of WASH services experienced by the B40 and absolute poor, as compared to the top 60 percent (T60) and nonpoor. To answer CQ2, the chapter considers households' access to water and sanitation using the 2015 NWSS and the 2011 MICS. Advanced mapping techniques are used to better understand access to water and sanitation services, and to highlight the relationship between access and poverty. Further, this chapter considers the Human Opportunity Index (HOI) to look at equality in access to WASH and understand the social determinants conditioning access to WASH services.

Chapter 5 covers some of the overlapping health risk factors associated with poor WASH and maps out their unequal distribution. In particular, this chapter focuses on the risk effects for children under five. The chapter aims to (a) quantify the proportion of WASH attributable risk of diarrheal disease borne by children in the bottom 20 percent (B20) and B40 of the income distribution, as measured by wealth quintiles; (b) estimate the potential health and other benefits of targeting WASH investments to children in the B20 and B40; (c) assist in identifying priority areas for WASH investment in which the social return will be greatest. A WASH poverty risk model is used to assess patterns of disease across different economic and geographic subsets of the population for children under five.

Chapter 6 addresses the sustainability of the water sector in Nigeria through the lens of the efficiency of SWAs, and through the performance of water schemes and water points. The chapter uses the International Benchmarking Network (IBNET) for Water and Sanitation Utilities dataset to look at service provision efficiency in terms of utility performance. The measures used to estimate efficient service provision are staff productivity, service continuity, water consumption per capita, percentage of water samples that passed residual chlorine tests, cost recovery, and average revenue. The chapter also uses information from the NWSS 2015 survey to identify the reasons why a limited percentage of water points and schemes are functional, and why some water points and schemes are failing faster than others. It also explores the possible drivers behind the failure of water schemes and water points, such as age, geographic distribution, hydrological characteristics, technology, and promoters. Finally, this chapter uses econometric techniques to decompose the relative share of each respective driver in contributing to water points and schemes' likelihood of failure.

Chapter 7 uses institutional and political economy analysis to explore challenges facing water service delivery in Nigeria. It provides a first look at bottlenecks and entry points for reform, highlighting key questions that may be unpacked further through fieldwork. With a primary focus on urban and rural water supply, the chapter sheds light on the causes behind the decline in access to piped water through household connections, and why the functionality of water points and schemes remains low. It sets out to understand why particular institutional capabilities have emerged, why certain bottlenecks persist, and what might be done to shift the institutional environment in a more positive direction over time.

Chapter 8 provides a brief overview of the status of public expenditure. The primary objective of this chapter is to analyze the recent fiscal developments in Nigeria's WASH sector within the context of a broad infrastructure investment program for growth and poverty reduction. The chapter offers insights on how to finance public investment, given the Federal Government of Nigeria's (FGN's) lack of access to resources and poor efficiency in expenditure. The broader aim for this chapter is to offer initial insights to help the Nigerian government map plans to better achieve the SDGs for WASH.

Chapter 9 illustrates how national challenges play out in a specific state by exploring the institutional and organizational landscape for urban water supply in Bauchi City. The chapter draws on fieldwork carried out in Bauchi City, which aimed to (a) understand the institutional bottlenecks to improving publicly provided water; (b) assess the organization and dynamics of

informal service chains; and (c) identify household willingness to pay for publicly provided water. Fieldwork relied on qualitative methods covering well-off areas with relatively reliable access to publicly provided water (Anguwan Albasa); poorer unplanned settlements (Kandahar); and areas with a mix of formal and informal suppliers (Old Town). Data were collected through focus group discussions with households and interviews with informal providers and senior officials in the water sector.

Chapter 10 concludes by offering key takeaway messages and policy strategies for addressing deficiencies facing the WASH sector. It summarizes the five core messages and provides preliminary entry points for reform to ensure better water and sanitation service delivery. Among other items, it advises the Nigerian government to adopt a multisectoral approach to dealing with the challenges facing the WASH sector, and to make a long-term commitment to finding pathways for better delivery in Nigeria including (a) greater investment in helping close implementation gaps, (b) support for service delivery capabilities in the water sector, and (c) greater integration of the private sector into the water and sanitation sectors. It also advises the government to place greater attention into building a more efficient financing and investment system, including helping upgrade tariff and subsidies structures, and creating more accountable budget processes.

Chapter 2

Poverty in Nigeria

Key Takeaways

- **In recent years, Nigeria has successfully reduced its poverty rate by approximately 10 percentage points.** Poverty rates fell from 46.4 percent in 2004 to 36.2 percent in 2013.
- **However, this reduction in the poverty rate has not translated into a reduction in the total number of poor citizens.** The country has experienced rapid population growth—nearly 3 percent per year—hampering the reduction of the absolute number of poor.
- **Three key factors have likely contributed to this low responsiveness:** (a) economic growth has been accompanied by high rates of population growth; (b) economic growth has not led to expanded jobs and other opportunities for all citizens; and (c) there is evidence that inequality has been rapidly increasing.
- **Access to infrastructure has a significant impact on poverty in Nigeria.** Econometric analysis indicates that the second biggest driver of the prominent north-south divide, as generated by endowments, is access to basic infrastructure.

Poverty and Inequality in Nigeria

While poverty declined by approximately 10 percentage points between 2004 and 2011, there was little improvement between 2011 and 2013 (see table 2.1). Poverty rates computed from the General Household Survey (GHS) panels, for which the consumption module was reestimated using survey-to-survey techniques, suggest that poverty rates are significantly lower than previous estimates.¹ According to the GHS panels, poverty rates fell from 46 percent in 2004 to 35.6 percent in 2011, and to 36.2 percent in 2013 in per capita terms at the national level. The stagnation between 2011 and 2013 is likely the result of an overall decrease in the growth of the oil, trade, and agriculture industries in 2012.

Most Nigerians remain either poor or vulnerable to poverty (Corral, Molini, and Oseni 2015). Households considered vulnerable to poverty are those that are above the poverty line in the consumption distribution² but below the middle-income cutoff of about ₦130,000 per capita per year (approximately ₦356 per capita per day, in 2010 prices). Hence, although welfare improved throughout the income distribution between 2004 and 2013, 86 percent of Nigerians are still considered vulnerable to poverty or poor: 36 percent of the population are poor and 50 percent are considered vulnerable to poverty. On the other end of the spectrum, only 14 percent of Nigerians are considered middle income or above. Between 2004 and 2013, changes in poverty, both positive and negative, have been most pronounced in urban areas. For instance, although the share of citizens vulnerable to poverty increased by 8 percent in urban areas, these areas also saw an 18 percent decrease in the poverty rate, and a 10 percent increase in the share of people in the middle income.

Table 2.1: Poverty Rates, Gaps, and Severity in Nigeria, 2004, 2011, and 2013

Percent

	Poverty rate			Poverty gaps			Severity of poverty		
	2004	2011	2013	2004	2011	2013	2004	2011	2013
Rural	51.61	46.35	48.49	18.97	14.78	14.8	9.45	6.47	6.16
Urban	34.16	16.69	15.92	10.52	3.83	3.85	4.65	1.33	1.45
Nigeria	46.42	35.64	36.19	16.45	10.82	10.66	8.02	4.61	4.38

Source: Molini et al. 2016.

Note: Calculations from Molini et al. (2016) based on NLSS 2003/04 (reestimated), GHS 2010/2011, and GHS 2012/2013.

Despite Nigeria's impressive reduction in the poverty rate, the total number of Nigerians living in poverty didn't change significantly. Over the last decade, Nigeria experienced rapid population growth: nearly 3 percent per year. The rapid population growth, coupled with no changes in the poverty rate between 2011 and 2013, offset the gains made in poverty reduction between 2004 and 2011. Between 2004 and 2013, the number of poor Nigerians increased by 788,000. Further, while the overall population increased by 40 million between 2004 and 2013—with population growth occurring almost evenly in urban and rural areas—the absolute number of poor decreased by 3 million in urban areas and increased by approximately 4 million in rural areas.

The poverty rate decreased much faster in urban areas than it did in rural areas. Between 2004 and 2013, the poverty rate in urban areas decreased from 34.2 percent to 15.9 percent, while poverty in rural areas barely improved, dropping from 51.6 percent to 48.5 percent. Although Nigeria's last urban-rural classification was conducted in 1991, such findings are consistent with the fact that growth in agriculture remained slow in the years 2011–14, and with the widespread belief that urbanization has been a key driver of poverty reduction in Nigeria.

Poverty reduction has not kept pace with the country's large gross domestic product (GDP) growth. Nigeria's GDP has outperformed the average GDP of countries in Sub-Saharan Africa and performed similar to other low- and middle-income countries (LMICs), growing at an average of 8 percent each year since 2004. However, the country's large GDP growth has not kept pace with the country's reduction in poverty: for every 1 percent growth in GDP per capita, the country experienced only a 0.6 percent decline in poverty. The low rate of poverty reduction may stem from the fact that the increase in GDP per capita did not lead to an equivalent increase in real per capita consumption: while GDP per capita grew by approximately 4.3 percent annually, average consumption grew at 3.2 percent. Hence, for each 1 percent increase in per capita GDP, there was only a 0.74 percent increase in per capita consumption. Further, most of the increase in consumption was driven by increased consumption in urban areas.

Three key factors likely contributed to the low responsiveness of poverty reduction to economic growth (Molini et al. 2016). First, *economic growth has been accompanied by high rates of population growth*. While Nigeria's population saw an increase of about 2.7 percent per year, a figure comparable to the Sub-Saharan African average, it exceeded the average rate of population growth for other LMICs, which decreased from 2.3 percent to 1.5 percent between 1990 and 2014. Such higher rates of population growth adversely impacted economic growth; this is further evidenced when decomposing GDP. Ultimately, Nigeria's high population growth is driven by a very high fertility rate—5.5 births per woman—which is double the average of LMICs and higher than the Sub-Saharan African average of 5 births per woman.

Second, *economic growth has not led to expanded jobs and other opportunities for all citizens*. Overall, the discrepancy between growth in consumption and GDP per capita are explained

by the structure of the economy, which is heavily dependent on oil and mining, a sector that generates few jobs and is often dependent on foreign labor. Further, nonoil sectors, such as finance, are highly concentrated geographically. Other sectors, such as agriculture and manufacturing, have also been performing poorly (Beegle, Ringold, and Johansson de Silva 2015). Overall, empirical analysis suggests that over the last decade, the Nigerian economy has had a low labor absorptive capacity at both the aggregate and sectoral levels (Ajakaiye et al. 2015).

Third, *there is evidence that inequality has been rapidly increasing*. Between 2004 and 2013, GDP per capita grew more rapidly than the national average for people in the top percentile of the income distribution—increasing overall inequality. For people in the bottom 10 percent of the income distribution, growth in GDP per capita was, between 2004 and 2011, better than it was for people in the other percentiles; however, it suffered serious setbacks in growth between 2011 and 2013. Measures of household consumption make it clear that inequality rose in this period: inequality increased by approximately 15 percent when using the Gini coefficient, and by 82 percent when considering the Theil index.

Persistently high levels of inflation have hampered poverty reduction in recent years. Since the 1980s, Nigeria has faced high levels of inflation, placing a large portion of the population—highly concentrated around the poverty line—at risk. Those living in urban areas are even more vulnerable. Nigeria fares worse in terms of inflation than do other oil-exporting LIMCs: it has the second-highest level of inflation out of all oil-exporting developing countries, second only to Angola (IMF 2011).

Poor households are likely to be headed by older men who are self-employed in agriculture and possess no education. Across all years and regardless of income, men are more likely than women to be the heads of households. Typically, the head of a poor, vulnerable to poverty, or middle-income household is 50 years old. Approximately 75 percent of the heads of poor households were self-employed in 2013, and they worked primarily in agriculture. Between 2004 and 2014, the percentage of poor households with an uneducated household head increased from 54 percent to 67 percent.

Most poor households face serious deficiencies in access to basic infrastructure. Poor households are less likely to own durables (e.g., televisions, fridges, stoves, and generators) than are vulnerable to poverty and middle-income households, potentially due to the limited availability of electricity in poor dwelling units. They also lag behind in ownership of vehicles for transportation, the use of efficient energy sources, and in access to improved water and sanitation.³

Nigeria has underperformed when compared to other Sub-Saharan African countries in an array of poverty-related, nonmonetary indicators. While Nigeria has improved in most of its anthropometric indicators, other African countries have generally performed better. Progress is particularly needed in improving the under-five mortality rate (U5MR), the maternal mortality ratio, and rates of stunting and malnutrition. In the education sector, Nigeria's gross enrollment ratio of primary schools is 13.7 percent lower than the average of LMICs in Sub-Saharan Africa (98.4 percent). Further, the literacy rate of Nigerian women is a mere 53.1 percent—far behind those of other countries (e.g., in Kenya and Rwanda).

Nigeria faces significant inequality in access to water and sanitation—particularly among children. When considering the Human Opportunity Index (HOI), which measures equality in access to water and sanitation for children (0–16 years) in Nigeria (circa 2006), both the HOI and the coverage for water are close to 0.^{4,5} Nigeria performs well in access to sanitation compared to a number of other African countries, but coverage is still a mere 15 percent. The gap between coverage and the HOI is more than 5 percent, thus children's access to flush toilets is both low, highly unequal, and very much influenced by their geographic and demographic circumstances (e.g., wealth, location).

Mind the Gap

Evidence suggests that poverty is highly concentrated in the north. As of 2013, over 57 percent of poor Nigerians lived either in the North East or North West. Including the North Central, around 72 percent of the poor live in northern regions—a 10 percentage point increase from 2004. This regional concentration is likely explained by a combination of factors, among which are less favorable climate, distance from the sea, and poor and dilapidated infrastructure. While the poverty rate and the absolute numbers of poor declined in the highly populated coastal and central regions since 2004, the opposite has occurred in the North West and North East zones. In contrast, middle- and high-income households are typically found in urban locations, and in the southern parts of the country.

Poverty rates in the North region are higher than they are in the South region, and have decreased at a much slower rate. In the past decade, all southern regions saw a decline in poverty. In contrast, only the North Central region saw a reduction in its poverty levels (a reduction of almost 18 points), while poverty rates remained the same in the North West and North East regions—at 47.6 percent and 59 percent, respectively. The reduction in the total number of poor also mirrors this divide: the total number of poor in the South South region decreased by almost 6 million, while there was an increase of almost 8 million in the North region.

Further, poverty is more chronic and long-lasting in the North region. Looking at the 2011 and 2013 GHS panels, we see clear patterns of chronic concentrated poverty in the North region: 75 percent of the *chronic poor* (poor in both periods) are in the North region, and 25 percent in the South region. Approximately 60 percent of the *transient poor* (poor in 2011 and nonpoor in 2013, or vice versa) also reside in the North region. In the northern regions, the percentage of the chronic poor is highest in the North West region (37 percent) and second highest in the North East region (15 percent). Inversely, the share of chronic poor is typically under 10 percent in the southern zones.

The North East and North West can be considered largely responsible for the low responsiveness of poverty reduction to growth. Between 2004 and 2013, their percent of the population remained consistent (37 percent), but their share of the poor increased from 46 percent to 57 percent. When calculating the growth elasticity of poverty with these two zones excluded, the value doubles, and the speed of Nigeria's poverty reduction outpaces growth. Different patterns of poverty reduction in these regions are reflective of both their different rates of growth in per capita consumption and variation in inequality.

The increase in inequality and polarization was driven by widening regional disparities. When calculating the Gini coefficient, we see that the increase in inequality at the national level was largely driven by two components: inequalities among regions (an average of 25 percent of the total increase in the Gini coefficient between 2003 and 2013 is explained by an increasing North-South regional divide) and within-zone inequalities (approximately 50 percent of the increase is explained by inequality within regions). Nigeria is also undergoing a fast process of polarization—the combination of divergence from global and convergence on local mean incomes—as opposed to inequality, which is the overall dispersion of the distribution. When using the relative distribution method, the generalized increase in consumption meant that as of 2013, households were crowded around the top deciles of the previous distribution in 2004—masking growing polarization. This polarization is confirmed when factoring out changes in real median expenditure. Lower deciles tend to be emptied in the southern regions (South West and South South), whereas the opposite is evident in the North West and North East. Hence, the north-south divide drives the pattern of distributional change.

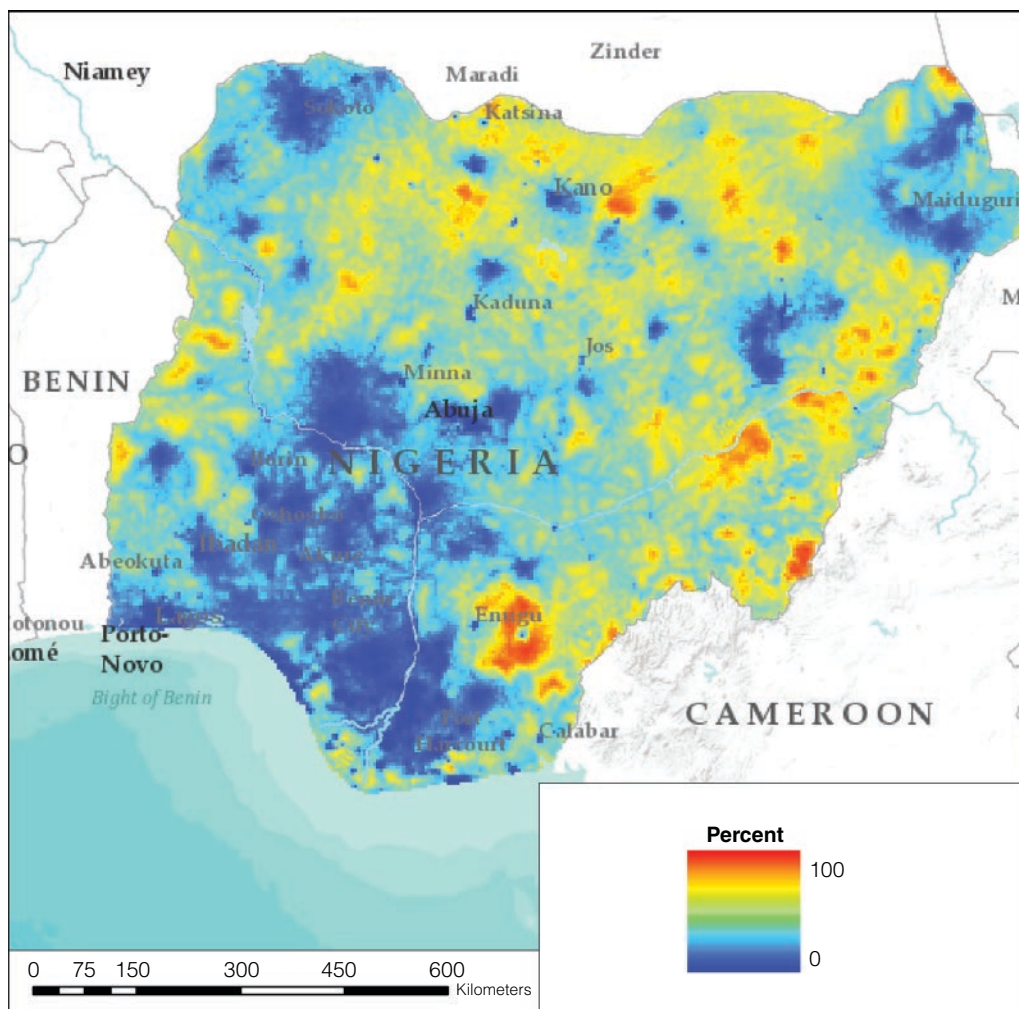
The north-south inequality divide spans across areas including education, health care, and nutrition. For instance, the enrollment rate across all age groups is lower in northern states, particularly for children ages 5–10. Further, after completing primary school (grade 6), over two-thirds of students in the North region are illiterate, as compared to 18 percent in the

South region. In the North East, 72 percent of students are illiterate after grade 6. In terms of health outcomes, the U5MR has declined drastically in the southern zones, but remains high in the North region. Stunting and malnutrition are also direr in the North region, and consistently at the highest levels in the North West.

The north-south divide is evident when considering poverty maps, and there is significant variation within zones. Gething and Molini (2015) present a statistical modeling approach that generates mapped surfaces of poverty rates at a fine spatial scale, in spite of various data limitations. Map 2.1 and map 2.2, panels a and b, utilize the 2012/13 GHS data to provide poverty headcount rates—the percentage of the population that live below the poverty line—across Nigeria. Map 2.1 provides a heat map of the poverty headcount rate at the national level, and map 2.2, panels a and b, present poverty rates and poverty headcounts at a more granular level: aggregated at the local government area (LGA) level.

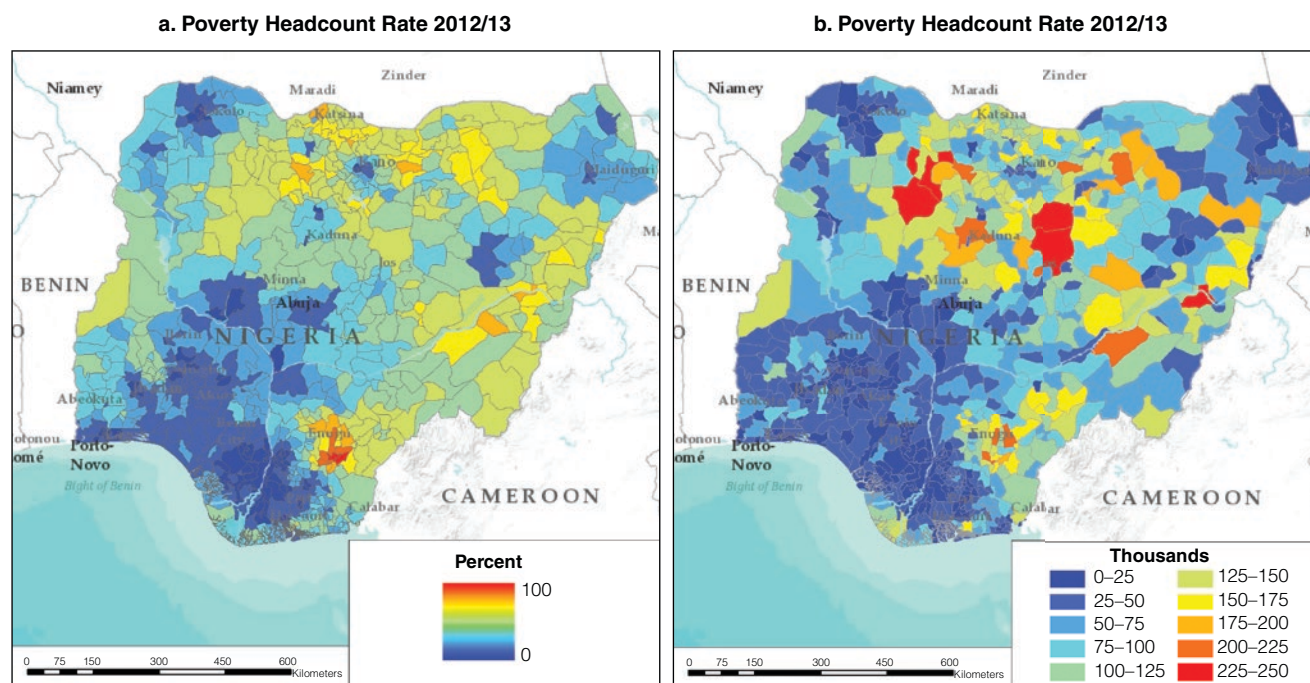
Maps 2.1 and 2.2 show a clear regional divide: the extreme poor inhabit a belt that extends across the country from the North West to the South East (extending from Zamfara State

Map 2.1: Predicted Poverty Headcount Rates in Nigeria, 2012/13



Source: Gething and Molini 2015.
 Note: The map denotes predicted percentage of poor at each location. The continuous surface is the posterior mean prediction at 5x5 kilometer resolution.

Map 2.2: Predicted Poverty Rate and Headcounts at the Local Government Area Level in Nigeria, 2012/13



Source: Gething and Molini 2015.

toward Cross Rivers State, bordering Cameroon). Further, poverty rates in the North West and North Central regions are relatively heterogeneous; the North Central region experiences low levels of poverty, which can be traced east from Abuja to the city of Jos, moving west into LGAs that border Benin, in Niger. Yet, other LGAs in this zone exhibit poverty rates as high as 60 percent to 85 percent. Among all regions, the South West is least affected by poverty; despite some exceptions, poverty rates appear to be lower than 12 percent, and the South Central region also performs well overall. Both of these southern regions experience positive spillover effects from the nearby Lagos. Among the southern regions, the South East is most visibly affected by poverty; rates in excess of 40 percent are observed at both the state and LGA levels. In the South South region, which encompasses the Niger Delta, pockets of poverty exist—namely in the LGAs of Southern Ijaw and Ekeremor.

The North-South Divide: An Econometric Analysis⁶

There is a high concentration of drivers of poverty reduction in the south, explaining the large north-south divide in poverty rates. Endowment differences account for 75 percent of this divide: 40 percent is explained by household structure: northern regions have higher dependency rates as well as more numerous households. The second biggest endowment-related factor driving the divide is access to basic infrastructure (20 percent), and the third biggest driver (13 percent of the endowment impact) is urbanization. Further, 6 percent of the endowment impact can be attributed to the educational divide between the north and south, in terms of household heads with primary, secondary, and tertiary education. Overall, differences in the structure of the labor market between the north and south—with the majority of those in the north dependent on subsistence agriculture—contributes to about 5 percent of the overall divide. When significant, returns on schooling, infrastructure, and productive assets serve to reduce the gap between the north and south.

Chronically poor households have unique demographic characteristics: they are larger, concentrated in the north, sustained by agriculture, headed by older men, and less educated. Chronically poor households are more prevalent in the north, while nonpoor households are concentrated in the south—particularly in the South West. In general, chronically poor households have more members and have a higher number of dependents than both transient and permanent nonpoor households. Chronically poor households are also likely to be headed by 50-year-old men who are self-employed in agriculture. Households headed by individuals with no education are also likely to be chronically poor.

Transiently poor and nonpoor households perform differently in a number of poverty-related, nonmonetary indicators. In general, transiently poor household heads' level of education is closer to that of chronically poor households than it is to that of the nonpoor; they are more likely to be employed in agriculture than nonpoor households; and they are more likely to be located in northern areas (59 percent) as compared to the nonpoor (30 percent). Transiently poor households are also more likely to be located in rural areas and are less likely to have electricity in their dwelling. They are also more likely to use uncovered pit latrines and unimproved water sources.

Econometric analysis reveals the importance of geographic region, education, type of employment, infrastructure, and climate in explaining chronic poverty. With all other factors being equal, living outside of the North West—as well as in urban rather than rural locations—increases the log odds that an individual occupies a dynamic profile higher than chronic poverty. When household heads possess higher levels of education, their households are more likely to occupy a higher dynamic category. Inversely, when a household head is employed in agriculture, his household has significantly lower log odds of occupying a higher category. Most interestingly, the log odds of moving out of chronic poverty increase in response to access to basic infrastructure and lower climatic variation.

Access to basic infrastructure—such as electricity, water and sanitation, and roads—is much higher in the southern regions. Access to basic services (e.g., electricity, water, and sanitation) reduces the likelihood of being poor in Nigeria. While access to electricity is a nationwide challenge, this problem is particularly acute in the north—only around 25 percent to 28 percent of households in the North East and North West have access to basic services. We observe a similar trend when considering access to water and sanitation. Access to improved water is typically higher in the south than in the north; in 2013, over 70 percent of households in the south had access to improved water, whereas the northern region had access rates as low as 49 percent in the North Central zone. In terms of sanitation, around 34 percent to 36 percent of households in the south had access to sanitation in 2013, whereas over 90 percent of households in the North East and North West lacked access. The north also has poor highway infrastructure, which limits households' connectivity to federal and state capitals.

Notes

1. The authors' reestimation of the consumption module was necessary, since the 2009–10 Harmonized Nigerian Living Standard Survey's (HNLSS) consumption module severely underestimated household survey consumption, and because consumption data for the 2003–04 Nigeria Living Standard Survey (NLSS) and GHS panel were collected differently, negating the possibility of comparing their respective consumption figures.
2. The consumption distribution is the measure of the purchase of goods and services across the population. This is an alternative means to assess economic equality for a given population.
3. These calculations were made using the General Household Survey Nigeria (GHSN 2012/2013) available at <http://econ.worldbank.org/WBSITE/>.
4. The HOI is also close to zero in Uganda, Rwanda, Liberia, and Madagascar.

5. As described by Molini et al. (2015), the HOI was created by the World Bank with external researchers in 2008. It is an indicator to measure the inequality of opportunities. In particular, the HOI considers (a) how far a country is from the goal of providing universal access to a set of goods and services and (b) the degree to which there is equality of opportunity to access the goods and services. Intuitively, the HOI is an inequality of opportunity discounted coverage rate. The higher the correlation between access and circumstances, the larger the discount or “penalty” to the coverage rate in computing the HOI (Dabalén et al. 2015). In this case, as overall coverage is low, it is difficult to decipher inequality in access.
6. Determinants of poverty rates in two southern zones (the South West and South South) and two northern zones (the North East and North West) are analyzed by estimating a recentered inference function (RIF) (Fortin, Lemieux, and Firpo 2011). Then, using a standard Oaxaca-Blinder decomposition, the divide in poverty rates is decomposed into the coefficient effect (differences in returns on variables), the endowment effect (changes in mean characteristics), and a residual. The same exercise is also conducted for middle-income households in these two groups.

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Chapter 3

WASH

Key Takeaways

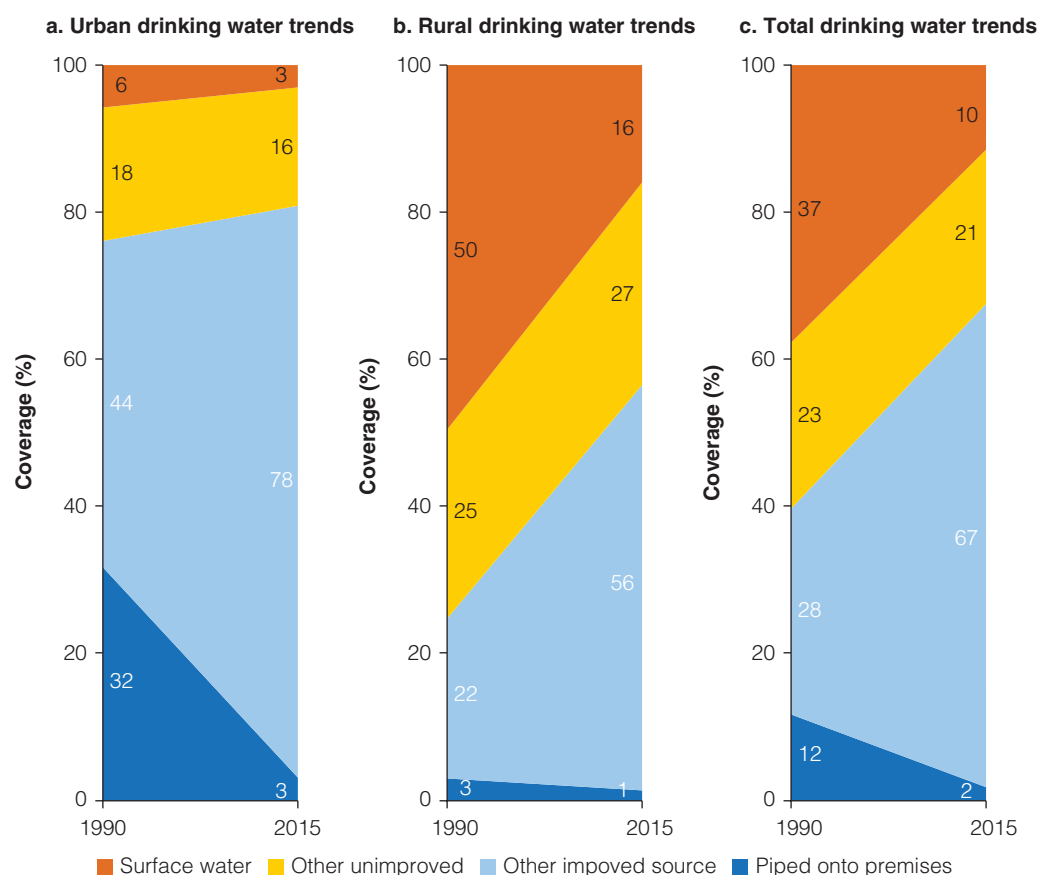
- **Nigeria has made considerable progress in the water sector.** The country has achieved the Millennium Development Goals (MDGs) for water, and the majority of citizens—61 percent—have access to improved water. Yet only 41 percent of the population has access to improved water within 30 minutes round-trip of their premises, and only 31 percent have access to improved water on premises. Even fewer, 7 percent, possess piped water on premises.
- **The sanitation sector is in critical condition.** Nigeria was unable to achieve the MDG for sanitation, and current data reflect this reality: only 29 percent of Nigerians have access to unshared improved sources of sanitation, and only 5.6 percent make use of sewerage systems. Due to the widespread repercussions of poor sanitation, shortcomings in this sector are of significant concern.
- **Approximately 23 million to 46 million Nigerians practice open defecation.** National estimates of open defecation rates—which vary between 13 percent and 25 percent—indicate that open defecation remains pervasive across the country.
- **Access to safely managed water sources is probably between 15 percent and 20 percent.** Of the 31 percent of households that have access to improved water on premises, one in six had interrupted service within the two-week period preceding the survey, and 21 percent of drinking water sources in the dry season and 42 percent of water sources in the rainy season were contaminated.

Access to Water and Sanitation in Nigeria

What is the level and quality of water, sanitation, and hygiene (WASH) services experienced by the bottom 40 percent (B40) and absolute poor, as compared to the top 60 percent (T60) and nonpoor? To understand Nigerian households' access to water and sanitation, we utilized data from the 2015 National Water Supply and Sanitation Survey (NWSS). We also used advanced mapping techniques to better understand geographic variation in access to water and sanitation services. Finally, we look at the NWSS data on public facilities to better understand access to water and sanitation in public health centers and schools.¹

Nigeria met the Millennium Development Goal (MDG) targets for water—69 percent of the population now have access to improved water. Between 1990 and 2015, Nigeria increased access to improved water by 29 percentage points. In 2015, 69 percent of households had access to improved water. This improvement was mainly driven by a 32 percentage point increase in coverage for rural areas—from 25 percent in 1990, to 57 percent in 2015 (figure 3.1, panels a–c). While coverage in urban areas is higher, access to improved water increased by only 5 percentage points during this 15-year period.

Figure 3.1: Trends in Access to Water, Nigeria, 1990–2015

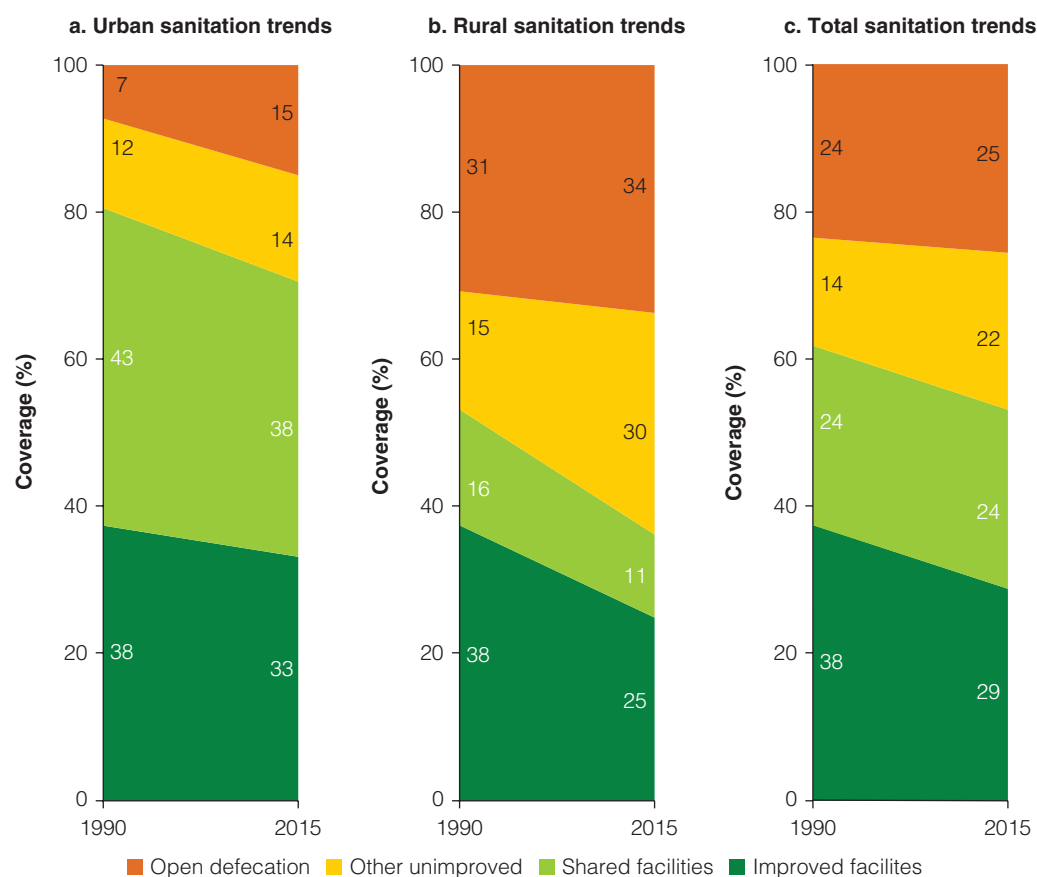


Source: WHO/UNICEF 2015a.

While access to improved water at the national level increased, access to piped water on premises declined by 10 percentage points: from 12 percent in 1990 to 2 percent in 2015. This is mainly due to a steep decline of 29 percentage points in access to piped water in urban areas—from 32 percent to 3 percent. The sharp decrease in access to piped water in urban areas is due to rapid urbanization, lack of investment, and institutional constraints in the expansion of services. Moreover, households continually face the risk of bacteriological or chemical contamination by increasingly relying on alternative water providers or private household solutions, such as unregulated manually drilled boreholes, which offer limited data on aquifer recharge and saline intrusion. On the supply side, the decrease in the provision of water to less than 50 liters per person per day affects the sustainability of the water utility systems, and leads to an inconsistent supply of water for those few consumers who have access to a water connection (Macheve et al. 2015). In rural areas, access to piped water was already low in 1990, and there was an additional decrease of 2 percentage points by 2015.

Nigeria did not meet the sanitation targets for the MDG, and the country has seen an overall decline in access to improved sanitation. At a national level, there was a decrease of 9 percentage points in access to improved sanitation. Access decreased from 38 percent in 1990 to 29 percent in 2015. Urban and rural access to improved sanitation were both 38 percent in 1990, and decreased to 33 percent in urban areas and 25 percent in rural areas in 2015 (figure 3.2).

Figure 3.2: Trends in Access to Sanitation, Nigeria, 1990–2015



Source: WHO/UNICEF 2015a.

Between 15 percent and 25 percent of the population still practice open defecation.² At the national level, open defecation rates remained relatively stable, with a 1 percentage point increase during this 25-year period. However, open defecation more than doubled in urban areas, from 7 percent in 1990 to 15 percent in 2015. Moreover, only 9 percent of the urban population was connected to a sewerage service in 2015 (National Population Commission [NPC [Nigeria]] and ICF International 2014). The practice of open defecation also increased in rural areas during this time period, though to a lesser extent—from 31 percent to 34 percent. There is significant reliance on on-site sanitation as a low-cost form of technology for reducing levels of open defecation, and the private sector provides services for excreta management. However, the final disposal sites of on-site sanitation technologies raise significant concerns about sustainability (World Bank 2009).

Access rates for WASH, while comparable to those of many countries in Sub-Saharan Africa, are much lower than the rates of most other countries in Africa. Most noticeably, access to piped water in Nigeria is below that of most countries in Sub-Saharan Africa. Similarly, access to improved sanitation in Nigeria falls below estimates for Senegal and Rwanda (table 3.1).

Latest WASH Estimates for Nigeria (NWSS Data)

This section seeks to assess the current state of access to water and sanitation in Nigeria. It draws primarily from the findings of the NWSS household survey, implemented in 2015 by the Federal Ministry of Water Resources (FMWR). As part of the NWSS, 201,842 households

Table 3.1: WHO/UNICEF Joint Monitoring Programme Estimates for Select Countries
Percent

	Improved water access	Piped water on premises	Open defecation	Improved sanitation
Nigeria	69	2	25	29
Congo, Dem. Rep.	52	8	10	29
Niger	58	9	73	11
Rwanda	76	9	2	62
Senegal	79	53	14	48
Sierra Leone	63	5	24	13
Sub-Saharan Africa	68	16	23	30

Source: WHO/UNICEF 2015a.

were surveyed, and the survey captures information on a household's access to sources of water and sanitation (see box 3.1 for an overview of the datasets used for this report, and some of the challenges and opportunities facing the data ecosystem in Nigeria). We use the following eight indicators, informed by the Sustainable Development Goals (SDGs) for water and sanitation, to provide an overview of the current state of access to water and sanitation in Nigeria:

In assessing access to water in Nigeria, we utilize four key indicators:³

- **Improved water** sources are those which, by the nature of their construction and when properly used, adequately protect the source from outside contamination, particularly fecal matter. Such sources include piped water to yards or plots, public taps or standpipes, tube wells or boreholes, protected springs, and rainwater.
- **Basic water** satisfies the requirement for “improved technology” as specified by improved water, but it also assumes a 30-minute round-trip collection time.
- **Improved water on premises** fulfills the same requirements as basic water, but further implies that improved water is available directly on one's premise.
- **Piped water on premises** fulfills the same requirements as “improved water on premises,” but water is provided through pipes.

In assessing access to sanitation, the following four key indicators are used:

- **Fixed-point sanitation** implies defecation into a pit or other containment structure, regardless of the quality of the structure or whether it is hygienically maintained (i.e., access to both improved and unimproved facilities). It is estimated as the opposite of open defecation, which is defined as “not having access to any type of toilet” or “going into the field.”
- An **improved sanitation facility** is one that hygienically separates human excreta from human contact that is unshared or is shared between two or more households.
- **Improved sanitation** implies access to a sanitation facility that hygienically separates human excreta from human contact and is not shared with any other households.
- **Sewerage** implies that a household is connected to a sewer system.

Box 3.1: Importance of Data

Having reliable and consistent population surveys and extensive data on government expenditure and service provision is the cornerstone of solid, evidence-based policy decision making. This report has made use of ample sources of data to provide an overview of the WASH sector in Nigeria. Among the datasets used are: The Demographic Household Survey (DHS), the Multiple Indicator Cluster Survey (MICS), the Living Standards Measurement Study (LSMS), the National Water Supply and Sanitation Survey (NWSS), data from the International Benchmarking Network for Water and Sanitation Utilities (IBNET), expenditure information published by the Central Bank of Nigeria, as well as other administrative data.

It is encouraging that the government of Nigeria has taken positive steps towards documenting and releasing independent, reliable data on population estimates and social service provision. Central to this positive trend is the passing of the Freedom of Information Act of 2011, which made significant advances in helping democratize and increase transparency in government data.

However, more work needs to be done to ensure that censuses and population surveys are done regularly, that data are released on a timely manner, and that the data collected are of the highest quality. For instance: NWSS surveys suffered from duplicate observations and a number of other inconsistencies. There were also severe constraints regarding the quality, timeliness, and availability of data on public accounts and national finances used in the public expenditure review (PER).

The Nigerian government thus needs to continue to promote the further implementation of population surveys, and keep working on bettering the infrastructure for the collection and documentation of service provision data. This will continue to allow for the production of high-quality policy research and well-informed policy making in relation to WASH and other sectors.

The majority of Nigerians (61 percent) have access to *improved water*, but only a small percentage of them have access to *improved water on premises*. Approximately 45 percent of the population have access to *basic water*, only 31 percent has access to *improved water on premises*, and a mere 7 percent has access to *piped water on premises* (table 3.2).⁴ Hence, the majority of those with access to *improved water* must travel long distances to use these sources, which likely affects their usage rates.

Less than one-third of Nigerians have access to *unshared improved sanitation*, and a mere 5.6 percent actually make use of sewerage systems. Overall, 44 percent of the population use an improved shared facility, but only 28.6 percent have access to an improved sanitation facility that is not shared with other households. Given that the urban population is increasing, this finding is particularly alarming, since evidence suggests that the use of access to improved sanitation has a significant impact on health and anthropometric characteristics. In spite of this, open defecation (calculated as the inverse of fixed-point sanitation: 1 minus the rate of fixed-point sanitation) remains relatively high (15 percent).⁵

Table 3.2: Key Indicators, by National and Regional Estimates, Nigeria, 2015
Percent

	Improved water	Basic water	Improved water on premises	Piped water on premises	Fixed-point sanitation	Improved sanitation (including shared)	Improved sanitation (unshared)	Sewerage
National	61.2	45.0	31.0	7.0	85.0	72.5	28.6	5.6
North Central	46.4	35.7	21.5	3.7	68.0	56.2	25.4	4.2
North East ^a	66.3	43.1	21.9	6.0	91.2	76.1	29.9	1.2
North West	58.0	43.9	37.0	10.7	97.4	86.6	40.8	1.0
South East	65.6	39.9	27.3	3.0	85.5	71.4	28.2	10.2
South South	59.9	41.3	25.9	6.7	82.2	63.4	19.7	4.8
South West	71.5	60.0	41.4	7.9	79.6	71.7	21.3	13.2

Source: World Bank elaboration based on the NWSS 2015.

a. This region includes states that were only partially covered in the household interview due to the conflict in the North East of the country.

Table 3.3: Key Indicators, by Location, Nigeria, 2015
Percent

	Rural	Small town	Urban	State capital	Total
Improved water	54	59	73	74	61
Basic water	37	43	58	61	45
Improved water on premises	24	28	43	49	31
Piped water on premises	4	6	13	12	7
Fixed-point sanitation	79	85	94	97	85
Improved sanitation (including shared)	64	72	84	89	73
Improved sanitation (unshared)	27	29	31	30	29
Sewerage	3	4	12	6	6

Source: World Bank elaboration based on the NWSS 2015.

Overall, the southern regions of Nigeria outperform their northern counterparts in access to improved water, while most northern regions have higher rates of improved sanitation. The South West has the highest rate of access to improved water (71.5 percent) and improved water on premises (41.4 percent) of all regions. Improved sanitation is higher in the north, with the North West having the highest level of access.

Urban areas⁶ and state capitals display higher rates of access to improved water and improved water on premises. This finding is likely explained by the presence of better infrastructure in urban areas across Nigeria. State capitals are particularly at an advantage, since they have greater access to improved WASH across all indicators (see table 3.3).

Although data are limited, it is estimated that between 15 percent and 20 percent of households have access to “safely managed water,” the SDG for water. Through the SDGs, the world has now committed to achieving universal access to water, sanitation, and hygiene under a broader,

more refined and more intricate monitoring framework. The new SDG indicators for measuring access are composite and stricter than the previous MDG indicators. The three additional measurements that define *safely managed* are whether a drinking water source is on premises, available when needed, and free of fecal and locally relevant chemical contamination. There are no data available in Nigeria that allow us to fully comply with the definition of *safely managed*, but access to an improved water source on premises and uninterrupted service over the last two weeks is used as a proxy. As seen in table 3.4, 31 percent of the population have access to improved water on premises, out of which 26.1 percent of households have access to *safely managed* water. Data on water quality are quite scarce, but a study conducted in Port Harcourt found that 21 percent of drinking water sources in the dry season and 42 percent of water sources in the rainy season were contaminated by thermotolerant coliforms (see box 3.2).

Box 3.2: Water Quality Testing Study in Port Harcourt, Rivers State, Nigeria

A comprehensive analysis (World Bank 2015) of water sources and quality was conducted in Port Harcourt, Nigeria, in the dry season, between November 2013 and February 2014, with a follow-up during the rainy season, between July and September 2015. Representative sampling suggests that municipal water supplies represent less than 1 percent of local water sources. Residents largely rely on privately constructed and maintained boreholes that are supplemented by commercially packaged bottled and sachet drinking water. The study led to several interesting findings:

There were significant changes between the dry and wet seasons, including for commercially packaged water. Contamination by thermotolerant coliforms increased from 21 percent of drinking water sources in the dry season to 42 percent of drinking water sources in the rainy season. The most significant increase was in sachet water, which showed the lowest frequencies of contamination in the dry season as compared to other sources (15 percent), but the highest frequencies during the rainy season (59 percent). Only half as many respondents reported drinking sachet water in the rainy season as they did in the dry season.

There were significant associations between water quality and other hazardous factors. Respondents primarily used flush or pour-flush toilets connected to septic tanks, while the remainder relied on toilets and pier latrines drained into surface waters. There were significant associations between fecal contamination in boreholes and the nearby presence of pier latrines. Sanitary surveys of boreholes showed that more than half were well constructed, and the study did not identify associations between structural or site deficiencies and microbial water quality.

The deterioration of drinking water quality during the rainy season is a serious public health risk for both untreated groundwater and commercially packaged water, highlighting a need to address gaps in the monitoring and quality control of alternative supplies. While commercially packaged water should be regulated by the Nigerian National Agency for Food and Drug Administration and Control (NAFDAC), the results of this study indicate that these regulations are currently not sufficient.

box continues next page

Box 3.2: Continued

Given the nearly universal reliance on borehole-based, on-site self-supply in the study area, the Port Harcourt Water Corporation (PHWC) may face challenges in increasing its connection and metering levels unless it can maintain—and convince consumers of—the reliability and quality of forthcoming municipal piped supplies. In the meanwhile, water quality management in Port Harcourt should therefore include more effective regulation of private, public, and commercial water sources, with a particular focus on water quality monitoring and oversight of bottled and sachet water providers.

Rates for sewerage are low across all locations. The availability of higher quality infrastructure likely explains why urban areas have a higher access to sewerage (12 percent) than nonurban locations (6 percent or lower). These abysmal rates of access to sewerage connections likely have severely deleterious impacts upon health outcomes in Nigeria.

Open defecation is highest in rural areas. Rates of open defecation—the inverse of fixed-point sanitation—are highest in rural areas, mirroring the urban-rural divide in access to sewerage and other forms of WASH infrastructure. Open defecation is lowest in state capitals, at 3 percent, and in urban areas, at 6 percent.

Although there is limited information on the use of household sanitation facilities, the data reveal interesting patterns in how the facilities are employed. In the states of Enugu and Ekiti: 81 percent of households that own a latrine and have improved facilities stated that at least one household member does not use the latrine. There is also a large gender divide in the use of latrines: adult men are more likely than adult women to use the toilet. Almost 50 percent of young boys and almost 30 percent of young girls don't use toilets at home. Interestingly, individuals from households that lack a toilet don't necessarily recur to open defecation: these individuals mostly use their neighbor's toilet, or a portable latrine. Respondents cited various reasons for not using the toilet, even if their household owned one. For instance, several female household members reported fear of contracting diseases as a key reason for not using the toilet. Some respondents stated that young boys under the age of 10 were “too young” to use the toilet (Box 3.3).

Nigeria is also making progress toward achieving the SDG for sanitation and hygiene. For measuring access to sanitation and hygiene in accordance with this SDG, several additional aspects are considered when examining the use of unshared improved sanitation facilities: (a) the availability of a place for handwashing with soap and water at home, (b) child feces disposal practices, and (c) menstrual hygiene management (MHM).² Using data and indicators for MHM, it is estimated that only 25 percent of women in Nigeria lack adequate privacy for defecation or MHM. However, estimates vary across states. For instance, 85 percent of women in Lagos reported having everything they need to manage their menstruation, while in Kaduna State this figure was only 37 percent (PMA2020). Moreover, there are major barriers to hygiene: 88 percent of women in Nigeria lack access to a place for handwashing with soap and water at home. In rural areas, this figure is a staggering 92 percent (Loughnan et al. 2016).

Box 3.3: Sustainable Total Sanitation—Nigeria Baseline Report

This box summarizes the description of baseline data collected in the states of Ekiti and Enugu as a part of the Sustainable Total Sanitation project in Nigeria (Abramovsky, Augsburg, and Oteiza 2015).

Gender difference in usage. There is a large gender divide in the use of latrines. Among households where at least one member reported not using the toilet, adult women were three times (18 percent) less likely to use the household's latrine than were adult men (5.6 percent). The main reason women stated for not using the toilet was fear of contracting disease; there appears to be a common belief in Nigeria that warm air coming up from the toilet pit makes women more susceptible to diseases.

Access to improved sanitation and usage. While 89 percent of households that own a latrine have improved sanitation facilities, the number falls to 81 percent if we look only at those households which declared that at least one member does not use the latrine. Even if the household has a toilet, not all members seem to use it: almost 50 percent of young boys and 30 percent of young girls.

Patterns in open defecation. Individuals from a household without a toilet didn't necessarily practice open defecation; these households mostly used their neighbor's toilet or a portable latrine. Moreover, despite owning a latrine, around 17 percent of households in Enugu and 27 percent of households in Ekiti stated that their personal preferences were an important factor in influencing their decisions to defecate openly. Furthermore, about three in four households whose members performed open defecation reported that it was done away from their own homes. There were various reasons stated for not using a toilet, even if the household owned one: in Enugu, respondents stated that young boys under the age of 10 were "too young" to use the toilet. For women, it was mostly the fear of contracting diseases.

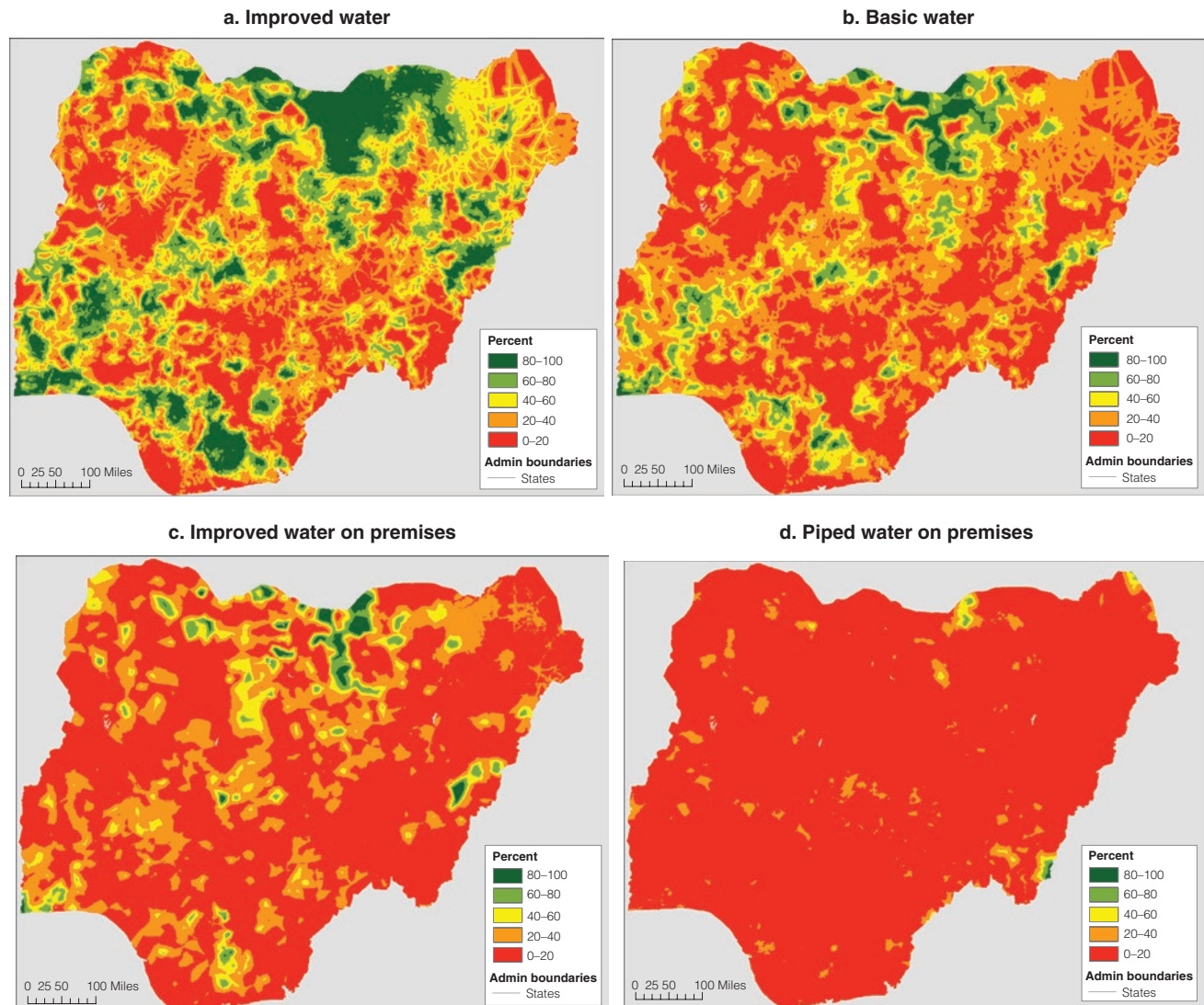
Obstacles in acquiring latrines: The baseline survey data shows that only 36 percent of households own some kind of functioning latrine. The cost of construction is reported as the main obstacle in the acquisition of latrines. The relative magnitude of the investment cost, compared to the household's income, explains a great deal of variation in latrine ownership. It costs on average of \$382 to construct a toilet in Ekiti and an average of \$296 to construct one in Enugu. This represents around 44 percent in Ekiti, and 77 percent in Enugu, of the annual income of those households that don't own a toilet. This suggests that the absence of a toilet does not necessarily stem from a lack of understanding about the cost and benefits of owning a toilet, but that it is perhaps best explained by the liquidity constraint of the households.

Latest Geographical WASH Estimates for Nigeria

Similar to the poverty maps used in chapter 2, heat maps were used to gain a sense of access to improved water and sanitation in Nigeria.⁸ Both national- and state-level maps were used for each of the seven WASH indicators, and overlaid them with other population characteristics to examine the relationship between poverty and access to water and sanitation.

When moving across tiers of access to water, from the most attainable (improved water) to the hardest to attain sources of improved water supply (piped on premises), we observe a steady decline in access rates is observed. Such findings are observed from map 3.1, panels a–d, as the standards of quality and technology required to access the water sources progressively increase. Overall, clusters in the North Central, South West, and South South regions exhibit the best performance in terms of improved water, basic water, and improved water on premises. Piped water on premises is scarcely available throughout the country, short of a few minor pockets in Taraba, Jigawa, and Yobe states.

Map 3.1: Access to Water, Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

There is a sharp north-south divide in access to fixed-point sanitation and access to improved sanitation. As shown in map 3.2, panel a (which shows the percentage of households with fixed-point sanitation, or **not practicing open defecation**), there is a belt extending from the South West to the South East of the country, separating regions with high open defecation rates in the south from regions with low open defecation rates in the north. The exception to this is the South South region, which seems to have low rates of open defecation. As shown in map 3.2, panel b, access to improved sanitation shows a similar north-south divide. Map 3.2, panel b, also suggests that there is an overwhelming lack of access to improved sanitation across the country.

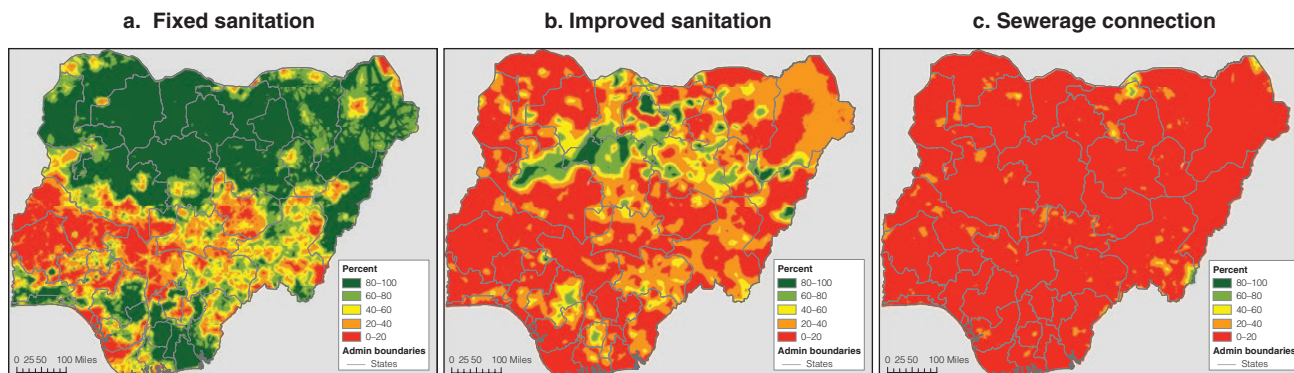
There is very limited access to improved sanitation and to sewerage systems across the country. As shown in map 3.2, panel c, only a few scattered regional pockets possess proper sewerage infrastructure in Nigeria. There is also little overlap between regions with access to improved sanitation and regions with access to a sewerage system.

These heat maps shown previously, maps 3.1 and 3.2, provide estimates of access to water and sanitation at local. The following maps provide estimates at the state level. For each WASH estimate, map 3.3, panels a, present the percentage of the population with access to improved water for each state, and map 3.3, panels b, present the total population, in millions, of those without access to improved water. Although Kaduna and Kano states have high rates of access to improved water among their residents, a large number of them do not have access to improved water. Although 40 percent to 60 percent of citizens have access to improved water in these states, approximately 4.5 million individuals in Kaduna and 6 million individuals in Kano still lack access. Additionally, while Bayelsa appears to be the worst performing state in map 3.3, panel a (0 percent to 20 percent of citizens have access to improved water), only about 1.6 million individuals lack access (map 3.3, panel b), which is a low figure in comparison to many other states.

States in Nigeria experience low levels of access to improved water on premises across the board. Nearly all states—with the exception of Lagos—have rates of access to *improved water on premises* that are below 60 percent (map 3.4, panel a). Approximately 5.6 million individuals still lack access in Lagos state. The state of Kano, while not exhibiting the absolute lowest rate of access, has approximately 9.1 million individuals who lack access to improved water on premises (map 3.4, panel b).

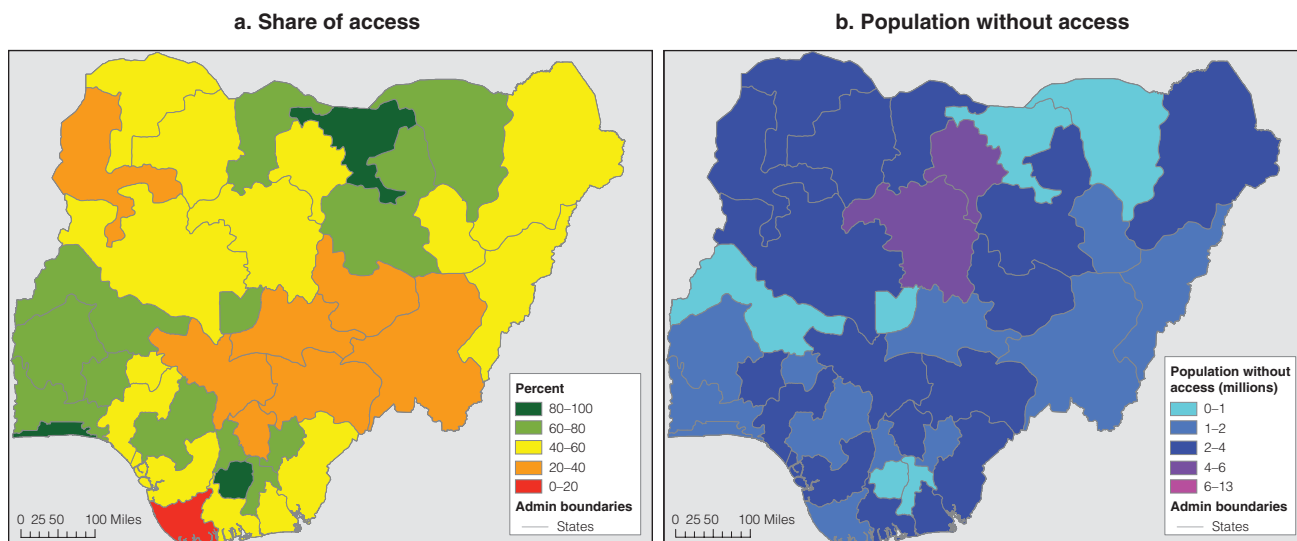
The central region of the country experiences high open defecation rates. As map 3.5, panel a, shows, there are around eight states, from Oyo in the west, to Taraba in the east, for which

Map 3.2: Access to Sanitation in Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

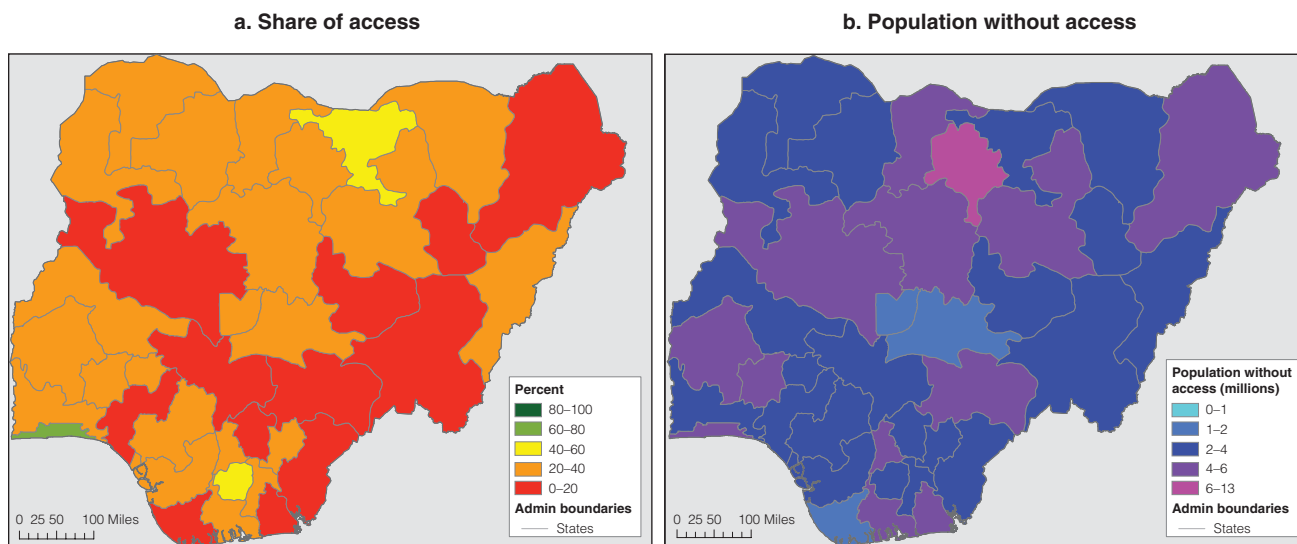
Map 3.3: Access to Improved Water, by State, Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

Note: Panel a reflects the proportion of the population with access to that particular WASH indicator; panel b reflects the absolute number of people without access to that particular indicator.

Map 3.4: Access to Improved Water on Premises, by State, Nigeria, 2015

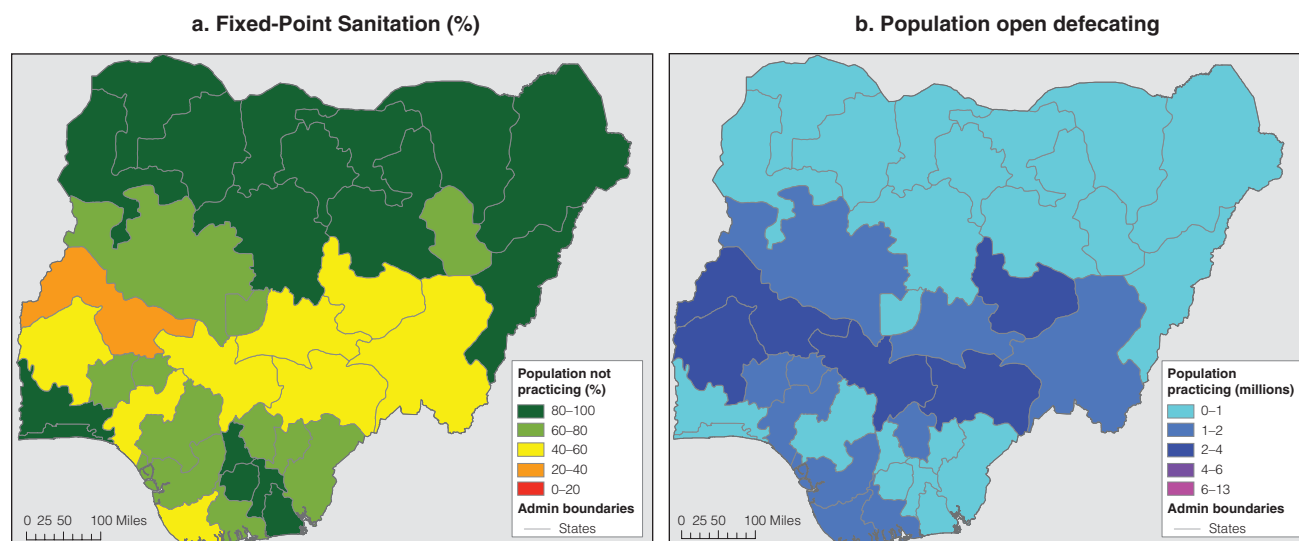


Source: World Bank calculations using NWSS 2015 data.

Note: Panel a reflects the proportion of the population with access to that particular WASH indicator; panel b reflects the absolute number of people without access to that particular indicator.

open defecation rates range between 40 percent to 80 percent. Yet, because of low levels of population density, many of these states do not have particularly high numbers of citizens practicing open defecation; most states have between 1 million to 2 million people practicing open defecation. The estimates range from 1.1 million in Nassarawa State to 3.5 million in Oyo State.

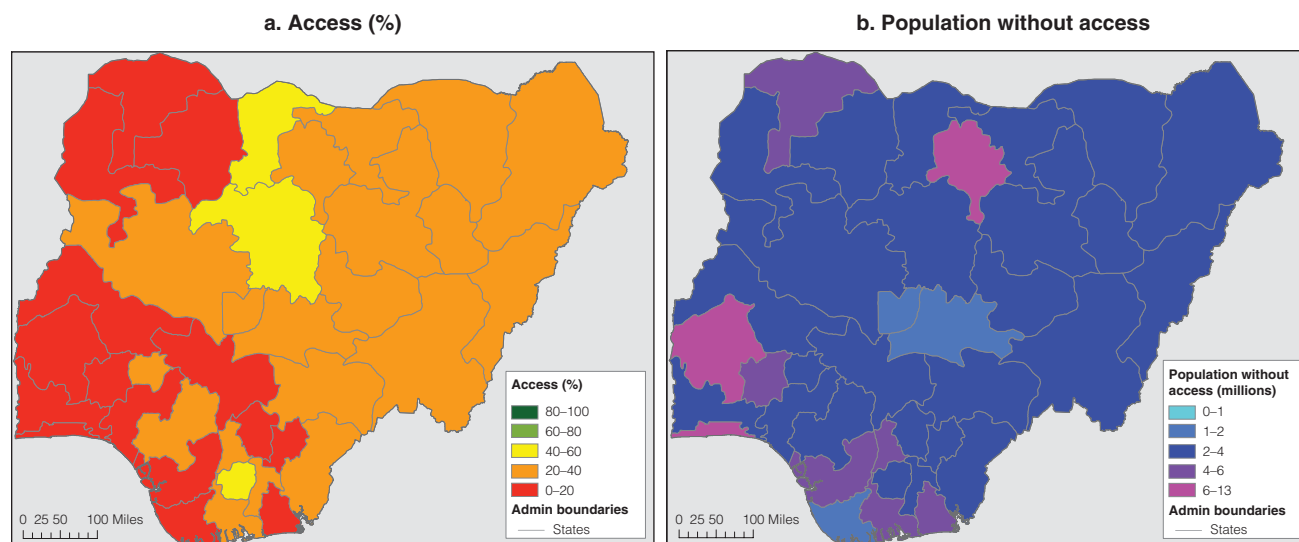
Map 3.5: Open Defecation, by State, Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

Note: Panel a reflects the proportion of the population with access to that particular WASH indicator; panel b reflects the absolute number of people without access to that particular indicator.

Map 3.6: Improved Sanitation, by State, Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

Note: Panel a reflects the proportion of the population with access to that particular WASH indicator; panel b reflects the absolute number of people without access to that particular indicator.

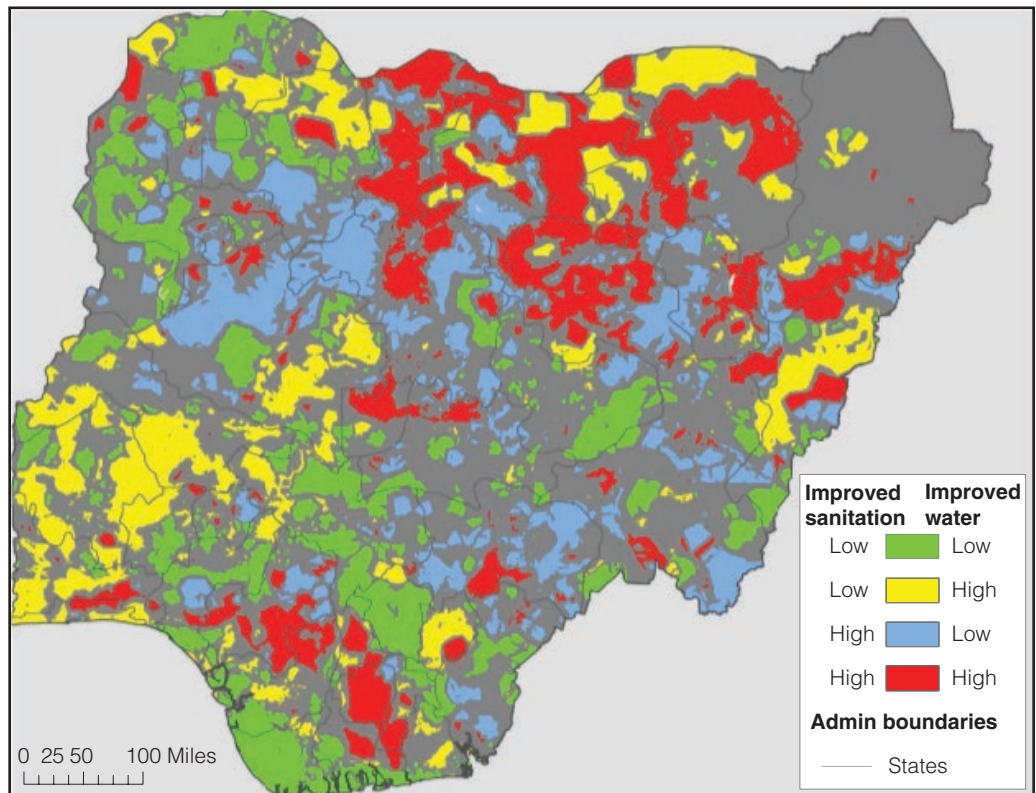
Access to improved sanitation is low nationally, and it is lower in the North West, South West, and South South regions. Several states have large segments of their populations that lack access to improved sanitation. The states of Imo, Kaduna, and Katsina have the highest rates of access to improved sanitation: between 40 percent and 60 percent (map 3.6, panel a). Between 2 million and 4 million residents in these states are without improved sanitation,

which is roughly on par with the majority of states in the country. In contrast, Lagos, Oyo, and Kano are among the states with the lowest access: around 6 million to 13 million individuals in these states lack access to improved sanitation (map 3.6, panel b).

In general, states with low access to improved water also have low access to improved sanitation. Yet this relationship does not hold among states with high access to improved water and high access to improved sanitation. For instance, Lagos State, which has 80 percent to 100 percent access to improved water, only has 0 percent to 20 percent access to improved sanitation. Lagos also has one of the highest number of people lacking access to improved sanitation. Jigawa and Imo states also mirror this performance, having high rates of access to improved water but low rates of access to improved sanitation.

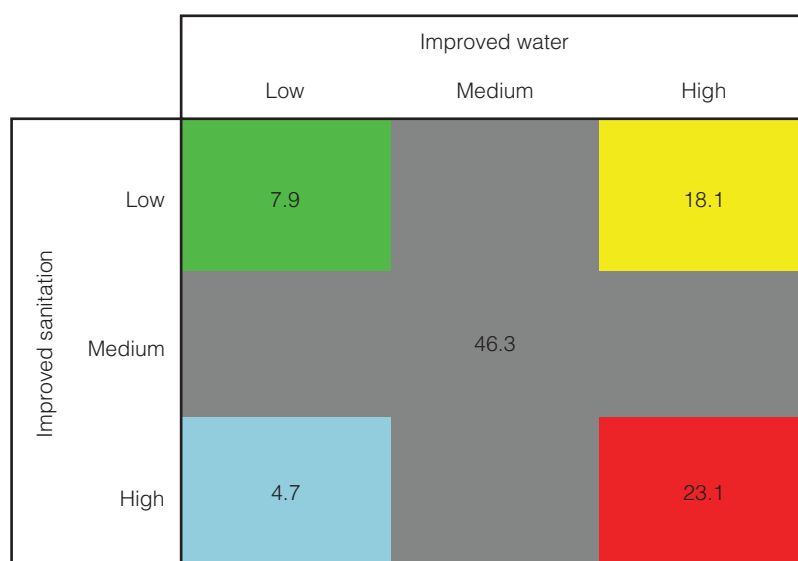
There is a high correlation between access to improved water and improved sanitation at the national level. Map 3.7 shows the interaction between improved water and improved sanitation, broken down by terciles. For example: “low-low” represents areas that belong to the bottom tercile of access to improved water and in the bottom tercile of access to improved sanitation; “high-high” represents areas that belong to the top tercile of access to improved water and the top tercile of access to improved sanitation. The corresponding figure 3.3, presents the share of the population in each of these groups. Almost a quarter of individuals have high access to both water and sanitation. Approximately 7.9 percent have low access to both improved sanitation and improved water—a relatively small share of the total population. Moreover,

Map 3.7: Access to Improved Water and Improved Sanitation, by State, Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

Figure 3.3: Access to Improved Water and Improved Sanitation, by State, Nigeria, 2015
Percent



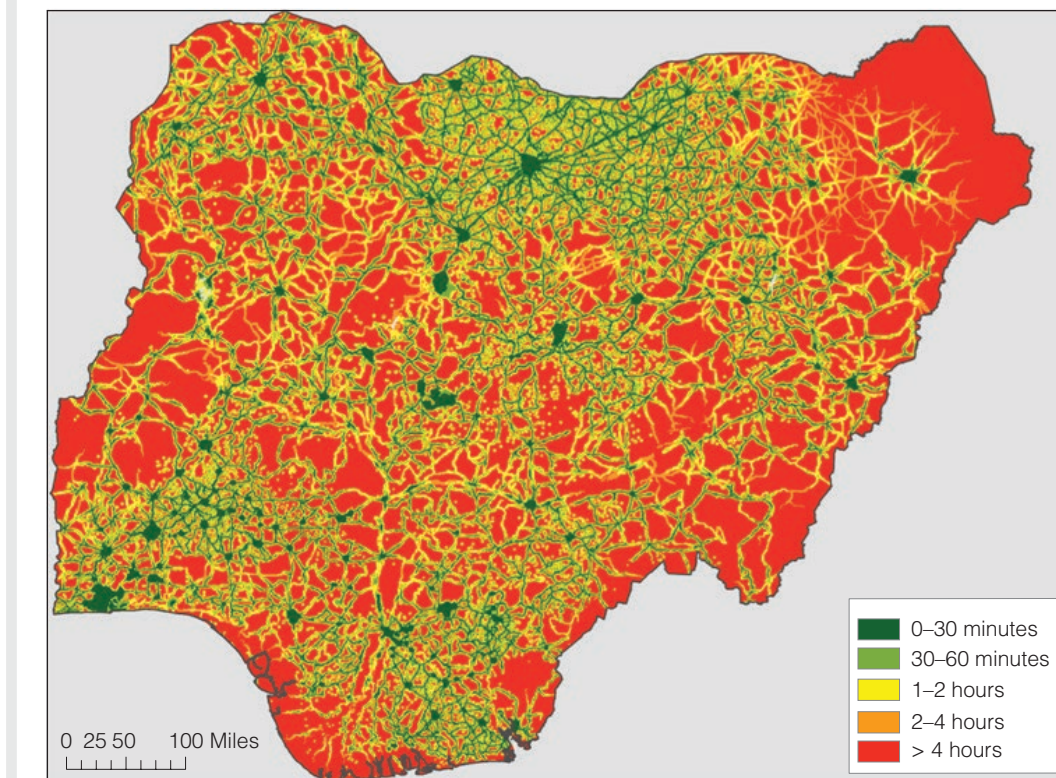
Source: World Bank calculations using NWSS 2015 data.

Note: This figure, based on data in map 3.7, shows the interaction between improved water and improved sanitation, broken down by terciles. For example: “low-low” represents the percentage of the population who are both in the bottom tercile of access to improved water and in the bottom tercile of access to improved sanitation.

18.1 percent of citizens have high access to improved water, but low access to improved sanitation, and 4.7 percent have high access to improved sanitation, but low access to improved water. Additional research is needed to understand the underlying factors driving these interactions.

Improved water is available to the majority of Nigerians, but the amount of time needed to access a reliable water source varies greatly across the country. The NWSS 2015 also includes a dataset on the functionality of water points and water schemes. A thorough analysis of this data in chapter 6 finds that around half of the water points and water schemes in Nigeria are not functioning. Map 3.8 presents the amount of time needed to complete a round-trip journey to the closest functioning⁹ water source from a given location, which is defined as the *rural accessibility index*.¹⁰ The accompanying table 3.4 presents the percentage of rural population in each time bracket. Only 38.7 percent of the rural population live within a 30-minute round-trip of a functioning water source, and 34.3 percent of the population live at least two hours away from these sources. Most alarmingly, over 26 million Nigerians living in rural areas must travel four or more hours round-trip to access functioning water points. These data were used to simulate a scenario in which we assume “perfect functionality” for all rural water sources (last column in table 3.4). After running the simulation, there remain low levels of access: only 42.3 percent of the rural population would have access to a water sources within 30 minutes, and more than 30 percent of the rural population would need to walk at least two hours to these sources. This strongly suggests that efforts are needed to expand the number of easily accessible functioning water sources in addition to improving the number of functioning water sources.

Map 3.8: Round-Trip Journey to the Closest Functioning Improved Water Source (in Minutes), Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

Note: The map presents travel distances, so it is not weighed by population density.

Table 3.4: Rural Accessibility Index, Nigeria, 2015
Percent

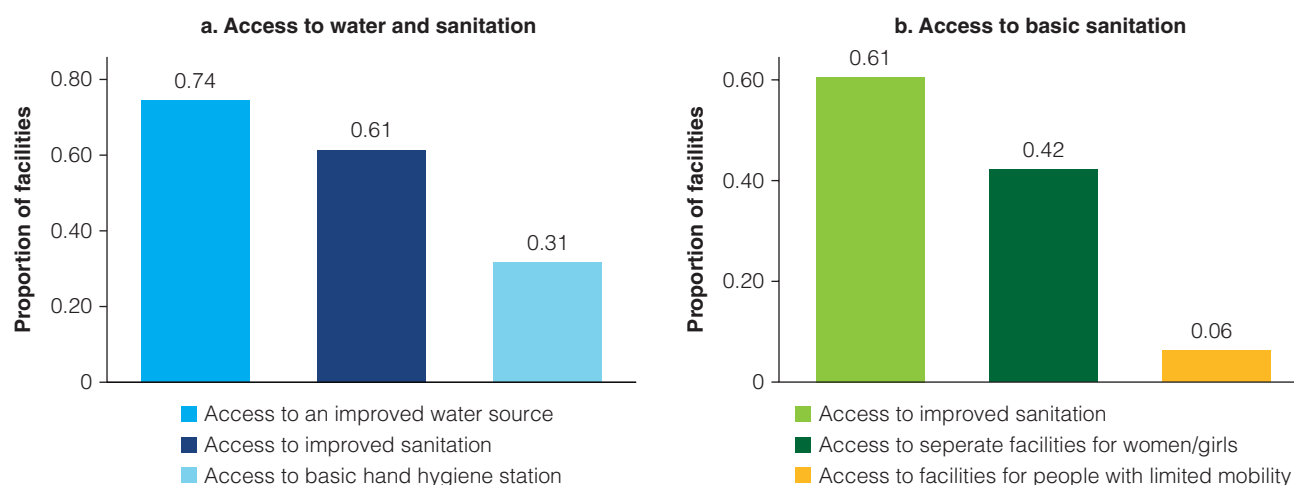
	Functioning	Any
<30 minutes	38.7	42.3
30–60 minutes	11.6	11.3
1–2 hours	15.3	15.4
2–4 hours	15.0	13.9
4–6 hours	7.8	7.1
More than 6 hrs	11.5	9.9

Note: This figure, based on data in map 3.8, presents the amount of time reported as needed to complete a round-trip journey to a functioning water source from a given location, which we define as the *rural accessibility index*. The distribution presented in the table is weighted by population density.

Access to WASH in Public Facilities

The NWSS 2015 also collected data on WASH in public facilities. A total of 51,551 facilities were the object of user interviews, with public schools comprising 62 percent of the sample, and public health centers comprising around 24 percent of the sample.¹⁴

Figure 3.4: Access to Water and Sanitation and Basic Sanitation in Public Health Centers, Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

Note: In panel a, N = 51551; in panel b, N = 12496.

Around 74 percent of public health centers have access to an improved water source, and 61 percent have access to improved sanitation (figure 3.4, panels a and b).¹² In terms of access to water, the NWSS data offer information on access to water sources, which was used to calculate the proportion of facilities with access to an improved water source, as defined by WHO/UNICEF.¹³ The NWSS data also offer information on type of toilet facility used, which was used to calculate the proportion of facilities with access to improved sanitation, as defined by WHO/UNICEF.¹⁴

Only 31 percent of public health care facilities have access to a basic, functioning hand hygiene station. The NWSS offers information on whether the centers have access to a handwashing facility, and whether or not it is being used, which was used as a proxy to calculate the proportion of facilities with access to a hand hygiene station, as defined by WHO/UNICEF¹⁵ (box 3.4). The NWSS offers data on whether the hand hygiene stations exist and are in use, and does not offer information on the availability of handwashing materials.¹⁶ Around 42 percent of the health centers have a separate facility for women and girls, and 6 percent have access to facilities for people with limited mobility.¹⁷ With regard to waste disposal, the NWSS does ask about waste disposal with the question, “how is the waste-bin disposed?” However, it does not differentiate between infectious and sharp waste (a differentiation required by the WHO/UNICEF), and the survey responses for the NWSS do not offer sufficient detail to allow us to properly define whether the disposal of waste complies with the standards suggested by WHO/UNICEF. Hence, we do not include the waste disposal measure in our calculations. Furthermore, around 67 percent of respondents believe that people with disabilities face challenges in accessing and using toilets, around 51 percent believe that the needs of the disabled are not considered when toilets are built in public places or homes, and 11 percent believe the greatest challenges were experienced in health centers (box 3.5).

Around 50 percent of public schools have access to an improved water source, 48 percent have access to improved sanitation, and 7 percent have access to a functioning, basic hand hygiene station (figure 3.5, panel a). This study also looked at the broader categories of access to basic sanitation. As shown in figure 3.5, panel b, 43 percent of public schools provide access to separate facilities for women and girls, and 4 percent provide access to facilities for people with limited mobility.

Box 3.4: Water, Sanitation, and Hygiene in Health Care Facilities, Status in Low and Middle-Income Countries, and a Way Forward

WHO/UNICEF (2015b) compiled data from 66,101 facilities in 54 low- and middle-income countries (LMICs). The report finds that, across all countries, 62 percent of health care facilities have access to an improved water source, 81 percent have access to improved sanitation, and 65 percent have access to water and soap for handwashing.

According to the report from the 280 representative health care facilities in the 2008 Nigeria HPSA survey, they observe that 71 percent of health care facilities have access to improved water, 71 percent have access to improved sanitation, and 84 percent have access to handwashing. The NWSS estimates for access to improved sanitation and access to handwashing are lower than those provided by the WHO/UNICEF report. The differences may be explained by the fact that the NWSS sample is much larger than the one created by WHO/UNICEF and the estimates of the 2008 Nigeria HPSA survey, and that this report is particularly looking at public health care facilities. The differences in estimates for handwashing might be partly explained by the fact that the NWSS does not offer information on whether the hand hygiene stations have soap or water or an alcohol-based hand rub dispenser.

Box 3.5: Disability and Access to Latrines—UNICEF Survey

UNICEF (2017) conducted a poll using a free short message service (SMS) social monitoring tool called UReport. Its aim was to derive an overview of Nigerians' perceptions of the challenges that disabled individuals face in accessing toilets. The poll, conducted in January 2017, had around 136,307 respondents. While it is not nationally representative, it does offer an interesting snapshot of the population's general perceptions of the sanitation challenges facing disabled people.

Around 67 percent of respondents believe that people with disabilities face challenges in accessing and using toilets, and around 51 percent believe that the needs of the disabled are not considered when toilets are built in public places or homes. Moreover, around 50 percent of respondents believe that no modifications have been made to toilets to ensure that they are more easily used by individuals with disabilities.

Around 32 percent of respondents believe that the disabled face the greatest challenges in accessing toilets in markets, 28 percent believe that the disabled face the greatest challenges in access in schools, 13 percent believe the greatest challenges were in homes, and 11 percent believe the greatest challenges were

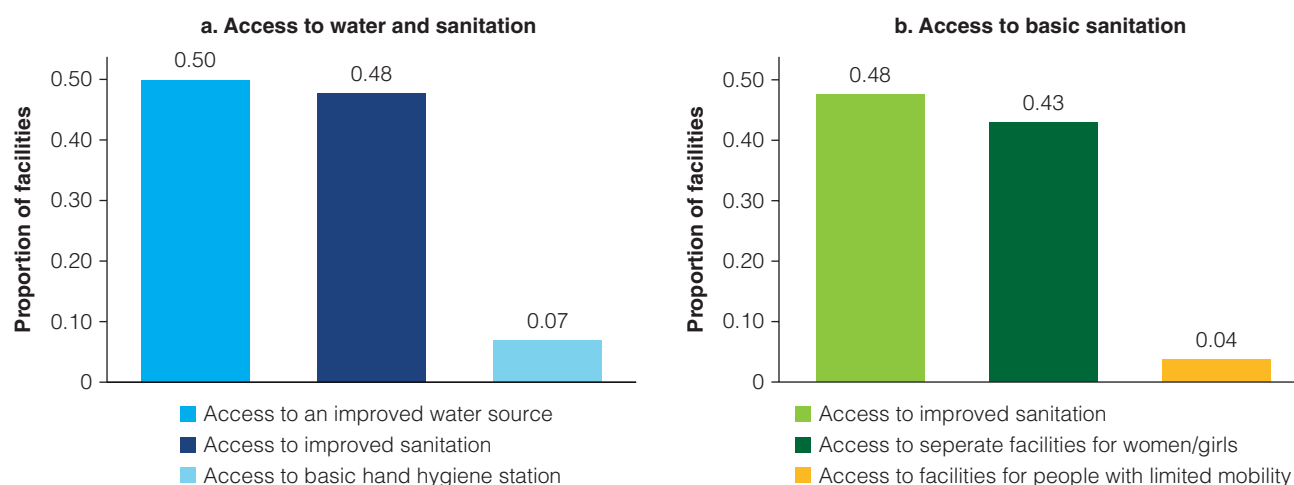
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Box 3.5: Continued

experienced in health centers. Among those who noted having a disabled person in their household, almost 90 percent of respondents believe that the disabled face challenges in accessing and using toilets.

Hence, the survey reveals a degree of national awareness with regard to disabled individuals' challenges in accessing WASH services, and highlights that additional efforts are needed, particularly at the design stage, in ensuring that facilities are able to meet the needs of all Nigerian citizens.

Figure 3.5: Access to Water and Sanitation and Basic Sanitation in Public Schools, Nigeria, 2015



Source: World Bank calculations using NWSS 2015 data.

Note: In panels a and b, N = 32155.

Concluding Remarks

The NWSS 2015 offers an up-to-date overview of the water supply and sanitation sector in Nigeria. While other surveys, such as the Demographic Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS), offer information on access to WASH, the NWSS provides a more recent snapshot. This chapter offered an overview of access to WASH along the following seven indicators: access to improved water, basic water, improved water on premises, piped water on premises, improved sanitation, fixed-point sanitation, and access to a sewerage. In doing so, it highlighted progress in some areas and major deficiencies in others, while also offering baseline information for assessing future progress in attaining the SDGs for water and sanitation.

The indicators for access to improved water sources in Nigeria show low rates of coverage. While the rate of access to improved water has increased to 61.2 percent, just under one-third of

Nigerians have access to improved water on premises, and an abysmal 7 percent have piped water on premises. Deficiencies in water access are a daily source of strain for most citizens.

The indicators for access to improved sanitation are not only low but also suggest that the sector is in an alarming state of dilapidation. Rates of open defecation may be low nationally, but less than one-third of citizens have access to improved sanitation, and approximately 94 percent of the population lack sewerage connectivity. These figures are alarming.

There is also a sharp urban-rural divide in access to water and sanitation. Urban areas and state capitals typically display higher rates of access to improved water and improved water on premises. Although rates of improved sanitation and sewerage are low across all areas, households in urban areas still experience higher access to sewerage systems. Despite increasing urbanization, slightly over half of Nigerians continue to reside in rural areas, and as such, their water and sanitation needs should be addressed.

There is limited access to water and sanitation in public facilities. According to the NSW 2015 survey, around 74 percent of public health centers have access to an improved water source, and around 61 percent have access to improved sanitation. Only 31 percent of these centers have access to a basic, functioning hand hygiene station, 42 percent have a separate facility for women and girls, and a mere 6 percent have access to facilities for people with limited mobility. Around 50 percent of public schools have access to an improved water source, 48 percent have access to improved sanitation, and 7 percent have access to a functioning, basic hand hygiene station. Moreover, only 43 percent of schools provide access to separate facilities for women and girls, and almost none provide access to facilities for people with limited mobility.

Nigeria's water and sanitation sector is likely in critical condition. Considering the well-documented and far-reaching impacts of poor access to water and sanitation, there can be little doubt that shortcomings in this sector are drastically hindering Nigeria's overall progress. Without immediate attention to this sector from policy makers and other key stakeholders, the country will, at best, continue to suffer from the damaging effects of the status quo. At worst, the situation will continue to deteriorate, making it increasingly difficult to establish the policies needed to rehabilitate the sector in the future. It is thus imperative that action be taken now, and that such actions are sustained.

Notes

1. This report draws upon data from both the WHO/UNICEF Joint Monitoring Programme (JMP) and the 2015 NWSS to calculate the estimates of access to WASH. The estimates provided in the graphs and text in this section come from the JMP. The 2015 JMP estimates vary slightly from the numbers in the NWSS, but have the added benefit that they allow us to compare access to WASH across time. Unless otherwise specified or attributed to the JMP, all data described in the following sections, and elsewhere in the report, is derived from the 2015 NWSS.
2. The official estimate produced by JMP is 25 percent for 2015; however, different surveys—including the census and NWSS 2015—propose an estimate that is closer to 15 percent.
3. Per the United Nations' SDGs, many WASH-related studies consider two additional indicators: *safely managed water* and *safely managed sanitation*. *Safely managed water* refers to basic drinking water sources located on premises, available when needed, and free of fecal (and priority chemical) contamination. *Safely managed sanitation* refers to basic sanitation facilities that are not shared with other households, and where excreta is safely reused or treated in situ or transported to a treatment plant. Unfortunately, the FMWR commissioned data collection for this study prior to the adoption of the SDGs in September 2015, and as such, only a rough calculation of safely managed water was provided, and no calculation for safely managed sanitation. Safely managed water was

calculated as those households that have access to an improved source of water on premises, and use uninterrupted service over the last two weeks as a proxy for available when needed.

4. The JMP estimated that only 2 percent of the population had access to piped water on premises, mostly based on a linear extrapolation of the trend estimated between 1990 and 2010; however, more recent estimates for Nigeria include DHS 2011 with 5.2 percent, DHS 2013 with 3.3 percent, and LSMS 2013 with 4 percent.
5. It must be noted that the rate of open defecation as calculated from the NWSS 2015 data (15 percent) stands in contrast to the figure presented by JMP: 25 percent. While much of this discrepancy may be attributed to methodological differences and other potential differences in the data collection process, the NWSS figure is comparable to other official estimates of open defecation, including the Census 2010 (12.6 percent) and the Living Standards Measurement Study (LSMS) 2011 (19.4 percent). Establishing a concise figure for the rate of open defecation in Nigeria is a matter of significant importance, and merits further investigation, though for the purposes of this report, greater value lies in understanding the relative performance of fixed-point sanitation. Further, due to methodological differences between the NWSS 2015 and the JMP surveys, it is not possible to compare trends over time between these two data sources.
6. Per Nigeria's National Water Supply and Sanitation Policy (2000), urban areas are defined as having a population of greater than 20,000 people, semi-urban areas (small towns) have a population between 5,000 and 20,000, and rural areas are inhabited by fewer than 5,000 people.
7. Menstrual hygiene management (MHM) refers to household access to suitable facilities (including adequate space, privacy, water, and soap) and materials for menstrual hygiene. Given that there is limited data on MHM, open defecation and handwashing indicators were identified as the best proxy indicators for inadequate hygiene.
8. As described in chapter 2, Gething and Molini (2015) present a statistical modeling approach that can generate mapped surfaces of poverty rates at a fine spatial scale, despite data limitations. The heat maps in chapter 3 utilize the same mapping methodology, and utilize an additional layer of data (the functionality of water points, as derived from NWSS 2015) to predict access to sources of water and sanitation, on a pixel-by-pixel basis, whereby each pixel represents 1 kilometer of land. Additional details of this methodology are provided in Andres et al. (2016).
9. Chapter 6 further discusses the functionality of water points and schemes in Nigeria.
10. The rural accessibility index uses NWSS household data, as well as data from the NWSS census of water points and water schemes, to estimate the round-trip distance to a functioning water source as of the time the survey was conducted. The distribution presented in table 3.1 is weighted by population density. Map 3.8, however, is meant to present travel distances, so it is not weighed by population density.
11. The rest of the sample (14 percent) comprises "markets," "motor parks" and "public recreational centers."
12. Many of the responses cite wells as the type of water source being used. They do not specify whether the wells are covered or uncovered, which marks the difference between improved and unimproved technology. We coded wells as improved.
13. Improved water sources in healthcare settings include piped water, boreholes/tube wells, protected wells, protected springs, rainwater, and packaged or delivered water. In the case of Nigeria, we also coded water from vendors as unimproved. Overall, we see that the water and sanitation-related questions asked in the public sanitation questionnaire of the NWSS are not entirely compliant with what was recommended by the WHO/UNICEF for monitoring WASH in Health Care Facilities. The WHO/UNICEF recommends assessing access to WASH in health care facilities along four areas: water, sanitation, hand hygiene, and health care waste management. The NWSS data offers questions that match onto a number of categories in the water, sanitation, and hand hygiene categories, but not in the area of waste management. See WHO/UNICEF 2016. Expert- Group- Meeting-on Monitoring WASH in Schools in the Sustainable Development Goals. http://www.wssinfo.org/fileadmin/user_upload/resources/WinS-Expert-Group-Meeting-June-2016-Report_FINAL.pdf

14. Improved sanitation facilities in healthcare settings include flush/pour flush toilets connected to a piped sewer system, septic tank or pit latrine; pit latrines with slab; ventilated improved pit latrines; and composting toilets.
15. The WHO/UNICEF defines a functional hand hygiene station as consisting of soap and water with a basin/pan for washing hands, or an alcohol-based hand rub dispenser.
16. The measure of access to a hand hygiene station used here is far from compliant with the standards set out by WHO/UNICEF (2016): they require that a hygiene station include soap and water, or an alcohol-based hand rub dispenser, to be considered “accessible.”
17. The NWSS survey data also includes questions which can help us better estimate whether health facilities offer access to broader definitions of basic sanitation. The WHO/UNICEF defines facilities with basic sanitation as those having: “...improved toilets or latrines for patients located on premises, that are functional at the time of visit, with at least one toilet designated for women/girls with facilities to manage menstrual hygiene needs, at least one separated for staff, and at least one meeting the needs of people with limited mobility.”). The NWSS has information on type of toilet facility, which we used to develop a measure of improved sanitation. It does not contain information on whether there is at least one toilet designated for women or girls, but it does note whether there are separate facilities for women, which we used as a proxy. Further, while the NWSS does not include a question pertaining specifically to whether facilities provide access for people with limited mobility, it does have a question asking about provisions for physically challenged people, which we use as a proxy to estimate the proportion of facilities that offer access to people with limited mobility.

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Chapter 4

The Poverty-WASH Access Nexus

Key Takeaways

- **Demographic characteristics—namely wealth, education, and urban or rural location—explain most of the variation in access to water, sanitation, and hygiene (WASH) services and inequity in access to WASH services for children.** Household income plays the most important role.
- **Improved water exhibits both the highest rate of population coverage and the highest level of inequality in distribution.** Regarding access to improved sanitation, coverage rates and inequality in distribution vary widely. The highest level of inequality is observed for sanitation facilities that are improved but shared.
- **Overlaying poverty rates with access to WASH suggests an obscure relationship between poverty and access to water and sanitation.** While there are many places with high poverty rates and low levels of access, there are many instances in which high poverty is associated with high access to WASH, and low poverty is associated with low access to WASH. Nevertheless, for low poverty households, access to education and urban or rural location may be central in explaining variation in access to water. Differences in state-level characteristics are also likely to play an important role in explaining variation in access to WASH.

Introduction

For the most part, the WASH sector and the Millennium Development Goals (MDGs) have focused on increasing overall WASH coverage over the last two decades. It is only recently—in large part due to the process of drafting the post-2015 SDGs—that issues of inequality have gained a more central role in conversations surrounding the WASH sector. The focus on inequality and inclusion is also a cornerstone of World Bank’s corporate goals of eradicating poverty and promoting shared prosperity. If the WASH sector is going to actively address inequalities in service delivery, stakeholders need to better understand who the poor are, where they live, and how to offer them improved access to services.

Disparities in access to WASH services are a source of concern. Access to safe WASH services underpins many aspects of social and human development—from better health and nutrition (e.g., from reduced diarrhea and enteropathy) (Sachs 2001), to lower absenteeism and school dropout rates (e.g., absenteeism increases if water for the school has to be fetched by children from far away sources or if children fall ill because of diseases associated with access to poor water sources) (Kremer et al. 2005), to improved household income (e.g., if household members miss fewer workdays because they are not falling sick due to water-related diseases) (Strauss et al. 1998).

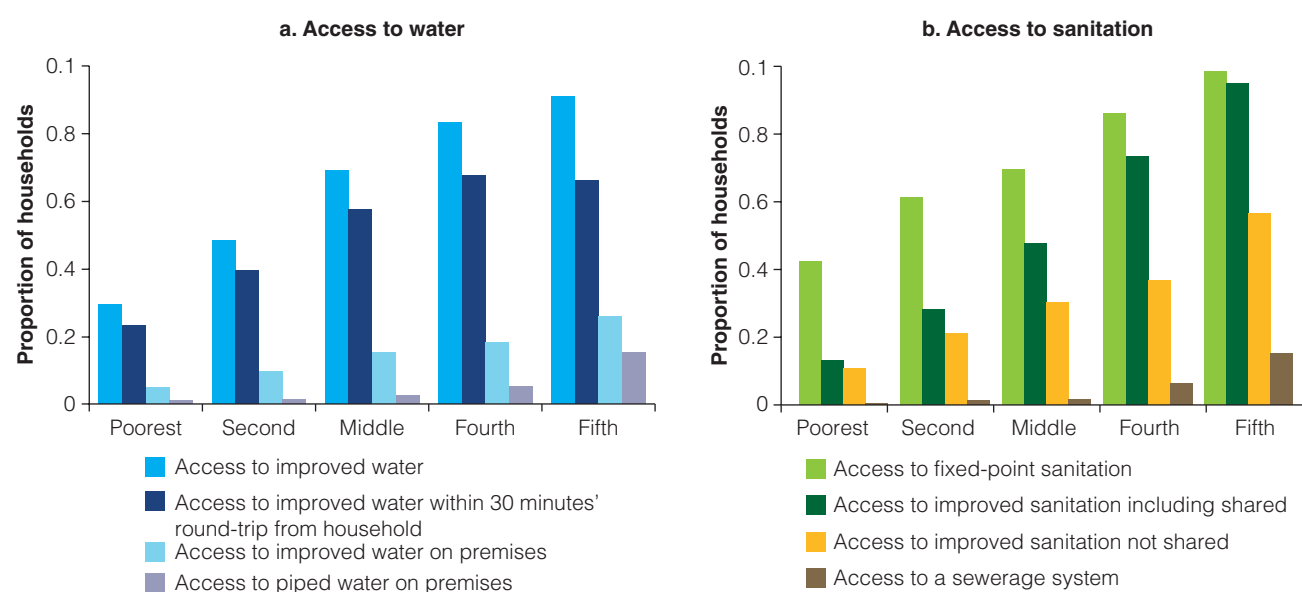
Improving WASH services can contribute in multiple ways to reducing poverty and increasing opportunities for upward social mobility. This chapter presents new analysis on the interactions between social and demographic characteristics and access to WASH, focusing on the bottom 40 percent (B40) of the population. It also considers where poor populations with limited access to WASH services reside. This chapter used data from the 2015 National Water Supply and Sanitation Survey (NWSS) and the 2011 Multiple Indicator Cluster Survey (MICS) to understand the linkages between access to water and sanitation and poverty. Further, the Human Opportunity Index (HOI) was used to better understand equity in access, as well as the social and human determinants influencing access to WASH services. As in chapter 3, advanced mapping techniques were used to better grasp the relationship between access to WASH and poverty, and the General Household Survey-(GHS)-NWSS data were also used to further understand patterns in differential access to water and sanitation across states and poverty groups.

Determinants of WASH Estimates for Nigeria

The most recent MICS was used to consider the interactions between access to improved water and sanitation sources across several population characteristics: wealth, education, religion, gender, and ethnic group. The survey was administered to Nigerian households in 2011. The MICS was used because it offers a richer and more wide-ranging set of questions on population characteristics than that provided by the NWSS. Thus, even though the survey was conducted six years ago, it offers interesting patterns in access to WASH across different subsets of the population.

Wealth is the most important factor in explaining access to WASH services. Only 29 percent of households in the poorest quintile have access to improved water, compared to 91 percent of households in the richest quintile (figure 4.1, panel a). Likewise, 12 percent of households

Figure 4.1: WASH Access, by Wealth Quintile, Nigeria, 2011



Source: World Bank calculations using NWSS 2011.
 Note: WASH = water, sanitation, and hygiene.

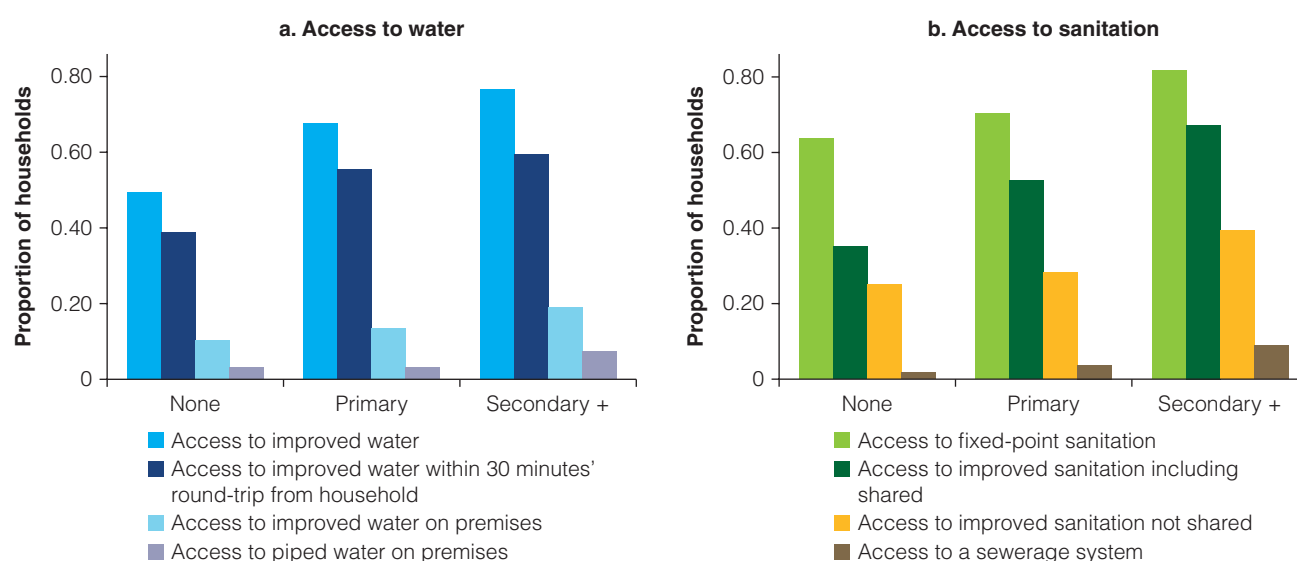
in the poorest quintile have access to improved sanitation (including shared), as compared to around 95 percent of households in the top quintile (figure 4.1, panel b).

Access to water and sanitation is positively correlated with the education level of the household head, although the association is weaker than it is for wealth. For instance, while 49 percent of households in which the household head has no education⁴ have access to improved water on premises, around 76 percent of households in which the household head has a secondary education or above have such access (figure 4.2, panel a). Likewise, while 34 percent of households in which the household head has no education have access to improved sanitation (including shared), that percentage jumps to 67 percent among households in which the household head has a secondary education degree or above (figure 4.2, panel b).

There is a sharp divide in access to water and sanitation sources between households located in urban regions and households located in rural regions. For instance, around 85 percent of households in urban regions have access to improved water, compared to 53 percent of households in rural regions (figure 4.3, panel a). Likewise, around 9.2 percent of households in urban areas have access to piped water on premises, compared to 2 percent of households in rural areas. In terms of sanitation, around 79 percent of households in urban regions have access to improved sanitation (including shared), compared to only 37 percent of households in rural regions (figure 4.3, panel b).

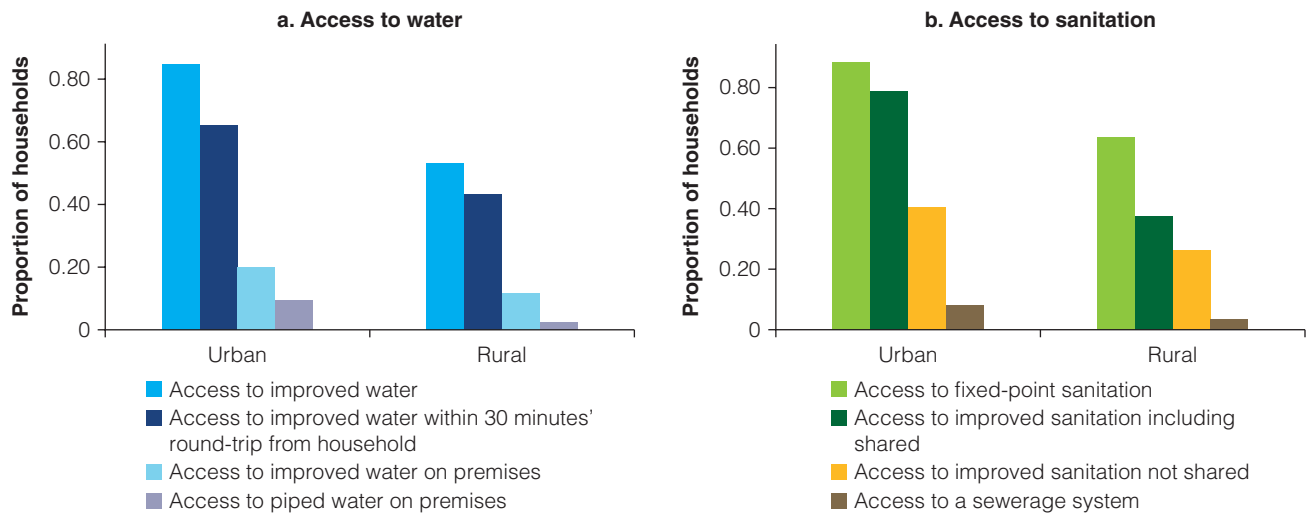
Religion plays a key role in explaining differences in access to water and sanitation. The percentage of households with access to improved water, improved sanitation (including shared), and access to sewerage systems is greater among Christian households than it is among Muslim households (figure 4.4, panel a).² Yet Muslim households have slightly greater access to fixed-point sanitation: our findings suggest that around 74 percent of Muslim households have access to fixed-point sanitation, compared to 70 percent of Christian households (figure 4.4, panel b). This latter point suggests that open defecation is marginally more prevalent in Christian households than it is in Muslim households.

Figure 4.2: WASH Access, by Education of Household Head, Nigeria, 2011



Source: World Bank calculations using NWICS 2011.
 Note: WASH = water, sanitation, and hygiene.

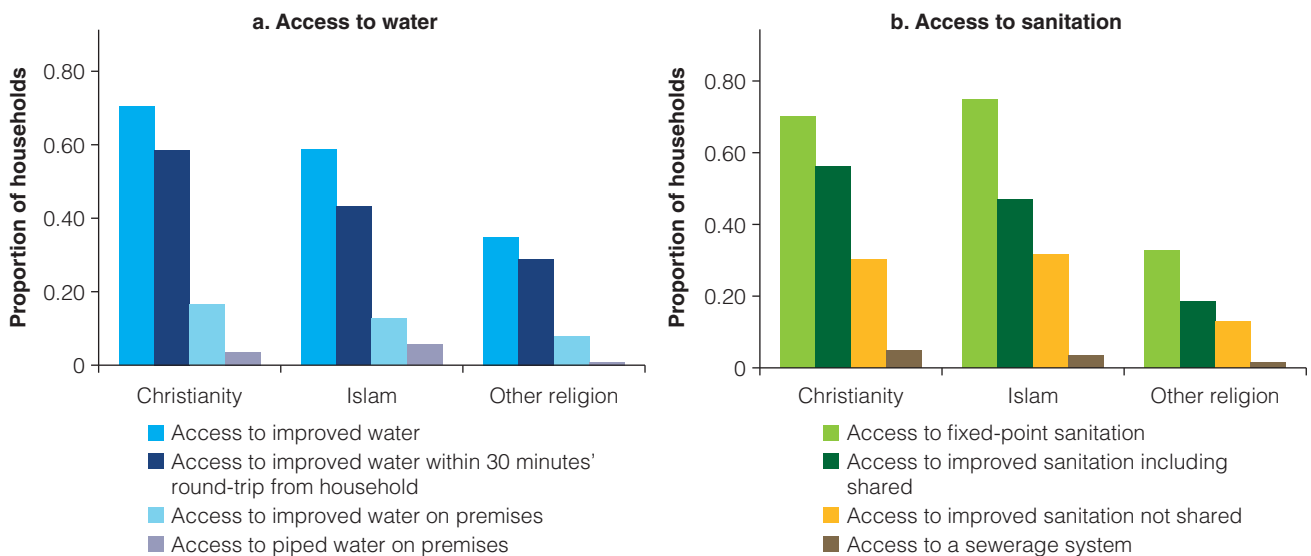
Figure 4.3: WASH Access, by Geography of Household Head, Nigeria, 2011



Source: World Bank calculations using NWICS 2011.

Note: WASH = water, sanitation, and hygiene.

Figure 4.4: WASH Access, by Religion, Nigeria, 2011

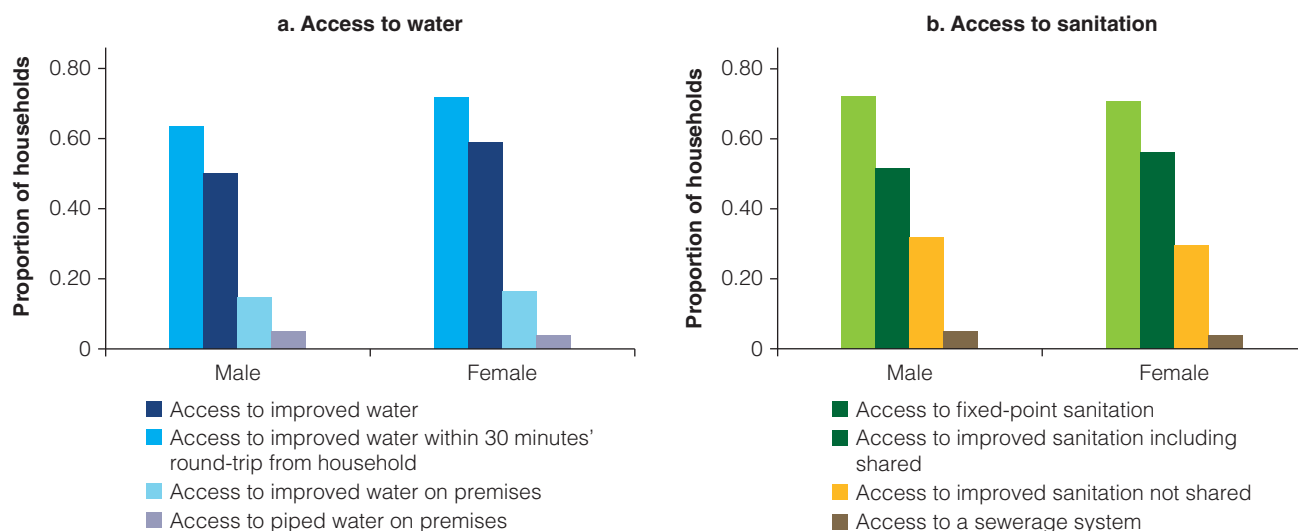


Source: World Bank calculations using NWICS 2011.

Note: WASH = water, sanitation, and hygiene.

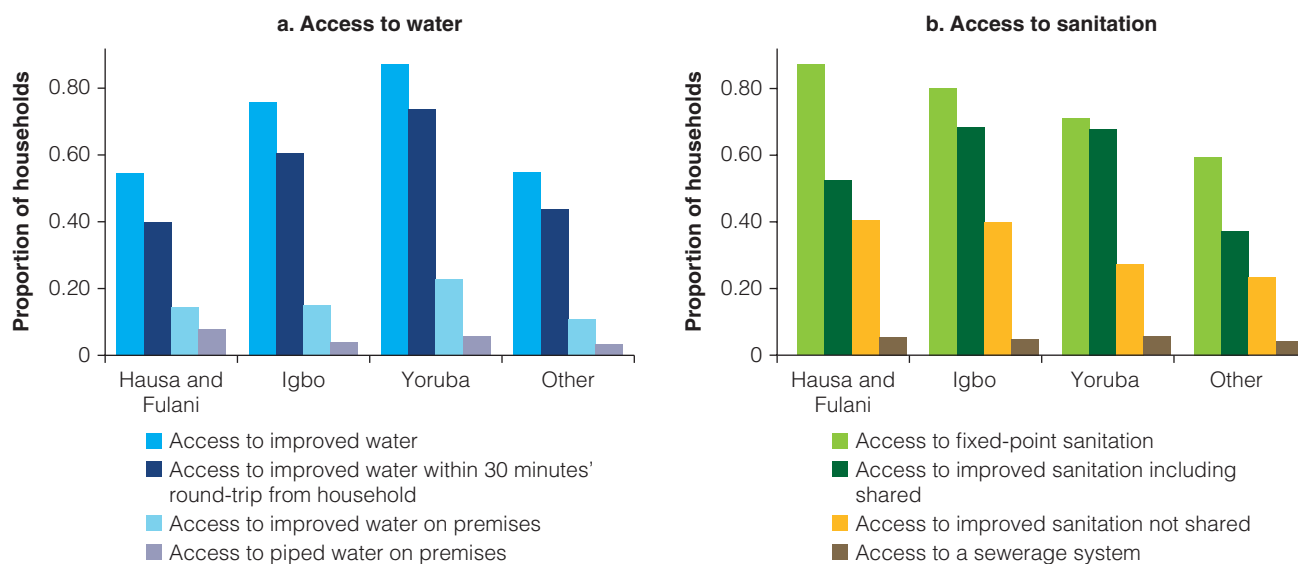
The gender of the household head plays a smaller role in explaining differences in access to water and sanitation than do some of the other population characteristics. Around 10 percent of households are female headed. These households have higher access to improved water and improved sanitation (including shared), while households with male heads have slightly higher levels of access to sewerage systems and piped water on premises. (figure 4.5, panels a and b)

Figure 4.5: WASH Access, by Gender of the Household Head, Nigeria, 2011



Source: World Bank calculations using NWICS 2011.
 Note: WASH = water, sanitation, and hygiene.

Figure 4.6: WASH Access, by Ethnic Group of Household Head (Means), Nigeria, 2011



Source: World Bank calculations using NWICS 2011.
 Note: WASH = water, sanitation, and hygiene.

The ethnicity³ of the household head plays a marginal role in explaining a household's access to water and sanitation. Households from the Yoruba ethnic group have, overall, greater access to water sources: 87 percent of households from the Yoruba ethnic group have access to improved water, 73 percent have access to improved water within 30 minutes' round-trip, and 23 percent have access to improved water on premises (figure 4.6, panel a). Households from the Igbo ethnic group follow the Yoruba in access to water, with 76 percent of households having access to improved water, 60 percent

having access to improved water within 30 minutes round-trip, and 15 percent having access to improved water on premises (figure 4.6, panel b).

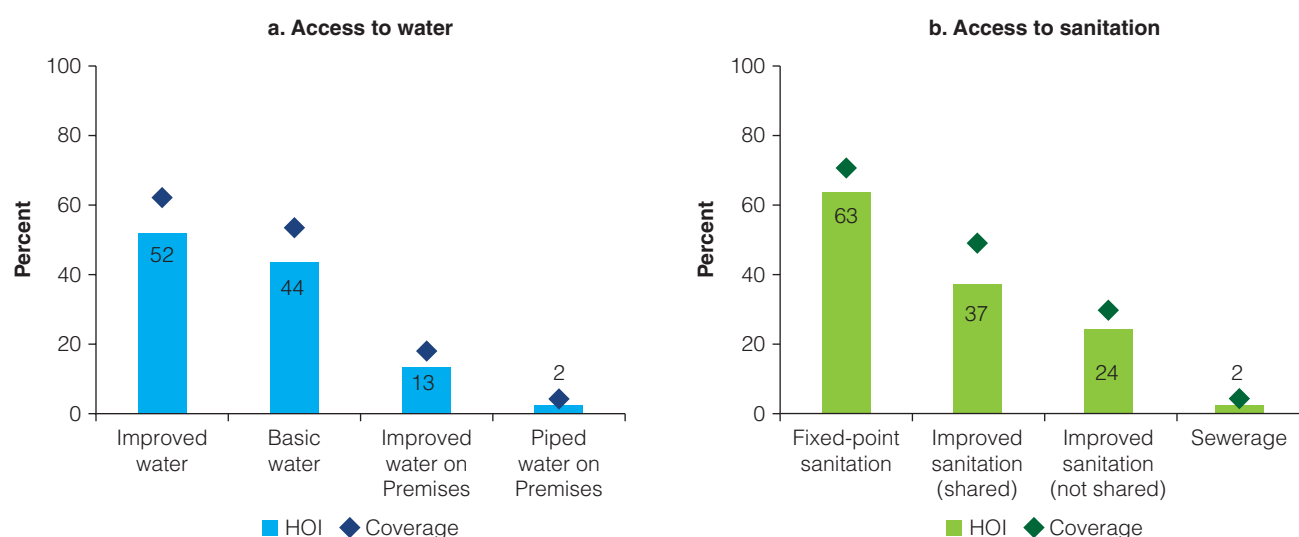
The Hausa and Fulani households, on the other hand, have greater access to fixed-point sanitation (i.e., the lowest open defecation rate), but have lower access to improved sanitation (including shared) and sewerage systems. The latter point coincides with the pattern observed in open defecation in Muslim and Christian households (figure 4.4, panel b): Hausa and Fulani households are predominantly Muslim, and the evidence suggests that open defecation is slightly less prevalent in Muslim households than it is in Christian households.

Human Opportunity Index

The HOI is an effective way to measure a country's progress toward the universal coverage of opportunities for children, as well as equitable access to those opportunities.⁴ For the purposes of this report, the HOI is calculated to consider access to WASH services for children under the age of 16.

Among water services, improved water has the highest coverage rate, but also the highest level of inequality in its distribution of services. Around 62 percent of improved water services are available to children, and 52 percent of them are equitably allocated. The difference between the two estimates, around 10 percentage points, is the percentage of improved water services allocated inequitably (figure 4.7, panel a). When considering access to improved water within 30 minutes' round-trip from households (basic water), the coverage rate is lower (53 percent), but the inequality in the distribution is only around 9 percent. Coverage for improved water on premises is 18 percent, with an HOI of 13 percent, reflecting lower inequality in the distribution of the service (5 percent) as compared to improved and

Figure 4.7: Composite HOI and Coverage for WASH Services, Nigeria, 2011



Source: World Bank calculations based on MICS 2011.

Note: Coverage rates may vary from JMP estimates due to restrictions when calculating the HOI. HOI = Human Opportunity Index; JMP = Joint Monitoring Programme; WASH = water, sanitation, and hygiene.

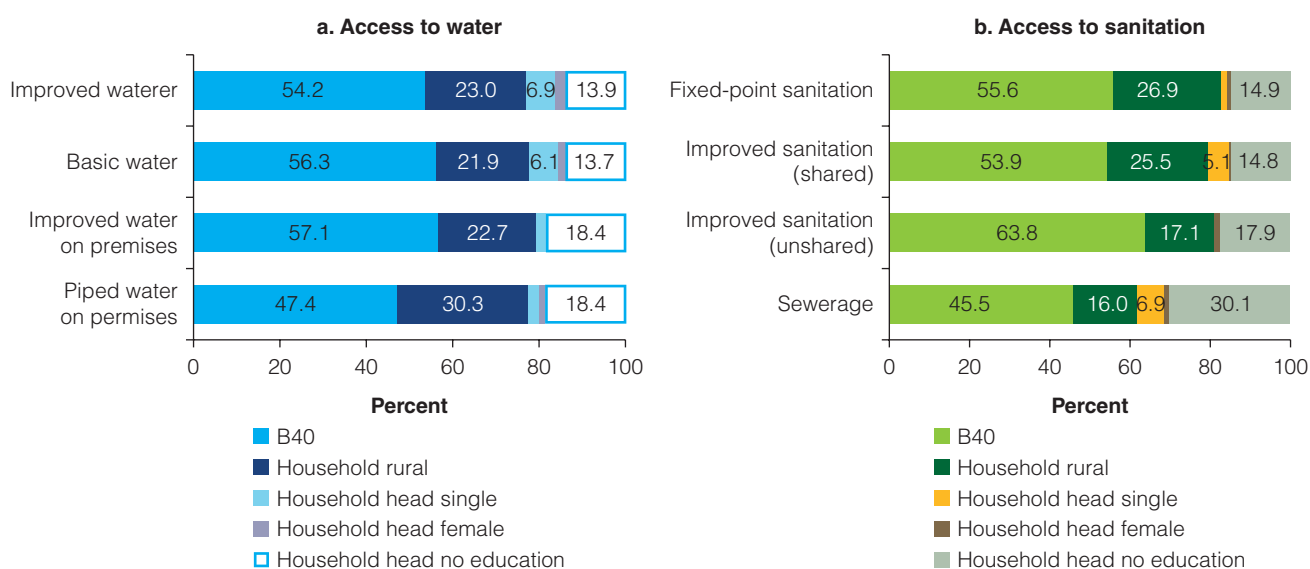
basic water. Access to piped water shows the lowest coverage when compared to the rest of the water services. The inequality, at 2 percent, is also the lowest among water services.

Coverage rates and inequality in the distribution of sanitation services vary widely (figure 4.7, panel b). Fixed-point sanitation services have the highest rate of access (71 percent), and inequality in the distribution is relatively low (8 percent). Further, roughly half of the population have access to improved sanitation using a shared facility (49 percent), though inequality is 12 percent—the highest among all sanitation services. With regard to improved sanitation services that are not shared, just under a third of Nigerians (30 percent) have access to such facilities, though these are more equally distributed than are shared facilities. Nationally, access to sewerage systems is low (4 percent) and the HOI is a negligible 2 percent.

Inequality in access to water services in Nigeria is mostly the result of variation in the wealth distribution (figure 4.8, panel a). Among the five factors⁵ considered in our analysis, wealth distribution—namely, residing in the B40 of the overall wealth distribution—has the most influence in predicting a child’s unequal access to water services.⁶ This is most pronounced for access to improved water on premises (57 percent). Whether or not a child lives in a rural area is a strong determinant of inequality, particularly in access to piped water on premises (30 percent). To a lesser extent, inequality in access to water services is adversely impacted by household heads’ lack of education. The marital status and gender of the household head seem to have relatively little or no significance in impacting the distribution of water services (less than 3 percent).

Residing in the B40 of the wealth distribution is the most powerful predictor of whether or not a child will have equal access to sanitation services. Wealth distribution has the largest effect on access to improved sanitation services that are not shared (64 percent). To a lesser extent, location of the household and a household head’s lack of education have a similar effect on access to this service (17 percent). Access to fixed-point and improved sanitation services that are shared appears to be most impacted by living in a rural location (figure 4.8, panel b). Household heads’ lack of education has the second most significant effect on access to sewerage systems, after that of income. Overall, household heads’ marital status and gender seem to have a relatively low impact on the distribution of sanitation services.

Figure 4.8: Shapley Decomposition for WASH Services, Nigeria, 2011



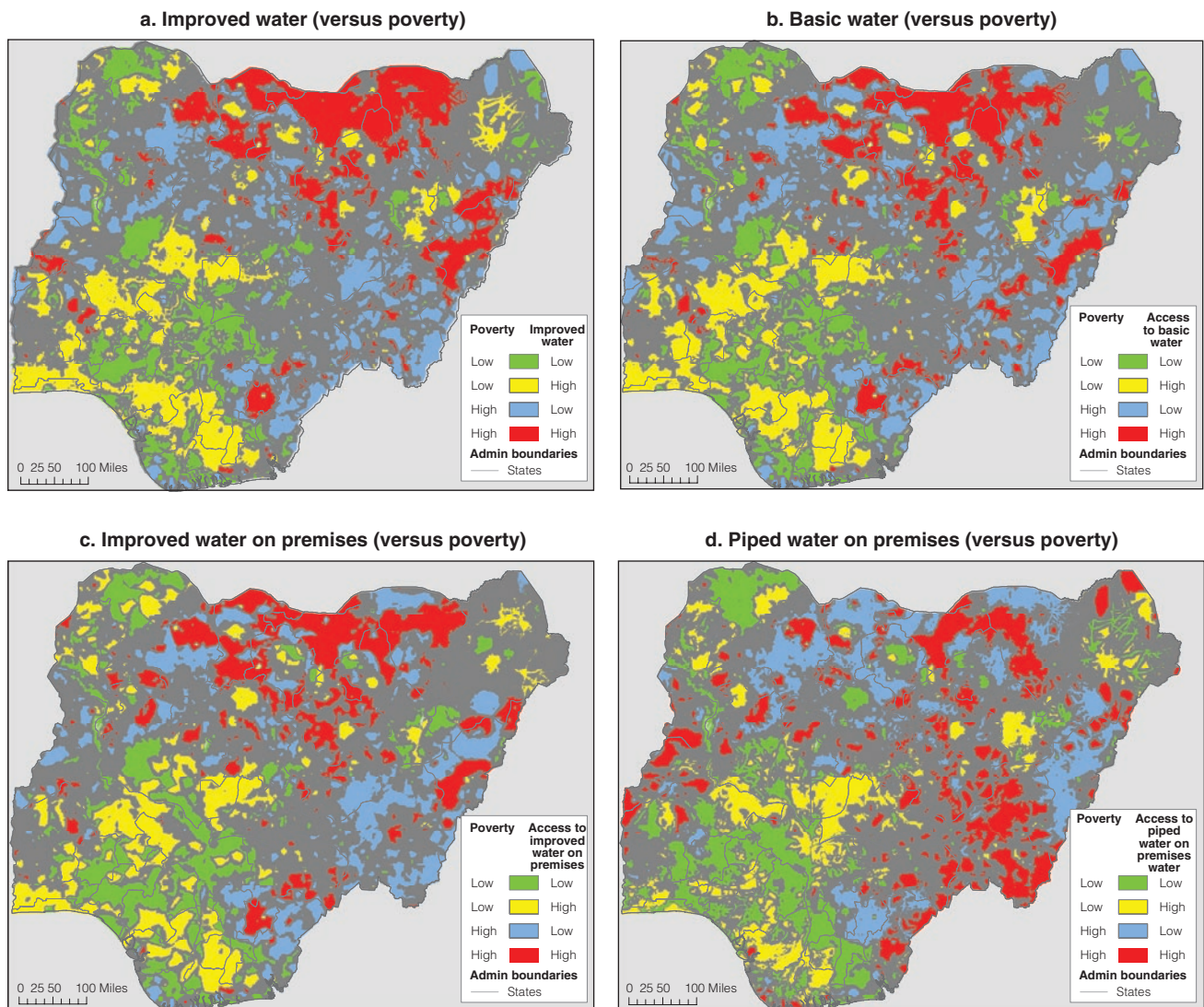
Source: World Bank calculations based on MICS 2011.
 Note: B40 = bottom 40 percent (wealth quintile); WASH = water, sanitation, and hygiene.

Overall, this analysis suggests that significant work is needed to expand coverage and equity in access to WASH services in Nigeria. When comparing the HOI against coverage rates, there are gaps, to varying extents, for both water and sanitation services, suggesting that the country needs to expand access—particularly for vulnerable groups. Improved water services and improved sanitation using a shared facility exhibit the largest gaps for water and sanitation, respectively.

Poverty and Access to Water

Interestingly, some areas experience both high levels of poverty and high levels of access to water (map 4.1, panels a–d).⁷ As shown in table 4.1, 10.7 percent of households experience high poverty and high levels of access to improved water. Moreover, of those citizens living in high levels of poverty, 9.7 percent have access to basic water, 9.9 percent have access to improved water on premises and 4.9 percent have access to piped water on premises. Areas with high poverty and high access to water are typically concentrated in the North Central and eastern parts of the country.

Map 4.1: Poverty and Access to Water, Nigeria, 2015



Source: World Bank calculations.

Table 4.1: Poverty and Access to Water, by Quintile, Nigeria
Percent

		Improved water			Basic water			Improved water on premises			Piped water on premises		
		Low	High	Other	Low	High	Other	Low	High	Other	Low	High	Other
Poverty	Low	6.4	40.4	38	7.3	40.5	36.8	9.6	38.1	36.4	37.5	10	37.3
	High	4.4	10.7		5.6	9.7		6.0	9.9		10.3	4.9	

Source: World Bank calculations.

Similarly, some areas experience low levels of access to water and low levels of poverty (map 4.1, panels a–d). For improved water, basic water, and improved water on premises, 6.4 percent, 7.3 percent, and 9.6 percent of citizens, respectively, experience both low poverty and low access to these services (table 4.1). Most surprising, when considering access to piped water on premises, 37.5 percent of citizens experience both low poverty and low access. Such low poverty, low access areas are found in the western regions, particularly in the North West and South West, and to some extent in the South South.

Poverty and Access to Sanitation

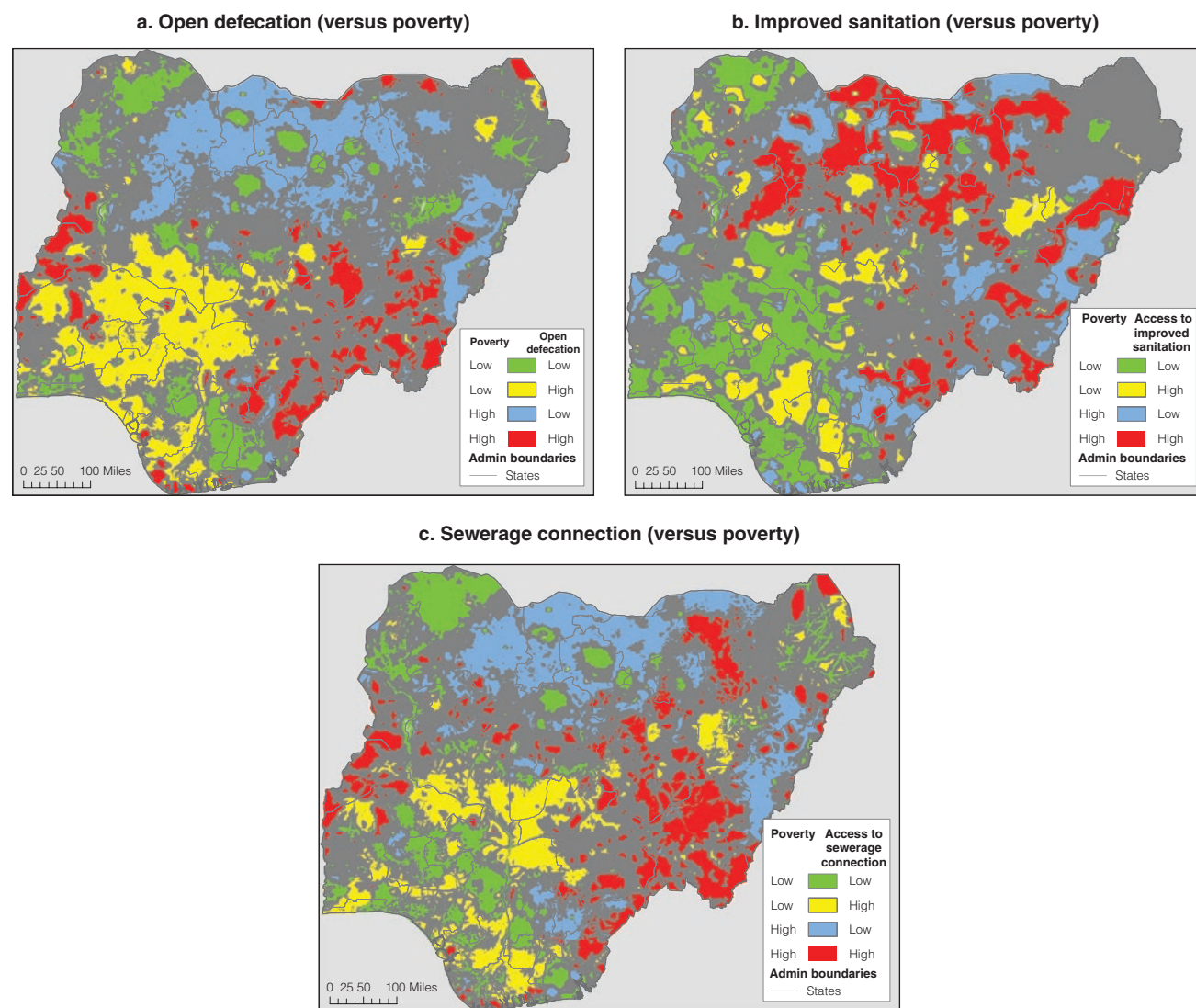
There is no clear pattern between poverty levels and rates of open defecation (map 4.2, panels a–c). As shown in table 4.2, 12 percent of Nigerians living in high poverty areas have low rates of open defecation, while 9.8 percent of those living in low poverty also have high rates of open defecation. Just over a third exhibit both low poverty and low rates of open defecation. The North Central region has a number of areas with high rates of poverty, but also low rates of open defecation. Inversely, the South West and South South regions have areas with low rates of poverty but high rates of open defecation.

There is also no clear relationship between poverty levels and access to sewerage systems. Sewerage systems are relatively scarce throughout the country. As mentioned in chapter 3, only 6 percent of households have access to sewerage systems (table 3.2). Broadly, 3.3 percent of Nigerians exhibit high levels of poverty and high levels of access, while a surprising 32.2 percent exhibit low levels of poverty and low levels of access (table 4.2). Areas with high rates of poverty and high access to sewerage are typically found in the South East region. We also find areas with low rates of poverty and low rates of access in the North West, South West, and South South regions, similar to that found with sanitation. Overall, nearly a third of Nigerians exhibit low poverty and low rates of access to sewerage.

Similarly, there is no straightforward relationship between poverty levels and access to improved sanitation. Around 18.7 percent of Nigerians live in areas of low poverty and high access to improved sanitation, and around 5.7 percent live in areas of high poverty and low access to improved sanitation. Around 22.1 percent of Nigerians are in low poverty areas and have low access to improved sanitation, and around 10.4 percent of Nigerians are in high poverty areas and have high access to improved sanitation (table 4.2). There are areas of high poverty and high access to improved sanitation in the North Central region, and to a lesser extent, in the Eastern regions (map 4.2). Inversely, there are areas of low poverty and low access in the North West, South West, and South South regions.

To further understand the factors underlying the poverty-WASH nexus, this report explores differences in socioeconomic factors for those households near to one another and exhibiting the same poverty levels, but experiencing different levels of access to improved water and sanitation. A geographic buffer was generated to capture households with high poverty and high rates of access and households with high rates of poverty but low rates of access that were within 50 kilometers of each other. This was done under the assumption that it is more

Map 4.2: Poverty and Sanitation, Nigeria, 2015



Source: World Bank calculations.

Table 4.2: Poverty and Access to Sanitation, by Quintile, Nigeria, 2015
Percent

		Open defecation			Sewerage			Improved sanitation		
		Low	High	Other	Low	High	Other	Low	High	Other
Poverty	Low	36.6	9.8	38.4	32.2	13.6	38.2	21.2	18.7	44.1
	High	12.0	3.2		12.8	3.3		5.7	10.4	

Source: World Bank calculations.

accurate to compare households close to each other, since they are more likely to share greater similarities across baseline geographic characteristics.⁹

There are no clear-cut differences in socioeconomic characteristics across all poverty levels that may help explain the difference in access to improved sanitation (table 4.3). Moreover, for high poverty households, the difference in the makeup of households for both improved sanitation and water is either counterintuitive—for instance, a slightly higher share of households with high access to improved water are in rural locations—or are not statistically significant.

For low poverty areas, households with higher access to improved water tend to have more educated household members and are more likely to be in urban locations (table 4.3).⁹

Table 4.3: Determinants of Poverty and Access to Improved Water and Sanitation for Households in a 50 km Buffer, Nigeria

Variable	Low poverty/ low access	Low poverty/ high access	Low poverty Dif mean	High poverty/low access	High poverty/high access	High poverty Dif mean
On improved sanitation						
Religion (Islam = 0; Christianity = 1)	0.64	0.73	0.0900	0.31	0.41	0.0999
Average log of household expenditure	11.62	11.46	-0.159	12.06	12.56	0.5
Proportion of household members who have attended school	0.84	0.88	0.0400	0.68	0.67	-0.009
Geography (Rural = 0; Urban = 1)	0.65	0.57	-0.079**	0	0	0
Proportion of household members who have worked during the last 7 days	0.86	0.87	0.0099	0.97	0.98	0.0099
On improved water						
Average log of household expenditure	12.73	11.82	-0.90**	12.1	11.97	-0.13
Religion (Islam = 0; Christianity = 1)	0.44	0.64	0.199	1	0.26	-0.74**
Proportion of household members who have attended school	0.62	0.91	290**	0.59	0.67	0.080
Geography (Rural = 0; Urban = 1)	0.14	0.83	0.659**	0.06	0	-0.05**
Proportion of household members who have worked during the Last 7 days	0.9	0.83	-0.06**	0.86	0.98	0.120**

Source: World Bank calculations.

Note: Significance level: ** = 5 percent or less.

Around 91 percent of households in low poverty and high access areas have attended school, compared to 62 percent of households in low access areas. Moreover, 83 percent of households in low poverty and high access areas are in urban locations, as compared to only 14 percent of households in low poverty and low access areas. These findings echo the earlier observations on the importance of education and urban or rural location in explaining access to WASH.

Across poverty access tiers, households are concentrated in a handful of states, which suggests that there are state-level factors driving differences in access. For example, for improved water, almost 60 percent of households in the low poverty and low access tier are in Bayelsa, Enugu, Ondo, Sokoto, and Delta, and around 56 percent of high poverty and low access households are in Benue, Enugu, and Katsina. For improved sanitation, around 43 percent of households in low poverty and low access tiers are in Osun, Delta, Lagos, and Ekiti, and around 63 percent of high poverty and high access households are in Katsina, Kano, Benue, Jigawa, and Taraba. This suggests that other state-level factors, such as expenditure and internal politics, are driving the differences in access to WASH across poverty groups.

Concluding Remarks

This chapter considered interactions between social and demographic characteristics of the population and access to WASH access, zooming in on the B40. Similarly, it examined the location of those poor populations with limited access to WASH services, and their differential access to water and sanitation by state and across a set of socioeconomic characteristics. Further, the report used the HOI to better understand equity in access, as well as the social and human determinants influencing access to WASH services.

Overall, income, education, and urban or rural location explain most of the variation in access to WASH. For instance, only 29 percent of households in the poorest quintile have access to improved water, compared to 91 percent of households in the richest quintile. Moreover, while 34 percent of households in which the household head has no education have access to improved sanitation (including shared facilities), that percentage jumps to 67 percent among households in which the household head has a secondary education degree or above. Moreover, income, education, and urban or rural location explain most of the variation in a child's unequal access to WASH. In particular, residing in the B40 of the overall income distribution explains most of the variation in a child's unequal access to water services. Gender, ethnicity, and religion play more marginal and ambiguous roles in explaining access to WASH.

The relationship between poverty rates and access to water and sanitation is, overall, obscure. Our maps show several unusual, counterintuitive patterns of high access to WASH and high poverty rates, and low access to WASH and low poverty rates. For instance, the percentage of households that have low access to piped water on premises is higher in low poverty areas than it is in high poverty areas: 37.5 of households in low poverty areas have low access to piped water on premises, compared to 10.3 percent of households in high poverty areas. However, the data suggest that, for households in low poverty, access to education and urban or rural location may help explain the differences in access to water. Moreover, when looking across all poverty access tiers, the high concentration of similar households in a few states further suggests that differences in state-level characteristics likely play a central role in explaining variation in access to water and sanitation.

Notes

1. Approximately 37.6 percent of household heads have no education, 22.5 percent have only a primary education, and 39.9 percent have at least a secondary education.
2. Population: 50.6 percent is Christian while 47.6 percent is Muslim.
3. Ethnic groups: 24.4 percent of households belong to the Hausa and Fulani ethnic group, 17.3 percent belong to the Yoruba group, 17.2 percent belong to the Igbo, and the remaining 41.2 percent belong to other minority ethnic groups.

4. To measure inequality, the HOI takes the respective level of coverage for each service that is considered, and discounts that measure by an estimate of how unequally that service is distributed among the population. The HOI summarizes in a composite indicator: (a) how many opportunities are available, that is, the coverage rate of a basic service (e.g., access to improved water); and (b) how equitably those opportunities are distributed, that is, whether the distribution of that coverage is related to exogenous circumstances (e.g., location, gender, household characteristics). Hence, an increase in coverage of a basic service at the national level will always improve the index. However, if that increase in coverage is biased toward a disadvantaged group, it will further reduce the inequality of opportunity, increasing the index more than proportionally.

The component used to estimate the inequality of opportunity is the dissimilarity index (D-index). The D-index, widely used in sociology (Paes de Barros et al. 2009), measures the dissimilarity of access rates for a given service for groups defined by circumstance characteristics as compared with that of the general population. It is defined as the weighted average of the absolute differences of group-specific access rates from the overall average access rate. The D-index ranges from 0 to 1 (0 to 100 in percentage terms), and in a situation of perfect equality of opportunity, D will be zero.

5. The five factors we considered here are whether (a) the household lies in the B40 of the income distribution, (b) the household is in a rural location, (c) the household head is single, (d) the household head is a female, and (e) whether the household head has an education. These factors mirror those used in previous studies to assess the inequality of opportunities. Moreover, these variables have also shown to be associated with the use of WASH services, and they are of particular interest because they are circumstantial; that is, they are factors that cannot be controlled by a child.
6. We used the Shapley decomposition to calculate the contribution of each circumstance, or factor, to the observed inequality of opportunity across households. The decomposition breaks down the R^2 of a regression based on the relative predictive share of each factor in determining the effect of the outcome variable, so, by definition, the Shapley decomposition adds up to 100 percent. To calculate the impact of each circumstance, the Shapley decomposition takes the average of all possible changes to different combinations of circumstances to show how much inequality changes as a consequence of adding an additional factor (Billler et al. 2014). Since circumstances correlate with each other, the change in inequality that results when a factor is added depends on the initial set of circumstances to which it is added.
7. Map 4.1 and table 4.1 show the interaction between access to sources of improved water and poverty, and map 4.2 and table 4.2 show access to sources of improved sanitation and poverty, broken down by quintiles. For example: for map 4.1, panel a, “low-low” is the percentage of households that are both in the bottom quintile of the access to improved water distribution and in the bottom quintile of the poverty rate distribution. “High-high” is the percentage of the population in the top quintile of the access to improved water distribution and in the top quintile of the poverty rate distribution.
8. The additional analysis using a buffer of 50 kilometers was conducted to obtain an unbiased estimate of the factors predicting access to WASH across poverty groups. The assumption was that households closer to one another are more likely to share commonalities in terms of key baseline geographic characteristics (e.g., annual precipitation, ground elevation, and other factors), and thus offer a valid proxy “treatment” and “control” group through which to better assess the factors predicting access to WASH across poverty groups. The data suggest that the differences in means for many geographic variables across households exhibiting similar poverty levels are different at the baseline, which implies that the groups are not balanced. The authors of this report plan to conduct additional analysis to determine if any additional interactions between poverty and WASH can be deduced from the data.
9. The proportion of households who have attended school was calculated as an aggregate of the number of people who went to school by household, as captured by the yes/no question: “Have you ever attended school?”, which was asked to all household members five years and above. The variable is equal to 1 if most of the people in the household attended school, and 0 if most of the people in the household did not attend school.

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Chapter 5

WASH and Health Outcomes

Key Takeaways

- **The overall distribution of the risk indexes indicates sharp divisions along geography, urban or rural location, and income groups in Nigeria.** In general, risk of diarrheal disease is negatively associated with wealth; the poorest and most vulnerable are also more likely to live in communities with higher exposure risk.
- **Overall measures of exposure and susceptibility are positively associated with each other, and negatively associated with wealth.** Those with the worst water, sanitation, and hygiene (WASH) conditions are also more vulnerable to disease due to inadequate health.
- **A majority share of the Global Burden of Disease Project (GBD) enteric burden estimated for Nigeria is associated with inadequate WASH, and disproportionately born by poorer children and those in vulnerable geographic areas.** Approximately 73 percent of the GBD enteric burden estimated for the country is associated with inadequate WASH. The national enteric burden associated with inadequate WASH is 10,083 disability adjusted life years (DALYs) per 100,000 children per year. Moreover, the WASH enteric burden for the poorest quintile is about four times greater than the enteric burden for the richest quintile. The burden for the poorest urban residents is 3.3 times higher than that for the richest, and in rural areas it is three times higher for the poorest rural residents than for the richest.

Introduction

Inadequate WASH can contribute to adverse health and development consequences, and some subsets of the population are more vulnerable to WASH-related risks than others. Population with poor health and nutrition are more vulnerable to experiencing the adverse effects of inadequate WASH than are those subsets of the population with good access to health and good nutrition. For example, being undernourished increases both the likelihood and severity of diarrheal disease, and those without access to timely health care are more likely to die as a result of an infection (Dangour et al. 2013). Moreover, children who are undernourished and lack access to quality health care face a higher risk of diarrheal disease and death related to poor access to WASH than do well-nourished children with access to high-quality health care.

Inadequate WASH can result in exposure to a wide range of pathogens and cause many health problems. The ingestion of contaminated water, food, or soil as a result of the unsafe management of human excreta, a contaminated or inadequate water supply, or poor personal and domestic hygiene provides routes of transmission for numerous microorganisms that can

cause diarrhea and other severe infections (White, Bradley, and White 2002). Evidence shows that inadequate WASH is estimated to explain around 2.4 million deaths annually, after controlling for a range of related health outcomes (including diarrheal diseases, soil-transmitted helminth infections, schistosomiasis, and undernutrition). The same study estimates that improving WASH conditions might reduce the global burden of disease by 9.1 percent in DALYs,⁴ and reduce deaths globally by 6.3 percent (Prüss-Üstün et al. 2008).

Diarrhea accounts for approximately 40 percent of the WASH-related disease burden (Prüss-Üstün et al. 2008) and remains one of the leading causes of death in children. Diarrhea spans a number of different diseases caused by a multitude of pathogens, including rotavirus, *Shigella* spp., pathogenic *Escherichia coli* (*E. coli*), *Giardia* spp., and *Cryptosporidium* spp. Together, diarrheal diseases in low- and middle-income countries (LMICs) have been estimated to be responsible for over 800,000 deaths annually (GBD 2013). Despite great progress in reducing diarrheal mortality worldwide—deaths from diarrheal diseases fell by 31 percent between 2000 and 2013—it remains the fourth leading cause of death in LMICs and the second leading cause of death in children under five (Liu et al. 2015).

External factors such as access to health care, the nutritional status of children, and larger environmental conditions magnify the WASH-related risk of diarrheal disease. Poor WASH conditions and other external factors are often concentrated among certain groups, reflecting broader structural inequities related to poverty and geography. These risks can be substantially modified by factors external to WASH, such as access to health care, the nutritional status of children, and children's ability to fight infection (Brown 2003; Guerrant et al. 2008) and larger environmental conditions (Prüss-Üstün and Corvalán 2006). Moreover, in many LMICs, rapid urban migration is creating crowded and unsanitary informal settlements, in which the poor urban population live without adequate WASH services and without high-quality health care access. Climate change has also increased the vulnerability of many poor communities to flooding and drought events, disrupting sanitation efforts and contributing to inconsistent agricultural production.

There is ample evidence documenting the association between clean WASH practices and undernutrition, and the negative effects of diarrhea on the health of undernourished children. There has been wide recognition of the intimate relationship between diarrhea and undernutrition. There has also been growing evidence of the association between environmental enteropathy and undernutrition (Humphrey 2009). Unsafe WASH conditions enable the transmission of enteric pathogens that can cause diarrhea and environmental enteropathy, and can lead to chronic problems with absorbing nutrients. This, in turn, can lead to stunting, wasting, and being underweight. The exposure to diarrheal pathogens among undernourished children and those who lack access to preventative or curative services (e.g., vitamin A, oral rehydration therapy) is even worse, since these children are more susceptible to infection from diarrheal pathogens and more likely to die from it. A recent systematic review exploring the effects of WASH practices on the nutritional status of children finds evidence of a protective effect of WASH interventions on growth in children (Dangour et al. 2013).

This chapter will cover some of the overlapping risk factors associated with poor WASH and map out their unequal distribution. The analysis will be only on the risk effects for children under five years of age. The end goal is to promote WASH investment strategies that more effectively and efficiently target areas with the greatest need. Specifically, this chapter aims to (a) quantify the proportion of WASH attributable risk of diarrheal disease borne by children in the bottom 20 percent (B20) and 40 percent (B40) of the income distribution; (b) estimate the potential health and other benefits of targeting WASH investments to children in the B20 and B40 of the income distribution; and (c) assist in identifying priority areas for WASH investment in which the social return will be greatest.

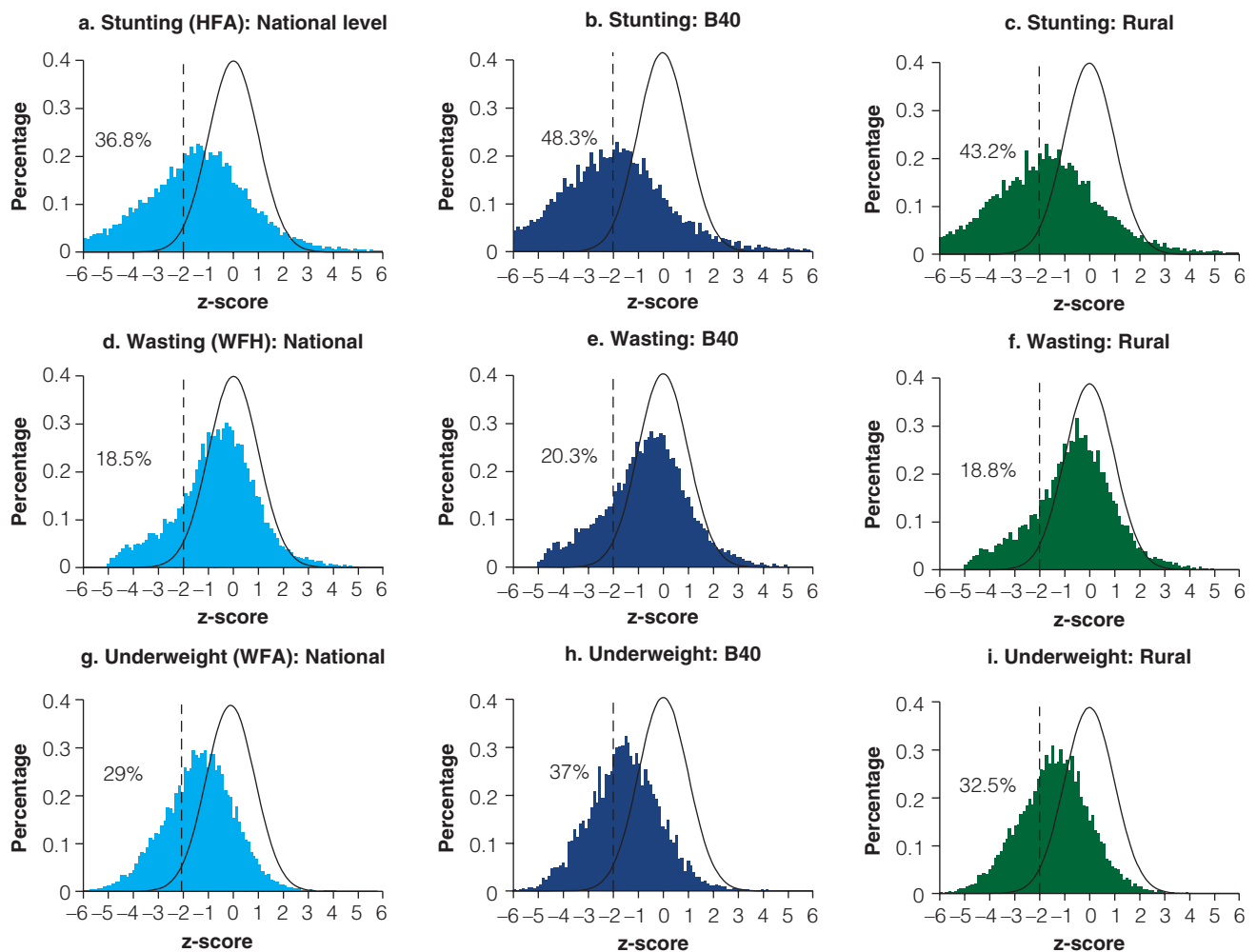
A WASH poverty risk model (WASH-PRM) is used to assess patterns of disease across different economic and geographic subpopulations of children under five. The model includes WASH exposure factors—access to water, household sanitation, and hygiene—that influence the risk

of diarrheal disease, and susceptibility factors—the acquisition of micronutrients, effective rehydration treatment, and undernutrition—that influence diarrheal disease and mortality. The model allows us to identify the population of children under five with the highest risk of diarrheal disease, stunting, and mortality, and to look at population patterns and the geographic distribution of the risks of diarrheal disease. The patterns that emerge from the model can help improve and streamline the targeting of WASH investments and programs.

Child Health Outcomes in Nigeria

Undernutrition is a major public health problem in Nigeria.² The 2013 DHS estimates that 36.8 percent of children under five in Nigeria are stunted, 18.5 percent are wasted, and 29 percent are underweight (figure 5.1, panels a, d, and g). Close to half of children in the B40 of the wealth distribution are stunted, and 37 percent of children in the B40 are underweight (figure 5.1, panels b and h). Similar patterns can be found in rural areas (figure 5.1, panels c, f, and i). While the proportion of under-five children who are stunted has improved since the previous

Figure 5.1: Malnutrition in Nigeria—Children 0–59 Months, 2013



Source: World Bank calculations based on the DHS 2013.
 Note: HFA = height-for-age; WFA = weight-for-age; WFH = weight-for-height.

Demographic Health Survey (DHS) in 2008, the extent of wasting and underweight among children has actually worsened, suggesting an ongoing nutritional deficiency among children in the country.

Inadequate WASH has also been found to increase the risk of contracting neglected tropical diseases, such as soil-transmitted helminth infections (STH), schistosomiasis, and trachoma (Grimes et al. 2015; Stocks et al. 2014; Strunz et al. 2014), all of which are endemic across Nigeria. STH infections, schistosomiasis (especially urinary and *S. haematobium*), and trachoma have registered prevalence rates of greater than 50 percent of the population in some regions of the country.^{3,4}

Five studies (Barzilay et al. 2011; Hutin, Luby, and Paquet 2003; Huttly et al. 1987; 1990; Oloruntoba, Folarin, and Ayede 2015) were identified to assess the effects of WASH interventions on diarrheal disease in Nigeria (box 5.1). The studies are subject to a high risk of bias, since none used a robust randomized control trial (RCT) design, only two had a nonexperimental design, and the other three studies were observational studies. Evidence from the studies suggests that WASH interventions have a positive effect on reducing diarrheal morbidity in Nigeria. Evidence from the observational studies suggests that inadequate sanitation facilities are associated with diarrheal morbidity, but, given that they are observational studies, they likely suffer from high degrees of bias, and do not allow us to make any causal inferences. While there is evidence of the relationship between WASH and diarrhea at the regional level, no evidence has been generated at the national level.

Box 5.1: WASH Interventions and Diarrheal Disease in Nigeria

One nonrandomized control trial, conducted in 2005, evaluates the impact of a point-of-use water chlorination and storage intervention on diarrheal-disease risk in a population of HIV-infected women in Lagos city (Barzilay et al. 2011). The intervention households received a 25-liter jerry can, one bottle of sodium hypochlorite solution, and basic sanitation and hygiene education. The report observes a 36 percent decrease in diarrhea between the pre- and postintervention phases, which was statistically significant ($p = 0.04$).

Another nonrandomized control trial evaluates the impact of the Imo State Drinking Water Supply and Sanitation project on diarrhea prevalence and incidence among selected households (Huttly et al. 1990). The Imo project consisted of a package of water supply (installation of boreholes with hand pumps), sanitation (promotion of ventilated improved pit latrines), and health and hygiene education, and was launched in 1982 in three intervention villages in Imo state, in southeastern Nigeria. This study assesses the impact of the project in these three villages as well as two control villages that did not receive the intervention. An impact of the project on diarrhea morbidity was found only in limited subgroups of the population and a greater association with water availability, rather than quality, was suggested for diarrhea rates in young children. In 1986, a baseline cross-sectional study of diarrhea and its putative risk factors, in the five villages mentioned above, was conducted (Huttly et al. 1990). This study finds that water purification (filtering, boiling, or addition of alum) was a protective factor in the dry season; using nonpurified water was associated with 1.3 times increased risk of diarrhea, however, when stratified by

box continues next page

Box 5.1: Continued

age (this association was only significant for adults). The absence of soap in the households indicated an increased relative risk of diarrhea in children aged 5–14 years during the wet season. The associations between diarrhea incidence and covering water containers, the presence of feces in the compound, and drinking only rainwater were not significant.

One age-matched case-control study aimed to determine the hygiene and sanitation risk factors of diarrheal disease among children under five in Ibadan, Nigeria (Olorunoba, Folarin, and Ayede 2015). Two hundred and twenty-two pairs of children were sampled from two health facilities. Control children were those under five who were admitted to hospitals for nondiarrheal illnesses, while cases were children under five who had been admitted for diarrheal illnesses. Logistic regression analysis finds lower risk of diarrhea among children having mothers with healthy hygiene practices. The risk of diarrhea was significantly higher among children whose mothers did not wash their hands with soap, who shared a toilet with other households and who had dirt or a foul smell around their toilets. There was, however, a reduced risk of diarrhea among children whose caregivers or mothers had adequate water for toilet use.

Another case control study aimed to assess both the importance of handwashing with soap and the risk of drinking street-vended water with regard to contracting cholera, during an outbreak in Kano City, Nigeria (Hutin, Luby, and Paquet 2003). Authors report that individuals in the cases (cholera) were more likely to have drunk street-vended water and to have failed to wash their hands with soap before meals.

WASH Poverty Risk Model

The WASH poverty risk model (WASH-PRM) applied in this analysis⁵ assesses patterns of disease risk among children under five, across different economic and geographic dimensions. The model combines exposure factors (WASH-related elements that influence the risk of diarrheal disease) with susceptibility factors (health and nutrition components that influence the risk of diarrhea and mortality) to create a risk index score calculated individually for each child, and then aggregated into subpopulation estimates using the 2013 DHS. The geographic distribution of the diarrheal disease risk is also mapped.

The primary purpose of this model is to describe how diverse and interrelated risk factors may contribute to how the national diarrheal disease burden is distributed across different subsets of the population (e.g., across wealth quintiles). The association or causality between WASH and these outcomes is not estimated because the DHS data is cross-sectional and prone to many biases. These descriptions are both quantitative (by economic group and setting) and spatial (through a series of heat maps showing intensity of risk) in nature. An understanding of the codistribution of these risk factors is used to identify the most consequential factors that require intervention.

The core PRM model combines key *susceptibility factors* and *exposure factors* that are most relevant to the following health outcomes: diarrhea, stunting, and mortality. The relative risks

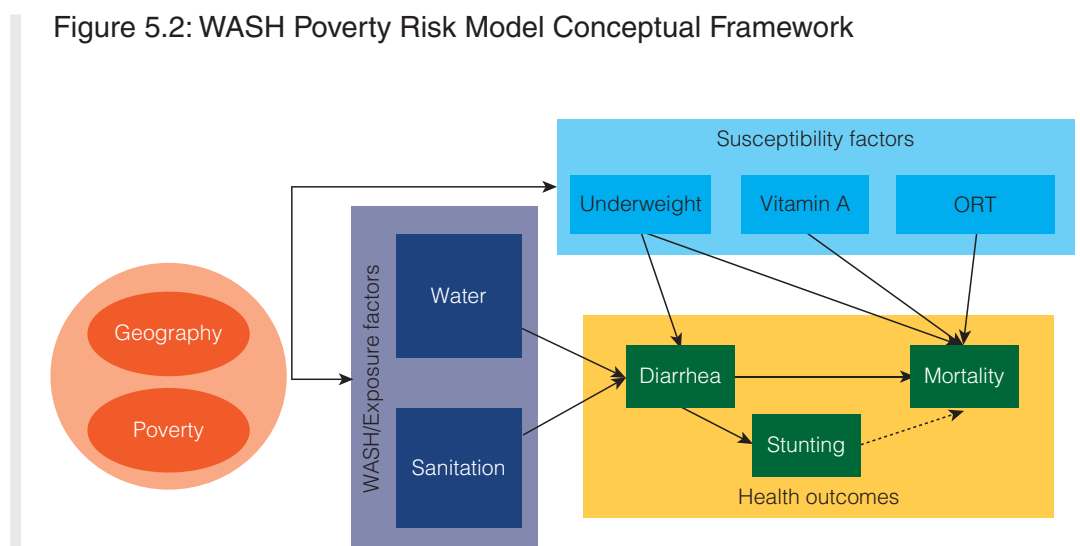
associated with these exposure and susceptibility factors were gathered from a systematic, review-based meta-analysis publication, and calculated following conventional burden of disease analyses (Murray and Lopez 1997).⁶ The concept of a “relative risk” (RR) is a common and established approach in the epidemiological literature (Hennekens and Buring 1989; Levin 1953). It represents the level of disease risk among “exposed” individuals, or those with a particular risk factor (e.g., *not* having safe drinking water) compared to “unexposed” individuals, or those without the risk factor (e.g., *having* safe drinking water). An RR greater than 1 indicates a larger risk of a given disease among the exposed versus the unexposed, and an RR of less than 1 indicates that the exposed have similar risks of getting the disease as do the unexposed. RR estimates are derived from pooling the effect sizes of high-quality studies designed to assess the effect of a given factor on a given disease, such as the effect of safe drinking water on diarrheal disease. These studies were identified using systematic literature review methods (Higgins and Green 2008).⁷

The exposure factors of the framework include WASH-related elements that influence the risk of diarrheal disease (figure 5.2). RRs were gathered from the literature for different levels of these WASH services. RRs for individual exposure risk factors are combined into a single exposure index. The susceptibility factors cover individual risk factors identified through the literature review. Quantitative risk estimates for each factor are combined into a single susceptibility index. Included here are also variations of other potentially important exposure factors (shown in light blue in figure 5.2) that are not included in the core model due to inconclusive evidence of the magnitude of excess risk or a lack of data on conditions and behaviors.

The risk index combines information on the child’s household WASH characteristics, individual health vulnerabilities, and the RR associated with each factor. The RRs for the susceptibility and exposure factors are multiplied to develop a cumulative risk index. Some risk factors decrease risk (e.g., improved water, access to vitamin A), while others increase risk (e.g., underweight). Each factor is weighted differently and calculated according to a RR factor, as informed by the literature review.

Scores for the *exposure index* are calculated individually for each child using the combined RR of access to WASH, based on the household’s coverage of water and sanitation service levels as derived from the 2013 Nigeria DHS. Service levels are defined with a desire to align them,

Figure 5.2: WASH Poverty Risk Model Conceptual Framework



Note: WASH/exposure factors in light blue are not included in the exposure index. HH = household head; ORT = oral rehydration treatment; WASH = water, sanitation, and hygiene.

where possible, with the World Bank Access Plus framework, and we use three service levels for both water and sanitation that can be combined to describe a number of exposure scenarios with varying degrees of diarrheal disease risk.⁸ Exposure values are then estimated for each child, and averaged by cluster using survey weights included in DHS datasets. After calculating the exposure index, it was rescaled and then adjusted it to the excess exposure risk due to inadequate WASH by subtracting 1 from the RR value.

The model includes three risk factors related to the *susceptibility* of diarrheal disease and mortality. These include the acquisition of susceptibility-related micronutrients (vitamin A), effective treatment (oral rehydration treatment), and undernutrition or underweight assessed by a child's WFA. We estimate RRs based on WFA z-scores recorded for under-five children in the child-level DHS data. RRs are assigned to different levels of WFA based on standard deviations below the global mean of the z-score distribution as compared to normal values.

The susceptibility index and exposure risk are combined into the overall risk index, which is simply the product of the two indexes. Risk index scores are calculated individually for each child under five years of age and then aggregated into subpopulation estimates. The risk results from the WASH Risk Index are then translated them into commonly used measures of disability adjusted life years (DALYs), developed and used by the Global Burden of Disease project (GBD). DALYs are a common health metric that combine both the years of life lost (YLL) due to a particular cause or risk factor as well as the years lived with disability. A single DALY can be considered as one year of healthy life lost. DALYs are used to provide a summary estimate for the distribution of the enteric disease burden attributable to inadequate WASH, calculated across different subsets of the population.

Results

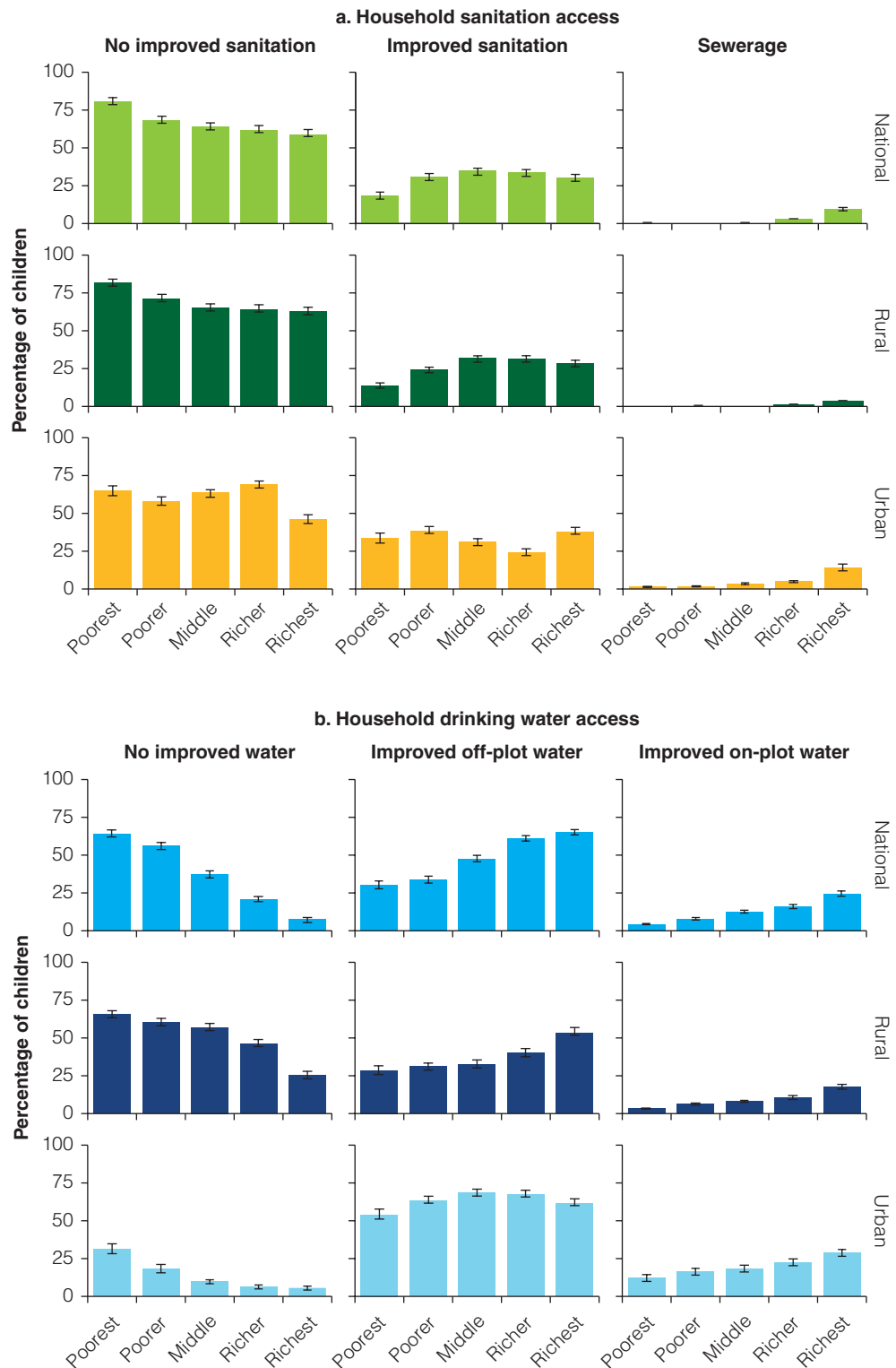
This section describes the main results of the analysis from the risk model. The results are presented in the following order: (a) the distribution and population patterns of exposure variables and the exposure index; (b) the distribution and population patterns of the susceptibility variables and the spatial distribution of the susceptibility index; (c) the distribution of the combined risk index; (d) the spatial distribution of the risk index and impact of water or sanitation interventions; and (e) the DALY burden of inadequate WASH.

Distribution of Exposure to Inadequate WASH Factors

Figure 5.3, panel b, shows the distribution of household sanitation access, and panel b shows the household drinking water access service levels by economic status (wealth quintile) for national, rural, and urban populations of children under five. The results suggest that a majority of children (75 percent of B20, 60 percent of those in the top 20 percent [T20]) do not have access to improved sanitation (figure 5.3, panel a). Moreover, there is a sharp disparity in access to improved sanitation across the economic distribution: around 15 percent of the poorest households (B20) have access to improved sanitation, compared to around 25 percent of the richest (T20) (figure 5.3, panel a). This pattern holds true across both rural and urban settings, although, in general, access to improved facilities is somewhat higher for children in urban households. Overall, very few children in households have access to a sanitation facility connected to a sewerage network: a sewerage service is available to only 5 percent of children in the richest households (T20 quintile), is marginally available in urban areas (around 12 percent for T20, 1 percent to 5 percent for other quintiles) (figure 5.3, panel a), and is rarely available in rural areas (mostly for the T20 [around 5 percent]).

There is also a large disparity in access to improved drinking water for children across the economic distribution. Almost 85 percent of the T20 have access to improved drinking water, while only 30 percent of the B20 have access (figure 5.3, panel b). This pattern holds true across both rural and urban settings, although, in general, access to improved drinking water

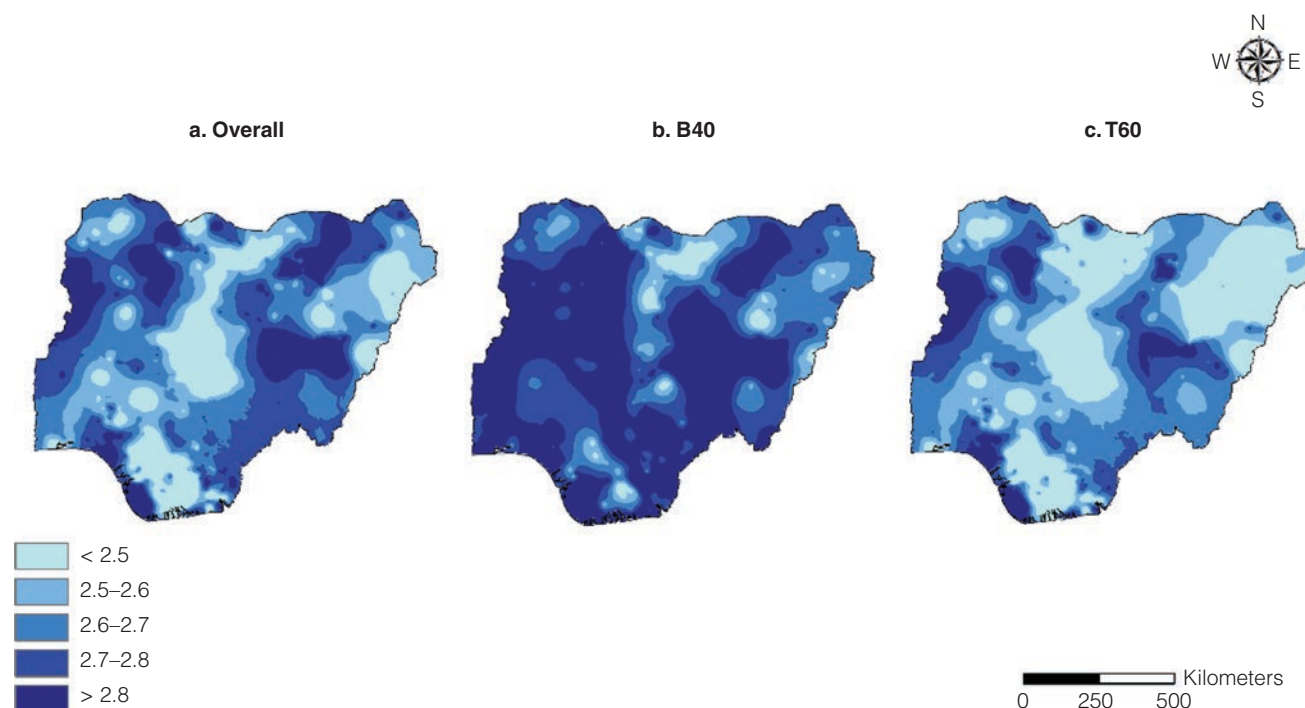
Figure 5.3: Distribution of Water and Sanitation Service Levels, by Economic Level for National, Rural, and Urban Populations of Children Under 5, Nigeria, 2013



Source: World Bank estimations based on the WASH-PRM.

Note: Water source categories: a. unimproved or surface water, b. off-plot improved, and c. on-plot improved. Sanitation categories: a. no or unimproved sanitation, b. Improved sanitation (nonsanitary), and c. improved sanitation (sanitary connection).

Map 5.1: Exposure Indexes in Nigeria for Overall, Bottom 40 Percent, and Top 60 Percent Populations of Children Under 5, 2013



Source: World Bank estimations based on the WASH-PRM.

Note: Map panels represent 5 square kilometers resolution. B40 = bottom 40 percent of wealth quintile; T60 = top 60 percent of wealth quintile.

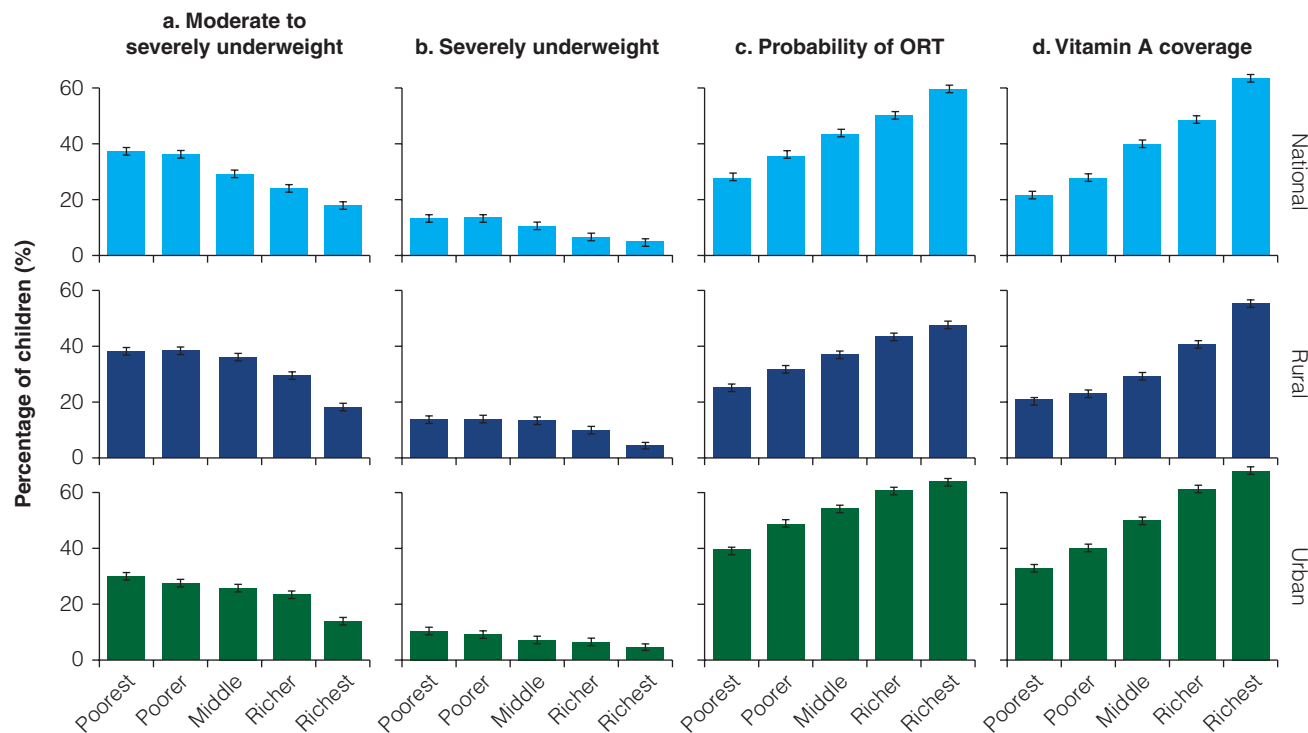
is higher for urban households. Overall, less than 5 percent of households in the B20 have access to on-plot improved water, compared to 25 percent in the T20 (figure 5.3, panel b).

Panels a–c of map 5.1 show a fine-scale spatial resolution map (at 5 square kilometers) of the exposure index value distribution across children under five in Nigeria, nationally (overall) (panel a), and partitioned by economic distribution (B40, panel b; T60, panel c). The maps show greater intra-regional heterogeneity in exposure. In the national level map, the highest exposure index values are concentrated in northwestern, northeastern, and southeastern Nigeria. For the B40 map, high exposure areas are more widespread and evenly distributed across the country. There are only a few concentrated areas of high exposure in the T60 map; these are located in the North West, South West, and north east.

Distribution of Susceptibility Factors

Figure 5.4 shows the distribution of susceptibility factors (moderate to severely underweight, probability of receiving oral rehydration treatment [ORT], and vitamin A coverage) by the economic distribution (wealth quintile) for national, rural, and urban populations of children under five. Nationally, there are higher percentages of underweight children in poor quintiles (almost 40 percent of B20 underweight, 15 percent of B20 severely underweight) compared to those in rich quintiles (15 percent of T20 underweight, 5 percent of T20 severely underweight). This pattern extends to urban and rural populations. The percentages of poor rural children that are underweight (almost 40 percent of B20) or severely underweight (5 percent of B20) are slightly higher than that of their urban counterparts (30 percent of B20, and 10 percent of B20, respectively). Nationally, the probability of receiving ORT is highest for the T20 (55 percent of T20), and this pattern extends to both rural and urban populations: only 20 percent of B20

Figure 5.4: Distribution of Susceptibility Factors by Economic Level for National, Rural, and Urban Populations, Nigeria, 2016



Source: World Bank estimations based on the WASH-PRM.

Note: Children that are more than 2 standard deviations less than the global mean weight for age (WFA) are considered underweight. Children that are more than 3 standard deviations less than the average WFA are considered severely underweight. ORT = oral rehydration treatment.

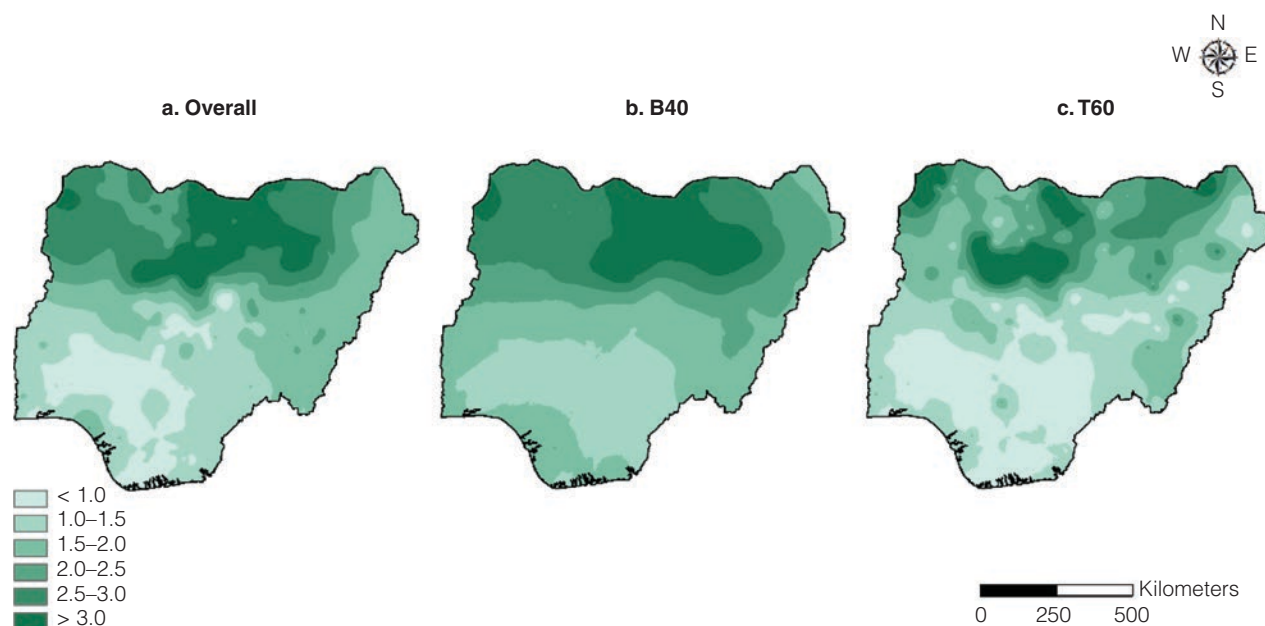
rural children have ORT access, while 40 percent of B20 urban children have access. Nationally, vitamin A coverage is much lower for children from poor quintiles (20 percent of B20) as compared to those from rich quintiles (almost 60 percent of T20). Vitamin A coverage is higher in urban populations, and even among the poorest and poorer quintiles, this coverage is notably higher than that of the corresponding rural populations.

Panels a–c of map 5.2 show a finer scale spatial resolution map (at 5 square kilometers) of the child susceptibility index value distribution across children under five in Nigeria, nationally (overall), and by economic group (B40 and T60). The overall map (further left) and B40 (middle) map both display a large concentration of high susceptibility index values in north central Nigeria. Areas with the lowest child susceptibility index values are concentrated in south-central Nigeria in the overall (further left), B40 (middle), and T60 (further right) population maps. In the T60 children population, there are areas with high susceptibility index values in northern Nigeria, but these areas are much smaller than for the overall population and the B40 population.

Distribution of Exposure, Susceptibility, and Risk Indexes

Panels a–c of figure 5.5 display the distribution of exposure, susceptibility, and risk by economic status (wealth quintile) for national, rural, and urban populations of children under five. For national, urban, and rural populations, the poorest and poorer (B40) children have a slightly higher mean exposure index value than the other wealth quintiles. The richest (T20) have the

Map 5.2: Susceptibility Indexes for Overall, Bottom 40 Percent, and Top 60 Percent Populations, Nigeria, 2016



Source: World Bank estimations based on the WASH-PRM.

Note: Map panels represent 5 square kilometers resolution. B40 = bottom 40 percent of wealth quintile; T60 = top 60 percent of wealth quintile.

lowest mean exposure index value (national and urban T20: 2, rural T20: 2.5). Nationally, and for rural populations, the mean risk index for the B20 is fourfold higher than it is for the T20 (8 versus 2). For urban populations, the mean risk index for the B20 is threefold higher than it is for the T20 (5 versus 1.5).

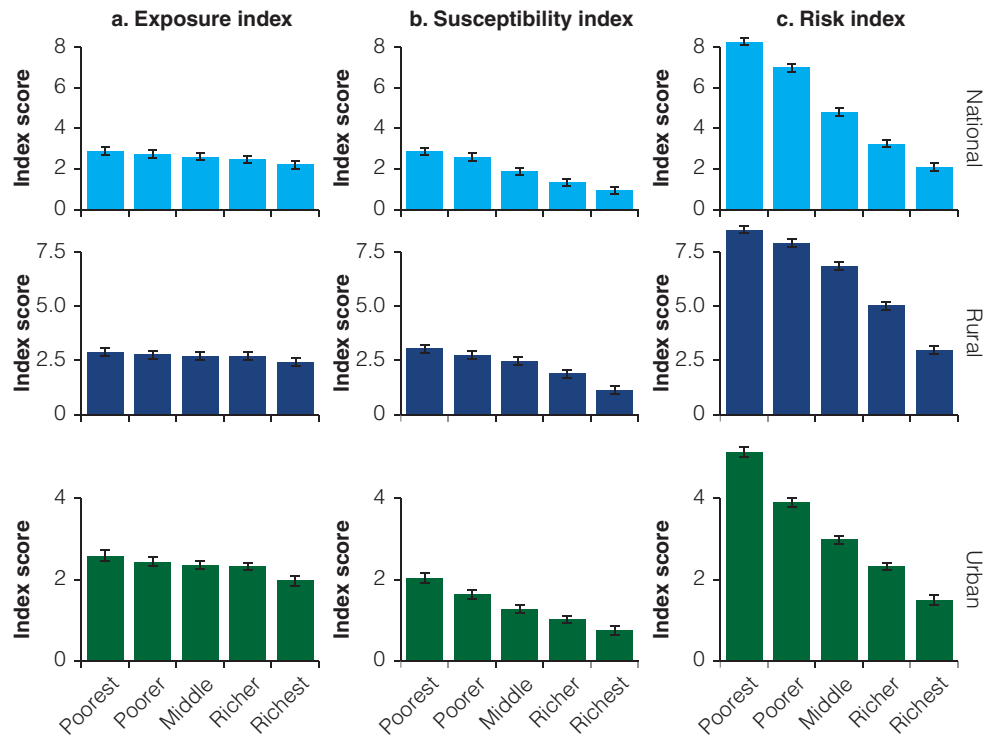
Spatial Distribution of Risk and Intervention Impacts

Panels a–c of Map 5.3 show the regional distribution of the disease risk index for children under five in Nigeria, both nationally (overall) and by economic group (B40 and T60). According to the overall map (panel a), children in the North West region have the highest average risk index value (>7), followed by the North East region (5–7). In the B40 map (panel b), the North West and North East regions have the highest average risk values (>7). B40 children have higher risk values (four out of six regions have average risk >5), especially as compared to the T60 children (all the regions have average risk values <5). All three maps suggest that the North West is a high-risk region.

The geographic distribution of the risk index is the product of the exposure and susceptibility indexes (Figures 5.4 and 5.6, respectively). It is interesting to note that the geographic distributions for exposure and susceptibility have some differences, with the North Central region experiencing the highest exposure and North West region experiencing the highest susceptibility.

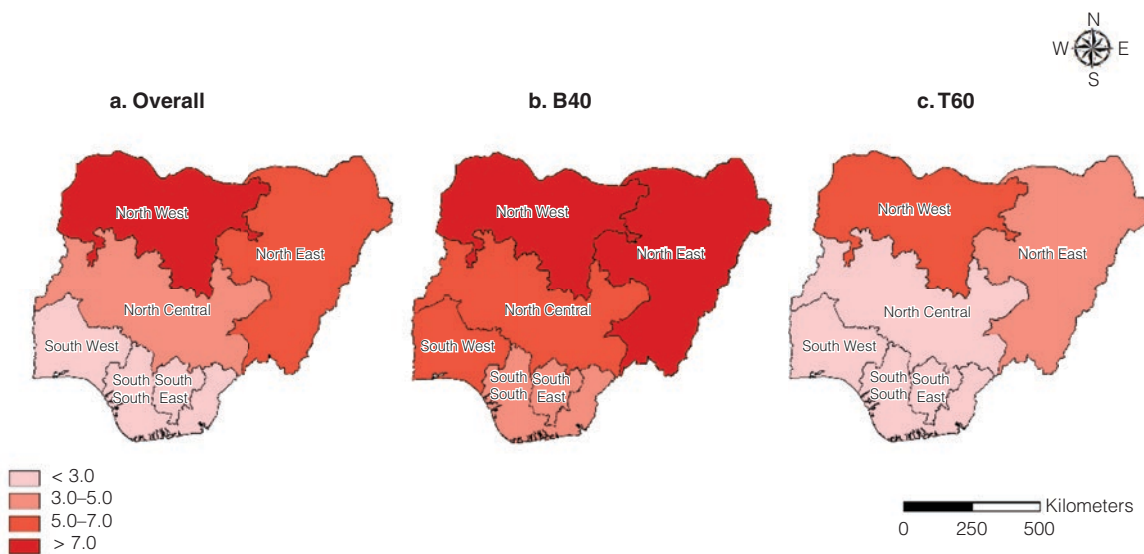
Panels a–c of map 5.4 show a finer scale spatial resolution map (at 5 square kilometers) of the disease risk index value distribution across children under five in Nigeria, both nationally (overall) and by economic group (B40 and T60). According to the overall map (panel a) and the B40 (panel b) populations, the highest risk area is in North Central Nigeria, and the lowest

Figure 5.5: Distribution of Exposure, Susceptibility, and Risk Indexes, by Economic Level (Wealth Quintile) and National, Rural, and Urban Populations, Nigeria, 2013



Source: World Bank estimations based on the WASH-PRM.

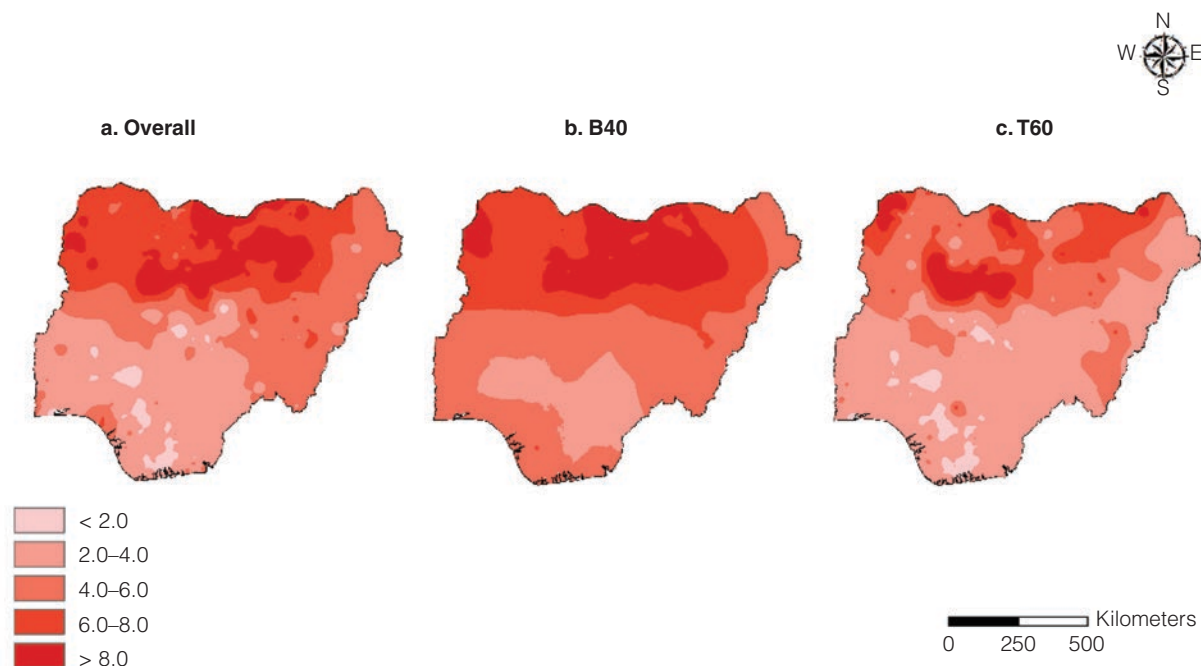
Map 5.3: Regional Risk Indexes for Overall, Bottom 40 Percent, and Top 60 Percent Populations, Nigeria, 2013



Source: World Bank estimations based on the WASH-PRM.

Note: B40 = bottom 40 percent of wealth quintile; T60 = top 60 percent of wealth quintile.

Map 5.4: Risk Indexes for Bottom 40 Percent and Top 60 Percent Populations, Nigeria, 2013



Source: World Bank estimations based on the WASH-PRM.

Note: Map panels represent 5 square kilometers resolution. B40 = bottom 40 percent of wealth quintile; T60 = top 60 percent of wealth quintile.

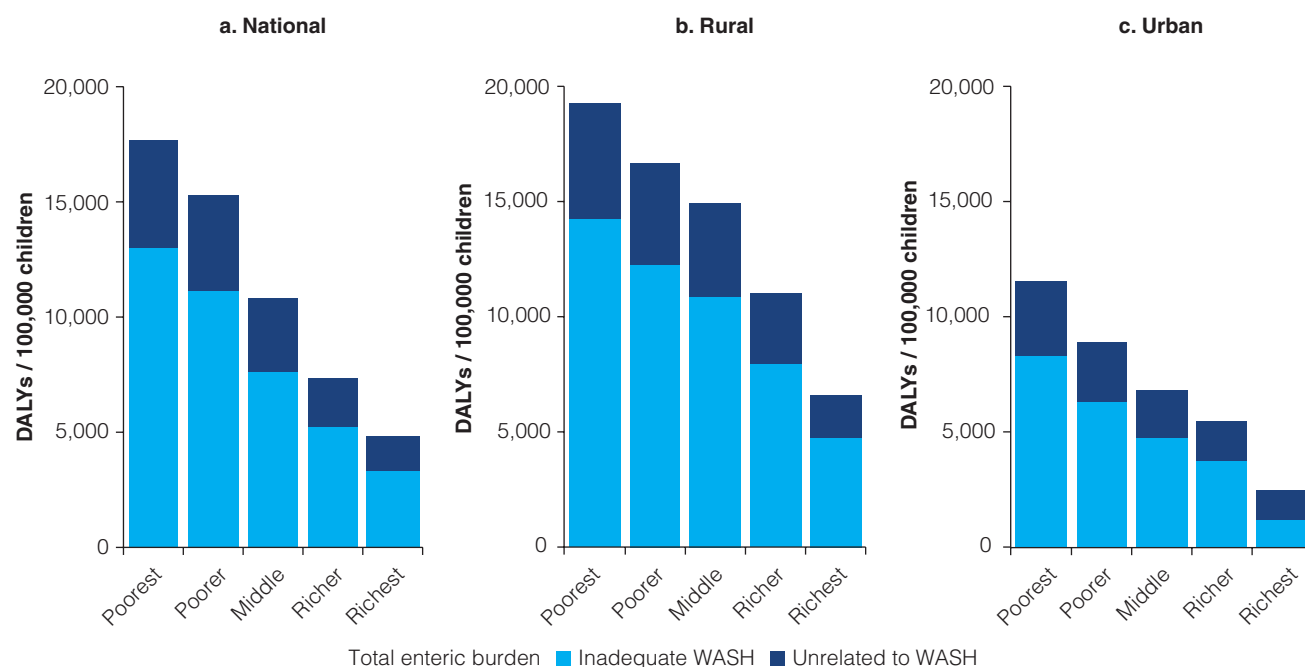
risk areas are largely concentrated in the South Central region. For the B40 population, there are larger areas of the highest susceptibility index values (>8) in northwestern and North Central Nigeria. There are concentrated areas of the highest risk values across all three maps—however, these high risk areas are more widespread in B40 and more localized in the T60 map, suggesting that the B40 of the population are vulnerable across larger areas of the country.

DALY Burden of Inadequate WASH in Nigeria

The WASH Risk Index model estimates the distribution of child diarrheal and enteric disease due to inadequate WASH. The risk estimates are then translated into the commonly used measure DALYs, developed and used by the GBD. DALYs are a common health metric that combines both the years of life lost (YLL) due to a particular cause or risk factor as well as the years lived with disability. For diarrheal and enteric disease among children under five, most (approximately 90 percent) of the DALY burden is due to YLL because of premature mortality. A single DALY can be considered as one year of healthy life lost. As such, DALYs permit comparison between diverse health conditions and provide a useful summary statistic of the disease burden for a given population.

DALYs are used to provide a summary estimate for the distribution of the enteric disease burden attributable to inadequate WASH, by subpopulation groups. Figure 5.6 shows the calculated total enteric burden rate⁹ in DALYs, divided into the fraction associated with having inadequate WASH and burden rates unrelated to WASH, by wealth quintile for national, rural, and urban populations of children under five.

Figure 5.6: Total and Inadequate WASH-Related DALY Enteric Burden for Children under Five, Nigeria, 2013

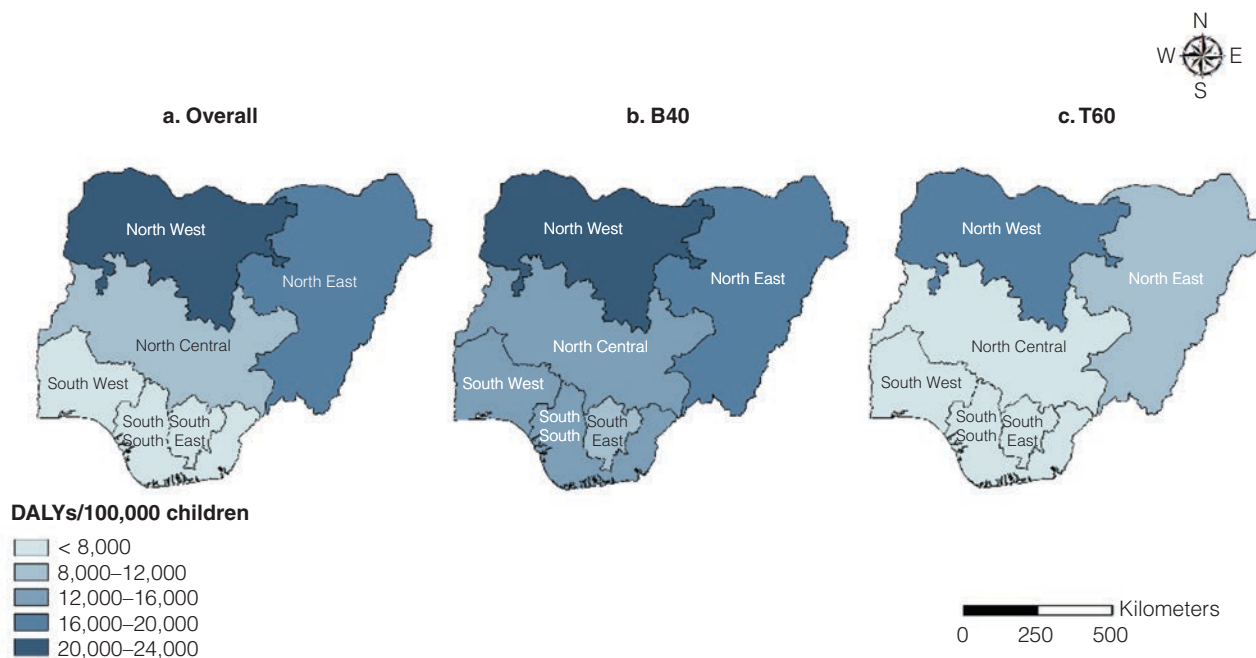


Source: World Bank estimations based on the WASH-PRM.
 Note: DALY = disability adjusted life year. WASH = water, sanitation, and hygiene.

It is important to clarify aspects of what is meant by “associated” and “unrelated to” inadequate WASH. First, some enteric infections are not preventable with improved WASH. For example, almost all children under five years of age experience rotavirus infections, but improvements in WASH do not prevent these. Hence, such infections are unrelated to inadequate WASH in that they would not be prevented with improvements. Second, the DALY burden associated with inadequate WASH here accounts for both the level of exposure due to inadequate WASH and children’s susceptibility due to other factors. That is, the DALY burden associated with inadequate WASH in a subpopulation reflects both exposure and susceptibility. Child susceptibility affects both the WASH associated and unrelated burdens. That is, children in the poorest subpopulations have a greater WASH associated burden in part because they have higher exposures, but also because children with inadequate WASH are more undernourished and have less access to health care. These susceptibility risk factors modify and magnify the impact of inadequate WASH. The fraction of the overall enteric burden in children varies across subpopulations, with a greater fraction in poorer subpopulations. The fraction due to inadequate WASH is also much higher in the poorest populations across all subpopulations (figure 5.6).

Panels a–c of map 5.5 display the total enteric burden rate for the overall, B40, and T60 populations of children under five. Here, children from the North West and North East regions have higher total enteric burden DALY rates in all three maps. The B40 children from the North West region have the highest overall average regional enteric burden (23,489 DALYs per 100,000 children). Based on these estimates, the national enteric burden associated with inadequate WASH is 10,083 DALYs per 100,000 children per year. This is approximately 73 percent of the estimated GBD enteric burden for the country. It is worth noting that the GBD project provides its own estimate of the burden attributable to inadequate WASH. However, this estimate differs from our calculation of the burden in several important ways. First, the calculation uses the WASH PRM risk index model, which accounts for the codistribution of inadequate WASH and child susceptibility. That is, data on the codistribution of risk factors

Map 5.5: Total Enteric Burden DALY Rate for Overall, B40, and T60 Populations, by Region, Nigeria, 2013



Source: World Bank estimations based on the WASH-PRM model.

Note: B40 = bottom 40 percent of wealth quintile; DALY = disability adjusted life year; T60 = top 60 percent of wealth quintile.

are used to account for the fact that children with inadequate WASH often also are more vulnerable due to under-nutrition and a lack of access to care. Second, using the underlying data on the distribution of risk factors, it is possible to examine the distribution across economic and geographic sub-populations. Lastly, in some cases slightly different assumptions regarding the relative risk associated with different WASH service levels were used.

Our distributional analysis of WASH-associated burden suggests that the health burden of inadequate WASH is disproportionately borne by poorer children and those in vulnerable geographic areas. Nationally, the WASH enteric burden for the poorest quintile is about four times greater than the enteric burden for the richest quintile. The WASH-related enteric burden is lower in urban populations than it is in rural populations, though both populations exhibit significant wealth-related disparities. The burden for the poorest in urban areas is 3.3 times higher than that for the richest, and in rural areas, it is three times higher for the poorest than for the richest. It should be noted that this analysis, like the underlying GBD estimates, accounts for the impact of inadequate WASH on acute morbidity and mortality from enteric infections, though it does not account for the effect that these infections may have on undernutrition and its chronic sequelae.

Concluding Remarks

Exposure (WASH) variables are often codistributed with susceptibility (health-related) variables, reflecting underlying structural inequalities relating to wealth, urban or rural situation, and location. This codistribution of related factors compounds the impact of poor WASH among these populations, since it increases the associated health risk. At the same time, the fact

that these variables are concentrated among certain groups presents an opportunity to better target WASH investments so that they reach the most vulnerable, who likely have the most to gain. In Nigeria, there are stark disparities between the rich and poor, those living urban and rural areas, and between regions. This suggests that, at least in terms of diarrheal disease, strategies that deliberately target the most vulnerable groups may yield the greatest health impacts.

The overall distribution of the risk indexes indicates sharp divisions along geography, urban or rural location, and income groups in Nigeria. In general, risk is negatively associated with wealth; the poorest and most vulnerable are also more likely to live in communities with higher exposure risk. Children in poor households have higher susceptibility and risk than children in rich households, with the B40 having almost 60 percent of the cumulative share of susceptibility and risk. In urban and rural settings, the poorest (B20) children have twice the susceptibility as compared to the richest (T20). The rural B20 have four times the risk of the richest (T20) children, while the urban B20 have three times the risk of the urban B20. The 40 percent of children with the highest risk bear approximately 78 percent of the risk, and this is similar in urban and rural settings.

WASH-related risk of disease varies significantly across regions and income groups in Nigeria. The reasons for this are threefold: (a) the variability in WASH-related exposures—with children in poorer households having higher exposures; (b) these same children are likely to be much more vulnerable due to underlying poor nutrition and a lack of access to basic health services; and (c) both WASH and health vulnerabilities are the product of underlying economic and geographic inequalities. All regions in Nigeria show disparities in risk between the poorest (B20) and richest (T20) quintiles, with the B20 having the highest mean risk index values. This pattern is especially evident in the South West region. Areas exhibiting the highest risk index values are concentrated in the north, with children from the North West and North East regions being particularly vulnerable to disease risk. According to the sanitation and water improvement maps, children from North West, then the North East, would experience the greatest risk reduction in response to improvements in access to water or sanitation, but all regions would benefit from such improvements.

A majority share of the GBD enteric burden estimated for Nigeria is associated with inadequate WASH, and disproportionately borne by poorer children and those in vulnerable geographic areas. Approximately 73 percent of the GBD enteric burden estimated for the country is associated with inadequate WASH. The national enteric burden associated with inadequate WASH is 10,083 DALYs per 100,000 children per year. Moreover, the WASH enteric burden for the poorest quintile is about four times greater than the enteric burden for the richest quintile. The burden for the poorest in urban areas is 3.3 times higher than that for the richest, and in rural areas it is three times higher for the poorest than for the richest.

This analysis suggests a number of priorities for designing more impactful WASH investment strategies:

- This analysis describes how WASH-related risk is distributed across wealth quintiles, between rural and urban populations, and by location. A simple next step would be to map existing World Bank programs in Nigeria against these findings to assess the extent to which investments are reaching the populations who stand to gain the most.
- Strategies to target investments toward groups with the greatest risk will not only require the identification and location of these groups but will also require that the WASH services provided or promoted are appropriate, available, and accessible to these groups.
- Assess whether the most vulnerable children are able to benefit from or take advantage of WASH services as they are offered or available, and if not, understand why.

- Geographic targeting of WASH investments to areas with higher concentrations of children who are vulnerable due to poor nutrition and low access to health care services. This may also facilitate cross-sectoral planning, delivery, and monitoring.
- Pro-poor targeting in coordination with social protection programs that focus on households with young children who are economically vulnerable.

The analysis also points to important knowledge gaps. There has been a large global effort to understand and document the impact of WASH investments, and this analysis suggests that overlapping vulnerabilities may substantially modify their impact. Analyses to understand how other vulnerabilities (e.g., environmental, health, and social) may change the impact of WASH interventions could provide new insights for improving the impact of WASH investments on poverty reduction.

Notes

1. DALY is a measure of overall disease burden, expressed as the number of years lost due to ill health, disability, or early death. It was developed in the 1990s as a way of comparing the overall health and life expectancy of different countries. DALY is becoming increasingly common in the field of public health and health impact assessment (HIA). It “extends the concept of potential years of life lost due to premature death...to include equivalent years of ‘healthy’ life lost by virtue of being in states of poor health or disability.” In so doing, mortality and morbidity are combined into a single, common metric.
2. Moderate malnutrition is defined as having a weight-for-age (WFA) ratio between -3 and -2 z-scores below the median of WHO’s child growth standards. It can be due to a low weight-for-height (WFH) (wasting), a low height-for-age (HFA) (stunting), or a combination. Similarly, moderate wasting and stunting are defined as a WFH and HFA ratio, respectively, which are between -3 and -2 z-scores below the WHO median. Children with moderate malnutrition have an increased risk of mortality, and moderate malnutrition is associated with a high number of nutrition-related deaths. If moderately malnourished children do not receive adequate support, their conditions may progress toward severe acute malnutrition (severe wasting or edema) or severe stunting (HFA less than -3 z-scores), both of which are life-threatening conditions.
3. See Global Atlas of Helminth Infections’ distribution of soil transmitted helminth survey data at its website: <http://www.thiswormyworld.org/maps/by-country/ng>.
4. See Global Trachoma Atlas’s website: <http://www.trachomaatlas.org/global-trachoma-atlas>.
5. See the detailed description of the methodologies and findings in the background paper commissioned for this task: Rheingans et al. (2016).
6. The relative risks are not estimated in each setting due to insufficient context-specific literature for model parameters, but national-level data are used to inform the model. This approach is consistent with conventional burden of disease analyses.
7. These systematic review methods limit investigator bias and the pooled effect (an average effect from across included studies) is calculated using conventional and reproducible methods, and the methods and results are reported as per conventional best practices (Moher et al. 2015).
8. See Rheingans et al (2016) for a description of the methodology.
9. See ‘Methods,’ section 2.4.6 “DALY Burden of Inadequate WASH,” in the background paper commissioned for this task for a comprehensive explanation. (Rheingans et al 2016).

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Chapter 6

Efficiency of the WASH Sector

Key Takeaways

- **When considering most water utility indicators, Nigeria underperforms in relation to both African and global averages.**
- **According to the 2015 National Water Supply and Sanitation Survey (NWSS), more than 38 percent of all improved water points and around 46 percent of all water schemes in Nigeria are nonfunctional.** These concerning figures beg for an investigation into the main drivers of failure.
- **Evidence from our analysis suggests that nearly 27 percent of water points are likely to fail in the first year of construction.** Further, nearly 40 percent are likely to fail in the long run (after 8–10 years).
- **Water schemes have a similar likelihood of failure within the first year.** Approximately 30 percent of water schemes are likely to fail in the first year, while around 60 percent are likely to fail after the age of 10 years.

Introduction

Nigeria faces significant water availability challenges. In the beginning of the millennium, Nigeria had an estimated 224 trillion liters of surface water per year and 50 trillion liters of ground water per year available to cover the water-related needs of its 128 million citizens. Total demand for the domestic consumption of water was estimated at around 6 billion liters per year, indicating that there is an abundant water resource potential (Akujieze et al. 2003). Today, given similar average per capita domestic consumption levels¹ (Danilenko et al 2014), and with Nigeria's population estimated at 182 million people, total demand for domestic consumption has increased to 7.7 billion liters per year.

Issues with the sustainability of water are mostly linked to institutional, social, and technical failures (Parry-Jones, Reed, and Skinner 2001). At least 30 percent of water pumps in Africa are not working (Baumann 2009). Programs to address these problems should adopt a multitiered approach, focusing on soft strategies (e.g., promoting ownership, and encouraging changes in behaviors, norms and practices) as well as hard strategies (e.g., investing in human resources and suitable technologies, increasing the availability of finance for capital expenditure, and developing means to help users pay for services) (Baumann 2009). Without this multitiered approach, water systems are bound to fail.

Nigeria faces wide-ranging deficiencies in the technical capacity of its water sector. Hydrogeological base maps for the country are of poor quality, and thus of little use in helping the government develop a water exploration and extraction plan. Poor knowledge of the Nigerian

geological terrain, a lack of adequate infrastructural facilities, and an inefficient legislative body have caused problems in the exploration, operation, and management of surface and ground water. Moreover, the country faces major problems with regard to the functionality of water pumps, resulting in a water service delivery system that does not match the population's increasing demand for water.

Even though the country has experienced a rapid growth in population, there has not been an improvement in the institutional capacity of the water service sector in Nigeria. When compared with global averages, Nigeria's water infrastructure—as measured by staff productivity, total consumption, service continuity, and cost recovery—has underperformed. Between 2011 and 2015, the performance of Nigerian water agencies was particularly poor: these agencies not only performed below the global average but they also greatly underperformed in comparison to the African average.

The previous chapters of this report sought to assess the extent of access to water and sanitation in Nigeria, focusing mostly on the demand side of WASH services. To provide a more holistic assessment, this section looks into the supply side of WASH services—aiming to understand the performance levels of water supply service providers.

In this chapter, the sustainability of the water sector in Nigeria is analyzed by looking into its technical capacity and efficiency in service provision. We use IBNET data to analyze the sector's efficiency in service provision—it measures efficient service provision in terms of staff productivity, service continuity, water consumption per capita, percentage of water samples that passed residual chlorine tests, cost recovery, and average revenue. We then use information from the NWSS 2015² to analyze the functionality of water points and schemes, and provide a broad sense of the possible explanations behind their failures. In particular, it seeks to answer the following questions: (a) Why are some water points and schemes failing faster than others? Is it age-specific? (b) Do they follow any geographic pattern? (c) Do promoters, technology, or hydrological circumstances matter in explaining failure rates? (d) What roles do management and maintenance play in explaining the likelihood of failure? and (e) What are the relative shares of each driver in explaining the failure of water points and schemes?

Assessing the Performance of Nigerian Water Agencies

In this section, data provided by the International Benchmarking Network are used for Water and Sanitation Utilities (IBNET) to build a broad base of knowledge analyzing the efficiency, availability, quality, and financial sustainability of service providers across Nigeria. The aim is to encourage greater conversation with public and private water service providers to help identify and address deficiencies. Box 6.1 provides a summary of the indicators used in this analysis.

The data suggest that water agencies in Nigeria exhibited mixed performance between 2011 and 2015. While there were improvements in staff productivity, water continuity, and quality (table 6.1), indicators of financial performance—average revenue and operational cost coverage—registered a decline. Water consumption also decreased during this period.

Table 6.2 presents the unweighted analysis of water agencies' performance. For the most part, this table shows trends similar to the weighted estimates in table 6.1. There are a number of notable exceptions: contrary to the weighted estimates, the unweighted estimates for continuity decreased during this time period, suggesting that the increase in continuity found in table 6.1 was driven by larger SWAs. Moreover, while average revenue decreased in both cases, the average operational cost recovery increased when unweighted between 2011 and 2015. However, the level of operational cost recovery remained low, and the water agencies did not recover costs, let alone generate profits. The average number of connections increased by almost 3 percent during this time.³

Box 6.1: Indicators for Measuring Performance

To assess the efficiency, availability, quality, and financial sustainability of service providers, we utilize a number of key indicators:

- **Staff productivity.** The number of employees per 1,000 connections. A lower number suggests a greater level of staff efficiency.
- **Availability**
 - *Continuity.* The average number of hours of service per day.
 - *Quantity.* Water consumption in liters per person, per day. Higher levels of consumption imply improved service delivery.
- **Quality.** This is measured by the percentage of samples that passed the relevant standards, as mandated by local laws or regulations, to detect the presence of residual chlorine.
- **Financial Sustainability**
 - *Operational cost recovery.* The ratio between operating revenues and operating costs. A ratio over 1 implies that a utility is generating profit.
 - *Average revenue.* Per cubic meter of water sold. This serves as a proxy for tariffs, and enables price comparisons across service providers.

Table 6.1: Nigeria State Water Agency Summary Statistics—Weighted by Number of Connections

Total state water agencies	Number of SWAs	2011	2015	% Δ 2011–15	Standard deviation	Min.	Max.
Staff productivity (staff/1,000 connections)	32	17.99	16.65	–7.5%	12.06	2.72	70.20
Continuity (hours/day)	35	11.94	12.24	2.5%	6.32	3	24
Chlorine test compliance (%)	31	79.47	80.92	1.8%	21.36	11.70	100
Water Consumption (l/capita/day)	18	56.67	46.58	–17.8%	21.29	22.93	84.16
Operational cost recovery	30	0.63	0.58	–7.8%	0.50	0	1.97
Average Revenue (US\$/m ³ sold)	30	0.32	0.26	–20.1%	0.30	0	1.59

Source: World Bank elaboration based on IBNET data.

Note: The standard deviation, minimum, and maximum values shown for each indicator are for the SWAs in 2015.

To uncover variations in performance among SWAs in Nigeria, we divided the water agencies into the following three categories, based on their performance (Figure 6.1):

- **Top 20 percent.** Agencies whose mean performance for a particular indicator was greater than the 80th percentile (or less than the 20th percentile in the case of staff productivity) for 2011–15.⁴

Table 6.2: Nigeria Water Agencies Performance Summary Statistics (Unweighted)

Total water state agencies	Number of SWAs	2011	2015	% Δ 2011–15	Standard deviation	Min.	Max.
Staff productivity (staff/1,000 connections)	32	26.37	24.19	–8.27	17.26	2.72	70.20
Continuity (hours/day)	35	10.48	9.88	–5.77	5.37	3.00	24
Water Consumption (l/capita/day)	18	53.08	47.48	–10.55	19.59	22.93	84.16
Chlorine test compliance (%)	31	82.07	84.15	2.52	21.06	11.70	100
Operational cost recovery	30	0.45	0.46	1.07	0.49	0	1.97
Average Revenue (US\$/m ³ sold)	30	0.29	0.26	–8.41	0.33	0	1.59
Total connections	35	31,308	32,234	2.96	29,503	306	138,137

Source: Authors' elaboration based on IBNET data.

Note: The standard deviation, minimum, and maximum values shown for each indicator are for the SWAs in 2015.

- **Bottom 20 percent:** Agencies whose mean performance for a particular indicator was less than the 20th percentile (or greater than the 80th percentile in the case of nonrevenue water and staff productivity) for the same period.
- **Middle 60 percent.** Agencies whose mean performance was between the 20th and the 80th percentile for the same period.

There was a boost in staff productivity across water agencies in the bottom 20 and middle 60 percentiles. Staff productivity increased for both the bottom 20 percent (from 46.5 to 44 employees per 1,000 connections) and the middle 60 percent (from 24 to 21 employees per 1,000 connections). Staff productivity for the top 20 percent of the agencies remained roughly the same, with the number of staff per 1,000 connections at around 10.

The continuity of water services displayed mixed performance across groups. The continuity of service decreased for the bottom 20 percent from 5.6 hours to 4.4 hours per day. It remained almost the same for the middle 60 percent, at almost 9 hours per day, and for the top 20 percent, at almost 17 hours per day. In terms of quantity, the average consumption of water decreased for the middle 60 percent by a large amount—from 48.6 to 41 liters per person per day. The top 20 percent of agencies showed a slight increase in the consumption of water—from 72.7 to 74.5 liters per person per day. Among the bottom 20 percent of agencies there were not enough observations in any given year to derive a conclusion with regard to changes in consumption.

There was an increase in water quality between the bottom 20 percent and middle 60 percent of water agencies. The percentage of samples that passed the relevant standards to detect the presence of residual chlorine increased from 85.8 percent to 86.8 percent for the middle 60 percent of agencies, and there was a larger increase for the bottom 20 percent—from 52.8 percent to 59.2 percent. Overall, 99 percent of samples in the top 20 percent of agencies met the relevant standards throughout the period.

There were mixed changes in levels of financial stability across all three groups. The average revenue for a cubic meter of water sold decreased from US\$1.31 in 2012 to US\$0.75 in 2015 for the top 20 percent, from US\$0.19 in 2011 to US\$0.17 in 2015 for the middle 60 percent, and increased from US\$0.01 to US\$0.013 for the bottom 20 percent between 2011 and 2014. On the other hand, cost coverage improved from 0.04 to 0.05 for the bottom 20 percent, decreased from 0.37 to 0.35 for the middle 60 percent, and remained roughly the same, at around 1.35, for the top 20 percent.

Across most indicators, Nigeria underperformed in comparison to both African and global averages (figure 6.2). As noted earlier, the performance of Nigerian water agencies was poor. Nigerian agencies not only performed below the global average, but they also underperformed in comparison to the African average by a significant margin during the same time period.

Figure 6.1: Best Versus Worst Performing Water Agencies, by Quintile, Nigeria, 2011–15

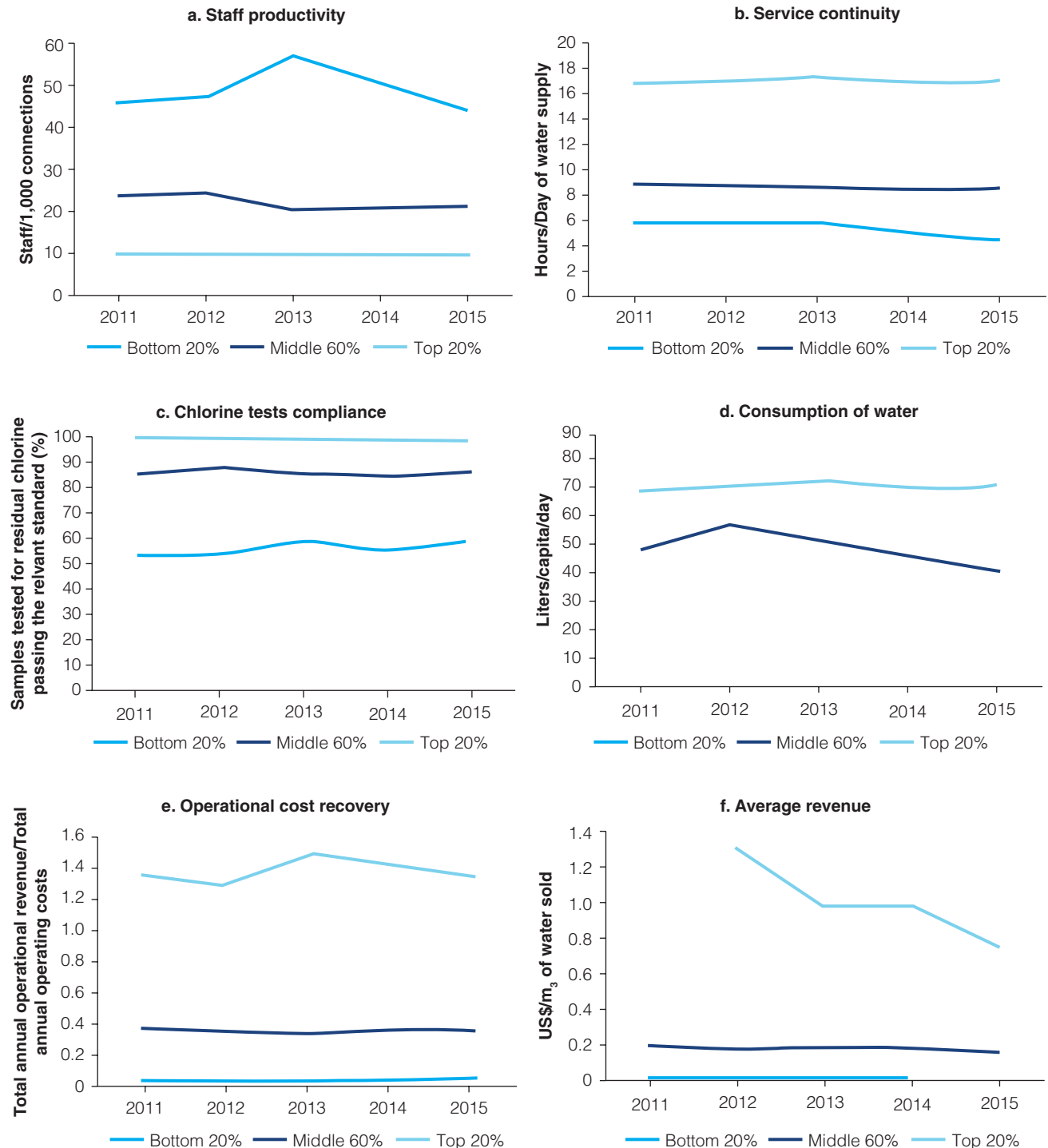
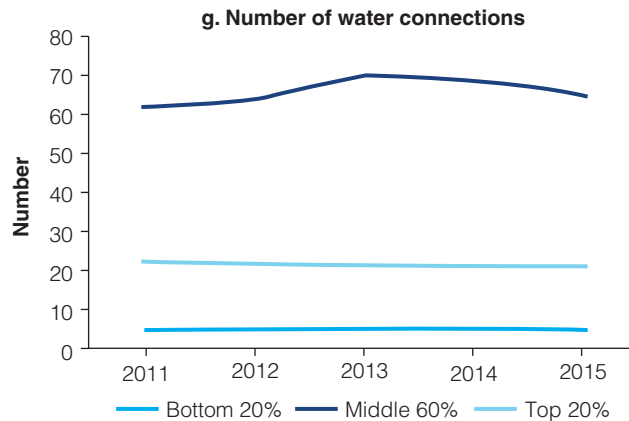


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Figure 6.1: Continued



Source: World Bank calculations based on IBNET data.

Note: (a) Based on unweighted observations. (b) Changes are computed based on the same composition of agencies in two consecutive years. (c) Since the top and bottom 20 percent of agencies are based on a smaller number of observations, the trends are more susceptible to large changes in the data of any one agency. Hence, despite our best efforts to exclude outliers while taking care to not discard useful data, trends for the bottom and top 20 percent of agencies show outsized growths or decreases in certain years due to the low number of observations. (d) Bold lines are based on at least 10 agencies. (e) Dashed lines are based on data for more than or equal to five, but less than or equal to ten agencies per year. (f) Dotted and dashed lines (for water consumption among the top 20 percent) indicate less than or equal to five observations per year. There was only one agency in the bottom 20 percent that consistently had observations across all years, and as such, it was not included in the graph.

Figure 6.2: Nigeria Versus Africa Region Versus Global Average Performance, Weighted by Number of Connections, 2001–14

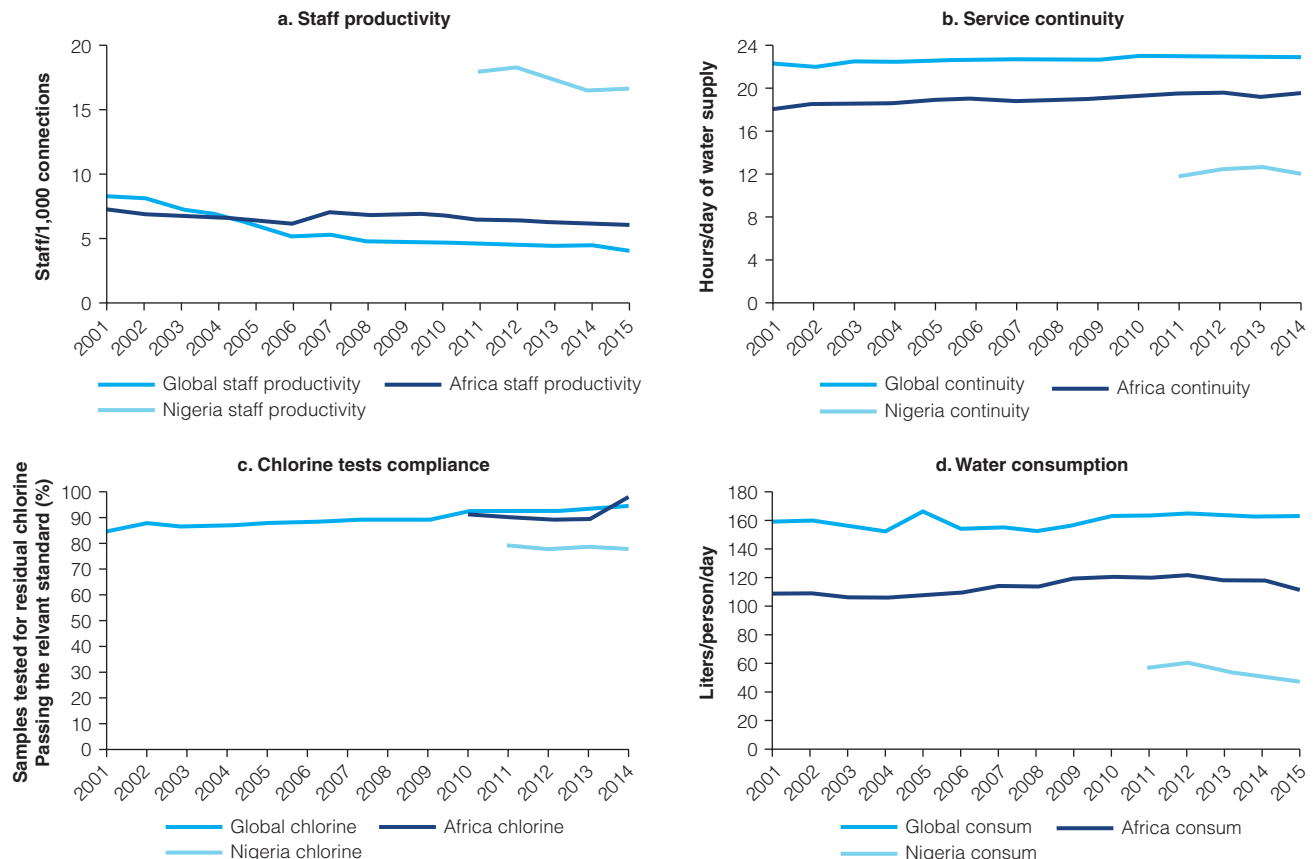
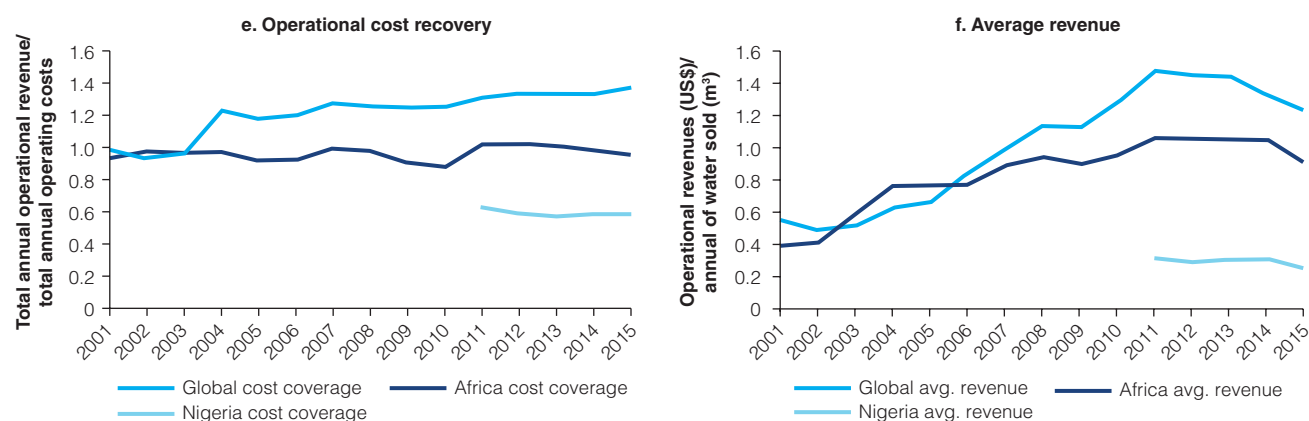


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Figure 6.2: Continued



Source: World Bank calculations based on IBNET data.

Note: (a) Weighted by number of connections. (b) Changes are computed based on the same composition of utilities in two consecutive years. (c) The bold lines are based on data from at least ten utilities per year for Nigeria and Africa, and from more than 100 utilities per year for global trends.

Assessing the Performance of Nigerian Water Schemes

In 2015, the NWSS conducted a nationwide survey of all water schemes in Nigeria. The survey provides information on 5,100 water schemes across states and local government areas (LGAs). Among many other details, the NWSS 2015 provides information on the location, promoters, scheme type, population served, year of construction, maintenance and operation, and functionality of water schemes, across states.

The geographic distribution of the water schemes suggests that slightly less than 45 percent of all schemes are located in the North West zone, followed by the South South (20 percent), North East (14 percent), and South East (10 percent) zones. Around 5 percent to 6 percent of total schemes are in the South West and North Central regions (table 6.3). While some schemes are small and serve fewer than 1,000 beneficiaries, some schemes are so large that they serve more than 50,000 beneficiaries. Table 6.3 also shows that smaller schemes with less than 1,000 beneficiaries constitute 28 percent of the total number of schemes, while larger schemes with 1,000 to 2,000 beneficiaries constitute slightly more than 16 percent, and those with 2,000 to 5,000 beneficiaries constitute 23 percent. The rest of the schemes are larger, and constitute around 15 percent of all schemes.

Overall, 30 percent of the water schemes failed within the first year of operation, and more than 55 percent of schemes 10 years and older are not operational (figure 6.3).⁵ To identify the relative importance of each driver of failure in different phases of a scheme's life span, the analysis considers three phases—short-term (the first year after installation), medium-term (between three to six years after installation), and long-term (more than eight years after installation). This is done to better understand how different factors—such as hydrology, technology, location, size, management and maintenance (as indicated in box 6.2)—affect a scheme's performance across different phases of its lifespan.

The north generally performs better than the south in terms of a water schemes' likelihood of failure over its entire life span. As evident from figure 6.3, panel b, in the initial couple of years,

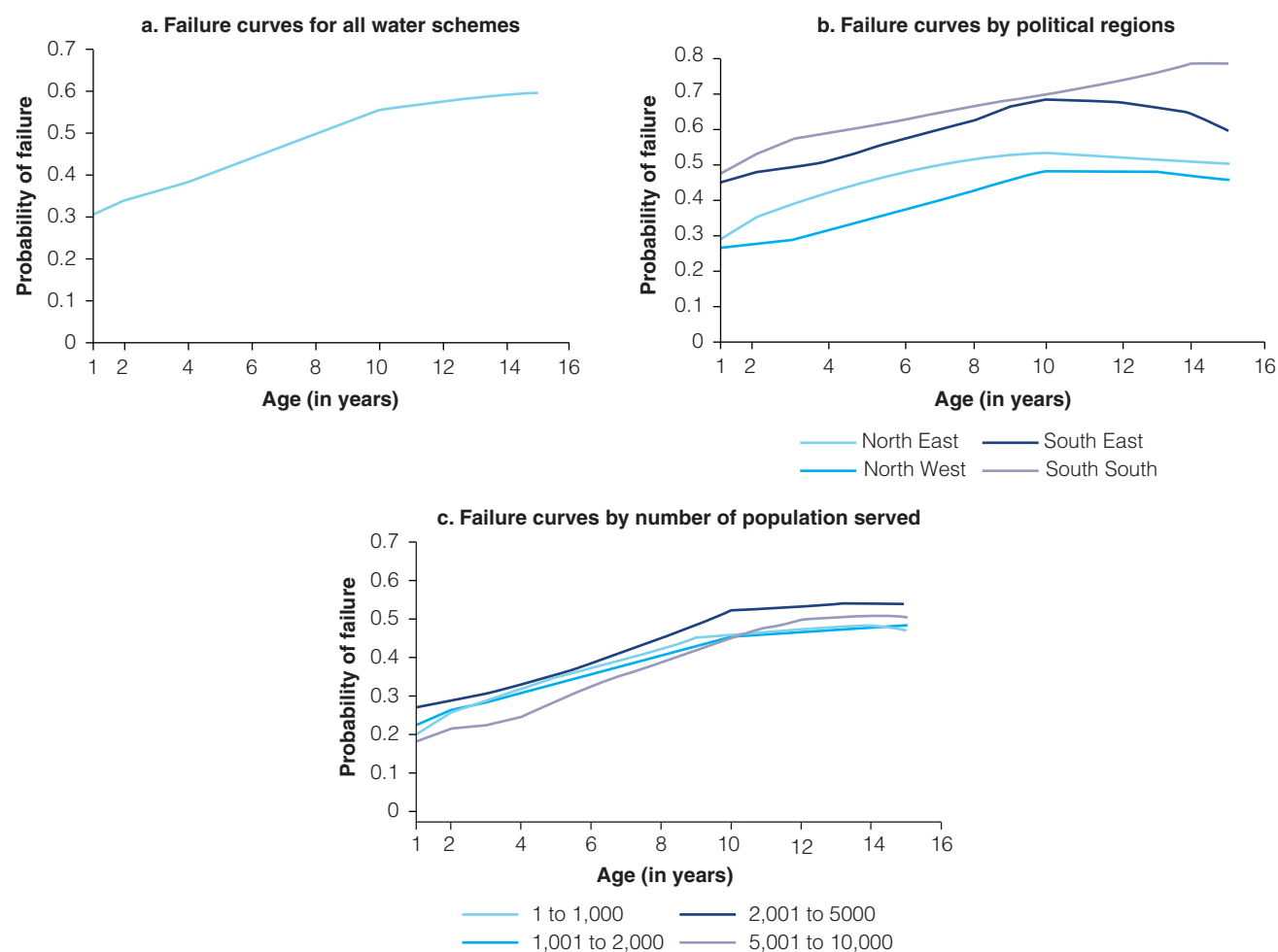
Table 6.3: Zonal Distribution of Schemes (Number), by Size, Nigeria, 2015

Scheme size based on population served	North Central	North East	North West	South East	South South	South West	Total by size (% of total by size)
1 to 1,000	60	252	620	194	259	70	1,455 (28.5)
1,001 to 2,000	29	184	478	43	79	9	822 (16.1)
2,001 to 5000	30	203	650	74	184	14	1,155 (22.7)
5,001 to 10,000	14	30	190	22	83	5	344 (6.8)
10,001 to 50,000	33	12	113	44	120	22	344 (6.8)
More than 50,000	14	15	45	20	32	12	138 (2.7)
No info. of pop. served	107	45	164	133	272	121	842 (16.5)
Total	287	741	2,260	530	1029	253	5,100
(% of total)	(5.6)	(14.5)	(44.3)	(10.4)	(20.2)	(5)	(100)

Source: World Bank calculation based on NWSS 2015 data.

Note: Figures in parentheses indicate rows' and columns' percentage of the total number of schemes.

Figure 6.3: Selected Failure Curves of Water Schemes, by Location and Size, Nigeria, 2015



Source: World Bank estimates based on NWSS 2015 data (see Andres Dasgupta, and Gething 2017 for full set of figures).

Box 6.2: Methodology for Calculating the Probability of Failure of Water Points and Water Schemes

Two other pieces of information that are crucial for our analysis are the age and functionality status of each scheme. The functionality analysis has two components: first, we analyze variation in the functionality of water points and schemes using local regression analysis. Due to our interest in predicting the likelihood of failure, we carry out a locally weighted regression of a dichotomous variable, “nonfunctionality” on the “age” of water points and schemes (in years), and display it in a graph. Second, we decompose the relative shares of the various drivers of failure using the Shapley decomposition.

The age of a scheme is calculated as its age in 2015, based on its year of commission. The central question is: do these water points fail because of age, or do other factors influence the process? In the results section, we plot the likelihood (probability) of failure against the respective age of these water points and categorize them by their location, technology, and promoters. To understand whether differences in operation and management options play a role in deciding the longevity of water points, we also categorize these water points by their maintenance and management options. Usage of a management committee is indicated by the presence of a community-based water, sanitation, and hygiene committee (WASHCOM) in a given community. We also calculate whether other factors play a role in predicting the failure rates of the water agencies (e.g., the local availability of spare parts, agents who conduct routine repairs, and hydrological factors—such as groundwater depth, groundwater storage level, and groundwater water productivity).

To understand the relative importance of driving factors behind water point and scheme failure, we used econometric analysis—the Shapley decomposition technique—to decompose the relative shares of these factors. This technique decomposes the relative contributions of each indicator or a group of similar indicators in explaining variation in the outcome indicator, which, in our case, is the likelihood of failure. To discover the reasons for early, midterm, or long-run failure, we group water points that are one years old, those that are three to six years old, and those that are older than eight years. Then, for each of these three age groups, we decompose the relative shares of political regions, hydrological conditions, scheme size, technology, location, promoters, management, and maintenance and operation in explaining the water points’ likelihood of failure.

the likelihood of failure for the best performing region in the south—the South East—is at least 8 percent to 10 percent higher than the poorest performer in the north (the North East). This gap is more or less remains consistent across the water schemes’ 15-year lifespan.

Midsized schemes with 5,000 to 10,000 beneficiaries perform slightly better than others in their initial 10 years. The likelihood of failure for all small and medium schemes shows a similar pattern of failure (figure 6.3, panel c).⁶ The likelihood of failure for these schemes within the first couple of years ranges between 20 percent to 30 percent, and then reaches a maximum of around 50 percent to 55 percent at eight to 10 years of age. For children older

than 10, the likelihood of failure remains largely stable at the same rate. Groundwater- and surface water-based pump-piped systems⁷ have a similar likelihood of failure over the first 15 years of their lifespan. Both types of pump-piped system schemes face a similar likelihood of failure; in the initial years this rate is approximately 30 percent, and at the age of 15 years it reaches 50 percent to 55 percent. Gravity flow schemes, on the other hand, have a rate of failure that is slightly less than 70 percent after eight years.

LGA and NGO promoted schemes have a lower likelihood of failure than their counterparts.⁸ Despite similar trends over the years, the FGN- and state-promoted schemes are almost 10 percent more likely to fail than local government and NGO-promoted schemes. Donor-promoted schemes perform similar to the FGN- and state-promoted schemes; these have almost a 65 percent to 70 percent likelihood of failure at the age of 15 years.

WASHCOM-managed⁹ water schemes perform at least 10 percent better in initial years, and around 25 percent better after 10 years. Moreover, the likelihood of failure is 8 percent to 10 percent less when spare parts are locally available, particularly within a scheme's initial eight to 10 years.¹⁰ When spare parts are locally available, the likelihood of failure is almost 10 percent less in the initial five years, and then slowly converges to the same rate of schemes for which parts are not locally available. Interestingly, this suggests that the proper maintenance and availability of required spare parts can reduce the initial failures of water schemes by a significant margin.

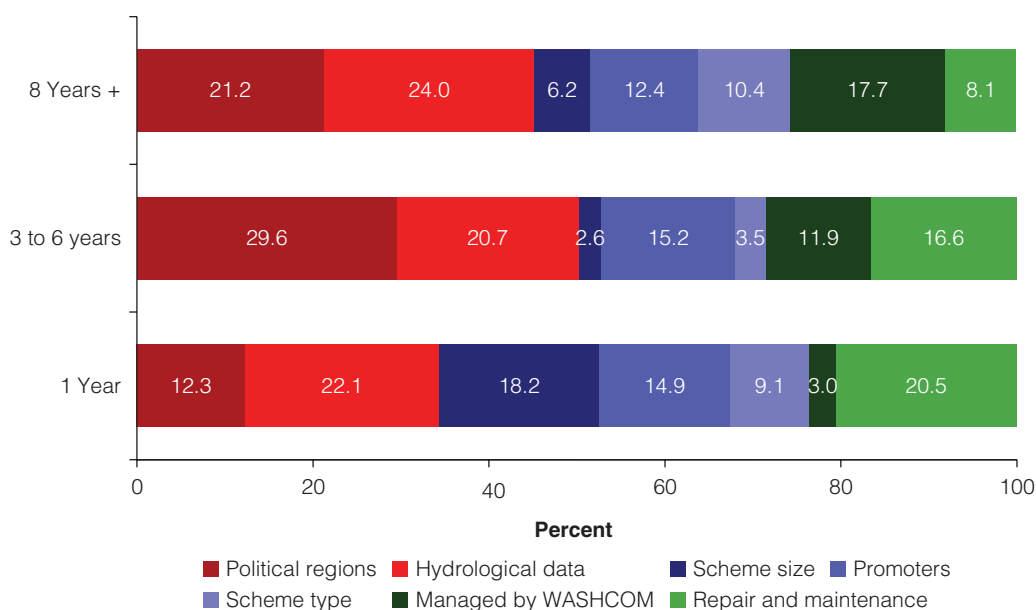
Evidence suggests that there is not much difference in the likelihood of failure between schemes maintained by private consultants¹¹ **and by water works, particularly after eight to 10 years.** Before that, however, the schemes repaired and maintained by water works perform slightly better, by at least 5 percent to 8 percent.

Water schemes with shallow groundwater depth have a greater chance of failure than do water schemes with deeper groundwater depth. Water schemes with deeper groundwater depth—between 25–100 meters below ground level—have around a 20 percent probability of failing within their first year, and over a 30 percent probability of failing after 10 years. Water schemes with a shallower groundwater depth—between 0–7 meters below ground level—have above a 30 percent probability of failing in their first year, and after 10 years, this probability reaches almost 60 percent.

When decomposing the drivers of failure, the aforementioned factors are grouped into three broader categories. First, **factors that cannot be changed**, such as *political region and the hydrological characteristics of where the water scheme is located*, are assessed. Second, **influential factors at the design and implementation stage** (and can be considered when developing new points and schemes)—namely *which promoter funded the construction, what type of technology is used to build the water scheme (e.g., hand pump, motorized pump)*, and the size of the water scheme are considered. Third, **influential factors at the operational stage** (and can be addressed for existing points and schemes): *management and maintenance* (the organization in charge of carrying out the repairs for the water schemes) and whether the water scheme is managed by a WASHCOM (figure 6.4) are considered.

In water schemes' first year of operation, factors that can be controlled in the design, operations, and implementation stages explain 66 percent of water scheme failure. As water schemes age, their likelihood of failure is better predicted by factors that can't be modified and can be controlled during their operational stages. Inversely, as water schemes age, the share of water scheme failures linked to factors that are relevant at the design and implementation stage decreases. In the water schemes' first year, 34 percent of failures are explained by factors that cannot be modified, and after eight to 10 years, that number increases to 45 percent. Likewise, the share of factors that can be changed during the operational stages increases from 24 percent in the water schemes' first year to 26 percent after eight to 10 years. Conversely, around 42 percent of water point failure in the first year can be linked to factors such as repair and maintenance, and management by WASHCOMs, whereas that number drops to 29 percent after eight or more years.

Figure 6.4: Shapley Decomposition of Water Schemes' Failure, Nigeria, 2015



Source: World Bank elaboration using NWSS 2015.
 Note: WASH = water, sanitation, and hygiene.

Assessing the Performance of Nigerian Water Points

As part of the NWSS there was a nationwide survey of all water points in Nigeria (see chapter 3). This survey provides information on 90,508 “improved” water points across states and LGAs. Similar to the water schemes survey, the survey includes details of water points’ respective years of construction, promoters, location, and their functional status.

Almost 89 percent of the water points are tube wells or boreholes. The rest are either protected dug wells, springs, harvested rainwater, or infiltration galleries (table 6.4). Out of all water points, around 79 percent have been constructed by government agencies over the years. Among those, the majority are built by state governments (30 percent), followed by federal governments (25 percent), and local governments (24 percent). The rest are built by donors (8 percent), NGOs (5 percent), and philanthropists and others (9 percent) (for more detailed information on the breakdown of water points by type of promoter, see table 7.1).

Fifty-four percent of water points are fully functional, and 8 percent are either in bad condition or not in use. Altogether, the total share of working water points is 61 percent. Nationally, around 75 percent of these working water points are functional throughout most of the year, and only one-third of states perform below the national average. Perhaps the most striking finding is that among all water points in Nigeria, more than one-third (38.2 percent) are not functioning at all (table 6.4).

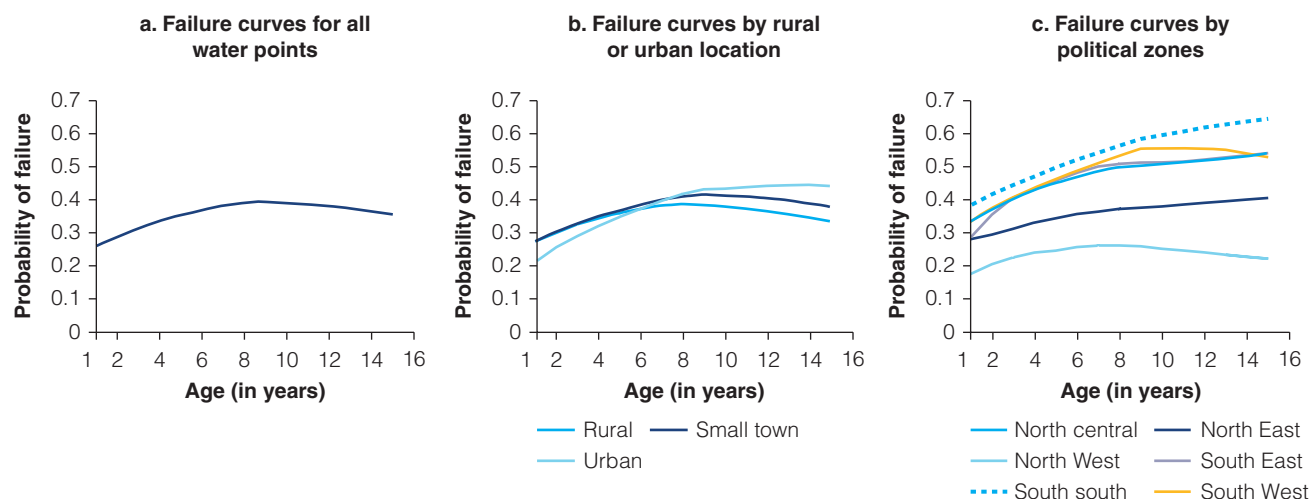
Around 25 percent to 30 percent of water points are likely to fail within the very first year after installation. The likelihood of failure increases with age, but does not vary much by location when water points are younger than eight to 10 years. After 10 years, however, older water points in rural areas perform better than their urban counterparts. After seven to eight years, the likelihood of failure in urban areas increases to around 45 percent as compared to 35 percent in rural areas (figure 6.5, panel a).

Table 6.4: Functioning Status of Different Sources of Improved Water, Nigeria, 2015

Improved source	Functional (and in use)	Functional (not in use)	Functional (in use but in bad shape)	Nonfunctional	Total
Tube well or borehole	42,574	3,840	2,284	31,764	80,462
Protected dug well	3,603	302	256	1,759	5,920
Protected spring	2,449	183	55	802	3,489
Infiltration gallery	141	18	12	99	270
Rainwater Harvesting	184	36	23	124	367
Total	48,951	4,379	2,630	34,548	90,508
%	54.1	4.8	2.9	38.2	100

Source: World Bank calculation based on NWSS 2015 survey data.

Figure 6.5: Selected Failure Curves of Water Points, Nigeria, 2015



Source: World Bank estimates based on NWSS 2015 data (see Andres Dasgupta, and Gething 2017 for full set of figures).

Regionally, the likelihood of failure is higher in the south than in the north, irrespective of a water point's age. To identify any spatial differences, we separated all water points into six political zones and plotted their likelihood of failure against their respective age. Figure 6.5, panel c, shows that the likelihood of failure is lowest in the North West, followed by the North East and North Central regions. The likelihood of failure in the North West region is around 15 percent within the first few years, while it is around 25 percent in the North East, and slightly above 30 percent in the North Central region. The likelihood of failure increases steadily with age in the North East and North Central regions—to more than 50 percent—while it is largely stable in the North West, at around 18 percent to 20 percent.

The likelihood of failure among motorized pumps is almost 20 percent higher after eight to 10 years, higher than the likelihood of failure for manual and hand pumps. Initially, manual and hand pumps, as well as motorized pumps, have close to a 30 percent chance of failure. In later years, manual and hand pumps maintain a similar likelihood of failure, while for motorized pumps this rate increases to almost 50 percent after eight to 10 years. We observe a similar pattern when we disaggregate the data by geographic region.

The initial likelihood of donor and NGO- or CBO-sponsored water points to fail is almost 5 percent to 10 percent lower than that of units promoted by governments—namely by the FGN and state governments. Among government-sponsored water points, LGA-sponsored points are the best performers. These water points have a steady likelihood of failure at around 25 percent over their lifetime. The likelihood of failure for FGN-sponsored water points increases from around 30 percent in the initial years to more than 50 percent after 10 years. Donor- and NGO- or CBO-sponsored water points maintain close to a 10 percent advantage over FGN- and state-sponsored water points across their entire lifespan.

The maintenance and management of water points is an important factor in explaining their likelihood of failure. Evidence suggests that the likelihood of failure is 15 percent to 20 percent less when nonfunctional water points are repaired by WASHCOM rather than by local artisans. In the initial years, the likelihood of WASHCOM-maintained water points to fail is around 10 percent as compared to 30 percent for water points that are repaired and maintained by local mechanics or artisans. The likelihood of failure among government- and donor- or NGO-maintained water points is similar, and this likelihood remains steady—at around 30 percent—over their lifespan. Interestingly, in the initial years, while the likelihood of failure is similar to that of water points that are maintained by local mechanics, it starts converging with the failure rate of WASHCOM maintained water points after eight to 10 years.

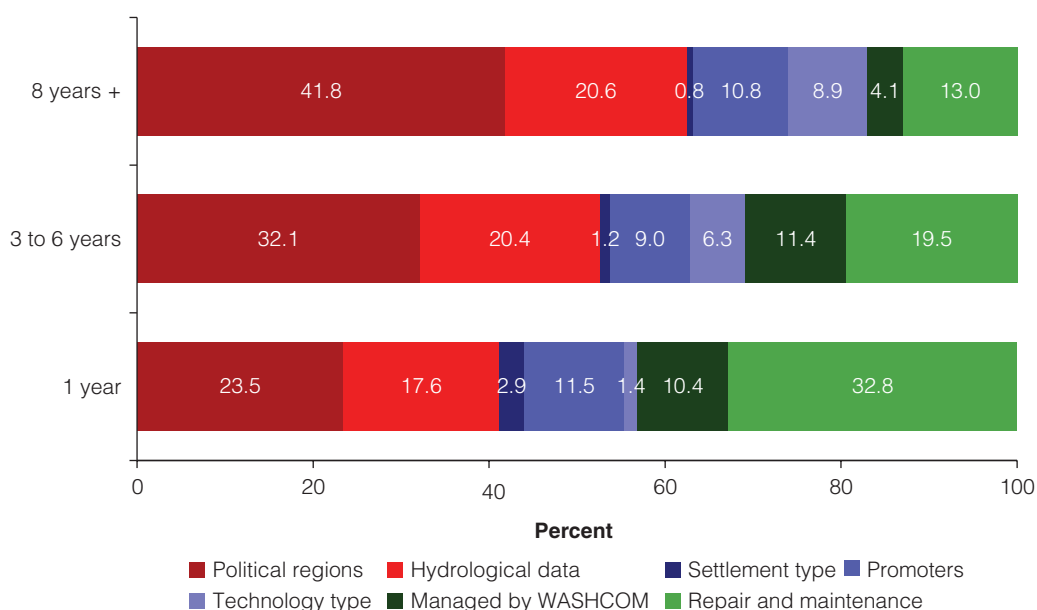
Failure declines by 5 percent to 10 percent when spare parts are locally available. Approximately 80 percent of nonfunctioning water points are subject to mechanical failure and, in about 45 percent of cases, spare parts are not locally available. When spare parts are available, the likelihood of failure declines by 5 percent in the initial years, and by almost 10 percent after eight to 10 years. This suggests that proper knowledge of water point repair, and the availability of required spare parts, can immediately improve the functionality of water points by a significant margin.

Water points that have deeper levels of groundwater storage, deeper levels of groundwater profundity, and higher levels of groundwater productivity are less likely to fail. Water points that have groundwater storage levels deeper than 2.5 centimeters have a 20 percent failure rate in their first year, which then increases to almost 30 percent by their eighth year. Those with storage levels shallower than 2.5 centimeters have around a 30 percent failure rate in their first year, which increases to over 40 percent by their eighth year. Moreover, water points with a groundwater depth of more than 25 meters below ground level have around a 20 percent failure rate within their first year, which does not significantly increase over time, whereas water points with depths less than 7 meters below ground level have almost a 30 percent failure rate in their first year, which increases to above 40 percent by their eighth year.

Lastly, water points with a groundwater productivity of greater than 5 liters per second have around a 20 percent failure rate in their first year, which rises to around 30 percent by their eighth year, whereas water points with groundwater productivity that is less than 5 liters per second have around a 30 percent failure rate in their first year, which increases to over 40 percent by their eighth year.

In the first year of operation, factors that can be controlled in the design, operations, and implementation stages explain 56 percent of water point failure (figure 6.6). As water points age, their failure is better predicted by those factors that can't be modified, and by those factors that can be controlled during the design and implementation stage. Inversely, the share of water point failure attributable to factors that are relevant at the operational stage decreases

Figure 6.6: Shapley Decomposition of Water Points' Failure, Nigeria, 2015



Source: World Bank elaboration using NWSS 2015.
 Note: WASHCOM = water, sanitation, and hygiene committee.

with water points' age. In the water points' first year, 44 percent of failures are explained by factors that can't be modified, and after eight to 10 years, that number increases to 63 percent. Likewise, the share of factors that can be changed during the design and implementation stage increases from 13 percent in the water points' first year to 20 percent after eight or more years. Conversely, around 43 percent of water point failure in the first year can be linked to factors in the operational stages, such as repair and maintenance and WASHCOM management, whereas that number drops to 17 percent after eight or more years.

Concluding Remarks

When considering most water utility indicators, Nigeria underperforms in relation to both African and global averages. The country encountered mixed trends in the overall performance of water agencies between 2011 and 2015. While there were improvements in staff productivity, water continuity, and water quality, indicators of financial performance (e.g., average revenue and operational cost coverage) registered a decline. Water consumption also decreased during this period.

Unfortunately, there is still a lurking degree of uncertainty behind some of the drivers of the performance of water agencies: there are inconsistent patterns between certain measures of efficiency, availability, quality, and financial sustainability, as well as in the overall performance of water agencies. The worst-performing SWAs had nine times more employees per 1,000 connections than the best-performing SWAs. Similarly, while the best-performing SWAs provide service for 20 hours a day, the worst performers only do so for five hours a day. In the same vein, the best performers tend to be in a cost recovery situation, with 100 percent quality test compliance, and they deliver an average of 120 liters per person per day. In contrast, the worst performers recover only 10 percent of their costs, no more than 70 percent of the quality tests have passed current standards, and they deliver only around 20 liters per person per day.

Half of the water schemes and 38 percent of water points are not functioning. Evidence from the analysis presented here suggests that nearly 27 percent of water points are likely to fail in the first year of construction and 40 percent are likely to fail in the long run (after eight to 10 years). Water schemes have a similar likelihood of failure within the first year. Approximately 30 percent of water schemes are likely to fail in the first year, and around 60 percent are likely to fail after 10 years.

If water points and schemes are more carefully attended to during the design, implementation, and operational stages, it is possible to drastically reduce failure rates. When decomposing the drivers of water points' and water schemes' failure rates, it is found that influential factors at the design and implementation stages explain around 13 percent to 42 percent of failure, and influential factors at the operational stage (e.g., maintenance and management) are responsible for 24 percent to 43 percent of the failure rate. In the first year of operation, factors that can be controlled in the design, operations, and implementation stages predict the failure of 66 percent of water schemes and 56 percent of water points. As water points age, there is an increase in the relative importance of those factors that can be controlled during the design and implementation stage in explaining their failure. As water schemes age, there is an increase in the relative importance of factors that can be controlled during the operational stages in explaining the SWAs' failure.

Notes

1. See IBNET's database for 2014, <https://www.ib-net.org/>.
2. NWSS 2015 data were collected and collated from all wards of Nigeria. They are a census of all water points and schemes in Nigeria, and were conducted as a follow-up to an earlier survey conducted in 2006.
3. IBNET information on the performance of the agencies across water indicators is available at the state-level, however, because of outliers and small samples of water agencies per state, state-level performance of utilities are not included in the report or the appendix. This information is available upon request.
4. Since the number of observations in the top 20 percent and bottom 20 percent of the utilities is less than 10—and in the case of water consumption, there are less than five observations—these results may be considered a broad, but not definitive snapshot, of these utilities' performance.
5. The analysis considers schemes that are already installed and not more than 15 years old. To avoid overestimation, we disregard all water schemes that are installed or rehabilitated in 2015—when the survey was conducted. Thus we run the functionality analysis and the Shapley decomposition on a sample of 3,325 water schemes. Similarly, considering older schemes may yield a reporting bias in favor of functional water schemes, since it may be difficult to recall all the schemes that failed long ago.
6. The number of smaller schemes with fewer than 1,000 beneficiaries, and those with 1,000 to 2,000 beneficiaries, constitute 31 percent and 18 percent, respectively, of the total number of schemes that are 15 years old or younger. Slightly larger or midsized schemes that serve between 2,000 to 5,000, and between 5,000 to 10,000 beneficiaries, constitute 23 percent and 6 percent, respectively. Slightly more than 5 percent of schemes are large schemes that serve more than 10,000 beneficiaries.
7. Almost 80 percent of all schemes are groundwater-based pump-piped systems, around 11 percent are surface water-based pump-piped systems, and 6 percent are gravity flow schemes.
8. Around 42 percent of schemes were commissioned by the state government, followed by 29 percent that were commissioned by the Federal Government of Nigeria (FGN). Around 12 percent were commissioned by LGAs, around 6 percent by nongovernmental organizations (NGOs), community-based organizations (CBOs), or philanthropists, and around 6 percent were commissioned by donors. For more information on the breakdown by promoter, see table 7.1.
9. WASHCOMs were formed and trained in 2,110 communities to ensure the effective participation of beneficiaries, as well as to promote a high sense of ownership and the

sustainability of projects. Community-level structures were established in the project LGAs as part of the program entry processes. Women make up an average of 45 percent of these WASHCOMs and play active roles in decision making. Federations of WASHCOMs were also established in the project LGAs; these unifying bodies serve to promote citizens' voice and accountability across each respective LGA (UNICEF 2015). More than one-third of water schemes in the NWSS data set were managed by WASHCOMs.

10. In slightly more than 39 percent of cases, spare parts are not locally available, as compared to 36 percent of cases in which spare parts are locally available. The remaining schemes (20 percent) do not have the necessary information to discern whether spare parts are locally available.
11. According to the available information on operation and management, around 42 percent of the water schemes are being repaired and maintained by private consultants. The rest are repaired and maintained by water works.

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Chapter 7

Institutional Landscape for Water Supply

Key Takeaways

- **Nigeria's federal system contributes to a diverse institutional landscape for the water sector** and a challenging context for the implementation of national programs with multiple government agencies engaged in the production and provision water. Coordination of planning and budgeting is particularly challenging given the number of actors, as well as their diverse incentives and priorities for allocating resources to the sector.
- **Reform signaling rather than implementation is common in the water sector.** Many drafted national laws, policies, and strategies for public water provision have not been officially adopted or approved through appropriate channels. Further, once approved, formal policies have not automatically resulted in changes to how systems for water service delivery function in practice.
- **At the state level, low budget credibility, discretionary cash rationing, and weak public investment management centralized in governors' offices impacts the quality of expenditure in water.**
- **State water agencies (SWAs) exercise limited autonomy over fiscal and human resources.** SWAs that have been established as state-owned corporations have a degree of autonomy on paper. Yet, even for these agencies, the collection of tariffs remains low, leaving SWAs dependent on state governments to finance their operations, expenses, and salaries.
- **Consistent and reliable data to inform decision making and performance management, as well as to contribute toward greater public accountability, are limited.**

Objectives and Scope

This chapter uses an institutional and political economy lens to explore challenges facing water service delivery in Nigeria. As highlighted by chapters 3 and 6, access to piped water through household connections has decreased in urban areas, and the postconstruction functionality of water points and schemes remains low. Self-supply through the informal water sector is common, and citizens' trust in public sector provision is limited. To unpack these issues further, this chapter provides a first look at why particular institutional capabilities have emerged, why certain bottlenecks persist, and strategies to shift the institutional environment

in a more positive direction over time. It draws on a political-institutional assessment of urban and rural water supply, summarizing available primary and secondary literature, as well as select key informant interviews carried out by phone.

Political, Institutional, and Organizational Landscape for Service Delivery

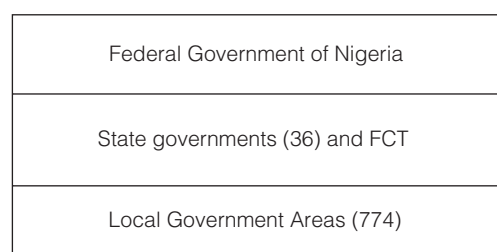
Nigeria is a large country characterized by considerable ethno linguistic diversity, requiring successive governments to continually invest in building a sense of national unity and statehood.¹ The logic of politics in Nigeria has been to maintain stability through the distribution of resources to powerful groups and individuals so they do not become a threat, while permitting some benefits to trickle down for the purposes of legitimacy. Decision making with regard to the allocation and use of resources has been guided by strategies for the management of political support, rather than achieving concrete development gains. This has contributed to the fact that a decade of impressive growth coupled with over US\$800 billion in earnings from oil and gas reserves have not translated into significant increases in the well-being of the majority of citizens, as discussed in chapter 2. Rather, the main beneficiaries of oil rents have been politicians, civil servants, high-ranking military officers, and business interests who together form Nigeria's elite class.

Nigeria is administered through a complex and still evolving federal structure, with a federal government, 36 state governments, the Federal Capital Territory (FCT), and 774 local governments. States are marked by varying degrees of autonomy from the political center, as well as varying degrees of institutional capacity. The incentives, technical skills, and availability of resources for public officials to carry out assigned functions are constrained across states and even more so for local government areas (LGAs). Governors are powerful actors at the subnational level since decision making for the use of public resources is centralized in their offices. See figure 7.1.

Within the Nigerian federal system, subnational governments are assigned primary responsibility for service delivery. Formally, responsibility is shared between states and local governments. The 1999 Constitution does not clearly define the relative roles of states and LGAs, leading to variation in how these tiers of government assume responsibility in practice (see chapter 8). While the federal government can adopt national legislation and policies, its legal authority to influence whether and how they are adopted and implemented by states is limited.

State and local governments largely depend on revenue transferred from the federal government to carry out their assigned functions; 50 percent of state and over 70 percent of local government receipts are composed of revenue transferred from the federal government (Lewis and Watts 2015). Oil and tax revenues are divided vertically between tiers of government and horizontally

Figure 7.1: Tiers of Government in Nigeria



Note: FCT = Federal Capital Territory.

Box 7.1: Allocation of Oil and Tax Revenues (Lewis and Watts 2015)

The Nigerian government's oil revenues are allocated to four main areas: (a) federal, state, and local budgets, and extra budgetary funds; (b) "cash calls" to the Nigerian National Petroleum Corporation (NNPC), to finance expenditures and investments in the oil sector; (c) the fuel subsidy; and (d) the excess crude account.

By law, central revenues from oil and taxes are divided among tiers of government according to formulae developed by a central revenue commission with legislative approval. Under the current formula, oil revenues are divided according to a rule that first gives 13 percent to oil-producing states (the derivation principle) and then splits remaining revenues among the federal government (52.68 percent), state governments (26.72 percent), and local governments (20.60 percent).

Tax revenues from oil (after application of the derivation principle), customs, excise, and corporate income taxes are divided among states as follows: 40 percent is allocated equally to all states, 30 percent in proportion to population, 10 percent in proportion to land mass and terrain, 10 percent according to "social development factors (education, health, and water)," and 10 percent to states that generate more internal revenue themselves.

across states and LGAs according to a carefully negotiated formula that sits at the heart of Nigeria's political settlement (see box 7.1). Reliance on centrally generated oil revenue weakens the citizen-state compact, severing the need for taxation and undermining accountability. Further, it has made the collection of data used to calculate the share of resources allocated to each state—such as population and access to services—a political as well as technical exercise. Additionally, it links quality of state budgeting and expenditure management to the availability and predictability of federal transfers.²

Reliance on centrally generated revenue has not necessarily translated into central government ability to influence state performance. Legally, states have autonomy with regard to how they allocate funds between sectors and manage resources transferred from the center; they have authority to engage in financial transactions, own assets, appoint officials, collect and retain revenue, manage their accounts and take out loans. Further, because centrally generated oil and tax transfers are "unconditional" (i.e., nontargeted), the federal government has little practical influence over how such resources are used. More recently, conditional transfers to influence performance in basic education and fiscal sustainability have been introduced. Yet evidence that conditionality has been applied in practice or that these mechanisms have strengthened accountability to the federal level is mixed.

Though the Nigerian political economy presents a difficult context for improving service delivery, the country is also characterized by strong entrepreneurial forces, pockets of public sector efficacy, and capabilities that allow institutional change to emerge under some conditions. A series of case studies carried out by the World Bank examine successful reforms and pockets of effectiveness in Nigeria. The case studies reveal that (a) leadership is a crucial ingredient for prompting and carrying out reform efforts; (b) strong technical skills can achieve results when political leaders consign the policy process to specialists and devote their political energies into removing impediments for technical staff; and (c) feedback loops and the use of

data can create space to learn, respond to bottlenecks as they arise, and facilitate midcourse corrections (Lewis and Watts 2015; World Bank 2015a).³ A core lesson is that pragmatism, course corrections, renewed pressures for change, and attention to unintended consequences have been integral to reform agendas. To the extent that pockets of effectiveness have emerged, they are typically the result of a long and complex process of experimentation.

Policy Context of Urban and Rural Water

The Federal Government's National Water Supply Policy of 2000 (NWSP 2000) sets out the policy context for water service delivery in Nigeria. It promotes “the provision of sufficient potable water and adequate 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.” Responsibility for achieving this vision is shared across Nigeria's federal, state, and local governments, as well as communities.

In the urban water sector, reforms have sought a more commercial approach to water provision, transforming public water providers (SWAs) into autonomous corporations that use private sector partners in the delivery of services. Institutional reforms introduced by the 2004 Nigeria Urban Water Supply Reform Project 2004 (NUWSRP 2004) and subsequent World Bank projects (NUWSRP II and III) aimed to improve the reliability and financial autonomy of SWAs, as well as to increase access to piped water networks. As explored below, implementation of these reforms has proved difficult and failed to deliver sustained change.

For rural areas, reforms have focused on expanding access. The 2016–30 Partnership for Expanded Water Supply, Sanitation & Hygiene (PEWASH) sets a goal of increasing water supply coverage to 57 percent to 100 percent by 2030 through water system rehabilitation, as well as expansion and construction of low-cost rural water schemes. PEWASH envisions shared ownership and management of rural water points by communities and LGAs, with communities taking charge of operations and maintenance (O&M).

As of early 2017, the federal government is initiating steps to update the prevailing national water policy⁴ with attention to the roles and responsibilities of the three tiers of government; the governance, regulatory and accountability framework; the capacity of stakeholders; financing and access for the poor; sector planning; monitoring and evaluation; education, information, and communication; research and knowledge; private sector participation and civil society; as well as water security and sustainability in the context of climate change.

Production and Provision in Urban and Rural Water Supply

According to prevailing legislative and policy frameworks, the federal government is responsible for managing water resources, as well as leading the formulation of national policy and strategy advice for the public provision of water. The Federal Ministry of Water Resources Management (FMWR) operates 12 River Basin Development Authorities (RBDAs), which are charged with the development, operation, and management of reservoirs within their catchment area, and for providing the bulk of the water supply for water agencies and irrigation. In the past, some RBDAs provided borehole water to communities. Prevailing frameworks also allow for the federal government to make capital investments in support of state and LGA institutions.

Responsibility for the provision and production of water services sits with state and local government institutions (Macheve et al. 2015). For *urban areas*, responsibility for provision and production is assigned to SWAs, which were established in 1997 and are formally accountable to state governments through the SMWRM and State Water Boards (SWBs).⁵ Legally, all SWAs are public institutions; some are established as state-owned corporations that, in principle,

grants them more autonomy (Macheve et al. 2015). Several states have established specific agencies for small towns, called State Small Town Water Supply and Sanitation Agencies (STWSSAs).⁶

Responsibility for *rural areas* varies by state. In principle, LGAs are responsible for the establishment, operation and maintenance of rural water supply schemes and sanitation facilities. Water, Sanitation, and Hygiene Departments have been established within local governments to oversee the delivery of water and sanitation services, and to provide support to communities in the facilities' management, sanitation promotion, and hygiene education. Water, sanitation, and hygiene committees (WASHCOMs) exist in some LGAs and are responsible for the management of water and sanitation activities at the community level. Many states have established State Rural Water Supply and Sanitation Agencies (RUWASSAs), which are responsible for supporting LGAs to manage the provision of potable water, sanitation, and hygiene in rural communities. Still, in other states, SWAs are responsible for rural water production and provision.

In practice, self-supply is common, and citizens' trust in public provision remains low. As described in chapter 3, publicly provided water reaches only a small share of citizens. Access to piped water through household connections has decreased, and the postconstruction functionality of water points and schemes remains low. Throughout Nigeria, nongovernmental organizations (NGOs), development partners, and the informal-private sector are directly involved in the production and provision of water services in both urban and rural areas. An overview of citizens' strategies for navigating this landscape to access water in Bauchi City is provided in chapter 9.

Governance Architecture for Publicly Provided Water Supply

The following explores the organizational and institutional architecture of publicly provided water, as well as how these systems function in practice. It addresses policy, planning, and budgeting; financing; and tariff setting and collection functions; as well as human resource management, oversight, and accountability. As much as possible, each subsection describes de jure arrangements followed by a discussion of their de facto operation.

Policy, Planning, and Budgeting for Urban and Rural Water

Federal and state governments are both assigned a role in policy making. The FMWR is responsible for leading the formulation of national policy and strategy advice for the public provision of water. It is up to each state to adopt and implement national legislation and policy, as well as to decide on the institutional framework for delivering services. The National Council on Water Resources (NCWR) is the highest water resources policy formulating body, chaired by the FMWR with representatives from the Federal Ministry of Environment and all commissioners for state governments.⁷ State Ministries of Water Resources are responsible for policy, regulation, and monitoring—though not all states have a stand-alone ministry of water resources (e.g., the Rivers State Ministry of Water Resources and Rural Development [RSWRRD] in Rivers State). Thus, while certain structures and policies related to water supply prevail throughout the country, there is a great deal of variation in the management and provision of water across jurisdictions (World Bank 2015b).

Federal, state, and local governments are responsible for their own planning and budgeting, and each plays a role in financing capital and recurrent expenditures in the water sector. Federal planning and budgeting processes are described in chapter 8. States are responsible for managing their public finances 'to deliver services required for meeting the development needs of the state including for urban and rural water supply (World Bank 2011a). The federal

government does not set targets or provide guidance to states regarding the level of resource allocation to water services, nor is there a national policy on tariffs.⁸ In line with states' institutional framework for public financial management, most have clear budget calendars that include time for consultation between the State Ministry of Budget and Planning and line ministries on sector needs and priorities. Once prepared, the budget is to be submitted by the governor to the State House of Assembly for approval. Limited information on the de jure arrangements for planning and budgeting at the local government level is available.

With regard to policy making in the water sector, a key point of consideration is the prevalence of reform signaling rather than implementation. World Bank (2015a) finds that government and development partner efforts to improve the institutional environment for water service delivery have primarily focused on developing formal policies and governance frameworks. Many draft national laws, policies, and strategies for public water provision have not been officially adopted or approved through appropriate channels. For example, the Draft National Water Resources Bill April 2007 has not yet been passed into legislation, while others, such as the Water Supply Investment Mobilization and Application Guidelines (WIMAG) have not yet been approved. Further, once approved, formal policies have not automatically resulted in changes to how systems for water service delivery function in practice (see chapter 9 on Bauchi).

An additional consideration is that planning and budgeting processes for the water sector are not well coordinated between tiers of government. The degree of state autonomy in Nigeria's federal system contributes to a diverse institutional landscape and a challenging context for the implementation of national programs. Coordination is particularly difficult given the number of actors contributing to the construction and maintenance of water infrastructure, and their diverse priorities and incentives for allocating resources to the sector. The desire to deliver services to constituents is a powerful incentive that can lead actors to bypass normal sector planning processes. For example, at the federal level, when the budget is sent to the legislature for approval, members of Parliament add constituency development projects for their districts that are not selected based on stated FMWR or SMWR priorities. New infrastructure projects are particularly visible to constituents, possibly contributing to a bias toward new (and often nonfunctional) construction, rather than carrying out maintenance on existing infrastructure.

At the state level, the Executive Council is one of the main de facto mechanisms for policy, planning, and budgeting for service delivery sectors (World Bank 2011a). The council is chaired by the governor and composed of commissioners serving in the states' executive branch (heads of state ministries). For states surveyed, World Bank (2011a) finds that commissioners for water resources management regularly participated in these meetings. No other water sector coordination mechanisms were in place. Similar to that on the federal level, the budget prepared by the Federal Ministry of Budget and Planning with inputs from ministries, departments, and agencies (MDAs), is also typically amended during the legislative approval process to accommodate legislators, adding specific projects for their home areas without necessarily aligning to identified sector needs (World Bank 2011b). Further, a 2011 state PEFA assessment of select state governments identified failure to budget for the recurrent costs (i.e., operation and maintenance) associated with capital investments. Limited information on the de facto processes for planning and budgeting at the local government level is available.

Financing Urban and Rural Water

According to the 2000 Water Supply and Sanitation Services (WSS) policy, financing urban and rural water is shared between tiers of government; in practice, federal, state, and local governments, as well as NGOs, communities, and development partners play a role. Accurate data reflecting the actual share of expenditure on capital investments and recurrent costs across these actors are unavailable. However, the NWSS (2015) data reflecting the sponsorship of water points and schemes in Nigeria may provide a notional idea of the distribution (see table 7.1).

Table 7.1: Water Points and Schemes, by Sponsor, Nigeria, 2015
Percent

	Federal	State	LGA	Donor	NGO, CBO	Philanthropist	Community	Unknown
Water Points	25.4	29.8	23.6	7.6	5.1	4.9	n.a.	3.5
Water Schemes	29.3	42.4	12.1	5.5	5.6	n.a.	5.1	n.a.

Source: NWSS 2015.

Note: CBO = community-based organization; LGA = local government area; NGO = nongovernmental organization; n.a. = not applicable.

As discussed in chapter 6, nationally, around 25 percent of water points and 29 percent of water schemes in Nigeria are sponsored by the federal government; around 30 percent of water points and 42 percent of water schemes were sponsored by state governments. Local governments sponsored close to a quarter of water points and 12 percent of water schemes. The share of water infrastructure sponsored by each actor varies significantly by state.⁹

The level and efficiency of public expenditure in the water sector is low. Capital expenditure by the federal government and states was close to 0.28 percent of GDP, which is lower than regional levels. Further, a large share of construction projects are never started or fully completed, and only 85 percent of completed projects are rated as satisfactory. These issues are discussed in detail in chapter 8.

At the subnational level, state public investment management is weak. The 2011 PEFA documents low execution rates for state capital budgets; at the same time, capital expenditures represent a larger share of actual state spending on water supply than recurrent costs. The 2011 PEFA finds that the procurement and management of capital investments was centralized, with the governor directly responsible for decision making on large and medium contracts. As the report describes, the “Governor personally selected the contractors under main projects, monitored their performance and authorized their payments. Fully competitive bidding was uncommon.” (World Bank 2011b).

For urban water, state governments rather than SWAs take the lead on capital investments, “providing the necessary permissions to proceed, approving the design and financial plans, managing the bidding process, supervision of projects, commissioning the investment and transferring it to the SWA.” (World Bank 2011b). A 2015 World Bank performance assessment of utilities finds that 71 percent of SWAs had prepared investment plans and 77 percent had prepared feasibility studies or design documents for capital projects, even if resources to fulfill them were unavailable.

State expenditure on water supply is impacted by the low credibility of state budgets and discretionary cash rationing (World Bank 2011b). As noted previously, states rely on intergovernmental transfers from the federal government to finance their budget. Difficulty in predicting the amount and timing of these transfers leads to a mismatch between the approved budget and the actual available resources. The resulting need for cash rationing introduces scope for discretionary decision making with regard to expenditure priorities, centralized in the governor’s office or with key advisors. In-year adjustments are typically made without formally updating the budget. Low budget credibility limits the MDAs’ ability to predict the availability of funds against the approved budget. Data from the Nigeria States’ Fiscal Database indicate that the average actual state expenditure for Housing and Community Affairs (which includes water supply) ranged from 46 percent to 62 percent of the approved budget between 2008 and 2013.

For local governments, a key issue is whether federal transfers reach local government accounts. Intergovernmental transfers to local governments flow from the federal level to states, which—in principle—are expected to release funds to the LGAs. A key issue is that federal transfers do not always reach local governments. There is a great deal of variation in the public financial management arrangements between states and LGAs across the country, as well as limited transparency in how these arrangements work in practice. The 2011 PEFA finds indications

that states withheld significant amounts of funds due to local governments, using them for common projects and the direct payment of civil servants and teachers employed by LGAs (World Bank 2011b).

A key area to investigate further is the role of community-based water, sanitation and hygiene committees (WASHCOMS). Communities (through WASHCOMS) are expected to contribute to financing the operation and maintenance costs of rural water. As described in chapter 6, the failure rate of water points maintained by WASHCOMS is lower than those maintained by local mechanics, government agencies, and donors or NGOs. WASHCOMS are present for 34 percent of water schemes, and schemes in which WASHCOMS are present are less likely to fail than when they are not present. How communities play a role in practice—including how they access and manage finance—will remain unclear without additional fieldwork.

Tariff Setting and Collection in Urban Water

Tariff setting is a state government function. The ways that tariff structures are developed vary by state, and it is not clear who has responsibility for reviewing them. The World Bank (2015a) performance assessment found that in practice, SWAs do not have the power to set tariffs, nor do they regularly review them. Of the SWAs surveyed, 46 percent reported that tariffs had not been reviewed in the last four years, and 29 percent had not been reviewed in four or more years (Lewis and Watts 2015).

Legally, state water agencies have authority to collect tariffs from customers for water consumption, and this is a potentially important source of internally generated revenue for state governments. Tariff collection practices vary by state, and nonrevenue water remains a challenge across the country. In some cases, SWAs directly collect tariffs; World Bank (2015a) finds that 51 percent of SWAs issue bills. In other cases, the state government or SWB collects tariffs on behalf of the utility. SWAs not issuing bills reported that they were compensated by state governments (Lewis and Watts 2015). A significant number of illegal connections and ineffective billing systems have contributed to high rates of nonrevenue water. Data suggests that the top 20 percent of SWAs collected between US\$0.80 and US\$0.90 per cubic meter sold between 2011 and 2014; the middle 60 percent collected roughly US\$0.20; and the bottom 20 percent collected US\$0. Operational cost recovery is close to the African regional average for the top 20 percent of SWAs, but near zero for the bottom 20 percent.

Most state governments finance SWA operations, expenses, and salaries, partially compensating for low tariff collection.¹⁰ This appears to contribute to a context in which SWAs' autonomy from the SMWR is constrained. According to the 2015 performance assessment, “almost 50 percent of SWAs (17 of 35) do not have the authority to decide how to allocate their revenue, and only 26 percent (9) have discretion on how to spend money in their accounts. For the other 8, the decision is made jointly by the SWA and the state government.” (Macheve et al. 2015).

Human Resource Management, Monitoring, and Accountability

Broadly, the human resources required to manage Nigeria's water resources are available within the country, though these resources are not evenly distributed. For example, the absence of skilled workers in rural regions has been identified as a key constraint.¹¹ There are strategies aimed at investing in the human capital of governments in charge of sanitation and drinking water, as well as plans to help cover remaining gaps in the distribution of human resources for these sectors.¹² A recent UNICEF multistakeholder analysis of binding constraints in the water sector reveals that although a federal strategy exists to identify and better manage human resource problems and capacity gaps, it is not being implemented (UNICEF 2016). Findings suggest that political interference in employment processes is a key bottleneck (UNICEF 2016).

In urban water, arrangements for human resource management create complex lines of accountability for performance. Arrangements for managing State Water Agency staff vary. In principle, SWAs established as corporations have more autonomy over the management of their staff than those that were not. In practice, for most states, SWA staff members are civil servants appointed and dismissed by their respective state governments according to the rules and policies that govern the civil service. Twenty-three percent of SWAs had no autonomy to hire staff, and only 19 percent were consulted when new staff were being hired. To some extent, the fact that SWAs' human resource management is carried out by state governments limits their ability to manage or better incentivize the performance of their employees.¹³

Daily management of the SWA is carried out by a general manager appointed by and accountable to the SWB. Formally, SWA boards have the authority to appoint the general manager, though in practice, the process is influenced by the governor. On average, general managers change once every three years. While boards have the authority to dismiss general managers, this has only happened once—with the remaining turnover related to staff reaching retirement age. Where they exist, the SWBs comprise government and political appointees; 2015 data reflect that consumers were represented on only three SWA boards and the private sector on only eight.

The availability of reliable data to inform decision making, manage performance, and contribute toward greater public accountability is limited. As described in Lewis and Watts (2015), government data in Nigeria are “often inadequate, frequently ambiguous and contradictory, and sometimes virtually nonexistent.” Systems for regular service monitoring of the water sector are in the design phase, with data on service delivery still collected in an ad hoc manner, and many indicators fail to capture necessary information.

At the federal level, the National Water Resources Institute is tasked with providing training and education, data collection, and dissemination services in the field of water resources development. Within the FMWR, there has been some traction with regard to collecting information on the functionality of water points and schemes. For example, this report has used data from the 2015 NNWSS, which were collected by the FMWRM in 2015. Yet more refined data are needed. For instance, the NWSS suffered from duplicate observations and a number of other inconsistencies. There are a number of constraints with regard to the quality, timeliness, and availability of data on public accounts and national finances, thus making it difficult to understand the volume and efficiency of expenditure in the water sector.¹⁴

For urban water, SWAs are expected to collect and monitor customer data and be responsive to end users, though the actual collection and use of data by SWAs is mixed. Overall, 97 percent of SWA customer databases maintain information on billing, and 91 percent maintain information on collection and disconnection due to nonpayment. Only 37 percent collected information to assist in targeting their services to the poor (World Bank 2015b). Reporting on water quality varies between regions. For example, 87 percent of SWAs in the South South region reported such information, while no SWA in the South East did so (World Bank 2015b). In 2015, 26 SWAs reported having customer relations departments, and a further eight had staff assigned to manage customer relations. Only 6 percent of SWAs reported having no system in place for customers to rectify billing errors. Yet, despite the existence of customer-oriented systems, evidence suggests that such systems are not effectively used to improve performance (World Bank 2015b).

Public access to information on urban water is limited. On average, 40 percent of SWAs publish tariff revisions in the local media, 40 percent hold public hearings on major investment projects, and 39 percent disclose water monitoring reports (World Bank 2015b). Yet there is variation across the SWAs.¹⁵ Lack of transparency regarding approved state budgets and funding flows further constrains public scrutiny (no state government has presented audited accounts more recently than 2013).

A key challenge in rural water supply is information asymmetry with regard to the quality of services provided by drilling contractors and monitored by MDAs. The need for specialized skills to construct boreholes means that neither water users nor government actors are easily able to discern whether a newly constructed borehole is providing high-quality water or whether the water supply will be sustained long-term. This means that government regulation of borehole construction is often difficult and ineffective, and service users in rural areas are unable to hold contractors or the state accountable. Where government monitoring of rural water takes place, the data collected provide information on the number of water points constructed, rather than on the quality of service provided. This means that important information on water provision is not collected, and hence state expenditure on rural water is made according to the number of water points constructed rather than the actual quality of the service provided.

Moreover, rural citizens have little power or influence over politicians and public provision, and politicians are not elected on the quality of water services. In addition, while the construction of new water points may be perceived by citizens as a visible improvement to their locality, improvements to water quality and water point maintenance are less visible to users. As such, these improvements are more difficult to achieve and there is little for local politicians to gain in addressing such systemic problems. Instead, local politicians have more to gain financially, or in reputation, from the construction of additional water points. This may contribute to the pattern of “build, neglect, and rebuild” noted in chapter 6.

Emerging Issues and Strategies for Reform

This chapter provides a first look at the incentives and institutional arrangements that contribute to the status quo in the water sector. In particular, the following are emerging findings:

- *Nigeria's federal system contributes to a diverse institutional landscape for the water sector and a challenging context for the implementation of national programs.* Due to the assignment of functions and how they are taken up in practice, multiple government agencies engage in the production and provision of water. Coordination of planning and budgeting is particularly challenging given the number of actors, as well as their diverse incentives and priorities for allocating resources to the sector.
- *Reform signaling rather than implementation is common in the water sector.* Many draft national laws, policies, and strategies for public water provision have not been officially adopted or approved through appropriate channels. Further, once approved, formal policies have not automatically resulted in changes to how systems for water service delivery function in practice.
- *At the state level, low budget credibility, discretionary cash rationing, and weak public investment management centralized in governors' offices impacts the quality of expenditure in water.* The quality of expenditure is further hampered by unclear fiscal arrangements between LGAs and states, and limited LGA autonomy over fiscal and human resources (impacting rural water in particular).
- *SWAs exercise limited autonomy over fiscal and human resources.* SWAs that have been established as state-owned corporations have a degree of autonomy on paper. Yet, even for these agencies, the collection of tariffs remains low, leaving SWAs dependent on state governments to finance their operations, expenses, and salaries. Further, arrangements for human resource management create complex lines of accountability for performance.
- *Consistent and reliable data to inform decision making and performance management, as well as to contribute toward greater public accountability, are limited.*

Further emerging strategies for improving the quality and access of water supply to citizens include the following:

- *Recognize the diversity and complexity of the federal system.* Seek flexible solutions that can adapt to a diverse political and institutional environment; align the incentives of federal, state, and local actors; and invest in communication and coordination between tiers of government.
- *Acknowledge and close the implementation gap.* A focus on the policy environment alone has not automatically resulted in better performance. Seek opportunities to reward performance rather than inputs, and form rather than function. Focus on locally identified solutions to locally identified problems. Support small but concrete improvements to build confidence, gain momentum, and build a constituency for more difficult reforms (see box 7.2).
- *In the short term, seek options that are robust—even within existing political-institutional constraints—while at the same time seeking improvements that gradually shift the system to a higher equilibrium over time.* For example, given the stickiness of the existing institutional environment, seek options for improving the quality and lowering the cost of self-supply through the informal sector. At the same time, target the long-run objective of building trust in publicly provided water through concrete improvements in SWA performance.
- *Tackle governance issues through multisector engagement.* For areas in which the water sector is impacted by cross-cutting governance issues—such as the implementation of national programs, state and public financial management practices, and fiscal arrangements between local governments and state governments—policy makers

Box 7.2: Improving Public Sector Provision in Kaduna—Navigating Political Economy Dynamics for Reform

Hima and Santibanez (2015) and World Bank (2015a) highlight how numerous water sector reforms and policies have failed to be implemented, and suggest reasons for why those benefiting from the current status quo lack incentives to fundamentally change these institutional arrangements. Yet there are certain state governments and public sector agencies within the Nigerian bureaucracy that function comparatively well. At the state level, Kaduna State shows signs of improved public water provision. In this state, the SWA had slowly been improving its water services to the residents, progressively building an expectation of reasonable water supply standards.

When state governor appointed a new general manager of the SWA, service quality deteriorated and users became frustrated with the state water service. Senior management within the SWA was able to use the momentum from this public dissatisfaction, as well as clear data on the SWA's worsening performance, to persuade the state governor to back reform within the SWA and increase its autonomy to collect revenues (World Bank Nigeria 2015). This example demonstrates that politically unpopular reforms—such as providing greater autonomy to state water agencies to collect tariffs—can become politically feasible when citizens' expectations of water services have progressively increased, and when the logic of reform can be effectively communicated by bureaucrats to political leadership.

should consider multisector engagement that jointly addresses technical and institutional issues. Solutions may be cross-cutting (e.g., focused on state public investment management [PIM]) or may consider the water sector as an entry point for strengthening the overall context (i.e., can improvements be made in PIM for state-level water projects, which can then be leveraged to create more systematic cross-sector changes?).

Notes

1. This section summarizes key findings from a series of discussion papers commissioned by the World Bank to inform its engagements in Nigeria. For a more detailed overview of the national political economy, see Lewis and Watts (2015).
2. A more detailed review of the budget process and of public expenditure as it related to the WASH sector is provided in chapter 8.
3. Case studies covered the Lagos Eko Secondary Education Project, the National Urban Water Sector Reform Project, Nigeria's response to Ebola, infrastructure development in Edo State, and the Nigeria FADAMA National Development Series.
4. Three states have adopted legislation establishing (de jure) independent regulation of water supply as provided in their respective water laws: Kaduna (2016), Lagos (2004), and Rivers States (2012). As of 2017, Lagos and Rivers States have established an independent regulator (in 2012), though evidence suggests these agencies have not been able to take up their assigned functions in practice. In some states, the State Ministry of Water Resource Management (SMWRM) serves as the regulator. As discussed in chapter 9, in Bauchi, the Bauchi State water law calls for a performance contract between the State Ministry of Water Resources and the SWA, but this has yet to be implemented. At national level, the FMWR is not performing any regulatory functions.
5. Some issues are shared, but these are owned by state governments (World Bank 2011b).
6. A widely recognized definition is as follows: "Small towns are settlements that are sufficiently large and dense to benefit from the economies of scale offered by piped water supply systems, but too small and dispersed to be efficiently managed by a conventional urban water agency. They require formal management arrangements, a legal basis for ownership and management, and the ability to expand services to meet the growing demand for water. Small towns usually have populations between 5,000 and 50,000 inhabitants, but can be larger or smaller." (Roche 2000)
7. World Bank (2011b) finds that the NCWR met regularly and was attended by technical managers and professionals, as well as by State Commissioners for Water Resource Management. While this federal institution was regarded as providing a useful platform for setting out and generating plans to respond to national challenges, responsibility for the uptake and implementation of these plans was up to state-level actors and typically did not occur.
8. While there is no national tariff policy, "the 2004 National Water Policy updated in 2009, repeats the 'affordability' criterion and adds that operators should be allowed to raise revenue to allow them to break even financially." Bauchi State has a tariff policy in place, which was seen as one of the key achievements recorded in the three years of the SUWASA project implementation in the state (SUWASA 2011).
9. For example, the share of water points sponsored by the federal government is as high as 52 percent (Taraba) and as low as 8 percent (Jigawa). The share of water schemes sponsored by the federal government ranges from 11 percent (Cross River) to zero (Ekiti and Lagos). For local governments, the share of water points sponsored varies from 54 percent (Jigawa) to 3 percent in Enugu. The share of water schemes ranges from 27 percent in the FCT to zero in a number of states (Ekiti, Akwa Ibom, Benue, Edo, Enugu, Kwara, Cross River, and Taraba).
10. Ninety-seven percent of SWAs received capital investments from state governments (SWA 2015).
11. Nigeria-GLAAS 2015 database, http://www.who.int/water_sanitation_health/monitoring/investments/glaas/en/.

12. Nigeria-GLAAS 2015 database, http://www.who.int/water_sanitation_health/monitoring/investments/glaas/en/.
13. This issue was raised during interviews carried out for this report. See also Macheve et al. (2015).
14. See box 3.1 for a more thorough overview of the datasets used for this report, and some of the challenges and opportunities facing the data ecosystem in Nigeria.
15. “In the North Central region, 67 percent of SWAs reported tariff changes. In the North West, South East, and South West regions, only 17–25 percent of SWAs did so. On conducting public hearings for investment and undertaking major rehabilitation projects, disclosure ranged from 57 to 67 percent of SWAs in the North West, South South, and South West regions. No NC SWAs conducted public hearings, and in the NE and SE regions, only 17–25 percent did so...” World Bank: Performance Assessment of the State Water Agencies (2011b).

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Chapter 8

WASH Public Expenditure Review

Key Takeaways

- **Nigeria needs to spend more—at least three times more than it does today.** Capital expenditure was close to 0.28 percent of gross domestic product (GDP)—that is lower than regional levels (0.7 percent of GDP). This figure is particularly troubling, since recent estimates suggest that Nigeria must invest 1.7 percent of its GDP to achieve the Sustainable Development Goal (SDGs). These figures for Nigeria are equivalent to US\$8 billion.
- **Nigeria also needs to spend more efficiently.** For instance, 44 percent of borehole construction projects are never started, and only 37 percent of borehole projects are fully completed. The proportion is even smaller for dam and canal projects: only 10 percent and 5 percent of projects, respectively, are completed. Fifteen 15 percent of completed projects are rated unsatisfactory.

Background and Overview of Budget Cycle

The primary objective of this chapter is to analyze the recent fiscal developments in Nigeria's water, sanitation, and hygiene (WASH) sector within the context of a broad infrastructure investment program for growth and poverty reduction. The overarching task is to offer insights on how to finance public investment within a challenging macrofiscal context, given the Nigerian government's lack of access to resources and poor efficiency of public expenditure. The broader aim is to offer initial insight to help the Nigerian government map-out plans to attain the SDGs for WASH.

As discussed in chapter 7, formal responsibility for the provision and production of water services sits with state and local governments. The federal government is responsible for managing water resources, as well as leading the formulation of national policy and strategy for public provision of water. However, the federal government often intervenes, directly financing investments, to increase water access.¹ The Federal Ministry of Water Resources (FMWR) is the primary agency in charge of WASH activities at the national level. State spending constitutes 50 percent of consolidated government expenditure.

At the federal level, the budget process follows four main stages: drafting, legislative approval, implementation, and monitoring and evaluation. Usually, the budget process begins in June of the year preceding the new fiscal year, with a request from the Federal Ministry of Finance (FMOF)² to the various ministries, departments, and agencies (MDAs) of the federal government to send in their expenditure proposals with estimated budget plans and targets.^{3,4} In the proposals, MDAs link their spending programs to the medium-term development priorities of

the government, as set out in the Medium-Term Expenditure Framework (MTEF). The MTEF, which is prepared every three years, includes government policies and revenue and expenditure projections, as well as the strategic development priorities of the federal government in the coming fiscal years. By October of the preceding year, a draft bill is prepared by the FMoF and sent to the presidency, which in turn sends it to the National Assembly. On approval of the budget by the National Assembly, the president signs the bill into law, called the Appropriation Act. The signing of the budget into law paves the way for the actual implementation of the budget (CSEA 2010).

Every year, the National Assembly defines the project responsibilities of MDAs and civil service organizations. These include construction projects (e.g., boreholes, buildings, roads and canals) as well as nonconstruction projects (e.g., procurement, training, and advocacy). Many civil service organizations overlap in the policy projects they cover. For example, small-scale dams are constructed by the federal ministries of water, agriculture, and environment and all the River Basin Development Authorities (RBDAs). Therefore, the delivery of the same project type varies depending on the incentive structures in place for bureaucrats in the specific organization responsible for each project, holding constant other project and organizational characteristics (Rasul and Rogger 2016).

The National Assembly is primarily responsible for assigning projects to organizations (MDAs and RBDAs) and enacts a budget law specifying the projects to be implemented each fiscal year. The projects are all established in law through the budget appropriation bills. The passage of the bill includes inputs from the executive branch, and ample involvement from sectoral committees within the legislative body. This unified budget is then voted on by both houses and introduced as the Budget Appropriation Act. This legal document defines the responsibilities of civil service organizations in terms of projects to be delivered (Rasul and Rogger 2016).

Nigeria's budget process is comprised of fragmented and complex institutional arrangements, with the FMoF only controlling part of the process.^{5,6} The 2007 Fiscal Responsibility and Public Procurement Acts sought to strengthen institutional arrangements for the management of fiscal funds and procurement processes, but these have been implemented only to a limited extent. The legal provisions guaranteeing the autonomy of the auditor general's function are also relatively weak (OPM 2015).

Moreover, current legal provisions provide the National Assembly with sweeping investigative powers, but they do not provide a strong role for the external audit function. The Fiscal Responsibility Commission also has considerable legal powers that are not currently being exercised. The auditor general is seeking to modernize and strengthen the role of his office through, among other measures, securing the right to make audit reports available directly to the public, rather than through the National Assembly. The adoption of the Freedom of Information law in 2011 was aimed at increasing access to fiscal information (OPM 2015).

The process of National Assembly scrutiny and conflict between the executive and legislative branches often result in the expansion of budgeted expenditures, and long and unpredictable delays in budget approval. Moreover, constitutional and legal arrangements around the role of the National Assembly in the budget process are vague, and significant expenditures are not included in either the federal or state budgets (OPM 2015).

Budget implementation is conducted by various MDAs of the federal government. On a quarterly basis, funds for capital projects are released to the relevant MDAs based on allocations in the federal budget, with revenues obtained from the Consolidated Revenue Fund (CRF). Since 2005, the FMoF has instituted a Cash Management Committee to ensure that funds are available to enable smooth financing of the government budget and thus reduce both discretionary borrowing from the overdraft (Ways and Means) account of the Central Bank of Nigeria (CBN) and delays in completing government projects. The allocation of money toward

Box 8.1: Data Restrictions

Several strategic government agencies, such as the FMoF, Budget Office of the Federation (BOF), National Bureau of Statistics (NBS), NPC, and the Central Bank of Nigeria (CBN) regularly publish reports and provide data and information on social services such as health, education, and water that can be freely accessed by members of the public from their official archives, or downloaded from official websites. However, there are severe constraints regarding the quality, timeliness, and availability of data on public accounts and national finances in Nigeria. These weaknesses are further aggravated by the absence of a constitutional provision that guarantees free access of Nigerian citizens to data on the budget and national revenues. Public oversight at the subnational level is even more obscure, since state governors retain enormous control over revenue utilization, and thus, the allocation of state patronage. The federal government has recently adopted a Freedom of Information Law (2011); this may eventually contribute to greater budget transparency. The law does not contain any provisions specific to fiscal information, though in principle, it enables requests for information to be made. However, focus group discussions with journalists suggest that as of mid-2013, such requests for information remain cumbersome and often ultimately go unfulfilled. Yet, there is some sign of increased public and civil society engagement with fiscal issues.

sector is determined by the Budget Office and FMoF,⁷ based on their expenditure envelope, which the National Assembly adjusts accordingly and approves (CSEA 2010).

Findings

Challenges in Access to Water, Sanitation, and Hygiene Services

A significant constraint to accessing WASH in Nigeria is lack of financial resources. Federal and state government budget allocations to the sector are insufficient to tackle the infrastructure deficiencies of the sector. Given the decline in oil prices since June 2014 and reduction of domestic oil production in 2016, government revenue has decreased significantly, evincing the difficult fiscal position of both federal and state governments. In particular, many state governments have suffered from insufficient funds to cover recurrent expenditure, such as salaries or pensions, and have accumulated arrears. Thus, a focus on increasing the efficiency of public expenditure within a context of declining fiscal resources will be critical.

Information and data in the area of financing and expenditure are difficult to acquire, given that most agencies are usually reluctant to release accurate data. The following section provides an analysis of public expenditure in the water, and, to a lesser degree, of the sanitation sector in Nigeria, based on the limited information gathered from the following sources: the 2010 report of the Center for the Studies of Economies of Africa (CSEA), the CBN Annual Economic Reports (2007–14), the Nigeria States' Fiscal Database, and the World Development Indicators (WDI).

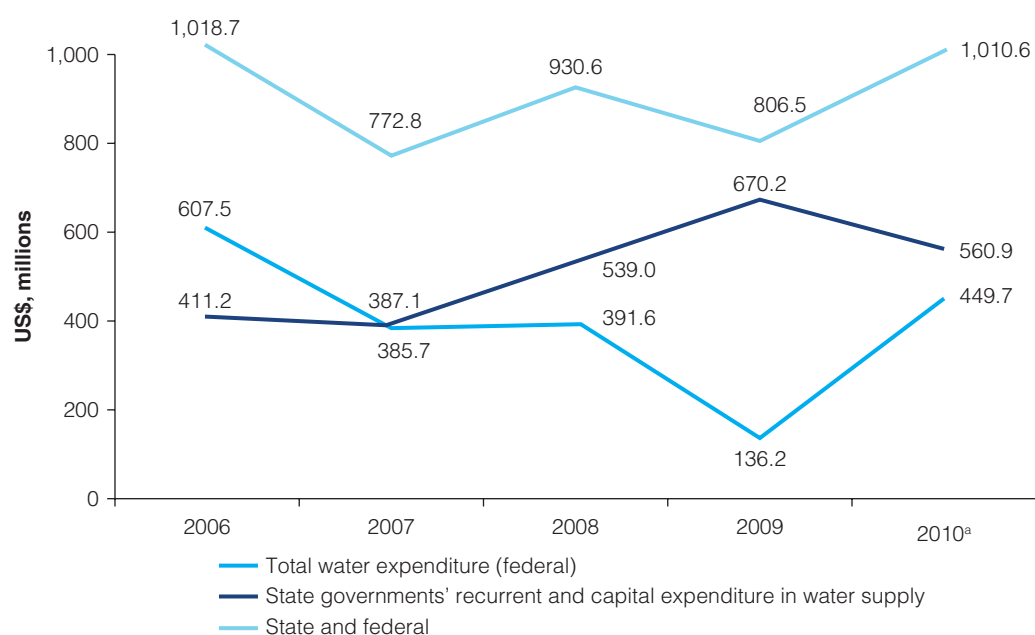
Federal and State Governments' Total Expenditure in the Water Sector

The Nigerian government invested close to US\$1 billion per year between 2006 and 2010 in the water sector (see figure 8.1).⁸ Despite assignment of primary responsibility for water services to subnational governments, the largest share of the total water expenditure was initially executed by the federal government (2006). In 2007, the share of total water expenditure for federal and state governments was basically the same. More recently, from 2008–10, public expenditure on water has become more unevenly distributed with an average of 0.13 percent spent by the federal and 0.27 percent by state governments during that period (figure 8.1). There is evidence to suggest that some local governments also spend resources on water supply, though their contribution is believed to be quite low. There is insufficient expenditure data to provide a more accurate picture of local government area (LGA) spending.

Between 2006 and 2010, total expenditure in the sector averaged 0.47 percent of GDP, with capital expenditure averaging 0.32 percent of GDP and recurrent expenditure averaging 0.15 percent (figure 8.2). As shown in figure 8.2, during this period, total government expenditure on water has been mostly driven by capital expenditure, but has been insufficient to meet infrastructure needs. The federal government's total expenditure in water dropped from US\$607.5 million in 2006 to US\$136.2 million in 2009, a reduction of almost 80 percent in three years (figure 8.3). During the same period, the states government's total expenditure in water raised from US\$411 million in 2006 to US\$670 million in 2009, an increase of 63 percent in three years (figure 8.5).

Figure 8.2 reflects a decline in the total water expenditure as a percentage of GDP in 2010. This is explained by the increase in GDP from 2009 to 2010: while the nominal total expenditure

Figure 8.1: Federal and State Governments' Total Expenditure in Water, Nigeria, 2006–10

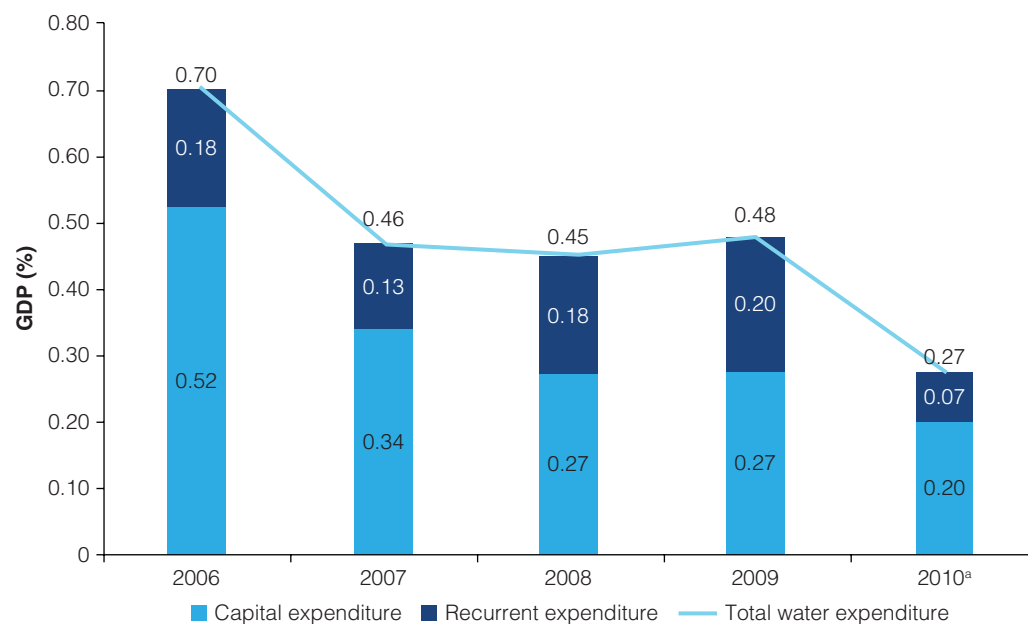


Sources: CBN 2007, 2008, 2009, 2011, 2013, 2014; CSEA 2010 for the federal water expenditure.

Note: CBN data comprise 36 states and the FCT.

a. Data for federal water expenditure in 2010 is budgeted, not actual expenditure.

Figure 8.2: Federal and State Governments' Expenditure on Water, Disaggregated by Capital and Recurrent Expenditures, Nigeria, 2006–10



Sources: CBN 2007, 2008, 2009, 2011, 2013, 2014; CSEA 2010 for federal water expenditure; WDI (2017).

Note: CBN data comprise 36 states and the Federal Capital Territory.

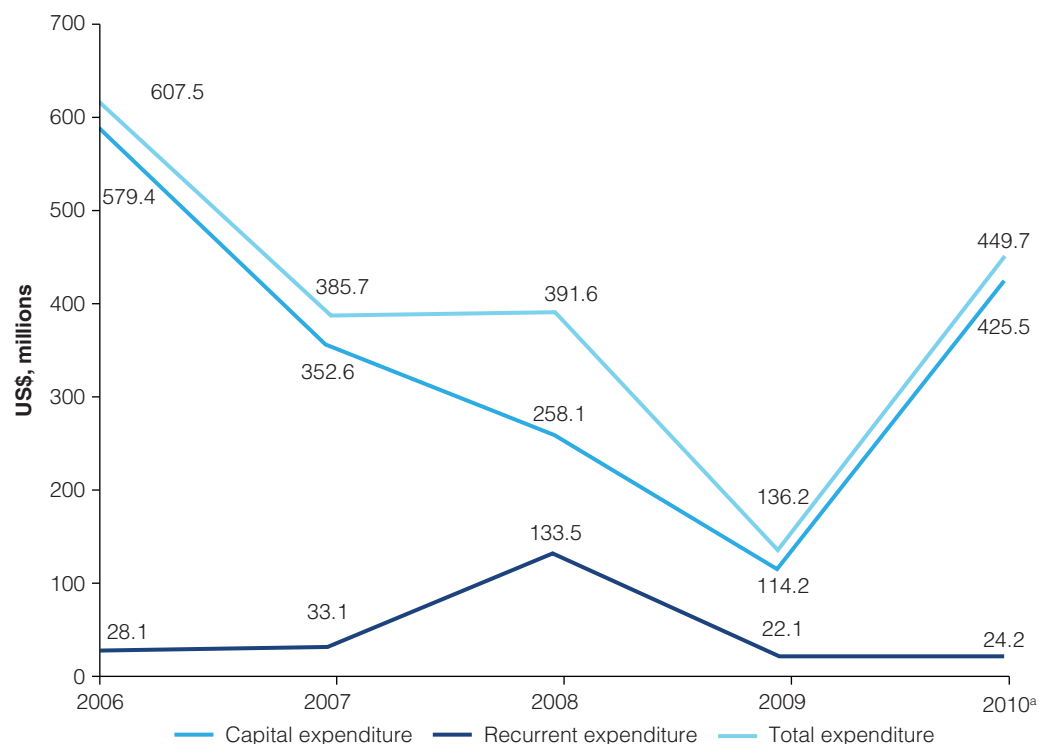
a. Data for federal water expenditure in 2010 are budgeted, not actual expenditure.

in water grew from US\$806.5 million in 2009 to \$1,010.6 million in 2010, the Nigerian GDP more than doubled—from US\$169.48 million in 2009 to US\$369.06 million in 2010. Therefore, while expenditure on water increased in absolute terms during this time period, given the large increases in the Nigerian GDP between 2009 and 2010, expenditure as a percentage of GDP actually shrunk.

Nigeria's capital investments in WASH are insufficient. Between 2006 and 2010, Nigeria's investment in capital expenditure has been on average around 0.32 percent of its GDP (see figure 8.2), which is lower than regional levels (0.7 percent). This falls short of what is needed for the country to reach the SDGs (Foster and Briceño-Garmendia 2010). Moreover, figures 8.3 and 8.4 show that the federal government has greater levels of capital expenditure than recurrent expenditure. This stands in sharp contrast with the state governments' expenditure on water, in which there is a more even distribution between capital and recurrent expenditures (see figures 8.5 and 8.6). Though to some extent, higher recurrent expenditure in the water sector is to be expected at state levels, given that they are assigned a greater role in the maintenance of infrastructure and in employing frontline staff. Between 2006 and 2010, the federal government's average total expenditure in the water sector amounted to around 0.21 percent of GDP (see figure 8.4), with average capital expenditure at around 0.18 percent, and the average recurrent expenditure representing only 0.02 percent of GDP.

The investment needed for Africa to achieve the SDGs for WASH is estimated at around US\$37 billion a year, or around 2 percentage points of the regional GDP per year. Limited investment in the sector will make it impossible to achieve the SDGs. Recent estimates produced by the World Bank show that the investment needed for Nigeria to achieve the SDG for WASH is equivalent to US\$8 billion,⁹ or 1.7 percentage points of GDP per year. Nigeria is among the

Figure 8.3: Federal Government Recurrent, Capital, and Total Spending in Water, in Nominal Values, Nigeria, 2006–10



Source: CSEA 2010 for federal expenditures.

a. Values for the year 2010 are budgeted for federal expenditure, not actual.

countries that contribute the largest share of global costs toward achieving the water SDGs. Other countries in this group include China, 0.20 percentage points of GDP; Brazil, 0.27; Mexico, 0.29; and India, 1.0 (Hutton and Varughese 2016).

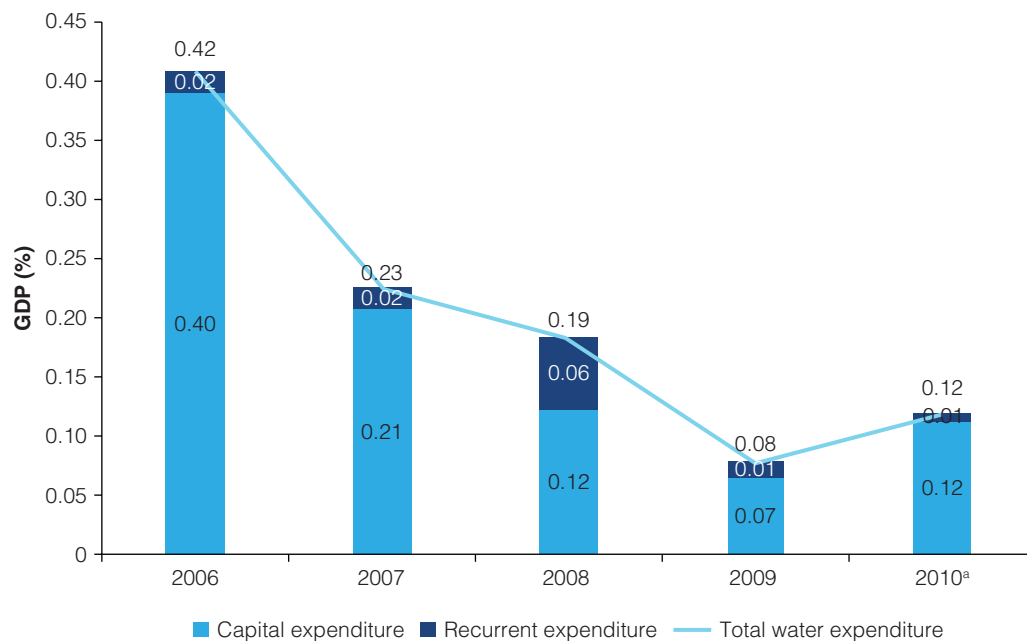
State Governments' Recurrent, Capital, and Total Expenditure in Water Supply

State governments spend close to half a billion dollars per year in the WASH sector. Looking at a larger set of time series data for state government expenditures from 2003 to 2014, we see that the amount of expenditure on water supply has gradually increased over time, sometimes more than tripling its 2003 value, and averaging around US\$470 million from 2010 to 2014. Whether this trend has continued given the post-2014 decline in government revenue is unclear, given the absence of data from 2015 and 2016.

Moreover, the share of expenditure on water is more or less equally split between capital and recurrent expenditure (figures 8.5 and 8.6). This stands in contrast to federal expenditure, which is mostly driven by capital investments (figures 8.3 and 8.4). Between 2003 and 2014, the average total capital expenditure for state governments in the water sector was around 0.11 percent, and the average recurrent expenditure represented 0.10 percent of GDP (see figure 8.6).

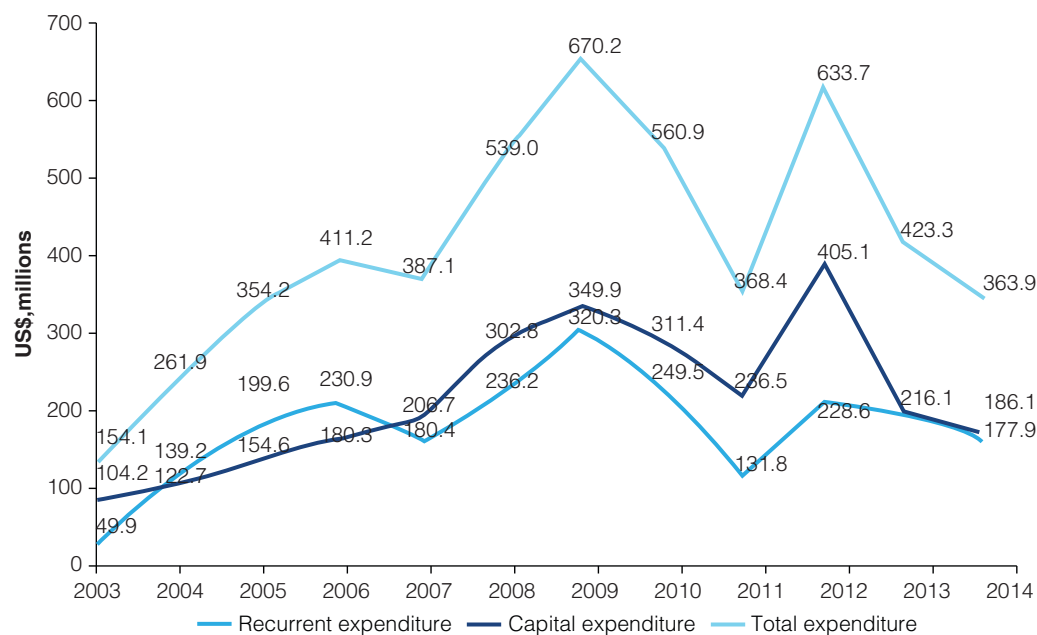
The average total expenditure of the state governments in the water sector between 2006 and 2010 amounted to 0.26 percent of GDP (figure 8.7). Average capital expenditure was around

Figure 8.4: Federal Government Recurrent, Capital, and Total Spending in Water, as Percentage of National GDP, Nigeria, 2006–10



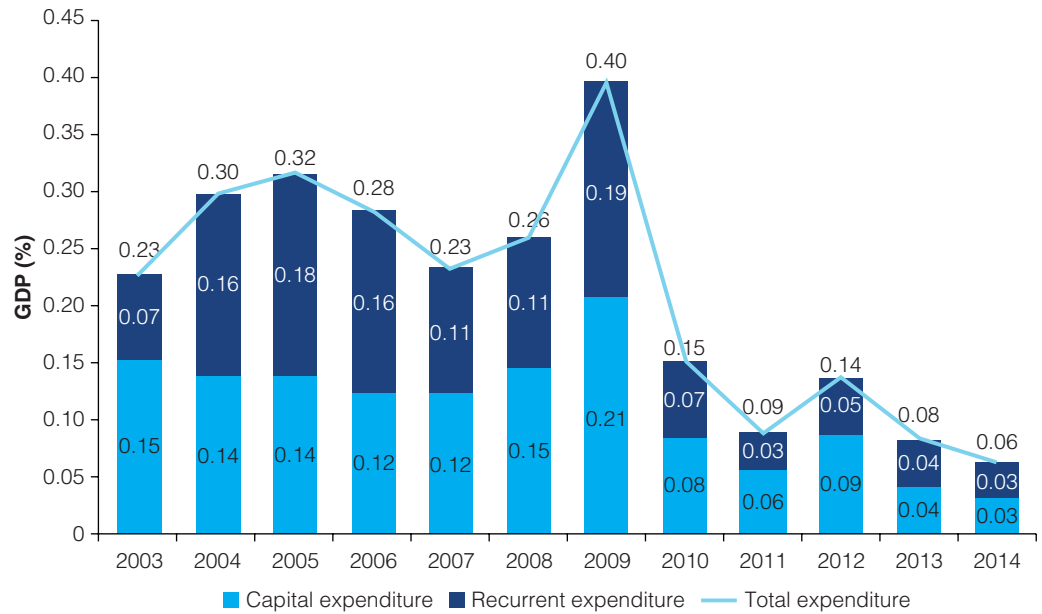
Sources: CSEA 2010 for the federal expenditures; WDI 2016.
 a. Values for the year 2010 are budgeted, not actual.

Figure 8.5: State Governments' Recurrent, Capital, and Total Expenditure in Water Supply, Nigeria, 2003–14



Sources: CBN 2007, 2008, 2009, 2011, 2013, 2014; WDI 2016.
 Note: CBN data comprise 36 states and the Federal Capital Territory. Water supply covers the collection, purification, and distribution to household, industrial, commercial, or other users. It excludes irrigation system operation for agricultural purposes; this is overseen by the Ministry of Water Resources and Rural Development.

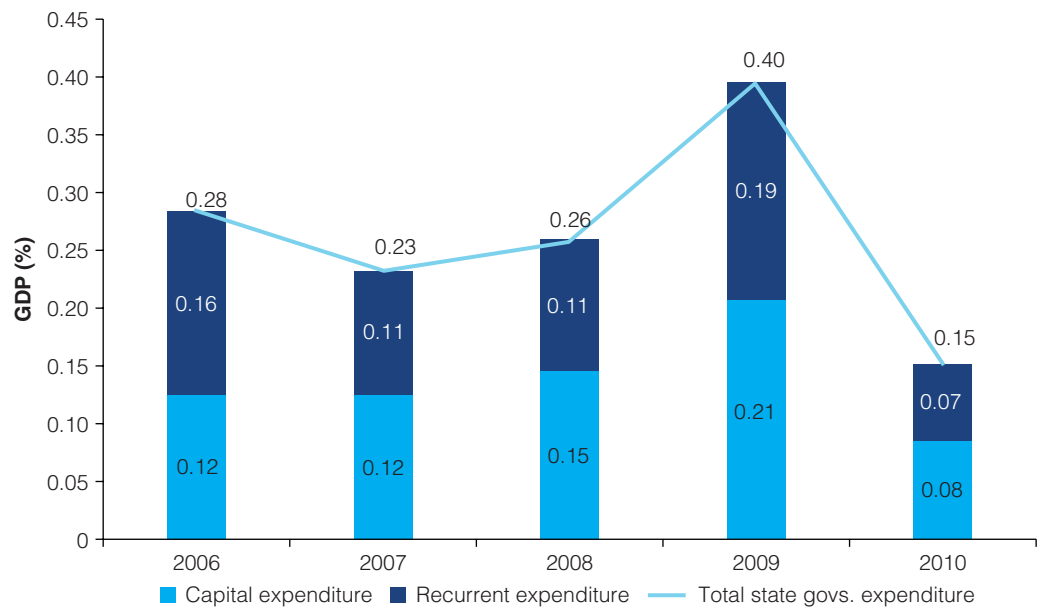
Figure 8.6: State Governments' Expenditure on Water, Disaggregated by Capital and Recurrent Expenditures, Nigeria, 2003–14



Sources: CBN 2007, 2008, 2009, 2011, 2013, 2014; WDI 2016.

Note: CBN data comprise 36 states and the Federal Capital Territory. GDP in current LCU and in nominal values for the state government expenditures.

Figure 8.7: State Governments' Expenditure on Water, Disaggregated by Capital and Recurrent Expenditures, Nigeria, 2006–10



Sources: CBN 2007, 2008, 2009, 2011, 2013, 2014; WDI (2017).

Note: CBN data comprise 36 states and the Federal Capital Territory. GDP in current LCU and in nominal values for the state government expenditures.

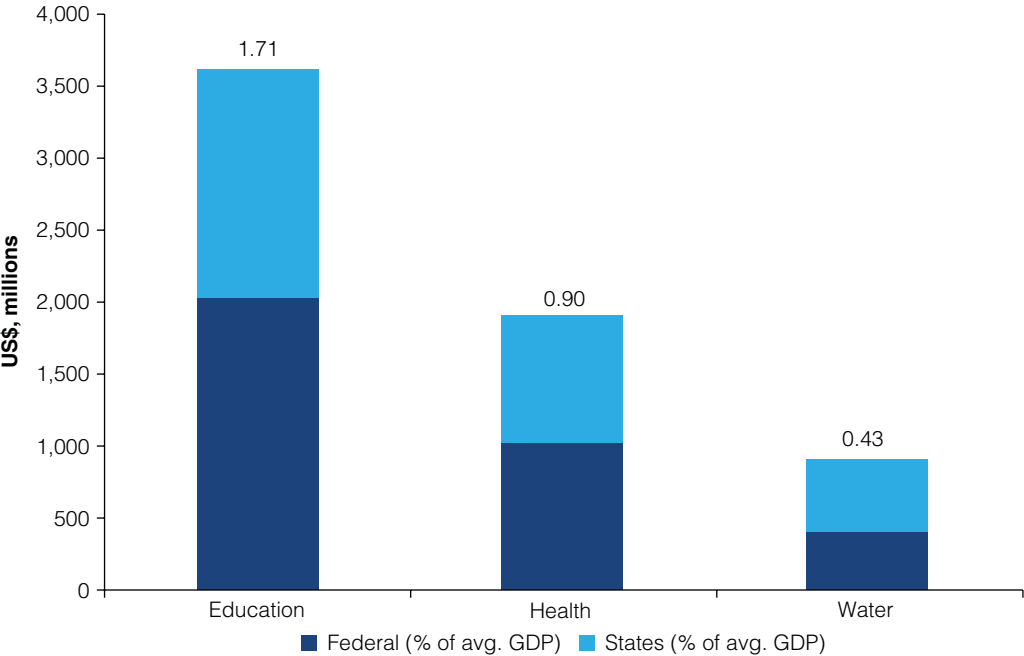
0.14 percent and the average recurrent expenditure represented 0.13 percent of GDP—showing a more even distribution between capital and recurrent expenditures. We do not find significant differences in the percentages for both periods analyzed in this section (2003–14 and 2006–10), despite the difference in the number of years covered for each period.

Urban areas and drinking-water services receive a disproportionate amount of WASH funding. Nigeria has laws recognizing the right of all citizens to water and sanitation, and it has a universal “access for all” policy. However, funds are reported to be mainly directed to urban areas and drinking water services, whereas the majority of the unserved are concentrated in rural areas and most lack sanitation services.¹⁰ In 2014, 81 percent of WASH funding went to urban areas, and only 19 percent was destined for rural areas. Moreover, in 2014, 96 percent of WASH expenditure went to drinking water services, and only 4 percent was devoted to sanitation services (see figure 8.10, panels a and b). A more equal distribution of services between urban and rural areas, and between drinking water and improved sanitation services, is required to help address some of the equity issues surrounding access to WASH services in Nigeria.

Federal and State Governments’ Total Expenditure in Education, Health, and Water

When comparing water sector expenditure with other service delivery sectors, **water expenditure accounts for a smaller share of the GDP than the share of both education and health** (see figure 8.8). The percentage of water expenditure is about half of what both federal and state governments spend on health, and almost a fourth of what they spend on education.¹¹

Figure 8.8: Federal and State Governments’ Total Expenditure in Selected Sectors, Nigeria, Average of 2006–10



Sources: CBN 2007, 2008, 2009, 2011, 2013, 2014 for state governments’ expenditure; CSEA 2010 for federal expenditures.
 Note: Federal expenditures in nominal values. Values for 2010 are budgeted for federal expenditure, not actual. CBN data comprise 36 states and the Federal Capital Territory.

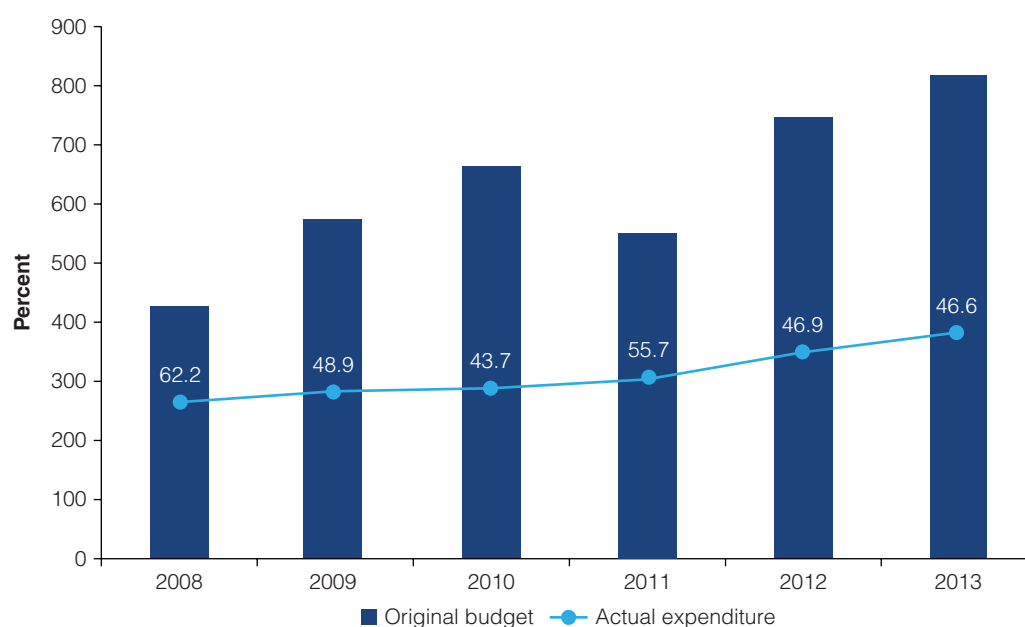
Budget Execution and Efficiency of Public Expenditure

Execution of the Federal budget often suffers from significant delays and deviations. The budget system provides a high degree of discretion to the Accountant General's Office. In particular, problems with timely budget approvals and cash management during budget execution affect capital budgets, with recurrent spending generally being favored.¹² Moreover, approved budget heads are often not equivalent to the amount of funds being made available to MDAs with certainty. Furthermore, two factors in the budget cycle often complicate its execution further: (a) the FMoF has to issue expenditure warrants, which in principle have to be completed on a quarterly basis; (b) and the Accountant General issues mandates to the Central Bank of Nigeria (CBN) to credit the accounts of MDAs, and issues letters of *Authority to Incur Expenditure* (AIEs) to MDAs. Shortfalls in revenues often lead to cash rationing and delays in budget execution.

The process for planning and budgeting at the state level is described in detail in chapter 7. Planning and budgeting processes for the water sector are not well coordinated between tiers of government. A further issue is that credibility of state budgets is low, with spending agencies typically receiving lower allocations than set out in the approved budget. Execution is characterized by discretionary cash rationing, at least partly driven by dependence on unpredictable transfers from the federal government. Limited information on the processes for planning and budgeting at the local government level is available.

Overall, the data on Housing and Community Affairs show that the state budget execution rate for the period 2008–13 averaged at around 50 percent. Although there are no data that focus solely on state expenditure on water supply, the housing and community affairs expenditure includes water supply expenditure. Figure 8.9 illustrates budget execution rates for housing and community affairs by comparing the original budget allocated to projects versus the actual expenditure. The graphs show that only half of the original budget allocated for housing and community affairs was spent.

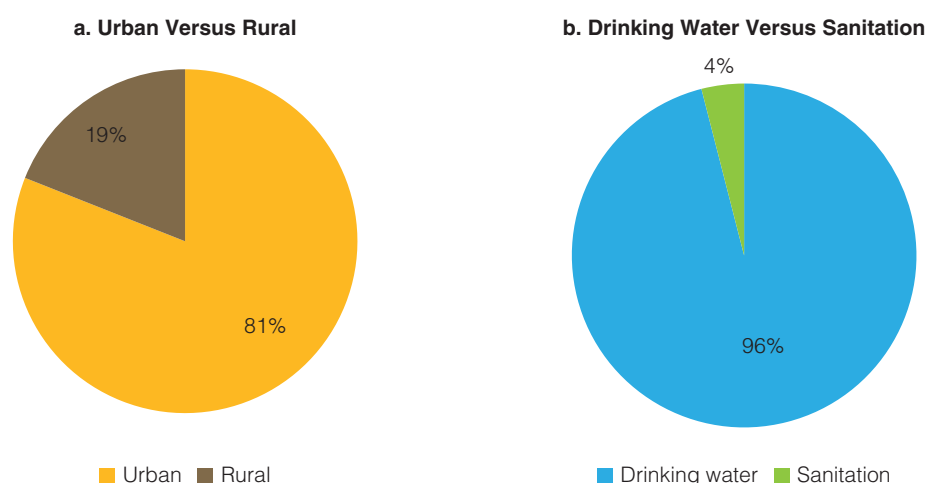
Figure 8.9: Budget Execution Rates for Housing and Community Affairs, Nigeria, 2008–13



Source: Nigeria States' Fiscal Database.

Note: Database includes the 36 states, but no data are provided for the Federal Capital Territory. Housing and community affairs expenditure includes water supply expenditure.

Figure 8.10: Urban Versus Rural and Drinking Water Versus Sanitation Funding, Nigeria, 2014



Source: Nigeria-GLAAS 2015.

Budget execution rates are low for water supply and sanitation, further constraining the sector. Capacity limitations at all administrative levels are among the factors constraining the physical implementation of infrastructure and the effective use of the budget.⁴ As discussed in chapter 7, issues that impact budget execution include overly ambitious goals, delays in the flow of resources, and lack of transparency in the allocation of resources. At the state level, dependence on unpredictable federal transfers and discretionary cash rationing in the governors' office are also key challenges.

To gain a better sense of the limitations behind budget execution, we considered water project completion rates across the country. In 2003 the Nigerian government began a program of sweeping reforms across all major government entities (Nkonjo-Iweala and Osafo-Kwaako 2007), which resulted in the cancellation of US\$18 billion of external debt from the Paris Club. At the federal level, the annual savings from debt interests were channeled into some social programs, and the presidency used this opportunity to track the effectiveness of government expenditure. In 2006 and 2007, the Nigerian government embarked on the Overview of Public Expenditure (OPEN) in the National Economic Empowerment and Development Strategy (NEEDS), known as the OPEN initiative, in which it traced, by project, the use and impact of 10 percent of all federal government social sector expenditures approved in 2006 and 2007 (Rasul and Rogger 2016). The projects selected to be part of the OPEN initiative were to be representative of existing social sector expenditures, but they were also intended to offer preliminary evidence for those projects intended to be scaled-up nationwide (Rasul and Rogger 2016). Under the OPEN initiative, expert teams visited public projects to record the extent to which these had been implemented as planned under the federal budget. The presidency contracted national and regional teams to undertake the monitoring process outside of civil service institutions.

Table 8.1 offers evidence on a series of characteristics related to water-related project completion rates, by type of project. It considers water-related projects traced under the OPEN initiative that were approved in the 2006–07 federal budgets. Boreholes are the most common projects, covering 29 percent of the OPEN projects. Most projects, including water-related projects, are implemented by a wide range of organizations. For example, there are 18 different civil service organizations building boreholes. Boreholes constitute most of the basic elements of rural infrastructure development. The size of the budget allocation reflects

Table 8.1: Descriptive Evidence on Water-Related Project Completion Rates, Nigeria, 2006–07

Project type	Number of projects and (%)	Number of implementing organizations	Median budget allocation (US\$, thousands)	Never started (%)	Average completion Rate (%)	Completed conditional on being started (%)	Fully completed (%)	Satisfactory quality rating (%)
Borehole	1348 29	18	29	44	47	84	37	85
Dam	624 13	14	18	79	15	74	10	50
Canal	76 2	12	347	70	14	45	5	92

Source: Rasul and Rogger 2016.

Note: The “project type” classification refers to the primary classification for each project. Other project classifications exist. The median budget allocation is in US\$, thousands (assuming an exchange rate of US\$1: ₦150). The sample of projects covers those with a positive budget allocation and for which the proportion completed evaluation variable and management scores are available. The project quality variable is not available for all projects. Figures are rounded to two decimal places where relevant.

Box 8.2: Public-Private Partnerships (PPPs) for the Water Sector in Nigeria

Nigeria’s National Water Supply and Sanitation Policy, approved in 2000, encourages private-sector participation and envisages institutional and policy reforms at the state level. However, little has happened in both respects. Only five of the 37 states—Lagos, Cross River, Enugu, Kaduna, and Ogun—began to introduce PPPs in the form of service contracts, but the responsibility of the private sector remains separate from that of the public sector, and is often limited to operating infrastructure. While the government has adopted a decentralization policy, little actual decentralization has happened. The capacity of local governments to plan and carry out investments, or to operate and maintain systems, remains low despite efforts at capacity development.

Given the reduced fiscal capacity of the Nigerian government and the large constraints it faces in its use of public resources, the government should reconsider turning to the private sector as an additional source of funding for WASH services.

There are several reasons why the Nigerian government should consider PPPs for the delivery of WASH services in the country: (a) PPPs are a way to introduce private sector technology, innovation, and operational efficiency to public service delivery; (b) they impose budgetary certainty by setting present and future costs of infrastructure projects over time; (c) they are a means for developing local private sector capabilities through joint ventures with large international firms, as well as subcontracting opportunities for local firms in areas such as civil works, facilities management, security services, cleaning services, and maintenance services; (d) PPPs are a path for gradually exposing state-owned enterprises and government

box continues next page

Box 8.2: Continued

to increasing levels of private sector participation (especially foreign) in a way that facilitates the transfer of important skills; (e) they make the country more competitive in terms of its infrastructure base, as well as by giving a boost to businesses and industries associated with infrastructure development (e.g., construction, equipment, and support services); (f) they supplement limited public sector capacities to meet the growing demand for infrastructure development; and (g) they extract long-term value-for-money through appropriate risk transfer to the private sector over the life of the project—from design and construction to operations and maintenance (O&M).

Given the many potential benefits of greater integration of the private sector into the WASH service delivery, policy makers should more substantially consider the use of PPPs for improving the delivery of WASH services throughout Nigeria.

the scale of the projects. For instance, the median budget for dams is US\$18,000, while the median budget for a canal is US\$347,000. The fact that projects are of relatively small scale is part of the reason why multiple organizations are implementing similar projects.

The proportion of projects for the construction of boreholes that were never started is 44 percent, and the proportions are even higher for canal and dam projects—70 percent and 79 percent, respectively. Moreover, only 37 percent of borehole projects are fully completed, and the proportion is even smaller for dam and canal projects, in which only 10 percent and 5 percent, respectively, are completed. While this may point to issues of corruption or passive waste, these are not likely to be the only explanations behind the poor quality and quantity of public service delivery. As the last column in the table 8.1 shows, the majority of completed projects are rated as satisfactory. These numbers imply that there may be important factors at the organizational level that explain variation in the quality and quantity of public service delivery in Nigeria.

Concluding Remarks

The level of expenditure for WASH in Nigeria is low. In particular, capital expenditure (averaging 0.32 percent of the GDP in the 2006–10 period) has fallen short in comparison to estimates for the region (0.7 percent of GDP). Nigeria needs to at least triple its level of capital investment in WASH to compare to its well-performing regional counterparts, and thus meet the necessary standards to ensure the availability and sustainability of water and sanitation for all citizens.

The efficiency of public expenditure should be enhanced. As illustrated by the poor level of budget execution rates, and by the unsatisfactory project completion rates, there is considerable space to improve the quality of expenditure of allocated resources; in particular, a deep analysis of bottlenecks to public investment management for water and sanitation may reveal areas in which institutional bottlenecks can be revealed and institutional capacities strengthened. Given the Nigeria's challenging macrofiscal outlook, state governments in particular need to explore ways to increase the resource envelope for water supply. One avenue is to implement an updated water pricing and financing structure to allow for a more effective service cost-recovery process, and for more substantial budget support to pent-up investment and renewal needs.

To maximize the provision of quality public service delivery in Nigeria, the government needs to ensure that more water and sanitation projects are completed, and that they are completed in a satisfactory manner. The current level of investment will certainly limit the likelihood of Nigeria achieving the new SDGs for clean water and sanitation. Thus, the government needs to find better ways to finance public investment. A larger share of resources focused on WASH services, a greater level of efficiency in budget expenditure, and greater integration of the private sector into the water and sanitation sectors, are required to help Nigeria move closer to achieving the SDGs in water and sanitation.

Notes

1. Nigeria-GLAAS 2015 database, http://www.who.int/water_sanitation_health/monitoring/investments/glaas/en/.
2. In 2015, President Buhari removed budget responsibilities from the Federal Ministry of Health (FMoF) and transformed the National Planning Commission (NPC) into the new Federal Ministry of Budget and National Planning, in charge of producing the 2016 budget and a three year (2017–19) budget plan for the country.
3. In Nigeria, the fiscal year covers the period from January 1 to December 31.
4. Under the current government, elected in 2015, budget functions have been removed from the FMoF and incorporated within the former NPC, which is now a ministry—the Ministry of Budget and National Planning.
5. Revenue sharing arrangements between the federal and state governments, under which a guaranteed share of revenues is passed to subnational governments, are deeply politically entrenched in Nigeria. These arrangements have militated against either the linking of fiscal transfers to accountability and performance, or arrangements for stabilising revenues in the face of oil price fluctuations (OPM 2015).
6. In 2015, budget responsibilities were removed from the FMoF and incorporated within the former National Planning Commission (NPC), which is now a ministry—the Ministry of Budget and National Planning. Since 2016 is the first budget process carried out in this new format, it is still unclear if the processes have been altered or still remain.
7. Budget responsibilities have been removed from the FMoF and incorporated within the former NPC, which is now a ministry—the Ministry of Budget and National Planning.
8. Nigeria-GLAAS 2015 presents an annual national budget for WASH in Nigeria of US\$587 million; the GLAAS report seems to show numbers for 2013 using the 2013/2014 country survey cycle. See Nigeria-GLAAS 2015 database, http://www.who.int/water_sanitation_health/monitoring/investments/glaas/en/. This number is similar to what the CBN presents for the state governments in 2010, which is US\$561 million. In 2013, this number is US\$432 million and in 2014 it is US\$364 million (see figure 8.5).
9. In 2015 prices.
10. Nigeria-GLAAS 2015 database, http://www.who.int/water_sanitation_health/monitoring/investments/glaas/en/.
11. Note that the percentage of expenditure on water in this section (0.43 percent) varies with that provided in the first section (0.47 percent). The reason is that in the first section, the expenditure as a percentage of GDP for each individual year between 2006 and 2010 was first computed, and then the average was obtained for the 2006–10 period, whereas in this section, the simple average was first computed using the annual dollar quantities spent for 2006–10, and then that average was computed into a percentage of the GDP. This method was used for the purposes of this section, since the data obtained for the education and health sectors were more limited and not as disaggregated as that for the water sector. Therefore, it was easier to compute expenditures and percentages of GDP in this manner for the purposes of comparing these three sectors.
12. Nigeria-GLAAS 2015 database, http://www.who.int/water_sanitation_health/monitoring/investments/glaas/en/.

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Chapter 9

Institutional Landscape for Urban Water Supply in Bauchi City

Key Takeaways

- **Citizens in Bauchi City perceive piped water to be more affordable (on a monthly basis) than other sources, piped water is believed to be of good quality, and residents would be willing to pay official connection fees to access piped water.** However, perceived barriers to connecting are high: these include quotes for connection fees that are higher than official rates; the need to cover material and labor costs; difficulty negotiating access or paying for permission to cross neighboring properties or nearby roads; and terrain issues, such as the need to buy and operate booster pumps in hilly areas.
- **Evidence points to two distinct areas of policy intervention: strengthening the delivery of publicly provided water, and strengthening the relationship between informal water suppliers and the Bauchi State Water and Sewage Corporation (BSWSC).** Strengthening financial planning and budgeting, as well as budget execution, will be crucial to advancing investments in infrastructure. A better understanding of the budget cycle—from planning to execution—will uncover key bottlenecks for the effective disbursement of the funds allocated by the state government to the BSWSC. Improving the strategic allocation and reliability of these funds is crucial for improving the BSWSC’s ability to plan and fund future reforms.

Objectives, Scope, and Methodology

This chapter illustrates how national challenges play out in a specific state by exploring the institutional and organizational landscape for urban water supply in Bauchi City. Nigeria is administered through a complex and ever-evolving federal structure, with a diverse political and institutional landscape. While certain structures and policies related to water supply prevail throughout the country, there is a great deal of variation in the management and provision of water across jurisdictions (Macheve et al. 2015). Bauchi State performs relatively well compared to other states in Nigeria, and therefore gives an indication of the upper bound of what is currently being achieved in the urban water sector. Further, it is one of three priority states under the World Bank-supported Third National Urban Water Sector Reform Project (2014) and was selected by the Federal Ministry of Water Resources (FMWR) for deeper examination.

The chapter draws on fieldwork carried out in Bauchi City, which aimed to understand the institutional bottlenecks to improving publicly provided water; assess the organization and

dynamics of informal service chains; and identify household willingness to pay for publicly provided water. Fieldwork relied on qualitative methods covering well-off areas with relatively reliable access to publicly provided water (Anguwan Albasa); poorer unplanned settlements (Kandahar); and areas with a mix of formal and informal suppliers (Old Town). Data were collected through focus group discussions with households, as well as interviews with informal providers and senior officials in the water sector.

Policy Context and Formal Institutional Architecture for Publicly Provided Water

The Bauchi State Ministry of Water Resources, created in 1996, oversees the two key state water agencies, the Bauchi State Water Board (BSWB) and the Bauchi State Rural Water Supply and Sanitation Agency. The Ministry of Water Resources is assigned responsibility for policy formulation, policy coordination, research and development; it also serves as a liaison with the federal, state, and local governments; donor coordination; and similar high-level issues. It oversees the functioning of the BSWB and BSWSC and facilitates funding from the government.

The mandate of the Rural Water Supply and Sanitation Agency (RUWASSA) is the provision of water, sanitation, and hygiene (WASH) services to all communities outside the state capital and local government headquarters. The staff of the RUWASSA was drawn from the Ministry of Water Resources, BSWB, and the Ministry of Rural Development when it was created in 2009. The RUWASSA of Bauchi has a strong relationship with eight local governments: it works with WASH units of the local government areas (LGAs), and in communities it establishes and works with community-based water, sanitation, and hygiene committees (WASHCOMs). In some cases, the Bauchi RUWASSA provides boreholes in remote areas of the city if there is no formal water supply.

The BSWB was established in 1998 as the Bauchi State government agency responsible for the supply of water for domestic, commercial, and industrial use to all urban areas. The 2011 Bauchi Water, Sanitation, and Hygiene Policy set out the objective of supplying potable water to all residents (Bauchi State Government 2011), and the transformation of the BSWB into the autonomous, commercially oriented BSWSC began in 2012.

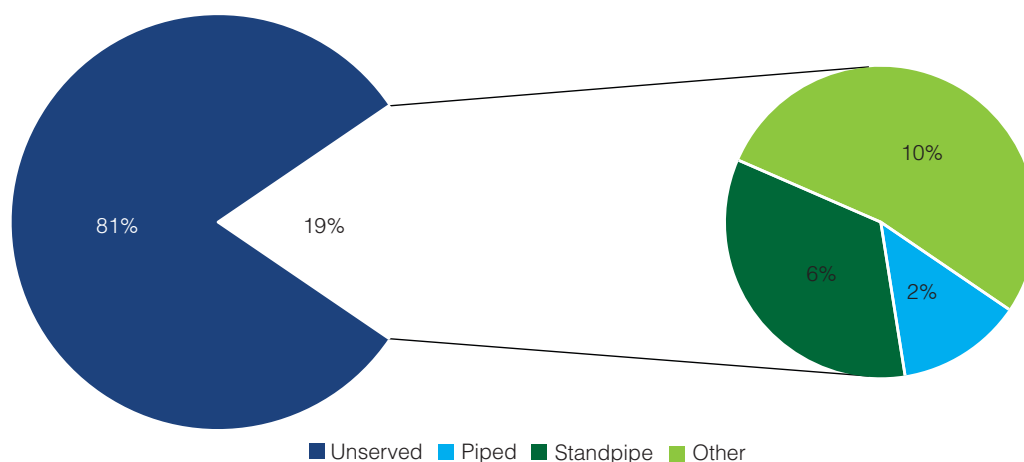
The Bauchi State Urban Water Sector Law, which came into effect in 2014, formally established the BSWSC and outlined its institutional and regulatory framework.¹ BSWSC supplies potable water to domestic, commercial, and industrial consumers in the urban areas of Bauchi State. There are 20 LGAs in the state, and all these LGAs are viewed as urban areas, making BSWSC effectively responsible for the supply of water to all the LGAs in the state.

Although reforms articulated in the Bauchi State Urban Water Sector Law offer a promising institutional architecture, they have not yet translated into substantial changes to how the system works in practice. For example, interviews with the manager of the BSWSC indicated that very few steps have been taken to revamp the structure of the corporation to enable it to perform its functions.

Provision and Production of Urban Water in Bauchi City

The BSWSC provides water supply service in four out of Bauchi State's 20 LGAs; it serves less than 19 percent of the population for which it is responsible. Only 13 percent of the people served have piped water connections (2 percent of the state population); 34 percent are supplied through standpipes (6 percent of the state population); and the

Figure 9.1: Proportion of Population Living in an Urban Local Government Area Served by BSWSC, Nigeria, 2014



Source: World Bank 2014.

Note: BSWSC = Bauchi State Water and Sewage Corporation.

remaining are served through alternative means such as water tankers (OPM 2017). Households account for 49 percent of the BSWSC's distribution (OPM 2017). Industrial institutions account for 22 percent, public institutions for 17 percent, and public standpipes for 11 percent (OPM 2017).

Only a small minority of areas in Bauchi City have water supply for 12 hours or more per day, with a majority of the city only benefitting from supply between zero and six hours a day (OPM 2017). Of the population with a household connection, only 39 percent benefit from running water between one and three days every week, and 58 percent benefit from running water between one and four days every week (OPM 2017).

As is the case in the rest of the country, self-supply is common. In Bauchi City, the informal private sector consists of cart vendors sourcing water from BSWSC pipes, shallow wells, free public stand posts, and boreholes, as well as tanker trucks relying on BSWSC collection points. Beyond the informal private sector, citizens rely on ground water or rainwater, sachet and bottled water, and private boreholes (figure 9.1).

Key Functions in Publicly Provided Urban Water

Planning and Budgeting

The BSWSC's budget is prepared by the state government on the basis of proposals made by the state water authorities (SWAs). These proposals are usually submitted during the third quarter; they must include the approved budget of the current fiscal year, as well as actual expenditures up to June. Allocations to the BSWSC are made on the basis of the previous year's budget with additions for the coming year. The State Ministry of Budget and Planning calls for budget defense toward the end of the year. Agreed allocations to recurrent (e.g., operations and maintenance [O&M]) and capital (e.g., infrastructure investments) expenditure are then reflected in the state capital budget.

The Bauchi State Urban Water Sector Investment Plan (2014–18) complements the state budgetary process. Developed in 2013 with assistance Sustainable Water and Sanitation in Africa (SUWASA) project (funded by the U.S. Agency for International Development [USAID]), this plan provides an approximation of the investment requirements for the urban water sector. It studies the existing funding arrangements, as well as needs for capital, operational, and maintenance expenditures. The document suggests that between 2014 and 2017, US\$10.6 million would be required to restore all existing systems to functionality and US\$124.4 million would be required to meet the capacity gap.

Financing

Table 9.2 sets out the Bauchi State WASH policy principles for public expenditure in the water sector. For urban water, the policy envisions the largest share of capital expenditure (60 percent) and all of the operating and maintenance expenditure being financed by state institutions, including tariffs collected by the BSWSC. For rural water, the policy envisions half of capital expenditure coming from the federal government, with the remaining amount covered by states (25 percent), LGAs (20 percent), and communities (5 percent). The policy envisions the largest share of operating and maintenance expenditure coming from communities (70 percent), with the remaining amount split between states (10 percent) and LGAs (20 percent).

As is true with data nationally, accurate data reflecting the actual share of expenditure on capital investments and recurrent costs across these actors are unavailable. However, NWSS (2015) data reflecting the sponsor of water points and schemes provide a notional idea of the distribution (see table 9.3). Notably, between 2000 and 2015, communities sponsored no water infrastructure. Actors not included in the Bauchi State WASH policy—such as nongovernmental organizations (NGOs), community-based organization (CBOs), philanthropists, and donors—sponsored 15 percent of water points and 12 percent of water schemes.

Table 9.1: BSWSC Annual Budgets, Bauchi State, Nigeria, 2013–16

Naira

	2013	2014	2015	2016
Recurrent	276,324,000	471,773,210	455,558,910	361,762,334
Capital	1,635,800,000	1,180,000,000	1,931,055,000	3,953,372,666
Total	1,912,124,000	1,651,773,210	2,386,613,910	4,315,135,000

Source: Based on annual state budgets; BSWSC.

Note: Data reflect planned expenditure, not budget releases. BSWSC = Bauchi State Water and Sewerage Corporation.

Table 9.2: Public Expenditure Principles for the Water Sector, Bauchi State, Nigeria, 2011

Percent

Agency	Rural Water Supply		Small Town Water Supply		Urban Water Supply	
	Capital	O&M	Capital	O&M	Capital	O&M
Federal government	50	0	50	0	30	0
State government	25	10	30	0	60	100
Local government	20	20	15	50	10	0
Community	5	70	5	50	0	0

Source: BSG 2011.

Note: O&M = operations and maintenance.

Table 9.3: Water Points and Schemes in Bauchi State, by Sponsor, Nigeria, 2015
Percent

	Federal	State	LGA	Donor	NGO, CBO, philanthropist
Water Points	44	32	8	7	9
Water Schemes	63	21	3	5	7

Source: NWSS 2015.

Note: CBO = community-based organization; LGA = local government area; NGO = nongovernmental organization.

The BSWSC finances its expenditure through tariff collection, state government allocations, and external funding from development partners. According to the Bauchi State Urban Water Sector Law (2014), BSWSC has autonomy over its revenue for operation and maintenance and is expected to cover operation and maintenance expenditures. In practice, poor tariff collection makes the SWA dependent on state disbursements to undertake expansion, construction, and repair of the water network. BSWSC revenue collection covers only 10 percent of operation and maintenance costs supply; this revenue is deposited in a special ring-fenced account. External funding from development partners, including from the World Bank, represents a substantial complement to state government contributions.

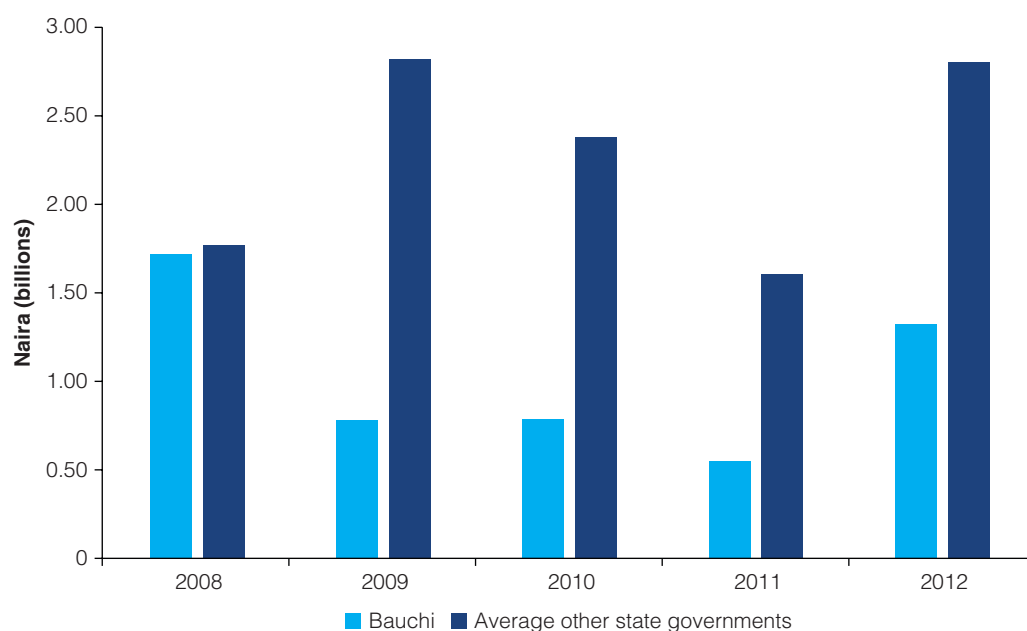
The difference between state budget allocations to water supply and budget outturns is large and growing. While actual expenditure on water supply in Bauchi was relatively close to the average state expenditure on water supply in Nigeria in 2008, it dropped well below the average between 2009 and 2012 (see figure 9.2). Actual expenditure against the approved budget for BSWSC decreased from 17 percent in 2013 to 4 percent in 2015. Bauchi State expenditure for Housing and Community Affairs, which includes water supply, has ranged from 2.7 percent to 9.3 percent of the approved budget between 2009 and 2013. During interviews, stakeholders attributed low execution of water supply budgets to the fact that more politically visible, “quick win” projects are given priority. Given that elections are held every four years, officials favor projects that can be planned, designed, and constructed within their term in office, such as roads.

Tariff Setting and Collection

The State Ministry of Water Resource Management (SMWRM) and the BSWSC are both assigned a role in setting tariff structures. According to the Bauchi State Urban Water Law (2014),² the State Ministry of Water Resources ensures that the BSWSC operates using sound commercial practice by issuing a State Tariff Policy and Regulation. On the basis of this policy, the BSWSC is expected to review water rate scales annually after consulting with consumers and carrying out a tariff assessment for planning purposes. The BSWSC’s proposed tariff structure shall be submitted to the SMWRM for approval. De jure, there seems to be a clear distinction between the roles of the FMWR and BSWSC. However, in practice much of the policy formulation and policy coordination functions rest with the BSWSC.

Tables 9.4 and 9.5 set out the prevailing connection fees and tariff structure in Bauchi, which was last reviewed in 2008. During field visits, neither the State Ministry of Water Resources nor the BSWSC could explain how the water rates were determined in 2008. Although the BSWSC has recently developed a new tariff structure with support from the USAID SUWASA program, it has yet to be adopted or implemented. The prevailing structure sets out a fixed connection fee based on pipe size, as well as fees to cover the cost of pipes and digging trenches. In practice, BSWSC clients must also cover the price of pipes and digging of the trench, increasing the cost of connection the further away one lives from the main piped network.³ These additional charges can make connection costs range from ₦8,200 to

Figure 9.2: Comparison of Bauchi with Other States' Average Expenditure on Water Supply, Nigeria, 2009–12



Source: Nigeria States Fiscal Database.

Note: Includes State Ministry of Water Resources, SWB, RUWASA, and WATSAN. RUWASA = Rural Water Supply and Sanitation Agency; SWB = State Water Board; WATSAN = water and sanitation.

Table 9.4: Government-Approved Connection Fees, BSWSC, Nigeria, 2009
Naira

Pipe Diameter (inches)	Pipe length (inches)					
	3	4	6	8	12	16
½	2,700	3,000	3,150	3,750	3,900	4,200
¾	4,200	4,950	5,250	5,550	5,850	7,500
1	4,950	5,025	5,400	5,850	6,000	12,000
1¼	—	—	6,000	7,000	8,250	21,000
1½	—	—	9,150	9,600	15,750	25,500
2	—	—	10,500	13,650	20,250	36,000
3	—	—	—	150,000	225,000	300,000
4	—	—	—	—	400,000	600,000

Source: BSWSC.

Note: BSWSC = Bauchi State Water and Sewerage Corporation; — = not applicable.

Table 9.5: BSWSC Tariff Structure, Bauchi State, Nigeria, 2009

Naira

Type of customer	Tariff charged by BSWSC
Domestic high, medium, and low density	500, 750, and 1,000 per month, respectively
Water rate (metered)	200/m ³
Sales of water (to tanker ticket)	2,000/trip
Connection application form	250/application
Construction sites	30,000/month
Car wash sites	30,000/month
Block making Industries	35,000/month
Institutions	20,000/month
Reconnection charges	1,500 and 3,000
Length of connection pipes	500/length

Source: BSWSC.

Note: BSWSC = Bauchi State Water and Sewerage Corporation.

₦21,000 (US\$26 to US\$68) in practice. With regard to monthly tariffs, commercial clients such as car wash sites, construction sites, and block making industries are assigned a higher tariff than public institutions (table 9.5). In principle, customers are to be billed a flat amount once a month.

Revenue generated through tariff collection has declined between 2011 and 2015. While the total billed amount increased during this period, the revenue collected declined. The Bauchi Water Board currently bills 18,000 customers; another 22,000 customers are believed to be connected to the water system but are not registered in the billing system; and no customers are metered. The BSWSC's revenue to billing ratio dropped from 22 percent in 2011 to just over 8 percent in 2015. A particular challenge has been the loss of revenue from major customers in the region. LGAs in the state stopped paying water rates for standpipes and their institutions due to a drop in local government receipts from federal allocations. Hospitals, the police and military, a local university, the Central Bank of Nigeria (CBN), and all state institutions are among other customers that have reduced or completely stopped payment of monthly bills.

BSWSC Human Resource Management, Monitoring, and Accountability

Formally, the BSWSC is governed by a board of directors appointed by the governor of the state; in practice, the board is frequently dissolved. The members of the governing body include a chairman, a managing director, a representative of the Ministry of Water Resources, a representative of the Bauchi State Chamber of Commerce, the Consumer Protection Council and other consumer advocacy groups operating in the state, a representative of the local government chairmen, and one other person with experience or specialization in water or in business who is capable of making contributions. Though policy specifies a four-year tenure for board members, the board has been dissolved by multiple incoming governments of the state. The current government also dissolved the board governing the BSWSC when it came to power in mid-2015, and a new board has yet to be reconstituted.

The BSWSC is managed by a team consisting of the general manager as the chief executive officer and four assistant general managers. Each of these managers oversees a department

(the Commercial Department, Finance and Accounts, Administration and Human Resources, and Operations and Maintenance). The activities of the BSWB are overseen by the state commissioner of Water Resources. Interviews with key informants suggested that given the complex organizational structure, decision making can be slow and coordination between these different departments is problematic.

Corporation staff members are civil servants hired by the state government. There were 306 staff mapped to the BSWSC in 2011, and this gradually increased to 412 in 2015. From 2015, the state government stopped recruiting full-time staff and recruits only casual workers on an as-needed basis. Many key stakeholders interviewed indicated that the capacity of state government officials to understand the water sector and relevant problems is very low. Staff capacity at the middle and lower levels within the BSWSC is also poor. The staff capacity issue is exacerbated by the fact that the BSWSC cannot employ or fire staff, and is therefore unable to independently build additional capacity or sanction poor performance.

The 2014 Bauchi Urban Water Law sets out the expectation that the BSWSC will operate on a performance-based contract with the state government, overseen by a performance contract monitoring and review commission. The objective is to incentivize BSWSC employees to fulfill the SWA's standards and targets. As of late 2016, implementation of this policy had not taken place.

The state has yet to establish a regulatory commission for its water corporation, nor are there signs that other state institutions are taking up key regulatory or oversight functions. The lack of incentives for regular monitoring and regulation is exemplified by the absence of a regulatory commission for water provision in Bauchi State. The establishment of an independent regulator could open the state government and water corporation to criticism, and in the absence of any perceived benefit to the state, this presumably acts as a disincentive for its creation.

Formal responsibility for monitoring water quality is assigned to the Federal Ministry of Health (FMoH), but in practice it does not play this role. According to the Nigerian Standard for Drinking Water Quality (ICS 13.060.20) the FMoH is responsible for drinking water quality surveillance and enforcement. The ministry was expected to issue strategies and procedures that would be implemented by a Division of Water Safety. Given that the FMoH has not played its surveillance role in practice, a revised policy is being drafted to shift the surveillance role to the FMWR.

Organization of the Informal Private Sector

A common supply chain in Bauchi City is for the informal private sector to distribute water from the piped network. Water sourced by the BSWSC is treated and then enters the pipe network. Private vendors enter into formal contracts with the BSWSC and connect to their pipe network. The collected water is stored in reservoirs or tanks, and sold through informal transactions to cart pushers who then sell the water onward to households. No receipts are normally offered for these transactions.

A second type of supply chain involves private vendors sourcing their water from open wells, which they have drilled using private contractors. In these instances, the water is not treated. The water is sold by private vendors to cart pushers through informal transactions. In certain areas cart pushers source the water directly from open wells, omitting the private vendor step.

In certain areas, cart pushers source their water from BSWSC burst pipes. Occasionally, associations form around these burst pipes, with different types of providers selling the water. For example, in one case, an open water source was created by the failure of a BSWSC pipe or valve. This open water source was used for washing clothes, both as a business by washer

men and directly by the surrounding households. Eventually, an association of washer men had formed. The Washmen Association is an informal business that operates at this open valve, charging fees for the collection of water and providing facilities for washing and drying clothes. The BSWSC recognizes the association and even provided them with standpipes to ensure better access to cleaner water. It also serves as the point of contact between the BSWSC and users in the region.

A further value chain is cart vendors sourcing their water from public standpipes. This type of value chain is particularly popular in areas where most households do not have a connection and reside quite far from the main connection point. Some public standpipes exist, and cart pushers travel to collect water from them and sell to the households in the area.

Some cart vendors source their water from boreholes. The water is sourced from private boreholes, drilled by private contractors, and not registered. The water is then pumped by an association that sells it informally to cart pushers. The latter then distribute the water to households for storage and consumption. A variation of the supply chain occurs when cart pushers source their water directly from boreholes.

Tanker truck drivers usually purchase water directly from sales points maintained by the BSWSC. They usually enter into formal agreements with the BSWSC. In some cases, the water is delivered directly to households. The tanker trucks' major customers, however, are industrial firms. Alternatively, tanker trucks sell to sachet factories that then distribute sachet water to consumers. Sachet water factories were particularly popular a few years ago, but are more difficult to find now. The factories supplied drinking water at convenience because in the absence of a BSWSC supply, alternative sources could not be trusted for drinking. However, the costs of production of sachet water have gone up considerably in Bauchi and elsewhere, and competition from areas with better ground water quality have taken over the market.

Citizens' Perceptions: Urban Water in Bauchi State

A consequence of the poorly maintained and geographically limited water infrastructure is that consumers may not have the option to connect to the piped supply or may be making a conscious choice not to connect or not to pay. This section presents a snapshot of citizens' strategies for accessing water in Bauchi City, their perceptions of who is responsible for water supply, and their experience with the BSWSC and connecting to the piped water supply. Evidence was gathered through focus group discussions and key informant interviews in Bauchi City between October 2016 and February 2017.

Accessing Water in Bauchi City

Evidence from fieldwork suggests that reliance on the informal water market is highest in areas of Bauchi City where there is no formal supply or a mixed supply. In these areas, the informal market responds to demand arising from the long-term unavailability of piped water and seasonal scarcity of free ground and rainwater sources. Similarly, in areas with no piped supply, the informal market responds to demand for water when free sources are scarce. Water vendors provide a redistribution service by fetching water from areas that continue to have tap or groundwater even, in the dry season. In areas where everyone has a household connection to the piped supply, the informal market responds to demand that arises from interruptions in piped supply or dissatisfaction with piped water quality.

Given limited access to piped water services, as well as water quality and seasonal availability problems with free water sources, people seem to have little choice but to buy from informal vendors. Respondents complained of the limited coverage and supply of BSWSC piped services, and while free well, borehole, tap, or rainwater was generally seen to have the advantages of

affordability and easy accessibility, these sources were often reported to be of inferior quality and become unavailable in the dry season. As such, people would then purchase jerry cans or packaged water to fulfill their household and consumption needs, if financially viable.

Focus group participants felt that those who buy water from informal providers end up paying more than what they would be billed for water from piped connections to the formal water supply. As one individual summarized, “...the person who is without a piped water connection definitely spends more money. Take for instance the number of people you have in your household, if you have say 10 people in your house, you might spend up to 600 naira daily buying water compared to those who only pay once in a month.”⁴

Fieldwork suggests that availability is a primary criterion for selecting a water source, because it lays the foundation for possible choices. It was widely agreed that water availability is less of a problem in the wet season. Generally, it was reported that during the rainy season tap water and groundwater from wells and boreholes are more available and of better quality. During the wet season, rainwater is the preferred choice for drinking and domestic uses because it meets all criteria: it is freely available, accessible close to home, and widely reported to be of better quality than other sources. However, water scarcity is a problem in the dry season, when most turn to informal providers.

Within the bounds of what is available, affordability is a further criterion for selecting water source. People generally expressed desire to have a sufficient quantity of what they perceived to be the best quality water, but their choice was always constrained by what they could afford. Even in the wealthiest area where focal group discussions (FGDs) were held, people were constrained by costs—these respondents agreed that bottled water was the best quality for health and taste, but none said they could afford to drink it regularly. In other areas, it was widely agreed that sachet water (pure water) was wanted for health and taste reasons but was not always affordable. Even jerry can vendor water was said to be unaffordable sometimes. One man from Kandahar said succinctly, “If you don’t have money to buy it, you can’t get good, clean water.”

Accessibility was expressed as another key criteria governing water choices. The main aspect of accessibility mentioned in the FGDs was proximity. The most important function of distributing vendors is that they deliver water to people who would otherwise have to go long distances to access it. Many respondents across the groups said that they send their children to fetch water for them, but sometimes this is not feasible. When nearby sources (e.g., wells, rainwater, in some cases boreholes) are not available, households that can’t fetch water themselves will either pay Islamic students to fetch it, or will purchase from vendors that deliver to them. It was widely reported that ease of access is the primary selling point for the distributing vendors in the dry season. In the wet season, rain and well water are generally the most accessible and people purchase substantially less, when the primary selling point for the water vendors then becomes water quality.

Within the bounds of what is available, affordable, and accessible, respondents reported choosing their water based on its quality. They judged water quality based on appearance (including color, the presence of particles or sediment, algae [referred to as “green particles”], worms or insects, turbidity versus clarity, appearance of the water container); taste (salty, “awful,” chemical-like—e.g., chlorine); and smell (“bad odor,” chemical-like—e.g., chlorine). There were variations between and within groups about which of these aspects was most important, but generally it was agreed that good water is clear, colorless, odorless and tastes pure. Good quality water was desired for a better experience of drinking or otherwise using it and was also linked strongly with health. Variability in the quality of piped, vended, and free water was a recurring theme. Nevertheless, the consensus was that bottled water is acknowledged as the best, followed by sachet water, tap water, borehole water (including tap and borehole water purchased from vendors), and, lastly, well water.

The importance of water quality did differ when usage was considered. “If the well water is not drinkable, then they will buy water to drink and the water from the well will be used

for other activities.”⁵ Generally with water used for domestic purposes, water quality was less of a concern. One exception was when taste or odor was too off-putting for cooking, bathing, or washing. The second exception was that groundwater is not preferred for washing because it is hard and does not lather properly (reported in FG1, FG11, FG12, and FG15).

Residents’ Perceptions: Who Is Responsible for Water Supply?

During focus groups discussions, there was a consensus among respondents that it was the government’s responsibility to ensure the supply of and access to water. People largely believed that provision of water was a part of the government’s “responsibility to the masses.”⁶ Other responses included that access to water was a “right” of the people, and the responsibility for this was shared between the federal and state governments.⁷ Respondents in Rafin Zurfi believed that the government had two main functions: protecting the people and their property, and providing essential social amenities, of which water was a pivotal one. It was envisaged that the federal government could contribute to water provision by complementing and supplementing the actions undertaken by the state government. Respondents in the Kandahar and Rafin Zurfi areas also cited promises made by the elected representatives during elections, in which water supply was promised to the people if they voted the new government in.

Local government, councilors, and community leaders were also believed to be indispensable for access to water. The main reason for this was their closeness to the people, and their ability to take this forward with the relevant state governments, governors, and other authorities. One respondent summarized notes: “if [a community leader] pressurize the government they will provide water. Even if the governor brings the pipes here, if the community head is not serious about it, his own community will not get.”⁸

Respondents in four out of the five sampled areas highlighted the role and responsibility of the community in accessing water. However, the envisaged roles or responsibilities of the community were vague and abstract. Respondents said that if the government sees the individual and community efforts taken then it would respond and do its share in providing access to water. As one respondent summarized, “at least the community can do 5 percent then the government will do 95 percent.”⁹ Respondents also recognized that when the government fails to provide access to water, the community can organize into a community organization and work toward accessing water. One of the respondents highlighted the fact that the community organization could mobilize resources from the people to access water supplies.¹⁰

Some examples of capital investments by nongovernment actors were raised during focus groups. An individual seeking the “blessing of the people” set up a solar-powered borehole, without any assistance from the community or government. However, poor electricity supplies limit the extent to which the borehole can be used. In another case, legislators in the region dug a few boreholes in the area, but these boreholes did not have water. As another example, a community was credited with digging three boreholes and a well in its area, without any assistance from any state agents. Due to maintenance issues, only one of the three boreholes is currently functional, and the community is trying to mobilize resources to repair and maintain the others. In another region, a committee formed by members of the community dug the only well in its area. This committee also looks into repairing the well when required.

Examples of community participation were cited in four out of the five sampled areas. Community participation, however, must have taken place at a very localized level, since different FGDs in the same area yielded different responses to the question on community participation. One of respondents in the Old Town area said that his community had an

organization that had been advocating for access to water since 1999, and was successful in increasing access to water numerous times by liaising with different state authorities.¹¹ Other examples of community participation in the Old Town area include the mobilization of resources for community issues, liaising with the local legislator for increasing access to water, and informal discussions among women.

Customers' Experiences with the BSWSC

Respondents connected to the formal water supply claimed that people paid the BSWSC for using piped water services in their households. The analysis of data from a short survey filled out by participants also suggests that there is no major discrepancy between the frequency with which bills are received and the frequency with which they are paid. However, it is possible that there is an element of response bias, as people were being asked about their civic behavior and responsibilities.

In several cases respondents suggested an element of reciprocity regarding payment of bills. *"It is about 'help me, I help you.' ... If they give us water, then we will pay the bills ... so that the government can get revenue to provide water and other services."*¹² Others spoke of a *"lack of regular water supply ... this will discourage you from paying."*¹³ In at least three instances, payment was also linked to a sense of affordability on behalf of formal users, with the general understanding that there were times when *"money isn't there,"* but whenever able, people paid.

A number of respondents across locations referred to problems with billing and payment. Respondents claimed that they were not provided with regular water bills the way the National Electric Power Authority (NEPA) bills were brought, which made it difficult for them to know the amount due even if they were willing to pay for water services. Respondents claimed it could *"be a whole year"* or more that they were not issued bills. In addition, some complained that they were sometimes expected to go to the water board office to pay bills, since the local branch had been closed. This was considered difficult and people were discouraged from traveling to make payments, as the office was far way (FGD 20).

Monitoring gaps in the BSWSC were also highlighted in a number of cases. Respondents claimed the water board staff provided inadequate service, and did not *"constantly follow up on their bills issue,"* and when people went to make payments *"no evidence is issued for my [sic] payment or recorded."*¹⁴ In addition, information on registered water suppliers was at times reported to be incomplete, so relevant authorities could not determine if people did not pay for water or whether they had illegal connections.

In general, respondents appeared to suggest that people would be more willing to pay for piped water services if certain quality standards were ensured. Of those respondents already connected to the piped water supply, 80 percent reported they would like better water quality and over 50 percent indicated a preference for more hours of service per day. Users indicated that people would generally *"pay, and on time"* if the frequency of supply and quality of piped water was improved; billing, registration and documentation issues were resolved; and efforts were undertaken to improve the awareness and orientation of users on using water, paying bills and reporting grievances.

Connecting to the BSWSC

Although most people would like to have piped water, given its advantages of quality and affordability, many respondents felt that connecting to the piped supply was challenging. This was mainly due to the expenses involved, the nature of the connection process and the physical limitations of the piped network.

A substantial number of people may be willing to pay more than the official connection fee; based on the fee scale collected from the SWA, the cost of connecting—inclusive of labor and

pipes—is at most ₦13,050 (US\$42). Information gathered from focus group participants through a “willingness to pay tool” suggests that 68 percent of the sample are willing to pay ₦13,000 (US\$42) or more to connect to the piped supply. Further, when informed of the monthly tariff, 87 percent responded that they would be willing to pay this tariff.

Yet citizens may be unaware of the official connection fee or are being asked to pay more when they try to connect. One group of respondents suggested the cost would exceed ₦20,000 to ₦30,000 (US\$65 to US\$97) if one lives close to a pipe. In the two other instances, respondents provided even higher estimates, with one respondent claiming that he had been given an estimate of ₦50,000 (US\$161)—just for pipes—since he lived on a hill; another noted he had tried to get a piped water connection but “*one official... gave me an estimate of about 150,000 naira [for registration, materials] because of this I couldn't continue.*”¹⁵ This could reflect some rent seeking on the part of officials, who may be charging higher connection fees than those officially quoted to researchers for the fieldwork.¹⁶

Respondents appeared to agree that once registration and inspection was complete, customers were responsible for purchasing all the materials required for the connection. In terms of equipment and materials required, most respondent groups mentioned pipes to their area, elbow junctions, and pipe or tap heads. Some respondents highlighted that tanks were required to store water. A number also spoke of it being necessary to buy pumps or engines, especially if their houses were at a height or distance, since water would not reach them otherwise. Purchasing gum or cement for the pipes and tanks was discussed in a few instances.

In addition, people had pay for laborers who would dig the pipe trench to connect their houses to the line. It appeared that in most cases, the BSWB does not provide workers for this purpose, and people have to source and pay laborers themselves. In two discussions, respondents suggested they had the option of using water board staff for this purpose, although they explained that one needed to pay the BSWB for this service, since “*nobody works for free anymore.*”

Most respondent groups believed free connections were possible in locations with a mixed or primarily formal supply, though respondents in at least seven groups proclaimed it was not feasible and one still had to pay to be connected. Free connections can be obtained by either directly tapping into the public piped network or through neighbors' connections. While there were a few references of the latter occurring without the neighbors' knowledge and permission, in most cases people were said to come together in “*joint ventures*” and share the cost of connection or to “*give a token*” to their neighbors to connect to their pipe and then pay money together, or to use the connection for free. Two groups of respondents mentioned the role of “*plumbers*” in facilitating these free connections, and explained that especially given the staff shortages in the Water Board, local plumbers had experience in this work and could “*get your water connected without them [Water Board] seeing any trace of the digging.*”¹⁷

Respondents across most locations seemed to be aware that such types of free connections to the piped supply were illegal and reported that the BSWB would disconnect them if the connections were known. Three groups also complained that such illegal connections reduced the water pressure and supply for the owner of the connection. However, there seems to be a general openness to sharing connections with neighbors, and a respondent even stressed that such water use should not be illegal, and that people should be allowed to “*improvise from [their] friends*” if a water pipe were brought to the area but they could not afford a connection.

In addition to the monetary costs of piped connections, supply reliability was seen as a major deterrent to connecting. Multiple groups across all four areas with unconnected respondents claimed that people are dissuaded from trying to connect to the formal piped network because they believe that they will not receive water even if they do.

BSWB staff were reported to be “careless” in inspecting and following up on major lines, and as a result, some people see the connections as a “waste of money” since they can go long stretches of time without tap water. Respondents also reported illegal connections to be a major problem in accessing water even after having connected to the piped water network.

In addition, terrain issues were brought up in most discussions. Respondents complained that they live in hilly regions, and it is problematic for those living at a height to access water due to insufficient water pressure. Under such circumstances, those who could afford it tend to purchase large engines or pumps to push water up the hills. However, not only were these pumps expensive and required electricity or generators to work but also those who could afford pumping machines “will channel all the water to their own storage tanks, leaving those of us without machines with no water. This discourages people from getting connections.”¹⁸ In addition, respondents complained that the hard or stony ground made it difficult for them to dig and lay underground water pipes, and that they were required to use above-ground pipes—which often crossed roads or other public places and thus were liable to frequent damage and breakage.

Negotiating access or paying for permission to cross neighboring properties or nearby roads is also an issue. In many groups, respondents claimed that if the BSWB’s proposed route for the piped connection passed through roads or other people’s properties, it posed a major challenge for the potential user, since they would then need to negotiate or pay for permission. Generally, respondents seemed to suggest that acquiring access through other people’s land or property was difficult, as they may “feel you want to destroy their fence just to put pipes.”¹⁹ One group indicated that the community leader’s intervention would be needed in this regard. If the neighbor or individual did not consent, then the connection could not be made. Similarly, to get a connection to a house across a road, one would “have to struggle with the State Development Board ... you will have to pay charges... [and] pay the State Development Board to come and cut the road or drill it.”²⁰

Emerging Findings and Entry Points for Reform

Findings in this chapter reflect how national challenges play out in the context of Bauchi State. In particular, implementation gaps prevail. The Bauchi State Urban Water Law is in some ways a model of what a technical reform could look like in Nigeria, but it remains unimplemented. Further, low credibility of the state budget contributes to a decreasing level of expenditure on water supply. Reduced or nonpayment of water bills by state and local government agencies also contribute to this low expenditure. As is the case nationally, the BSWSC lacks autonomy over its fiscal and human resources, creating a challenging context for incentivizing performance. Due to low revenue collection, the BSWSC relies on the state government for funding, and employees are recruited and managed by the state.

With regard to citizens’ perceptions of water in Bauchi City, the formal and hidden costs of connections are a barrier, and perceptions about the unreliability of service also play a role. Findings from the focus group discussions reflect the following key points about citizens’ perceptions:

- Availability is the primary criterion for choice of water source, with affordability and accessibility being secondary considerations. Within the bounds of what is available—affordable and accessible—citizens in Bauchi City choose water based on its quality.
- Publicly provided piped water is viewed as being more affordable (on a monthly basis) than other sources, and is believed to be of good quality.
- Residential customers of the BSWSC report problems with billing and payment. Though respondents reported paying their bills regularly, they also suggested that people are

more willing to pay when the service is more reliable (e.g., more hours of supply or higher water pressure).

- Evidence suggests that citizens in Bauchi City would be willing to pay official connection fees to access piped water. However, there are a number of perceived barriers to connecting, including (a) quotes for connection fees that are higher than the official rate; (b) the need to cover material and labor costs; (c) the difficulty of negotiating access or paying for permission to cross neighboring properties or nearby roads; and (d) terrain issues—such as the need to buy and operate pumps in hilly regions.
- Perceptions of reliability were also seen as a deterrent to connecting to the piped supply.

Analysis also points to two distinct areas of feasible policy intervention: (a) strengthening the delivery of publicly provided water, and (b) strengthening the relationship between informal water suppliers and the BSWSC:

- *Strengthening financial planning and budgeting, as well as budget execution, will be crucial to advancing investments in infrastructure.* A better understanding of the budget cycle—from planning to execution—will uncover key bottlenecks for the effective disbursement of the funds allocated by the state government to the BSWSC. Improving the strategic allocation and reliability of these funds is crucial for improving the BSWSC's ability to plan and fund future reforms.
- *Increasing the BSWSC's autonomy over financial and human resources is a promising area of intervention.* While top management at the BSWSC appears willing to advance reforms, it is constrained by an inability to directly manage staff (i.e., hire, fire, and promote) as well as its *de facto* dependence on unreliable budget allocations from the state government.
- *Strengthening incentives and capabilities for BSWSC tariff collection is an important complement to increasing the body's autonomy.* In the short term, this can start with a concerted effort to collect tariffs from the larger institutional providers that are currently underpaying. This may require dialogue between the BSWSC and these public institutions to negotiate a feasible plan for payment. In the medium term, a comprehensive tariff reform alongside investments in metered connections are necessary.
- *Regulation of the informal private sector through service-level agreements emerged as a promising area of policy intervention.* In the short term, the BSWSC does not appear to be able to cope with the increased demand for water services from customers in Bauchi City. Regulation should be based on the following principles: (a) Recognizing water vendors as an integral part of the urban water supply system and as official partners with whom to build trust and accountability; (b) Addressing constraints on informal water markets, such as the cost of water sources (connection fees and tariffs for piped supply), water access and availability (leading to queuing), and counterproductive laws against water vending; and (c) Improving water services for customers in terms of water quality controls and regulating the price of water; and forming vendor and consumer associations, thereby improving the relationships between vendors, consumers and the BSWSC.

Notes

1. See Bauchi State Urban Water Sector Law.
2. See Bauchi State Urban Water Law 2014.
3. Data from a sample of receipts suggest that the typical total cost for a household will range from ₦8,000 to ₦18,000 (US\$26 to US\$58), of which the official connection fee is

likely to be between ₦3,500 to ₦4,500 (US\$11 to US\$15) with the remainder being used for buying the pipes and digging the trench.

4. Interview with female respondent, Kandahar, FGD3. 2016.
5. Interview with female respondent, Stadium Area, FG14. 2016.
6. Interview with male respondent, Kandahar, FG2. 2016.
7. Interview with male respondent, Kandahar, FG2. 2016.
8. Interview with female respondent, Stadium Area, FG27. 2016.
9. Interview with female respondent, Stadium Area, FG14. 2016.
10. Interview with male respondent, Old Town, FG21. 2016.
11. Interview with male respondent, Old Town area, FG11. 2016.
12. Interview with male respondent, Old Town, FGD 12. 2016.
13. Interview with male respondent, Old Town, FGD 12. 2016.
14. Interview with male respondent, Stadium Area, FGD 16. 2016.
15. Interview with male respondent, FGD 2. 2016.
16. For evidence of “hidden costs” see also ActionAid (2015), according to which nearly 60 percent of respondents claim to have to pay a bride to obtain “household service” such as water and electricity.
17. Interview with male participant, FGD 16. 2016.
18. Interview with female respondent, FGD 14. 2016.
19. Interview with female respondent, Rafin Zurfi, FGD 5. 2016.
20. Interview with male respondent, Old Town, FGD 11. 2016.

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Chapter 10

Emerging Messages and Needs Looking Forward

Nigeria is a water-rich country that faces increasing water security challenges, especially in the water supply and sanitation sector. Despite uneven distribution and availability of its water resources, Nigeria is water-rich. The country needs to build an effective integrated water management framework—consisting of robust institutions, solid policies, strong organizational capacities, and a rigorous data framework—to deal with growing water demands, the rapid degradation of resources, and the rising threat of climate change. Nigeria’s water security challenges are nowhere as acute as in the water supply and sanitation subsector: access to piped water service is steadily regressing in urban areas, infrastructure managed by underfinanced and underperforming SWAs is undergoing rapid decay, and urbanization is placing added pressures on the capacity of water agencies to deliver services. Most urban dwellers must rely on scarce, unsafe, and costly supplies from informal vendors or private wells. In rural areas, low levels of investment and high system failure rates have resulted in a water supply that is well below regional standards. Half of the rural water systems are permanently out of service within eight years of commissioning. Moreover, government oversight of sanitation has left the sector in serious conditions: with the exception of Abuja, in urban and rural areas alike, access to sanitation consists almost exclusively of private on-site facilities, supported by informal fecal sludge management. Approximately 15 percent to 25 percent of the population still practice open defecation. The socioeconomic cost of poor sanitation is estimated at US\$2 billion per year.

This report offers an overview of the state of WASH services in the country. It draws from a number of national data sources, desk reviews, and original research to analyze service delivery in the country, and assess the sector’s performance. It offers a synopsis of poverty in Nigeria, considers the relationship between poverty and water, sanitation, and hygiene (WASH); explores demographic patterns that influence access to WASH; and examines the relationship between WASH and child health outcomes. Further, it evaluates the performance of water agencies, conducts a public expenditure review of the WASH sector, identifies institutional bottlenecks, offers insights on how to make the sector more efficient and sustainable, and explores the organization of the institutional landscape for urban water supply in Bauchi City. The report also provides recommendations for tackling the current crisis in Nigeria’s WASH services. Key messages:

Message 1: Nigeria’s WASH Sector is in Critical Condition and Requires Immediate Attention

Although Nigeria has made considerable progress in the water sector, access to high-quality water services remains low. The country has achieved the Millennium Development Goal (MDG) for water, and 61 percent of citizens have access to improved water.¹ Yet around 57 million people continue to live without access to improved water, and 71 percent of people in the poorest quintile lack access to an improved water source. Only 31 percent have access to improved water on premises, a meager 14 percent of the population have access within 15 minutes of their premises, and only 7 percent possess piped water on premises. Moreover, 13 percent of the population in capital cities enjoy access to piped water on premises, while only 4 percent of the rural population have such access.

The sanitation sector is in precarious condition. Nigeria was unable to achieve the MDG for sanitation. Only 29 percent of Nigerians have access to improved and unshared sanitation facilities, and there is no significant disparity between rural and urban areas. Less than 6 percent make use of sewerage systems. Approximately 27 million to 46 million Nigerians—between 15 percent and 25 percent of the population—practice open defecation. Moreover, open defecation rates remained relatively stable during the past 25 years. Poor sanitation costs the country ₦455 billion (around US\$2 billion) each year.

Over the last few decades, Nigeria reversed its progress in access to piped water and improved sanitation. According to data from the Joint Monitoring Programme (JMP), while access to improved water at the national level increased, access to piped water on premises in urban areas declined from 32 percent in 1990 to less than 10 percent in 2015, suggesting an erosion of utility service coverage. Access to improved sanitation also decreased from 38 percent to 29 percent during this time period.

In terms of access to improved water and piped water on premises, Nigeria lags behind many other countries in the region. Around 61 percent of Nigerians have access to improved water and around 7 percent have access to piped water on premises. In contrast, 81 percent of citizens in the Democratic Republic of Congo, 93 percent of citizens in Senegal, and 85 percent of citizens in Sierra Leone have access to improved water. Moreover, 17 percent of citizens in the Democratic Republic of Congo, 80 percent of citizens in Senegal, and 12 percent of citizens in Sierra Leone have access to piped water on premises.

There is no clear-cut regional divide in access to WASH. When mapping access to water and sanitation at the local government area (LGA) level, the findings suggest significant variation among states. Although there is a north-south divide in access to improved sanitation and open defecation practices, most other WASH indicators do not indicate a sharp north-south division—which contrasts long standing regional differences in infrastructure and development. Further research is needed to better understand these patterns and to help develop more tailored policy solutions that account for regional characteristics.

There is a clear wealth, education, and urban-rural divide in access to water and sanitation. Only 29 percent of households in the poorest quintile have access to improved water, compared to 91 percent of households in the richest quintile. Likewise, only 12 percent of households in the poorest quintile have access to improved sanitation, compared to 95 percent of households in the top quintile. Moreover, while 34 percent of households in which the household head has no education have access to improved sanitation, and that percentage jumps to 67 percent among educated households. Lastly, 85 percent of urban households have access to improved water, compared to 53 percent of households in rural regions.

Analyses conducted for the purposes of this study confirm with new detail the degree to which Nigeria's WASH sector is underdeveloped in comparison to regional standards, for both water supply and sanitation, and across urban and rural areas, with piped utility service regressing, and significant access gaps for the poor. Nigeria's WASH sector is in critical condition, calling for priority policy attention and bold actions by state and federal governments.

Message 2: Improving the WASH Sector Will Have Significant Implications for Poverty Reduction and Human Development Outcomes

Poor households disproportionately bear the effects of inadequate access to WASH. Using advanced mapping techniques, the analysis pinpoints high-poverty and low-WASH access hotspots, and finds a strong geographical correlation between the two. Many of the health burdens related to low access to WASH are thus borne by the poor. Addressing shortcomings

in WASH sector development will yield vast benefits: not only in terms of health outcomes, in particular for the poor, but also in terms of the overall productivity of the nation.

Poor households are being left behind in access to WASH services. For households residing in the bottom 20 percent (B20) of the income distribution, approximately 29 percent have access to improved water services. Further, only 5 percent of these households have access to such services on premises, and less than 1 percent have access to piped water. Around 55 percent of poor households also defecate in the open, and only 10 percent have access to improved sanitation facilities.

Using the Human Opportunity Index (HOI), the report finds that inequality in access to water services among children is mostly the result of variation in income distribution. Income distribution—namely, residing in the bottom 40 percent (B40) of the overall wealth distribution—has the most influence in predicting a child's unequal access to water services.

For the most part, mapping techniques suggest an obscure relationship between poverty and access to water and sanitation. When overlapping poverty maps with access maps, a number of seemingly counterintuitive patterns became evident. For instance, 10.7 percent of the population are poor *and* have relatively high access to improved water, whereas 6.4 percent of nonpoor households have relatively low access. Nevertheless, further analysis suggests that, for low poverty households, access to education and urban or rural location may be central factors in explaining disparities in access to improved water. Moreover, across poverty-access tiers, households are concentrated in a handful of states, which suggests that there are state-level characteristics driving the differences in access to WASH.

Access to high-quality WASH is critical for reducing the enteric burden in the country. The report utilizes a WASH poverty risk model to assess patterns of disease risk among children under five, across different economic and geographic dimensions. The model assesses that approximately 73 percent of the enteric burden estimated for Nigeria is associated with inadequate WASH. The national enteric burden associated with inadequate WASH is so great that approximately 10,083 life years are lost² per 100,000 children per year.

Moreover, the WASH enteric burden for the poorest quintile is about four times greater than the enteric burden for the richest quintile. The burden for the poorest in urban areas is 3.3 times higher than that of the richest. Correspondingly, this burden is approximately three times higher for the poorest in rural areas than for the richest citizens who reside there. Hence—inadequate WASH undoubtedly has dramatic consequences upon the health, well-being and productivity of Nigerian citizens—particularly the poorest.

Inadequate access to WASH is associated with undernutrition, which is a major public health problem in Nigeria. Unsafe WASH conditions enable the transmission of enteric pathogens that can cause diarrhea and environmental enteropathy, and can lead to chronic problems with absorbing nutrients. This, in turn, can lead to stunting, wasting, and being underweight. The 2013 DHS estimates that 36.8 percent of children under five years of age are stunted, 18.5 percent are wasted, and 29 percent are underweight. Close to half of children living in the B40 of the income distribution are stunted, and 37 percent of children in the B40 are underweight. While the proportion of under-five children who are stunted has improved since the previous Demographic Health Survey (DHS) in 2008, the extent of wasting and underweight status among children has worsened, suggesting that Nigerian children face chronic nutritional deficiency.

Inadequate WASH has also been found to increase the risk of contracting neglected tropical diseases, such as soil-transmitted helminth infections, schistosomiasis, and trachoma—all of which are endemic across Nigeria. In some regions of the country, these diseases are prevalent in more than 50 percent of the population.

Overall, these findings highlight the long-standing deleterious relationship between WASH, poverty, and human development outcomes. There is an urgent need for policy makers to

address deficiencies in the sector and target future efforts toward the *most impoverished Nigerians*, who disproportionately suffer as a result of inadequate access to WASH.

Message 3: The WASH Sector Is Constrained by Inefficient Service Delivery and Failing Facilities

At least part of the shortcomings in the WASH sector is connected to deficiencies in the performance of water agencies, water points, and water distribution schemes. More than 38 percent of all improved water points and around 46 percent of all water schemes in Nigeria are nonfunctional (deemed out of service in 2015, at the time of the survey). Further, nearly 30 percent of water points and water schemes appeared to fail in the first year of operation after construction, presumably because of poor build quality. The report finds that certain factors, if more carefully considered during the design, implementation, and operational stages, would drastically decrease the failure rates of water points and water schemes.

When considering most water-utility service indicators, Nigeria underperforms in relation to both African and global averages. Data from International Benchmarking Networks for Water and Sanitation Utilities (IBNET) highlight that Nigerian SWAs perform below the average level of performance for utilities in Africa, for most available indicators. The few exceptions include the indicators of staffing levels and chlorine test compliance. The data further indicate that Nigerian SWAs underperform global IBNET averages.

Nigerian SWAs display mixed results and trends in terms of operational efficiency. For example, between 2011 and 2015, the continuity of service decreased for the bottom 20 percent of SWAs from 5.6 hours to 4.4 hours per day. It remained almost the same for the middle 60 percent of SWAs, at almost 9 hours per day, and for the top 20 percent, at almost 17 hours per day. In the same period, there was a boost in staff productivity across water agencies in the bottom and middle percentiles. Staff productivity increased for both the bottom 20 percent (from 46.5 to 44 employees per 1,000 connections) and the middle 60 percent (from 24 to 21 employees per 1,000 connections). Staff productivity for the top 20 percent of SWAs remained roughly the same, with the number of staff per 1,000 connections marginally decreasing from 9.8 to 9.7.³ WASHCOM managed water schemes perform at least 10 percent better in initial years, and around 25 percent better after 10 years of age. The mechanisms behind the better performance of community managed schemes needs to be better understood, and that lessons from these experiences should be scaled up.

Hence, if Nigeria is to stabilize its WASH sector, a number of counterproductive trends must be reversed. The country must overcome the spectacular share of existing water points and water schemes in disrepair (46 percent), as well as the continual erosion of the already inefficient services provided by urban water agencies.

Message 4: To Achieve the SDGs in WASH, Nigeria Must Invest at Least Three Times More than it Does Today

Nigeria needs to spend more to achieve the SDGs in WASH. Recent estimates produced by the World Bank suggest that Nigeria must invest about 1.7 percent of its current GDP, or US\$8 billion per year, to achieve the SDGs by 2030.⁴ Although there are no recent estimates for overall expenditure in the sector, between 2006 and 2010, the Federal Government of Nigeria (FGN) and the states invested close to US\$1 billion per year (0.42 percent of GDP) in WASH. Capital expenditure was close to 0.28 percent of GDP, which is lower than regional levels (0.7 percent of GDP). Overall, these figures are particularly low in light of what is needed to stem the crisis in the sector.

Nigeria also needs to spend more efficiently. Current and future resources must be harnessed more efficiently. For instance, in 2015, 44 percent of borehole construction projects committed were never started. Figures are even higher for canal and dam projects—70 percent and 79 percent, respectively. Moreover, only 37 percent of borehole projects, 10 percent of dam projects, and 5 percent of canal projects were fully completed.

In retrospect, Nigeria's WASH sector is vastly underfinanced, and allocated funds—already scarce—are implemented in a very ineffective manner. The exceptional prioritization of adequate financing resources is required, though this alone is unlikely to prove sufficient. Greater accountability will be needed to ensure that, for instance, budgeted and approved projects are actually completed.

Message 5: Sound Sector Institutions Are Needed to Better Sustain Preexisting and New WASH-Related Efforts

Nigeria's federal system contributes to a diverse institutional landscape for the water sector across 36 states, and a challenging context for the implementation of national programs. Within the Nigerian federal system, subnational governments are assigned primary responsibility for water supply and sanitation; in practice the FGN also plays a substantial role in financing capital investments. Coordination of planning and budgeting of investments and of associated operations and maintenance is particularly challenging given the number of actors, as well as their diverse incentives and priorities for allocating resources to the sector. Thus, policy makers should revisit the role of each tier of government, both on paper and in practice, to better integrate federal spending on water into state planning and budgeting.

Reform signaling, rather than implementation, is common in the water sector. Many draft national laws, policies, and strategies for public water provision have not been officially adopted or approved through appropriate channels. Further, once approved, formal policies have not automatically resulted in changes with regard to how water service delivery systems function in practice.

At the state level, the poor quality of public financial management impacts WASH services. Data from the Nigeria States' Fiscal Database indicate that the average actual federal expenditure for housing and community affairs (which includes water supply) ranged from 46 percent to 62 percent of the approved budget between 2008 and 2013. Public investment management is centralized in the state executives' offices, with governors directly responsible for the selection of contractors and monitoring their performance. However, low budget credibility and the resulting need for cash rationing introduces some scope for discretionary decision making regarding expenditure priorities. A further constraint is that unclear fiscal arrangements between LGAs and states contributes to limited LGA autonomy over fiscal and human resources, which impacts the provision of rural water in particular.

State Water Authorities (SWAs) exercise limited autonomy over fiscal and human resources. All SWAs are public institutions, though on paper, some have been established as state-owned corporations with a degree of autonomy. Yet, even for these agencies, the collection of tariffs remains low, leaving SWAs dependent on state governments to finance their operations, expenses, and salaries. Further arrangements for human resource management create complex lines of accountability for performance. Reliable data to inform decision making and performance management—as well as contribute toward greater public accountability—are also limited.

As an example of citizens' perceptions of water, in Bauchi City, the formal and hidden costs of connecting to piped water and negative perceptions of the reliability of utility service are

significant challenges. Piped water is viewed as being more affordable (on a monthly basis) than other sources of water. While evidence suggests that citizens would be willing to pay official connection fees and tariffs to access piped water services, perceived barriers to connecting are high. These include quotes for connection fees that are higher than official rates; the need to cover material and labor costs; difficulty negotiating access or paying for permission to cross neighboring properties or nearby roads; and terrain issues, such as the need to buy and operate booster pumps in hilly areas.

Sector institutions are the key instruments for improving Nigeria's beleaguered WASH sector. As such, the aforementioned challenges—administrative, financial, and otherwise—must be addressed to stem the current crisis. Improving sector institutions will also go a long way in terms of building user confidence, thus increasing their likelihood of using public WASH services, including piped water.

Needs Looking Forward

Failure to address the current situation will have dire consequences for the nation. Without immediate attention to this sector failure by policy makers and other key stakeholders, the country will at best continue to suffer from the damaging effects of the status quo. At worst, the situation will continue to deteriorate, making it increasingly difficult to recover and to establish the policies and programming needed to rehabilitate the sector in the future. It is thus imperative to take stock of past failings and to take decisive action now, and that such action be expanded and sustained as part of a long-term national commitment.

The analysis in this diagnostic suggests seeking opportunities for reform that can deliver better services within the existing political context. Greater attention should be placed on further delving into good practices in water and sanitation reform, public-private partnerships (PPPs), and service delivery from other countries, and incorporating these lessons into the Nigerian context.⁵ The main binding constraints to water sector development in Nigeria pertain to governance and inadequacies in finance in a context of fragmentation:

- The government must demonstrate a long-term commitment to finding pathways for better delivery in Nigeria in the context of a federal system with enormous potential, but uneven institutional capabilities. Governance is the central reason why Nigerian water institutions perform poorly compared to neighboring countries with fewer resources. The implementation of functional responsibilities by federal and state governments, the low priority of water on the political agenda, and misaligned incentives and weak accountability systems hinder the enactment of policies and institutional reforms. For instance, the Nigeria Urban Water Supply Reform Project (NUWSRP) was launched in 2004 with the support of the World Bank, the African Development Bank (AFDB), the U.S. Agency for International Development (USAID), and the Agence Française de Développement (AFD); its aim was to assist in the corporatization of state water agencies and the establishment of regulatory capacities. However, it has been initiated in several states, but has yet to be fully and sustainably enacted in any. These efforts highlight the need to find new pathways for external actors (including the federal government) to incentive better performance, allowing subnational governments to find innovative solutions, share lessons learned, and scale up what works. Water service providers continue to be subject to direct political interference by state governments, enjoy minimal autonomy, and have few incentives to improve performance. Water providers are chronically underfinanced: they have inadequate tariff revenues and operate on shoestring budgets, incompatible with the basic operations, maintenance, and management functions of a utility. The establishment of sustainable independent state regulatory agencies is also failing, inviting consideration of more pragmatic alternatives, such as regulatory provisions embedded in state-SWA performance contracts. Finally, SWAs offer very little transparency and accountability to their consumers, and civil society is only marginally involved in helping to improve the sector. As a result of such governance failings, utility

service that should support socioeconomic development of the nation gives way to unsafe, expensive, and unequal coping water supply alternatives, such as informal vending and, for those who can afford them, private boreholes.

- To improve the current situation, there must be a strengthened long-term commitment to governance and institutional reforms, and a push for reforms that help better align institutional incentives, offer more robust accountability mechanisms, and prioritize financing and capacity building in the sector. A renewed federal-state coalition may be needed in the WASH sector, by which federal and states agree to clarified responsibilities, and by which a federal mandate is upheld to guide, incentivize, support, and oversee sector development efforts by the states. Such national recommitment to give Nigerians the WASH services they deserve would also benefit from wide political endorsements to ensure continuity across electoral cycles. Given the challenge at hand, a strong participation of civil society for representing users and for monitoring governance and service gains should be valued by governments as indispensable.
- The government should invest in closing implementation gaps, supporting service delivery capabilities in the water sector, and promoting greater integration of the private sector into the water and sanitation sectors. At both the federal and state levels, policy making, oversight, planning, and regulatory roles are often impaired by uneven institutional capacities, insufficient resources, and inadequate data. Public service providers face similar challenges, with unclear lines of accountability and limited incentives to perform. The poor performance of the public water sector lies in stark contrast with the dynamism and explosive growth of alternative private providers, such as informal water vendors and well drillers in urban areas. Institutional and service delivery capabilities must also be strengthened to ensure the sustainability of Partnership for Expanded Water, Supply, Sanitation & Hygiene (PEWASH), Nigeria's updated rural Water Supply and Sanitation Services (WSS) program. The sector requires pragmatic approaches to scaling up capacity-building programs, which build on locally owned solutions to bottlenecks that impair performance. The sector also requires pragmatic approaches to human resource management to better align incentives, promote greater accountability, and encourage the retention of talent. Moreover, there should be greater, and a more strategic, promotion of private sector involvement in water management, paving the way for the introduction of new methods and skills. Nigeria lacks an example of a well performing urban SWA by regional or international standards. In this context, the careful introduction of PPPs in the operation and maintenance (O&M) of a few selected water systems can be a potentially game-changing opportunity: allowing the sector to witness normal, modern O&M, to replenish its skills and learn from experimentation, while also placing emulation pressure on public operations to offer better, more efficient services. Similarly, in the interest of customers and citizens, the role of the informal water vending, well-drilling, and fecal sludge disposal businesses should be better recognized within the existing legal and political frameworks, and better integrated—through regulation and capacitation—into the water and sanitation service delivery chains.
- The water sector requires greater and more efficient financing and investment, including upgraded tariff and subsidies structures and a more accountable budget processes. The large deficits in WSS service access suggest that chronic underinvestment in infrastructure expansion, upgrade, and renewal is the norm. Poor coordination among federal and state actors leads to highly inefficient public expenditure. Coverage of recurrent O&M costs through tariff revenues and budget support and subsidies is insufficient, leading to the systemic neglect of maintenance needs, erosion of service standards, and loss of market share to informal service options. An updated water pricing and financing structure is required to promote a more effective cost-recovery process, and to provide more substantial budget support for investment and renewal needs. States' attitudes toward tariff reform and regulation should evolve, recognizing that inadequately low tariffs are contributing to the disappearance of SWAs' service, forcing citizens, especially in poorer areas, to buy scarce, unsafe, and much more expensive water supplies from private vendors.

To help attain cost-recovery and affordability objectives, there should be a greater emphasis on decoupling tariffs and subsidies, with tariffs consistent with cost-recovery and consumption subsidies more narrowly targeted on the poor households who need them. To incentivize better sector performance, it is also imperative to push forward on a financing structure that is more accountable and driven by results. The establishment of rules-based funds—to channel federal budget support to state investments in a more transparent manner—would be an important tool for empowering the federal leadership, and to guide and incentivize sector development and reform by the states. Renewed emphasis is also needed on a long-term utility credit-worthiness agenda that promotes access to commercial finance.

- Additionally, in light of the synergies between WASH and other sectors, a multisectoral approach is needed. Access to WASH services in Nigeria is sharply conditioned by differences in levels of poverty, education, wealth, geographic location, and health. So to generate a sustained impact, the WASH sector must be fully coordinated with the interventions and programming of associated sectors, such as public health, education, urban and rural development, environment, and governance. The combination of such interventions will have more impact than the sum of their parts. New efforts should also consider geographical mapping and targeting to ensure that programs reach populations most in need.

The country can and *must* take significant action to improve its water and sanitation sector. With the knowledge put forward in this report, subsequent dialogue, and ample action, it is possible for Nigeria to transcend the current crisis in the sector. Achieving the SDGs is still within reach. The costs of not moving forward in the sector are simply too great to ignore; the lives of 182 million individuals—and the fate of the nation as a whole—are linked to progress in this sector.

Notes

1. The JMP estimates that approximately 69 percent of the population have access to improved water; however, this estimate is based on the linear interpolation of different surveys in the country. The 61 percent figure provided here was computed from the NWSS 2015, for which 200,000 households were interviewed, across every ward in the country.
2. This loss of life years is formally expressed as disability adjusted life years (DALYs).
3. It is also necessary to note that the top 20 percent SWAs are the largest, accounting for an average of 70 percent of the total number of connections in Nigeria during 2011–15.
4. In 2015 prices.
5. A synthesis report on all 18 countries diagnosed as part of the World Bank WASH Poverty Diagnostics will be published, which will include rich information on the challenges and good practices facing the WASH sector across countries, and can serve as a useful anchor document to incorporate relevant lessons for improving the WASH sector in Nigeria.

Appendix A

Table A.1: Share of Household Access to Water and Sanitation Indicators, by Urban or Rural Location and North or South Country Divide, Nigeria, 2015

Percent

	Full sample	Rural north	Rural south	Urban north	Urban south
Improved water	61.18	51.83	60.90	70.28	75.62
Improved water within 30 minutes	44.96	36.90	41.24	54.32	62.23
Improved water on premises	30.98	25.09	25.61	41.34	45.43
Piped water on premises	7.03	5.32	3.37	14.54	11.34
Improved sanitation (including shared)	72.51	71.83	60.30	86.97	83.84
Improved sanitation (unshared)	28.58	32.63	21.03	38.01	25.11
Fixed-point sanitation	84.97	84.39	75.88	97.38	92.32
Access to sewerage	5.61	1.34	5.33	3.61	17.28
Observations	201,842	89,435	71,517	16,056	24,834

Source: NWSS 2015.

Table A.2: Share of Household Access to Water Indicators, by State, Nigeria, 2015

Percent

	Improved water	Improved water within 30 minutes	Improved water on premises	Piped water on premises
Abia	76.93	49.98	29.23	1.06
Adamawa ^a	67.70	35.72	29.40	4.40
Akwa Ibom	60.24	42.63	21.76	0.45
Anambra	68.93	38.21	24.56	0.77
Bauchi	70.27	57.20	31.26	5.66
Bayelsa	33.42	21.90	14.77	4.00
Benue	31.31	27.35	17.89	0.66
Borno ^a	65.84	32.35	15.98	10.97
Cross River	54.60	28.06	12.93	2.98
Delta	64.85	56.32	34.34	17.62
Ebonyi	66.72	45.07	27.81	0.10
Edo	74.09	47.65	30.71	0.56
Ekiti	42.07	30.27	21.05	5.32

table continues next page

Table A.2: Continued

	Improved water	Improved water within 30 minutes	Improved water on premises	Piped water on premises
Enugu	28.75	7.35	6.42	3.76
FCT Abuja	87.80	75.85	37.29	14.12
Gombe	57.35	43.45	11.37	1.87
Imo	80.81	56.32	44.15	7.27
Jigawa	96.16	71.15	56.51	22.96
Kaduna	51.62	45.14	40.83	4.75
Kano	50.55	39.58	32.97	10.44
Katsina	65.23	47.24	38.44	10.35
Kebbi	38.99	30.13	24.89	5.89
Kogi	43.48	26.52	19.25	2.27
Kwara	73.48	57.41	31.29	0.83
Lagos	80.66	72.28	59.60	16.62
Nassarawa	40.88	35.86	16.10	1.77
Niger	49.59	33.86	24.35	7.46
Ogun	83.00	67.49	48.53	6.34
Ondo	52.79	41.63	25.12	2.21
Osun	64.81	55.68	26.75	1.89
Oyo	77.57	62.35	35.33	3.35
Plateau	31.78	25.99	14.36	2.66
Rivers	59.57	37.91	30.07	9.45
Sokoto	54.27	35.04	31.21	10.90
Taraba	50.11	32.18	8.20	0.56
Yobe ^a	85.15	46.20	23.62	14.04
Zamfara	52.45	36.44	33.21	13.37
Total	61.18	44.96	30.98	7.03
Observations	201,842	201,842	201,842	201,842

Source: NWSS 2015.

Note: FCT = Federal Capital Territory.

a. These states were covered only partially in the household interview due to the conflict in the North East of the country.

Table A.3: Share of Household Access to Sanitation Indicators, by State, Nigeria, 2015

Percent

	Improved sanitation (including shared)	Improved sanitation (unshared)	Fixed-point sanitation	Access to sewerage	Access to sewerage (unshared)
Abia	85.31	24.94	97.31	21.21	4.48
Adamawa ^a	74.35	30.72	90.53	1.35	0.32
Akwa Ibom	76.17	17.68	98.29	2.33	1.33
Anambra	74.85	36.65	88.77	7.32	3.93

table continues next page

Table A.3: Continued

	Improved sanitation (including shared)	Improved sanitation (unshared)	Fixed-point sanitation	Access to sewerage	Access to sewerage (unshared)
Bauchi	80.47	37.80	97.25	0.16	0.12
Bayelsa	34.83	2.42	59.60	3.85	0.26
Benue	60.62	33.95	73.47	3.38	1.27
Borno ^a	79.42	35.24	96.00	2.86	2.25
Cross River	55.96	21.02	78.56	0.00	0.00
Delta	71.34	11.75	77.59	9.00	1.02
Ebonyi	43.61	12.80	68.40	3.84	0.61
Edo	78.56	34.13	89.63	0.00	0.00
Ekiti	61.09	33.32	71.88	7.22	5.92
Enugu	54.76	11.40	67.21	4.27	0.65
FCT Abuja	71.64	32.05	83.60	13.95	7.63
Gombe	70.26	19.76	86.39	0.27	0.11
Imo	87.45	44.27	97.87	13.36	7.69
Jigawa	81.70	38.82	97.40	1.65	0.65
Kaduna	74.37	65.07	97.19	0.98	0.37
Kano	91.72	39.57	99.83	1.07	0.50
Katsina	91.62	50.01	98.17	0.40	0.24
Kebbi	86.05	23.93	95.95	0.74	0.40
Kogi	51.11	14.49	57.91	6.11	1.93
Kwara	40.82	12.22	48.17	0.45	0.00
Lagos	92.44	24.18	97.20	29.26	11.71
Nassarawa	66.14	22.96	78.11	3.54	0.41
Niger	61.91	34.07	81.67	3.50	1.45
Ogun	83.05	14.41	92.09	5.23	0.37
Ondo	68.08	19.96	72.90	0.16	0.09
Osun	52.57	14.62	60.57	1.28	0.21
Oyo	47.88	21.01	60.89	11.01	5.64
Plateau	45.61	22.17	54.62	2.75	1.22
Rivers	51.28	24.61	78.59	8.69	4.80
Sokoto	86.31	19.93	90.64	1.16	0.17
Taraba	59.80	21.96	77.88	2.69	1.16
Yobe ^a	90.88	24.71	95.38	0.52	0.06
Zamfara	94.78	26.70	99.39	1.19	0.49
Total	72.51	28.58	84.97	5.61	2.24
Observations	201,842	201,842	201,842	201,842	201,842

Source: NWSS 2015.

Note: FCT = Federal Capital Territory.

a. These states were covered only partially in the household interview due to the conflict in the North East of the country.

Table A.4: Share of Water Schemes and Water Points Failing, by State, Nigeria, 2015
Percent

	Water points	Water schemes
Abia	63.21	80.00
Adamawa	29.47	53.70
Akwa Ibom	66.63	63.33
Anambra	46.77	46.47
Bauchi	23.76	37.84
Bayelsa	62.96	64.64
Benue	47.33	86.21
Borno	16.39	26.79
Cross River	55.42	52.63
Delta	55.68	72.23
Ebonyi	38.79	56.00
Edo	54.20	50.00
Ekiti	49.26	31.25
Enugu	41.84	50.00
FCT	49.10	27.27
Gombe	51.05	46.85
Imo	52.49	65.41
Jigawa	15.70	15.52
Kaduna	39.21	61.31
Kano	22.02	57.56
Katsina	28.30	33.20
Kebbi	48.42	59.02
Kogi	61.43	70.37
Kwara	46.66	40.91
Lagos	34.17	15.91
Nasarawa	40.01	40.00
Niger	37.69	49.21
Ogun	50.91	36.84
Ondo	60.34	58.97
Osun	44.61	63.79
Oyo	42.31	43.59
Plateau	45.97	43.75
Rivers	26.52	54.40
Sokoto	45.90	47.67
Taraba	44.38	45.95
Yobe	14.51	23.08
Zamfara	27.40	38.10
Total	38.19	45.84
Observations	89,871	5,100

Source: NWSS 2015.

