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DIRECTIONS IN DEVELOPMENT
Infrastructure

Africa's Water and Sanitation Infrastructure

Access, Affordability, and Alternatives

Sudeshna Ghosh Banerjee and Elvira Morella

THE WORLD BANK

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About the AICD

This study is a product of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. The AICD provides a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It also offers a more solid empirical foundation for prioritizing investments and designing policy reforms in the infrastructure sectors in Africa.

The AICD was based on an unprecedented effort to collect detailed economic and technical data on the infrastructure sectors in Africa. The project produced a series of original reports on public expenditure, spending needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. The most significant findings were synthesized in a flagship report titled *Africa's Infrastructure: A Time for Transformation*. All the underlying data and models are available to the public through a Web portal (http://www.infrastructureafrica.org), allowing users to download customized data reports and perform various simulation exercises.

The AICD was commissioned by the Infrastructure Consortium for Africa following the 2005 G-8 Summit at Gleneagles, which flagged the importance of scaling up donor finance to infrastructure in support of Africa's development.

The first phase of the AICD focused on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries were Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Democratic Republic of Congo, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage was expanded to include the remaining countries on the African continent.

Consistent with the genesis of the project, the main focus was on the 48 countries south of the Sahara that face the most severe infrastructure challenges. Some components of the study also covered North African countries to provide a broader point of reference. Unless otherwise stated, therefore, the term "Africa" is used throughout this report as a shorthand for "Sub-Saharan Africa."

The AICD was implemented by the World Bank on behalf of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's regional economic communities, the African Development Bank, and major infrastructure donors. Financing for the AICD was provided by a multidonor trust fund to which the main contributors were the Department for International Development (United Kingdom), the Public Private Infrastructure Advisory Facility, Agence Française de Développement, the European Commission, and Germany's Kreditanstalt für Wiederaufbau (KfW). The Sub-Saharan Africa Transport Policy Program and the Water and Sanitation Program provided technical support on data collection and analysis pertaining to their respective sectors. A group of distinguished peer reviewers from policy-making and academic circles in Africa and beyond reviewed all of the major outputs of the study to ensure the technical quality of the work.

Following the completion of the AICD project, long-term responsibility for ongoing collection and analysis of African infrastructure statistics was transferred to the African Development Bank under the Africa Infrastructure Knowledge Program (AIKP). A second wave of data collection of the infrastructure indicators analyzed in this volume was initiated in 2011.

Series Foreword

The Africa Infrastructure Country Diagnostic (AICD) has produced continent-wide analysis of many aspects of Africa's infrastructure challenge. The main findings were synthesized in a flagship report titled *Africa's Infrastructure: A Time for Transformation*, published in November 2009. Meant for policy makers, that report necessarily focused on the high-level conclusions. It attracted widespread media coverage feeding directly into discussions at the 2009 African Union Commission Heads of State Summit on Infrastructure.

Although the flagship report served a valuable role in highlighting the main findings of the project, it could not do full justice to the richness of the data collected and technical analysis undertaken. There was clearly a need to make this more detailed material available to a wider audience of infrastructure practitioners. Hence the idea of producing four technical monographs, such as this one, to provide detailed results on each of the major infrastructure sectors—information and communication technologies (ICT), power, transport, and water—as companions to the flagship report.

These technical volumes are intended as reference books on each of the infrastructure sectors. They cover all aspects of the AICD project relevant to each sector, including sector performance, gaps in financing and efficiency, and estimates of the need for additional spending on investment, operations, and maintenance. Each volume also comes with a detailed data appendix—providing easy access to all the relevant infrastructure indicators at the country level—which is a resource in and of itself.

In addition to these sector volumes, the AICD has produced a series of country reports that weave together all the findings relevant to one particular country to provide an integral picture of the infrastructure situation at the national level. Yet another set of reports provides an overall picture of the state of regional integration of infrastructure networks for each of the major regional economic communities of Sub-Saharan Africa. All of these papers are available through the project web portal, http://www.infrastructureafrica.org, or through the World Bank's Policy Research Working Paper series.

With the completion of this full range of analytical products, we hope to place the findings of the AICD effort at the fingertips of all interested policy makers, development partners, and infrastructure practitioners.

Vivien Foster and Cecilia Briceño-Garmendia

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The book draws upon a number of background papers that were prepared by World Bank staff and consultants, under the auspices of the Africa Infrastructure Country Diagnostic (AICD). Key contributors to the book on a chapter-by-chapter basis were as follows.

Chapter 1

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Chapter 5

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Chapter 7

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Chapter 8

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Chapter 9

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(continued next page)

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Abbreviations

ADAMA	Nazareth Water Company, Ethiopia
ADeM	Águas de Moçambique
AICD	Africa Infrastructure Country Diagnostic
AREQUAPCI	association of water resellers
AWSA	Addis Ababa Water Services Authority, Ethiopia
BOCC	basket of construction components
BWB	Blantyre Water Board, Malawi
CAPEX	capital expenditure
CFA	Communauté Financière Africaine Franc
CBO	community-based organization
CEMAC	Central African Economic and Monetary Community
COMESA	Common Market for Eastern and Southern Africa
CRWB	Central Region Water Board, Malawi
DAWASCO	Dar es Salaam Water and Sewerage Company, Tanzania
DBT	direct block tariff
DHS	demographic and health survey
DUWS	Dodoma Urban Water and Sewerage Authority, Tanzania
EAC	East African Community
ECOWAS	Economic Community of West African States
FCT	Federal Capital Territory, Nigeria

GDP	gross domestic product
GNI	gross national income
GRUMP	Global Rural-Urban Mapping Project
GWC	Ghana Water Company
HCI	high conflict index
IBNET	International Benchmarking Network for Water and Sanitation Utilities
IBT	increasing block tariff
ICP	International Comparison Program
IDA	International Development Association
IDAMC	Internally Delegated Area Management Contract
IFRS	International Financial Reporting Standards
JIRAMA	Jiro sy Rano Malagasy, Madagascar
JMP	Joint Monitoring Programme
KIWASCO	Kisumu Water and Sewerage Company, Kenya
LCI	low conflict index
LWB	Lilongwe Water Board, Malawi
LWSC	Lusaka Water and Sewerage Company, Zambia
MCI	medium conflict index
MDG	Millennium Development Goal
MICS	multiple-indicator cluster survey
MSNE	Mauritania Société Nationale d'Eau et d'Electricité
MWSA	Mwanza Water and Sewerage Authority, Tanzania
MWSC	Mombasa Water and Sewerage Company, Kenya
NGO	nongovernmental organization
NRW	nonrevenue water
NWASCO	Nairobi Water and Sanitation Company, Kenya
NWC	National Water Company
NWSC	National Water and Sewerage Company, Uganda
NWSC	Nkana Water and Sewerage Company, Zambia
O&M	operations and maintenance
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
ONAS	Office National de l'Assainissement du Sénégal
ONEA	Office Nationale des Eaux et d'Assainissement, Burkina Faso
OPEX	operating expenditure
PPI	private participation in infrastructure
PPIAF	Public-Private Infrastructure Advisory Facility

PPP	purchasing power parity
PSP	private sector participation
PwC	PricewaterhouseCoopers-Africa
REGIDESO	Régie de Production et de Distribution d'Eau
RUWATSSA	State Rural Water Supply and Sanitation Agency, Nigeria
SADC	Southern African Development Community
SDE	Sénégalaise des Eaux
SEEG	Société d'Electricité et d'Eaux du Gabon
SEEN	Société de Exploitation des Eaux du Niger
SNEC	Société National des Eaux du Cameroon
SODECI	Société de Distribution d'Eau de Côte d'Ivoire
SOE	state-owned enterprise
SONEB	Société Nationale des Eaux du Benin
SPEN	Société de Patrimoine des Eaux du Niger
STEE	Société Tchadienne d'Eau et d'Electricité, Chad
SWSC	Southern Water and Sewerage Company, Zambia
TdE	Togolaise des Eaux
UNICEF	United Nations Children's Fund
VIP	ventilated improved pit
WASA	Water and Sanitation Authority, Lesotho
WB	Water Board
WHO	World Health Organization
WSP	Water and Sanitation Program
WSP-SA	Water and Sanitation Program–South Asia
WSS	water supply and sanitation
WUC	Water Utilities Corporation, Botswana

CHAPTER 1

The Elusiveness of the Millennium Development Goals for Water and Sanitation

The welfare implications of safe water cannot be overstated. Infectious diarrhea and other serious waterborne illnesses are leading causes of infant mortality and malnutrition. Their impact extends beyond health to the economic realm in the form of lost work days and school absenteeism. It is estimated that meeting the Millennium Development Goal (MDG) for access to safe water[1] would produce an economic benefit of US$3.1 billion (in 2000 dollars) in Africa, a gain realized by a combination of time savings and health benefits. The cost-benefit ratio is about 11, which suggests that the benefits derived from access to safe water are far greater than the costs of providing it (Hutton and Haller 2004).

Similarly, sanitation makes a key contribution to public health, particularly in densely populated areas. Adequate sanitation is defined as any private or shared, but not public, facility that guarantees that waste is hygienically separated from human contact (JMP 2000). Adequate sanitation reduces the risk of a broad range of diseases—including respiratory ailments, malaria, and diarrhea—and reduces the prevalence of malnutrition. Access to this standard of sanitation produces direct health gains by preventing disease and delivering economic and social benefits. It is estimated that a reduction in diarrheal illness would produce a gain of 99 million days of school and 456 million days of work for the working population ages 15–59 in Africa. The workdays alone represent economic benefits equal to as much as US$116 million (Hutton and Haller 2004).

The international adoption of the MDGs in 2000 created a new framework for focusing poverty reduction efforts on the indicators that are most meaningful for economic development. The MDGs have called attention to deficiencies in the quantity and quality of water supply and sanitation (WSS). MDG 7 calls for ensuring environmental sustainability and—relevant to this book—reducing by half the number of people without sustainable access to safe drinking water and improved sanitation. Although the world overall is on track to meet the MDG drinking water target, Africa lags. The gap is most acute in Sub-Saharan Africa, where only 58 percent of the population enjoys access to safe drinking water, and the gap is widening, as the increasingly urban population places a greater strain on existing service providers (table 1.1). Of the 828 million people in the world whose water sources remain unimproved, 37 percent live in Sub-Saharan Africa. According to projections, 300 million people—almost 38 percent of Sub-Saharan Africa's population, or half the number of people who presently have access to improved water—will need to be covered to meet the MDG target (JMP 2008).

The world is not on track to meet the MDG sanitation target. More than 2.5 billion people remain without improved sanitation worldwide; of that total, 22 percent, or more than half a billion people, live in Africa. A reported 221 million people in Africa still defecate in the open, the second-largest total for any region after South Asia. Access to improved sanitation

Table 1.1 Regional Progress toward the MDG Drinking Water Target

Region	*Drinking water coverage (%)*		*Coverage needed to be on track in 2006 (%)*	*MDG target coverage (%)*	*Progress*
	1996	*2006*			
Sub-Saharan Africa	49	58	65	75	Off track
North Africa	88	92	92	94	On track
Latin America and the Caribbean	84	92	89	92	On track
East Asia	68	88	78	84	On track
South Asia	74	87	82	87	On track
Southeast Asia	73	86	82	87	On track
West Asia	86	90	90	93	On track

Source: JMP 2008.

Table 1.2 Regional Progress toward the MDG Sanitation Target

Region	*Sanitation coverage (%)*		*Coverage needed to be on track in 2006 (%)*	*MDG target coverage (%)*	*Progress*
	1990	*2006*			
West Asia	79	84	86	90	On track
Latin America and the Caribbean	68	79	78	84	On track
North Africa	62	76	74	81	On track
Southeast Asia	50	67	64	75	On track
East Asia	48	65	65	74	On track
South Asia	21	33	46	61	Off track
Sub-Saharan Africa	26	31	50	63	Off track
World	54	62	69	77	Off track

Source: JMP 2008.

has increased only modestly in Sub-Saharan Africa, from 26 percent of the total population in 1990 to 31 percent in 2006. To be on track with the MDG's sanitation benchmark, improved sanitation coverage should have been at 50 percent of the population in 2006. To meet the MDG sanitation target, the current number of people with improved sanitation in Africa needs to more than double, from 242 million in 2006 to 615 million in 2015. Unless the current trend changes, Sub-Saharan Africa will definitely not meet the sanitation target (table 1.2).

A Timely Synthesis

With only five years remaining until the MDG deadline in 2015, it is essential to take stock of the status of the WSS sectors, analyze their achievements and shortcomings in Sub-Saharan Africa, and identify the sector characteristics that either advance or inhibit the population's ability to access service. Governments have adopted WSS reforms and attracted investments to build dynamism in the sectors and to enhance performance outcomes. These initiatives have been critical to developing implementation capacity and to establishing innovative forms of service delivery.

Building on background work carried out under the auspices of the Africa Infrastructure Country Diagnostic (AICD) and presented by Foster and Briceño-Garmendia (2009), this volume integrates a wealth of primary and secondary information to present a quantitative snapshot of the state of the WSS sectors in Africa, including the current status of access and coverage trends. It explains institutional and governance structures and utility performance and articulates the volume and quality of financing available over time for WSS. The volume also evaluates the challenges to the WSS sectors and explores the factors that might explain the expansion of coverage. Finally, it endeavors to estimate spending needs for WSS, with a target of meeting the MDG goal, and compares those needs with the existing financing envelopes, disaggregated into shares that can be recouped through efficiency improvements and gaps that would remain even if all feasible efficiencies were achieved. The directions for the future draw on lessons learned from experiences around the continent and present the menu of choices available to African countries.

Data Sources and Methodologies

Monitoring the progress of infrastructure sectors such as water supply has been a significant by-product of the MDGs, and serious attention and funding have been devoted in recent years to developing monitoring and evaluation systems in countries around the world. The Joint Monitoring Programme (JMP) on WSS is an institutional endeavor by the World Health Organization and the United Nations Children's Fund to systematically track progress toward the WSS MDG. The JMP's monitoring introduced the concept of improved and unimproved WSS and categorized WSS sources according to the typology shown in table 1.3.

The JMP and AICD Methodologies

AICD used a body of household surveys similar to that of the JMP—demographic and health surveys (DHSs), multiple-indicator cluster surveys (MICSs), and income/expenditure surveys—but the JMP has adopted special rules for use when the exact disaggregation across WSS modalities is not available in the surveys. Those rules apply most often to the largest sources of WSS, namely, wells or boreholes and traditional pit latrines. The JMP statistics apportion 50 percent of wells or boreholes to the protected or "improved" category and the remainder to the unprotected or "unimproved" category. Similarly, covered pit latrines are placed in the "improved" category, and the unprotected in the "unimproved" category. In the AICD analysis, the information available in the survey has been taken at face value without any adjustment. Therefore, only the household connections to piped water and piped water delivered through public standposts constitute the "improved water" category, and flush toilets and ventilated improved pit (VIP) latrines are included in the

Table 1.3 Definition of Coverage of Improved Water

	JMP category	*AICD category*
Primary source of water supply		
Piped water into dwelling or yard	Improved	Improved
Public tap or communal standpipe, standposts, or kiosks	Improved	Improved
Wells or boreholes, hand pumps, or rainwater	Improved/unimproved	Unimproved
Surface water (for example, lake, river, pond, dam, or spring)	Unimproved	Unimproved
Vendors or tanker trucks	Unimproved	Unimproved
Other (for example, bottled water)	Unimproved	Unimproved
Primary source of sanitation		
Flush toilet to network or septic tank	Improved	Improved
VIP latrine, SanPlat, or basic pits with slab	Improved	Improved
Traditional pit latrine	Improved/unimproved	Unimproved
Bucket or other container	Unimproved	Unimproved
Other	Unimproved	Unimproved
No facility (nature or bush)	Unimproved	Unimproved

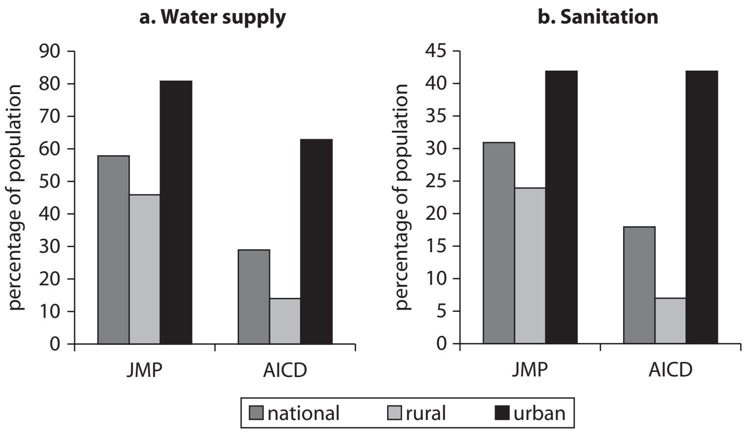
Source: Banerjee, Wodon, and others 2008.
Note: VIP = ventilated improved pit.

"improved sanitation" category. Further, the DHSs describe access to sanitation without discriminating between on-site sanitation and use of sewerage facilities, so that both are included in the flush toilet category. Most of these flush toilets, however, use septic tanks rather than sewer connections. For this reason, this study assumes that the DHS information relating to flush toilets refers to septic tanks.

Owing to these methodological differences, the JMP and AICD figures differ on improved water and improved sanitation. Not surprisingly, the differences are more pronounced in rural areas, where wells/boreholes and traditional pit latrines are the most prevalent forms of WSS sources (figure 1.1). In this volume, we focus above all on what lies within each of the improved and unimproved categories, rather than on the aggregates. Further, JMP uses methodologies that usually differ from methodologies used by each country to evaluate coverage. In most cases, national statistics would show higher coverage figures than does JMP.

Sanitation can be provided on numerous distinct levels that can be graphically represented as rungs on a ladder. Starting from open defecation, the successive increments are traditional latrines (various kinds of pits), improved latrines (including SanPlat, VIP latrines, and basic pits

Figure 1.1 JMP and AICD Estimates of the Prevalence of "Improved" Water Supply and Sanitation



Sources: Banerjee, Wodon, and others 2008; JMP 2008.

with slabs), and flush toilets (connected to either a septic tank or a water-borne sewage network). The higher rungs of the ladder carry higher unit costs and lower levels of perceived health risk (figure 1.2).

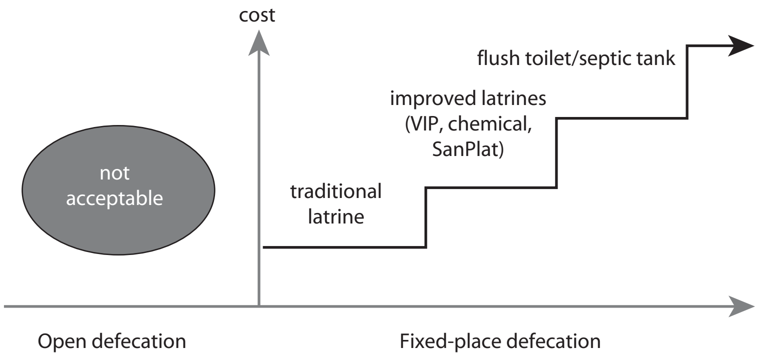
This concept carries over to water, but not as clearly, because the sources cannot be ranked on the basis of quality or cost. It is evident, however, that surface water represents the bottom rung, and household connections to piped water and piped water delivered through public standposts are at the upper end of the ladder. What comes out very clearly in the literature is that the distance to the water source makes a substantial difference to health outcomes and time savings.

Data Sources

The analysis presented in this book is based on three primary databases that underlie three AICD background papers—Banerjee, Skilling, and others (2008), Banerjee, Wodon, and others (2008), and Morella, Foster, and Banerjee (2008). These background papers are referred to throughout this volume.

Household surveys: AICD DHS/MICS Database and Expenditure Database. The results from household surveys are used extensively in chapters 2 and 3. The first, the AICD DHS/MICS database, was used to analyze the current status and access trends presented in this volume; it is a composite of 63 DHS and MICS data sets. Thirty countries in Africa

Figure 1.2 The Sanitation Ladder



Source: Authors.
Note: VIP = ventilated improved pit.

have had at least one DHS conducted since 1990, and 24 have at least two DHS data points between 1990 and 2005, which enables trend analysis. Second, the AICD expenditure survey database includes the most recent household-level expenditure surveys for 30 African countries during the period from 1997 to 2005. This database incorporates surveys modeled after the Living Standards Measurement Surveys. These surveys provide a wealth of information on use of and payment for infrastructure services, as well as offering data on household assets and expenditure patterns. Known by different names in different countries, these surveys are carried out by country governments to reflect local nuances and priorities. Therefore, their infrastructure modules often are not harmonized or comparable, and standardization techniques have been employed to permit continentwide inferences (annexes 1.1 and 1.2).

AICD Water Supply and Sanitation Survey. This survey was carried out in two phases and administered to line ministries, sector institutions, and water utilities with a view to capturing institutional and performance variables. Seven modules of data were collected for each country, of which five are qualitative and two are quantitative. The focus of each module is reflected in table 1.4.

The data were collected in two phases (2007 and 2009) and from two distinct sources (AICD and the International Benchmarking Network for Water and Sanitation Utilities [IBNET]). AICD's data collection in 24 countries in 2007 resulted in a comprehensive data set covering 51 utilities. AICD's 2009 flagship report (Foster and Briceño-Garmendia 2009) was

Table 1.4 Modules of AICD WSS Survey

Module	*Description*	*Data collection unit*	*Data collection source and coverage*	*Topics in questionnaire*
Module 1: Institutional and regulatory	Qualitative	Country	AICD Phase I	Legal framework, sector organization, regulatory framework, regulatory process, tariff adjustment, private participation
Module 2: Rural water	Qualitative	Country	AICD Phase I	Sector organization, service characteristics
Module 3: Governance	Qualitative	Utility	AICD Phase I	Ownership, board structure, performance contract, performance monitoring and disclosure, finance, labor
Module 4: Sanitation	Qualitative	Country	AICD Phase I	Sector organization, service characteristics
Module 5: Small-scale independent providers	Qualitative	Largest city	AICD Phase I	Point sources, mobile sources
Module 6: Operational and financial	Quantitative	Utility	AICD Phase I, II, IBNET	Access, quality of service, operational performance, financial performance
Module 7: Tariff schedules	Quantitative	Utility	AICD Phase I	Currently effective tariff schedule

Source: Authors.
Note: IBNET = International Benchmarking Network for Water and Sanitation Utilities.

based on this data-collection effort. In 2009, AICD carried out a second round of data collection in three more countries and covering three additional utilities, but this information was restricted to operational and financial performance only (module 6). The AICD data set was integrated with that of IBNET, which collected operational and financial performance data (module 6) for 32 more utilities. The upper bound of the data set covers 32 countries and 86 utilities; the lower bound covers 24 countries and 51 utilities.

Different modules underpin the individual chapters in this volume. For instance, chapter 2 draws on modules 2 and 5 to elaborate on the current state of the formal, informal, and rural water markets. Chapter 3 employs the questions in module 4 to present the sanitation snapshot. Chapter 4 draws on modules 1 and 3, which contain questions detailing the institutional environment of the WSS sectors. Quantitative data were captured to develop an understanding of the financial, technical, and operational performance of the selected utilities (module 6). Utilities were asked to provide data for the 10-year period from 1995 to 2005, but because older data were rarely available, the emphasis shifted to collecting data from the five-year period from 2000 to 2005. Chapter 5 is based on the operational and financial time-series data on utility performance contained in module 6. The information presented in tariff schedules (module 7) is used in chapters 5 and 6.

AICD fiscal database. The country-level analysis of the volumes, patterns, and composition of financial resources for WSS draws on the AICD fiscal database used extensively in chapter 8. That database, which captures information on public spending in the infrastructure sectors of 25 countries, is a unique attempt to document in a standardized manner the levels and patterns of public spending for infrastructure, including WSS. If one uses the database, it is possible to comparisons across sectors and ensure consistency over time. Financing flows within public spending are defined as including tax revenue or user charges channeled through both on-budget (central and local governments) and off-budget mechanisms (state-owned enterprises and special funds).

Country Categories

The performance of the utilities is evaluated across various functional and financial dimensions and presented in selected country groupings consistent with the method used in Foster and Briceño-Garmendia (2009), described in annex 1.3. The country groupings are based on (1) income and fragility (middle-income, low-income fragile, low-income,

Table 1.5 Utilities Analyzed in This Report, by Categories

	IBNET	*AICD*	*Total*
Sub-Saharan Africa	32	54	86
Income group			
Low-income, fragile	1	2	3
Low-income, nonfragile	20	26	46
Middle-income	1	11	12
Resource-rich	10	15	25
Regional economic community			
CEMAC	1	3	4
COMESA	10	19	29
EAC	17	8	
ECOWAS	3	14	
SADC	27	26	
Water availability			
High water scarcity	2	30	32
Low water scarcity	30	24	54

Source: Authors.
Note: CEMAC = Central African Economic and Monetary Community; COMESA = Common Market for Eastern and Southern Africa; EAC = East African Community; ECOWAS = Economic Community of West African States; SADC = Southern African Development Community.

and resource-rich), (2) water scarcity (high, low), and (3) regional economic community (EAC, ECOWAS, CEMAC, COMESA, and SADC) (table 1.5). The utilities are further distinguished by size (small, large).

Key Finding 1: Wide Differences in Patterns of Access to Water

In rural areas, reliance on surface water remains prevalent, and boreholes are the principal improved source of water. The share of the population relying on surface water fell sharply in the 1990s, from 50 percent to just more than 40 percent, where it has remained for the past five years (table 1.6). Boreholes are the main source of improved water, accounting for a further 40 percent of the population. Access to piped water and standposts is very low, barely increasing over the period 1990–2005. Indeed, in many countries, less than 1 percent of the rural population receives piped water. It is striking that in more urbanized countries, access to piped water and standposts in rural areas is substantially higher.

In urban areas, coverage of piped water fell markedly over the period 1990–2005 owing to rapid population growth. At close to 40 percent, however, it is still the single largest source of urban water. Coverage of

Table 1.6 Evolution of Water Supply Coverage in Africa, by Source
(percent)

	Piped supply		*Standposts*		*Well and boreholes*		*Surface water*	
Period	*Urban*	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*
1990–95	50	4	29	9	20	41	6	50
1995–2000	43	4	25	9	21	41	5	41
2001–05	39	4	24	11	24	43	7	42

Source: Banerjee, Wodon, and others 2008.

standposts saw a similar decline, but that of boreholes rose, so that each represented about 24 percent of the urban population in 2005. Overall, about two-thirds of the urban populace depends on utility water. The lower coverage of standposts compared with piped water is particularly striking, given the relatively low cost of standposts and the pressure to expand services rapidly. Reliance on surface water, at 7 percent of the urban population, changed little between 1990 and 2005.

Utilities are the central actors responsible for water supply in urban areas. In the middle-income countries they are essentially the only players, reaching about 98 percent of the urban population, the vast majority through private piped-water connections. In low-income countries only 68 percent of urban residents benefit from utility water, fewer than half through private piped connections (table 1.7). For the rest, informal sharing of connections through resale between neighbors (15 percent of the urban population) is almost as prevalent as formal sharing through standposts (19 percent of the urban population).

Utilities report providing about 20 hours per day of service (table 1.8). They typically produce just more than 200 liters per customer served, though the amount for middle-income countries is about twice that for low-income countries. If the total water production of the utilities could be evenly distributed to the entire population residing in the utility service area, it would amount to 74 liters per capita a day, just about adequate to meet basic human needs.

Urban households that do not benefit from utility water rely on several alternatives. The rapid expansion of boreholes in urban areas has already been noted. Water vendors, another alternative, may sell water obtained from utilities, boreholes, or surface sources from either trucks and carts or, less frequently, through private distribution networks. Water vendors account for only 3 percent of the African urban market,

Table 1.7 Services Provided by Utilities in Their Service Areas
(percent)

	Access by private residential piped-water connection	*Access by standpost*	*Access by sharing neighbors' private connection*	*Access to utility water by some modality*
Sub-Saharan Africa	44.3	13.0	21.7	64.0
Low-income countries	42.2	23.2	22.5	68.6
Low-income, fragile countries	25.6	2.2	41.0	56.0
Resource-rich countries	30.3	15.8	7.4	48.8
Middle-income countries	88.0	9.7	0.3	97.8

Source: Banerjee, Skilling, and others 2008.

Table 1.8 Quality of Services Provided by Utilities in Their Service Areas

	Availability of water		*Quality of supply*	
	Water production per resident in the utility service area (liters per capita per day)	*Water production per customer served by utility in service area (liters per capita per day)*	*Samples passing chlorine test (%)*	*Continuity of water service (hours per day)*
Sub-Saharan Africa	116.4	162.9	87.9	19.6
Low-income countries	66.0	130.2	92.8	19.0
Low-income, fragile countries	35.7	76.5	75.3	18.2
Resource-rich countries	140.5	208.8	78.1	18.4
Middle-income countries	208.8	233.6	97.2	24.0

Source: Banerjee, Skilling, and others 2008.

rising to 7 percent in West Africa. In some countries, however, their contribution to urban water supply is much larger: Nigeria (10 percent), Chad (16 percent), Niger (21 percent), and Mauritania (32 percent). In 15 large cities in Africa, the cost of vendor water, particularly when transported directly to the household, can be 2–11 times more expensive than having a household connection (table 1.9). This high willingness to pay for vendor water is a potential revenue source that the utilities are typically unable to capture.

Wells and boreholes are by far the fastest-growing source of improved water in both urban and rural areas. Service expansion shows a similar overall pattern in both cases: The absolute number of people depending

Table 1.9 Average Price for Water Service in 15 Largest Cities, by Type of Provider

	House connection	*Small piped network*	*Standpost*	*Household reseller*	*Water tanker*	*Water vendor*
Average price (US$ per cubic meter)	0.49	1.04	1.93	1.63	4.67	4.00
Markup over house connection (%)	100	214	336	402	1,103	811

Source: Keener, Luengo, and Banerjee 2009.

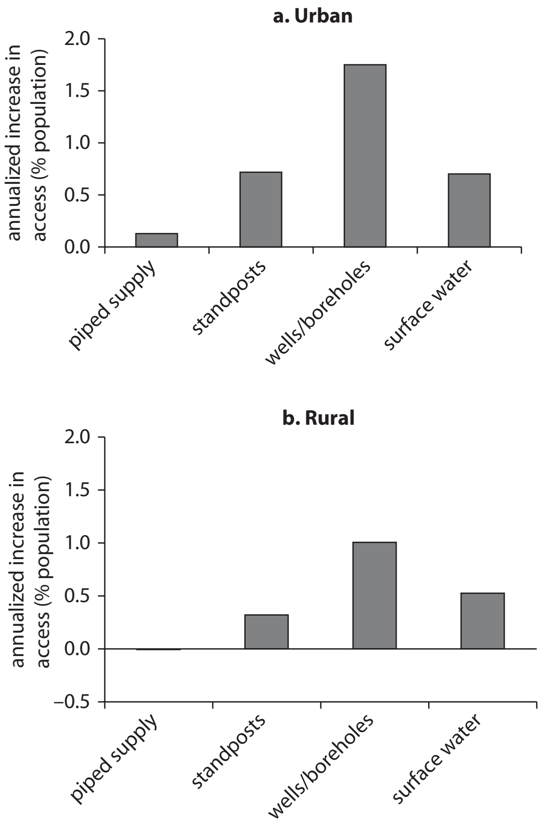
on surface water continues to grow, a grim statistic in its own right (figure 1.3). Across the board, wells and boreholes are expanding coverage much more rapidly than all the utility-based alternatives put together. Within the purview of the utility, access to standposts seems to be growing faster than piped water. However, the combined growth rates of the various improved forms of water in urban areas (less than 1 percent a year) still fall short of population growth (more than 4 percent a year).

Access to improved water sources is highly inequitable across the income distribution (figure 1.4). Access to piped water and standposts is heavily concentrated among the more affluent segments of the population, typically in urban areas. The poorest 40 percent of the population, by contrast, depends on surface water and on wells and boreholes in almost equal measure. Only 10 percent of African households in the bottom 60 percent of population are covered by piped supply. For the middle-income countries, access to piped water and standposts among the poorest quintiles is substantially higher than in the low-income countries.

Key Finding 2: Equally Wide Differences in Patterns of Access to Sanitation

Traditional pit latrines are by far the most common facility in both urban and rural areas, but more than a third of the population—mostly in rural areas—still defecates in the open (table 1.10). Improved sanitation (septic tanks and improved latrines) reaches less than 20 percent of Africa's population, and less than 10 percent in rural areas. Coverage of improved latrines is no greater than that of septic tanks, despite the significant cost difference between them. Only 10 percent of the population uses a septic tank; coverage in rural areas is practically negligible. In urban areas, septic tanks are much more common than improved latrines, and less than 10 percent of the population practices open defecation.

Figure 1.3 Dependence on Surface Water in Urban and Rural Areas, 1990s versus Early 2000s

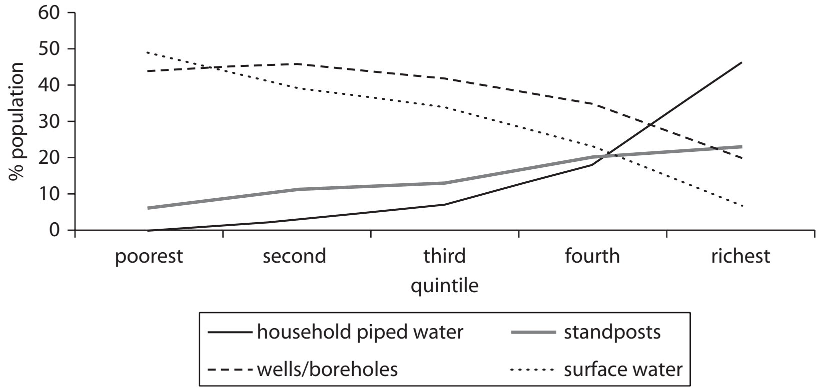


Source: Banerjee, Wodon, and others 2008.

Waterborne sewerage systems are rare in Africa. Only half of the large cities operate a sewerage network at all, and only in Namibia, South Africa, and the exceptional case of Senegal do some of the utilities covering the largest cities provide universal sewerage coverage. Little more than half of the households with piped water also have flush toilets, which are often connected to septic tanks rather than to sewers.

Patterns of access to sanitation vary dramatically across income groups. Open defecation is widely practiced in the lowest income quintile and not practiced at all in the highest. Conversely, improved latrines and septic tanks, virtually nonexistent among the poorest quintiles, are used by only 20–30 percent of the population in the

Figure 1.4 Coverage of Water Services, by Income Quintile



Source: Banerjee, Wodon, and others 2008.

Table 1.10 Patterns of Access to Sanitation in Africa
(percentage of population)

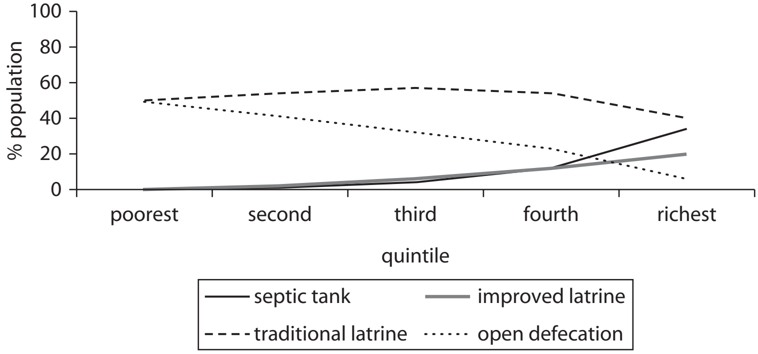
Area	*Open defecation*	*Traditional latrine*	*Improved latrine*	*Septic tank*
Urban	8	51	14	25
Rural	41	51	5	2
National	34	52	9	10

Source: Banerjee, Wodon, and others 2008.

richest. Access to improved latrines parallels that of septic tanks, suggesting that despite their lower cost, improved latrines remain something of a luxury, with little success in penetrating the middle of the income distribution. More important, the minimal presence of improved sanitation across poorer groups highlights a crucial issue—that high average rates of coverage do not help the most vulnerable populations. Traditional latrines are by far the most egalitarian form of sanitation, accounting across income ranges for about 50 percent of households (figure 1.5).

Traditional latrines are not only are the most common form of sanitation in Africa, but they are also the fastest growing. In recent years they have been used by an additional 2.8 percent of the population each year in urban areas and an additional 1.8 percent in rural areas, more

Figure 1.5 Coverage of Sanitation Services, by Income Quintile



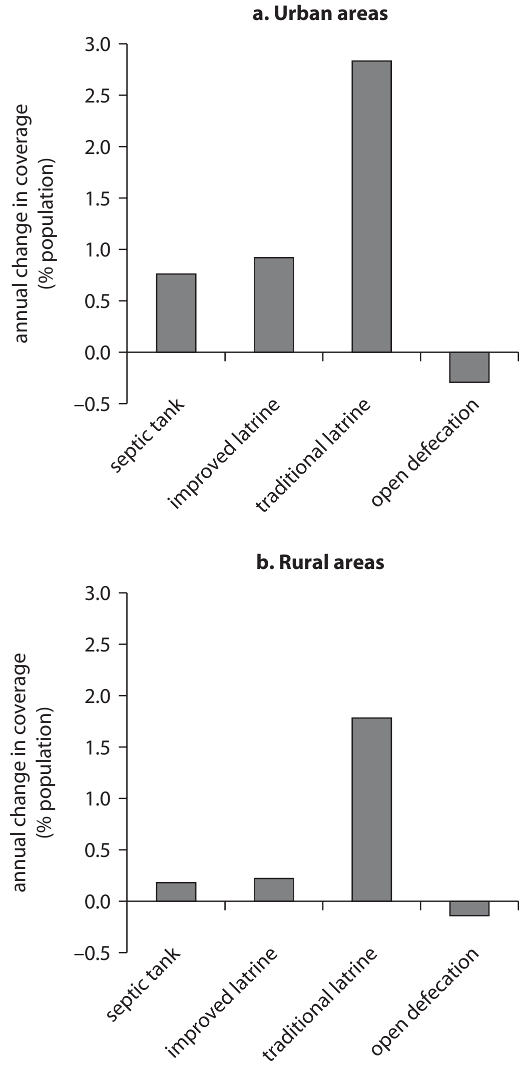
Source: Morella, Foster, and Banerjee 2008.

than twice the rate of expansion of septic tanks and improved latrines combined (figure 1.6). Growth in the use of traditional latrines is concentrated among the poorer quintiles and of improved latrines and septic tanks among the richer quintiles. Because the MDG target focuses on the two most improved sanitation options, the expanding use of traditional latrines does not always fully register in policy discussions. Meanwhile, the prevalence of open defecation in Africa has finally begun to decline, albeit at a very modest pace.

Key Finding 3: High Costs, High Tariffs, and Regressive Subsidies

African water utilities operate in an environment of high costs, with two-thirds of the utilities operating in 2005 within the cost band of \$0.4 to \$0.8/m^3. Since then, costs have continued to rise in nominal terms. The high average cost of operations and maintenance (O&M) in Africa is somewhat misleading, driven as it is by the high cost of providing services in the middle-income countries of South Africa and Namibia, which is more than \$1, because it includes the cost of purchasing bulk water. Overall, Africa's experience in recovering operating costs is positive, with many utilities setting tariffs at levels high enough to recoup O&M costs. In fact, African tariffs are highest among the developing regions, with the operating ratio very close to 1 mainly because utilities spend everything they collect and nothing over that. Thus, they are not adequately funding either capital expenditures or rehabilitation or maintenance.

Figure 1.6 Annual Growth in the Use of Sanitation Types, 1990–2005
(percent)



Source: Morella, Foster, and Banerjee 2008.

Full cost recovery is far off. Only four utilities in middle-income countries achieve their capital cost recovery at an average level of consumption of 10 m^3/month. It is only in the last block of the increasing block tariff structure that prices are set with an eye to cost recovery because of the widespread perception that recouping capital costs from consumers is not feasible because of the limited budgets of African households.

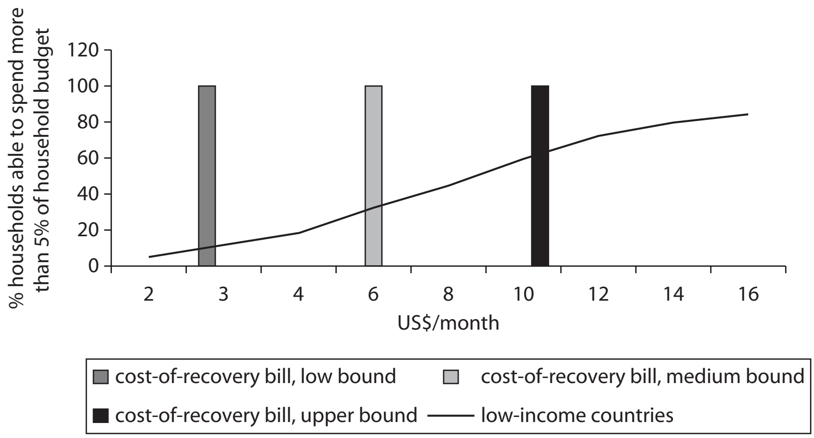
In most countries of the region, utilities' capital costs have been almost entirely subsidized by the state or by donors, but the subsidies are highly regressive, especially those to residential consumers in urban areas. Across the bottom half of the income distribution, barely 10 percent of households have access to piped water. Indeed, more than 80 percent of households with piped water come from the top two quintiles of the income distribution. Because poorer households are almost entirely excluded, they cannot benefit from subsidies embedded in prices for piped water. In many cases, targeting performance is further exacerbated by poor tariff design, with widespread use of minimum charges and rising block tariffs that provide large blocks of highly subsidized water to all consumers.

Tariffs high enough to provide full capital cost recovery should be affordable for half of the population in Africa—and for about 40 percent of the population in low-income countries—but not for the remainder. Assuming household average consumption of 10 cubic meters a month (or about 65 liters per capita a day), a monthly utility bill under full-cost-recovery pricing of $1 would be about $10. Based on an affordability threshold of 5 percent of household income, full-cost-recovery tariffs would prove affordable for 40 percent of the population in low-income countries (figure 1.7). With about 10 percent of the national population already enjoying a direct water connection, an additional 30 percent of the population could be connected to water service and be able to pay for it. Most of the remaining 60 percent of the population would be able to afford bills of about $6 a month.

Key Finding 4: The Stark Challenge of Financing the MDG

The overall price tag for reaching the MDG target for access to WSS is estimated at $22.6 billion per year, or 3.5 percent of Africa's gross domestic product. Most of that sum is related to the water sector, which is estimated to require allocations up to $17 billion per year, or 2.7 percent of Africa's gross domestic product (GDP) (table 1.11). The cost of new infrastructure is the largest share, requiring allocations of up to 1.5 percent of Africa's GDP every year, or 43 percent of overall spending. O&M needs are the next largest category, standing at 1.1 percent of Africa's GDP, or 31 percent of overall costs. Rehabilitation of existing assets requires lower yet substantial allocations—up to 0.9 percent of Africa's GDP—accounting for one-fourth of the overall needs.

Figure 1.7 Affordability of Full-Cost-Recovery Tariffs in Low-Income Countries



Source: Adapted from Banerjee, Wodon, and others 2008.

The composition of spending needs differs between middle- and low-income countries (table 1.12). Low-income countries (fragile or nonfragile) and resource-rich countries show much similarity, with costs divided almost equally among expansion, rehabilitation, and maintenance. Conversely, middle-income countries focus more on maintenance, which accounts for half of the overall spending needs, but the high coverage rates and relatively lower rehabilitation backlog make infrastructure expansion and rehabilitation less of a priority.

The affordability of meeting the MDG challenge appears to correlate strongly with a country's income. Halving the share of the population that lacks access to WSS services by 2015 is estimated to require only 1.5 percent of middle-income countries' GDP per year. Resource-rich countries would have to invest twice as much annually—3 percent of their GDP. The bill becomes prohibitively expensive for low-income countries, which would have to allocate at least 7 percent of their GDP to WSS every year to meet the goal. The burden would be even higher for fragile states: almost 12 percent of GDP each year.

As of 2005, Sub-Saharan Africa spends about $7.9 billion a year (1.2 percent of the region's GDP) on WSS—about a third of what is required if the MDG is to be met. In absolute terms, spending levels vary significantly across the country groups (table 1.13): Middle-income countries spend $2.6 billion, followed by low-income countries ($1.8 billion),

Table 1.11 Overall WSS Spending Needs

	Share of GDP (%)					*$ million per year*				
	CAPEX					*CAPEX*				
	Expansion	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total needs*	*Expansion*	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total needs*
Water	1.13	0.68	1.80	0.89	2.69	7,225	4,327	11,553	5,686	17,239
Sanitation	0.41	0.21	0.62	0.22	0.84	2,617	1,352	3,969	1,432	5,401
Total	1.54	0.89	2.42	1.11	3.53	9,843	5,679	15,522	7,118	22,640

Source: Authors' calculations.
Note: CAPEX = capital expenditure.

Table 1.12 Breakdown of Spending Needed to Meet MDGs in WSS, by Spending Category and Country Group

	Share of GDP (%)					*$ million per year*				
	CAPEX					*CAPEX*				
	New investment	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total spending needs*	*New investment*	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total spending needs*
Sub-Saharan Africa	1.5	0.9	2.4	1.1	3.5	9,843	5,679	15,522	7,118	22,640
Resource-rich countries	1.3	0.8	2.1	0.8	2.9	2,864	1,741	4,605	1,759	6,364
Middle-income countries	0.4	0.4	0.7	0.7	1.5	1,034	951	1,985	1,991	3,976
Low-income, fragile countries	5.9	2.7	8.5	3.3	11.8	2,208	1,006	3,213	1,223	4,437
Low-income, nonfragile countries	3.4	1.8	5.1	1.9	7.1	3,714	1,968	5,682	2,128	7,810

Source: Authors' calculations.
Note: CAPEX = capital expenditure.

Table 1.13 Spending by Functional Category, Annualized Average Flows, 2001–05

	Share of GDP (%)			*$ million per year*		
	O&M	*Total CAPEX*	*Total spending*	*O&M*	*Total CAPEX*	*Total spending*
Sub-Saharan Africa	0.5	0.7	1.2	3,112	4,778	7,890
Low-income, fragile countries	0.3	0.8	1.1	128	313	441
Low-income, nonfragile countries	0.3	1.4	1.7	307	1,533	1,840
Middle-income countries	0.7	0.2	1.0	1,996	641	2,637
Resource-rich countries	0.1	0.7	0.8	188	1,564	1,753

Sources: Briceño-Garmendia, Smits, and Foster 2008 for public spending; PPIAF 2008 for private flows; Foster and others 2008 for financiers from outside the Organisation for Economic Co-operation and Development.
Note: CAPEX = capital expenditure.

and resource-rich countries ($1.7 billion); fragile states spend about $0.5 billion in capital investment and O&M. Expressed as a percentage of GDP, infrastructure spending fluctuates widely across different country groups. Low-income countries and fragile states spend 1.1 and 1.7 percent of their GDP, respectively, whereas middle-income countries and resource-rich countries spend 1 percent or less of theirs (1.0 and 0.8 percent, respectively). The composition of spending also varies substantially across country groups. Middle-income countries allocate 80 percent of WSS spending to maintenance, reflecting the fact that they have already built much of the infrastructure needed. By contrast, the other country groups allocate no more than 30 percent to this item. Therefore, resource-rich countries, low-income countries, and fragile states spend 70 to 90 percent of their budgets for WSS infrastructure on capital investments. Although this reflects their need to build new facilities, a danger looms of neglecting the maintenance needs of the limited network that is available.

Inefficiencies of various kinds (incomplete execution of budgets, operational inefficiencies, and underpricing) total an estimated $2.9 billion a year (0.5 percent of GDP). Eliminating those efficiencies would provide a large share of the additional funds needed to achieve the MDG. Even if all the efficiency gains were realized, however, a funding gap would remain. Subtracting existing spending and potential efficiency gains from the spending needed to reach the MDG leaves an annual funding gap of about $11.9 billion a year, or 1.8 percent of GDP (table 1.14). Although the gap is widest for capital investment ($8.6 billion), a large shortfall also exists for O&M.

Table 1.14 Funding Gap
($ million per year)

	Total needs	Spending traced to needs	Gain from eliminating inefficiencies	Sources of inefficiency: Underexecution of budget	Sources of inefficiency: Operating inefficiencies	Sources of inefficiency: Underpricing	(Funding gap) or surplus
Sub-Saharan Africa	–22,640	7,890	2,877	168	1,259	1,450	–11,873
Low-income, fragile countries	–4,531	441	471	6	106	358	–3,620
Low-income, nonfragile countries	–7,810	1,840	685	39	265	381	–5,285
Middle-income countries	–3,987	2,637	1,037	8	492	537	–312
Resource-rich countries	–6,364	1,753	522	137	172	214	–4,089

Source: Briceño-Garmendia, Smits, and Foster 2008.

The smallest funding gap is found in middle-income countries, where inefficiencies are greatest. After tackling the inefficiencies, middle-income countries would face a negligible funding gap of $0.3 billion, most of which could be realized by reallocating resources from O&M to capital expenditure or from another infrastructure sector. The largest funding gap remains in low-income countries (nonfragile), which account for about half of the total funding gap for Sub-Saharan Africa ($5.3 billion).

In the aggregate, the region needs to increase capital investment in water infrastructure by 1.3 percent of GDP. Low-income, nonfragile countries need to invest an additional 3.3 percent and fragile states an additional 6.8 percent.

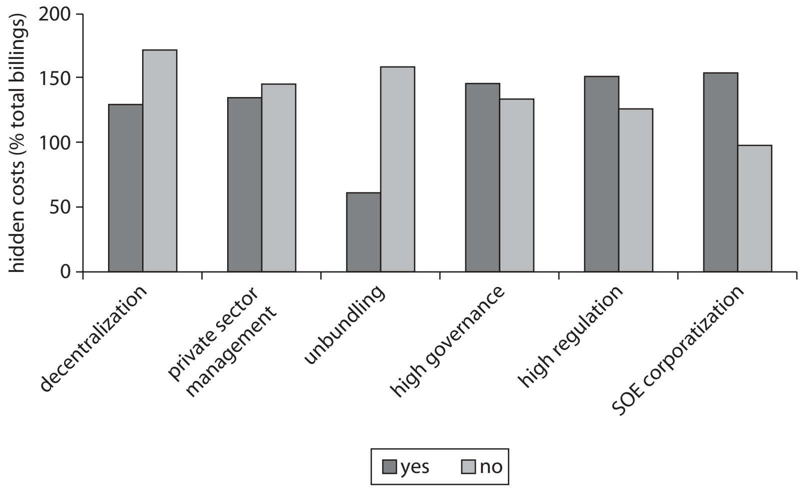
Key Finding 5: Institutional Reform for Better Water Sector Performance

Many African governments have reformed their WSS systems in the past two decades to provide better services for their citizens. Countries that have pursued institutional reforms have built more efficient and effective sector institutions and achieved faster expansion of higher quality services. The potential dividend of such efforts is large, because addressing utility inefficiencies alone could make a substantial contribution to closing the sector funding gap in many countries. Utilities that have decentralized their WSS services or adopted private sector management have done a better job of eliminating inefficiencies and other hidden costs than those that have not. Unbundling of services can also be beneficial, but unbundling is rare in Africa and exclusively concentrated in middle-income countries, whose superior performance can be explained for many other reasons. At the same time, higher levels of regulation and better governance of utilities (often accompanied by corporatization) are associated with lower efficiency (figure 1.8).

The reform agenda has had two major thrusts: increasing private participation and improving governance from within.

Private sector participation has helped to improve utility performance, with Senegal being particularly noteworthy. Management contracts awarded to private operating companies, being relatively short-term instruments, have had a material effect on improving revenue collection and service continuity, but they have not had much of an impact on more intractable issues, such as reducing unaccounted-for water and expanding access. Lease contracts have drastically improved access and boosted operational efficiency, but, except in Côte d'Ivoire, the associated investments

Figure 1.8 Hidden Costs and Institutions



Source: Banerjee, Skilling, and others 2008.
Note: SOE = state-owned enterprise.

have been publicly financed. The lease contracts in Guinea and in Maputo have been affected by a lack of coordination between the private contractor and the government, which has stalled progress in some key areas, such as unaccounted-for water. Overall, private sector contracts accounted for almost 20 percent of the increase of household connections in the region, twice the amount that would be expected given their market share of only 9 percent (table 1.15). However, half of these gains were made in Côte d'Ivoire alone (which has been adversely affected since the onset of civil war in 2002).

About half of the countries (mainly anglophone) have established dedicated regulatory agencies for the water sector, although a significant number of these have not adopted private sector participation. Conversely, a number of francophone countries with private participation have adopted regulatory frameworks contractually, without establishing an independent regulatory agency. No evidence seems to support the superiority of any one of these two approaches. Even where explicit regulatory frameworks have been established, these typically meet only around half of the corresponding good practice criteria. However, evidence for the links between introducing an independent regulator and improving performance is negligible for the water sector. Similarly, no conclusive evidence is found of the superiority of regulation by contract over the traditional form of regulation by agency.

Table 1.15 Overview of Impact of Private Sector Participation on Utility Performance

		Unit change in performance before and after private participation					
Country or city	*Contract*	*Household connections*	*Improved water*	*Service continuity*	*Unaccounted-for water*	*Collection ratio*	*Labor productivity*
Gabon	Concession contract	+20			−8		
Mali		+15	+29		−14		
Côte d'Ivoire	Lease contract or *affermage*	+19	+22				+2.6
Guinea			+27		−0		
Maputo			+2	+10	−1	+24	
Niger		+9	+3		−5		+3.2
Senegal		+18	+17		−15		+2.8
Johannesburg	Management contract				−0	+10	
Kampala				+6	−2	+12	
Zambia				+5	−28	+19	

Source: Adapted from Marin 2009.
Note: Blank cells denote missing data; household connections and improved water are measured as additional percentage points of households with access; service continuity is measured as additional hours per day of service; unaccounted-for water is measured as lower percentages of lost water; collection ratio is measured as additional percentage points of collection; and labor productivity is measured as additional thousands of connections served per employee.

Of governance reforms that appear to be the most important drivers of higher performance, two are especially promising: performance contracts with incentives and independent external audits. For instance, Uganda's water company has had success using a performance contract that offers incentives for good performance and improves accountability. The introduction of independent audits has also positively affected efficiency.

A Multidimensional Snapshot of WSS in Africa

What policies are appropriate to deal with the state of the sectors just reviewed? How can WSS services be improved and access to them widened to include more of the continent's people? No recipe book neatly lays out the steps that each country should adopt to enhance coverage. In fact, the challenge of expanding access differs immensely across Sub-Saharan Africa, and so do the explanations for mixed performance.

The rest of this volume presents a snapshot of sector performance, financing resources, and institutional, regulatory, and governance frameworks that is meant to augment our understanding of specific country experiences, help define barriers and constraints, measure resources and capacities, and identify opportunities for improvement.

Chapters 2 and 3 set the stage by presenting access trends and market structures in water and sanitation sectors, respectively. Chapter 4 discusses the sector's organization and regulatory arrangements. An analysis of performance variables in urban water utilities follows in chapter 5. Tariff structures, subsidy mechanisms, and affordability themes are introduced in chapter 6. Chapters 7 and 8 present financing arrangements for WSS, estimate the amounts that will have to be spent to achieve the MDG targets for access to WSS, and calculate the gap between available financing and the amounts needed. Finally, chapter 9 provides menu of options that may be used to bridge the funding gap in water and sanitation. These concluding chapters also review policy options.

The chapters are supported by a comprehensive set of tabular appendixes that present the information base generated from AICD's extensive data-collection and data-processing efforts. Six sets of tables follow: Appendix 1 deals with access to WSS services (chapters 2–3). Appendix 2 relates to the institutional landscape (chapter 4). Appendix 3 is concerned with the technical and financial performance of water utilities (chapter 5). Appendix 4 relates to utility tariffs. Appendix 5 explores the affordability of WSS services (chapter 6). Appendix 6 deals with investment needs and the gap between those needs and available resources (chapters 7–8).

Annex 1.1 Surveys in the AICD DHS/MICS Survey Database

	Available observations			*Year of survey*		*Included in the trend analysis*
Country	*1990–95*	*1996–2000*	*2001–05*	*DHS*	*MICS*	
Benin		√	√	1996, 2001		X
Burkina Faso	√	√	√	1993, 1999, 2003		X
Cameroon	√	√	√	1991, 1998, 2004		X
Central African Republic	√			1995		
Chad		√	√	1997, 2004		X
Comoros		√		1996		
Congo, Dem. Rep.	√		√		2000	X
Congo, Rep.			√	2005		
Côte d'Ivoire	√	√		1994, 1999		X
Ethiopia		√	√	2000, 2005		X
Gabon		√		2000		
Ghana	√	√	√	1993, 1998, 2003		X
Guinea			√	1999, 2005		X
Kenya	√	√	√	1993, 1998, 2003		X
Lesotho		√	√	2005	2000	X
Madagascar	√	√	√	1992, 1997, 2004		X
Malawi	√	√	√	1992, 2000, 2004		X
Mali		√	√	1996, 2001		X
Mauritania			√	2001		
Mozambique		√	√	1997, 2003		X
Namibia	√	√		1992, 2000		X
Niger	√	√		1992, 1998		X
Nigeria	√	√	√	1990, 1999, 2003		X
Rwanda	√	√	√	1992, 2000, 2005		X
Senegal	√	√	√	1993, 1997, 2005		X
South Africa		√		1998		
Sudan		√			2000	
Tanzania	√	√	√	1992, 1999, 2004		X
Togo		√		1998		
Uganda	√		√	1995, 2001		X
Zambia	√	√	√	1992, 1996, 2002		X
Zimbabwe	√	√		1994, 1999		X

Source: Banerjee, Wodon, and others 2008.
Note: DHS = demographic and health survey, MICS = multiple-indicator cluster survey.

Annex 1.2 Surveys in the AICD Expenditure Survey Database

	Country	*Type and year of survey*	*Sample size*	*Questions on water supply*	*Questions on sanitation*
1	Angola	Integrated Expenditure Survey 2000	10,116	Yes	No
2	Benin	Core Welfare Indicators Questionnaire 2002	5,350	Yes	Yes
3	Burkina Faso	Core Welfare Indicators Questionnaire 2003	8,500	Yes	Yes
4	Burundi	Priority Survey 1998	6,668	Yes	No
5	Cameroon	Enquête Camerounaise auprès des ménages II 2001	4,584	Yes	Yes
6	Cape Verde	Integrated Expenditure Survey 2001	—	Yes	Yes
7	Chad	Enquête sur la consommation et le secteur informel au Tchad 2002	10,992	Yes	Yes
8	Congo, Dem. Rep.	Integrated Expenditure Survey 2005	10,801	Yes	Yes
9	Congo, Rep.	Enquête Congolaise auprès des ménages pour l'évaluation de la pauvreté 2005	12,097	Yes	Yes
10	Côte d'Ivoire	Integrated Expenditure Survey 2002	5,002	Yes	Yes
11	Ethiopia	Welfare Monitoring Survey 2000	16,672	Yes	Yes
12	Gabon	Core Welfare Indicators Questionnaire 2005	7,902	Yes	Yes
13	Ghana	Ghana Living Standards Survey 1998/99	5,991	Yes	Yes
14	Guinea-Bissau	Core Welfare Indicators Questionnaire 2002	3,216	Yes	Yes
15	Kenya	Welfare Monitoring Survey 1997	10,874	Yes	Yes
16	Madagascar	Enquête prioritaire des ménages 2001	5,081	Yes	Yes
17	Malawi	Integrated Household Survey 2003	11,280	Yes	Yes
18	Mauritania	Enquête permanente sur les conditions de vie des ménages 2000	5,865	Yes	Yes
19	Morocco	Integrated Household Survey 2003	5,129	Yes	Yes
20	Mozambique	Inquérito aos agregados familiares sobre orçamento familiar 2002/03	8,703	Yes	Yes
21	Niger	Integrated Household Survey 2005	6,690	Yes	Yes
22	Nigeria	Nigeria Living Standards Survey 2003	19,158	Yes	Yes
23	Rwanda	Enquête intégrale sur les conditions de vie des ménages (avec module budget et consommation) 1999	6,420	Yes	Yes
24	São Tomé and Príncipe	Enquête sur les conditions de vie des ménages 2000	6,594	Yes	Yes

(continued next page)

	Country	*Type and year of survey*	*Sample size*	*Questions on water supply*	*Questions on sanitation*
25	Senegal	Integrated Expenditure Survey 2001	2,418	Yes	Yes
26	Sierra Leone	Integrated Household Survey 2003	3,713	Yes	Yes
27	South Africa	Integrated Expenditure Survey 2000	26,263	Yes	Yes
28	Tanzania	Household Budget Survey 2000	22,207	Yes	Yes
29	Uganda	National Household Survey 2002	9,710	Yes	Yes
30	Zambia	Living Conditions Monitoring Survey 2002	9,715	Yes	Yes
Total			267,711	30	28

Source: Banerjee, Wodon, and others 2008.
Note: — = not available.

Annex 1.3 Introducing a Country Typology

Africa's numerous countries face widely diverse economic situations. Understanding that structural differences in countries' economies and institutions affect their growth and financing challenges as well as their economic decisions (Ndulu and others 2007), this chapter introduces a four-way typology to organize the rest of the discussion. This typology provides a succinct way of illustrating the diversity of infrastructure financing challenges faced by different African countries.

Middle-income countries have a gross domestic product (GDP) per capita in excess of $745 but less than $9,206. Examples include Cape Verde, Lesotho, and South Africa (World Bank 2007).

Resource-rich countries are countries whose behaviors are strongly affected by their endowment of natural resources (IMF 2007).[2] Resource-rich countries typically depend on minerals, petroleum, or both. A country is classified as resource rich if primary commodity rents exceed 10 percent of GDP. (South Africa is not classified as resource intensive, using this criterion.) Examples include Cameroon, Nigeria, and Zambia.

Fragile states are low-income countries that face particularly severe development challenges, such as weak governance, limited administrative capacity, violence, or the legacy of conflict. In defining policies and approaches toward fragile states, different organizations have used differing criteria and terms. Countries that score less than 3.2 on the World Bank's Country Policy and Institutional Performance Assessment belong to this group. Fourteen countries in Africa are in this category. Examples include the Democratic Republic of Congo, Côte d'Ivoire, and Sudan (World Bank 2005).

Other low-income countries compose a residual category of countries with GDP per capita below $745 and that are neither resource-rich nor fragile states. Examples include Benin, Ethiopia, Senegal, and Uganda.

Notes

1. See United Nations, "Millenium Development Goals, http://www.un.org/millenniumgoals/.
2. See also Paul Collier and Stephen O'Connell, draft chapter (2006) for the synthesis volume of the African Economic Research Consortium's *Explaining African Economic Growth* project, Oxford University and Centre for Study of African Economies, and Swarthmore College and Centre for Study of African Economies.

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CHAPTER 2

Access to Safe Water: The Millennium Challenge

The water landscape in Africa is characterized by discrepancies within and among countries. Some countries are closer than others to achieving the water target spelled out in the Millennium Development Goals (MDGs).[1] In this chapter, we present the recent evolution and current status of water service in Africa, focusing on the underlying markets—urban formal, urban informal, and rural—each with their unique attributes and players. Some countries emerge as robust performers in expanding coverage in urban and rural areas, whereas others have remained stagnant or fallen behind in serving their population.

The Importance of Wells and Boreholes in Water Supply

Less than one-third of African households have reached the top parts of the ladder. About 15 percent of African households receive piped water through household connections; another 15 percent receive it through standposts. Wells and boreholes cover 37 percent of households, making them the most prevalent form of water supply in the region. Much of the remainder of the population relies on surface water. Operating mainly in urban areas, water vendors serve about 2 percent of households.

Rates of water supply coverage show tremendous heterogeneity from one country to another. The variation in household piped-water coverage is wide—from 2 percent in Uganda to about 60 percent in South Africa. In most countries, piped water reaches less than 20 percent of households (figure 2.1a). Only three countries—Gabon, Senegal, and South Africa—can claim a piped-water coverage rate of more than 40 percent. The coverage of wells/boreholes and surface water reveal even greater variation (figure 2.1b).

The low rate of piped-water coverage reflects Africa's relatively low rate of urbanization. Piped-water coverage in rural areas is several magnitudes lower than in urban areas. Only 4 percent of rural households in Africa receive piped water, compared with 38 percent in urban areas. When public standposts are included, more than 60 percent of Africa's urban households have access to some kind of utility provided water. In rural areas, wells and boreholes and surface water predominate. More than 80 percent of Africa's rural households receive their water from these sources.

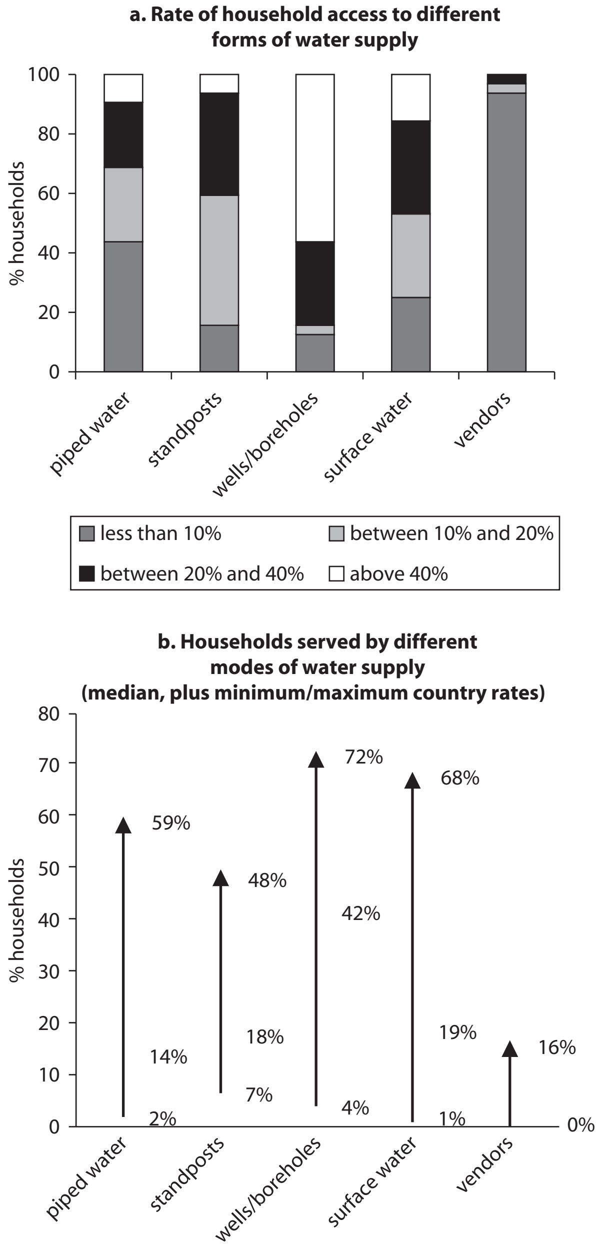
Richer households are much more likely to enjoy access to piped water than are poorer households. On the water-supply ladder, rising income is associated with piped water and a declining dependence on wells, boreholes, and surface water. In the lowest three quintiles of the wealth distribution, access to piped water through a household connection is well below 10 percent, with negligible coverage of the poorest households (table 2.1). Even in the fourth quintile, access to piped water within the household is less than 20 percent, whereas for the richest quintile it is close to 50 percent—still far from universal (and highly variable across countries).

Most of the countries in the sample of the Africa Infrastructure Country Diagnostic (AICD) are low-income countries with a per capita gross domestic product (GDP) of less than $1,000 per year, but the sample also includes several middle-income countries: Cape Verde, Gabon, Lesotho, Namibia, and South Africa. The degree of urbanization varies widely in Africa—from 12 percent in Uganda to 80 percent in Gabon—the average being about 35 percent.

Both income and urbanization are directly correlated with access to safe water. Higher incomes make safe water more affordable, and the greater population densities associated with urbanization help to reduce the cost of expanding access to modern services.

Access to piped water is four times greater in middle- than in low-income countries and three times greater in the most urbanized

Figure 2.1 African Households' Access to Various Forms of Water Supply



Source: Banerjee, Wodon, and others 2008.

Table 2.1 Coverage Rate of Water Supply
(percent)

	Overall	*Rural*	*Urban*	*Quintile 1*	*Quintile 2*	*Quintile 3*	*Quintile 4*	*Quintile 5*
Household piped water	15	4	38	0	3	7	18	46
Standposts	15	10	25	6	11	13	20	23
Wells/ boreholes	37	43	24	44	46	42	35	20
Surface water	30	41	7	49	39	34	23	7
Vendors	2	1	4	1	1	2	2	2

Source: Banerjee, Wodon, and others 2008.

economies than in the least, and recourse to surface water is about twice as prevalent in the low-income and least urbanized countries than in the middle-income and most urbanized countries (table 2.2). These patterns hold across urban and rural service segments, and across the different quintiles of the distribution of spending on water service as well. Thus, in more highly urbanized countries, even the rural population is substantially better off. Nevertheless, even in middle-income and urbanized countries, the benefits of access are largely confined to the top three quintiles of the distribution, with too many in the bottom two quintiles still without access to safe water.

In the vast majority of countries the distribution of access is even more unequal than the distribution of income, exacerbating inequalities in society as a whole. Furthermore, the distribution of new connections resulting from the service expansions that have occurred in recent years is also more unequal than income. It appears, therefore, that the benefits of current access and new extensions tend to accrue to the better-off. This may be because access rates in Africa remain low even among the wealthier segments of the population, so it makes business sense for the utilities to initially concentrate their expansion efforts (Diallo and Wodon 2005).

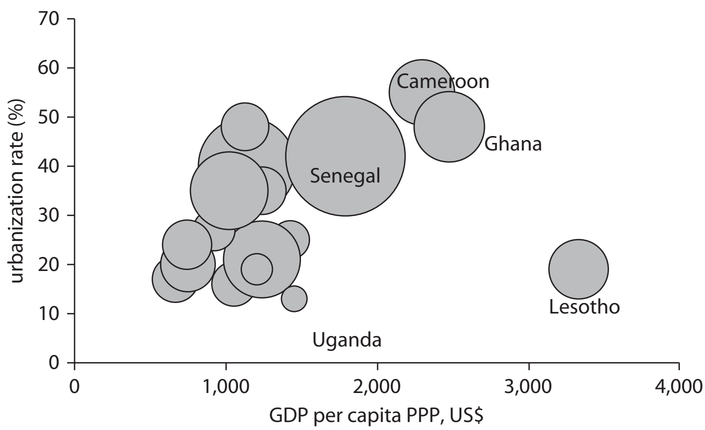
Even if one controls for income and urbanization, some countries stand out as having much higher (or lower) levels of coverage than might be expected, and these cases merit closer study (figure 2.2). As seen in figure 2.2, Cameroon and Ghana have relatively high incomes and high rates of urbanization, yet their piped-water coverage is relatively small, suggesting underperformance. Senegal, by contrast, has coverage that compares favorably with that of peers at similar (and even greater) levels of income and urbanization. Sitting just to the left of Senegal, on the 50 percent urbanization line, Nigeria stands out as having low levels of

Table 2.2 Coverage Rate of Water Supply, by Country Income and Urbanization Status
(percent)

Population weighted	*Household piped water*	*Public standpost*	*Well or borehole*	*Surface water*	*Vendors*
By country income					
Middle	44	22	13	18	1
Low	11	14	40	32	2
By urbanization level					
Low	7	16	36	39	1
Medium	17	12	35	33	0
High	21	15	40	19	4

Source: Banerjee, Wodon, and others 2008.
Note: Urbanization level: low (0–30 percent), medium (30–40 percent), and high (> 40 percent).

Figure 2.2 Extent of Access to Piped Water through Household Connection, by GDP and Urbanization Rate



Source: Banerjee, Wodon, and others 2008.
Note: PPP = purchasing power parity.

piped-water coverage relative to peers. Benin, a strong performer on piped-water access, provides a good contrast with Nigeria. Zambia, too, performs reasonably well on access to piped water, relative to its per capita national income and rate of urbanization.

Low Access to Piped Water. . . for Various Reasons

Access to piped water is low in most of Africa and has not expanded substantially in recent years. The main reasons are rapid population growth and shrinking household size (box 2.1), two trends that continually increase the size of the unserved population and challenge the capacities of weak and underfunded utilities to expand connections to growing numbers of households.

Box 2.1

The Problem of Shrinking Households

As incomes rise, African households are getting smaller. Urbanization, lower fertility, and greater economic resources all allow nuclear families to disengage from extended households because they no longer need the economies of scale provided by larger households. In Benin, for example, the average household size decreased from 6.0 in 1996 to 5.2 in 2001.

Shrinking household size exerts a strong effect on the need for new water-supply connections, sometimes canceling out the effect of slower population growth. For that reason, the new-connection needs of richer countries may equal or outstrip those of poorer countries.

There is a wide cross-country dispersion in the relative growth rates of population versus the number of households. For the AICD sample as a whole, however, the average rate of population growth is 2.5 percent, and the average increase in the number of households is 3.2 percent, so the trend toward smaller household sizes represents almost one-third (0.7 percent) of the new connections needed to keep access rates constant (Diallo and Wodon 2007).

In a few countries, by contrast, household size has increased. Typically this occurs during hard times, as households join forces to cope with deterioration in their living conditions.

Rates of Change in Number of Households and Population, Selected Countries

Difference between annual household growth and population growth	*Countries*
Higher than 2 percent	Benin, Namibia, Zimbabwe
Between 1 and 2 percent	Cameroon, Guinea, Mali, Nigeria
Between 0 and 1 percent	Burkina Faso, Côte d'Ivoire, Kenya, Madagascar, Malawi, Niger, Rwanda, Senegal, Tanzania, Zambia
Less than 0 percent	Chad, Ethiopia, Ghana, Mozambique, Uganda

Source: Banerjee, Wodon, and others 2008.

The challenge of reaching universal access to safe sources of water is typically understood as a supply-side problem of rolling out infrastructure networks to increasingly far-flung populations, entailing major investments. However, even in densely populated urban areas, where infrastructure is already present or easy to expand, service coverage is by no means universal. Part of the access problem therefore appears to be related to demand-side barriers that prevent households from hooking up to available services. In addition to high connection charges that make hookups unaffordable, demand-side barriers include illegal land tenure, which disqualifies households from connecting, and a variety of other social and economic factors that may deter households from becoming utility clients.

Household surveys can be used to explore the reasons why a household might elect not to connect to the water-supply network. Samples are based on geographic clusters that *at least for urban areas* are physically small, amounting to no more than a few city blocks. It is therefore possible, at least in urban areas, to study the extent to which people who lack access to infrastructure live in clusters where infrastructure is available (as indicated by the fact that some of their immediate neighbors are connected). The resulting analysis gives us a sense of the degree to which low access to services is driven by supply-side issues (infrastructure networks not reaching the areas where people live) or by demand-side issues (people not connecting to available infrastructure networks). The building blocks of the analysis are presented in box 2.2.

The novelty of this approach is that we break down the traditional measure of household *coverage* into two components (using the method of Foster and Araujo 2004 and Komives and others 2005). The first component, which we call *access,* is the percentage of the population that lives in a cluster where at least one household has service coverage, indicating that the infrastructure is physically proximate and that households probably have an opportunity to connect. The second component, which we call *hookup,* is the percentage of the population living in clusters where the opportunity to connect to the service is available. Using these two concepts, we can estimate the percentage of the unserved population that constitutes a supply-side deficit (meaning that they are too far from the network to make a connection until the network is expanded to reach them) versus a demand-side deficit (meaning that something other than distance from the network is preventing them from taking up the service).

The optimal policy response to the two conditions is very different—hence the importance of making the distinction. The solution to a supply-side deficit is to make further investments to extend the geographic reach

Box 2.2

Coverage, Access, and Hookup Rates: Relationships and Definitions

Coverage rate = number of households using the service / total number of households

Access rate = number of households living in communities or clusters where service is available / total number of households

Hookup rate = number of households using the service / number of households living in communities where service is available

Coverage = access rate x hookup rate

Unserved population = 100 – coverage rate

Pure demand-side gap = access rate – coverage rate

Supply-side gap = unserved population – pure demand-side gap

Pure supply-side gap = supply-side gap x hookup rate

Mixed demand and supply-side gap = supply-side gap x (100 – hookup rate)

Proportion of deficit attributable to demand-side factors only = pure demand-side gap / unserved population

Proportion of deficit attributable to supply-side factors only = pure supply-side gap / unserved population

Proportion of deficit attributable to both demand- and supply-side factors only = mixed demand and supply-side gap / unserved population

Source: Foster and Araujo 2004.

of the network. The solution to a demand-side deficit is to make policy changes that address barriers to service take-up, such as high connection charges or illegal tenure.

For various reasons, it could be questioned whether everyone in a given geographic cluster really has the opportunity to connect. First, even in a small cluster, some residents may live too far from the network to connect. Second, the network may not have the carrying capacity required to service all residents in a particular geographic cluster without further investment and upgrade. Third, even if a household is physically close to a network with adequate carrying capacity, it may choose not to connect because it has an acceptable alternative (such as a borehole).

Diallo and Wodon (2007) use a statistical approach to correct for these problems. They simulate the maximum connection rate obtainable in any primary sampling unit based on that of the richest households in that area. If less than 100 percent of the richest households (which are assumed to be able to play) are connected, something other than demand-side barriers is probably at work. The methodology is less applicable to rural areas because the clusters tend to be larger and population densities much lower.

Rates of access to piped water in urban areas of Africa exceed coverage rates by 30 to 40 percentage points (table 2.3). Indeed, access rates are as high as 70 to 90 percent, which means that the vast majority of the urban population, even in low-income countries, lives in relatively close proximity to existing water networks. Hookup rates are another story: They are significantly higher in middle-income than in low-income countries. The proportion of the coverage deficit that is attributable to demand-side factors, adjusted using the method of Diallo and Wodon (2007), is 14 percent in the low-income countries (meaning that one in seven urban residents elects not to connect to the available service) and 36 percent in the middle-income countries. Without the adjustment, the share of the coverage deficit attributable to demand-side factors appears much larger.

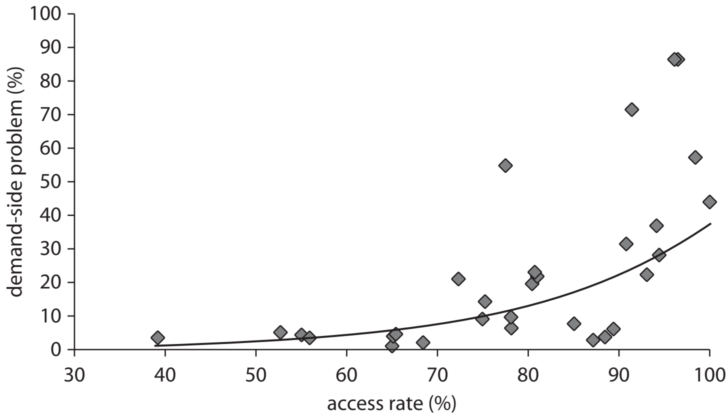
When coverage is examined by country, one sees a very strong relationship between the level of access (that is, the share of the population living in areas where piped-water service is available) and the size of the demand-side deficit (figure 2.3). That relationship is intuitively satisfying because, as rates of access rise with expansion of infrastructure network,

Table 2.3 Water-Service Coverage in Urban Africa and Share of Coverage Deficit Attributable to Demand-Side Factors
(percentage of urban households)

	Decomposition of coverage			*Proportion of coverage deficit attributable to demand-side factors*	
	(1)	*(2)*	*(1) x (2)*		
	Access	*Hookup*	*Coverage*	*Unadjusted*	*Adjusted*
Country income					
Low	68	42	31	58	14
Middle	91	74	69	61	36
Urbanization level					
Low	76	42	33	65	20
Medium	76	56	46	63	8
High	71	49	34	55	45

Source: Banerjee, Wodon, and others 2008.

Figure 2.3 Country Scatter Plot of Current Access Rates for Piped Water and Demand-Side Factors in Coverage Deficit



Source: Banerjee , Wodon, and others 2008.

demand-side factors come to assume a greater role in the remaining coverage deficit. One also observes, however, substantial variation across countries in the size of the adjusted coverage deficit that is due to demand-side factors—from less than 5 percent in Burkina Faso, the Central African Republic, Chad, Ethiopia, Mozambique, Rwanda, Tanzania, and Uganda, to more than 50 percent in Côte d'Ivoire, the Republic of Congo, Gabon, Senegal, and Zambia.

We have already noted the importance of distinguishing between demand- and supply-side factors when making policies to increase access. The demand-side problems are comparatively more deep-rooted and are directly related to the consumer's income and ability to pay. The supply-side problems are related to the utilities' investments in its network and to expand its consumer base. The ability to do so depends on the strength of its revenue: If the volume of high-value industrial and residential consumers is low in the consumer mix, the utilities will find it difficult to generate adequate funds to invest in network expansion.

Multiple Players in the Urban Water Market

Our analysis of patterns of access to water in urban areas reveals three categories of countries (table 2.4). The first comprises countries in which a large share of the urban population obtains water through wells and

Table 2.4 Patterns of Urban Access to Water
(percent)

Dominant modality	*Range of prevalence*	*Average prevalence*	*Countries*
Piped water	28–93	57	Benin; Comoros; Congo, Dem. Rep.; Congo, Rep., Côte d'Ivoire; Ethiopia; Gabon; Kenya; Lesotho; Mauritania; Namibia; Senegal; South Africa; Togo; Zambia; Zimbabwe
Standposts	37–53	43	Burkina Faso, Cameroon, Central African Republic, Ghana, Guinea, Madagascar, Malawi, Mozambique, Niger, Rwanda, Tanzania, Uganda
Wells/ boreholes	33–48	39	Chad, Mali, Nigeria, Sudan

Source: Banerjee, Wodon, and others 2008.

boreholes, while other improved sources also provide substantial coverage. The second comprises countries where the majority of the urban population depends on public standposts. The third group comprises countries where the majority of the urban population has piped water from household connections.

Urban households that lack a piped-water connection have several alternative sources from which to choose: public standposts, water kiosks, vendors (or resellers) of water, rainwater harvesting, shallow wells, and surface water. Although the ability of these alternative suppliers to provide adequate service to the unconnected population is debated, their operations recently have come to be better understood (Collignon and Vézina 2000; Kariuki and others 2003; Kariuki and Schwartz 2005; Keener and Banerjee 2005). These providers have come to occupy an important place in urban Africa, particularly in dense periurban areas and in postconflict economies. In these areas, the formal sector's ability to deliver services is continually challenged, and an informal market has emerged to fill the gap.

Household connection rates are directly linked to the strength of the informal market. Not surprisingly, the percentage of unconnected households served by water tankers or water vendors is higher in countries where household connection rates are lower. In countries with very low rates (less than 30 percent) of household connection, 13 percent of the unconnected urban population, on average, relies on water trucks or water vendors. In countries with low to medium (30–60 percent) rates of household coverage, just 4 percent of the unconnected urban population relies on water trucks or vendors. For countries with medium to high (> 60 percent) rates of household coverage rates, only 2 percent of the unconnected urban population relies on water trucks or vendors.

In an analysis of data available from Africa's 24 largest cities from the AICD Water Supply and Sanitation (WSS) Survey, we found that public standposts are the principal source of water for unconnected households. Average standpost coverage in the cities studied was 28 percent, but standposts supply water to up to 53 percent of unconnected households (table 2.5).

The actual coverage of public standposts may be lower, however, than suggested by the foregoing figures, which are derived from official data reported by utilities and governments. Several independent sectoral surveys assessed the coverage provided by standposts and other alternative providers in a way that made it possible to compare the results with official statistics. In Maseru, the capital of Lesotho, for example, data from an official multiple-indicator cluster survey revealed that about half of the urban population lacked a piped-water connection and that the utility *assumed* that this segment was reliant on its free public standposts. But an earlier, more detailed sectoral survey undertaken in Maseru in 2002 showed that coverage by free public standposts was as low as 16 percent of the population, with the coverage among the unconnected falling from 100 percent to 24 percent (Hall and Cownie 2002).[2] It is unlikely that the three-year lag between surveys accounts for the stark differences in these numbers.

In fact, utility data deviate from household survey data in estimating standpost coverage. Most utilities calculate that coverage by multiplying the number of existing standposts by a "standard" number of users (usually 300 to 500).[3] The resulting estimates can be very inaccurate, however, because they do not take into account the factors that affect the real usage of standposts—such as their location relative to population, water pressure, operating hours, and even whether a given standpost is actually working. In Ouagadougou, for example, the number of people relying on standposts was often calculated using a multiplier of 700 people per standpost. After detailed field studies showed actual coverage to be much lower, the utility reduced its standard number of users from 700 to 300 people per standpost.[4]

About one out of five standposts in Africa is in poor working condition. In some places, the figures are much worse. In Kinshasa, for instance, only 21 percent of the standposts are in good working condition

Table 2.5 Water Supply in Africa's Largest Cities, by Source

Country	*Largest city*	*Household connection* (%)	*Standpipes/ kiosks* (%)	*Water tankers* (%)	*Household resellers* (Yes/No/%)	*Water vendors* (Yes/No)	*Small piped networks* (Yes/No)
Benin	Cotonou	31	—	n.a.	Yes	No	Yes
Burkina Faso	Ouagadougou	34	61	n.a.	No	5	No
Ethiopia	Addis Ababa	39	40	n.a.	Yes	Yes	No
Mozambique	Maputo	26	26	n.a.	26	Yes	12
Niger	Niamey	31	21	n.a.	No	10	No
Nigeria	Kaduna	48	2	—	Yes	Yes	No
Rwanda	Kigali	35	51	3.21	10	No	No
Senegal	Dakar	77	19	n.a.	Yes	No	No
South Africa	Johannesburg	88	12	0.24	No	No	No
Congo, Dem. Rep.	Kinshasa	36	—	n.a.	Yes	No	Yes
Ghana	Accra	56	—	—	Yes	Yes	No
Kenya	Nairobi	51	41	—	No	8	9
Lesotho	Maseru	33	16	1.00	31	5	No
Malawi	Blantyre	47	—	n.a.	Yes	No	No
Namibia	Windhoek	73	20	n.a.	No	No	No
Sudan	Greater Khartoum	27	0.11	0.43	Yes	60	No
Zambia	Lusaka	27	58	n.a.	Yes	Yes	No
Cape Verde	Praia	34	60	6.30	No	No	No
Chad	N'Djamena	22	—	—	Yes	Yes	Yes
Côte d'Ivoire	Abidjan	65	—	n.a.	Yes	No	Yes
Madagascar	Antananarivo	42	34	n.a.	Yes	8	Yes

(continued next page)

Table 2.5 *(continued)*

Country	*Largest city*	*Household connection (%)*	*Standpipes/ kiosks (%)*	*Water tankers (%)*	*Household resellers (Yes/No/%)*	*Water vendors (Yes/No)*	*Small piped networks (Yes/No)*
Tanzania	Dar es Salaam	29	4	2.00	35	2	Yes
Uganda	Kampala	30	5	—	Yes	Yes	Yes
	Average	43	28	2.20	—	—	—
	Median	35	21	2	—	—	—
	Minimum	22	0.11	0	10	2	6
	Maximum	88	61.0	6	35	60	12
	Number of countries with relevant presence	All	All	11/23 (48)	17/23 (74)	14/23 (61)	9/23 (39)

Source: Keener, Luengo, and Banerjee 2009.
Note: For the unconnected market, the data obtained from independent studies have been highlighted. The remaining data come from utility and government sources. n.a. = not applicable, — = not available.

(table 2.6). In many cities where standposts tend to be in poor working condition, vendors sell water door to door or from household connections. In such cases, although people may occasionally obtain their water directly from the standpost, they also get it from vendors who make it their business to transport water from operating standposts.

The growing role of household resellers is usually hidden in household surveys, because it is illegal to sell water in many countries, and households are unwilling to admit to engaging in proscribed activities. However, the results of the module of AICD's WSS Survey devoted to small-scale independent providers (module 5) reveal that household reselling is a common occurrence in 70 percent of the countries studied—despite being prohibited in 24 percent of the countries in which it is prevalent. In Maputo, for instance, one-third of the unconnected obtain their water from neighbors (Boyer 2006). Similarly, in Maseru, household resellers provide water to 31 percent of the population and to almost half of the unconnected (Hall and Cownie 2002).

Table 2.6 Working Status of Standposts in the Largest Cities in Africa
(percent)

Country	*Largest city*	*Population depending on standposts*	*Share in good working order*	*Share free of charge*
Sudan (HCI)	Greater Khartoum	0.11	100	0
Congo, Dem. Rep. (HCI)	Kinshasa	n.a.	21	—
Mozambique (MCI)	Maputo	26	58	0
Rwanda (MCI)	Kigali	51	75	0
Namibia (MCI)	Windhoek	20	100	100
Lesotho (LCI)	Maseru[a]	16	48	100
Kenya (LCI)	Nairobi	41	89	0
Nigeria (LCI)	Kaduna	2	55	96
Benin (LCI)	Cotonou	n.a.	100	0
Burkina Faso (LCI)	Ouagadougou	61	100	0
Cape Verde (LCI)	Praia	60	100	0
Niger (LCI)	Niamey	21	98	0
Zambia (LCI)	Lusaka	58	97	0
Malawi (LCI)	Blantyre	n.a.	90	0
Madagascar (LCI)	Antananarivo	34	82	40
	Average	32.40	81	24

Source: Keener, Luengo, and Banerjee 2009.
Note: Data obtained from independent studies have been highlighted. The remaining data come from utility and government sources. HCI = high conflict index, MCI = medium conflict index, LCI = low conflict index, n.a. = not applicable, — = not available.
a. A negligible percentage of the standpipe/kiosk coverage is paid.

Legalizing household resale of water could be beneficial in expanding access to safe water, as demonstrated in Côte d'Ivoire (box 2.3).

Other alternatives to piped water are offered by small-scale service providers who sell water from boreholes, wells, and other nonnetwork sources. In the past decade, water vendors, such as standpost operators, have gained some attention from the development community. Overall, vendors serve only 4 percent of urban Africa, but in some countries they play a prominent role. In Mauritania, 32 percent of urban residents depend on vendors. Vendors serve more than 5 percent of urban households in Burkina Faso, Chad, Niger, Nigeria, and Tanzania.

Water truckers tend to supply high- and middle-income households. They are especially visible in cities where the piped-water service is very poor in reach and reliability, such as Dar es Salaam, Kampala, and Nairobi. Truckers are present in half of the cities considered in this study, but their market share is limited (between 0.2 and 6.5 percent). In some cities, such as Accra and Luanda, water tankers not only supply directly to upper- and middle-income households but also play a key role in the

Box 2.3

Legalizing Household Resellers in Côte d'Ivoire

To make it easier for the poor to receive safe water, Côte d'Ivoire legalized household resellers in informal settlements. Legalization enabled the water utility, Société de Distribution d'Eau de Côte d'Ivoire (SODECI) to indirectly influence the price and quality of water sold in these areas. It issued about 1,000 licenses to water resellers, many of whom have invested in last-mile network extensions to cater to demand in poor neighborhoods. SODECI reduces the risk of nonpayment by charging a high deposit (about $300) and invoicing resellers monthly.

But the scheme faces implementation challenges. Household resellers pay SODECI twice—in the form of reseller payments and a price markup for network extensions. Furthermore, there is no special tariff for household resellers; they pay the high consumer tariff, so the incentive to become a household reseller is limited. An association of water resellers called AREQUAPCI that includes members licensed by SODECI has successfully worked out a deal to buy water at the same preferential rate as standpipe operators.

Source: Collignon and Vézina 2000.

supply chain. Because of the limited extent of the piped network, many kiosks depend on water supplied by tankers.

Small piped-water networks are relatively new in the urban landscape. In 40 percent of the largest cities, small, secondary water networks are operated by independent providers. These may be connected to the main city network (as in Abidjan, Cotonou, and Nairobi) or completely separated from the city network (as in Kampala, Maputo, and Nairobi). Even then, their coverage is marginal, at 12 percent in Maputo and 9 percent in Nairobi.

The Role of Wells, Boreholes, and Surface Water in the Rural Water Market

In most countries, wells and boreholes remain the most important source of water in rural Africa. Surface water is the second most important source, extending to more than 30 percent of the rural population in half of the sample countries. In no country in our sample does piped supply extend to more than 25 percent of the rural population. In fact, only in Namibia and South Africa does piped water reach more than 15 percent of the rural population, and in 7 out of 10 African countries it reaches less than 5 percent. Also, water collection imposes an enormous burden on households, primarily on women and children (box 2.4). Taking water closer to people promises enormous gains from health and time savings even if the opportunity cost of time is severely discounted.

Our analysis of access patterns at the rural level reveals three categories of countries (table 2.7). The first comprises those in which most of the rural population depends on surface water, the second those in which most rural dwellers obtain water through wells or boreholes, and the third group countries in which the rural population tends to rely on standposts.

The challenges in rural water supply management are many, but perhaps the most important is sustaining the service. Governments struggle to enhance access to safe water and to maintain existing facilities, but low capacity at the local level hobbles water supply management, because inadequate maintenance leads to frequent breakdowns and cuts the useful life of equipment obtained with scarce resources. The need for new or rehabilitated systems widens the gap between available funding and the funding needed to meet the water MDG.

In many countries, more than a third of rural water systems are not working at any given time (figure 2.4). Senegal, where 85 percent of rural water facilities are functioning, is the top performer, providing a stark

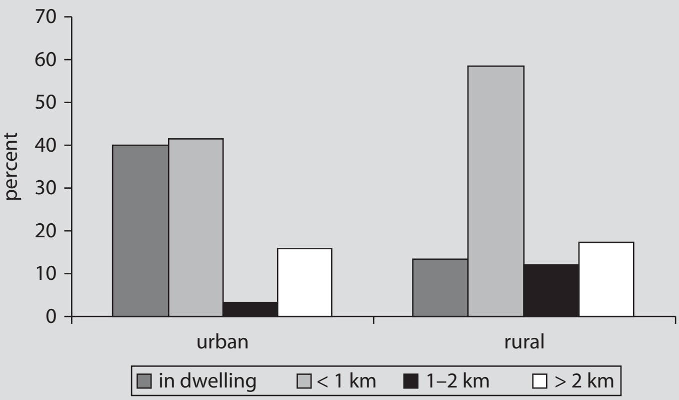
Box 2.4

The Opportunity Cost of a Distant Water Supply

Fetching water from outside the home is an activity dominated by women and girls. Blackden and Wodon (2006) compute that more than two-thirds of the 6 million hours that Ghanaians spent fetching water in 1992 were spent by women. If access to water were more convenient, those hours might be spent on education or other productive purposes. Providing African households with reasonable access to water would bring significant gains in productivity, health, and welfare.

On average, urban households that lack private water connections live about 500 meters from their water source, while in rural areas the average distance is closer to one kilometer. Some 20 percent of urban households and 30 percent of rural households live more than one kilometer from their water source.

Distance of Households from Water Source in Selected Countries
(Percentage of Households)



Patterns of access vary from country to country, but, on average, urban households have more convenient access to water than do rural households. For instance, 53 percent of rural households in Tanzania live more than two kilometers from their water source. At the other extreme are Madagascar, Nigeria, and South Africa, where less than 2 percent of rural households live more than two kilometers from their water. Even in urban areas, water can be far away. In urban Mauritania, for example, 66 percent of households live more than two kilometers away from their water source. In urban Ghana and Sierra Leone, the corresponding figure is 53 percent. In comparison, less than 5 percent of households in urban areas in the Democratic Republic of Congo, the Republic of Congo, Ethiopia, Morocco,

(continued next page)

Box 2.4 *(continued)*

Niger, Nigeria, South Africa, Uganda, and Zambia live more than two kilometers from their water source.

Household surveys allow us to measure changes in the time households spend fetching water. Since 1990, the average time spent fetching water for household consumption has remained virtually unchanged, at 45 to 50 minutes (round trip). In some countries, more time is spent at the task. Households in Ethiopia, Mozambique, Tanzania, and Uganda spend more than one hour each day fetching water for household consumption. In Ethiopia, Mozambique, Tanzania, and Uganda, moreover, the amount of time has increased over the years. These are also countries where more than 90 percent of households fetch water from outside their dwelling.

Source: Banerjee, Wodon, and others 2008.

Table 2.7 Patterns of Access across Countries in Rural Areas
(percent)

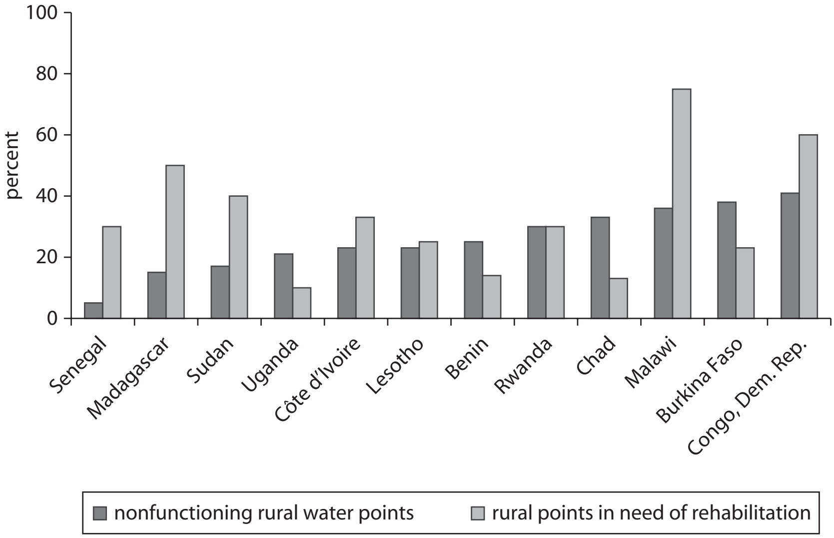
Dominant modality	*Range of prevalence*	*Average prevalence*	*Countries*
Standposts	28–93	57	Lesotho, South Africa
Wells/ boreholes	41–87	62	Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Côte d'Ivoire, Ghana, Guinea, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Senegal, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe
Surface water	56–87	65	Congo, Dem. Rep.; Congo, Rep.; Ethiopia; Gabon; Kenya; Madagascar; Rwanda

Source: Banerjee, Wodon, and others 2008.

contrast with the Democratic Republic of Congo, where no more than 40 percent of rural water equipment is in working order. A significant number of rural water facilities are in need of rehabilitation at any given time—more than half in the Democratic Republic of Congo, Madagascar, and Malawi.

Evidence from Ethiopia suggests that mechanized boreholes are more likely to be nonfunctional than springs and hand pumps, probably for lack of a reliable supply chain of replacement parts (Water and Sanitation

Figure 2.4 Working Status of Rural Water Points



Source: Banerjee, Skilling, and others 2008.

Program 2006). Field research from Ghana, Kenya, Uganda, and Zambia reveals that the supply-chain problem also affects hand pumps, because of factors specific to the African rural water realm—among them the separation of pumps from other machines requiring spare parts, low pump density, poor choice of technology, restrictive maintenance systems, and relatively poor and immobile end users (Harvey and Reed 2006) Analysis of 25 studies across 15 countries in Africa has clarified the division of responsibility in the supply chain for spare parts. Governments and donors are responsible for managing the chain, but public and private sector entrepreneurs are important players as well. One thing is clear: Depending on the private sector alone to supply spare parts is unlikely to be sustainable because of the low population density and income level of many rural areas (Water and Sanitation Program 2006).

Steep Growth of Wells and Boreholes as Sources of Water

The dynamics of service expansion reveal a similar overall pattern in both urban and rural areas. Across the board, the use of wells and boreholes is expanding more rapidly than all the utility-based alternatives put together.

Water supply has evolved differently in Africa's urban areas than in its rural areas. Utilities have been unable to keep pace with the rising demand for water in urban areas, with the result that piped-water coverage has declined over the past decade. In the mid-1990s, 43 percent of urban African households received piped water; by the early 2000s, the figure had slipped to 39 percent (table 2.8). The situation with urban standposts is similar, with a decline from 29 percent to 24 percent over the past 15 years. The decline occurred because the combined growth rates of improved sources of water in urban areas (less than 1 percent a year) fell short of population growth (more than 4 percent a year). The decline in piped water has been matched by a rise in the prevalence of wells and boreholes, as well as slight increases in the use of surface water and water vendors in urban areas.

By contrast, the situation in rural areas has improved, though from a low baseline. More rural dwellers now have access to standposts, wells, and boreholes than they did in the early 1990s. Most important, dependence on surface water has declined substantially—from 50 percent to 42 percent in rural areas and from 41 percent to 33 percent overall.

To learn how households have moved from one source to another, we analyzed household surveys completed for the time periods 1995 to 2000 and 2001 to 2005. Our analysis used two indicators: annualized change in coverage (expressed as a percentage of the population) and absolute annual change in population coverage. The first indicator is defined as the number of people who gain coverage to each water source each year, divided by the population in the end year. The second indicator is the absolute number of people who move into or out of a specific source each year during the time period.

Each year during the decade from 1995 to 2005, about 400,000 people were added to the rolls of those who receive piped water (figures 2.5 and 2.6). In other words, the absolute number of people who gained piped water obtained through a household connection was that much higher than the number of those who lost it (or who were born into households without piped water). Most of the change came from network expansions in Ethiopia, Côte d'Ivoire, and Senegal—partially offset by contractions of coverage in Nigeria and Tanzania. Ethiopia annually moved about 300,000 people to piped-water service between 1995 and 2005, whereas Nigeria lost about 700,000 people from piped water in the same 10-year period.

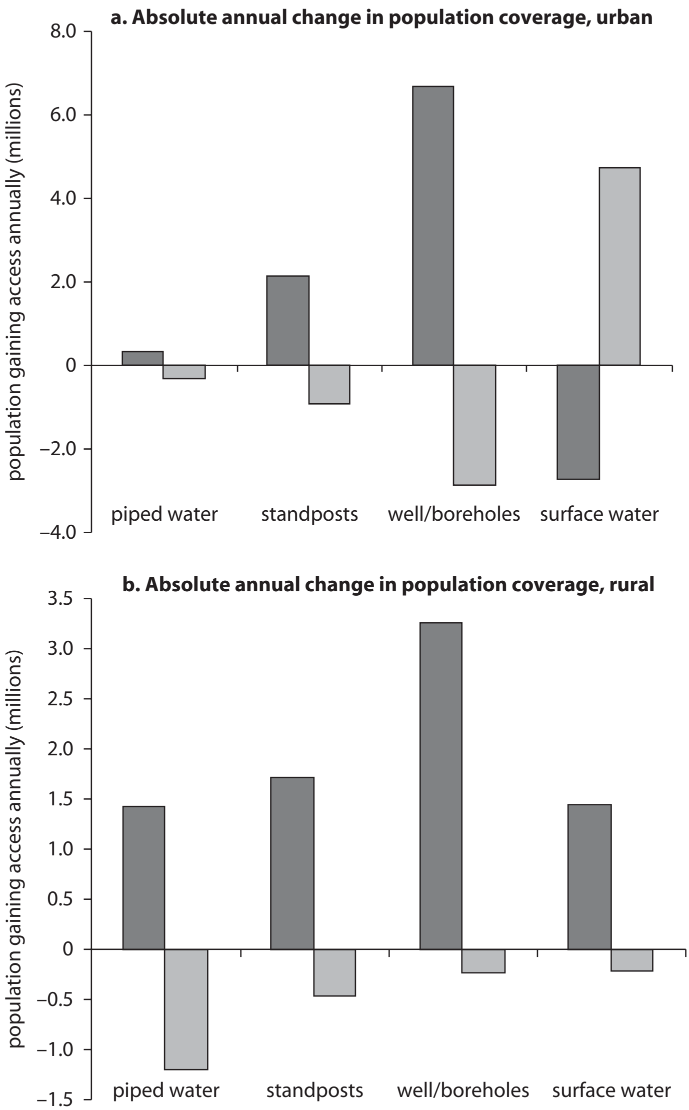
Other sources—chiefly standposts, wells and boreholes, and surface water—recorded an increase in use. The rise in the number of people using surface water is primarily due to changes in the Democratic Republic of Congo, where more than 4 million people each year are added to the rolls of surface-water users.

Table 2.8 Evolution of Water-Supply Sources, 1990–2005
(percentage of population using source)

	Household connection to piped water			*Standposts*			*Wells and boreholes*			*Surface water*		
	Urban	*Rural*	*Overall*	*Urban*	*Rural*	*Overall*	*Urban*	*Rural*	*Overall*	*Urban*	*Rural*	*Overall*
1990–95	50	4	18	29	9	15	20	41	37	6	50	41
1995–2000	43	4	17	25	9	15	21	41	38	5	41	31
2001–05	39	4	17	24	11	16	24	43	41	7	42	33

Source: Banerjee, Wodon, and others 2008.

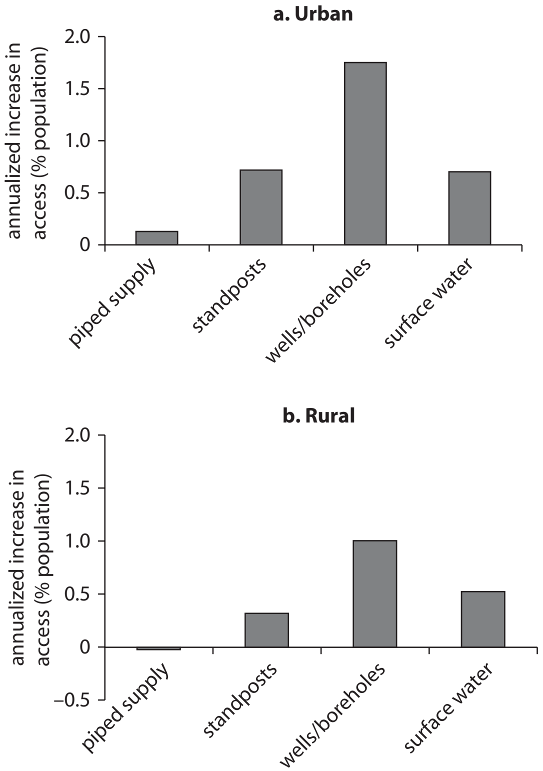
Figure 2.5 Annualized Change in Coverage of Various Water Sources, 1995–2005



Source: Banerjee, Wodon, and others 2008.

A few outliers emerge as exceptions to the generally mediocre picture. Senegal stands out as having the largest average annual gain in piped-water coverage, adding almost 2 percent of its population each year, immediately followed by Benin (table 2.9). By contrast, the Democratic Republic of Congo, Malawi, Nigeria, Rwanda, Tanzania, and Zambia reduced their

Figure 2.6 Annualized Change in Coverage of Various Water Sources, 1995–2005



Source: Banerjee, Wodon, and others 2008.

coverage between the late 1990s and the early 2000s. In the case of public standposts, Mali has achieved the most accelerated expansion, followed by Benin. On the opposite side of the spectrum, Lesotho, Malawi, and Nigeria recorded reductions in access to standposts. Uganda was by far the leader in enhancing well and borehole coverage, adding almost 7 percent of its population each year.

Another way to assess national water-supply performance is to rank countries in terms of their success in reducing reliance on surface water. From this angle, the progress is far from dramatic. Uganda also stands out for moving almost 3 percent of its population away from surface water every year, immediately followed by Lesotho. In other countries, less than 2 percent of the population has moved away from surface water every year, although reliance on surface water has actually risen in the Democratic Republic of Congo, as noted, and in several other countries.

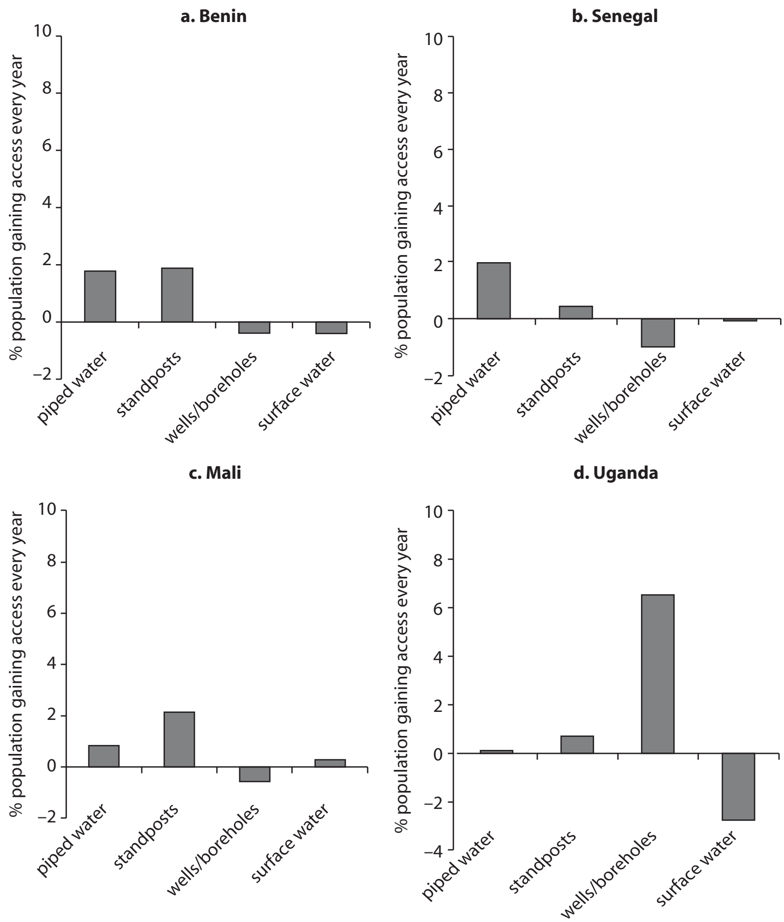
Table 2.9 Annualized Change in Coverage by Water Source and by Country, 1995–2005
(percentage of population accessing source)

Household piped water		*Standposts*		*Wells/boreholes*		*Surface water*	
Senegal	1.98	Mali	2.14	Uganda	6.53	Uganda	–2.75
Benin	1.78	Benin	1.88	Lesotho	3.75	Lesotho	–2.45
Zimbabwe	1.69	Burkina Faso	1.40	Nigeria	3.60	Mozambique	–1.81
Côte d'Ivoire	1.47	Tanzania	1.36	Mozambique	2.95	Namibia	–1.19
Namibia	1.43	Madagascar	1.18	Malawi	2.69	Cameroon	–0.99
Mali	0.83	Congo, Dem. Rep.	1.12	Rwanda	2.51	Ghana	–0.88
Burkina Faso	0.69	Ethiopia	1.09	Ghana	2.09	Côte d'Ivoire	–0.72
Cameroon	0.45	Côte d'Ivoire	0.94	Niger	1.55	Zimbabwe	–0.42
Ethiopia	0.44	Cameroon	0.81	Guinea	1.45	Benin	–0.40
Niger	0.27	Uganda	0.71	Cameroon	1.33	Nigeria	–0.39
Ghana	0.26	Namibia	0.57	Côte d'Ivoire	1.16	Ethiopia	–0.36
Chad	0.23	Niger	0.52	Namibia	1.06	Guinea	–0.16
Mozambique	0.16	Guinea	0.49	Zambia	0.95	Senegal	–0.07
Uganda	0.12	Senegal	0.44	Ethiopia	0.89	Niger	–0.02
Kenya	0.09	Rwanda	0.33	Tanzania	0.82	Mali	0.28
Guinea	0.08	Ghana	0.30	Chad	0.73	Tanzania	0.50
Madagascar	0.03	Mozambique	0.28	Zimbabwe	0.52	Madagascar	0.53
Lesotho	0.00	Chad	0.26	Kenya	0.40	Malawi	0.60
Malawi	–0.09	Kenya	0.20	Madagascar	0.25	Zambia	0.66
Zambia	–0.13	Zambia	0.19	Benin	–0.39	Kenya	0.86
Congo, Dem. Rep.	–0.16	Zimbabwe	–0.02	Mali	–0.57	Chad	1.20
Rwanda	–0.39	Malawi	–0.31	Burkina Faso	–0.77	Rwanda	1.81
Nigeria	–0.57	Lesotho	–0.47	Senegal	–0.99	Burkina Faso	2.31
Tanzania	–1.01	Nigeria	–0.66	Congo, Dem. Rep.	–4.75	Congo, Dem. Rep.	7.53

Source: Banerjee, Wodon, and others 2008.

Although most of Sub-Saharan Africa is not on track to reach the water MDG by 2015, a handful of countries have made remarkable progress in expanding access to improved sources of water, and at a rate that substantially exceeds their peers. This group includes Benin, Burkina Faso, Mali, and Senegal, which have moved a substantial share of their population to improved sources of piped-water connections or standposts. Lesotho, Nigeria, and Uganda have experienced the largest gains in expanding well and borehole coverage. The performance of four of those countries is tracked in figure 2.7.

Figure 2.7 Four Solid Performers in Expanding Access to Safe Water, 1995–2005



Source: Banerjee, Wodon, and others 2008.

When we analyze rural and urban spaces in isolation, other leaders emerge. Benin, Namibia, and Senegal each have managed to move more than 1 percent of their rural population to piped water supplied through household connections. Benin has also succeeded in raising standpost access in rural areas. Mali has provided standpost access to an additional 3 percent of its rural population each year. The biggest success story in well and borehole coverage is Uganda, where slightly more than 7 percent of the rural population has converted to this source of water each year. As noted, Uganda is also a major success story in reducing dependence on surface water.

In the urban water space, Ethiopia stands out as having achieved the largest average annual gain in household connections to piped water, adding almost 5 percent of its urban population each year, immediately followed by Côte d'Ivoire. By contrast, the Democratic Republic of Congo, Malawi, Nigeria, Rwanda, Tanzania, and Zambia slipped in their urban piped-water connections between the late 1990s and the early 2000s. In the case of public standposts, Uganda achieved the most accelerated expansion in urban areas, followed closely by Burkina Faso (which also did well with household connections). On the opposite side of the spectrum, Côte d'Ivoire, Lesotho, and Nigeria recorded urban dwellers' declining access to standposts. Nigeria, Malawi, and Rwanda were by far the leaders in enhancing well and borehole coverage, more than 4 percent of its urban population each year.

Notes

1. With a target date of 2015, MDG number 7 calls for ensuring environmental sustainability and—central to this analysis—reducing the number of people without sustainable access to safe drinking water by half.
2. These figures are likely to have changed. Since this study was completed, the water utility has undertaken, with apparent success, a new program focusing on token-run standposts.
3. For all the cities for which we could only rely on the utility's information, coverage was calculated this way.
4. Personal communication with Seydou Traore, Water and Sanitation Program, on September 25, 2007.

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CHAPTER 3

Access to Safe Sanitation: The Millennium Challenge

To meet the sanitation target articulated in the Millennium Development Goals (MDGs), the number of people with proper sanitation in Africa needs to more than double—from 242 million in 2006 to 615 million in 2015. Some countries are closer to meeting the target than others. This chapter focuses on sanitation coverage trends in Africa with an analysis of progress made in the past decade. It then goes on to identify the countries that have managed to raise a substantial population up from the lower end of the sanitation ladder.

The Predominance of On-Site and Traditional Pit Latrines

Waterborne sewerage systems are rare in Africa. Only half of Africa's large cities have sewerage networks, and only Namibia, Senegal, and South Africa provide universal sewerage access. Sewerage networks that reach just about 10 percent of the population within the service area, such as those in Côte d'Ivoire, Kenya, Lesotho, Madagascar, Malawi, and Uganda, are more typical. Little more than half the households with piped water also have flush toilets, which are often connected to septic tanks rather than to sewers.

This is not surprising given that development of waterborne sewerage networks generally lags substantially behind the evolution of the piped-water networks on which they depend. In the low-income countries of

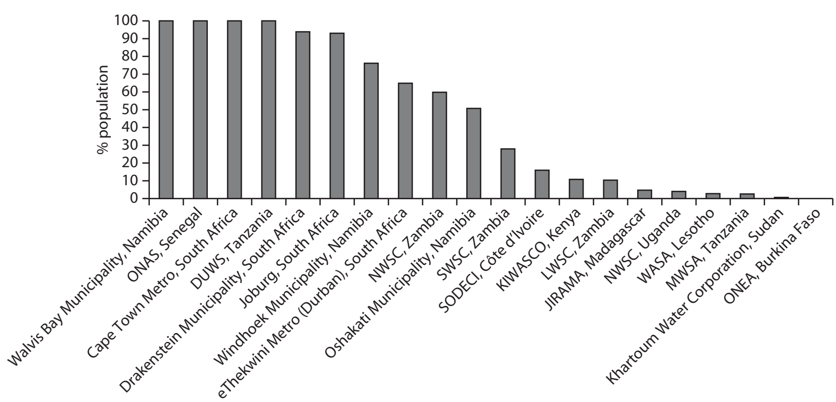
Africa, only 15 percent of the population enjoys private connections to piped-water networks, and this already places a low ceiling on the potential for waterborne sewerage (figure 3.1).

Sanitation is predominantly on-site and typically takes the form of traditional pit latrines. Half of the population uses traditional latrines, and the rate of use is approximately equal in both urban and rural areas. Overall, one-third of the population practices open defecation. Curiously, the number of improved latrines is not much greater than that of septic tanks, despite a significant cost difference between the two. An urban-rural divide emerges when access to improved sanitation is considered.

In rural areas, 41 percent of the population continues to practice open defecation, and improved sanitation modalities reach less than 10 percent. Conversely, in urban areas, 39 percent has access to improved modalities such as improved latrines or septic tanks, and less than 10 percent practices open defecation. Africa's low overall access rates to improved sanitation are partly due to negligible service coverage in rural areas, where most people still reside (table 3.1).

Traditional latrines are the most common sanitation option in Africa, but the health benefits they provide depend on how they are constructed and used. Even basic latrines can provide protection if they are covered and emptied in a timely fashion, and if people wash their hands after use. Conversely, improved latrines will not provide sanitary protection if people do not use them properly, or do not use them at all.

Figure 3.1 Population That Has Wastewater Connection in the Utility Service Area



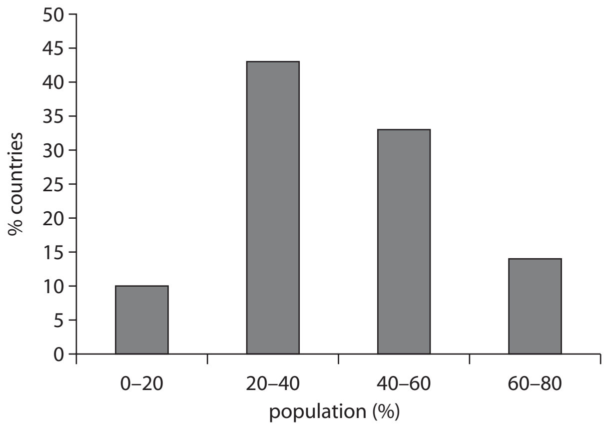
Source: Morella, Foster, and Banerjee 2008.

Table 3.1 Patterns of Access to Sanitation
(percent)

	Open defecation	*Traditional latrine*	*Improved latrine*	*Septic tank*
Urban	8	51	14	25
Rural	41	51	5	2
Overall	31	51	8	10

Source: Banerjee and others 2008.

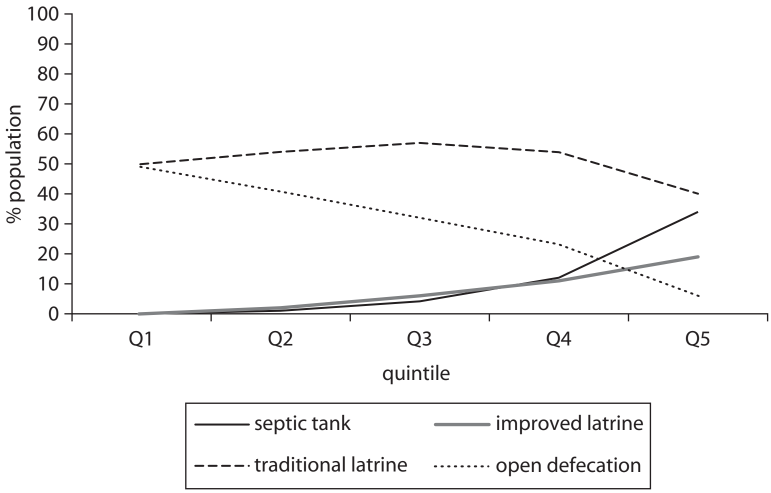
Figure 3.2 Population Sharing Water and Toilet Facilities



Source: Morella, Foster, and Banerjee 2008.

In urban areas, sanitation facilities are typically shared among multiple families. Household surveys focus only on formal service provision and do not take into account informal sharing between households. In urban areas, more than 40 percent of households report sharing toilet facilities with other households (figure 3.2). In Benin, Burkina Faso, the Democratic Republic of Congo, Ghana, Guinea, and Madagascar, more than half of households share toilet facilities. In Ghana—where compound housing is commonplace—as many as 80 percent of urban dwellers share water and sanitation facilities with other households. This practice suggests that people lose time waiting to access facilities and may also pay significant surcharges to the facility owners. Shared facilities are often poorly maintained, which poses health risks and may discourage use.

Figure 3.3 Access Patterns across Income Quintiles



Source: Banerjee, Wodon, and others 2008.

Patterns of sanitation access vary dramatically across the socioeconomic spectrum. As might be expected, open defecation is more widely practiced by those in the lowest income groups, where it accounts for half of the population and declines steadily toward zero prevalence in the highest income groups. Conversely, the poorest half of the population has virtually no access to improved latrines and septic tanks; even among the richest strata, barely 20 to 30 percent of households have such access (figure 3.3). The figures indicate that although improved latrines cost less than septic tanks, they remain something of a luxury, even for the middle-income groups. As well, although high average rates might suggest comprehensive coverage, the numbers are somewhat misleading, because people in higher income groups are generally the ones benefiting from these sanitation improvements, and those in the more vulnerable populations are left without adequate coverage. Finally, traditional latrines are by far the most egalitarian form of sanitation, used in about 50 percent of households across all income ranges.

The Sanitation Challenge across Countries

In most countries, well below 10 percent of the population has septic tanks and less than 20 percent has improved latrines. The difference is made up, in varying degrees, by traditional pit latrines and/or open defecation.

Fifty-one percent of the population uses pit latrines, and this number remains remarkably constant between urban and rural areas and across the socioeconomic spectrum. In Malawi, Tanzania, and Uganda, as much as 80 percent of the population uses traditional pit latrines. These general patterns masks huge differences in access to different modalities of sanitation throughout the African countries (table 3.2).

In all countries, the patterns of access between urban and rural areas differ greatly. In Zimbabwe, 95 percent of urban residents use septic tanks, but rural coverage is less than 2 percent. In Namibia, Senegal, and South Africa more than 50 percent of the urban population has access to septic tanks; the numbers in rural areas range from 14 percent (Senegal) to 6 percent (South Africa). Burkina Faso has the best coverage of improved latrines in urban areas, where 70 percent of the population uses this type of facility. Yet, in rural areas, coverage is 10 times smaller, down

Table 3.2 Patterns of Access to Flush Toilets and Alternatives
(percentage of households, population-weighted average)

	Septic tank	*Improved latrine*	*Traditional latrine*	*Open defecation*
By time period (national)				
Early 1990s	9	6	50	46
Late 1990s	9	7	47	37
Early 2000s	10	9	52	34
By location				
Rural	2	5	52	41
Urban	28	14	49	8
By quintile				
First	0	0	50	49
Second	1	2	54	41
Third	4	6	57	32
Fourth	12	11	54	23
Fifth	34	19	40	6
By country income group				
Low	7	8	52	33
Middle	33	8	41	13
By subregion				
East Africa	4	4	56	35
West Africa	12	8	48	33
Southern Africa	23	11	36	28
Central Africa	3	13	65	18

Source: Banerjee, Wodon, and others 2008.
Note: The total on trend analysis (by time period) may not add to 100 because a balanced panel has been taken in the three time periods.

to 7 percent. In Zimbabwe, the unserved population in urban areas is close to zero, as opposed to more than 40 percent in rural areas. In all countries, urban sanitation coverage generally exceeds national averages. In many countries, most of the urban population enjoys septic tanks and improved latrines, while less than 20 percent practices open defecation. Conversely, most of the population in rural areas uses traditional latrines, and no more than 15 percent of the rural population has septic tanks. Open defecation remains common in rural areas, and more than 50 percent of the population in half the countries engages in this practice. In a few countries—Benin, Burkina Faso, Chad, Namibia, and Niger—nearly all the rural populations still practice open defecation.

Countries can be categorized in three ways, based on their urban sanitation coverage. The first group includes countries where most of the urban population—between 50 and 90 percent—rely on traditional latrines. This is the case of the Central African Republic, Chad, the Comoros, the Democratic Republic of Congo, the Republic of Congo, Ethiopia, Guinea, Lesotho, Malawi, Mali, Mauritania, Mozambique, Nigeria, Sudan, Tanzania, and Uganda. The second group comprises countries where most of the urban population—from one-third to one-half—use improved latrines, along with a significant percentage—20 to 40 percent—who use traditional latrines. This is the case of Benin, Burkina Faso, Cameroon, Ghana, Madagascar, Niger, and Rwanda. The third group includes countries where at least one-third and up to 95 percent of the urban populations have septic tanks, although in some countries up to 45 percent still use traditional latrines. This is the case of Côte d'Ivoire, Gabon, Kenya, Namibia, Senegal, South Africa, Zambia, and Zimbabwe.

Similarly, countries can be categorized based on coverage in rural areas, but a different group of countries emerge. The first category includes countries where more than 50 percent of the rural population still practices open defecation: This is the case of Benin, Burkina Faso, Chad, Côte d'Ivoire, Ethiopia, Mauritania, Mozambique, Namibia, Niger, and Sudan. The second category includes countries where most use traditional latrines. This is the largest group, including Cameroon, the Comoros, the Democratic Republic of Congo, the Republic of Congo, Gabon, Ghana, Guinea, Kenya, Malawi, Mali, Nigeria, South Africa, Tanzania, Uganda, and Zambia. In the third category, an increasing number of people use improved latrines, although many still use traditional latrines and practice open defecation. This is the case in the Central African Republic, Lesotho, Madagascar, Rwanda, Senegal, and Zimbabwe (table 3.3).

Table 3.3 Patterns of Access to Sanitation across Countries
(percent)

Dominant modality	*Range of prevalence*	*Average prevalence*	*Countries*
Urban			
Flush toilet	30–95	58	Côte d'Ivoire, Gabon, Kenya, Namibia, Senegal, South Africa, Zambia, Zimbabwe
Improved latrine	29–67	50	Benin, Burkina Faso, Cameroon, Ghana, Madagascar, Niger, Rwanda
Traditional latrine	45–87	68	Central African Republic; Chad; Comoros; Congo, Dem. Rep.; Congo, Rep.; Ethiopia; Guinea; Lesotho; Malawi; Mali; Mauritania; Mozambique; Nigeria; Sudan; Tanzania; Uganda
Rural			
Improved latrine	11–44	25	Central African Republic, Lesotho, Madagascar, Rwanda, Senegal, Zimbabwe
Traditional latrine	50–83	71	Cameroon; Comoros; Congo, Dem. Rep.; Congo, Rep.; Gabon; Ghana; Guinea; Kenya; Malawi; Mali; Nigeria; South Africa; Tanzania; Uganda; Zambia
Open defecation	54–94	74	Benin, Burkina Faso, Chad, Côte d'Ivoire, Ethiopia, Mauritania, Mozambique, Namibia, Niger, Sudan

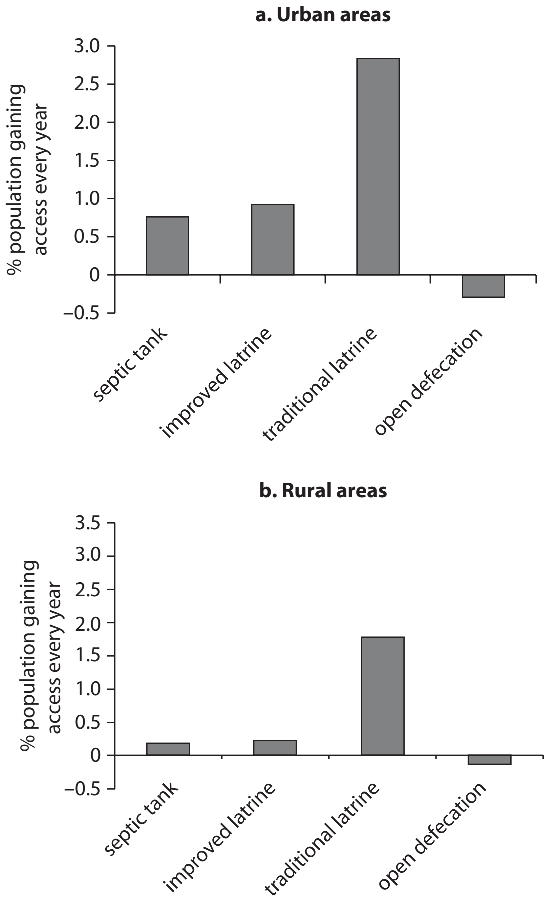
Source: Banerjee, Wodon, and others 2008.

Steep Increases in the Use of Traditional Pit Latrines

Not only are traditional latrines the most common form of sanitation in Sub-Saharan Africa, but they have also been by far the fastest growing one since 1995. Annualized reports show that an estimated 2.8 percent of the urban population and 1.8 percent of the rural population gains access to traditional latrines each year (figure 3.4). This is a much faster rate of growth than expansion of septic tanks and improved latrines together. Given that the MDG target focuses on the two higher-end improved sanitation options (septic tank, improved latrines), this rapid increase in the number of traditional latrines is not always fully recognized in policy discussions.

Expansion rates of improved latrines and septic tanks are four times faster in urban areas than in rural areas. Another piece of good news is that the prevalence of open defecation in Sub-Saharan Africa has finally begun to decline, albeit at a very modest pace. Approximately 0.3 percent

Figure 3.4 Annualized Growth in Coverage in Urban and Rural Areas, 1995–2005



Source: Morella, Foster, and Banerjee 2008.

of the urban population has been moving away from open defecation each year into some form of sanitation service, and the corresponding figure for the rural population is 0.1 percent.

Expansion rates across income groups show that the poorest have little access to the best forms of sanitation. The expansion of septic tanks is concentrated in the middle- and upper-income quintiles, reaching a peak in the third quintile, well beyond the growth in the fifth quintile. Although people in all income groups have gained better access to improved latrines, those in the highest income groups have benefited the most. Those in all income groups have also gained more access to traditional latrines; however, this gain has been greatest for those in the lower-income groups. The number of people practicing open defecation decreases only in the second quintile of the distribution (figure 3.5).

The geographical distribution of improved sanitation modes shows the rates of development in various countries over the years. Nigeria and Senegal account for much of the increased septic tank coverage, 35 percent and 17 percent, respectively, mainly due to their sizes. Burkina Faso, Madagascar, and Rwanda account for much of the improved latrine growth. For traditional latrines, Nigeria and Ethiopia account for 51 percent of new users. Despite these improvements, the largest populations (70 million people) still practice open defecation in Ethiopia and Nigeria.

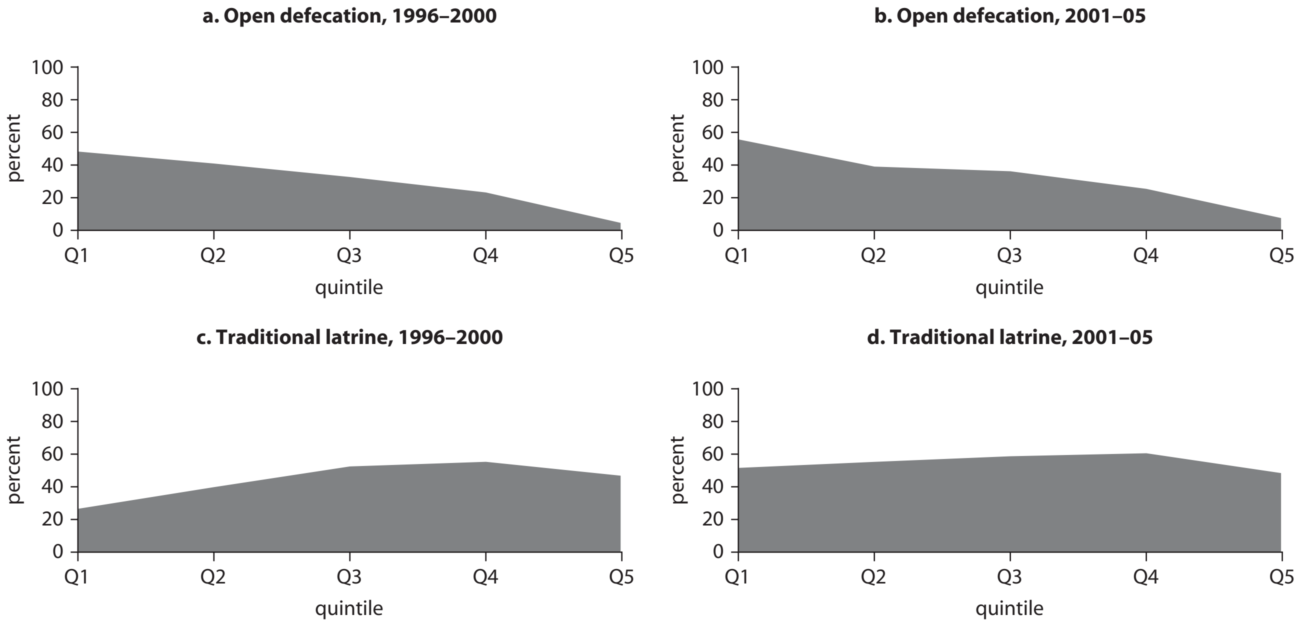
Good Progress in a Handful of Countries

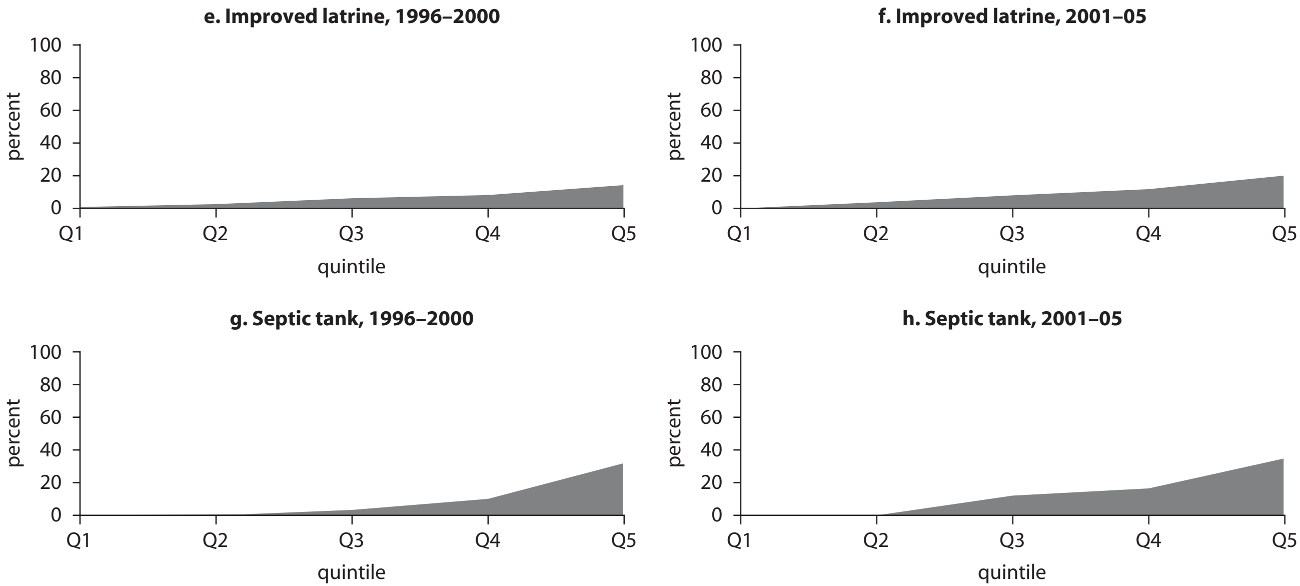
A handful of African countries have been making impressive gains in sanitation since 1990. Although the improvements in these countries may still be too small and too late to meet the sanitation MDG, the successful cases could provide valuable lessons for other countries in the region.

The following analysis highlights countries that have had the greatest changes in access to different levels of sanitation. This list was dominated by some of the larger countries, such as Ethiopia and Nigeria, where, as a result of their sizes, even relatively modest percentage changes had major results. In this section, the focus is on countries that have achieved large percentage gains relative to the size of their populations. This signals successful experience, although in the case of the smaller countries this does not prove to be material at the regional level. Any country moving more than 2 percent of its population up any of the rungs of the sanitation ladder each year can be considered to be making noteworthy progress (table 3.4). Several solid performers emerge.

In the case of septic tanks, Senegal stands out as having by far the largest average annual gain, as more than 3 percent of its population gains access to septic tanks each year. As a result, the number of people using a septic tank in Senegal has increased from 9 percent to 36 percent from 1997 to 2005 (figure 3.6). By contrast, Lesotho, Madagascar, and Zambia show declining septic tank coverage from the late 1990s and the early 2000s.

Figure 3.5 Growth in Access by Mode and Quintile





Source: Morella, Foster, and Banerjee 2008.

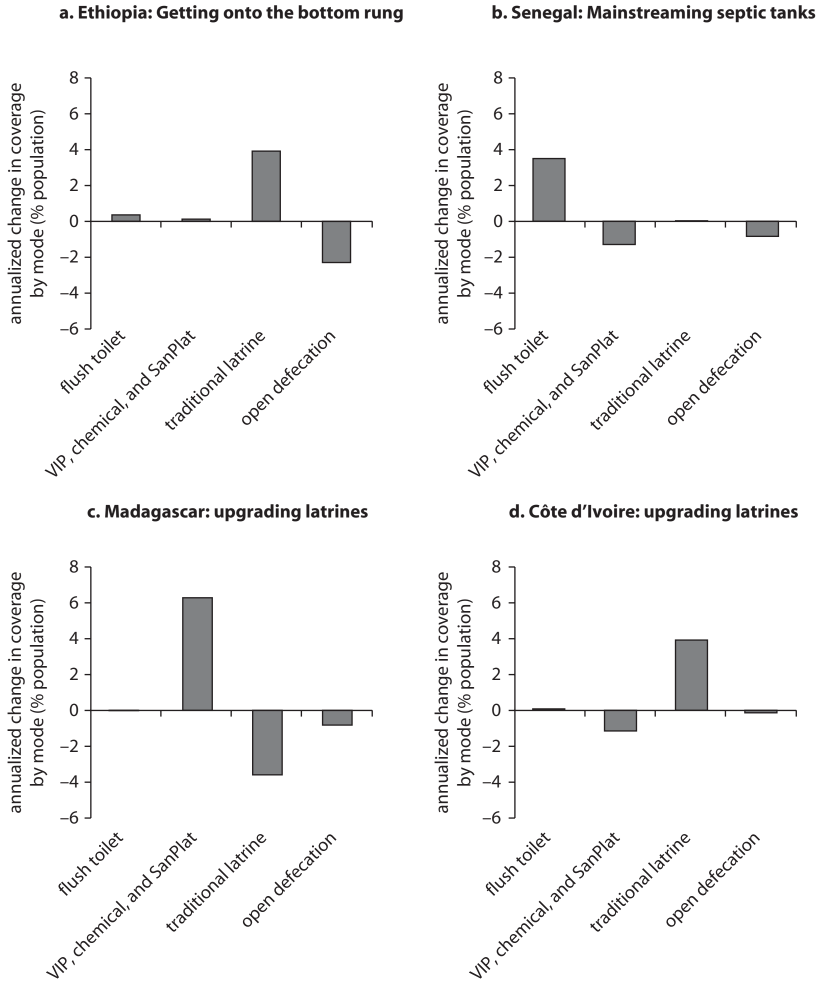
Table 3.4 Annualized Change in Coverage, 1995–2005

(percentage of population per year)

Septic tank		*Improved latrine*		*Traditional latrine*		*Open defecation*	
Senegal	3.50	Madagascar	6.46	Côte d'Ivoire	4.10	Ethiopia	–2.30
Zimbabwe	1.51	Rwanda	4.59	Uganda	3.96	Zimbabwe	–1.37
Mali	1.02	Burkina Faso	4.43	Ethiopia	3.92	Mozambique	–1.25
Namibia	1.00	Benin	2.53	Congo, Dem. Rep.	3.63	Madagascar	–0.84
Ghana	0.70	Zimbabwe	1.13	Nigeria	2.84	Senegal	–0.84
Nigeria	0.63	Cameroon	0.95	Mozambique	2.79	Guinea	–0.55
Benin	0.48	Mali	0.81	Malawi	2.61	Mali	–0.43
Cameroon	0.38	Lesotho	0.64	Guinea	2.09	Cameroon	–0.29
Ethiopia	0.37	Ghana	0.61	Mali	1.36	Côte d'Ivoire	–0.14
Burkina Faso	0.34	Tanzania	0.57	Zambia	1.08	Congo, Dem. Rep.	–0.05
Tanzania	0.25	Kenya	0.48	Chad	0.90	Malawi	–0.04
Chad	0.23	Guinea	0.34	Ghana	0.79	Rwanda	0.20
Malawi	0.17	Niger	0.32	Kenya	0.77	Nigeria	0.34
Uganda	0.10	Namibia	0.30	Niger	0.63	Namibia	0.35
Côte d'Ivoire	0.08	Congo, Dem. Rep.	0.26	Cameroon	0.57	Uganda	0.38
Kenya	0.05	Zambia	0.20	Zimbabwe	0.52	Zambia	0.42
Guinea	0.04	Uganda	0.20	Tanzania	0.52	Ghana	0.61
Congo, Dem. Rep.	0.04	Mozambique	0.17	Namibia	0.15	Tanzania	0.63
Niger	0.00	Malawi	0.16	Senegal	0.03	Kenya	0.82
Rwanda	0.00	Ethiopia	0.12	Rwanda	–0.44	Benin	0.90
Mozambique	0.00	Chad	–0.52	Lesotho	–0.48	Burkina Faso	1.04
Madagascar	–0.01	Nigeria	–0.68	Benin	–1.08	Lesotho	1.05
Lesotho	–0.09	Côte d'Ivoire	–1.20	Burkina Faso	–2.25	Chad	1.60
Zambia	–0.12	Senegal	–1.29	Madagascar	–3.69	Niger	1.81

Source: Morella, Foster, and Banerjee 2008.

Figure 3.6 Successful Examples from Up and Down the Sanitation Ladder, 1995–2005



Source: Morella, Foster, and Banerjee 2008.
Note: VIP = ventilated improved pit.

In the case of improved latrines, Burkina Faso, Madagascar, and Rwanda stand out as having achieved accelerated expansion. In Madagascar, about 7 percent of the population has gained improved latrine coverage every year; in Burkina Faso and Rwanda, the corresponding figure exceeds 4 percent. In the Democratic Republic of Congo, Côte d'Ivoire, Ethiopia, and

Uganda, more than 3 percent of the population has gained access to traditional latrines every year.

Another way to quantify success is to identify the countries that have had the most rapid reductions in the number of people practicing open defecation. Ethiopia has had the biggest reduction: between 2000 and 2005, the share of the population without access to any form of sanitation dropped from 82 percent to 62 percent. Mozambique and Zimbabwe immediately follow: more than 1 percent of their populations have stopped the practice of open defecation every year. Nigeria, which has made impressive gains in many areas of sanitation improvement, has not had such rapid reduction in its open defecation rate. Conversely, Senegal continues showing a salient performance on septic tank coverage.

Individual countries are focused on different goals, based on their current levels of sanitation coverage, and the strategies they employ have distinct financial and health implications. In Ethiopia, for example, the main goal is to reduce the practice of open defecation by getting people onto the bottom rung of the sanitation ladder. Ethiopia therefore adopted a culturally appropriate formula rather than simply spending money on hardware, which yielded significant results (box 3.1).

Countries such as Burkina Faso and Madagascar are focused on upgrading services for people who are already engaged in some kind of basic sanitation practice. In Senegal, the aim is to move people from the middle to the top of the ladder by building more septic tanks.

A similar analysis of a country's performance can be conducted at the urban and rural levels. For example, Senegal appears to have made great strides in septic tank coverage when looking at figures for urban areas, but the increase in rural areas is much less remarkable. The same applies to Zimbabwe, where the noteworthy expansion in urban areas is offset by the decline in septic tank coverage in rural areas. Also, in Burkina Faso there has been little improvement in latrine access in large cities, and the results in rural areas are 10 times smaller. Conversely, Côte d'Ivoire and Uganda show similar progress in traditional latrine coverage across urban and rural areas, as does Ethiopia in reducing the practice of open defecation (table 3.5).

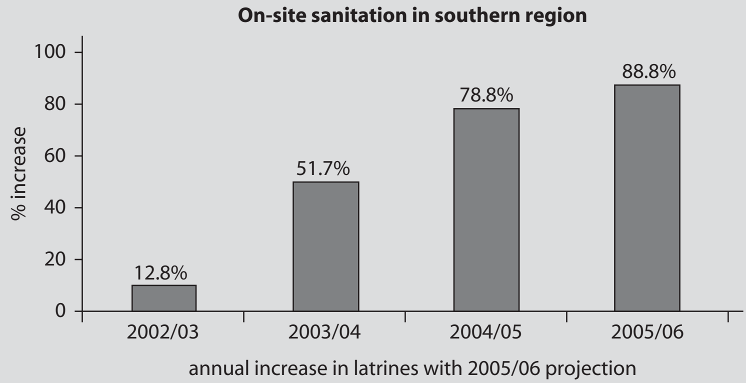
Box 3.1

Ethiopia's Success with a Community-Led Program

The southern region of Ethiopia—home to diverse cultures and scores of ethnic groups—has a population of 15 million, much larger than many African countries. Population density varies, peaking at 1,100 people per square kilometer in the Wanago district.

In early 2003, access to on-site sanitation was lower than 13 percent, below the national average of 15 percent (see figure). Traditional latrines were most prevalent but scarcely used, poorly maintained, smelly, and dangerous to children and animals. Meanwhile, population expansion, growing household densities, and deforestation were combining to reduce private options for open defecation.

Latrine Construction 2002/03 and 2005/06



The Southern Regional Health Bureau, charged with promoting sanitation and hygiene by the national Ministry of Health, applied a community-led total sanitation approach, including zero subsidies but allowing the community to devise its own innovative and affordable models.

With a modest but dedicated sum of money, a mass communication campaign was launched using the slogan "Sanitation is everyone's problem and everyone's responsibility." It promoted sustainable and affordable sanitation by creating awareness and encouraging self-financing across all income quintiles. Close collaboration with all stakeholders created advocacy consensus building and capacity building, promotion (by community volunteers), and supportive supervision.

(continued next page)

Box 3.1 *(continued)*

At the household level, women were identified as the main drivers of latrine construction. At public consensus-building meetings, they complained about how open defecation directly affects their lives, highlighting the health risks of contact with feces in the banana plantations and in the fields where they collect fodder for cattle. They also complained of the bad smell and embarrassment of seeing people defecate in the open space. Featured stories cited shame as an important factor in consensus building and a strong motivator for latrine construction. Volunteer community health promoters went house to house across villages with health extension workers and members of the subdistrict health committee to persuade households to build latrines, and then they supervised construction.

Alongside other gains in public health, pit latrine ownership rose from less than 13 percent in September 2003 to more than 50 percent in August 2004. By August 2005, it had reached 78 percent, and a year later was on track to reach 88 percent.

Source: Reproduced from Water and Sanitation Program 2008.

Table 3.5 Annualized Change in Coverage by Modality and by Country, 1990–2005
(percent)

Septic tank		*Improved latrine*		*Traditional latrine*		*Open defecation*	
Urban							
Senegal	5.7	Burkina Faso	17.2	Nigeria	5.1	Malawi	1.0
Zimbabwe	3.0	Madagascar	8.5	Congo, Dem. Rep.	4.7	Rwanda	0.4
Mali	2.3	Rwanda	6.1	Côte d'Ivoire	4.5	Namibia	0.4
Namibia	1.8	Benin	5.3	Uganda	4.4	Tanzania	0.3
Burkina Faso	1.3	Ghana	2.0	Mozambique	4.2	Kenya	0.3
Ghana	1.2	Tanzania	1.8	Ethiopia	3.9	Benin	0.2
Benin	1.2	Mali	1.7	Chad	3.6	Chad	0.1
Ethiopia	1.2	Niger	1.4	Malawi	3.3	Cameroon	0.1
Tanzania	1.1	Cameroon	0.9	Guinea	2.3	Burkina Faso	0.1
Chad	0.9	Congo, Dem. Rep.	0.8	Rwanda	2.2	Uganda	0.1
Malawi	0.9	Uganda	0.7	Niger	2.0	Zambia	0.1
Uganda	0.5	Mozambique	0.6	Kenya	2.0	Zimbabwe	0.0
Nigeria	0.5	Kenya	0.6	Ghana	1.7	Guinea	0.0
Côte d'Ivoire	0.5	Lesotho	0.5	Cameroon	1.6	Ghana	–0.1
Rwanda	0.4	Guinea	0.5	Zambia	0.8	Lesotho	–0.1
Lesotho	0.3	Ethiopia	0.5	Mali	0.7	Senegal	–0.1
Cameroon	0.2	Malawi	0.4	Lesotho	0.6	Niger	–0.2
Madagascar	0.2	Zambia	0.3	Namibia	0.4	Nigeria	–0.2
Congo, Dem. Rep.	0.2	Zimbabwe	0.2	Tanzania	0.2	Mali	–0.4
Zambia	0.0	Namibia	0.2	Zimbabwe	0.0	Côte d'Ivoire	–0.5
Guinea	0.0	Senegal	–0.1	Benin	–3.2	Congo, Dem. Rep.	–0.5
Kenya	–0.1	Nigeria	–0.3	Senegal	–3.8	Mozambique	–0.9
Niger	–0.2	Côte d'Ivoire	–0.9	Madagascar	–5.3	Madagascar	–1.1
Mozambique	–0.4	Chad	–1.6	Burkina Faso	–13.1	Ethiopia	–2.2

(continued next page)

Table 3.5 *(continued)*

Septic tank		*Improved latrine*		*Traditional latrine*		*Open defecation*	
Rural							
Senegal	1.7	Madagascar	5.9	Ethiopia	4.3	Niger	2.5
Mali	0.6	Rwanda	4.6	Côte d'Ivoire	3.9	Burkina Faso	1.6
Namibia	0.5	Zimbabwe	1.8	Uganda	3.9	Chad	1.5
Nigeria	0.5	Burkina Faso	1.7	Congo, Dem. Rep.	3.1	Ghana	1.5
Ethiopia	0.3	Lesotho	1.1	Senegal	2.6	Kenya	1.0
Zambia	0.2	Benin	1.0	Malawi	2.5	Benin	0.9
Burkina Faso	0.1	Mali	0.6	Guinea	2.1	Tanzania	0.7
Guinea	0.1	Kenya	0.4	Mali	1.7	Lesotho	0.6
Benin	0.1	Namibia	0.4	Mozambique	1.7	Nigeria	0.5
Chad	0.1	Guinea	0.3	Nigeria	1.3	Namibia	0.5
Côte d'Ivoire	0.1	Tanzania	0.2	Zambia	1.1	Uganda	0.4
Malawi	0.0	Zambia	0.2	Zimbabwe	0.9	Zambia	0.3
Uganda	0.0	Uganda	0.1	Tanzania	0.6	Congo, Dem. Rep.	0.2
Niger	0.0	Malawi	0.1	Cameroon	0.6	Rwanda	0.1
Kenya	0.0	Ethiopia	0.1	Ghana	0.5	Malawi	–0.2
Mozambique	0.0	Congo, Dem. Rep.	0.0	Kenya	0.5	Cameroon	–0.2
Rwanda	0.0	Niger	–0.1	Chad	0.4	Côte d'Ivoire	–0.4
Tanzania	0.0	Chad	–0.1	Benin	0.4	Mozambique	–0.8
Congo, Dem. Rep.	0.0	Mozambique	–0.1	Niger	0.3	Mali	–0.8
Madagascar	0.0	Cameroon	–0.1	Namibia	0.1	Guinea	–0.9
Ghana	0.0	Ghana	–0.8	Burkina Faso	–0.3	Madagascar	–1.0
Zimbabwe	–0.1	Nigeria	–0.9	Lesotho	–0.5	Senegal	–1.0
Lesotho	–0.1	Côte d'Ivoire	–1.3	Rwanda	–1.3	Zimbabwe	–1.5
Cameroon	–0.1	Senegal	–2.1	Madagascar	–3.1	Ethiopia	–2.8

Source: Morella, Foster, and Banerjee 2008.

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CHAPTER 4

Improving the Organization of the Water and Sanitation Sectors

Many African governments have reformed their water and sanitation systems to provide quality services for their citizens. The sector reforms are critical in creating the necessary institutional structure for improved service delivery, but, although costs are predominantly paid up front, it takes time to reap the benefits, and costs are sometimes not shared equitably among the various stakeholders.

Most African countries are taking gradual steps, cautiously weighing the benefits and costs based on their socioeconomic conditions. Governments have approached the reform process in various ways, but because most of the documentation of these processes is anecdotal rather than systematic, it is difficult to assess their impact or to replicate successful programs. Collecting this kind of data in Sub-Saharan Africa is challenging, and the situation is made worse by the relatively limited history of the monitoring and evaluation efforts related to the Millennium Development Goals (MDGs), as well as by the broader context of weak institutional capacity.

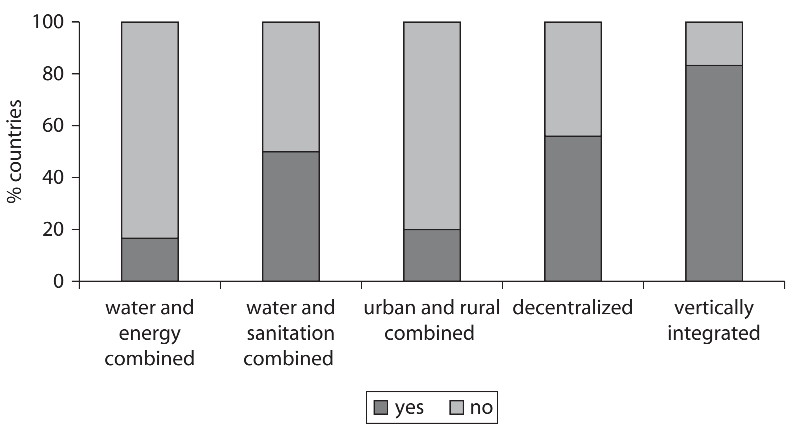
In this chapter, the sector organization and market structure are assessed in four distinct water and sanitation spaces with a focus on developing succinct indexes on the institutional development: urban piped water, standposts and other informal services in the unconnected market, rural water, and sanitation. The indexes are a standardized survey-based methodology that employs categorical values (0s and 1s), and the questions in the Africa Infrastructure Country Diagnostic (AICD) Water Supply and Sanitation (WSS) Survey (modules 1 and 3) require an implicit judgment of what is commonly accepted as good practice in other developing countries. The 1s are added to create a composite index for each country. These indexes from the questionnaire responses allow the ranking of institutional maturity and where the country stands at this point in time. It is important to note that a 100 percent score does not imply that there is no scope for improvement.

The Heterogeneity of the Urban Water Market

No consistent set of institutional arrangements is found across Sub-Saharan Africa. Institutional structures range from national-level utilities responsible for countrywide coverage to those with limited jurisdictions. Generally, the central government is responsible for managing the urban water sector, but several providers, including municipal agencies, public-private partnerships, and corporate utilities, also deliver services.

Some utilities are responsible for water, sanitation, and even energy, whereas others handle only water distribution. Generally, water utilities are dedicated to providing water and, in some cases, wastewater facilities. Half of the countries have utilities that jointly provide water and wastewater services (figure 4.1). Only ELECTRA in Cape Verde, Société Tchadienne d'Eau et d'Électricité (STEE) in Chad, Jiro sy Rano Malagasy

Figure 4.1 Range of Institutional Arrangements in Water Service Provision



Source: Banerjee, Skilling, and others 2008a.

(JIRAMA) in Madagascar, and ELECTROGAZ in Rwanda provide both water and energy. Few countries in Africa have unbundled bulk water generation and distribution facilities. Most utilities primarily cover urban areas. In Benin, Kenya, Rwanda, South Africa, and Tanzania, utilities provide services to both urban and rural dwellers.

The urban water scorecard is a snapshot of three key institutional dimensions: broad sectoral policy reforms, amount and quality of regulation, and enterprise governance. It is composed of three indexes: the urban reform index, the regulation index, and the state-owned enterprise (SOE) governance index. Table 4.1 shows the components of these indexes. First, we define reform parameters as the implementation of sectoral legislation, restructuring of enterprises, and introduction of policy oversight and private sector participation. Second, autonomous, transparent, and accountable regulatory agencies and regulatory tools (tariff methodology) should be established to monitor quality. Third, to properly maintain facilities, SOEs should encourage shareholder participation, create greater board and management autonomy, and improve accounting and disclosure mechanisms. They should also consider various forms of management, including outsourcing to the private sector. Note that reform and regulation are country-level indicators, but governance is measured at the enterprise level.

Urban Water Reforms across Countries

The urban water sector reform was evaluated based on four attributes: legislation, restructuring, policy oversight, and private sector involvement (Vagliasindi and Nellis 2009). At the country level, each subindex is expressed as a percentage of positive responses to the binary questions to the total number of indicators. The urban reform index is an average of these four subindexes; each subindex carries the same weighting.

Most African countries have undertaken at least one key reform step. One way to establish a transparent framework for service provision is to outline a water policy that includes the government's sector goals and institutional commitments. In most countries, governments have recently begun the reform process; only eight countries have sector legislation more than five years old. Côte d'Ivoire passed a water law in 1973, but most countries implemented water legislation only in the past decade. As of 2005, all but five countries have established water policies, and two of those countries are in the process of drafting water policies.

The most common reform steps are corporatization and the passing of a private sector participation law. However, the passing of a law does not

Table 4.1 Urban Reform, Regulation, and the SOE Governance Index

Reform	*Internal governance*
Legislation	**Ownership and shareholder quality**
Existence of de jure reform	Concentration of ownership
Implementation of reform	Corporatization/limited liability
Restructuring	Rate of return and dividend policy
Unbundling/separation of business lines	**Managerial and board autonomy**
SOE corporatization	Autonomy in hiring/firing/wages/ production/sales
Existence of regulatory body	Size of the board
Policy oversight	Presence of independence directors
Oversight of regulation monitoring outside the ministry	**Accounting, disclosure, and performance** monitoring
Dispute arbitration outside the ministry	Publication of annual report
Tariff approval outside the ministry	International Financial Reporting Standards/ external audits/independent audit
Investment plan outside the ministry	Audit publication
Technical standard outside the ministry	Remuneration of noncommercial activity
Private sector involvement	Performance contracts/with incentives
Private de jure/de facto	Penalties for poor performance
Private sector management/ investment ownership	Monitoring/third party monitoring
Absence of distressed/renegotiation/ renationalization	External governance
Regulation	**Labor market discipline**
Autonomy	Restriction to dismiss employees
Formal autonomy on hiring/firing	Wages compared with private sector
Financial autonomy (partial/full)	Benefits compared with private sector
Managerial autonomy (partial/full)	**Capital market discipline**
Multisectoral agency/commissioners	No exemption from taxation
Transparency	Access to debt compared with private sector
Publication of decisions via report/ Internet/public hearing	No state guarantees
Accountability	Public listing
Existence of appeal	**Outsourcing**
Independence of appeal (partial/full)	Billing and collection
Tools	Meter reading
Existence of tariff methodology/ tariff indexation	Human resources
Existence of regulatory review	Information technology
Length of regulatory review	

Source: Vagliasindi and Nellis 2009.
Note: SOE = state-owned enterprise.

guarantee private sector participation. Although 83 percent of countries have legalized private participation, only 63 percent have been able to attract some kind of private participation in any of the three largest utilities in their respective countries. Private providers have entered into management contracts in only half of the countries and have invested in water sectors in only 5 percent of cases. Leases have been used widely, and management contracts are the second most common form of private participation.

The cancelation rate of private sector contracts for water supply has been much higher in countries in Africa than in other developing countries. Approximately 29 percent of private contracts for water supply have been prematurely terminated. As a result, just a handful of private operators are still active: one each in Cameroon, Cape Verde, Côte d'Ivoire, Gabon, Ghana, Mozambique, Niger, and Senegal, and four in South Africa.

The private sector is disproportionately more involved in the West African francophone countries (Côte d'Ivoire, Guinea, Niger, and Senegal), with some exceptions (Mozambique and Uganda). Senegal's successful private sector experience is presented in box 4.1. Another distinctive feature of the African experience has been the use of concessions for joint power and water utilities, as in Gabon and Mali. Only a single divestiture has occurred: the 1999 sale of 51 percent of equity in the water company in Cape Verde.

Policy oversight is relatively well defined in Africa. In at least half of the countries studied, functions such as tariff approval, investment plans, technical standards, regulation monitoring, and dispute arbitration are clearly allocated to bodies other than the line ministries, such as special entities within the ministries, interministerial committees, or regulators. Oversight of economic regulation and tariff setting by bodies other than the line ministries exists in 78 and 65 percent of the countries, respectively.

Progress in restructuring has been relatively slow. Only five countries—Burkina Faso, Namibia, Niger, South Africa, and Uganda—have separated bulk-water production from the distribution function. In the other countries, the functions are performed in tandem, by the same utility. Niger has made the most progress and reports a score of more than 80 percent on the restructuring subindex. In 2000, the water company Société Nationale des Eaux (SNE) in Niger was separated into the asset-holding company, Société de Patrimoine des Eaux du Niger (SPEN), and a private operator, Société de Exploitation des Eaux du Niger (SEEN), responsible for production, transmission, and distribution in the urban areas (World Bank 2007).

Box 4.1

Senegal's Successful Experience with Private Sector Participation

The Senegal experience under the *affermage* is characterized by two remarkable results: first, an impressive expansion of access, and second, a large increase in operational efficiency that mainly originated from a reduction of nonrevenue water (NRW).

The first result was mainly related to a massive subsidized connection program sponsored by donors and, in part, to the cash-flow surplus generated by the private operators. In particular, the social connection program, implemented with donor support, provided about 129,000 connections (75 percent of all new connections installed) benefiting poor households living in targeted neighborhoods. A portion of the new connections, however, ended up disconnected, despite tariffs declining in real terms up to 2006 and the social tariff corresponding to a consumption of six cubic meters per month—mostly applying to poor households.

The second result was strictly related to contract innovations geared toward increasing the operator's incentives to perform efficiently. In particular, the contract included targets for NRW reduction and bill collection backed by financial penalties for noncompliance. These targets were then applied to a notional sales volume based on the amount of water actually produced, which was used to determine the operator's remuneration in lieu of the actual water sold. Whenever the operator fell short of the NRW and bill collection targets, the notional sales volume would be lower than the actual sales, penalizing the operator.

Another innovation in Senegal's public-private partnership was the responsibility of the private operator to finance part of the network's rehabilitation using cash flow. This approach provided the operator with more flexibility to identify and reduce water losses, lessening its dependency on the public asset-holding company.

The impact of these innovations on efficiency has been remarkable, making Senegal's *affermage* a prominent example of private participation in Africa. Today, Senegal can report a level of NRW comparable to the best water utilities in Western Europe. These results also confirm that operational efficiency is perhaps the area in which a private operator can make the most positive and consistent impact.

Source: Adapted from Marin 2009.

Most countries have achieved 40 to 80 percent in the urban reform index. A majority of countries score well on certain subcomponents, but not on others. For instance, Benin scores very high on legislation and policy oversight but very low on restructuring and private sector involvement, whereas Rwanda scores high on restructuring and private sector involvement but low on policy oversight and legislation. Côte d'Ivoire, Kenya, Mozambique, Sudan, Tanzania, and Uganda scored more than 50 percent in each of the subindex scores, suggesting a balanced approach to the reform process (figure 4.2).

Two Distinct Approaches to Sector Regulation

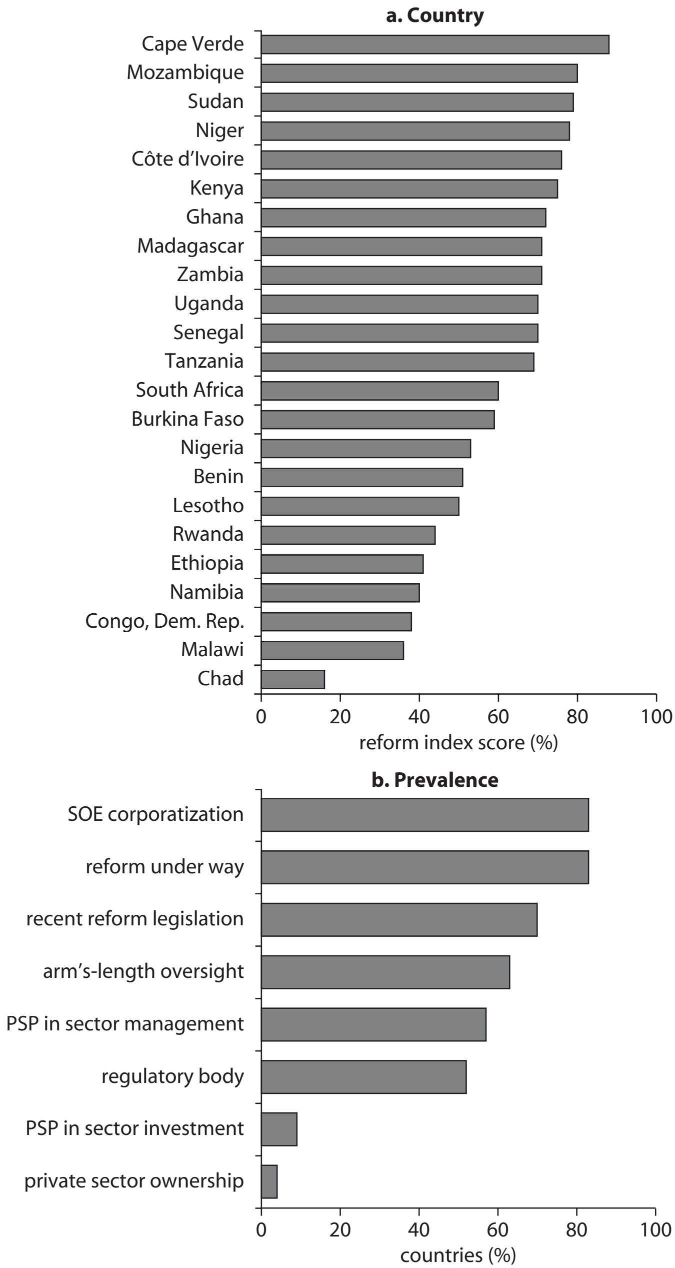
The regulation index is created using four essential attributes of what is conventionally considered a good regulatory framework: autonomy, accountability, transparency, and tools (Vagliasindi and Nellis 2009). The index is an average of these four subindexes and presents a picture of the maturity and depth of the regulatory framework.

Anglophone and francophone countries have taken two distinct approaches to sector regulation. About half of the countries (mainly anglophone) have established regulatory agencies for the water sector, although a significant number of these do not have private sector participation. Conversely, several francophone countries with private participation have adopted regulatory frameworks without establishing an independent regulatory agency. These approaches appear to be equally effective; in both cases, the established regulatory frameworks typically meet only about half of the corresponding good practice criteria.

Line ministries (or subentities), such as ministries of finance/economy and health/environment, continue to play a strong role in the regulation of water services. Parliaments, state water corporations, or asset-holding companies also help to set tariffs or approve investment plans (table 4.2). In some cases, the allocation of regulatory responsibilities is efficient. For instance, monitoring water quality requires different skill sets than those needed to review tariff adjustment proposals. In other cases, the fragmentation might create inefficiencies in the sector and a lack of depth in regulatory capacity. The regulatory entities also have a designated responsibility for monitoring and enforcing the license/charter provisions as well as setting customer service regulations. The gaps in water regulation fall more within the area of customer service and quality standards.

Half of the countries studied have set up regulatory agencies to govern the sector and bring it in the purview of formal rules on tariff and service standards. In the 11 countries with distinct economic regulatory bodies,

Figure 4.2 Country Ranking and Prevalence of Key Reform Activities



Source: Banerjee, Skilling, and others 2008a.
Note: PSP = private sector participation.

Table 4.2 Regulatory Roles in the Urban Water Sector
(percent)

Role	*Line ministry*	*Entity within ministry*	*Regulatory body*	*Interministerial committee*	*Other*	*Unregulated or nobody*
Granting licenses and/or assigning service obligations	57	22	13	9	0	0
Approving investment plans	52	13	13	4	17	0
Establishing technical standards and minimum service levels	40	24	20	8	4	4
Arbitrating in a dispute	36	12	20	12	16	4
Approving tariffs	35	13	22	0	30	0
Setting water quality standards	27	18	23	9	18	5
Monitoring and enforcing compliance with economic rregulation	26	17	30	9	13	4
Providing customer service regulations	26	13	26	9	17	9
Monitoring water quality	26	22	13	9	26	4
Proposing/advising on tariffs	13	25	13	17	33	0

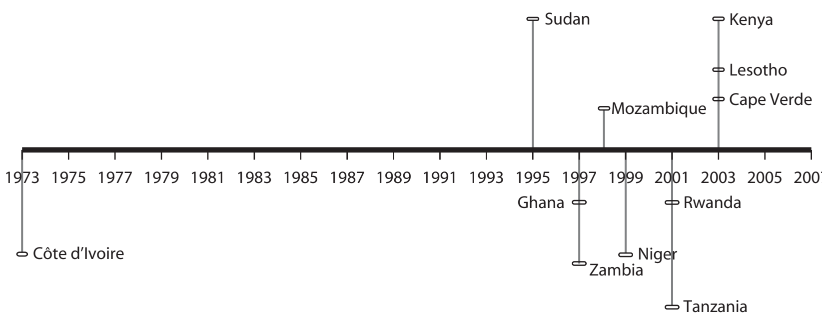
Source: Banerjee, Skilling, and others 2008a.
Note: Rows may not add to 100 because roles may be performed by more than one institution.

10 were created between 1995 and 2003 (figure 4.3). In Côte d'Ivoire, the regulatory agency, Direction de l'Hydrolique was set up in 1973–74. Of the 11 stand-alone regulators, five have jurisdiction over multiple sectors, and the rest are responsible for only WSS activities. The nascent regulators face the challenge of establishing a track record of sound decision making and acquiring competent staff.

Most countries are adequately equipped with regulatory tools. Regulatory institutions in a majority of African countries appear to have established a tariff methodology to conduct periodic reviews. Madagascar is the only country that does not have an established set of regulatory tools to manage tariffs. The tariffs in Sub-Saharan Africa are largely regulated—to the degree that proposals are made and approved. It is sometimes unclear how tariff increases are determined and why they are increased. Most countries use the price cap methodology of adjusting tariffs as opposed to other forms, but some countries raised tariffs based on "reasonableness" or to reflect actual costs. Although some countries perform periodic tariff adjustments, few index tariffs on an annual basis. In the 12 countries with periodic tariff reviews, the time between reviews ranges from one to five years. The annual periodic reviews might, in fact, be more comparable to annual indexation.

The regulatory agencies are likely to be headed by boards. Only in Côte d'Ivoire and Lesotho are regulators headed by individuals. In all countries, except for Mozambique and Rwanda, the president or the line minister has the authority to appoint the head or commissioner of the regulatory agencies. Clearly, the president and the line ministry play strong roles in the governance of the regulator, and the judicial and legislative branches of government play more limited roles. The term limits

Figure 4.3 Year of Establishment of Regulatory Agencies



Source: Banerjee, Skilling, and others 2008a.

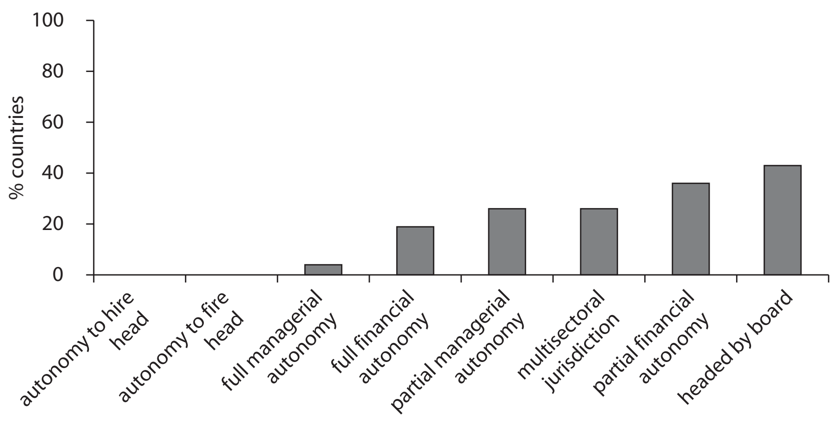
for the head or commissioner vary between three and six years, with an average of 3.3 years. The heads of these institutions can be reappointed, except in Niger, where they serve a single term.

Some regulatory agencies have achieved partial financial autonomy. The agencies are most commonly funded by sector levies or license fees, or by the central government. Cape Verde, Mozambique, Niger, and Rwanda use sector levies or license fees to fund the regulatory agencies. Côte d'Ivoire and Lesotho rely completely on the central government for funding, whereas donors play a substantial role in funding the regulators in Ghana, Tanzania, and, to a lesser extent, Sudan (figure 4.4).

Almost all countries use a standardized format to compile regulatory reports. Regulatory entities are less likely, however, to share their findings and decisions with the general public. In some cases, there is no mechanism to share decisions, but when decisions are made public, this usually occurs in the form of published reports (as in 81 percent of the countries studied). Public hearings are infrequent and held in only 50 percent of the countries. Similarly, hearings are rarely published on the Internet.

Consumer participation in the regulatory process is relatively limited. Where consumers have a role in the actual regulatory process, they are most often part of the appeals process rather than reviewers of regulatory proposals or board representatives. A social accountability index including four indicators[1] represents consumer influence in the regulatory process. Burkina Faso, Ghana, Malawi, Tanzania, and Zambia have the most socially accountable regulatory framework. In these countries, consumer

Figure 4.4 Understanding Performance in Regulatory Autonomy



Source: Banerjee, Skilling, and others 2008a.

representation exists in the regulatory body; consumers have the right to comment on draft regulations, review tariff proposals, and appeal regulatory decisions. Consumer representation is even less frequent within the regulatory body itself. Only in Burkina Faso, Ghana, Namibia, Tanzania, and Zambia do consumers have representation within the regulatory agency (figure 4.5).

Only Cape Verde, Kenya, Niger, Senegal, Tanzania, and Uganda have scored higher than 60 percent on the regulation index. A majority of countries have poor regulatory independence across all sectors, demonstrating that the standard model has limited relevance in Africa. Regulatory attributes can be identified that very few countries have adopted, such as formal autonomy to hire and fire, full managerial autonomy, and full independence to appeal. The countries have neither the authority to hire or fire head commissioners, nor do they allow full independence to appeal regulatory decisions (figure 4.6).

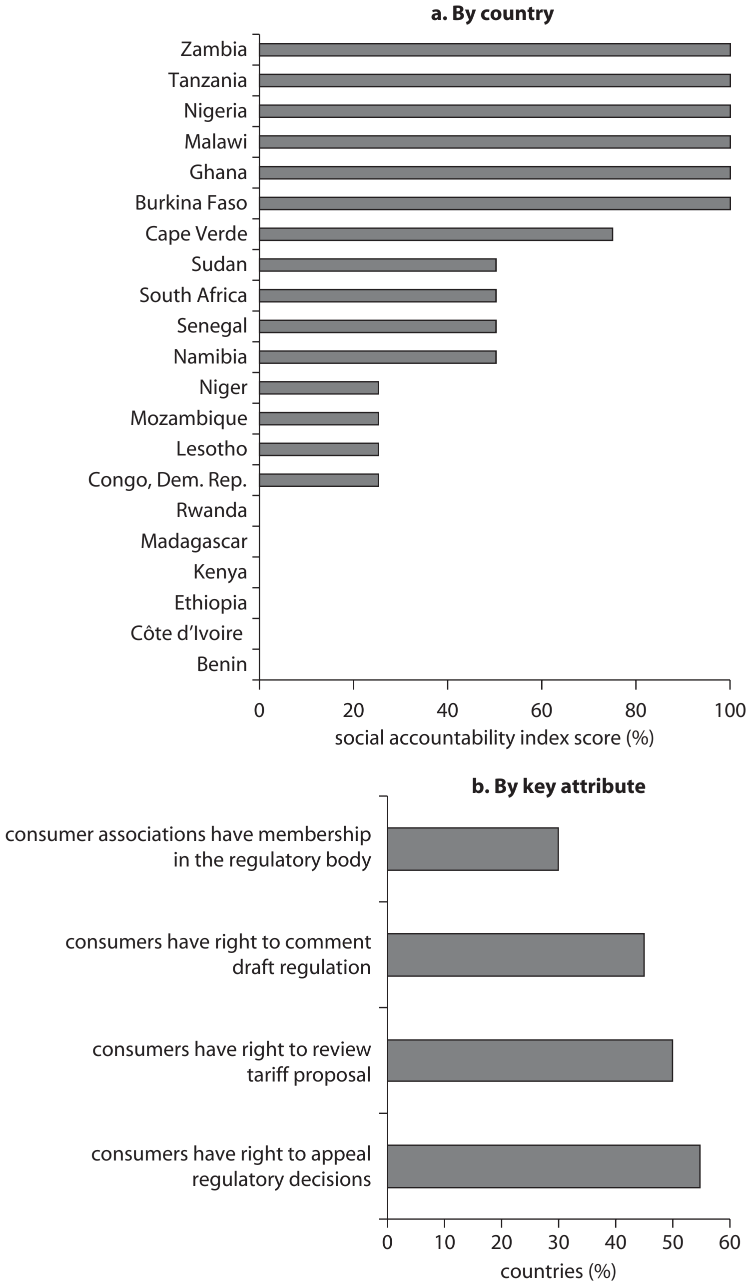
Water Utilities: Halfway toward Good Practice Criteria for Enterprise Governance

The SOE governance index is used to determine whether SOEs are being governed using sufficiently commercial principles. Several aspects of SOE management are examined, including ownership and shareholder quality; managerial and board autonomy; accounting, disclosure, and performance monitoring; outsourcing; labor market discipline; and capital market discipline. Using this scoring system, we can see which utilities in Sub-Saharan Africa have adopted policies of good governance and commercial orientation.

The goal in governance reforms has been to move toward corporatization of SOEs, decentralize responsibilities to lower levels of government, and improve the governance of SOEs by adopting modern management methods. In 83 percent of the countries, at least one water utility has been corporatized, thereby laying the foundation for more commercial management. Close to half of the countries sampled have decentralized their water utilities over the past decade, thereby making local communities more responsible for utility management. Lesotho and Zambia began their decentralization processes in the early 1990s, and the rest of the countries decentralized in the past decade. All of the francophone countries studied still have centralized water utilities.[2]

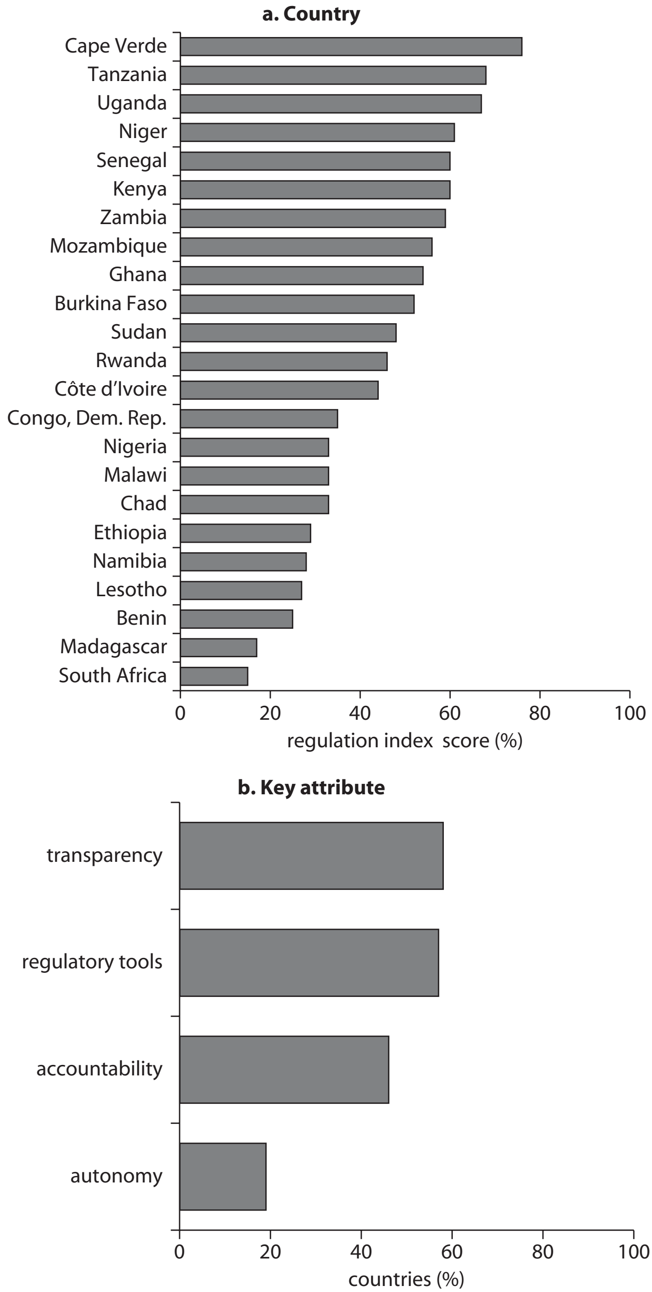
About 52 percent of the sample utilities are corporatized entities, meaning that the public sector service provider functions as a private

Figure 4.5 Prevalence and Key Attributes of the Social Accountability Index



Source: Banerjee, Skilling, and others 2008a.

Figure 4.6 Country Ranking and Prevalence of Key Attributes of Regulation

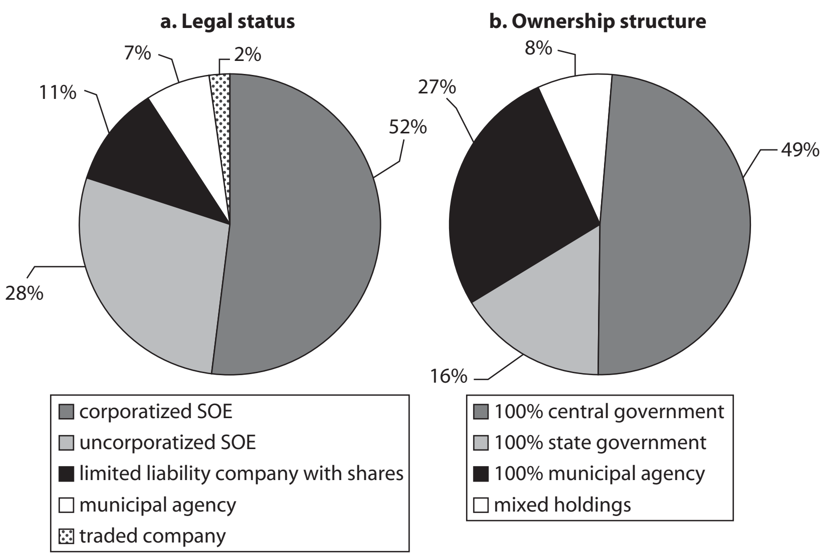


Source: Banerjee, Skilling, and others 2008a.

company in terms of efficiency, productivity, and financial sustainability (figure 4.7, panel a). The public sector provider does this through implementing some or all of a series of changes, including establishment of a distinct legal identity; segregation of the company's assets, finances, and operations from other government operations; and development of a commercial orientation and managerial independence, while remaining accountable to the government or electorate. Although other utilities are not corporatized, they could be better governed through the adoption of some or all of these corporate practices. The heart of corporate governance is to protect and enhance the long-term value of the company for shareholders (government and other) by increasing sales, controlling costs, and increasing revenue.

Nearly half of the African water utilities are SOEs, the majority owned by the central government; others are owned at the state or municipal level. Together, 92 percent are state owned, with ownership varying at different levels of government (figure 4.7, panel b). In a few countries, such as Kenya, Namibia, South Africa, and Zambia, where water service delivery has been decentralized to the local level, utilities are majority owned by municipalities. Namibia still provides service through municipal

Figure 4.7 Legal Status and Ownership Structure of Water Utilities



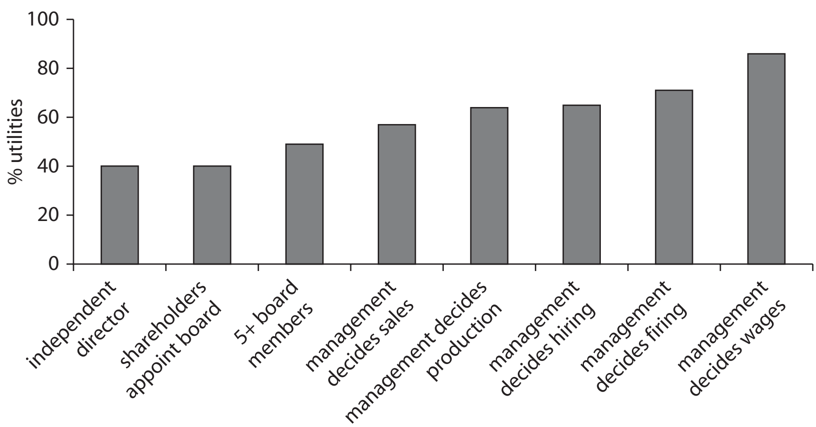
Source: Banerjee, Skilling, and others 2008a.
Note: SOE = state-owned enterprise.

departments, and only the utilities engaged in active public private partnerships, as in Cape Verde, Côte d'Ivoire, Niger, and Senegal, have diversified shareholding.

The use of external financial and independent audits is common. Similarly, the management or board determines wages and bonuses in the majority of entities. Utilities perform poorly on indicators such as public listings, outsourcing functions, and dividend payments. Société de Distribution d'Eau de Côte d'Ivoire (SODECI) in Côte d'Ivoire is the only water utility that is listed on a stock exchange; its shares are publicly traded. Similarly, only 27 percent of the utilities are required to pay dividends to their shareholders.

About 84 percent of the entities have boards of directors, though few are well represented or benefit from the presence of independent directors. Only half the entities have a board with more than five members, and only 40 percent of the entities—notably in Kenya, Tanzania, Uganda, and Zambia—have at least one independent director on the board. Sixty percent have government-appointed boards (figure 4.8). Obviously, the owners' interests are well represented on the boards, and the managerial decision-making process is heavily influenced by politics. Only Société de Exploitation des Eaux du Niger (SEEN), in Niger, has a representative board appointed by shareholders, with independent directors. For instance, in the National Water and Sewerage Company (NWSC) in Uganda, the Ministry of Water, Lands, and Environment appoints the board of directors; in the Office Nationale des Eaux et d'Assainissement

Figure 4.8 Performance in Managerial Autonomy



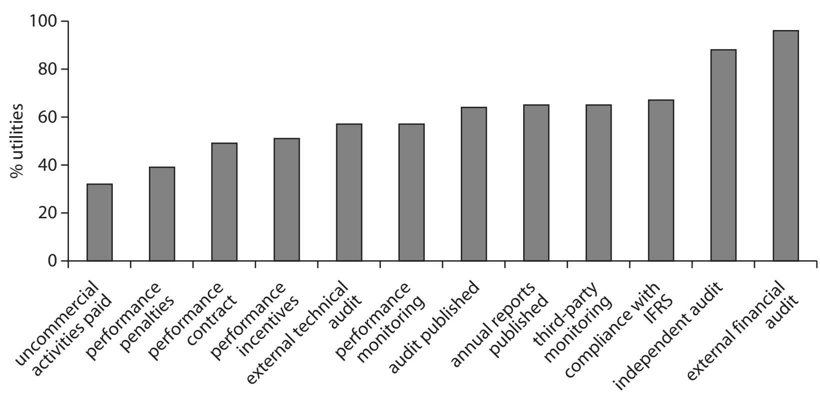
Source: Banerjee, Skilling, and others 2008a.

(ONEA), the board is appointed by the Council of Ministers (Baietti, Kingdom, and Van Ginneken 2006).

Half of the entities have performance contracts with defined and monitorable targets. Management through such contracts takes a systematic approach to performance improvement through an "ongoing process of establishing strategic performance objectives; measuring performance; collecting, analyzing, reviewing, and reporting performance data; and using that data to drive performance improvement" (PA Consulting 2007). All entities in South Africa, Tanzania, Uganda, and Zambia use these contracts. The NWSC uses annual and multiyear performance contracts (Baietti, Kingdom, and Van Ginneken 2006). Sixty-five percent of the firms use third-party monitoring, which demonstrates a commitment to enhancing external accountability for results. The extent to which these performance contracts are implemented depends on how the internal incentive mechanisms are established. More than half of the utilities have performance-based management systems, and 39 percent penalize for poor performance. In about 57 percent of the utilities, staff members are given periodic performance reviews (figure 4.9).

Outsourcing is relatively new and still not widespread. It allows an entity to focus on its core business and potentially lower costs. Utilities in Mozambique and Khartoum, Sudan, are the only utilities that report outsourcing billing and collection, meter reading, human resources, and information technology. In fact, 88 percent of the utilities score less than 40 percent on the outsourcing subindex. Outsourcing operating expenses can be quite expensive. For instance, outsourcing as a share of operating

Figure 4.9 Performance Monitoring



Source: Banerjee, Skilling, and others 2008a.
Note: IFRS = International Financial Reporting Standards.

expenses of the NWSC in Uganda is in the range of 30 to 40 percent (Baietti, Kingdom, and Van Ginneken 2006).

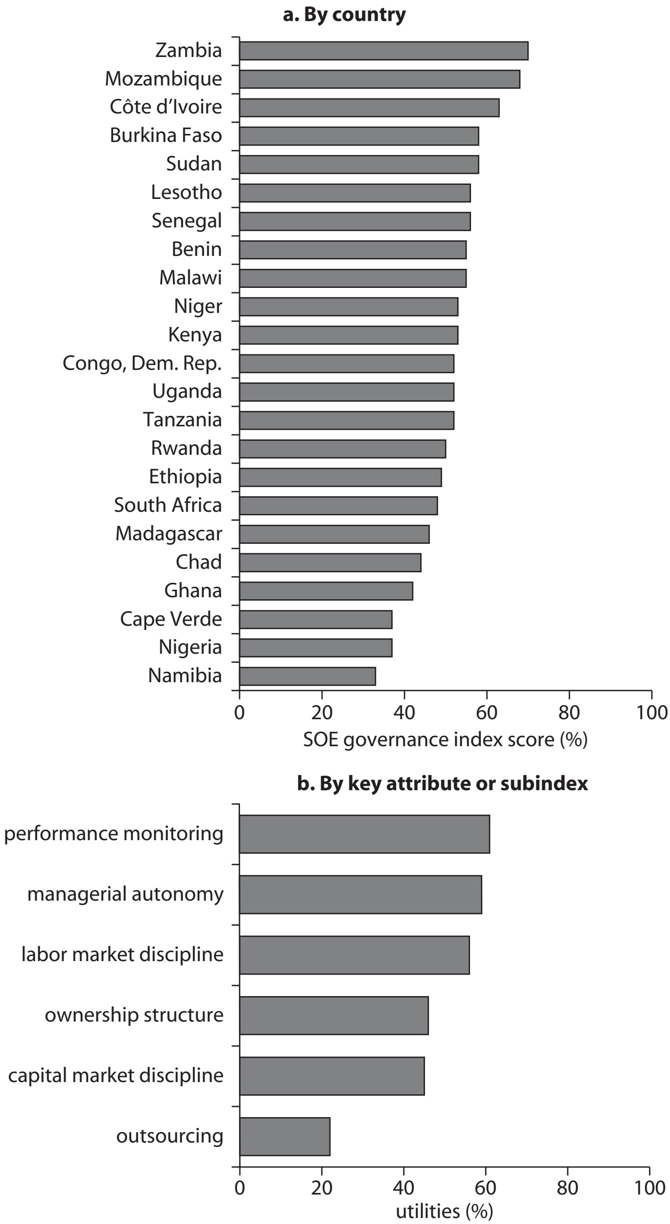
SODECI scores the highest on capital market discipline, which relates to the commercial nature of the utility. Águas de Moçambique (ADeM) in Maputo, SEEN in Niger, FCT in Nigeria, ELECTROGAZ in Rwanda, the South African utilities, and Lusaka Water and Sewerage Company (LWSC) in Zambia also score high on capital market discipline. About 25 percent of the utilities in Africa adhere to the highest levels of labor market discipline, which relates to the ability to hire and fire workers and to set wages and benefits with regard to the private sector.

A majority of the entities score between 40 and 80 percent on the SOE governance index. Africa's state-owned water utilities typically meet only about half the good practice criteria for enterprise governance. Firms do well on "capital market discipline" and "accounting, disclosure, and performance monitoring" subindexes, with more than 60 percent of the utilities scoring between 40 and 60 percent in each subindex. African water utilities rarely outsource. Most are a long way from achieving managerial and board autonomy; less than one-fourth score more than 80 percent on this subindex. Interestingly, the correlation between the SOE governance index and the earlier reform and regulation index is very low, which is to say that some countries do much better on SOE governance than on reform and regulation, and vice versa.

Countries have made more serious efforts to improve internal processes and corporate governance mechanisms during the past decade than in other infrastructure sectors. A growing number of utilities in countries such as Lesotho, Uganda, and Zambia are using performance contracts, though some do not incorporate the penalties, performance-based remuneration, and third-party monitoring that makes these mechanisms truly effective. The Mozambican and Zambian utilities have the highest scoring internal governance structures when it comes to meeting the needs of their consumers, regulators, governments, and other stakeholders. The LWSC in Zambia is the best-governed utility in Africa according to the criteria developed in this chapter, scoring 73 percent. Johannesburg, SEEN, and Sénégalaise des Eaux (SDE) have also made substantial progress in governance reforms (figure 4.10).

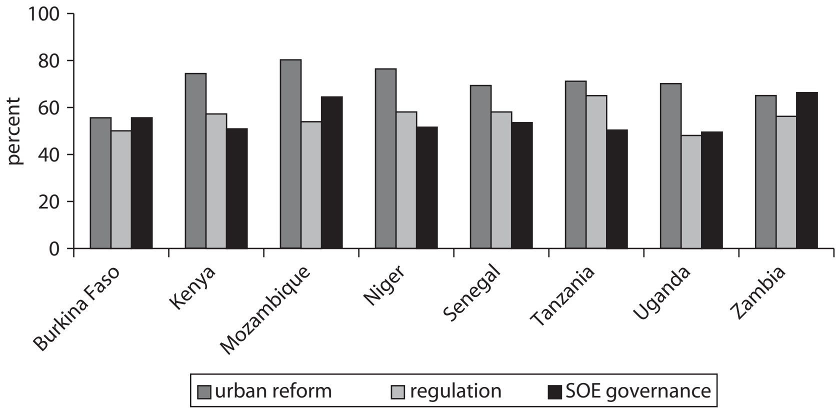
In summary, many African countries have initiated water sector reforms, and two major thrusts to this reform agenda have been seen: private participation and improvement of internal governance. Some countries, such as Burkina Faso, Kenya, Mozambique, Niger, Senegal, Tanzania, Uganda, and Zambia, are remarkable performers that have progressed at

Figure 4.10 Country Ranking and Prevalence of Key Attributes of the SOE Governance



Source: Banerjee, Skilling, and others 2008a.
Note: SOE = state-owned enterprise.

Figure 4.11 Solid Country Performances



Source: Banerjee, Skilling, and others 2008a.
Note: SOE = state-owned enterprise.

a steady pace in different areas of urban sector reform (figure 4.11). These countries have developed a formal regulatory structure, a market-oriented and accountable internal governance mechanism, and wide-ranging urban sector reforms.

Varied Institutional Models for Nonpiped Services in the Urban Water Market

Because utilities and standpost operators do not keep track of the different types of customers they serve, raw coverage numbers conceal essential parts of the urban water picture. Breaking down consumers by type is very important, for example, when it comes to understanding the price structure of the market, because the standpost operator usually charges the direct consumer and the reseller differently. In periurban areas of Accra, although most water is sold through standposts, 20 percent is resold by cart operators (Sarpong and Ambrampah 2006). Likewise, standpost operators in Khartoum sell most of their water (80 percent) to cart operators, who then resell to households (Elamin and Gadir 2006). Similarly, in Ouagadougou, more than 80 percent of water sold at standposts is bought by cart operators and not by individuals (Collignon and Vézina 2000). In Luanda, Angola, most of the water delivered in periurban areas, where the majority of the population lives, is carried by water trucks that sell water obtained either from the piped-water system or directly from the main river. The water trucks sell to an estimated 10,000 nonmobile water vendors and households that have built water storage tanks; these households in turn sell water to the rest of the population. In periurban areas of Luanda, 70 percent of residents purchase their water from water vendors (Development Workshop 1995).

People in urban areas who do not have access to piped water get their water from a number of different sources. There are "formal" sources, such as standposts and boreholes, as well as an emergence of "informal" sources, such as water vendors and tankers, resellers, and small piped systems. The quality of the water from these suppliers is not monitored in the same way as piped water.

Public standpipes can be managed by a number of different parties that retain responsibility for payment, supervision, and maintenance. Two main systems are found: one in which the utility retains control, and the other, in which the utility delegates various functions to third parties and serves primarily as a bulk water supplier.[3] In a little more than one-quarter of the 24 largest cities studied in the module for small-scale independent providers of the AICD WSS survey, utility staff manages standpipes using one of three management models (free, prepayment, or managed by a paid utility staff member). In almost three-quarters of the cases, utilities had a contract with a third party (whether a private individual or a community organization), a support institution (local government, community-based organization [CBO], or nongovernmental organization [NGO]) to manage the standpipe (table 4.3).[4]

Direct Management by Utilities. In the past three decades, a shift has occurred so that standpipes that were once owned and provided to the population free of charge by utilities are now run by either private individuals or community groups (figure 4.12). The data indicate that many utilities viewed the free standpipes as a financial drain. As a result, only five of the sample cities still had free standpipes. With the exception of Madagascar, where less than half of the standpipes provide free water, free public standpipes in countries including Namibia, Lesotho, Nigeria, and South Africa were mostly concentrated within larger piped systems or in cities with sufficient levels of piped coverage to help subsidize the costs. Other cities, except for Kaduna, Nigeria, are moving toward paid standpipes or kiosks; Johannesburg, Maseru, and Windhoek are installing prepaid standpipes, and Antananarivo is installing kiosks.

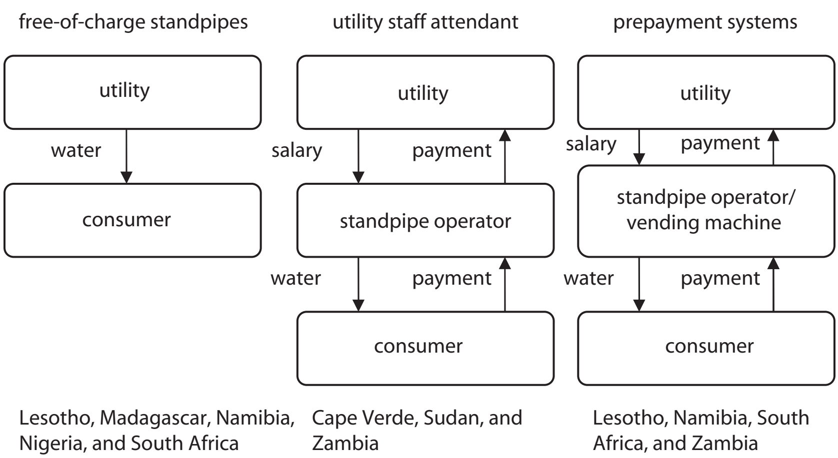
The second model, in which the utility hires a salaried attendant, is an increasingly uncommon practice that is still used in a few countries. This

Table 4.3 Standpipe Management
(percent)

Ownership	*Country*	*City*	*free of charge*	*Management (by)*		
				Private	*Utility*	*Community*[a]
Utility	Cape Verde	Praia	0	0	100	0
	Lesotho	Maseru	100	0	97	3
	Madagascar	Antananarivo	40	60	0	40
	Namibia	Windhoek	100	0	100	0
	Nigeria	Kaduna	96	4	96	0
	South Africa	Johannesburg	100	0	100	0
	Sudan	Greater Khartoum	0	0	100	0
	Zambia	Lusaka	0	5	90	5
Private	Benin	Cotonou	0	100	0	0
	Burkina Faso	Ouagadougou	0	100	0	0
	Niger	Niamey	0	100	0	0
	Kenya	Nairobi	0	88	0	12
	Rwanda	Kigali	0	100	0	0
	Senegal	Dakar	0	85	0	15
Community	Ethiopia	Addis Ababa	0	0	0	100
	Malawi	Blantyre	0	—	—	70
	Mozambique	Maputo	0	44	0	56

Source: Keener, Luengo, and Banerjee 2009.
Note: — = not available.
a. In the community category, we merge the delegated management model with direct contracting with a community group and the delegated management model with institution support as discussed later in this section.

Figure 4.12 Utility Direct Management Models



Source: Keener, Luengo, and Banerjee 2009.

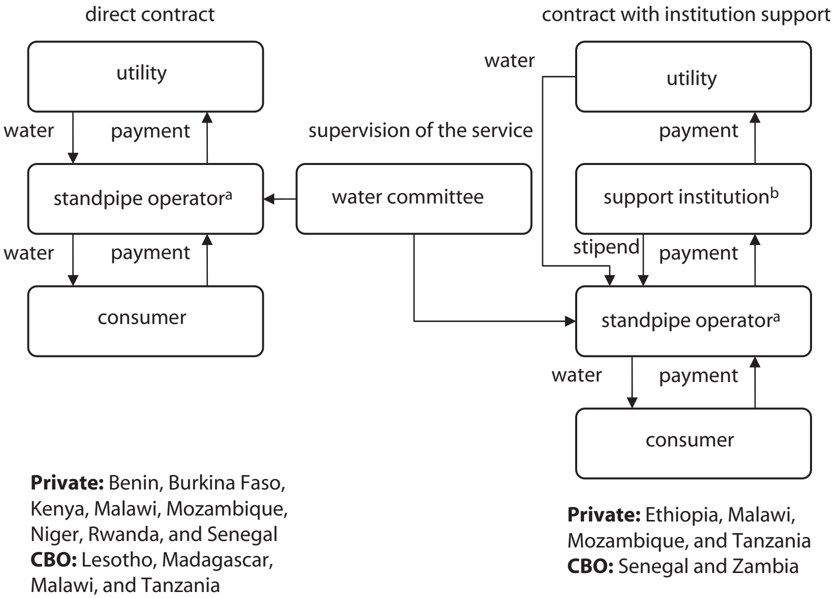
model has been rejected in some countries because, typically, limited incentive exists for a wage-earning employee to ensure cost recovery. In Zambia, the utility has tried to improve this model by introducing water commissions.

A newer model, in which customers can pay for water at standpipes using electronic systems, is being introduced to reduce management costs and problems with nonpayment and to potentially provide more targeted subsidies as payment tokens can be distributed via existing systems. South Africa currently uses this model, and electronic prepayment cards and vending machines are also being introduced in Lesotho and Namibia. In Zambia, customers use tokens or monthly cards instead of vending machines. These systems allow for tariffs to be set at a unit rate that is lower than the smallest coin (Brocklehurst and Janssens 2004; Kariuki and others 2003) and may allow for lower prices, because they eliminate the middleman. In Lesotho, the water utility and retail outlets sell prepaid cards. In some instances, however, independent "operators" sell tokens, at a higher price, at the standpipes. Although this is more convenient for customers, it is important to have formal outlets to maintain set prices.

Delegated Management Model. In the increasingly common delegation model for public standpipes, utilities either sign a contract directly with a standpipe operator, who pays the standpipe bill (and in some cases maintains the standpipe), or sign a contract with a support institution. In the support institution model, local officials or members of a water committee then supervise operators. Under this system, the institution pays the utility for each standpipe, based on a bulk water price. Community groups or local officials typically select the standpipe operators, and the process is generally far from transparent and often influenced by local politics (figure 4.13).

Over the medium term, the delegation model has not always provided reliable service with timely bill payment to the utility and has been largely ineffective in providing a subsidized or "social" price to the end consumer. The most successful delegation models have been those that are heavily monitored by the utility, or another external body, which in turn has increased costs. Conversely, when utilities delegate most of their critical functions such as management, monitoring, maintenance, and oversight, this can result in higher consumer prices and more frequent breakdowns in service. There are exceptions, particularly in areas with high social capital.

Figure 4.13 Delegated Management Models



Source: Keener, Luengo, and Banerjee 2009.
Note: CBO = community-based organization.
a. Standpipe operator can be a private individual or a CBO.
b. Support institution: Local leaders, local authority administrators, or NGOs.

Community-Based Management (Local Leaders, Local Authority Administrators, NGOs, and CBOs). Community management works only where there is a true sense of community, and where there is personal security and accepted methods for dealing with those who do not follow regulations. Unlike rural areas, urban neighborhoods share a greater degree of heterogeneity.

Local leaders and community organizations play various roles in standpipe management and oversight; in some cases (in parts of Addis Ababa, Blantyre, Dar es Salaam, and Maputo), utilities have put local leaders in charge of operations and maintenance, with the assumption that these leaders will act in their constituents' best interest. In these cases, the performance of the standpost, in terms of pricing, maintenance, timely bill payment, and so forth, is largely dependent on the management skills and legitimacy of the local leader and the degree of oversight by an external party.

Several schemes have put community organizations in charge of management or oversight in an effort to make standpipe/kiosk operators more accountable to their customers. These projects have been somewhat more effective than schemes that simply delegate management to a local leader. This practice is still very limited in the urban and periurban areas of Sub-Saharan countries, and in places where there is not enough social cohesion or strong local power structures and no oversight from a supporting institution, the model can also lead to corruption and mismanagement. In Blantyre and Lilongwe, for instance, community-managed kiosks that had been developed with extensive community involvement were taken over by local elites as soon as the mediating NGO left.

The effectiveness of schemes involving community organizations varies and depends on the community's social cohesion and management capacity, as well as external monitoring. A Water and Sanitation Program report on the role of small- and medium-size organizations providing water in urban areas (Vézina 2002) stressed the limitations of community-based management models that lacked external monitoring and support: there is a tendency to minimize expenses by limiting the extension of the system, and although in principle these organizations are based on the voluntary participation of community members, to reduce operating and maintenance costs, actual management is often controlled by a small group that may monopolize control of the finances. With such arrangements, elite capture remains a problem that requires strong institutional controls and active monitoring.

Some more recent models for community involvement use sophisticated incentives and monitoring to mitigate corruption. In Blantyre, Malawi, the water users association controls as many as 70 water points each. The utility provides technical assistance, legally registers the association, and monitors operation of the standpost. The association employs both the kiosk attendants and meter inspectors. The latter check the meter readings; if there is a difference between the inspector's meter reading and the amount of revenue collected, it is subtracted from the attendant's salary. Although the price of this water is 25 percent higher than at other kiosks, residents prefer to use these kiosks because the quality of service is monitored and reliable. (This is not necessarily the case with other neighborhood kiosks.) In Dakar, Senegal, about 15 percent of the public standposts have been built via a partnership between the utility and an NGO, ENDA Tiers Monde. ENDA partners with communities and local neighborhood associations (for example, women's groups and self-help groups); the community groups pay 25 percent of the capital costs of a standpipe, which is then built by the utility. The community also selects a standpost operator who collects revenue for the utility, and ENDA helps to create a local water council.

Private Management. Although utilities contract out the operation of standpipes to private managers on the premise that this will promote efficiency and cost recovery, the results are not always positive. Many utilities in Sub-Saharan cities such as Blantyre, Cotonou, Dakar, Kigali, Nairobi, Niamey, Ouagadougou, and Quelimane have leased their installations and sold bulk water to private operators. The model has two particular weaknesses: (1) The selection process of standpipe operators, particularly when the municipality is involved, is rarely transparent, and (2) because a private manager is running the standpipe, the water utility is less involved in collecting water revenue, ensuring good quality service, and maintaining adequate tariff levels. The price and hours of operation are also crucial to the success of this model: In the 1990s in Quelimane, Mozambique, private standpipe operators were billed according to fixed estimates of water consumption, but the water supply was extremely limited and intermittent. Certain standpipe operators found it difficult to generate enough water revenue to pay back the water bill and did not have funds to adequately maintain the standpipes (SAWA 1997).

Household Resellers

Reselling of water by households with private connections is commonly believed to be illegal in Sub-Saharan cities (Boyer 2006; Collignon and Vézina 2000; Kariuki and others 2003), but only 4 out of 15 cities in the study with prevalence of household water resellers explicitly prohibit the resale of water by households (table 4.4). Only three cities have legalized household resale and require a permit for this business. Box 4.2 presents a case study of regulated water reselling in Abidjan. In the majority of cases, a confusing legal limbo prevails; household water resellers are neither prohibited nor legalized. Even if regulations are in place prohibiting household water resellers, they are not enforced, as in Dakar or Dar es Salaam. Utilities and government simply do not control and rarely contest this practice, and in the case of Kampala, the practice is encouraged in areas at the end of the network. Detailed case studies that highlight the importance of this source in allowing access where standposts or individual connections have not kept pace point to the serious impact that prohibition of this source would have on poor urban households.

Table 4.4 Regulation of Household Water Resellers

Country	*City*	*Prohibited*	*License*
Benin	Cotonou	No	No
Chad	N'Djamena	No	—
Congo, Dem. Rep.	Kinshasa	No	No
Côte d'Ivoire	Abidjan	No	Yes
Ethiopia	Addis Ababa	No	No
Ghana	Accra	No	No
Lesotho	Maseru	—	—
Madagascar	Antananarivo	No	No
Malawi	Blantyre	—	—
Mozambique	Maputo	No	No
Nigeria	Kaduna	Yes	n.a.
Rwanda	Kigali	No	Yes
Senegal	Dakar	Yes	Yes
Sudan	Greater Khartoum	Yes	No
Tanzania	Dar es Salaam	Yes	No
Uganda	Kampala	No	No
Zambia	Lusaka	No	No
	% yes	24	18

Source: Keener, Luengo, and Banerjee 2009.
Note: n.a. = not applicable, — = not available.

Box 4.2

Regulation in Water Reseller Market in Abidjan

Abidjan is one of the few cities with experience in attempting to regulate this sector, though they also focus on removing illegal connections. Although the results have been disappointing because of a lack of incentives, there is still potential to explore better mechanisms for using this source. In the early 1980s, the utility SODECI and the national government decided to address the increasing growth of household water resellers that tapped into illegal connections to the network. The authorities would provide permits to the household water resellers as long as they converted their connections into formal ones. The expected outcomes were an increase in sales among the poor, a reduction in illegal activity, and an improvement in revenue collection. The campaign did not provide any incentive to the resellers; they were billed as domestic customers and faced an increasing block tariff. Moreover, the water vendor was required to provide a title deed for the permit and to invest in an extension from the meter to the water point. As a result, only 1 percent of the total resale at the household level is currently conducted through legalized resellers.

Source: Kariuki and others 2003.

Table 4.5 Regulation of Water Tankers

Country	*City*	*Regulated*
Cape Verde	Praia	Yes
Chad	N'Djamena	Yes
Ethiopia	Addis Ababa	Yes
Ghana	Accra	No
Kenya	Nairobi	Yes
Nigeria	Kaduna	No
Rwanda	Kigali	No
South Africa	Johannesburg	No
Sudan	Greater Khartoum	Yes
Tanzania	Dar es Salaam	No
Uganda	Kampala	No

Source: Keener, Luengo, and Banerjee 2009.

Given the coverage gap and the ready distribution system that household resellers provide, a valid question is whether to explore methods to partner with private households to increase coverage.

Water Tankers

The utility emerges as a minor player in the operation of water tankers. The formal and informal private sectors are the main operators in four out of nine cities with water tanker supply (table 4.5).

Many Levels of Government Players in the Rural Water Market

Different levels of government play various roles in rural water provision. Box 4.3, for instance, presents the typical issues faced by Cross River State in Nigeria. In about one-third of the countries, the central government is responsible for rural water supply, and it shares this task with regional/state or local governments in another 27. In Cape Verde, Chad, Madagascar, South Africa, and Uganda, local governments are responsible for water supply.

The central government, local government, and NGOs play the greatest roles in most aspects of rural water service provision. Urban utilities and community service providers play the smallest roles, though community service providers are most involved in the direct provision of service. Although regional governments, rural agencies, and the private sector also contribute to water provision in certain countries, they are generally less involved across the range of countries and tasks (table 4.6).

Box 4.3

Issues Constraining Rural Water Supply in Cross River State, Nigeria

Cross River State, one of the 36 states in Nigeria, is located in the tropical rain forest belt of Nigeria. About 75 percent of its population, 3.25 million people, lives in rural areas and is engaged in subsistent farming, and more than 70 percent lives with less than $1 a day.

Cross River State is one of the states selected by the World Bank to carry out an assessment of the rural water supply based on public expenditure reviews. This is part of a substantial effort implemented by the World Bank to assess rural water sector performance in West Africa. The review, whose findings are reported here, covers the period from 2002 to 2007.

Water supply in the Cross River State is in crisis. Coverage stands at only 25 percent in urban areas and 31 percent in semiurban and rural areas. Rural water is mainly supplied through boreholes with hand pumps and wells, 65 percent of which are not functioning. Moreover, no water treatment is provided.

Meeting the MDG for water is estimated to require an additional 10,098 boreholes with hand pumps and 2,525 motorized boreholes to be built across the state by 2015, a daunting task given the current financial, institutional, and technical capacity.

Lack of adequate budgetary funding and low disbursement efficiency are major constraints. Rural water captures only 0.5 percent of the state capital budget, and execution ratios average less than 20 percent. Weak institutions and fragmented responsibilities translate to feeble leadership and rural water falling behind in the political agenda. The sector is under the responsibility of the State Rural Water Supply and Sanitation Agency (RUWATSSA), which remains a section of the Rural Development Agency. Differently from in other states, no dedicated ministry champions for reforms and allocations. More importantly, although a rural water policy does exist nationally, this is not necessarily reflected in state policies, and effective cooperation is not pursued between the national and state governments. Responsibilities are decentralized locally, but RUWATSSA continues to be characterized by a weak and poorly funded mandate and loose connections to the national water sector.

Maintenance and rehabilitation of rural water schemes are jeopardized by the lack of skilled staff and the substantial underdevelopment of a local private sector. Technical capacity for routine maintenance remains low; spare parts for boreholes are difficult to find and very expensive where available.

(continued next page)

Box 4.3 *(continued)*

Finally, no effective strategy to promote community participation has been put in place, with the result that involvement by local communities in rural water provision remains shallow at best. Absent any sense of ownership, rural communities do not take responsibility in preserving and repairing facilities, and they would not have the capacity to do so without adequate training.

Source: Iliyas, Eneh, and Oside 2009.

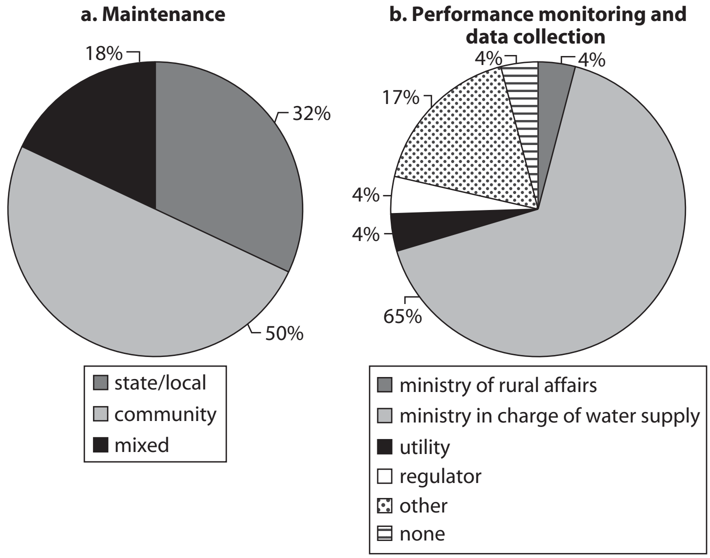
Table 4.6 Stakeholder Involvement in Rural Water Activities
(percent)

	Planning projects	*Preparing projects*	*Financing rural water*	*Providing services*	*Providing technical assistance*	*Ensuring water quality*
Central government	41	31	50	8	31	48
Regional government	14	17	13	8	11	16
Local government	24	24	18	24	14	10
Rural water agency	16	14	5	14	11	6
Utility	0	0	0	5	11	16
Community	3	7	8	24	3	3
Private sector	3	7	8	16	19	0

Source: Banerjee, Skilling, and others 2008b.
Note: Columns do not add to 100 percent because more than one agency can be responsible for performing the activities.

Rural water points are typically managed by the level of government closest to the communities themselves, and, in some cases, the government and community share the responsibility. In half of the countries, the community is primarily responsible for maintaining the rural water points (figure 4.14). The central government does not play a major role, except in Malawi, where it shares this responsibility with the local government, community, and private groups. The ministry in charge of water supply is by far the most important institution when it comes to collecting data and monitoring the rural water points, as in Cape Verde, where the

Figure 4.14 Responsibility for Maintenance and Monitoring of Rural Water Points



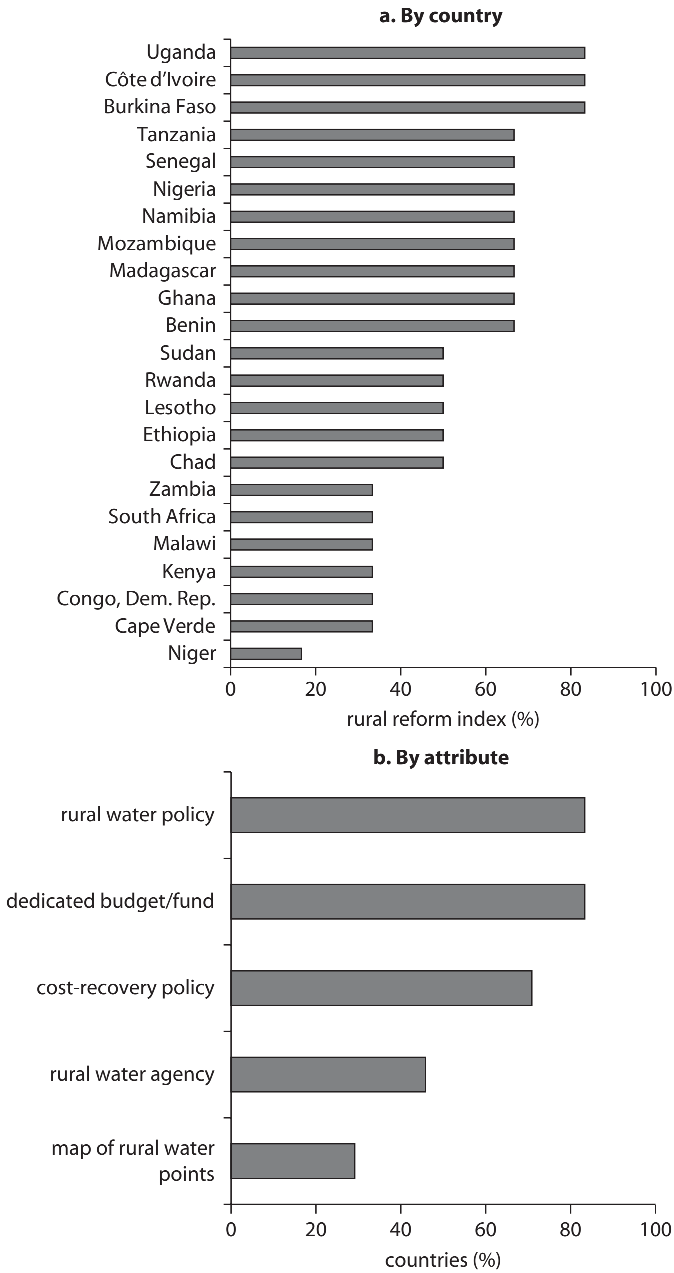
Source: Banerjee, Skilling, and others 2008b.
Note: Panel b total is 98 percent because of data unavailability for some countries.

Ministry of Rural Affairs performs this role. The regulator (Direction de l'Hydrolique) tracks data in Côte d'Ivoire, and the utilities are responsible for the same in Sudan.

About half of the countries reportedly have a rural water agency, but most countries at least have an established policy in place specifically for the rural water sector. A few countries, such as Benin, Burkina Faso, Côte d'Ivoire, Ghana, Lesotho, Mozambique, Namibia, Nigeria, Senegal, and Uganda, have both a rural water policy and a rural water agency to ensure service delivery to rural dwellers. The water points are dispersed across the rural space and are often mapped to monitor their functioning. Of these countries, only Benin, Burkina Faso, and Uganda have a rural water map as well.

The rural water index is used to measure each country's progress. This is done using five indicators: existence of a rural water agency, existence of a rural water policy, existence of a map of rural water points, existence of a dedicated budget or rural water fund, and existence of a cost-recovery policy (figure 4.15). Burkina Faso, Côte d'Ivoire, and Uganda score the highest and are the best-performing countries in creating wide-ranging reforms for the rural sector. Though we cannot evaluate the performance

Figure 4.15 Country Ranking and Prevalence of Key Attributes for the Rural Reform Index



Source: Banerjee, Skilling, and others 2008b.

of rural facilities using the existing data, we find that the percentage of rural water points in need of rehabilitation and the rural water index are negatively correlated,[5] suggesting a positive association between rural reforms and functioning rural water facilities.

WSS services in small towns are often neglected and are often not taken into account in urban and rural water strategies. In many countries, particularly more populous ones, people are concentrated in small towns, and there is a need for an explicit strategy to provide infrastructure services. For instance, in Côte d'Ivoire, Benin, Madagascar, Nigeria, and Senegal, more than 30 percent of the population lives in small towns. Small towns range in size from 2,000 inhabitants in Benin, Ghana, Madagascar, and Niger to 160,000 in Nigeria. Small towns are covered under a rural or urban strategy in only five countries. Half of the countries surveyed have a specific policy or strategy for provision of small town water services. Even among these countries, only a few, such as Côte d'Ivoire, Ghana, Lesotho, and Uganda, have a specialized agency for small town water services.

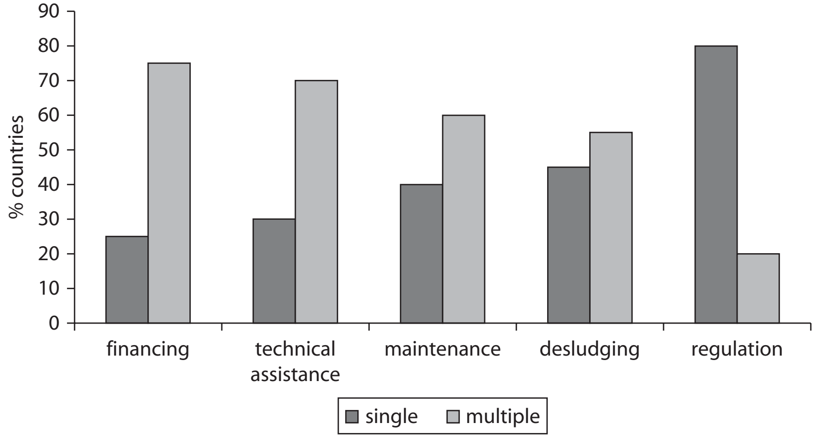
Many Players with No Clear Accountability in the Sanitation Market

The sanitation sector is governed by a complicated institutional framework characterized by complexity, a multiplicity of actors, and lack of clear accountability for sector leadership. On-site sanitation operation requires financing, technical assistance, maintenance, emptying (or desludging) of facilities, and regulation. In most countries, central ministries, national and city-level utilities, local government agencies, households, NGOs, and other institutions share these responsibilities. In most countries, regulation is the only area where there is a clear delegation of responsibility to a single entity (figure 4.16).

Institutional arrangements tend to differ sharply across urban and rural environments. In rural areas, communities and households typically manage sanitation, with oversight from ministries of health. The central government is generally responsible for urban sanitation under the oversight of ministries of water, environment, housing, or public health. Municipal agencies or utilities are typically responsible for running and maintaining sanitation operations.

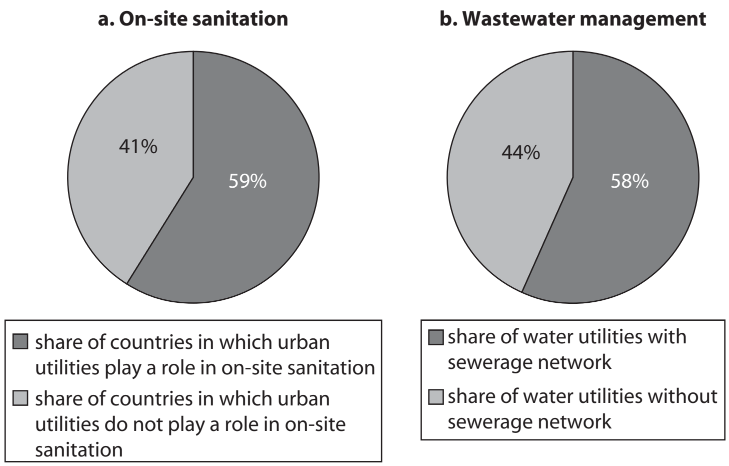
About 60 percent of water utilities operated sewerage networks, and a similar proportion had some responsibility for on-site sanitation as well (figure 4.17). Sanitation either can be treated as a separate business, with

Figure 4.16 Responsibilities for On-Site Sanitation Functions



Source: Morella, Foster, and Banerjee 2008.

Figure 4.17 Urban Utilities' Responsibility over On-Site Sanitation and Wastewater Management



Source: Morella, Foster, and Banerjee 2008.

dedicated staff, organization, and management, or it can be operated jointly with water; both approaches are equally prevalent. Senegal is the only country with a specialized sanitation utility, Office National de l'Assainissement du Sénégal (ONAS), which reports to the Ministry of Sanitation, which was recently restructured as the Ministry of Urban

Affairs, Housing, Urban Water, Public Hygiene and Sanitation. In Burkina Faso, the water utility Office Nationale des Eaux et l'Assainissement (ONEA) has a separate department that is responsible for sanitation.

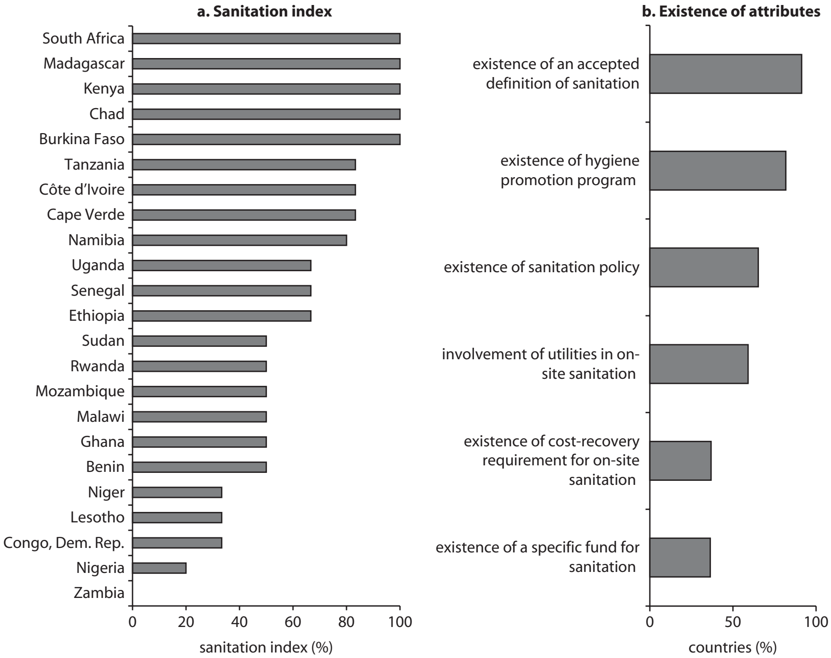
The devolution of provision of sanitation services to subnational governments has been the most significant reform of the past decade, affecting 80 percent of countries surveyed. Decentralization first began in large cities, where it had effectively been the practice because of the comprehensive role played by many water utilities. Utilities in rural areas are also being decentralized, with responsibilities transferred to small local authorities, many of which have been recently established, as in Benin, Burkina Faso, and Mali.

Reform progress can be evaluated using a simple scoring system, called the sanitation index. Countries have worked to establish a comprehensive sanitation framework to move more people away from open defecation. This reform index focuses on on-site sanitation, because a vast majority of Africans depend on this source, and the prevalence of piped sewerage is miniscule in comparison. The sanitation index includes six indicators: existence of a national sanitation policy, existence of a hygiene-promotion program, existence of an accepted definition of sanitation, existence of a specific fund for sanitation, involvement of utilities in on-site sanitation, and clear cost-recovery policies for on-site sanitation. The index is calculated by adding the values of the six indicators, and the countries with any missing data points are dropped to ensure consistency. Together, these six indicators provide a holistic measure of a country's sanitation agenda.

Most countries have worked to create an accepted definition of sanitation and a hygiene-promotion program to establish a strong sanitation framework. Fifteen countries have also established a national sanitation policy, and seven countries have developed operating cost-recovery policies, known to pay significant dividends. Only eight countries have set up a sanitation fund or a dedicated budget line; in Chad and Ethiopia, these are funded exclusively by donors or a combination of government, sector levies, and donors. Côte d'Ivoire is the only country with a fund financed entirely by sector levies. Burkina Faso, Chad, Kenya, Madagascar, and South Africa stand out for having scored 100 percent on the sanitation index. At the other extreme are countries such as the Democratic Republic of Congo, Lesotho, Nigeria, and Zambia, which are struggling to establish appropriate sanitation systems (figure 4.18).

The widespread use of on-site sanitation facilities brings up issues of construction, management, and maintenance of latrines. The AICD WSS survey provides an overview of the practice with respect to latrine

Figure 4.18 On-Site Sanitation Index



Source: Morella, Foster, and Banerjee 2008.

construction and operation. In most cases, the private sector, households, and/or NGO/CBOs are responsible for the construction of on-site sanitation. The government rarely finances the construction of sanitation facilities. Latrine emptying is predominantly a private sector function, although in a substantial number of cases the municipality and/or local utility takes primary responsibility. Only nine countries reported having formal regulatory oversight of latrines, and the majority of countries report concerns about proximity of unhygienic latrines to drilled holes, with the potential for cross-contamination (table 4.7).

Table 4.7 Management of Latrines

	Latrine construction	*Emptying of latrines*	*Regulation of latrines*	*Level of latrine regulation*	*Problem with groundwater contamination*
Benin	Households	Local private	No	n.a.	Yes
Burkina Faso	Government	Combination	No	n.a.	No
Cape Verde	NGO/CBO	Municipality	No	n.a.	
Chad	NGO/CBO				No
Congo, Dem. Rep.	Private sector	Local private	No	n.a.	No
Côte d'Ivoire	Government, households	Utility, combination	Yes	Utility	
Ethiopia	Private sector	Municipality	No	n.a.	Yes
Ghana					Yes
Kenya	NGO/CBO	Combination	Yes	Central government, utility	
Lesotho	Households	Utility	Yes	Central government	No
Madagascar	Households	Local private, combination	Yes	Municipality	No
Malawi	Government/NGO/ households	Municipality, local private, utility	Yes	Central government , municipality, community	Yes
Mozambique	Households/NGO	Other	No	n.a.	Yes
Namibia	Government/households	Municipality			Yes
Niger	Households	Local private	No	n.a.	Yes
Nigeria		Local private	No	n.a.	Yes
Rwanda	Households	Combination	No	n.a.	No
Senegal	Government/NGO/ households	Local private	Yes	Central government	Yes
South Africa	Government	Municipality	Yes	Municipality	Yes
Sudan	Households	Local private	Yes	Municipality	No
Tanzania	Households	Local private	No	n.a.	Yes
Uganda	Households	Combination	Yes	Municipality	Yes
Zambia	Households	Local private	No	n.a.	Yes

Source: Morella, Foster, and Banerjee 2008.
Note: CBO = community-based organization, n.a. = not applicable, NGO = nongovernmental organization.

Notes

1. Indicators include "consumer associations have membership," "consumer associations have a right to appeal regulatory decision," "consumers have a right to comment on draft regulations," and "consumers have a right to review tariff proposals."
2. There is centralized mode of service delivery in urban centers, but they might be decentralized for small towns and rural areas.
3. In the majority of Sub-Saharan cities, the utility follows one of these two models. Examples exist of kiosks that are both owned and operated by private individuals that use utility water, as in Nairobi and Blantyre (Chirwa and Junge 2007; Oenga and Kuria 2006), or that are owned and operated by community groups, as in Dakar (Brocklehurst and Janssens 2004). These are largely the exceptions, however.
4. In about half of the AICD sample cities, more than one management model was being used, either because one model is in the process of being replaced by another (Lesotho, for example) or because of heterogeneous areas demanding different management approaches.
5. The correlation coefficient between the percentage of rural water points in need of rehabilitation and the rural water index is –0.46.

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CHAPTER 5

Urban Water Provision: The Story of African Utilities

Most countries in Sub-Saharan Africa cannot provide adequate water and other services for their citizens because of low coverage rates. People lack proper services because systems fail, often because not enough was invested to appropriately build and maintain them, and also because of the stress that urbanization places on this existing infrastructure. In the past decade, Africa's population grew at an annual average of 2.5 percent, and the urban and slum population grew at almost double that rate.

A well-performing utility provides service to customers who demand it, at a level that meets their needs and at a price that they are able and willing to pay (Tynan and Kingdom 2002). This chapter closely examines the performance of the individual utilities that form the core of service provision in African countries, drawing on the Africa Infrastructure Country Diagnostic (AICD) Water Supply and Sanitation (WSS) Survey. This chapter introduces a measure called "hidden cost," which comprehensively quantifies underperformance or inefficiencies and defines the economic burden. The relationship between hidden cost and institutional indicators demonstrates the contribution of institutional reforms to utility performance and service delivery.

Access to Utility Water

Utilities in Africa operate in service areas of varying sizes (annex 5.1). They can serve as few as 30,000 people, as in Oshakati, Namibia, or more than 15 million residents, as in the Democratic Republic of Congo, Ghana, and Lagos, Nigeria. The utility in Johannesburg has the highest number of residential water connections—more than 1 million. About 40 percent of the utilities in Africa have fewer than 20,000 residential water connections.

Although water access trends are typically analyzed based on national coverage statistics from household surveys (see chapter 2), it is also interesting to look at the trends that emerge directly from the utility data. These statistics focus solely on access within the utility service area and show how utility water is distributed to different segments of the population. Utility-based coverage statistics tend to differ from the figures found through household surveys. In general, coverage statistics based on household surveys tend to reveal higher access rates because they include informal and illegal connections.

With regard to piped-water service, comparing household survey access rates with utility data is complicated by the fact that some service areas fall outside the national or urban geographic spheres covered by household surveys. For the handful of countries where a reasonable match can be made between geographic areas, the population coverage rates reported by the household surveys are 4 to 16 percent higher than those in the utility coverage data. Moreover, the household surveys show an additional served population that represents 14 to 33 percent of the total population with access (table 5.1).

Utilities in some countries also provide service for "off-grid" consumers in addition to servicing formal clients when their service area is bigger than the network area. These off-grid provisions include off-grid boreholes with networks or water quality checks. In Lusaka and Dar es Salaam, community partnerships manage large off-grid systems.

About 98 percent of the population in the utility service areas in the middle-income countries receives utility water, whether through private piped connections, shared connections with neighbors, or standpost services. In the low-income countries, however, only 69 percent of residents in the service area are accessing utility water, leaving a sizeable minority that must rely on other sources, such as ground or surface water. The low-income, fragile countries have the maximum connection deficit—only 26 percent are covered by piped-water supply and 56 percent by some sort of utility water. These countries also have the highest

Table 5.1 Comparison of Coverage Statistics for Water, Based on Utility Data versus Household Surveys
(percent)

	Coverage rate derived from household surveys (A)	*Coverage rate derived from utility data (B)*	*Difference in coverage rates (A–B)*	*Potential rate of informality (A–B)/(A)*
SONEB (Benin)	29	25	4	14
SDE (Senegal)	77	66	11	15
ONEA (Burkina Faso)	33	25	8	25
JIRAMA (Madagascar)	17	13	4	25
ELECTROGAZ (Rwanda)	16	11	5	30
WASA (Lesotho)	50	34	16	33

Source: Banerjee, Skilling, and others 2008.
Note: JIRAMA = Jiro sy Rano Malagasy, ONEA = Office Nationale des Eaux et d'Assainissement, SDE = Sénégalaise des Eaux, SONEB = Société Nationale des Eaux du Benin, WASA = Water and Sanitation Authority.

proportion of people sharing taps with neighbors, confirming a degree of informality not witnessed in other countries.

The connection deficit varies drastically among income groups. The middle-income countries have piped-water coverage that is multiple times higher than that of other income groups—twice the low-income, three times the resource-rich, and more than three times the low-income, fragile countries. In middle-income countries, the vast majority of people who access utility water do so through private residential connections. In low-income, fragile countries, however, less than half of those who receive utility water do so via private piped connections; the rest share connections with neighbors or rely on communal modalities such as utility standposts. Few people in the middle-income countries informally share connections, but in the low-income countries, this practice is almost as common as the use of formal utility standposts, albeit with substantial regional variations. The East African Community (EAC) and Economic Community of West African States (ECOWAS) regional groups have the highest number of households dependent on a neighbor's connection (table 5.2).

The water-abundant countries have fewer utility-provided connections, and the water-scarce countries not only have more private water connections, but also have better coverage through standposts and from neighbors. Overall, the large utilities are better at providing some sort of

Table 5.2 Overview of Access Patterns in the Utility Service Area
(percent)

	Access by private residential piped-water connection	*Access by standpost*	*Access by sharing of neighbors' private connection*	*Access to utility water by some modality*
Sub-Saharan Africa	44.3	13.0	21.7	64.0
By income				
Low-income	42.2	23.2	22.5	68.6
Low-income, fragile	25.6	2.2	41.0	56.0
Resource-rich	30.3	15.8	7.4	48.8
Middle-income	88.0	9.7	0.3	97.8
By regional economic community				
ECOWAS	38.1	8.8	34.3	68.6
SADC	53.2	11.1	8.1	62.2
CEMAC	24.2	—	—	65.0
EAC	44.7	26.5	40.4	91.6
COMESA	26.0	18.2	23.7	54.7
By water availability[a]				
High water scarcity	56.4	16.3	15.2	68.8
Low water scarcity	32.5	8.9	19.6	57.1
By utility size[b]				
Small	47.0	15.5	20.7	68.6
Large	39.5	13.8	25.6	80.9

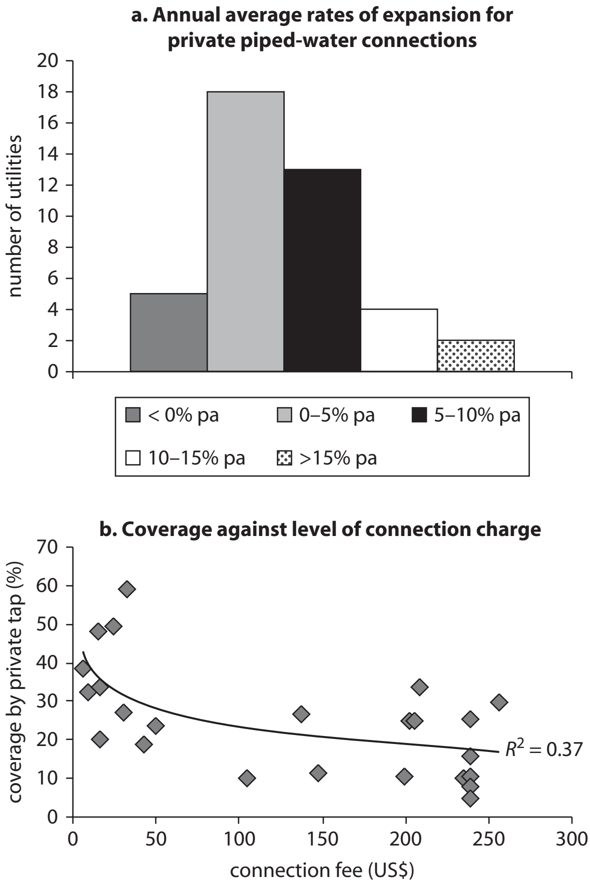
Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: CEMAC = Central African Economic and Monetary Community, COMESA = Common Market for Eastern and Southern Africa, EAC = East African Community, ECOWAS = Economic Community of West African States, SADC = Southern African Development Community. — = not available.
a. Water abundance is defined as renewable internal freshwater resources per capita in excess of 3,000 cubic meters.
b. Large utilities are defined as those serving more than 100,000 connections.

utility water to consumers and manage to serve four out of five residents in their service area.

The Pace of Expansion of Utility Water Coverage

Although utilities might have substantially different access rates for private piped-water connections, a key issue is how quickly the coverage gap is being closed. This can be gauged by looking at the average annual growth rate of connections in recent years. It is currently 5 percent; however, that value differs from country to country (figure 5.1, panel a).

Figure 5.1 Expansion of Utility Water Coverage



Source: Banerjee, Skilling, and others 2008.

Five utilities (in the Democratic Republic of Congo, Kenya, and Nigeria) actually report an absolute decline in the number of customers connected. In contrast, the 10 fastest-expanding utilities (in Benin, Cape Verde, Ethiopia, Malawi, Uganda, and Zambia) are growing at an average annual rate in excess of 7 percent, a pace that would allow the utilities to double the number of connections if it were sustained over a decade. In absolute terms, utilities are growing fastest in the largest cities; Cape Town, Johannesburg, and Lagos each add between 30,000 and 50,000 new connections each year. Given Sub-Saharan Africa's 3.5 percent urban demographic growth rate, however, more than one-third of the utilities in the region are simply not expanding rapidly enough to achieve proper coverage.

One factor that sometimes hampers growth of connections is cost. The average connection fee for piped-water service, among the 26 utilities able to supply this data point, is $265. In the low-income countries, significant negative correlation is seen between the connection charge and the coverage of private taps in the utility area (figure 5.1, panel b).

Water Production Capacity Varies from Country to Country

Utilities can expand coverage only if there is sufficient water production in the service area relative to the resident population. Water production varies widely across the country income groups. Middle-income countries produce around 209 liters per day for each resident in the service area, indicating that enough water would be available to adequately serve the entire population if the distribution networks were expanded.

By contrast, utilities in the low-income countries produce only 130 liters per capita per day, just enough for those customers who are already connected to the system. If these utilities were to connect their entire unserved populations to the network, the availability of water would drop to only 66 liters per capita per day, suggesting that these utilities need to invest in both water production capacity and water distribution networks to reach universal coverage. The low-income, fragile countries experience the lowest production, at only 77 liters per capita per day for their consumers, which falls to only 36 liters per capita per day if the water is spread to all the residents in the service area. Once again, there is a difference in water production between water-scarce and water-abundant countries, with the latter group serving 176 liters per capita per day compared with 125 liters per capita per day for the former (table 5.3). This reflects the higher ability of utilities to produce and serve more water in water-rich countries compared with utilities facing arid environments.

Two-Part Tariff Structures for Piped Water

Many countries in Africa have adopted a two-part tariff structure that incorporates both fixed and water-use charges. Two-part tariffs are designed so that the fixed part helps to cover production and administrative costs (such as billing and meter reading) and the water-use portion covers partial operations and maintenance (O&M) costs. Fixed charges can take two forms—a minimum consumption charge and a monthly

Table 5.3 Water Production per Capita in the Utility Service Area

	Water production per capita in the utility service area (liters per capita per day)	*Water production per capita served by utility in service area (liters per capita per day)*
Sub-Saharan Africa	116.4	162.9
By income		
Low-income	66.0	130.2
Low-income, fragile	35.7	76.5
Resource-rich	140.5	208.8
Middle-income	208.8	233.6
By regional economic community		
ECOWAS	42.3	96.8
SADC	132.5	184.4
CEMAC	107.4	229.5
EAC	71.3	118.9
COMESA	142.4	183.3
By water availability[a]		
High water scarcity	81.5	125.4
Low water scarcity	115.3	175.9
By utility size[b]		
Small	102.5	160.1
Large	106.2	189.4

Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: CEMAC = Central African Economic and Monetary Community, COMESA = Common Market for Eastern and Southern Africa, EAC = East African Community, ECOWAS = Economic Community of West African States, SADC = Southern African Development Community.
a. Water abundance is defined as renewable internal freshwater resources per capita in excess of 3,000 cubic meters.
b. Large utilities are defined as those serving more than 100,000 connections.

fixed fee—and they also allow for the recovery of investment costs without distorting price signals. The volumetric tariff, which is based on water use, usually takes the form of increasing block tariffs (IBTs). The IBT has long been a common structure in developing countries, where unit prices in the lower brackets of consumption (in cubic meters per month) tend to be smaller than the prices in higher brackets.

Fourteen utilities have designed a two-part tariff, including 13 that enforce a "fixed charge plus IBT." Only the National Water and Sewerage Company (NWSC) in Uganda uses a "fixed charge plus linear tariff" structure. In addition to these utilities, seven have a "minimum consumption plus IBT" structure. The remaining 24 utilities use an interesting range of structures: 19 impose an IBT structure and three enforce a linear structure, which means that households pay the same price per unit of consumption. The remaining two utilities have different tariff structures: the Central Region Water Board (CRWB) in Malawi charges a flat fee or fixed charge for the first 32 units of consumption, and the Kisumu Water and Sewerage Company (KIWASCO) in Kenya has a U-shaped structure, in which tariffs decline after the first block and rise again after the third.

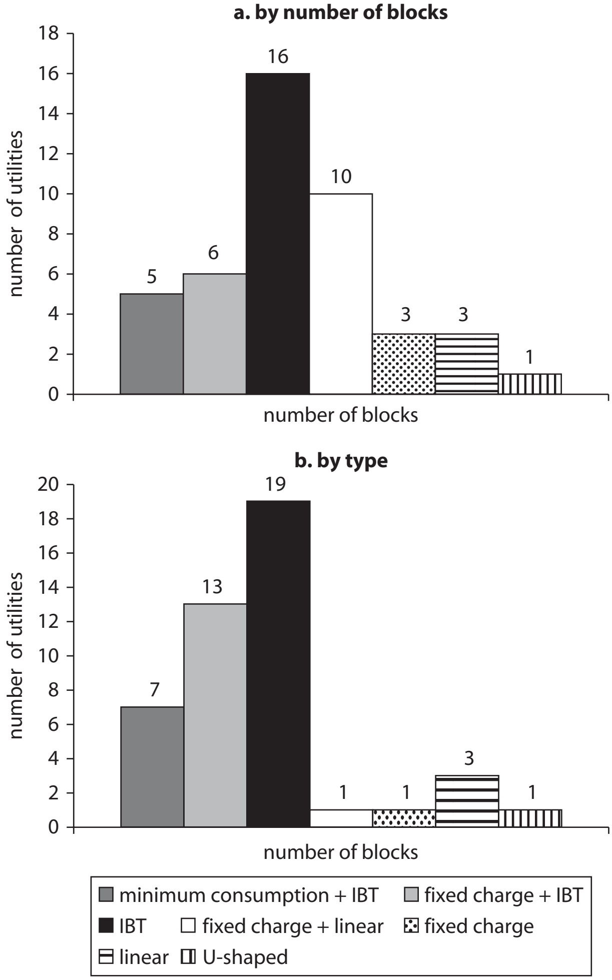
The block structure can add to the complexity of tariffs. It can range from one (linear) to seven, with the average being just above three blocks. The most common is a three-tiered block structure, used by 16 utilities. Ten water utilities in Africa use a four-block structure. At the high end are utilities such as Drakenstein, in South Africa, which has seven blocks. ELECTROGAZ in Rwanda, as well as in Johannesburg and Tygerberg in South Africa, has a six-block water tariff structure (figure 5.2).

Twenty-nine percent of the water utilities in Africa use a monthly fixed fee, which is usually based on pipe size. The lowest fees are for the typical residential pipe size of 15 to 20 millimeters. Fixed fees can also be determined based on consumption. This charge is meant to cover the fixed part of the O&M cost. Fifteen percent of the utilities levy this charge, and, in all cases, the fee includes consumption of, at most, 10 cubic meters (m^3).

The size of the first block varies. In most countries, the first block is usually below 10 m^3; only 20 percent have a first block higher than 10 m^3. Only 36 percent have a first block of less than 6 m^3 per month, which is considered almost subsistence consumption. At the other extreme are utilities with a large consumption spread in the first block. The size of the last block also reveals interesting patterns. The last block can start from 5 m^3, as it does in the Société Nationale des Eaux du Benin (SONEB) in Benin or the Dar es Salaam Water and Sewerage Company (DAWASCO) in Tanzania. It can also start at 1,000 m^3, as it does in Drakenstein, South Africa, or Katsina, Nigeria. In 64 percent of the utilities, the starting point of the last block is less than or equal to 50 m^3.

Developing countries have often used the price of a first block as a social tariff, or lifeline, so that the poor can get at least a minimum quantity of safe water at a subsidized price. In numerous countries with a minimum consumption charge, such as Côte d'Ivoire, Malawi (Blantyre Water Board), and Mozambique, the block structure begins from block two, and the price of block one is therefore zero. The price of the last block is often set with cost recovery and water conservation in mind. In about one-third of utilities, the tariffs are set higher than $0.8/$m^3$. The fixed charges, which are expected to be paid every month, irrespective of consumption, are usually less than $4. Of the 44 percent of the utilities

Figure 5.2 Variations in Tariff Structures



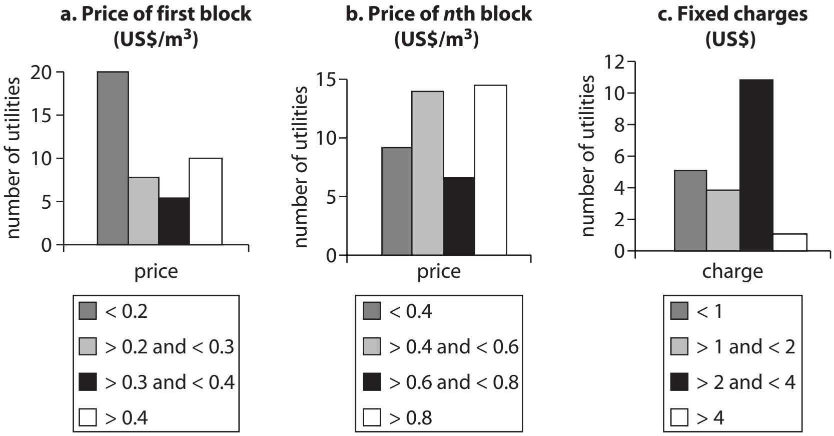
Source: Banerjee, Foster, and others 2008.
Note: IBT = increasing block tariff.

that enforce a fixed-fee or minimum-consumption charge, about half are set between $2 and $4 (figure 5.3).

Sewerage Charges Linked to Water Bills

Sewerage payment structures vary and can be calculated either as a surcharge percentage on the water bill or by using an independent block or fixed tariff structure. In more than half of utilities, the sanitation charge

Figure 5.3 Utility Prices and Charges



Source: Banerjee, Foster, and others 2008.

is levied as part of the water bill. That charge ranges from 30 percent in Zambia to 85 percent in Lesotho, with an average of 53 percent. Six African utilities use the block-tariff structure for sewerage, with the blocks varying between one and five. Walvis Bay in Namibia stands out because of its use of a decreasing block tariff, in which prices decline with rising consumption. KIWASCO in Kenya is the only utility that reports levying a separate connection fee of $90 specifically for sewer service (table 5.4).

Burkina Faso has taken an innovative approach by levying a sanitation tax as a surcharge on the water bill, which is then used to subsidize access to on-site sanitation facilities in Ouagadougou (box 5.1).

Modest Water Consumption by End Users

Demand management can be reliably assessed only for those water utilities with good metering coverage, as they would therefore be expected to have relatively meaningful estimates of water consumption and nonrevenue water (NRW). There are four categories of sample utilities. The first category comprises 15 utilities that do not report meter coverage. The second category comprises 26 utilities (mainly in Ethiopia, Nigeria, and Zambia) with low meter coverage (less than 50 percent of residential connections), averaging 19 percent for the group. The third category comprises 11 utilities (mainly in South Africa and Tanzania) with moderate

Table 5.4 Structure and Level of Wastewater Tariffs

Utility	*Country*	*Type of tariff*	*Connection fee (US$)*	*Fixed charge (US$)*	*Number of blocks*	*Size of first block*	*Size of nth block*	*Price of first block (US$)*	*Price of nth block*
ONEA	Burkina Faso	Flat	0	0	1	0+		0.04	0.04
AWSA	Ethiopia	Flat	0	0	1	7.1+		0.07	0.07
NWASCO	Kenya	IBT	0	0	4	0–10	60+	0.13	0.21
KIWASCO	Kenya	IBT	90	0	5	0–10	60+	0.21	0.42
Walvis Bay	Namibia	DBT	0	2.69	4	0–15	85+	0.34	0.02
ONAS	Senegal	IBT	0	0	3	0–20	40+	0.02	0.13

Source: Banerjee, Foster, and others 2008.
Note: AWSA = Addis Ababa Water Services Authority, DBT = direct block tariff, IBT = increasing block tariff, KIWASCO = Kisumu Water and Sewerage Company, NWASCO = Nairobi Water and Sanitation Company, ONAS = Office National de l'Assainissement du Sénégal, ONEA = Office Nationale des Eaux et d'Assainissement.

Box 5.1

Burkina Faso's Sanitation Tax

The on-site sanitation problems in Ouagadougou are specifically addressed in the Sanitation Strategic Plan's implementation by the national public utility in charge of water supply and sanitation.

A sanitation marketing approach has enhanced construction services offered to households by small providers and stimulated household demand for improved sanitation facilities. Approximately 700 masons and social workers have been trained since the beginning of the program.

Burkina Faso's national utility offers to provide part of the material for free to households—equivalent to about a 30 percent subsidy with the rest financed by the households. The subsidy is financed by the utility through a small sanitation tax on the water bill.

This example shows that on-site sanitation corresponds to a strong demand from urban dwellers, with more than 60,000 pieces of sanitation equipment subsidized so far—latrines as well as gray-water-removal systems. It also demonstrates the importance of a local financing mechanism. Donors have contributed to the mechanism, but only modestly. Most of the funds come from the tax on the water bill.

Source: Reproduced from Water and Sanitation Program 2008.

meter coverage (50 to 70 percent of residential connections), averaging 58 percent for the group. The fourth and final category comprises an additional 32 utilities (mainly in Burkina Faso, Cape Verde, Côte d'Ivoire, Ethiopia, Mozambique, Lesotho, Namibia, Niger, Rwanda, Senegal, and Uganda)[1] with high meter coverage (greater than 70 percent of residential connections), averaging 95 percent for the group. This section focuses only on the last three groups.

Although water consumption measurements are not necessarily very accurate, evidence from the African utilities reviewed suggests that end-user water consumption is quite modest. The overall average consumption is 80 liters per capita per day, ranging from 189 liters per capita per day in the middle-income countries to 37 liters per capita per day in the low-income, fragile countries. Among the regional economic communities, consumption is particularly low in the EAC (at 42 liters per capita per day) compared with the Southern African Development Community (SADC) and ECOWAS (at 77 to 86 liters per capita per day). In some countries, the actual consumption per capita might be lower because of widespread reselling, particularly in periurban areas with intermittent supply.

Pricing is the main way that utilities can manage demand and requires a proper metering system to support volumetric charging and the application of metered tariffs to provide an adequate cost signal to customers. The overall reported rate of water metering in sample African countries whose utilities report medium to large metering ratios stands at 85 percent. Interestingly, the low-income, fragile countries report a 100 percent metering ratio compared with only 68 percent in the middle-income countries, suggesting that rebuilding after a conflict has involved a more formal release of connections with individual household meters. The average revenue per cubic meter of water billed ranges from around $0.40 in low-income countries to more than $1.10 in middle-income countries. The tariffs in water-abundant countries are two-thirds of those found in water-scarce countries. Within the regional economic communities, the ECOWAS has the highest average revenue, at $0.6 per cubic meter, compared with only $0.3 to $0.50 elsewhere in Africa. Many of the francophone countries of West Africa are in the CFA franc region, where prices tend to be systematically higher (table 5.5). Although this revenue is typically not sufficient to cover full capital costs, these costs are nonetheless quite high compared with those in other developing regions. Overall, evidence shows that significant price signals are getting through to a substantial share of the customer base.

A fairly strong negative correlation is found between metering levels and average residential water consumption in utilities with a metering level of about 50 percent of residential connections. Essentially, these utilities fall into two groups: Those with metering ratios of 50 to 70 percent tend to have average water consumption of about 188 liters per capita per day, and those with metering ratios of 90 to 100 percent tend to have average water consumption of about 50 liters per capita per day.

Surprisingly, consumption and price are positively correlated as tariff rates are near cost recovery at high consumption levels. Utility clients pay a substantially higher price per unit of consumption, particularly high-volume nonresidential consumers. Thus, no strong evidence is evident of wasteful overuse of water in Africa, and the relatively modest levels of consumption would not be further reduced by more aggressive use of demand management tools.

Table 5.5 Indicators of Demand Management Calculated across Utilities with Metering Ratios above 50 Percent

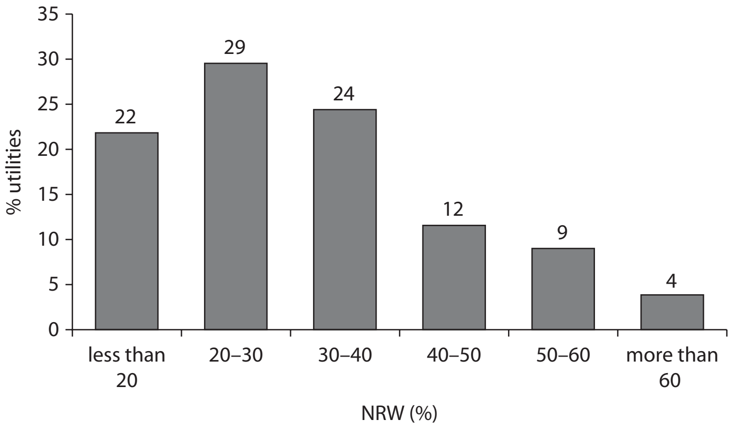
	Water consumption per capita served (liters per capita per day)	*Metering ratio (%)*	*Revenue per cubic meter of water consumed (US$/m³)*	*Nonrevenue water (%)*
Sub-Saharan Africa	79.5	85.4	0.5	30.1
By income				
Low-income	64.1	86.7	0.4	31.3
Low-income, fragile	36.9	100.0	0.6	24.8
Resource-rich	—	91.3	0.7	34.3
Middle-income	188.8	68.0	1.1	21.7
By regional economic community				
ECOWAS	77.0	101.4	0.6	22.1
SADC	85.8	82.1	0.5	30.0
CEMAC	—	—	—	—
EAC	41.6	78.9	0.3	28.8
COMESA	60.0	90.1	0.5	35.8
By water availability[a]				
High water scarcity	102.2	81.0	0.6	30.2
Low water scarcity	68.6	87.2	0.4	30.0
By utility size[b]				
Small	64.6	85.4	0.4	30.8
Large	133.6	85.5	0.8	27.0

Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: CEMAC = Central African Economic and Monetary Community, COMESA = Common Market for Eastern and Southern Africa, EAC = East African Community, ECOWAS = Economic Community of West African States, SADC = Southern African Development Community. — = not available.
a. Water abundance is defined as renewable internal freshwater resources per capita in excess of 3,000 cubic meters.
b. Large utilities are defined as those serving more than 100,000 connections.

Substantial Water Losses in Distribution System

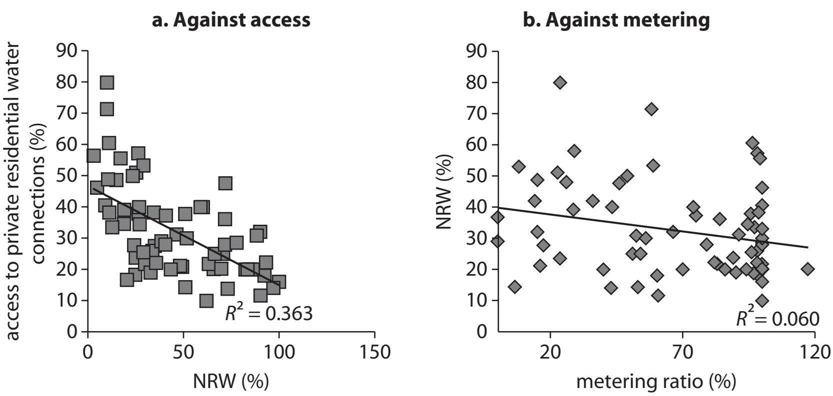
Although end-user water use is modest, a substantial volume of water is lost during the distribution process. The average level of NRW in the sample is close to 30 percent, well above good practice levels (below 23 percent) for developing countries (Tynan and Kingdom 2002) (figure 5.4). The middle-income countries have the lowest nonrevenue losses, followed by the low-income, fragile countries. This good performance can be attributed to different factors—in the middle-income countries, it is due to superior technical and management performance, and for the low-income, fragile countries, it is due to relatively new systems constructed as part of the

Figure 5.4 Frequency Distribution of Nonrevenue Water



Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: NRW = nonrevenue water.

Figure 5.5 Cross-Plots between NRW and Other Variables



Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: NRW = nonrevenue water.

rebuilding effort. Within the regional economic communities, the range is capped between 22 and 36 percent.

Nonrevenue water measures include both technical and nontechnical losses. Experience in Asia suggests that NRW tends to be inversely proportional to access rates, because lower rates of access invite higher rates of informal and clandestine use, by both households and small-scale providers (McIntosh 2003). This relationship clearly holds for the African utilities, where there is a negative correlation of close to 33 percent between access rates and NRW (figure 5.5).

In principle, higher metering rates should help to reduce NRW by enabling utilities to pinpoint the location of losses on the network, but no evidence of such a relationship was found in the sample of African utilities. In fact, among utilities claiming 100 percent meter coverage, the level of NRW ranges between 20 and 47 percent. Moreover, utilities reporting moderate levels of meter coverage have an almost identical range for NRW. This suggests that utilities are not using metering effectively to control NRW.

Difference in Quality of Service among Country Groups

It is difficult to properly evaluate some of the services provided by African utilities. The only way to evaluate water quality is to look at the percentage of samples, taken from a water treatment plant, that pass the chlorine test. This indicates the effectiveness of the treatment process but says nothing about the quality of water received at the tap. The scores show a substantial difference in performance between utilities in middle-income countries, which score close to 100 percent on this variable, and those in low-income, fragile countries, which score only 75 percent. Among the regional economic communities, the Central African Economic and Monetary Community (CEMAC) is at the lower end of this indicator, compared to the EAC and SADC, which report a more than 90 percent success rate.

On average, utilities for the sample group provide just under 20 hours of continuous service per day. However, low-income, fragile, and resource-rich countries provide, on average, five to six hours less service per day than middle-income countries. The countries with high water scarcity offer longer hours of service compared with water-abundant countries.

Finally, the "complaints lodged by customers" indicator provides somewhat nebulous information, because low levels of complaints could indicate either good service or a poor system for recording complaints. Overall, the indicators show much higher levels of complaints in low-income countries, where more than 200 complaints were lodged in the preceding year. The middle-income countries, on the other hand, recorded only 26 complaints per 1,000 connections. Among the regional economic communities, the number ranges from 50 to 183 complaints per 1,000 connections. The rate also varies widely among high- and low-water-scarcity countries, where the latter reported more than twice the number of complaints per 1,000 connections (table 5.6).

Table 5.6 Indicators of Service Quality

	Percentage of samples passing chlorine test (%)	*Continuous water service (hours per day)*	*Water and wastewater consumer complaints per connection (number per 1,000 residential connections)*
Sub-Saharan Africa	87.9	19.6	78.4
By income			
Low-income	92.8	19.0	211.0
Low-income, fragile	75.3	18.2	—
Resource-rich	78.1	18.4	41.9
Middle-income	97.2	24.0	25.6
By regional economic community			
ECOWAS	88.4	22.8	183.0
SADC	90.1	17.2	50.0
CEMAC	68.0	19.5	—
EAC	94.8	16.0	119.7
COMESA	85.5	15.5	69.5
By water availability[a]			
High water scarcity	86.5	22.2	27.0
Low water scarcity	88.9	17.8	60.7
By utility size[b]			
Small	89.4	17.6	94.4
Large	80.8	19.6	77.5

Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: CEMAC = Central African Economic and Monetary Community, COMESA = Common Market for Eastern and Southern Africa, EAC = East African Community, ECOWAS = Economic Community of West African States, SADC = Southern African Development Community. — = not available.
a. Water abundance is defined as renewable internal freshwater resources per capita in excess of 3,000 cubic meters.
b. Large utilities are defined as those serving more than 100,000 connections.

Technical Efficiency and Effective Management of Operations

Labor productivity, pipe water breaks, and operating cost are the three indicators used to evaluate the technical operations of the utilities (table 5.7). State-owned enterprises (SOEs) can be social buffers to (very inefficiently) transfer rents or resources to the population. Labor productivity rates can be hard to compare because of differing reliance on contractors. Nevertheless, a frequently used international benchmark for labor productivity is 2 employees per 1,000 connections, which has been modified to 5 employees per 1,000 connections for developing countries (Tynan and Kingdom 2002). Overall, African utilities in the sample report an average

Table 5.7 Indicators of Operational Efficiency

	Employees per 1,000 water connections (number/1,000 connections)	*Water pipe breaks per year per km of water network (number per year/km)*	*Operating cost per cubic meter of water consumed (US$/m³)*
Sub-Saharan Africa	5.6	8.0	1.2
By income			
Low-income	9.1	6.6	0.7
Low-income, fragile	11.1	7.9	0.7
Resource-rich	10.0	14.1	0.3
Middle-income	2.9	7.2	1.5
By regional economic community			
ECOWAS	5.2	3.6	0.7
SADC	5.0	7.3	1.3
CEMAC	6.3	58.0	0.5
EAC	11.0	5.5	0.5
COMESA	14.7	9.7	0.5
By water availability[a]			
High water scarcity	4.3	5.7	1.3
Low water scarcity	7.1	9.3	0.5
By utility size[b]			
Small	14.0	7.5	0.6
Large	6.3	13.7	0.7

Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: CEMAC = Central African Economic and Monetary Community, COMESA = Common Market for Eastern and Southern Africa, EAC = East African Community, ECOWAS = Economic Community of West African States, SADC = Southern African Development Community.
a. Water abundance is defined as renewable internal freshwater resources per capita in excess of 3,000 cubic meters.
b. Large utilities are defined as those serving more than 100,000 connections.

of about 5.6 employees per 1,000 connections, which is right around the developing country benchmark cited above. The variation among the income groups is wide, ranging from 11 employees per 1,000 connections in the low-income, fragile countries to just about 3 employees per 1,000 connections in the middle-income countries.

A commonly used international benchmark for average operating costs of water utilities is around $0.40 per cubic meter (Global Water Intelligence 2004). The costs reported by the African utilities are substantially higher, ranging from $0.30 per cubic meter in resource-rich countries to $1.50 per cubic meter in middle-income countries. The latter result is due to the high cost of water in Namibia and South Africa. Even within the regional economic communities, the average operating cost ranges from $1.30 per cubic meter in the SADC (which includes Namibia and South Africa) compared with $0.50 to $0.70 per cubic meter in other regional blocks. As operation costs depend largely on water availability, the difference in costs between water-scarce countries and water-abundant countries is stark: The former have average operating costs almost three times that of the latter.

The rate of bursts per kilometer of water main provides some indication of the condition of the underlying infrastructure, and hence the extent to which it is being adequately operated and maintained. The resource-rich countries report the highest rate of bursts, at 14 per year per kilometer, compared with only 6.6 in low-income countries. The utilities in the CEMAC regional community report a significantly higher number of bursts compared with the other regional blocks.[2]

Three indicators are used to evaluate the primary components of operating costs: labor costs, energy costs, and service contracts (table 5.8).

Table 5.8 Utility Cost Structures
(percent)

	Share of labor costs in operating expenses	*Share of energy costs in operating expenses*	*Share of service contracts in operating expenses*
Sub-Saharan Africa	21.4	12.0	11.3
By income			
Low-income	28.3	14.9	26.3
Low-income, fragile	24.5	11.8	4.0
Resource-rich	33.9	29.7	12.5
Middle-income	15.9	1.6	6.6
By regional economic community			
CEMAC	34.5	—	—
COMESA	34.9	20.8	4.4
EAC	32.9	14.0	10.5
ECOWAS	22.1	14.8	23.6
SADC	19.1	7.5	6.8
By water availability[a]			
High water scarcity	18.7	10.8	8.2
Low water scarcity	25.5	10.0	6.8
By utility size[b]			
Small	33.4	19.7	15.1
Large	29.1	16.2	20.6

Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: CEMAC = Central African Economic and Monetary Community, COMESA = Common Market for Eastern and Southern Africa, EAC = East African Community, ECOWAS = Economic Community of West African States, SADC = Southern African Development Community. — = not available.
a. Water abundance is defined as renewable internal freshwater resources per capita in excess of 3,000 cubic meters.
b. Large utilities are defined as those serving more than 100,000 connections.

Overall, African utilities allocate just more than 21 percent of their operating expenses to labor and just about 12 percent to energy. The structure of operating expenses differs substantially across the different groups. The share of labor and energy is lowest in the middle-income countries. In particular, utilities in the low-income and resource-rich countries allocate almost twice as high a share of their operating expenses to labor and multiple times to energy compared to the middle-income countries. The share of service contracts is lowest in the low-income, fragile, and middle-income countries. One simple explanation for this is that in both Namibia and South Africa, water-distribution utilities are not involved in production, but instead purchase their water from bulk suppliers. So, although they spend a significant amount of operating expenses on bulk water purchase, their direct labor and energy costs are correspondingly reduced. Utilities in the ECOWAS allocate more than 23 percent of their operating costs on service contracts—more than utilities in the other regions. This may also explain why they have a correspondingly lower labor share than those in other regional blocks.

Financial Efficiency and the Alignment of Operations and Finances

Five indicators are used to evaluate the financial performance of the utilities: collection efficiency, operating cost ratio, debt-service ratio, value of gross fixed assets per connection, and average operating revenue (table 5.9). A well-performing utility is one that maintains its assets and uses them efficiently. This minimizes the need for new investments and reduces capital costs.

The average operating ratio of African utilities shows that operating costs are barely covered and fall short of what is needed to recoup capital expenditures. This ratio is below the benchmark level of 1.3 for developing countries identified by Tynan and Kingdom (2002). Paradoxically, the operating ratio reported for middle-income countries is below unity exhibited by low-income and resource-rich countries. One reason for this may be the exceptionally high operating costs (in excess of $1 per cubic meter) that are reported by utilities in middle-income countries. All the regional economic communities, except the SADC, which includes the middle-income countries of Namibia and South Africa, meet operational cost coverage. The economies of scale of large utilities are evident in the very high operating cost coverage at 3.4, which is three times that of the small utilities.

Table 5.9 Utility Financial Ratios

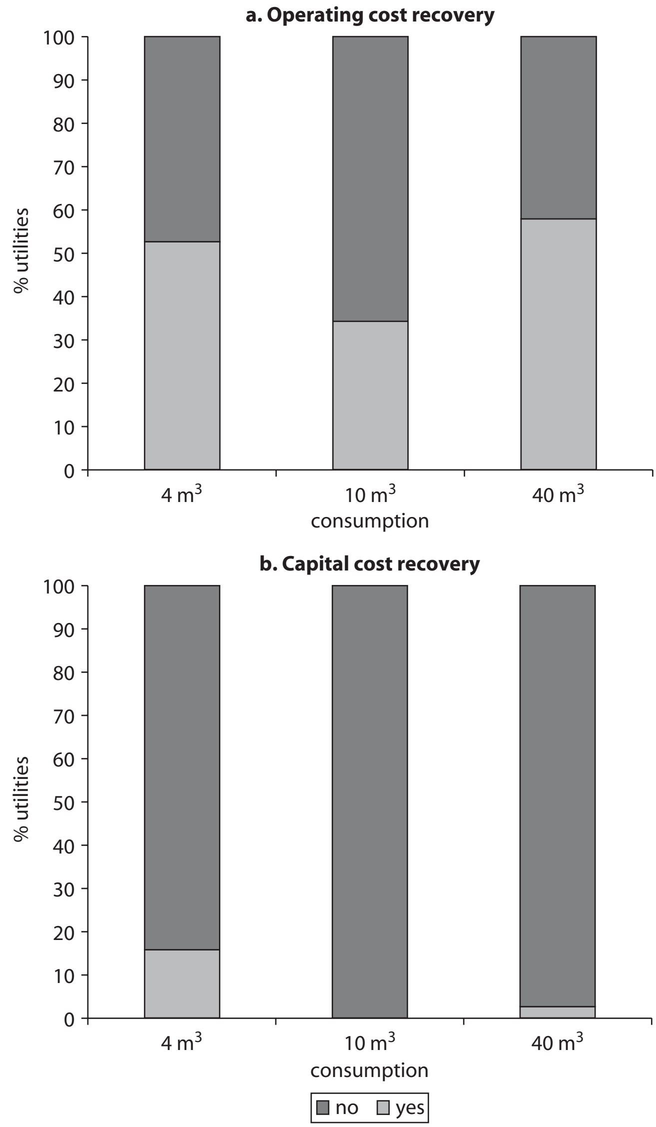
	Collection efficiency (%)	*Operating cost coverage (ratio)*	*Debt-service ratio*	*Value of gross fixed assets per connection (US$)*	*Average operating revenue (US$/m³)*
Sub-Saharan Africa	92.2	0.9	11.1	490.2	0.9
By income					
Low-income	95.7	1.0	11.4	999.4	0.5
Low-income, fragile	96.9	0.8	20.4	558.7	0.5
Resource-rich	72.4	1.0	157.4	752.4	0.3
Middle-income	99.8	0.8	3.6	358.3	1.2
By regional economic community					
ECOWAS	105.4	1.0	16.0	934.1	0.8
SADC	86.8	0.8	4.7	385.7	1.0
CEMAC	91.0	1.1	157.4	1,112.1	0.4
EAC	97.5	1.0	21.8	353.8	0.3
COMESA	76.6	1.0	14.3	388.6	0.4
By water availability[a]					
High water scarcity	83.9	0.9	7.4	372.9	1.1
Low water scarcity	76.3	0.9	8.2	426.5	0.5
By utility size[b]					
Small	87.1	1.1	36.7	930.1	0.5
Large	91.4	3.4	15.3	1491.0	0.6

Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: CEMAC = Central African Economic and Monetary Community, COMESA = Common Market for Eastern and Southern Africa, EAC = East African Community, ECOWAS = Economic Community of West African States, SADC = Southern African Development Community.
a. Water abundance is defined as renewable internal freshwater resources per capita in excess of 3,000 cubic meters.
b. Large utilities are defined as those serving more than 100,000 connections.

More utilities are able to cover operating costs at extremely low or extremely high levels of consumption than at average levels. More than 50 percent of the utilities recoup the operating cost at consumption levels of 4 m^3 or 40 m^3. Capital cost recovery,[3] however, is close to impossible in the African context. The highest number of utilities accomplish capital cost recovery at a subsistence consumption level of 4 m^3, which has significant implications for equity. The degree of cost recovery is the lowest at an average consumption level of 10 m^3. Households at the low and high ends of consumption are contributing more to cost recovery than the average consumer (figure 5.6).

The average revenue per unit of water sold is $0.9, primarily because of relatively higher tariffs in the middle-income countries. The revenue in

Figure 5.6 Effective Tariffs at Various Consumption Levels



Source: Banerjee, Skilling, and others 2008.

the middle-income countries is three times that of the low-income and low-income, fragile countries, and four times that of the resource-rich countries. Among the regional economic communities, the SADC reports an average revenue of about $1, which is significantly higher than anywhere else on the continent. Water is priced higher in water-scarce countries than in water-abundant countries, suggesting that price signals are aligned with scarcity.

Because of inconsistent accounting standards, data on asset values can paint only a broad picture. Replacement cost accounting is not widely practiced, so reported values likely reflect historic costs of investment. The average value of gross fixed assets per water connection is $490. The low-income countries report an average gross fixed value that is three times higher than the value in middle-income countries, primarily because the latter group has a significantly higher number of connections.

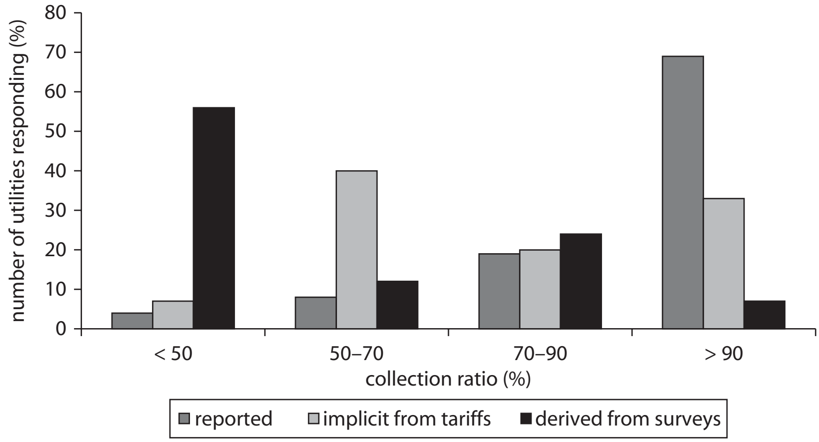
We have few solid data points on utility debt. It appears that most utilities do not list long-term debt on their balance sheets. Most utilities are not creditworthy and do not carry their own debt. The central government borrows the money, and the utilities are simply the recipients of the capital grants. As a result, the derived debt-service ratios indicate that levels of debt are so minimal that utilities can easily cover them through their operating revenue.

The African utilities surveyed report collection ratios of more than 92 percent, on average. Resource-rich countries have the lowest levels of collection. In the regional economic communities, the collection ratio ranges from 76 percent in the Common Market for Eastern and Southern Africa (COMESA) to 105 percent in the ECOWAS, which may simply reflect a drive to collect arrears from earlier periods.

Government entities are some of the most important consumers for water utilities. For instance, 42 percent of the total billings for the Régie de Production et de Distribution d'Eau (REGIDESO), in the Democratic Republic of Congo, are for government entities. Government agencies are responsible for 20 to 30 percent of total billings for the Office Nationale des Eaux et d'Assainissement (ONEA), Société de Distribution d'Eau de Côte d'Ivoire (SODECI), Lilongwe Water Board, and Nikana Water and Sewerage Company (NWSC). These agencies, however, can be the worst offenders in paying bills as well. Though no direct data are available on government arrears, it is worth noting that the highest collection period—in REGIDESO—lasts about 2,000 days.

The collection-efficiency ratios reported by the utilities are very high, relative to their experience. We, therefore, carried out a number of cross-checks on the data. First, using household survey data it is possible to calculate the percentage of households with water service that do not report paying a utility bill. This provides a first-order estimate of the extent of undercollection from the residential sector, though the numbers will make the phenomenon seem greater than it really is

Figure 5.7 Reported versus Implicit Collection Ratios



Sources: AICD WSS Database; Banerjee, Skilling, and others 2008.

because they do not distinguish between formal connections that do not pay for service and informal connections that are not billed. Second, it is possible to compare the average revenue that the utility collects per cubic meter with the average tariff charged based on the tariff schedule. This shows which revenue falls short of the tariffs that have been charged. Figure 5.7 compares the distribution for these three measures of collection efficiency. Whereas the vast majority of utilities report collection ratios above 90 percent, almost half of the utilities present implicit collection rates below 70 percent, and more than half of the utilities collect tariff revenue from fewer than 50 percent of their customers, according to household surveys.

The High Cost of Inefficiencies in Operations and Pricing

The inefficiency of the service providers and considerable mispricing in the water sector adversely affects optimal resource allocation and the financial sustainability of the sector. One way of presenting a global measure of utility inefficiency is to quantify the dollar cost of observable operational inefficiencies. This concept, the "hidden cost," is a measure of wastefulness and ineptitude. Hidden cost indicates the cost of inefficient production and partially quantifies opaque transfers from producers to consumers (Mackenzie and Stella 1996). Hidden cost also provides distorted incentives to the utilities and consumers, leading to overconsumption and wasting of scarce resources (Briceño-Garmendia, Smits, and Foster 2008). Even without explicitly revealing itself in the budget, it affects the macroeconomic stability and underreports the size of the public sector.

The hidden cost estimates the financial losses associated with four components—undercollected revenue, distribution losses, underpricing, and overstaffing—and expresses these losses as a percentage of the utilities' overall turnover. These inefficiencies can be quantified by comparing the revenue available to the utility with the revenue available to an ideal utility that is able to charge cost-recovery tariffs, collect all of its revenue, minimize distribution losses, and employ an ideal number of workers per connection (box 5.2).

Box 5.2

Methodology for Estimation of Hidden Cost

The current profile of the utilities on these four indicators is measured against the ideal scenario, which includes the following:

Nonrevenue water. An internationally accepted benchmark of 20 percent NRW is employed.

Cost-recovery tariff. A capital premium of $0.40/m^3 (Global Water Intelligence 2004) is added to the O&M cost (available from the AICD WSS Database) to arrive at the cost-recovery tariff.

The collection ratio. This is instituted as 100 percent.

Overstaffing. Two hundred connections per employee is an accepted benchmark. This estimate is taken from two sources:

(a) The estimate—averaging more than 302 utilities from developing countries, excluding Sub-Saharan Africa—taken from the database amassed by Gassner, Popov, and Pushak (2008, http://www.ppiaf.org/documents/trends_and_policy/PSP_water_electricity.pdf) is 230 connections per employee.

(b) An analysis of data from 246 water utilities (including 123 utilities from 44 developing countries) proposed a benchmarking target of 5 or fewer staff per 1,000 connections for developing-country water utilities (that is, 200 connections per employee). This target was based on the levels of productivity actually being achieved by the top quartile of developing-country utilities within the database. By contrast, many developing-country utilities reported more than 20 staff per 1,000 connections (Tynan and Kingdom 2002).

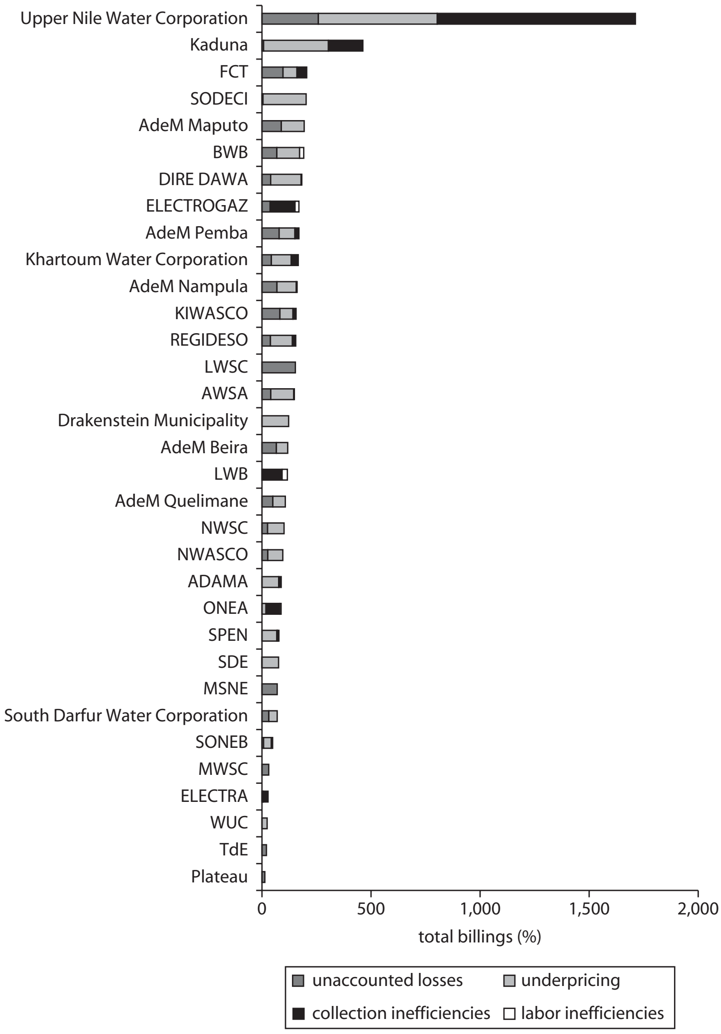
Source: Briceño-Garmendia, Smits, and Foster 2008.

The hidden costs constitute 145 percent of the total billings in water utilities in Africa. The utilities that report the lowest hidden cost (as a share of total billings) are Plateau in Nigeria and Togolaise des Eaux in Togo. The highest is Upper Nile Water Corporation in Sudan, which loses 1,700 percent of its revenue to operational and pricing inefficiencies (figure 5.8).

The hidden costs, comprising underpricing and operational inefficiencies, amount to 0.4 percent of gross domestic product (GDP) (table 5.10). On average, the contribution of the two components is similar. Underpricing costs Africa 0.2 percent of GDP or $1.5 billion annually. In other words, revising tariffs to make them equal to historic recovery unit average costs, which would enable all African water utilities to recover capital costs as well, would increase the potential for efficiency gains to $1.5 billion a year. In GDP terms, the countries that are most affected by the pricing inefficiency are low-income fragile states, where it accounts for 0.9 percent of their GDP (or $0.4 billion per year). On the other hand, under-recovery of tariffs weighs the least on GDP for utilities in resource-rich countries (0.1 percent of GDP or $0.2 billion per year).

Three types of operational inefficiencies account for 0.2 percent of GDP on average, or $1.3 billion per year: distributional losses, undercollection of bills, and overstaffing or labor inefficiencies. First, utilities incur substantial losses on their water distribution networks. Poor network maintenance (which leads to physical leakage) and poor network management (which leads to clandestine connections and various forms of theft) each partially explains these distribution losses. Distribution losses amount to $0.4 billion a year (0.07 percent of GDP). African water utilities typically lose 35 percent of their water in distribution losses, nearly twice the 20 percent benchmark. Second, water utilities face serious problems in collecting their bills: Undercollection of bills costs almost $0.5 billion a year (0.07 percent of GDP). African water utilities manage to collect about 90 percent of the bills owed to them by their customers, short of a best practice benchmark of close to 100 percent. Third, SOEs may retain more employees than are strictly necessary to discharge their functions, often because of political pressure to provide jobs for members of certain interest groups. Overstaffing is estimated to cost utilities at least $0.4 billion a year, or 0.06 percent of GDP. African water utilities have overstaffing ratios of 24 percent over developing-country benchmarks, and a typical utility has approximately 5.6 employees per

Figure 5.8 Utility Inefficiencies as Percentage of Total Utility Revenue



Source: AICD WSS Database; Banerjee, Skilling, and others 2008.
Note: ADAMA = Nazareth Water Company; AWSA = Addis Ababa Water Services Authority; BWB = Blantyre Water Board; FCT = Federal Capital Territory Water Board; KIWASCO = Kisumu Water and Sewerage Company; LWB = Lilongwe Water Board; LWSC = Lusaka Water and Sewerage Company; MSNE = Mauritania Société Nationale d'Eau et d'Electricité; MWSC = Mombasa Water and Sewerage Company; NWASCO = Nairobi Water and Sanitation Company; NWSC = National Water and Sewerage Company, Uganda; ONEA = Office Nationale des Eaux et d'Assainissement; REGIDESO = Régie de Production et de Distribution d'Eau; SDE = Sénégalaise des Eaux; SODECI = Société de Distribution d'Eau de Côte d'Ivoire; SONEB = Société Nationale des Eaux du Benin; SPEN = Société de Patrimoine des Eaux du Niger; TdE = Togolaise des Eaux; WUC = Water Utilities Corporation, Botswana.

Table 5.10 Hidden Cost of Inefficiencies

	GDP share (%)						*US$ million per year*					
	Operational inefficiencies						*Operational inefficiencies*					
	Labor inefficiencies	*Losses*	*Undercollection*	*Total operational inefficiencies*	*Tariff cost recovery*	*Total*	*Labor inefficiencies*	*Losses*	*Undercollection*	*Total operational inefficiencies*	*Tariff cost recovery*	*Total*
Sub-Saharan Africa	0.06	0.07	0.07	0.2	0.23	0.43	375	425	458	1,259	1,450	2,709
Low-income, fragile countries	0.04	0.17	0.06	0.28	0.93	1.21	17	65	25	106	358	464
Low-income, nonfragile countries	0.08	0.1	0.06	0.24	0.35	0.59	87	111	67	265	381	646
Middle-income countries	0.03	0.06	0.1	0.18	0.2	0.38	68	150	274	492	537	1,029
Resource-rich countries	—	0.05	0.03	0.08	0.1	0.18	—	103	69	172	214	386

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: — = not available.

1,000 connections though the developing-country benchmark is only 2 employees per 1,000 connections. In some cases, there are 42 employees per 1,000 connections. These results for labor inefficiencies underscore the importance of strengthening external governance mechanisms that can impose discipline on the behavior of SOEs. Overstaffing partially explains why in African countries with a publicly owned operator the share of spending allocated to capital spending frequently remains below 25 percent despite increasing spending needs. Utilities in low-income, nonfragile countries present the highest labor inefficiencies among the four-country group (0.08 percent of their GDP).

These inefficiencies can be attributable to the fact that African SOEs are characterized by low investment and high operating inefficiency. Water SOEs account for 40 percent of total public expenditures (central government and nonfinancial enterprises). Despite their large resource base, they invest comparatively little (on average) only 18 percent of the government water resource envelope. As a result, governments are typically required to step in to assume most SOE investment responsibilities, which are confined to undertaking daily O&M. Most SOEs operate at arm's length from the central government and fail in practice to meet criteria for sound commercial management. When these enterprises run into financial difficulties, the central government—as the main stakeholder—acts as the lender of last resort, absorbs debts, and assumes by default the financial, political, regulatory, and mismanagement risks. Lumpy capitalizations and debt swaps that cover the cumulative cost of operational inefficiencies are frequent events in the African utility sector, which have the potential to create a moral hazard that would perpetuate operational inefficiencies if proactive reforms are not undertaken.

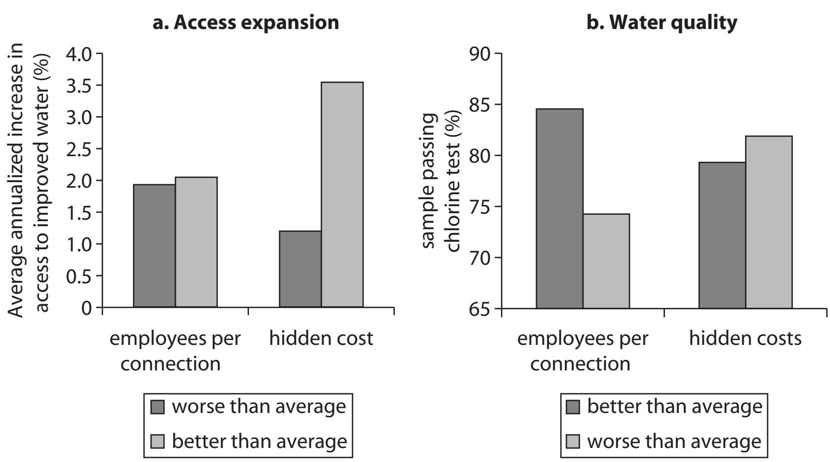
Undermaintenance is another source of inefficiencies in African WSS utilities, although this has not been quantified given the scarce data for the sector. The underinvestment in O&M can greatly affect continuity of service, level of technical and commercial losses, and adequate capacity and functioning of treatment, transmission, and distribution systems. The lack of institutional capacity and regulation, the absence of fiscal discipline and availability of resources, and the persistence of civil conflict in Africa during the past two decades have left WSS facilities neglected by inadequate O&M, which eventually increases the spending needs for rehabilitation and construction of new assets.

Operating inefficiencies have been impeding expansion. Inefficiencies not only drain the public purse but also seriously undermine the performance of utilities. One casualty of insufficient revenue is maintenance.

The rate of bursts per kilometer of water mains reflects the condition of the underlying infrastructure, and the extent to which it is being adequately operated and maintained. Among African utilities, huge variation is seen between low- and middle-income countries, with bursts ranging from five per kilometer in the latter to just more than one per kilometer in the former. Utility managers often have to choose between paying salaries, buying fuel, or purchasing spare parts. Often they have to cannibalize parts from other working equipment. The investment program is another major casualty. Service expansion—measured as the percentage of residents in the utility service area that gains access to either piped water or standposts per year—is significantly higher for more efficient utilities. In particular, utilities with low hidden costs have an average annual increase in coverage of more than 3 percent, essentially twice as much as the annual increase of utilities with high hidden costs (figure 5.9). Overstaffing also seems to hinder expansion.

For similar reasons, more efficient utilities deliver better quality water. Utilities with lower rates of employees per connection manage to have on average 85 percent of water supplied with adequate chlorine, compared with 75 percent of the rest of the utilities. Conversely, utilities with higher hidden costs tend to deliver slightly higher quality water.

Figure 5.9 Utility Efficiency Affects Access Expansion and Water Quality



Source: Banerjee, Skilling, and others 2008.

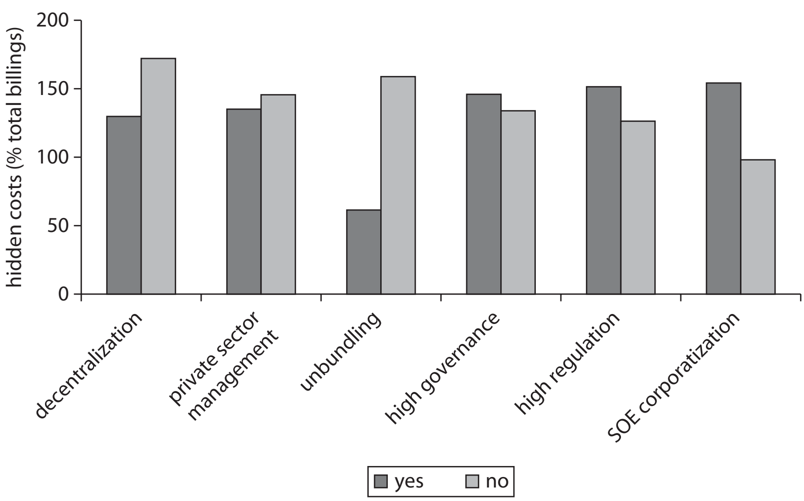
The Role of Institutions in Improving Performance

Good institutional frameworks help to lower the inefficiency of utilities, and institutional reform is key to improving performance. Utilities that have decentralized or adopted private sector management have substantially lower hidden costs than those that have not. Unbundling also has a significant effect, but unbundling is rare in Africa and exclusively concentrated in middle-income countries, whose superior performance can be explained for many other reasons. Conversely, higher levels of regulation and governance, as well as corporatization, are associated with lower efficiency in the form of higher hidden costs (figure 5.10).

The reform agenda has had two major thrusts: increasing private participation and improving governance from within.

Private sector participation has helped to improve utility performance, with Senegal being particularly noteworthy. Management contracts, being relatively short-term instruments, have had a material effect on improving revenue collection and service continuity. However, they have not had much of an impact on more intractable issues, such as unaccounted for water and access. Lease contracts (and the associated public-funded investments) have drastically improved access and boosted operational

Figure 5.10 Hidden Costs and Institutions



Source: Banerjee, Skilling, and others 2008.
Note: SOE = state-owned enterprise.

efficiency. With the exception of Côte d'Ivoire, however, the associated investments have been publicly financed. The lease contracts in Guinea and Maputo have been affected by a lack of coordination between the private contractor and the government, which has stalled progress in key areas, such as unaccounted-for water. Overall, private sector contracts accounted for almost 20 percent of the increase of household connections in the region, twice the amount that would be expected, given their market share of only 9 percent (table 5.11). However, half of these gains were made in Côte d'Ivoire alone (which has been adversely affected since the onset of civil war in 2002).

About half of the countries (mainly anglophone) have established distinct regulatory agencies for the water sector, although a significant number of these have not adopted private sector participation. Conversely, numerous francophone countries with private participation have adopted regulatory frameworks contractually, without establishing an independent regulatory agency. There does not appear to be any evidence supporting the superiority of any one of these two approaches. Even where explicit regulatory frameworks have been established, these typically meet only about half of the corresponding good practice criteria. However, evidence on the links between introducing an independent regulator and improving performance is negligible for the water sector. Similarly, no conclusive evidence is seen for the superiority of regulation by contract over the traditional form of regulation by agency (Vagliasindi and Nellis 2009).

Of governance reforms that appear to be the most important drivers of higher performance, two appear especially promising: performance contracts with incentives and independent external audits. Uganda has enjoyed success using a performance contract in its water company, providing the utility with incentives for good performance and producing greater accountability (box 5.3). The introduction of independent audits has also positively affected efficiency.

Table 5.11 Overview of Impact of Private Sector Participation on Utility Performance

		Unit change in performance before and after private participation					
	Contract	*Household connections*	*Improved water*	*Service continuity*	*Unaccounted-for water*	*Collection ratio*	*Labor productivity*
Gabon	Concession contract	+20			−8		
Mali		+15	+29		−14		
Côte d'Ivoire	Lease contract or *affermage*	+19	+22				+2.6
Guinea			+27		0		
Maputo			+2	+10	−1	+24	
Niger		+9	+3		−5		+3.2
Senegal		+18	+17		−15		+2.8
Johannesburg	Management contract				0	+10	
Kampala				+6	−2	+12	
Zambia				+5	−28	+19	

Source: Adapted from Marin 2009.
Note: Blank cells denote missing data; household connections and improved water are measured as additional percentage points of households with access; service continuity is measured as additional hours per day of service; unaccounted-for water is measured as reduced percentage points of losses; collection ratio is measured as additional percentage points of collection; and labor productivity is measured as additional thousands of connections served per employee.

Box 5.3

Uganda's Successful Case of State-Owned Enterprise Reform

The National Water and Sewerage Corporation (NWSC) is an autonomous public corporation, wholly owned by the government of Uganda, that is responsible for water and sanitation services in 23 towns with a population of 2.2 million, 75 percent of the population in Uganda's large urban centers.

Large inefficiencies before 1998, including poor service quality, very low staff productivity, and high operating expenses, with the collection rate at only 60 percent and a monthly cash deficit of $300,000, posed an urgent need to revamp operations.

Turnaround strategies culminated in establishing area performance contracts between a NWSC head office, which performs contract oversight and capital investment, as well as regulation of tariffs, rates, and charges, and the area managers, acting as operators and, therefore, responsible for management, operation and maintenance services, revenue collection, and rehabilitation and extension of networks. The objective was to enhance each area's performance by empowering managers and making them accountable for results. A comprehensive system of more focused and customer-oriented targets was designed. Typical performance indicators included working ratio, cash operating margin, nonrevenue water, collection efficiency, and connection ratio. Performance evaluation looked at both processes and outputs and was conducted through regular as well as unannounced visits. Incentives were both financial (including penalties for performances below targets) and nonfinancial (including trophies for best performing areas/departments and publication of monthly, quarterly, and annual best as well as worst performances).

In fiscal 2003–04, the Area Performance Contracts were changed into Internally Delegated Area Management Contracts (IDAMCs), aimed at giving more autonomy to operating teams and based on clearer roles, better incentive plans, and a larger risk apportioned to operating teams. The IDAMC framework was

(continued next page)

Box 5.3 *(continued)*

later consolidated by the use of competitive bidding as a basis for awarding contracts to the operating units.

A review of 10 years of NWSC operations shows that gains in operational and financial efficiency and service expansion have been substantial and impressive relative to the performance of the NWSC's peers in Africa.

NWSC Efficiency Gains

	Year	
Performance indicator	*1998*	*2008*
Service coverage	48%	72%
Total connections	50,826	202,559
New connections per year	3,317	25,000
Metered connections	37,217	201,839
Staff per 1,000 connections	36	7
Collection efficiency	60%	92%
NRW	60%	32.50%
Proportion of metered accounts	65%	99.60%
Annual turnover (billion U Sh)	21	84
Profit (after dep.) (billion U Sh)	–2.0	+3.8

Source: Muhairwe 2009.
Note: NRW = nonrevenue water, U Sh = Ugandan shilling.

Key success factors are indentified in the empowerment of staff, devolution of power from the center to regional operations, increased customer focus, as well as adoption of private sector–like management practices, including performance-based pay, the "customer pays for good service" principle, and so on. Also, the emphasis on planning, systematic oversight and monitoring, information sharing through benchmarking, and continuously challenging management teams with new and clear performance targets have created a strong system of checks and balances and powerfully triggered involvement, engagement, and a sense of pride on the side of the staff, beyond what simple financial incentives may obtain.

Sources: Adapted from Muhairwe 2009; National Water and Sewerage Corporation n.d.

Annex 5.1 Utilities in the AICD WSS Database

No.	*Country*	*Utility*	*Population in service area*	*Coverage of service area*	*Sewerage network*
1	Benin	SONEB	2,900,000	National	No
2	Burkina Faso	ONEA	2,779,875	National	Yes
3	Cameroon	SNEC	—		Yes
4	Cape Verde	ELECTRA	231,882	National	Yes
5	Chad	STEE	—	National	No
6	Congo, Dem. Rep.	REGIDESO	18,000,000	National	No
7	Côte d'Ivoire	SODECI	8,892,850	National	Yes
8	Ethiopia	ADAMA	218,111	Urban	No
9	Ethiopia	AWSA	2,887,000	Urban	Yes
10	Ethiopia	Dire Dawa	284,000	Urban	Yes
11	Ghana	GWC	17,199,942	National	Yes
12	Kenya	KIWASCO	465,613	Urban	Yes
13	Kenya	MWSC	826,000	Urban	No
14	Kenya	NWASCO	2,496,000	Urban	Yes
15	Lesotho	WASA	540,500	National	Yes
16	Madagascar	JIRAMA	4,885,250	National	Yes
17	Malawi	BWB	833,418	Urban	No
18	Malawi	CRWB	288,705	Urban	No
19	Malawi	LWB	634,447	Urban	Yes
20	Mozambique	AdeM Beira	580,258	Urban	No
21	Mozambique	AdeM Maputo	1,778,629	Urban	No
22	Mozambique	AdeM Nampula	385,809	Urban	No
23	Mozambique	AdeM Pemba	131,980	Urban	No
24	Mozambique	AdeM Quelimane	288,887	Urban	No
25	Namibia	Oshakati Municipality	31,432	Urban	Yes
26	Namibia	Walvis Bay Municipality	54,025	Urban	Yes
27	Namibia	Windhoek Municipality	300,000	Urban	Yes
28	Niger	SEEN/SPEN	2,240,689	National	Yes
29	Nigeria	Borno	—	Urban	No
30	Nigeria	FCT	6,000,000	Urban	No
31	Nigeria	Kaduna	3,126,000	Urban	No
32	Nigeria	Katsina	2,845,920	Urban	No
33	Nigeria	Lagos	15,367,417	Urban	No
34	Nigeria	Plateau	1,334,000	Urban	No
35	Rwanda	ELECTROGAZ	2,010,000	National	No
36	Senegal	SDE/ONAS	7,808,142	National	Yes
37	South Africa	Cape Town Metro	3,241,000	Urban	Yes
38	South Africa	Drakenstein Municipality	213,900	Urban	Yes
39	South Africa	eThekwini (Durban)	3,375,000	Urban	Yes

(continued next page)

No.	Country	Utility	Population in service area	Coverage of service area	Sewer network
40	South Africa	Johannesburg[a]	3,753,900	Urban	Yes
41	Sudan	Khartoum Water Corporation	7,602,000	Urban	Yes
42	Sudan	South Darfur Corporation	2,051,000	Urban	No
43	Sudan	Upper Nile Water Corporation	250,000	Urban	No
44	Tanzania	DAWASCO	—	Urban	Yes
45	Tanzania	DUWS	279,000	Urban	Yes
46	Tanzania	MWSA	458,493	Urban	Yes
47	Uganda	NWSC	2,284,000	National	Yes
48	Zambia	LWSC	1,564,986	Urban	Yes
49	Zambia	NWSC	990,806	Urban	Yes
50	Zambia	SWSC	294,000	Urban	Yes

Source: Banerjee, Skilling, and others 2008a.
Note: ADAMA = Nazareth Water Company; AWSA = Addis Ababa Water Services Authority; BWB = Blantyre Water Board; CRWB = Central Region Water Board; DAWASCO = Dar es Salaam Water and Sewerage Company; DUWS = Dodoma Urban Water and Sewerage Authority; FCT = Federal Capital Territory Water Board; GWC = Ghana Water Company, JIRAMA = Jiro sy Rano Malagasy; KIWASCO = Kisumu Water and Sewerage Company; LWB = Lilongwe Water Board; LWSC = Lusaka Water and Sewerage Company; MWSA = Mwanza Water and Sewerage Authority; MWSC = Mombasa Water and Sewerage Company; NWASCO = Nairobi Water and Sanitation Company; NWSC = National Water and Sewerage Company, Uganda; NWSC = National Water and Sewerage Company, Zambia; ONAS = Office National de l'Assainissement du Sénégal; ONEA = Office Nationale des Eaux et d'Assainissement; REGIDESO = Régie de Production et de Distribution d'Eau; SDE = Sénégalaise des Eaux; SEEN = Société de Exploitation des Eaux du Niger; SNEC = Société National des Eaux du Cameroon; SODECI = Société de Distribution d'Eau de Côte d'Ivoire; SONEB = Société Nationale des Eaux du Benin; SPEN = Société de Patrimoine des Eaux du Niger; STEE = Société Tchadienne d'Eau et d'Electricité; SWSC = Southern Water and Sewerage Company; WASA = Water and Sanitation Authority. — = data not available.

Notes

1. Francophone countries have a much stronger metering tradition, which reflects different traditions in France and England.
2. This number reflects the value for SNDE (Société Nationale de Distribution d'Eau, the Republic of Congo).
3. Capital cost = O&M cost + capital premium of \$0.4/m^3. The capital premium is based on internationally used benchmarks computed by Global Water Intelligence (2004).

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CHAPTER 6

Cost Recovery, Affordability, and Subsidies

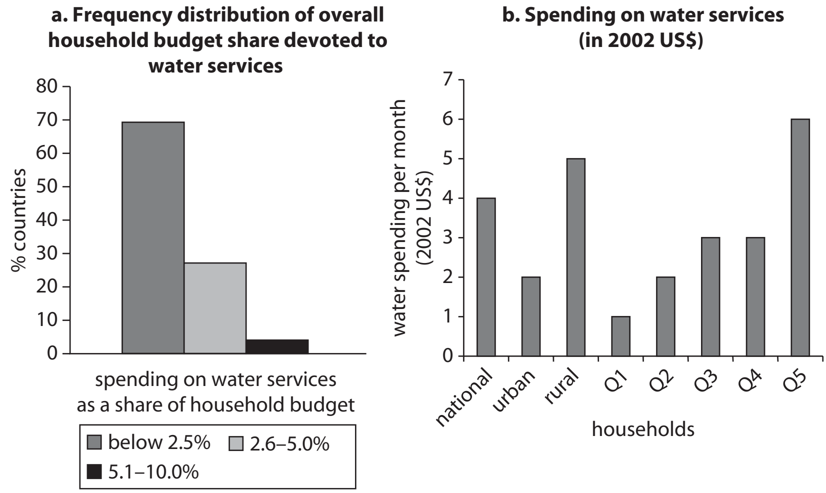
The need to provide Africans with safe drinking water is immense and immediate. As a poor continent, however, Africa lacks the level of household and government funds required to significantly expand water networks and improve service quality. In the best-case scenario, its governments could set tariffs at cost-recovery levels so that water service providers could justify investments in expanded networks, but a significant share of the existing and potential consumer base cannot afford to pay at that rate.

This chapter uses household survey data in the Africa Infrastructure Country Diagnostic (AICD) to examine Africa's ability to pay for water services and implement operating and capital cost-recovery tariffs. It evaluates the targeting and actual performance of existing tariffs' subsidy mechanisms and considers alternative systems with potentially better outcomes.

Average Monthly Spending on Water

Most African households live on very modest budgets. The average African household survives on not more than $180 per month; urban household budgets are about $100 per month higher than those of rural households. Household budgets range from $60 per month in the lowest

Figure 6.1 Spending on Water Services



Source: Banerjee, Wodon, and others 2008.
Note: Q = quintile.

quintile to no more than $400 per month in the highest income quintile except in middle-income countries, where the richest quintile has a monthly budget of $200 to $1,300 (table 6.1).

On average, Africans spend more than half their household budget on food. Monthly spending on water averages $4, or 2 percent of household budgets, and rarely exceeds 3 percent. Only in Cameroon, Mauritania, and Rwanda are water expenses more than 5 percent of the household budget. Spending on water services increases with rising income levels: The top 20 percent of African households pay $6 per month (2 percent of income), primarily because they are disproportionately connected to formal water networks (figure 6.1).

Wide Price Variations among Service Providers in the Urban Water Market

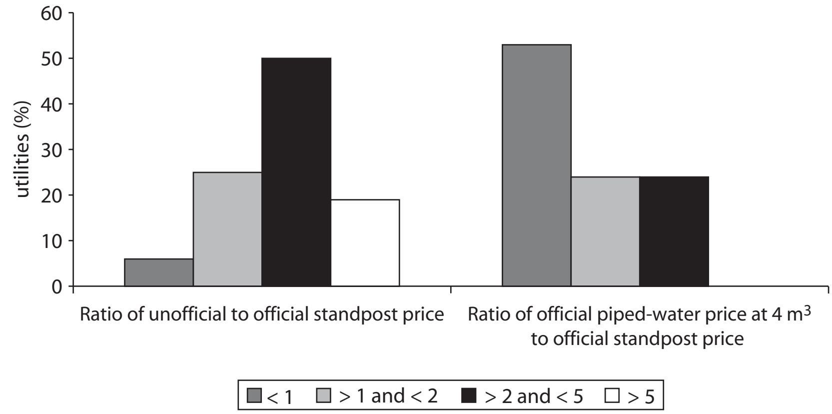
The price of water in the unserved market is substantially higher than the price utilities charge for household connections. Utilities supply piped water delivered through public standposts in addition to piped connections to houses and yards. Prices at public standposts are usually subsidized so that low-income households in periurban areas can benefit from improved water supply. The important policy questions are whether this practice realizes the objective of providing affordable water to public standpost users and the extent of cross-subsidy between the low-volume

Table 6.1 Monthly Household Budget

	Total household budget (2002 US$)								*Food expenditure as a share of total household budget (%)*							
	National	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*	*National*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Overall	177	130	241	59	97	128	169	340	55	61	48	63	64	63	60	48
Low-income countries	139	109	208	53	80	103	135	258	59	64	50	67	68	66	64	52
Middle-income countries	300	199	350	79	155	181	282	609	45	54	42	51	55	52	50	38

Source: Banerjee, Wodon, and others 2008.
Note: Q = quintile.

Figure 6.2 Comparison of Official and Retail Standpost and Small[a] Piped Consumer Prices



Source: Banerjee, Foster, and others 2008.
Note: The Democratic Republic of Congo is not included in the graph because the formal standpost price is almost negligible. Figure based on information available for 12 utilities.
a. Refers to minimum consumption level of 4 m^3.

consumers at public standposts and those who have household connections to piped water.

The average official price is \$0.63/cubic meter (m^3) at public standposts and \$0.55/m^3 for small consumers of household connections to piped water. Standpost consumers are paying more to approximately half the utilities. For the rest, the evidence suggests that consumers whose households are connected to piped water are cross-subsidizing standpost consumers at the same level of consumption (figure 6.2). This would be extremely inequitable if the standpost and low-volume piped-water consumers were in similar income strata.

The official standpost tariff may not, however, be what consumers really pay. Operators and middlemen come between the utility and consumers. The result is a highly dynamic market in which, except in Ouagadougou, informal retail prices are much higher than the official standpost tariffs. For half the utilities, the informal standpost price is between two and five times the formal standpost price. This is true of dense periurban areas with shortages of households connected to piped water and a significant dependence on public standposts (box 6.1). For instance, in Antananarivo, Lusaka, and Cotonou, retail prices are more than five times higher than official tariffs.

In the largest African cities, alternatives to piped water supply are priced from 1.3 times as high for small piped-water networks to 10 to 20

Box 6.1

Piped Water Delivered through Public Standposts in Kigali, Rwanda

The water production capacity of ELECTROGAZ, the main utility in Kigali, is inadequate to meet network demand. The lack of bulk supply causes rolling outages throughout the city and often forces residents with private connections to seek water at public sources, such as public standposts.

The financial stability of Kigali public standposts can be estimated from the tariff paid by standpost operators (RF 240, $0.42 per cubic meter), the total cost of production by ELECTROGAZ (RF 205), the rate of unaccounted-for water in distribution and selling (35 percent and 5 percent, respectively), and the volume and price of water sold at the public standposts. Three operators selling 100 jerricans each per day at RF 10, 20, and 30 per jerrican would earn estimated monthly net incomes of $314, $949, and $1,584 (the 2008 gross domestic product per capita was $370). The combination of a low tariff and a 35 percent rate of unaccounted-for water in distribution creates losses for the utility.

Of the roughly 240 public standposts in Kigali, an estimated 193 (80 percent) were operating in December 2008. Utility officials estimate that 60,000 people use piped water delivered through public standposts, though this figure includes consumers who use them only when their primary source is unavailable. Based on total water volume recorded at meters, public standposts could supply only 48,500 people with 20 liters daily. That figure is equal to the upper segment of the population that depends primarily on public standposts (about 6 percent of the city's population).

The utility's limited production capacity has affected both the level of peak demand at public standposts and the cost of production. Observations and interviews with consumers indicate that prices have often been higher in areas when and where water service has been cut—and lower after periods of precipitation that increase the availability of other supply options, such as rainwater and natural springs.

Source: Keener and others (forthcoming).

times as high for mobile distributors (table 6.2). The lower prices are paid by small utility consumers, and the higher prices are paid by unserved consumers of alternatives. They do not benefit from utility service and must pay significantly more. Moreover, the prices charged by each water provider in the informal sector also show a higher variation than those

Table 6.2 Prices by Alternate Water Service Provider

Country	*Largest city*	*Household connection (US$/m³)*	*Small piped network (US$/m³)*	*Standpipe (US$/m³)*	*Household reseller (US$/m³)*	*Water tanker (US$/m³)*	*Water vendor (US$/m³)*
Benin	Cotonou	0.41	n.a.	1.91	1.91	n.a.	n.a.
Burkina Faso	Ouagadougou	0.90	n.a.	0.48	n.a.	n.a.	1.67
Ethiopia	Addis Ababa	0.19	n.a.	0.87	1.44	3.85	—
Mozambique	Maputo	0.96	0.98	0.98	0.98	n.a.	—
Niger	Niamey	0.52	n.a.	0.48	n.a.	n.a.	1.79
Nigeria	Kaduna	0.17	n.a.	—	—	3.43	5.71
Rwanda	Kigali	0.44	n.a.	1.79	1.79	4.48	n.a.
Senegal	Dakar	0.37	n.a.	1.53	—	n.a.	2.29
South Africa	Johannesburg	0.05	n.a.	n.a.	n.a.	—	—
Congo, Dem. Rep.	Kinshasa	0.05	2.11	1.02	1.01	n.a.	n.a.
Ghana	Accra	0.52	n.a.	5.51	1.53	5.46	6.89
Kenya	Nairobi	0.18	0.60	1.73	n.a.	3.74	3.47
Lesotho	Maseru	0.40	n.a.	2.58	—	—	—
Malawi	Blantyre	0.12	n.a.	1.16	3.38	n.a.	n.a.
Namibia	Windhoek	1.45	n.a.	n.a.	n.a.	n.a.	n.a.
Sudan	Great Khartoum	0.37	n.a.	1.15	—	4.32	3.00
Zambia	Lusaka	0.56	n.a.	1.67	—	n.a.	3.00
Cape Verde	Praia	2.67	n.a.	9.44	n.a.	9.67	11.38
Chad	N'Djamena	0.22	—	—	—	n.a.	—
Côte d'Ivoire	Abidjan	0.04	—	0.93	1.82	n.a.	3.35
Madagascar	Antananarivo	0.11	0.47	1.24	—	n.a.	2.33
Tanzania	Dar es Salaam	0.39	—	0.87	0.98	2.40	2.56
Uganda	Kampala	0.25	n.a.	1.40	1.40	—	4.50
	Average	0.49	1.04	1.93	1.63	4.67	4.00
	Median	0.37	0.79	1.24	1.49	4.08	3.00
	Minimum	0.04	0.47	0.48	0.98	2.40	1.67
	Maximum	2.67	2.11	9.44	3.38	9.67	11.38

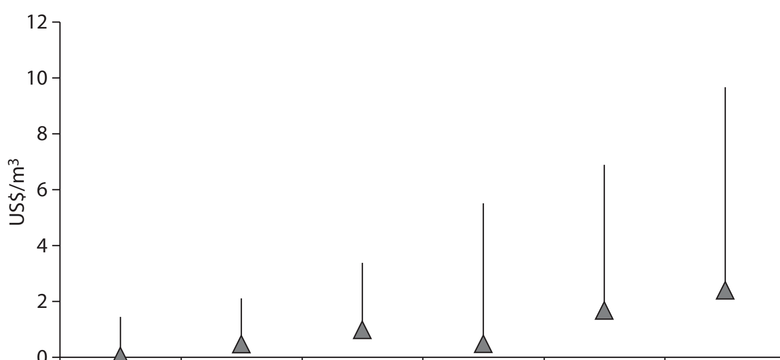
Source: Keener, Luengo, and Banerjee 2009.
Note: n.a = not applicable, — = not available.

offered by the utilities to connected households; this further underscores the volatility and inequity in the market structure.

Households with private connections or yard taps face water prices significantly lower than those dependent on piped water delivered through public standpipes and the informal market. The prices for each water provider in the informal sector also show higher variability than those offered by the utilities to connected households. This applies to alternative providers in different cities (the standard deviation of the prices for each informal water service is 1.3 to 5 times higher than for the household connection), as well as for different neighborhoods within the same city (figure 6.3). Cape Verde's prices for formal and informal water services are highest because of the specifications of its water production system.

When formal household connections to piped water are not available or the retail public standpipe price varies from the official price, utilities lose potential revenue from unserved or underserved customers. For the cities studied, the ratio between informal to formal standpipe prices goes from 0.9 in Ouagadougou, to 20.4 in Kinshasa, with a median ratio of 3. High retail prices and the size of the population coverage by standpipes

Figure 6.3 Price by Water Service Provider



	HH connection	small piped network	HH reseller	standpipe or kiosk	water vendor	water tanker
average	0.39	1.04	1.63	1.52	3.38	4.67
max	1.45	2.11	3.38	5.51	6.89	9.67
▲ min	0.04	0.47	0.98	0.48	1.67	2.40

Source: Keener, Luengo, and Banerjee 2009.
Note: The average prices are presented. Cape Verde is excluded from this graph because it is an outlier.
HH = household.

combine to create an economic environment in which estimates of the total gross profit[1] captured by standpipe operators ranged from $15,477 in Khartoum to almost $10 million in Lusaka.[2] These amounts can represent a significant percentage of formal utilities' revenue: in Maputo, 12 percent; Addis Ababa, 44 percent; and Lusaka, 120 percent. Thus, although standpipes are already heavily subsidized by utilities, none of this subsidy reaches the final consumers.

Two-Part Tariffs and the Small Consumer

The tariff at an average consumption level of 10 m^3 is about $0.49/$m^3$ in Africa. However, tariffs at ELECTRA, in Cape Verde, exceed $3 for that consumption level because of the expense of desalination, which raises the cost of water production. If Cape Verde is excluded from the continental figure, the average tariff is $0.43/$m^3$. The tariff levels in Africa are comparable to the average in Latin America and the Caribbean, which at $0.41/$m^3$ at an average consumption of 15 m^3 is higher than other regions in the world, such as East Asia, Eastern Europe, and the Middle East. South Asian water tariffs are the world's lowest, with an observed average tariff of only $0.09/$m^3$ (table 6.3).

The implementation of the increasing block tariff (IBT) structure is based on the implicit assumption that small consumers are poor and large consumers will cross-subsidize the small ones. To investigate whether small consumers pay lower prices than large consumers, the water price

Table 6.3 Comparison of Water Tariffs in Africa and Other Global Regions at Various Levels of Consumption
($/$m^3$)

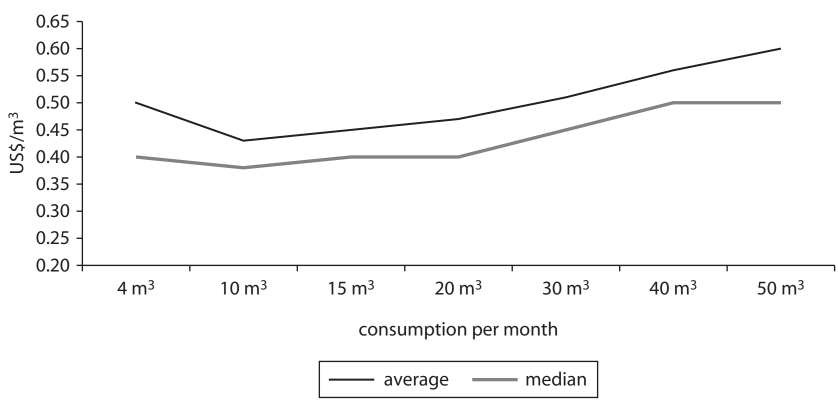
Consumption level	*4 m^3*	*10 m^3*	*15 m^3*	*40 m^3*
Average	0.55	0.49	0.52	0.65
Median	0.41	0.38	0.40	0.51
Comparable tariffs (average consumption = 15 m^3)				
Organisation for Economic Co-operation and Development			1.04	
Latin America and the Caribbean			0.41	
Middle East and North Africa			0.37	
East Asia and Pacific			0.25	
Europe and Central Asia			0.13	
South Asia			0.09	

Sources: Banerjee, Foster, and others 2008; Foster and Yepes 2006.

per cubic meter for three consumption levels—4, 10, and 40 m^3/month—is calculated. The effective price sharply declines at the average consumption of 10 m^3, and then rises again. The price at the subsistence consumption rate of 4 m^3 is roughly comparable to the price at 20 m^3 of consumption (figure 6.4).

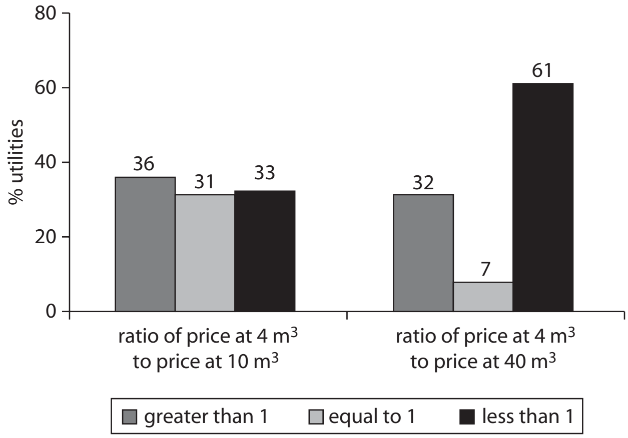
The two-part IBT tariff structure can fail to favor small consumers for two reasons. First, the fixed-fee and minimum-consumption charges place an enormous burden on low-volume consumers. This is the part of the water bill the households cannot control regardless of their level of consumption. Komives and others (2005) compare the average price per m^3 of IBT, IBT with fixed-fee, and IBT with fixed-fee and minimum-consumption charges. They find that low-volume consumers under the two-tariff regimes bear the burden of higher prices. Small consumers pay the lowest prices in only a few countries in Africa. Among the 45 utilities in the sample, the effective price increases with rising consumption in 27 utilities. In the majority of utilities, high-end consumers pay more than low-end or average consumers. Inequity is more prevalent, however, at the lower end of consumption, among households consuming 4 to 10 m^3/month. In 16 utilities, the effective tariffs of small consumers are higher than those of average consumers. This difference is pronounced in the case of five utilities in Mozambique. Because these utilities have a minimum threshold of 10 m^3, the small consumer whose water intake is about 4 m^3 pays on average about \$0.57 more than those consuming 10 m^3 and about \$0.40 more than those consuming 40 m^3 (figure 6.5).

Figure 6.4 Average Water Tariffs for Africa at Different Consumption Levels



Source: Banerjee, Foster, and others 2008.
Note: Cape Verde is not included in this graph because it is an outlier.

Figure 6.5 Utilities Charging Higher Effective Prices to Small Consumers



Source: Banerjee, Foster, and others 2008.

Second, the arrangement of the block's size and price is important, particularly that of the first block. If the first block is wide, it allows leakage of the implicit subsidy to the nonpoor and leads to a higher price per m^3 for the low-volume consumers in the band. Fixed and minimum consumption charges have a significant impact on the unit price paid by small consumers. With a fixed charge, small consumers usually have to pay a higher price per unit than large consumers. For utilities that impose a fixed-fee or minimum consumption charge, the average price at 4 m^3 is \$0.64/m^3, as opposed to \$0.47/m^3 for those who do not. The size of the first block can also impact the price paid by small consumers. Generally speaking, the larger the size of the first block in an IBT structure, the higher the probability that subsidies for the low price of the first block will leak to large consumers. Of the 45 utilities in the sample, only nine have a tariff design with a first block that rises above 10 m^3 (the rest have a flat or linear structure). This effect, though important, is overwhelmed by the fixed-fee and minimum consumption charges, which can erase the block-tariff structure's positive impact on small consumers.

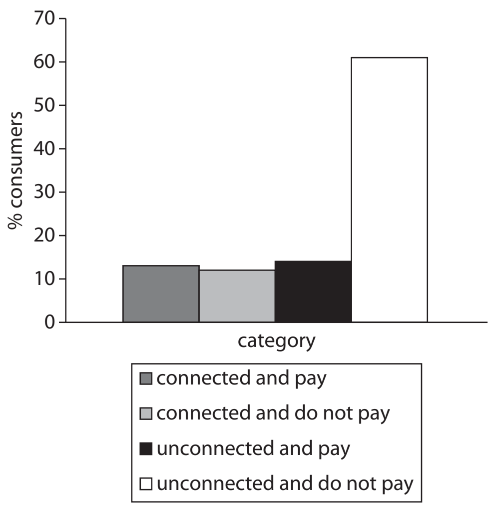
The subsidy to the low block under the current IBT structure does not benefit small consumers (usually the poor) exclusively; instead, a large amount of the subsidy leaks to large consumers (usually the nonpoor). Further, the fixed and minimum consumption charges and the large size of the low blocks often cause small consumers to pay higher effective prices per unit than large consumers.

Paying for Water: How Common?

The discussion so far has focused on formal utility customers who report paying a utility bill. But to focus only on this category of users is to miss a substantial part of the African story. Household surveys provide unique insights into two other key categories of consumers. First, there are those who do not have their own household connection to piped water but nonetheless register expenditure because they are accessing the network through some secondary source, usually a neighbor's tap. Second, there are those who do have a household connection to piped water but do not register any expenditure, whether because they are in arrears or because the connection itself is clandestine.

About 61 percent of the African population is not connected to and does not pay for formal water services (figure 6.6). The traditional customers who connect and pay are actually a minority of those who use the service; the population that connects but does not pay is almost as large as the percentage that connects and pays. Moreover, for access to household connections to piped water, the population that is unconnected but nevertheless pays to obtain the service through secondary sources is slightly higher than the one that connects and pays for proprietary service.

Figure 6.6 Connection and Payment, by Consumer Categories

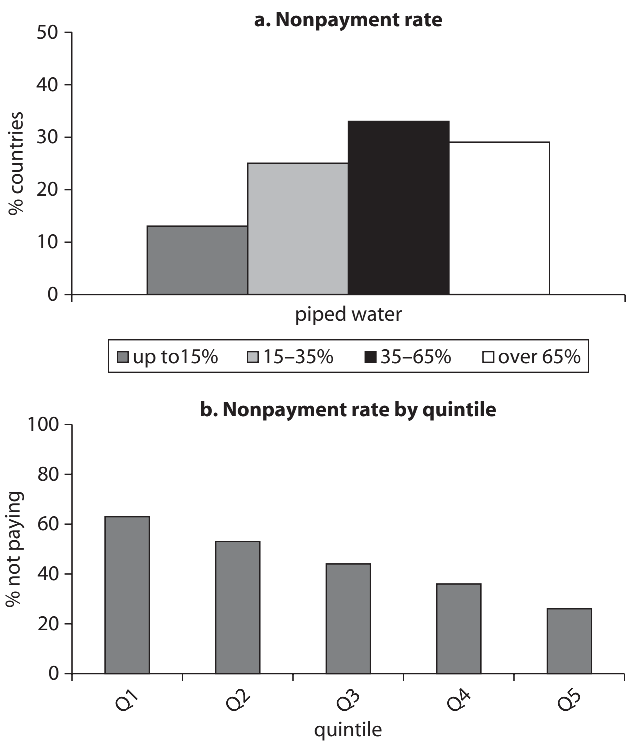


Source: Banerjee, Wodon, and others 2008.

Overall, an estimated 12 percent of those who have household connections to piped water do not appear to be paying for them in any given month. Nonpayment rates in excess of 65 percent can be found in 30 percent of customers with household connections to piped water (figure 6.7, panel a).

The extent to which nonpayment is higher among the poorest can be seen as an indicator that households are facing affordability problems. In the first quintile, the nonpayment ratio amounts to approximately 63 percent of households, and this ratio declines steadily to 26 percent of households in the fifth quintile (figure 6.7, panel b). This pattern indicates that nonpayment, to some extent, does represent an affordability issue, given the decline as household budgets rise across the distribution. Nevertheless, the existence of a significant nonpayment rate, even among

Figure 6.7 Nonpayment Rates of Water Services



Source: Banerjee, Wodon, and others 2008.
Note: Q = quintile.

the richest quintiles, suggests that problems of payment culture also exist. Moreover, given that the majority of connected households are in the richer quintiles, in absolute terms the largest number of nonpaying customers also comes from the richer quintiles (even though the nonpayment ratio for this group is comparatively low).

Recovering Operating Costs: Affordable

As utilities move toward commercial entities, it becomes essential to establish demand for services. Affordability is typically measured by the share of infrastructure spending in the total household budget and whether it exceeds a set threshold (Fankhauser and Tepic 2005). There is no absolutely scientific basis for determining the value of such affordability thresholds; however, based on experience with actual household expenditure patterns and results of willingness to pay surveys, certain thresholds have come to be widely used by practitioners. The World Health Organization, for example, uses a 5 percent affordability threshold for water and sanitation services in developing countries. The evidence presented on current expenditure patterns earlier suggests that households spend 2 to 5 percent on water services. In the discussion that follows, 5 percent is used as a reference affordability threshold.

To estimate the percentage of African households likely to face affordability problems for modern infrastructure services, two elements are needed. First, indicative values of the true cost of infrastructure services are needed as a reference point. The absolute cost of the total monthly bill can be computed based on different assumptions about subsistence household consumption and the tariff applied. For piped-water service, subsistence consumption ranges between 4 m^3 per month (based on an absolute minimum consumption of 25 liters per capita per day for a family of five) and 10 m^3 per month (based on a somewhat more comfortable but still modest level of 60 liters per capita per day for a family of five). The indicative tariff ranges from \$0.40/m^3 to \$0.80/m^3, depending on whether the goal is operating or full capital cost recovery. The lower-bound monthly bill is about \$2, and the upper-bound monthly bill is about \$8 for household connections to piped water (table 6.4).

Second, the survey data on budget expenditures are used to estimate what percentage of households would hit the 5 percent affordability thresholds at different levels of absolute expenditure. For example, a household with a monthly budget of \$100 would hit the affordability threshold of 5 percent of income once any service cost more than \$5 per month.

Table 6.4 Reference Points for the True Cost of Infrastructure Services

	Piped water	*Reference*
Lower bound	Subsistence household consumption	4 m^3
	Tariff (operating cost recovery) $/$m^3$	$0.40/$m^3$
	Total monthly bill ($)	$2
Upper bound	Subsistence household consumption	10 m^3
	Tariff (capital cost recovery) $/$m^3$	$0.80/$m^3$
	Total monthly bill ($)	$8

Source: Banerjee, Wodon, and others 2008.

By pooling all African households across countries and grouping them into a common set of quintiles based on purchasing power parity adjustments to their budgets, it is possible to report results for the continent as a whole. Figure 6.8 plots the share of budget required to meet increasing levels of spending on infrastructure services for the average household in each of the continental income quintiles.

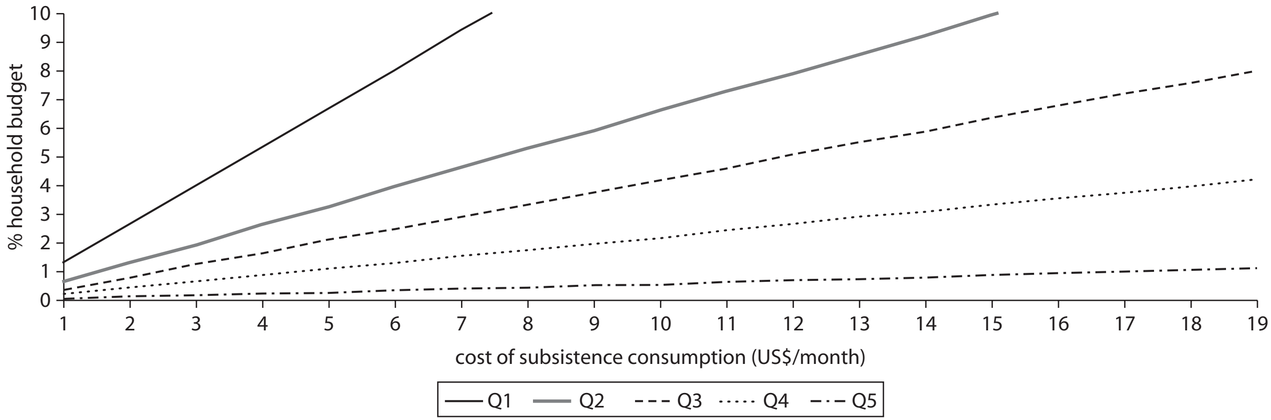
The average household in the first quintile hits the 5 percent affordability threshold at close to $4 per month, which is more than enough to pay for the subsistence minimum consumption of piped water. The average household in the second quintile hits the 5 percent affordability threshold at close to $8 per month and would be able to pay for the upper bound of piped water. Households in the third, fourth, and fifth quintiles do not face any affordability constraints within the range of service baskets considered here.

Very modest consumption baskets priced at levels compatible with operating cost recovery appear to be affordable across the full range of household budgets in Africa. Nevertheless, an estimated 60 percent of the African population cannot afford to pay full cost-recovery tariffs or extend consumption beyond the absolute minimum subsistence level.

These continental results mask a great deal of variation across individual countries because almost all the households in the poorer countries may be in the bottom quintile for Africa as a whole, whereas almost all the households in the more affluent countries may be in the uppermost quintile for Africa as a whole. Table 6.5 provides a similar type of analysis at the country level to calculate the percentage of households in each country that would fall beyond the 5 percent affordability threshold at any particular absolute monthly cost of service.

The countries divide into three groups. At one extreme is group 1, in which a majority of urban households can afford a monthly expenditure of $8, and often considerably more. At the other extreme is group 3, in

Figure 6.8 Share of Average Urban Household Budget Required to Purchase Subsistence Amounts of Piped Water, by Continental Income Quintiles



Source: Banerjee, Wodon, and others 2008.
Note: Q = quintile.

Table 6.5 Share of Urban Households Whose Utility Bill Would Exceed 5 Percent of the Monthly Household Budget at Various Prices

		Monthly bill ($)							
Group		*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*
1	Cape Verde	0	0	0	0	0	0	0	0
	Morocco	0	0	0	0	0	0	0	0
	Senegal	0	0	0	0	0	0	1	1
	South Africa	0	0	0	0	1	1	1	1
	Cameroon	0	0	0	0	1	2	7	17
	Côte d'Ivoire	0	0	1	2	3	5	7	10
	Congo, Rep.	0	0	3	5	12	21	28	35
2	Ghana	0	2	7	11	30	46	55	67
	Benin	0	2	4	12	33	45	60	71
	Kenya	0	0	5	20	36	62	72	78
	Sierra Leone	0	4	16	30	44	54	62	67
	São Tomé and Principe	0	2	13	29	46	64	77	81
	Burkina Faso	0	4	20	34	47	62	72	78
	Zambia	0	4	18	35	50	58	67	76
	Nigeria	3	10	23	35	57	78	89	95
	Madagascar	0	16	28	47	61	68	78	85
3	Niger	1	11	28	55	70	79	89	93
	Tanzania	1	8	25	55	75	89	96	98
	Guinea-Bissau	0	6	38	65	81	89	91	93
	Uganda	2	17	45	65	82	90	96	97
	Burundi	7	29	53	72	82	90	97	100
	Malawi	2	32	66	78	87	92	93	94
	Congo, Dem. Rep.	9	49	79	91	98	99	100	100
	Ethiopia	40	87	95	99	99	99	99	100
Summary	Low-income	5.0	18.4	32.4	44.5	59.5	72.3	79.7	84.3
	Middle-income	0.0	0.0	0.1	0.2	1.2	1.8	2.9	4.7
	All	3.7	13.7	24.2	33.2	44.7	54.3	60.2	64.1

Source: Banerjee, Wodon, and others 2008.

which at least 70 percent, and in some cases more than 90 percent, of urban households would be unable to afford a monthly expenditure of $8 for water. All the remaining countries fall into group 2, in which a substantial share of the urban population—between one- and two-thirds—would face difficulties covering an upper-bound monthly expenditure.

The High Cost of Connecting to Water and Sanitation Services

Network connection costs can prove to be a significant barrier to consumer access in Africa. The connection charges vary widely, from about

$6 in the Upper Nile in Sudan to more than $240 in Côte d'Ivoire, Mozambique, and Niger,[3] and more than $300 in Drakenstein, eThekwini, and Johannesburg, South Africa. Connection costs can vary even among water utilities in the same country. For instance, Addis Ababa Water Services Authority (AWSA), Nazareth Water Company (ADAMA), and Dire Dawa—three utilities in Ethiopia—charge connection costs of $14, $9, and $43, respectively. A comparison with the gross national income (GNI) per capita suggests that, in some countries, the connection charge is relatively expensive. On average across Africa, the connection charge is 28 percent of the GNI per capita. In middle-income countries such as South Africa and Namibia, though the connection cost is high, it is negligible compared with GNI per capita, but in countries such as Niger, the connection charge is more than 100 percent of the GNI per capita (figure 6.9).

Similarly, for sanitation, the capital costs associated with infrastructure facilities can be considered prohibitive when compared with the limited budgets. For instance, standardized unit costs drawn from the Senegal sanitation sector can be employed to estimate the percentage of households' monthly budget that would be absorbed by the upfront investment cost associated with different types of sanitation facilities (table 6.6). The results indicate that although traditional latrines look quite affordable across the income spectrum in Senegal, improved latrines represent more than a month of the household budget even for households in the highest income group. These findings are borne out by the patterns of access to sanitation already observed across the socioeconomic spectrum. Half of Sub-Saharan African households have invested in traditional latrines in

Figure 6.9 Formal Water Connection Cost

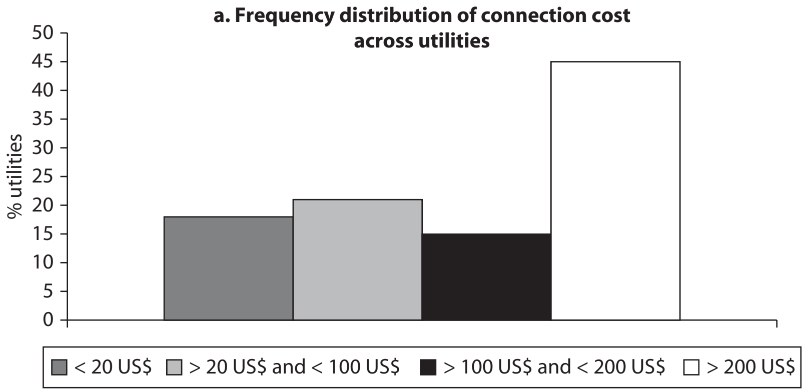


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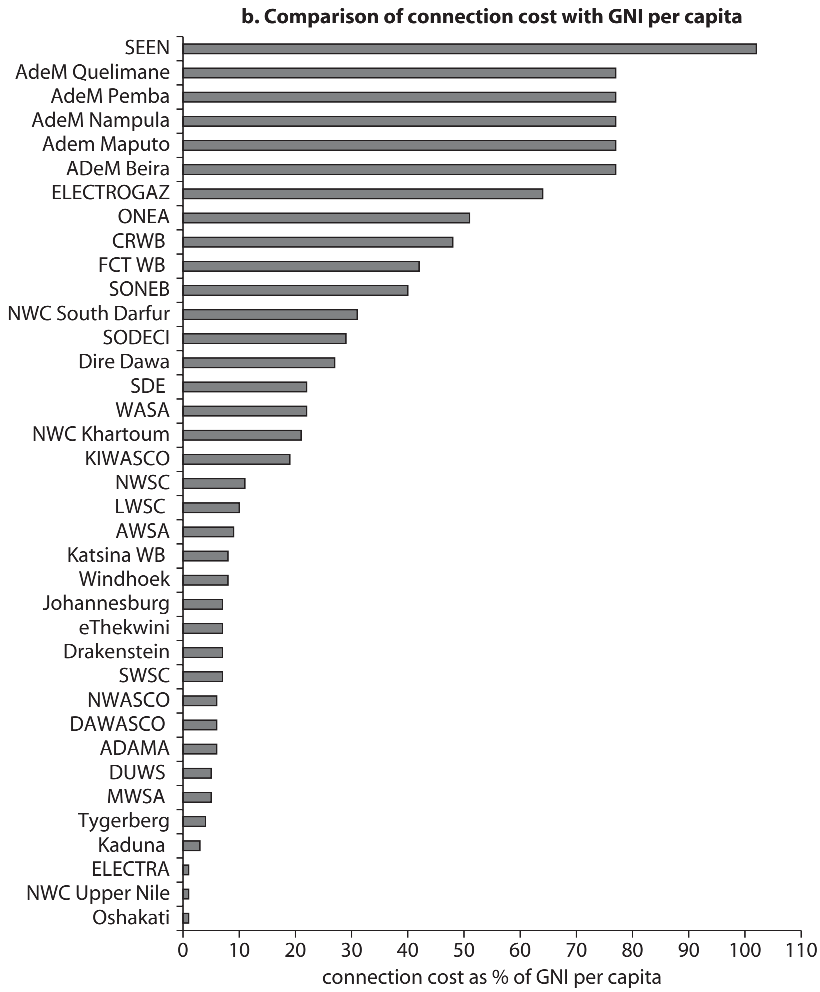
Figure 6.9 *(continued)*



Source: Banerjee, Foster, and others 2008.
Note: ADAMA = Nazareth Water Company; AWSA = Addis Ababa Water Services Authority; CRWB = Central Region Water Board; DAWASCO = Dar es Salaam Water and Sewerage Company; DUWS = Dodoma Urban Water and Sewerage Authority; FCT WB = Federal Capital Territory Water Board; GNI = gross national income; KIWASCO = Kisumu Water and Sewerage Company; LWSC = Lusaka Water and Sewerage Company; MWSA = Mwanza Water and Sewerage Authority; NWASCO = Nairobi Water and Sanitation Company; NWC = National Water Company; NWSC = National Water and Sewerage Company, Uganda; ONEA = Office Nationale des Eaux et d'Assainissement; SDE = Sénégalaise des Eaux; SEEN = Société de Exploitation des Eaux du Niger; SODECI = Société de Distribution d'Eau de Côte d'Ivoire; SONEB = Société Nationale des Eaux du Benin; SWSC = Southern Water and Sewerage Company; WASA = Water and Sanitation Authority; WB = Water Board.

Table 6.6 Cost of Facility as Percentage of Monthly Household Budget in Senegal

	National	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Total monthly household budget in Senegal (2002 US$)	227	154	315	102	134	166	225	394
Cost of facility as percentage of monthly household budget								
Septic tank	289	427	209	641	491	396	292	167
Improved latrine	194	286	140	430	330	266	196	112
Traditional latrine	22	32	16	48	37	30	22	13

Source: Morella, Foster, and Banerjee 2008.
Note: Q = quintile.

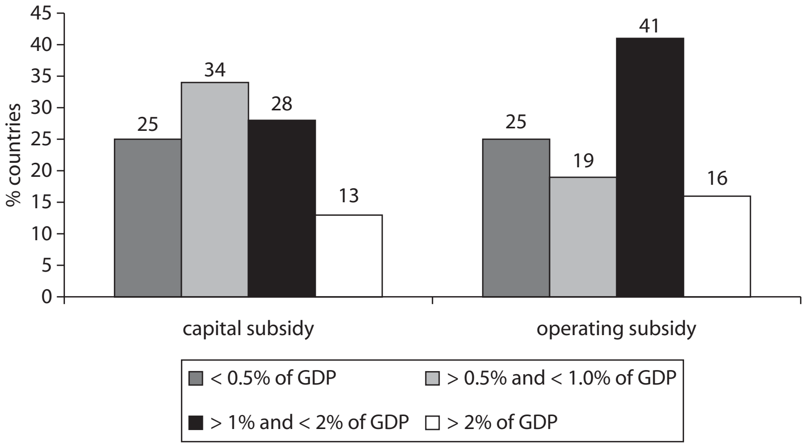
the absence of any far-reaching subsidization policy; this corroborates other evidence that investments of this size are affordable across the income spectrum. At the same time, the fact that improved latrines are confined to upper-income groups bears out the high budget shares that families would need to finance an improved latrine.

The Cost of Subsidizing Capital and Operating Expenses

The affordability of infrastructure services needs to be considered not only at the household level, but also at the level of the public finances of each country. To the extent that households cannot afford to pay cost-recovery tariffs, the move toward universal access will create burgeoning liabilities for the state, which must bridge the gap between the tariffs the public can afford to pay and the real cost of service provision. This analytical framework also can be used to estimate the aggregate value of these subsidies in each country, which helps to assess whether subsidizing services to reach universal coverage is an affordable strategy at the country level. Once again, no absolute scientific method can determine the affordability threshold at the country level; nevertheless, it is possible to get a sense of when costs reach a level that is manifestly unattainable.

A one-time, finite capital subsidy of $200 per unserved household, designed to cover the costs of connection of these households over a 10-year period, will cost approximately 1 percent of the annual African gross domestic product (GDP). An estimated 60 percent of the countries would face costs in excess of 1 percent of GDP. The cost would exceed 2 percent of GDP in Ethiopia, Malawi, the Democratic Republic of Congo, the Republic of Congo, and Sudan. The highest burden on fiscal

Figure 6.10 Subsidy Needed to Maintain Affordability of Water Services



Source: Banerjee, Wodon, and others 2008.

resources would be for the Democratic Republic of Congo, which must spend a projected 18 percent of its GDP on household connections to piped water. In more affluent countries, such as Gabon, the cost of this policy would amount to no more than 0.02 percent of the GDP.

An indefinite, ongoing operating subsidy of $2 per month to ensure that currently unserved customers can continue to afford service once connected places similar strains on the government budget. For 40 percent of the countries, providing a monthly subsidy of $2 for water would amount to spending 1 to 2 percent of GDP. For 16 percent of the countries, it will be more than 2 percent of GDP. The highest burden would be on the Democratic Republic of Congo, followed by Ethiopia, Malawi, Niger, and Sudan, which would have to spend more than 2 percent to maintain a sustainable consumer base for water services. Like the capital subsidy, this operating subsidy would consume 1.1 percent of the African GDP (figure 6.10).

Poor Targeting of Utility Subsidies

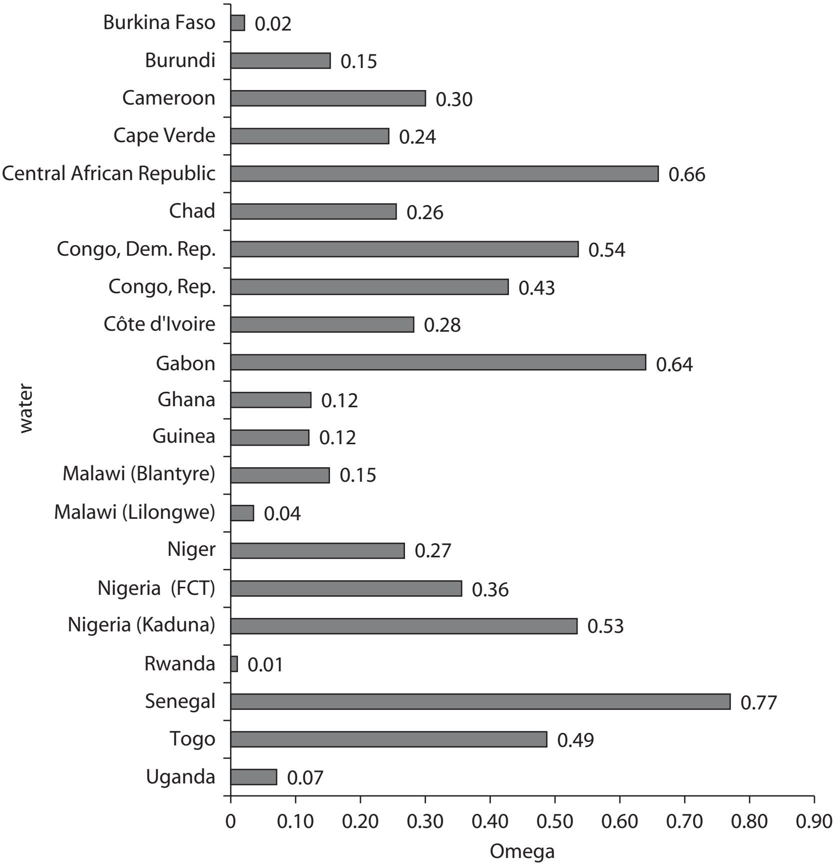
Customers receive substantial subsidies in most African countries, because residential water tariffs tend to be below utility costs. The working assumption is that the price per m^3 in the highest bracket of consumption in the tariff schedule can be used as a first approximation of the cost of providing the service. (Actually, the estimates of targeting performance are not very sensitive to that assumption.) As shown by Komives and others (2005), a simple framework can be used not only to analyze the targeting performance of water subsidies in about 20 African countries for which data are available, but also to understand what affects targeting performance through so-called access (who uses water) and subsidy design factors (who benefits from subsidies and by how much among users).

The targeting performance indicator used in the analysis, denoted by Ω (omega), is simply the share of the subsidies received by the poor divided by the proportion of the population in poverty. In other words, a value of one for Ω implies that the subsidy distribution among the poor is proportional to their share in the overall population. If the poor account for 30 percent of the population, then a neutral targeting mechanism would allocate 30 percent of the subsidy to the poor. A value (lower) greater than one implies that the subsidy distribution is (regressive) progressive, since the share of benefits allocated to the poor is (lower) larger than their share in the total population. For instance, suppose that 30 percent of the population is poor and obtains 60 percent of the subsidy benefits. In such a case, Ω would equal two, meaning that the poor were receiving twice as much subsidy as the population on average.

Utility subsidies tend to be very poorly targeted. As shown in figure 6.11, in none of the countries is the targeting indicator superior to one; it is often well below one. Although comparability issues are found among countries, on average the poor are benefiting only from one-fourth to one-third of what a household randomly selected in the population would get.

The targeting performance indicator Ω can be deconstructed into "access" and "subsidy design" factors[4] to allow analysis of why subsidies are targeted as they are. Access factors are those related to the availability of water service in the area in which a household is located and to the household's decision to connect to the network when service is available. These access factors have a strong influence on targeting performance but are usually difficult to change in the short run. Policy design is more susceptible to subsidy factors, such as tariff structure changes that affect who is targeted to receive the subsidies. Policy design also is affected by rates of subsidization and the quantities of water consumed by the households that benefit from the subsidies. Investigations reveal that most water subsidy mechanisms are poorly targeted, essentially because most of the poor

Figure 6.11 Overall Targeting Performance (Ω) of Utility Subsidies

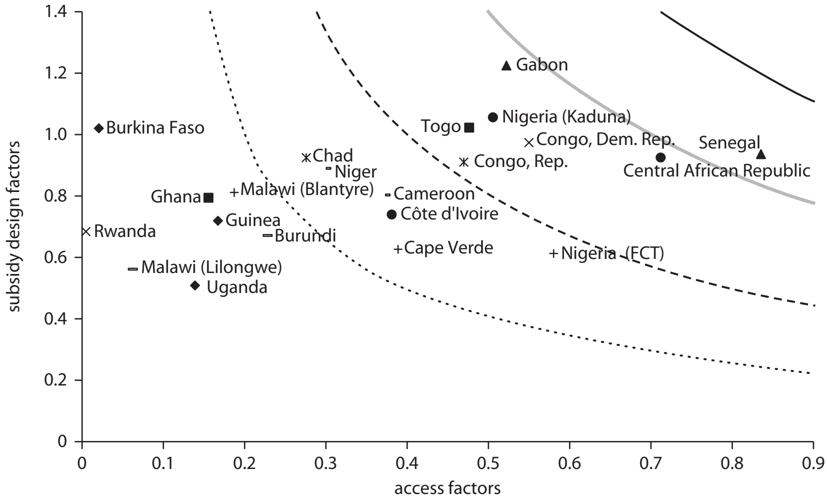


Source: Banerjee, Wodon, and others 2008.
Note: FCT = Federal Capital Territory.

lack access to the water network and, therefore, cannot benefit from water subsidies, but also because the existing tariff structures are not designed to target subsidies to the poor.

This can be seen clearly in figure 6.12, which deconstructs the value of the targeting indicator into access and subsidy design factors. The curves added to the graphs represent combinations of access and subsidy design factor values that result in the same value for Ω. The closer a country is located to the upper right of the graphs, the better the targeting performance, because again Ω is the product of the access and subsidy design factors.

Figure 6.12 Access Factors and Subsidy Design Factors Affecting Targeting Performance



Source: Banerjee, Wodon, and others 2008.
Note: See text for an explanation of the different curves.

The two variables used to compute the access factors are, first, whether a household is located in an area served by the water network, and, second, whether a household in such an area is actually connected to and getting service from the network. The value of the access factors is simply the rate of connection to the network among the poor (which depends on access and uptake when there is access) divided by the rate of the connection in the population as a whole. As expected, the access factors are much lower than one for all countries, simply because on average the poor have much lower connection rates than the population as a whole.

Subsidy design factors, which take into account who benefits from subsidies among households connected to the network and how large the subsidies are, make up the second variable affecting the value of the targeting parameter. The subsidy design factor represents the ratio of the average benefit from the subsidy among all poor households that are connected to the network, divided by the average benefit among all households connected to the network, whether poor or nonpoor. Surprisingly, in many countries the subsidy design factors are also below unity, thereby limiting targeting performance. The main explanation is that although the rate of subsidization of the poor (that is, the discount versus the full cost of providing water for the utility) is often larger than for the population as a whole that is connected to the network, the quantities consumed by the population as a whole tend to be larger than those consumed by the poor, so that the overall subsidy received by the poor is lower on average than that received by the population as a whole.

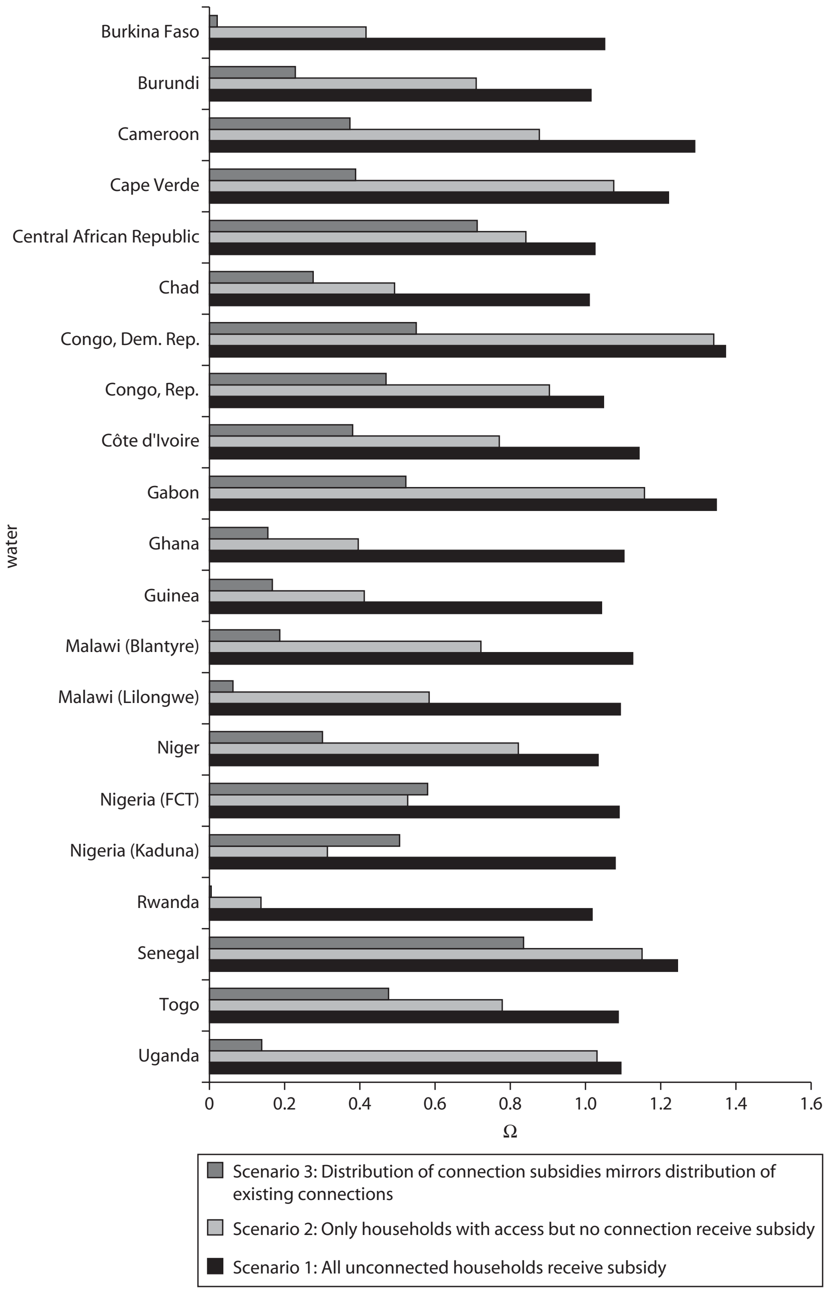
Consumption subsidies for water appear to be poorly targeted in African countries for several reasons. Access factors are important in determining the potential beneficiaries of consumption subsidies. Poor households tend to live in areas without water service, and so it is impossible for them to benefit from the subsidies. Even when they live in an area that offers potential access to the network, many among the poor remain unconnected to the networks because they live too far from the water pipes or the cost of connecting to the network and purchasing the equipment required to use water is too high. Good subsidy design mechanisms would allow countries to compensate for the negative impact of access factors on targeting performance. Unfortunately, the traditional IBT structures that prevail in many countries tend to be poorly targeted. They spread subsidies to all households connected to the network; even those that consume high amounts of water benefit from a subsidy for the part of their consumption that belongs to the lower level blocks of the tariff structure. In addition, the lower blocks often are too high in terms of consumption to target the poor well. Finally, significant differences in unit prices may not be present among the various blocks.

Connection Subsidies as a Viable Alternative

One possible alternative is to provide connection rather than consumption subsidies, assuming that the generation or production capacity is sufficient to expand the network. Figure 6.13 provides the potential targeting performance of connection subsidies under the three scenarios.

First, we assume that connection subsidies will be distributed in the same way as existing connections. This is a pessimistic assumption from a distributional point of view because it tends to favor better-off households, but it could be realistic if access rates to the network are low. Second, we assume that new connections could be distributed randomly among households that currently are not connected but are located in a neighborhood where connections are available. Third, we assume that new connection subsidies could be randomly distributed among all households that do not currently have access. This is a very optimistic

Figure 6.13 Potential Targeting Performance of Connection Subsidies under Various Scenarios



Source: Banerjee, Wodon, and others 2008.
Note: FCT = Federal Capital Territory.

assumption given that many of these households are not located in neighborhoods where access is available.

The value of Ω is largest under the assumption that new connections benefit households that are selected randomly from the population without access. In all countries, Ω is larger than one under this assumption. Yet, the assumption is not realistic. The second scenario assumes that households that benefit from new connections are selected from unserved households located in areas where there is already access to the network. The values of Ω, although often lower than one, are still much better than those for consumption subsidies. In the third scenario, targeting performance remains poor. Thus, if connection subsidies could be designed to reach the majority of households not connected today but living in areas where service is provided, the targeting performance of those subsidies would be better than that of consumption subsidies. In addition, connection subsidies help to reduce the cost of service for users (compared with street vendors for water, for example) and bring positive externalities in areas such as education and health.

Finally, it is often argued that any removal of utility subsidies would be detrimental. Again, the household survey evidence provides an opportunity to test this hypothesis. In most countries, water spending represents only a tiny fraction of total consumption for the population as a whole. Among households connected to the network and consuming water, the fraction is much higher, typically 3 to 5 percent. This, in turn, is directly related to the impact of a proportional increase in water tariffs on poverty. For simplicity, relative poverty measures can be used: The poverty line in each country is set at half the mean level of per capita consumption. In many countries, the impact of a 50 percent increase in tariffs or even of a doubling of the tariffs is truly marginal at the national level, with estimates of the shares of the population living in poverty changing by barely one-tenth of a percentage point. Among households with a connection to the network, the impact is larger, but still fairly limited. There is rarely an increase in the share of households in poverty larger than one or two percentage points, and because the households that benefit from a connection tend not to be poor compared with other households, the increase in poverty starts from a very low base.

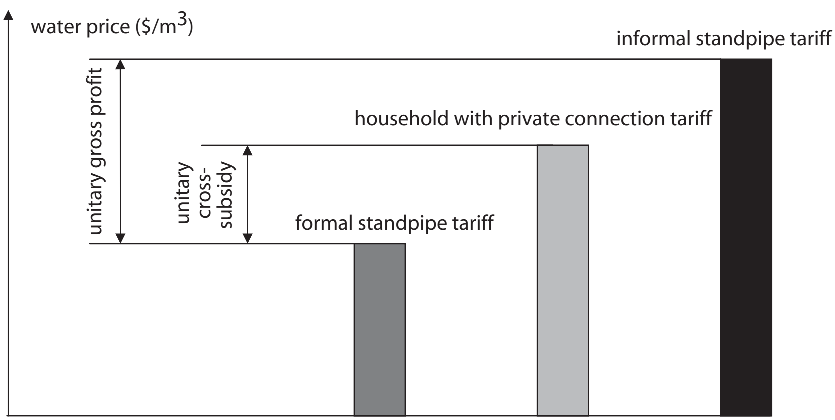
Thus, in general, it can be said that the impact on poverty of an increase in tariffs is small in most cases. This does not mean that such a poverty impact does not have negative consequences on those hit by it. It does mean, however, that if subsidies were reduced, and the funds were used in a different, more pro-poor way, there would be a potentially substantial gain for poverty reduction.

Annex 6.1 Methodology for Estimating the Annual Gross Profit and the Annual Cross-Subsidy between Household Consumers and Standpipes Captured by Standpipe Operators in a City

The following figure shows the prices charged by the utility to the standpipe operators (formal or official standpipe price), to a household with a private connection, and by the standpipe operator to the consumers (informal standpipe tariff). We define *unitary standpipe operator gross profit*, *unitary cross-subsidy between consumers with a household connection* and *standpipe operators* in the following way:

Unitary standpipe operator gross profit (P_G) (\$/m^3) = informal standpipe price (\$/m^3) – formal standpipe price (\$/m^3)

Unitary cross-subsidy household (HH) connection-standpipe operator ($S_{\text{HH-Stdp}}$) (\$/m^3) = HH consumer price (\$/m^3) – formal standpipe price (\$/m^3).



Source: Luengo, Keener, and Banerjee 2008..

Because households with private connections are assessed tariffs based on consumption levels, we have to define a common level of consumption to compare tariff structures across countries. The reference we use for this in an average consumption level of 60 liters per capita per day for people with a household private connection (Water Utility Partnership 2002). When analyzing the cross-subsidies between small and large consumers, one interesting finding is that the fixed-fee and minimum-consumption charge means an economic burden on low-volume consumers with a household connection. Although the increasing block tariff is commonplace in African countries, the two-part tariff structure can fail to lead to a price that favors small consumers (Banerjee, Wodon, and others 2008). Except in a few countries, among those who have a household connection, average consumers (60 liters per capita per day), not small consumers (25 liters per capita per day) pay the lowest price. In that sense, the 60 liters per capita per day reference can help us to define the lower boundary (and a better estimate) of the cross-subsidy between consumers with a household connection and standpipe operators.

To estimate the annual gross profit of the standpipe operators and the annual cross-subsidy between the consumer with a household connection and the standpipe operator, we use the following formulation:

Annual gross profit of standpipe operators (\$/year) = $P_G \times U \times 365$ (days/year) × 1,000 (liters/m^3) × $P \times C$,

where

P_G (\$/m^3): Unitary standpipe operator gross profit

U (liters per capita per day): Standpipe unit consumption; based on the AICD data, it is fixed at 25 liters per capita per day

P (#): City population

C (%): Coverage of the water service by standpipes

Annual cross-subsidy between the consumer with a household connection and the standpipe operator (\$/year) = $S_{HH\text{-}Stdp} \times U \times 365$ (days/year) × 1,000 (liters/m^3) × $P \times C$,

where

$S_{HH\text{-}Stdp}$ (\$/m^3): Unitary cross-subsidy between household consumer-standpipe operator

U (liters per capita per day): Standpipe unit consumption; based on the AICD data, it is fixed at 25 liters per capita per day

P (#): City population

C (%): Coverage of the water service by standpipes.

Notes

1. Gross profit = revenue from water sales – cost of water sales. This calculation does not include operation and maintenance costs, other overhead costs, taxes, and financial costs.
2. See annex 6.1 for the calculation methodology.
3. Based on 26 utilities for which information on connection charges were available.
4. Ω = (access factors) × (subsidy design factors).

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CHAPTER 7

Spending Needed to Meet Goals in Water and Sanitation

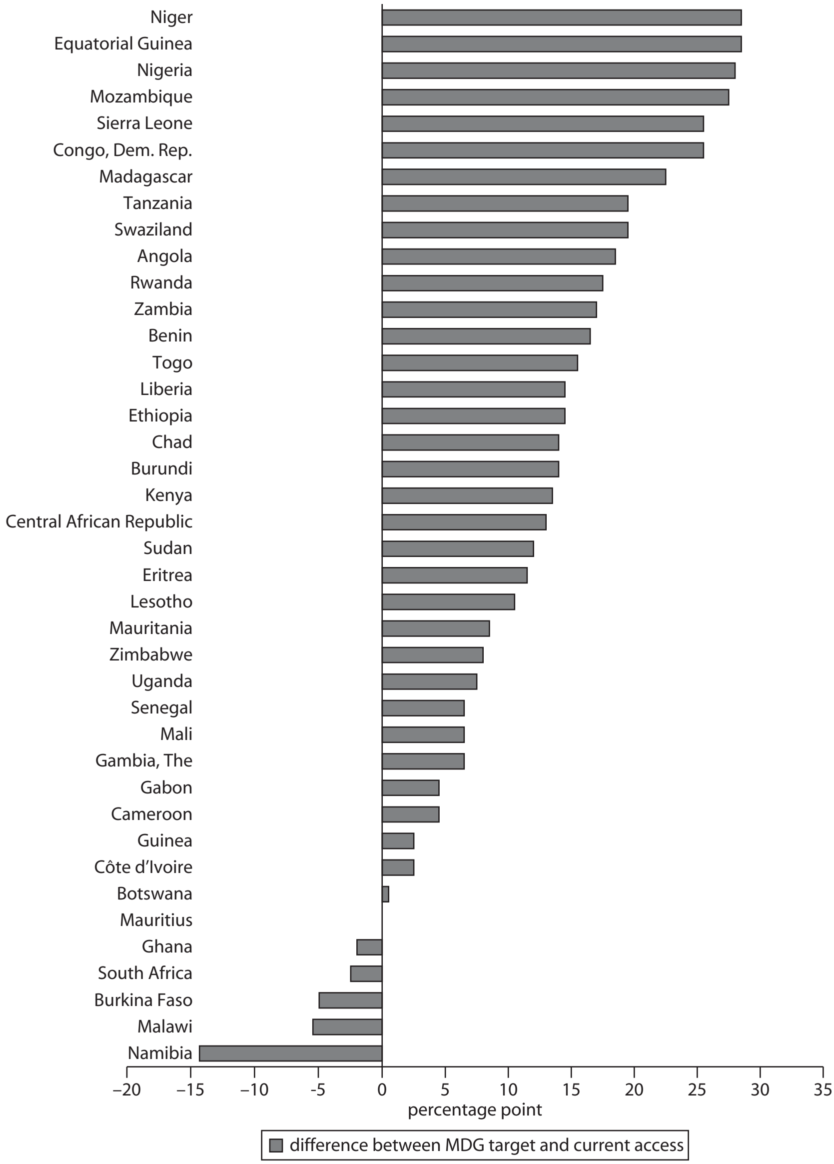
The Millennium Development Goal (MDG) for sustainable access to safe drinking water and improved sanitation presents an enormous financing challenge, particularly to many low-income countries. This chapter focuses on the levels of investments required to meet the water and sanitation MDG, assuming that access patterns remain broadly the same during the period from 2006 to 2015. The analysis presented here takes into account population growth and estimates the investment needed to expand access, rehabilitate existing assets, and ensure adequate maintenance.

The Challenge of Expanding Coverage

The progress toward the MDG for sustainable access to safe drinking water and basic sanitation has been made mostly in the water space as of 2006. Twenty-six countries are on track to meet the water MDG. At one end stand Niger, Equatorial Guinea, Nigeria, Mozambique, Sierra Leone, and the Democratic Republic of Congo, which show coverage rates of more than 25 percentage points below the MDG targets (figure 7.1).

At the other end, five countries had already reached the target as of 2006. Among these, two are middle-income countries: Namibia and South Africa. The rest are low-income countries: Burkina Faso; Malawi,

Figure 7.1 Water MDG Gap, 2006



Source: JMP 2006.

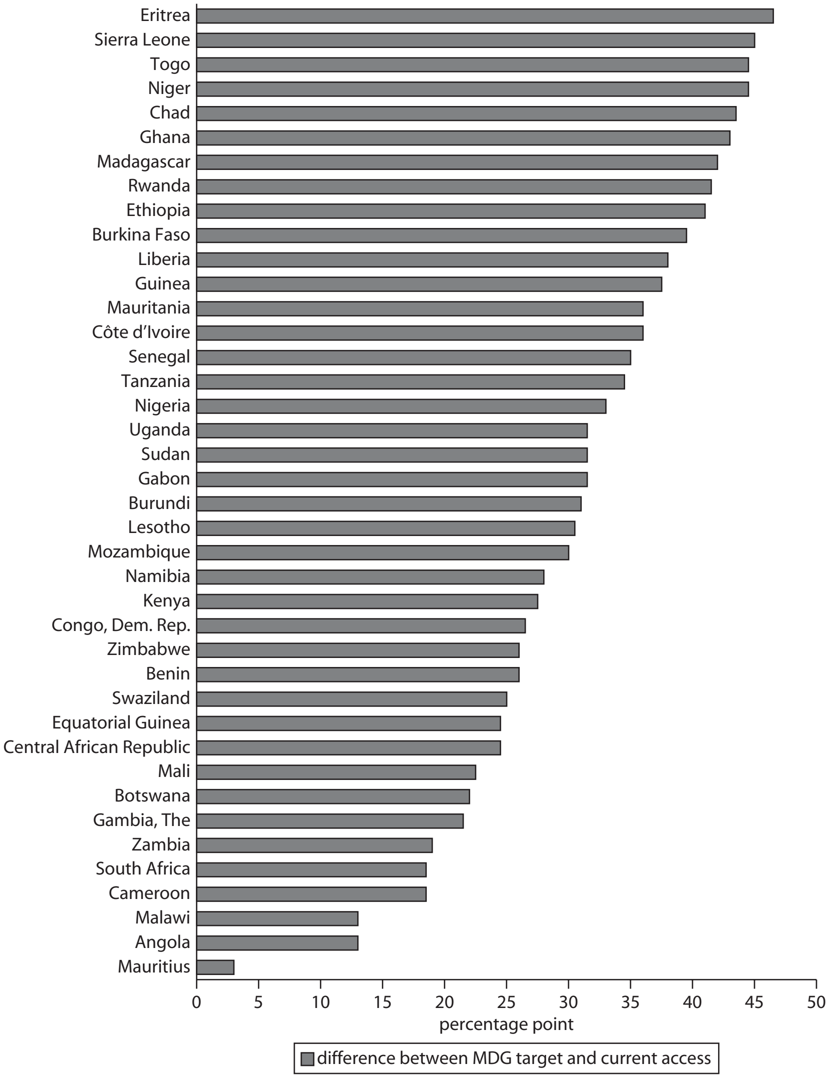
where improved water coverage doubled from 1990 to 2006; and Ghana. In the middle, 17 countries are 10 to 25 percentage points away from the target. These include, in decreasing order, Madagascar, Tanzania, Swaziland, Angola, Rwanda, Zambia, Benin, Togo, Liberia, Ethiopia, Chad, Burundi, Kenya, the Central African Republic, Sudan, Eritrea, and Lesotho. Also, Botswana, Cameroon, Côte d'Ivoire, Gabon, The Gambia, Guinea, Mali, Mauritania, Senegal, Uganda, and Zimbabwe are less than 10 percentage points away from the target.

Progress is more modest in sanitation: in 29 countries, improved sanitation coverage will have to more than double for the MDG target to be reached. In the sanitation space, at one end stand Eritrea, Sierra Leone, Togo, Niger, Chad, Ghana, Madagascar, Rwanda, Ethiopia, and Burkina Faso, all more than 40 percentage points away from MDG targets. A second group—including Liberia, Guinea, Mauritania, Côte d'Ivoire, Senegal, Tanzania, Nigeria, Uganda, Sudan, Gabon, Burundi, Lesotho, Mozambique, Namibia, Kenya, the Democratic Republic of Congo, Zimbabwe, Benin, Swaziland, Equatorial Guinea, the Central African Republic, Mali, Botswana, and The Gambia—show coverage rates between 20 and 40 percentage points below targets. Only Zambia, South Africa, Cameroon, Malawi, Angola, and Mauritius report coverage rates less than 20 percentage points away from targets (figure 7.2).

For countries that have already reached the water MDG, the analysis presented here sets the bar a little higher, assuming that the number of people without access in 2006 (instead of 2000) is halved by 2015. Also, it is assumed that the water and sanitation MDG is reached equally in urban and rural areas. The challenge is particularly severe for rural areas, whereas in some countries urban access is already on or above target. In this case, current urban access is assumed to be maintained in 2015.

The water and sanitation MDG targets translate into 764 million water customers and 646 million sanitation customers by 2015 using demographic projections for urban and rural populations, and assuming urban and rural population growth rates are equal to the averages for the past decade. This means that improved water service will need to be extended to an additional 308 million Africans, equal to one-third of the overall population in 2006 (table 7.1). Almost 70 percent of the new customers will be located in rural areas. To reach the sanitation MDG, the population with improved sanitation will need to more than double. New customers stand at 409 million people, equal to more than half of the overall population in 2006. Again, almost 70 percent of new customers will be located in rural areas.

Figure 7.2 Sanitation MDG Gap, 2006



Source: JMP 2006.

Middle-income countries are better positioned with respect to the MDG challenge in both absolute and relative terms, given the typically higher starting levels of coverage. They will have to improve water service for 9 million Africans and improve sanitation for 16 million. Nonfragile, low-income countries will face the largest number of new

Table 7.1 Additional Population to Be Served by 2015
(millions of people)

	Water			Sanitation		
	National	*Urban*	*Rural*	*National*	*Urban*	*Rural*
Angola	7.0	4.3	2.7	5.3	3.6	1.6
Benin	3.7	1.4	2.4	3.8	0.9	3.0
Botswana	0.3	0.2	0.0	0.6	0.3	0.3
Burkina Faso	6.0	1.5	4.6	8.2	1.1	7.1
Burundi	4.0	0.5	3.5	4.5	0.6	3.9
Cameroon	4.2	3.6	0.6	6.5	4.0	2.5
Cape Verde	0.2	0.1	0.0	0.2	0.1	0.1
Central African Republic	1.1	0.3	0.8	1.4	0.4	1.0
Chad	3.8	1.1	2.8	6.6	1.6	5.0
Congo, Dem. Rep.	26.2	5.3	20.9	26.8	8.5	18.3
Congo, Rep.	1.2	0.6	0.6	2.0	1.3	0.7
Côte d'Ivoire	4.5	4.2	0.3	8.9	3.7	5.1
Equatorial Guinea	0.2	0.1	0.1	0.2	0.1	0.1
Eritrea	1.9	0.4	1.5	3.2	0.7	2.5
Ethiopia	23.3	5.6	17.8	42.5	6.2	36.3
Gabon	0.3	0.3	0.0	0.6	0.5	0.1
Gambia, The	0.6	0.5	0.2	0.8	0.6	0.2
Ghana	7.1	4.0	3.0	12.6	6.6	6.0
Guinea	1.5	0.9	0.6	4.4	1.3	3.1
Kenya	11.9	2.5	9.4	16.8	5.9	10.8
Lesotho	0.4	0.2	0.2	0.8	0.2	0.5
Liberia	1.5	0.9	0.5	2.2	1.1	1.1
Madagascar	8.0	1.7	6.3	10.9	3.2	7.7
Malawi	4.9	1.4	3.5	4.5	1.6	2.9
Mali	3.3	1.7	1.6	5.2	1.6	3.6
Mauritania	0.8	0.3	0.6	1.6	0.4	1.2
Mauritius	0.1	0.0	0.1	0.2	0.1	0.1
Mozambique	9.5	2.7	6.8	9.5	2.9	6.6
Namibia	0.4	0.2	0.1	0.8	0.2	0.6
Niger	7.5	0.8	6.7	8.7	1.0	7.7
Nigeria	69.7	29.0	40.7	72.0	37.7	34.4
Rwanda	4.3	1.3	3.1	6.0	1.5	4.6
Senegal	3.5	1.5	2.0	6.2	1.5	4.8
Sierra Leone	3.3	0.8	2.5	3.8	1.3	2.5
South Africa	7.7	5.9	1.8	13.4	7.8	5.6
Sudan	11.8	6.9	4.9	17.8	7.7	10.1
Swaziland	0.4	0.1	0.3	0.4	0.1	0.3

(continued next page)

Table 7.1 *(continued)*

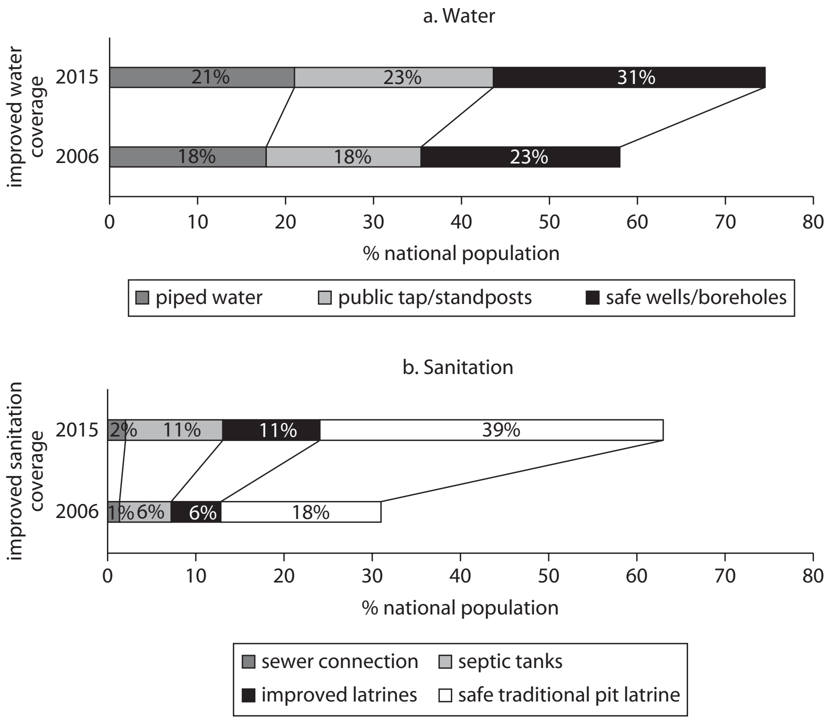
	Water			*Sanitation*		
	National	*Urban*	*Rural*	*National*	*Urban*	*Rural*
Tanzania	15.4	3.5	11.9	20.4	6.5	13.9
Togo	15.9	1.4	14.5	20.7	2.1	18.6
Uganda	9.3	1.4	7.9	15.6	2.4	13.3
Zambia	3.6	0.7	2.9	3.7	1.2	2.5
Zimbabwe	2.0	1.0	1.0	4.2	1.1	3.0
Resource-rich	101.8	46.5	55.3	114.6	57.7	57.0
Middle-income	9.3	6.7	2.6	16.3	8.7	7.6
Low-income, fragile	62.5	16.2	6.3	81.0	21.5	59.4
Low-income, nonfragile	118.5	31.2	87.4	172.7	43.3	129.4
Sub-Saharan Africa	**307.7**	**92.4**	**215.3**	**408.7**	**130.0**	**278.7**

Sources: JMP 2006; World Development Indicators Database 2006 (http://data.worldbank.org/).

water customers in absolute terms: 120 million. Yet, in relative terms, they are better positioned than fragile, low-income countries, which will need to raise by more than 40 percent the number of people with access to improved water. Interestingly, even in relative terms, fragile, low-income countries score second to resource-rich countries, which will need to add more than 100 million Africans to water service, equal to 42 percent of their current population. In the sanitation space, nonfragile, low-income countries face the most difficult challenge: they will have to add more than 170 million customers, equal to more than half of their current population. Fragile, low-income countries follow closely in relative terms, although in absolute terms resource-rich countries will need to add a larger number of customers given their size.

The analysis assumes a *base scenario* in which the share of the population using high-quality or improved water and sanitation services relative to the overall served population will remain the same in 2015, although in absolute terms more people will enjoy high-quality services because of demographic growth (figure 7.3). As a result, in 2015 private water connections will account for no more than one-third of improved water coverage, standposts for another third, and wells and boreholes for the remaining 40 percent. Similarly, improved sanitation coverage will still be achieved predominantly through safe traditional latrines (around 60 percent); ventilated improved pit latrines will account for one-fifth of

Figure 7.3 Population Split across Water and Sanitation Modalities Given Current and Target Coverage by 2015 under the Base Scenario Assumptions



Source: Authors' compilation.

improved sanitation coverage, septic tanks for another fifth, and sewer connections for less than 5 percent.

The Unit Cost of Service Provision across Countries

The unit costs of infrastructure determine the level of spending on service expansion, rehabilitation, and operations and maintenance (O&M). Unit costs vary to a large extent across countries and within regions as a result of density, location, technological innovation, and level of local market development—factors that are almost all exogenous, at least in the short and medium terms.[1] Concentration largely reduces investment costs for water and sewerage networks in dense city centers, whereas great distances make it impractical to roll out connection lines into dispersed rural areas.

Poor capacity in the local construction sector, lack of skilled construction workers, shortage of materials, and scarce financing reduce the range of available on-site technologies and constrain the development of innovations that would ensure higher quality at more affordable prices. Efficiency considerations call for understanding of what level of service can be realistically provided to as many people as possible rather than channeling limited public resources into higher-quality services accessible by considerably fewer people. Therefore, the typology of country settings ultimately shapes the trade-off between political objectives and spending constraints.

Vast differences in costs are seen across countries and between urban and rural areas. The capital cost per capita of an urban residential water connection can range from $200 in countries where urbanization and concentration have taken off up to $1,000 in countries that are primarily rural. Similarly, the capital cost per capita of an urban standpost connection can range from $60 to $150. The price of a residential water connection in rural areas fluctuates even more across countries. It increases from $700 in countries where rural areas are more densely populated to a price 10 times higher in countries with mostly remote rural spaces. The capital cost per capita of a standpost installed in rural areas fluctuates less, with a range of $100 to $200.

Similar differences in network infrastructure prices can be found within countries between urban and rural areas. Table 7.2 reports capital costs per capita of water connections at different urban and rural locations. Locations span from megacities with populations of more than 3 million people and densities of about 5,000 people per square kilometer, to rural areas more than six hours of travel time away from the nearest urban center, whose typical densities barely reach 15 people per square kilometer. The capital cost per capita of a private connection increases exponentially from highly dense megacities to remote rural areas. The capital cost per capita of a standpost connection quadruples.

The considerable sensitivity to density makes infrastructure networks less affordable in Africa than elsewhere. Africa remains a predominantly rural continent and is therefore low-density. Sixty-six percent of Africans still live in rural areas, and of those 50 percent live in the rural hinterlands and up to 16 percent in remote villages. Also, one-third of the urban population—equal to 10 percent of the overall population—lives in peri-urban areas with fewer than 100 people per square kilometer, and a slightly larger share—13 percent of the overall population—lives in cities with a population of more than 1 million and densities of about 3,500 people per square kilometer.

Table 7.2 Unit Costs of Water Network Infrastructure Services by Location in the Median Country

	Large cities							
	> 3 million people	*2.0–2.99 million people*	*1.0–1.99 million people*	*0.5–0.99 million people*	*0.1–0.49 million people*	*Secondary cities*	*Rural hinterland*	*Deep rural area*
Median density (inhabitants/km^2)	5,009	4,083	2,855	2,712	1,373	1,282	38	13
$ per capita								
Private water connection	232	255	302	309	428	443	1,825	3,156
Standpost connection	66	72	85	87	119	123	268	273

Source: Authors' compilation.

Note: Cities are classified by population size with typologies spanning from secondary cities with populations of fewer than 100,000 people to megacities with more than 3 million inhabitants. Nonurban areas are classified by distance or travel time to the nearest city. In particular, "rural hinterland" indicates rural locations within six hours' travel time from the closest urban center, and deep rural areas are those more than six hours away. Urban and rural locations are assigned with the median of the densities estimated for each location in 42 Sub-Saharan African countries.

Unit costs of on-site facilities also vary across countries. The price of a borehole with hand pump is $20 to $90 per capita, and the price of a well with hand pump is $15 to $80 per capita (table 7.3). More advanced technologies, such as boreholes with hand or even electric pumps, are typically used in urban areas, whereas less-expensive technologies are more common in rural areas, where low densities require less capacity.

Unit costs of on-site sanitation services range from $39 for a traditional latrine to $60 for an improved latrine to $125 for a septic tank (table 7.4). Sanitation unit costs are adjusted by a construction index factor (box 7.1) to reflect differences across local construction markets and levels of technological innovation in the sanitation sector.

For sewerage networks, owing to their low prevalence in Africa, a median unit cost based on experience from World Bank operations has

Table 7.3 Unit Costs of Wells and Boreholes

	Borehole with hand pump ($ per capita)	*Well with hand pump ($ per capita)*
Benin	50	36
Burkina Faso	36	26
Cameroon	76	58
Cape Verde	50	36
Chad	50	36
Congo, Dem. Rep.	50	36
Côte d'Ivoire	50	36
Ethiopia	50	36
Ghana	22	20
Kenya	50	36
Lesotho	50	36
Madagascar	50	17
Malawi	50	36
Mozambique	50	36
Namibia	50	36
Niger	94	82
Nigeria	50	36
Rwanda	50	36
Senegal	50	36
South Africa	50	36
Sudan	50	36
Tanzania	50	36
Uganda	50	36
Zambia	50	36

Source: World Bank's public expenditures reviews for Cameroon, Côte d'Ivoire, and Niger.

Table 7.4 Unit Costs of On-Site Sanitation Services

	Septic tank	*Improved latrine*	*Traditional latrine*
$ per capita	125	57	39

Source: World Water Assessment Programme 2000, http://www.unesco.org/water/wwap/wwdr/indicators/.

Box 7.1

The Construction Index Factor

The construction index used in this analysis results from the Basket of Construction Components (BOCC) approach introduced in the 2003 to 2006 round of the International Comparison Program (ICP) to calculate comparable prices in the construction sector.

The ICP, the world's largest statistical initiative, produces internationally comparable price levels, economic aggregates in real terms, and purchasing power parity estimates. The ICP uses a series of statistical surveys to collect price data for a basket of goods and services. By using estimates of purchasing power parity as conversion factors, the resulting comparisons of gross domestic product allow for measuring the relative social and economic well-being of countries, monitoring the incidence of poverty, tracking progress toward the MDGs, and targeting programs effectively.

The launch of BOCC followed the conclusion that lack of comparability of capital goods in different countries had weakened the effectiveness of the past ICP round. In particular, BOCC resulted from the attempt to respond to the following issues: Given the nature of the construction sector and the inherent difficulties in construction price comparisons, what improvements can be made? What basis and level of comparison is appropriate for the sector? How can quality and level-of-service differences among countries be incorporated in these comparisons?

The BOCC measures relative prices at the level of the construction component, which can be thought of as an aggregation of several construction work items. These items include the material put in place, labor and equipment, and any consumables required. The price comparisons are performed using three baskets: residential, nonresidential, and civil works. Each basket is broken down into construction systems. Under each system a set of construction components is identified and defined. The approach was endorsed by the ICP Technical Advisory Group as a much simpler price comparison tool than the current practice, and it is expected to reduce resource and expertise requirements in the price collection process in the construction sector.

Source: Adapted from World Bank, "International Comparison Program 2011," http://www.worldbank.org/data/icp.

been estimated at $400. After adjusting for the construction index factor, the average cost per capita of a sewerage connection is estimated at $440.

To Close the MDG Coverage Gap

The total spending required for reaching the water and sanitation MDGs is valued at $22.6 billion per year or 3.5 percent of Africa's gross domestic product (GDP). Most of the needs come from the water sector, which is estimated to require allocations up to $17 billion per year or 2.7 percent of Africa's GDP (table 7.5).

The cost of new infrastructure appears to carry the heaviest weight and require allocations up to 1.5 percent of Africa's GDP every year, or 43 percent of overall spending. O&M needs immediately follow and stand at 1.1 percent of Africa's GDP, or 31 percent of overall costs. Rehabilitation of existing assets requires lower yet substantial allocations—up to 0.9 percent of Africa's GDP—which accounts for one-fourth of the overall needs. A similar composition can be observed for water spending needs, 42 percent of which are generated by investments in expansion, 25 percent by rehabilitation of existing assets, and 33 percent by O&M. The sanitation sector shows a different composition: investments in new infrastructure dominate spending needs and account for more than 40 percent, and rehabilitation and O&M each account for one-fourth.

A larger share of spending on water and sanitation is allocated to rural areas because of the large urban-rural divide in access to infrastructure services, quality of service, and asset conditions, which are estimated to account for 59 percent of overall requirements (figure 7.4). In particular, rural areas should absorb up to 63 percent of the overall investments in new infrastructure. Almost the same share of rehabilitation spending should be channeled to rural areas, owing to a much more severe obsolescence of rural infrastructure. O&M needs are almost evenly split between urban and rural areas.

These distribution patterns do not apply equally to water and sanitation. In the water space, more than 60 percent of spending needs originate from rural areas, whether they are investments in new infrastructure, rehabilitation of existing assets, or maintenance. In the sanitation space, 55 percent of overall spending needs originate from urban areas. O&M needs mainly concern urban sanitation assets, yet rural areas account for 57 percent of rehabilitation needs.

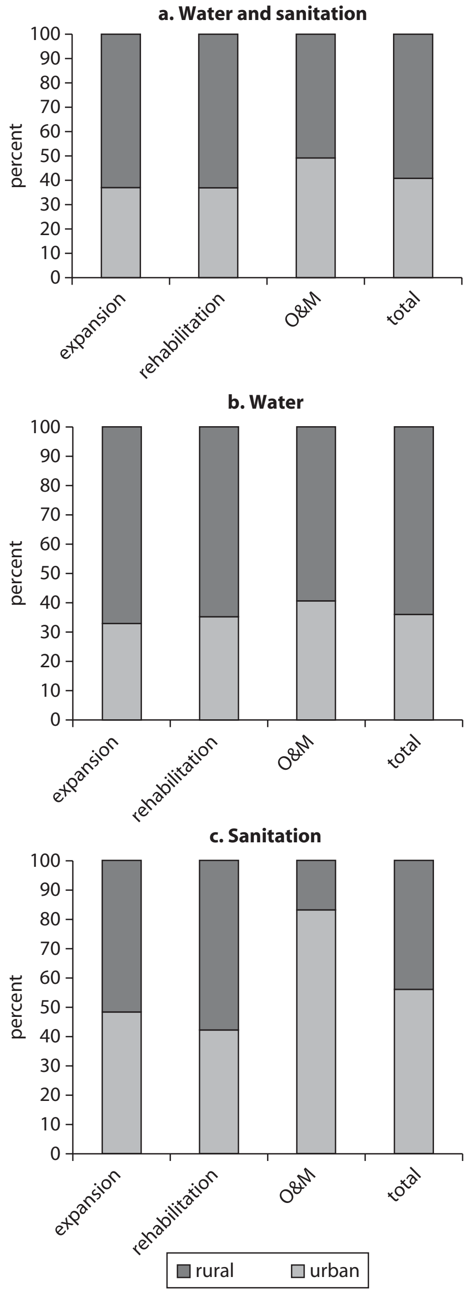
The composition of spending needs differs between middle- and low-income countries (table 7.6). Low-income countries, whether fragile or

Table 7.5 Overall Water and Sanitation Spending Needs

	Share of GDP (%)					*$ million/year*				
	CAPEX					*CAPEX*				
	Expansion	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total Needs*	*Expansion*	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total needs*
Water	1.13	0.68	1.80	0.89	2.69	7,225	4,327	11,553	5,686	17,239
Sanitation	0.41	0.21	0.62	0.22	0.84	2,617	1,352	3,969	1,432	5,401
Total	1.54	0.89	2.42	1.11	**3.53**	9,843	5,679	15,522	7,118	**22,640**

Source: Authors' calculations.
Note: CAPEX = capital expenditure, GDP = gross domestic product, O&M = operations and maintenance.

Figure 7.4 Urban-Rural Split of Spending Needs



Source: Authors' compilation.

Table 7.6 Split of Spending Needs by Category

	Share of GDP (%)					*US$ million per year*				
	CAPEX					*CAPEX*				
	New investment	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total spending needs*	*New investment*	*Rehabilitation*	*Total CAPEX*	*O&M*	*Total spending needs*
Sub-Saharan Africa	1.5	0.9	2.4	1.1	3.5	9,843	5,679	15,522	7,118	22,640
Resource-rich	1.3	0.8	2.1	0.8	2.9	2,864	1,741	4,605	1,759	6,364
Middle-income	0.4	0.4	0.7	0.7	1.5	1,034	951	1,985	1,991	3,976
Low-income, fragile	5.9	2.7	8.5	3.3	11.8	2,208	1,006	3,213	1,223	4,437
Low-income, nonfragile	3.4	1.8	5.1	1.9	7.1	3,714	1,968	5,682	2,128	7,810

Source: Authors' calculations based on access data as of 2006.
Note: CAPEX = capital expenditure, GDP = gross domestic product, O&M = operations and maintenance.

nonfragile, and resource-rich countries show much similarity, with costs divided almost equally among expansion and rehabilitation and maintenance. Conversely, middle-income countries focus more on maintenance, which accounts for half the overall needs, and the high coverage rates and relatively lower rehabilitation backlog make infrastructure expansion and rehabilitation less of a priority.

The total spending needs range from a maximum of $3.3 billion per year in the case of South Africa to a minimum of $19 million per year in the case of Equatorial Guinea, with a fair number of countries, including Nigeria, Sudan, Kenya, the Democratic Republic of Congo, Ethiopia, and Tanzania, that should spend between $1.0 and $2.3 billion per year to halve the gap of people without access to water and sanitation services by 2015 (figure 7.5). Middle-income countries together report the highest needs, almost $3 billion per year, followed by resource-rich countries, with $1.5 billion per year. Despite the lower size of their economies, low-income countries altogether account for a similar amount, owing to the larger service gap they have to make up for.

It should be noted, however, that for some countries, part of the information required to calculate specific spending components is not available. For these, estimates may be just lower bounds of the actual spending needs.

Normalizing needs by the size of the countries' economies reveals that most countries should allocate well over 3 percent of their GDP every year to water and sanitation.

As expected, the level of spending required by the MDG varies to a large extent across countries. Three country groups can be identified. The first group represents countries with large spending needs—more than 10 percent of the GDP per year. The second includes countries with medium spending needs—3 to 10 percent of the GDP per year. The third group consists of those with needs less than 3 percent of GDP per year. Among these, Equatorial Guinea stands at the bottom of the distribution, with overall needs below 0.3 percent of the GDP. On the opposite end, Togo, the Democratic Republic of Congo, and Liberia, show manifestly unaffordable needs that reach more than 20 percent of the GDP per year.

The affordability of the MDG challenge appears to correlate strongly to a country's income. Halving the population without access to water and sanitation services by 2015 is estimated to require only 1.5 percent of middle-income countries' GDP per year. Resource-rich countries should invest twice as much annually—3 percent of their

Figure 7.5 Africa's Water and Sanitation Needs by Country

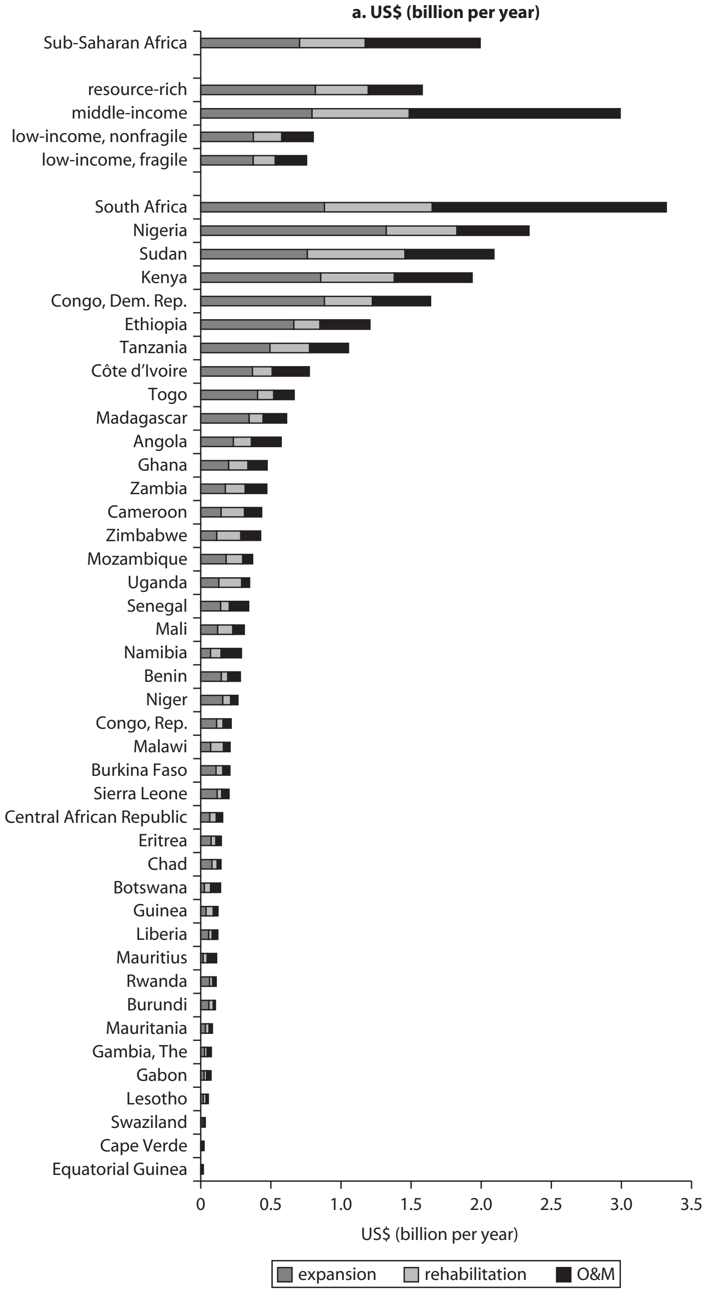


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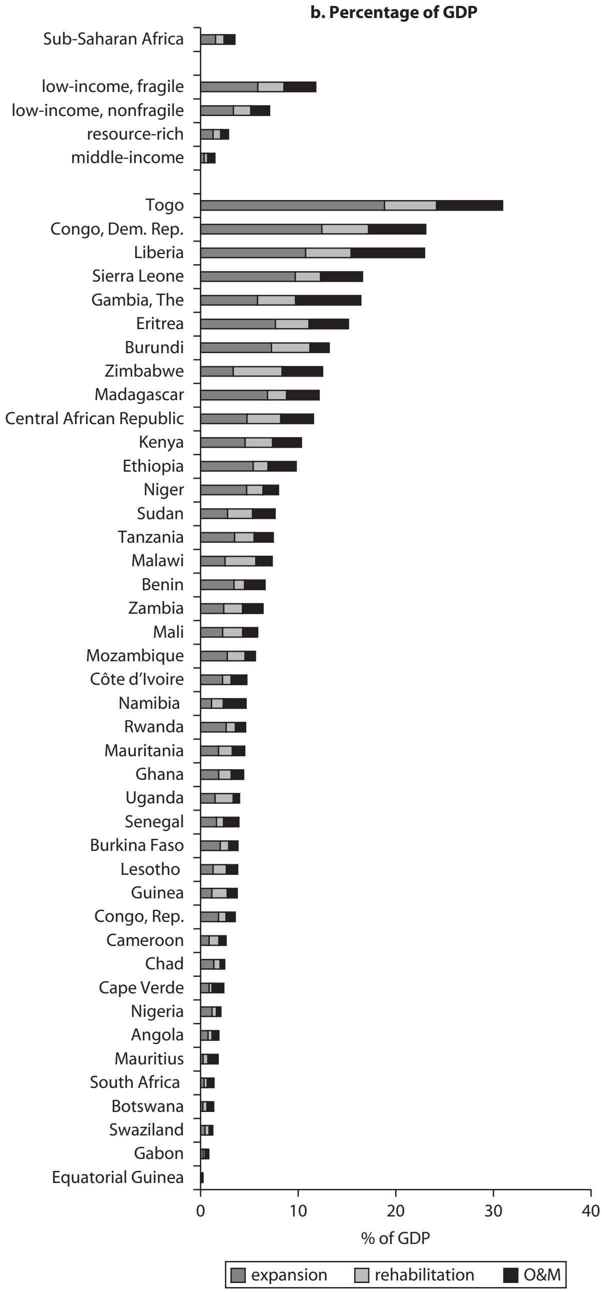
Figure 7.5 *(continued)*



Source: Authors' compilation.
Note: O&M = operations and maintenance.

GDP. The bill becomes prohibitively expensive for low-income countries, which are required to allocate at least 7 percent of GDP annually to water and sanitation every year, and especially for fragile states, for which water and sanitation needs reach almost 12 percent of GDP per year.

Compared with existing spending on water and sanitation—a topic of discussion for the next chapter—delivering the additional financing needed to meet the water and sanitation MDGs looks comfortably manageable only for middle-income countries and barely manageable for resource-rich countries. Both might be able to afford service expansion in tandem with maintaining and even improving service standards. This is not the case for low-income countries, however, particularly fragile states. Realistically, these countries must either accommodate new customers with lower-cost technologies that substantially reduce investment needs and maintenance costs or postpone their achievement of the goals.

Annex 7.1 Unit Cost Matrix Model: A Methodology for Estimating Nonstandardized Unit Costs of Network Assets

The unit costs matrix model is designed specifically to estimate the capital cost per capita of expanding networks in all relevant infrastructure sectors, including water and sanitation, energy, information and communication technologies, and roads, as a function of density and location. The main value of this model is that it allows estimation of country-specific, as opposed to standardized, unit costs. As such, it provides a tool to assess the affordability and efficiency of networks given a country's typical geography, urbanization, and density patterns, and to explore the viability of lower-cost technological alternatives.

A prerequisite to the analysis is the definition of density-based city categories and rural regions, which ideally compose an urban-rural gradient. Cities are classified by population size using data from Henderson (2002)[2] so that typologies span from secondary cities with populations fewer than 100,000 people to megacities with more than 3 million inhabitants. Nonurban areas, including rural hinterlands and deep rural regions, are classified by distance or travel time to the nearest city. Densities are attributed to each typology (table 7.1A) using extent layers from the Global Rural-Urban Mapping Project (GRUMP). This makes it possible to convert the distribution of human population

Table 7.1A Population Density across Urban and Rural Typologies (Number of People per Square Kilometer)

	Large urban					*Secondary cities*	*Rural hinterland*	*Deep rural area*
	> 3 million people	*2.0–2.99 million people*	*1.0–1.99 million people*	*0.5–0.99 million people*	*0.1–0.49 million people*	*< 0.1 million people*	*Between 1 and 6 hours' travel time from nearest city*	*More than 6 hours' travel time from nearest city*
Benin				4,861	1,446	840	46	13
Burkina Faso			2,108		271	268	43	15
Cameroon			4,897		645	1,640	31	7
Cape Verde						1,248	102	40
Chad			2,854		1,373	200	23	4
Congo, Dem. Rep.			2,571	2,617		1,367	35	13
Côte d'Ivoire	4,743			2,306	1,430	1,142	34	13
Ethiopia		4,724			1,644	1,440	107	25
Ghana			3,159	3,199	413	690	71	29
Kenya		2,461		19,928	1,367	1,682	89	5
Lesotho					1,168	—	71	35
Madagascar			3,134		1,040	1,692	40	15
Malawi	—	—	—	—	—	—	114	12
Mozambique	5,008				2,318	1,601	26	9
Namibia					534	—	2	2
Niger				1,573	1,950	1,246	36	2
Nigeria	5,394		4,349	2,806	2,614	1,315	91	50
Rwanda					2,650	—	309	103
Senegal		8,630			1,903	1,383	33	7
South Africa		1,765	1,076		574	400	22	1
Sudan	—	—	—	—	—	807	22	6
Tanzania		4,083	5,406		2,032	1,672	36	16
Uganda			2,529			3,060	122	37
Zambia			1,307	1,105	850	582	14	8

Sources: Authors' compilation based on GRUMP data and Henderson 2002.
Note: Blank cells indicate no cities with that population size. — = not available.

from national or subnational spatial units (usually administrative units) to a series of geo-referenced quadrilateral grids. In urban areas, where multiple cities of a country fall in the same category, the median density of the category is calculated.

It should be noted that density figures are approximate at best owing to the limitations associated with input data. A particular limitation is posed by the paucity of data sets that observe city populations at the same point in time. Henderson (2002) is one of the few, but its data are no more recent than 2000.

The analysis disaggregates unit cost structures of network water services in subcomponents, such as water production and storage, distribution, and connection, and estimates them separately. Although water production, storage costs, and connection costs do not vary by density and location, distribution costs are a function of distance from the water source and concentration of connections.

Standard values for key inputs to the analysis, such as water production capacity per day, storage capacity per connection, and urban and rural water consumption by house and standpost connection, are derived from World Bank water programs in Africa.

In addition to these, a few assumptions are made regarding the number of people per standpost—no more than 200—and the normative walking distance to a standpost—1 kilometer maximum.

Unit prices of materials and technologies (such as the cost of a well with an electric pump or of a meter of water main and small diameter pipe) and connection costs are derived from a study undertaken as part of the Africa Infrastructure Country Diagnostic that collected evidence on unit costs from water and sanitation programs financed by donors in Africa between 2002 and 2006 (box 7.1A).

Box 7.1A

Unit Costs of Infrastructure Projects Study

The objective of the Unit Costs of Infrastructure Projects Study is to design, generate, and analyze a database of standardized unit costs for different types of commonly financed infrastructure investments in Sub-Saharan Africa over the past decade. Actual unit costs are gathered from recently completed projects by

(continued next page)

Box 7.1A *(continued)*

using documentation on procured contracts obtained from four development finance institutions.

The analysis spans relevant infrastructure sectors, including roads, water and sanitation, and energy. Although the objective was to compile a representative sample of projects, with a target of 150 contracts per sector, practical constraints limited the sample to 115 road contracts, 144 water contracts, and 58 electricity contracts over a shorter period of time—approximately 2002–06.

The study focuses on unit output costs—that is, the cost per unit of infrastructure (a water connection, for example) as opposed to the cost per unit of input (such as labor costs). Standardized output costs are especially useful for planning purposes and for estimating value for money. The spread of unit cost values is described using the median—not affected by outlier values—as the center point and the interquartile range to explain the distance from the center. Outlier values are excluded in the calculation of the range.

Three main challenges emerged from this study and are likely to affect similar exercises of this kind. First, the great variability among collected unit cost figures mainly reflects differences in project design. This is an issue because available information on project design does not easily allow standardizing the infrastructure outputs being compared. Where this information is available, it takes the form of technical specifications that run to hundreds of pages. The variability in the design of the outputs made it necessary to subdivide contracts into ever-smaller categories—something not conducive to making generalized conclusions. Second, many practical challenges are involved in parsing and compiling information. Not least of these is the difficulty of obtaining decentralized paper records of projects from donors. Even where electronic databases are maintained, locating and segregating the relevant data remains a complex and time-consuming exercise. Third, data collection difficulties normally occur, reducing the sample size and the significance of the comparisons being made.

As far as water and sanitation is concerned, the 144 sampled projects include 33 well contracts, 60 distribution main contracts, 14 reservoir contracts, 26 service connection contracts, and 11 public latrine contracts. Data are drawn from only one development institution, and the country coverage is highly skewed, with more than 80 percent of the contracts coming from just five countries: Mozambique, Namibia, Nigeria, Tanzania, and Zambia. The water and sanitation unit costs are summarized in the following table.

(continued next page)

Box 7.1A *(continued)*

Unit Costs for Water and Sanitation Projects, 2006 US$

Type	*Unit*	*Lower quartile*	*Median*	*Upper quartile*
Wells—no pump	*$/well*	*5,297*	*6,341*	*6,707*
Wells—electric pump	$/well	14,112	37,492	54,701
Wells—electric and hand pump	*$/well*	*11,288*	*13,959*	*14,896*
Pipe—small diameter	$/m	14	26	40
Pipe—midsize diameter	$/m	122	144	219
Pipe—mains	*$/m*	*358*	*457*	*633*
Reservoir construction—steel	$/kl	437	1,067	2,584
Service connection—yard	$/conn	13	24	74
Service connection—standpipe	*$/conn*	*177*	*282*	*363*
Latrines—public	$/conn	14,014	19,659	29,662

Source: Adapted from Africon 2008.
Note: Italicized rows denote sample sizes large enough to provide reliable unit cost predictions.
conn = connection, kl = kiloliter, m = meter.

Annex 7.2 Methodology for Quantifying Rehabilitation and O&M Needs

Network infrastructure:

$$R_i = k \times \frac{UC_i}{30},$$

UC_i = Unit cost per capita of asset I,
k = coefficient that takes a value of 5 or 10 depending on country category.

Nonnetwork infrastructure:

$$R_i = a \times \frac{UC_i}{l},$$

UC_i = Unit cost per capita of asset I,
a = value of the components of asset i to be replaced expressed as percentage of the total cost of I,
l = life span of asset I.

Values for *a* and *l:*

	a (%)	*l* (years)
Water		
Urban areas	40	10
Rural areas	80	5
Sanitation		
Septic tank	12.5	10
Improved latrine	12.5	10
Traditional (safe) latrine	100	5

Per capita O&M:
$O\&M = p \times UC_i$,
UC_i = Unit cost per capita of asset *I*,
p = coefficient that takes a value of 3% for network assets and 1.5% for nonnetwork assets.

Notes

1. Based on unit cost matrix model (annex 7.1) designed for this analysis. It estimates the capital cost per capita of a network connection at varying levels of density in both urban and rural areas.
2. This is one of the few databases compiling city populations at the same point of time.

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CHAPTER 8

Bridging the Funding Gap

The price tag for many countries to accomplish the Millennium Development Goals (MDGs) for water supply and sanitation (WSS) is prohibitive when compared with current levels of spending. This chapter delves into the levels and composition of spending on WSS, evaluates how much more can be done within Africa's existing resource envelope by alleviating inefficiencies, and finally arrives at the annual funding gap. It further explores the potential for raising additional financing and policy adjustments to reduce the burden of the funding gap.

Current Spending on Water and Sanitation

Africa is spending a total of $7.9 billion a year to address its WSS needs, which is equivalent to 1.2 percent of Sub-Saharan Africa's gross domestic product (GDP). Existing spending on infrastructure in Africa is higher than previously thought when the calculation takes into account budget and off-budget spending—including state-owned enterprises (SOEs) and extrabudgetary funds—as well as external financing, a category that comprises official development assistance (ODA) from the member states of the Organisation for Economic Co-operation and Development (OECD), financiers from outside the OECD, self-household financing, and private participation in infrastructure. Overall, however, these numbers might be underestimated given the complexity of traced resources allocated to the sector, in particular those coming from nongovernmental organizations and allotted to sanitation or rural water programs, which are not always centrally recorded and hence could not be fully captured in this exercise.

In absolute terms, spending levels vary significantly across the country groups (table 8.1): Middle-income countries spend \$2.6 billion, followed by low-income countries (\$1.8 billion), and resource-rich countries (\$1.7 billion); fragile states spend about \$0.5 billion in capital investment and operations and maintenance (O&M). Expressed as a percentage of GDP, infrastructure spending fluctuates widely across different country groups; whereas low-income countries and fragile states spend 1.1 percent and 1.7 percent of their GDP, respectively, middle-income countries and resource-rich countries spend 1 percent or less of GDP (1.0 percent and 0.8 percent, respectively).

The composition of spending also varies substantially across country groups. Middle-income countries allocate 80 percent of WSS spending to maintenance, likely reflecting the fact that they have already built much of the infrastructure needed. By contrast, all the other country groups allocate at most 30 percent to this item. Therefore, resource-rich countries, low-income countries, and fragile states spend 70 to 90 percent of their budgets on capital investments. Although this reflects their need to build new WSS facilities, a danger exists of neglecting the maintenance needs of the limited network that is available.

Table 8.1 Spending by Functional Category, Annualized Average Flows, 2001–05

	GDP share (%)			*US\$ (million per year)*		
	O&M	*Total CAPEX*	*Total spending*	*O&M*	*Total CAPEX*	*Total spending*
Sub-Saharan Africa	0.5	0.7	1.2	3,112	4,778	7,890
Low-income, fragile	0.3	0.8	1.1	128	313	441
Low-income, nonfragile	0.3	1.4	1.7	307	1,533	1,840
Middle-income	0.7	0.2	1.0	1,996	641	2,637
Resource-rich	0.1	0.7	0.8	188	1,564	1,753

Sources: Foster and Briceño-Garmendia 2009; Briceño-Garmendia, Smits, and Foster 2008 for public spending; PPIAF 2008 for private flows; Foster and others 2008 for non-OECD financiers.

Note: Aggregate public sector covers general government and nonfinancial enterprises. Figures are extrapolations based on the 24-country covered in AICD Phase 1. Total might not add up exactly because of scaling up among country groups and rounding error. CAPEX = capital expenditure, GDP = gross domestic product, O&M = operations and maintenance.

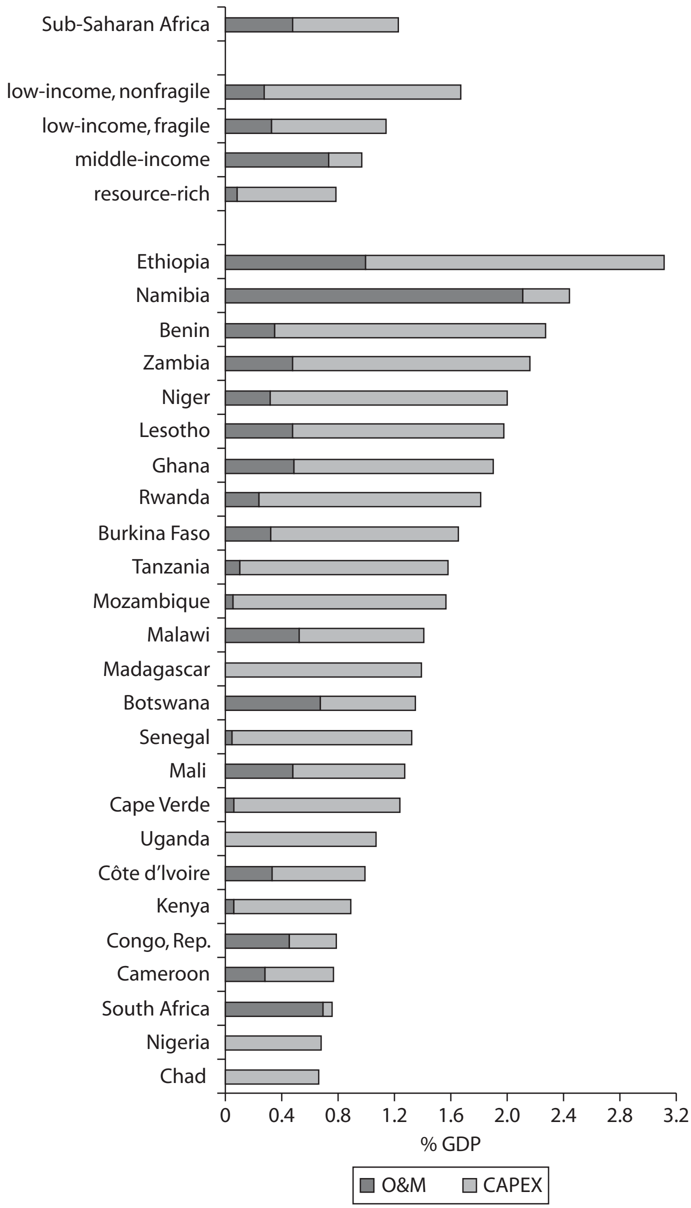
The explanations for this composition of spending are different in each case. For low-income fragile states, the problem is the limited flow of resources available; this fosters a preference for investing in expansion of access to new customers. Resource-rich countries, in contrast, have a limited propensity to spend on infrastructure.

The spending effort is relative to the size of the economy. The divergence in WSS spending across countries is also considerable; it ranges from 0.7 percent of GDP in Chad to 3.1 percent in Ethiopia. Particularly important differences are seen in the shares of spending in O&M and capital spending (figure 8.1). Namibia, Ethiopia, Botswana, and South Africa allocate the highest percentages of their GDP to O&M of the existing infrastructure, whereas Chad and Madagascar spend the least in this category. Surprisingly, Uganda and Senegal, some of the best performers in Sub-Saharan Africa, assign less than 0.05 percent of GDP to O&M. Ethiopia, Benin, Zambia, and Niger dedicate the highest percentages of GDP to capital investment, and South Africa the least, at 0.07 percent of its GDP.

Three key players are seen in WSS sector financing: the public sector, donors, and households (table 8.2). In Sub-Saharan Africa, households are important financiers of capital investment (0.3 percent of Sub-Saharan African GDP) and account for $2.1 billion, most of it dedicated to the construction of on-site sanitation facilities, such as latrines. The level of contributions from OECD donors is similar to that of domestic public resources (comprising tax revenue and user charges raised by SOEs), equivalent to 0.2 percent of Sub-Saharan African GDP. The contribution of non-OECD countries is only 0.03 percent of Sub-Saharan African GDP, and that of the private sector is almost nonexistent (close to 0 percent of Sub-Saharan African GDP).

Financing follows specialization patterns. Across country groups, households' contribution to rehabilitation and construction of new facilities ranges between 0.2 percent (middle-income countries) and 1.4 percent (low-income, nonfragile countries; figure 8.2). The role of ODA is particularly important to low-income, nonfragile countries because it represents on average 0.7 percent of GDP of countries with limited domestic resources but adequate institutional capacity. In resource-rich countries, the public sector plays a significant part in financing the WSS sector (0.3 percent of GDP), but its role in the fragile states and middle-income countries is very modest. Non-OECD finance has shown a preference for low-income countries (fragile and nonfragile) and resource-rich countries.

Figure 8.1 Water and Sanitation Spending from All Sources as a Percentage of GDP, Annual Averages by Functional Category, 2001–05



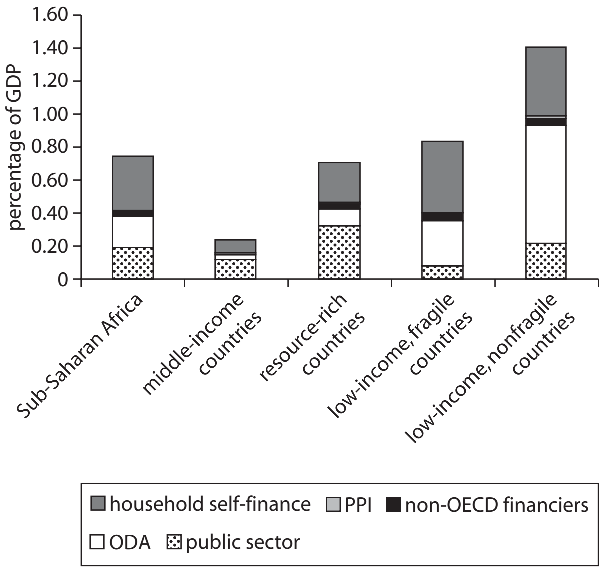
Source: Authors' calculations.
Note: CAPEX = capital expenditure, GDP = gross domestic product, O&M = operations and maintenance.

Table 8.2 Capital Investments of the Most Important Players, Annualized Average Flows, 2001–05

	GDP share (%)						*US$ (million per year)*					
	Public sector	*ODA*	*Non-OECD financiers*	*PPI*	*Household self-finance*	*Total CAPEX*	*Public sector*	*ODA*	*Non-OECD financiers*	*PPI*	*Household self-finance*	*Total CAPEX*
Sub-Saharan Africa	0.2	0.2	0.03	0.0	0.3	0.7	1,252	1,227	163	10	2,125	4,778
Low-income, fragile	0.1	0.3	0.05	0.0	0.4	0.8	30	105	20	0	165	313
Low-income, nonfragile	0.2	0.7	0.05	0.0	0.4	1.4	243	783	55	2	451	1,533
Middle-income	0.1	0.0	0.00	0.0	0.1	0.2	324	101	8	2	206	641
Resource-rich	0.3	0.1	0.04	0.0	0.2	0.7	717	238	80	7	522	1,564

Source: Foster and Briceño-Garmendia 2009; Briceño-Garmendia, Smits, and Foster 2008 for public spending; PPIAF 2008 for private flows; and Foster and others 2008 for non-OECD financiers.
Note: CAPEX = capital expenditure, GDP = gross domestic product, ODA = official development assistance, OECD = Organisation for Economic Co-operation and Development, PPI = private participation in infrastructure.

Figure 8.2 Water and Sanitation Capital Investment as a Percentage of GDP, by Funding Source, Annualized Averages for 2001–05



Source: Briceño-Garmendia, Smits, and Foster 2008; Foster and Briceño-Garmendia 2009.
Note: GDP = gross domestic product, ODA = official development assistance, OECD = Organisation for Economic Co-operation and Development, PPI = private participation in infrastructure.

Poor Budget Execution by the WSS Sector

African governments allocate 0.7 percent of their GDP to support the provision of WSS infrastructure from their central government budgets alone (table 8.3). For Africa, this effort translates to an estimated $180 million a year for an average country. For a perspective on this figure, an investment of $100 million can purchase about 100,000 new household connections to water and sewerage. It runs well short of covering the WSS spending needs presented in chapter 7 of this book.

As a percentage of GDP, budget spending on WSS infrastructure is comparable across resource-rich and low-income countries (fragile and nonfragile). In absolute terms, however, middle-income countries have a much larger infrastructure budget, with spending per capita several times higher than in low-income countries because of the much larger value of GDP (table 8.4). Overall, WSS spending is the second-largest infrastructure item in central government accounts, after spending on transport, particularly in the middle-income countries. It ranges from about half of all

Table 8.3 Annual Budgetary Flows, Annualized Averages, 2001–05

	Share of GDP (%)	*US$ (billion per year)*
Sub-Saharan Africa	0.7	4.4
Low-income, fragile	0.4	0.2
Low-income, nonfragile	0.5	0.5
Middle-income	0.9	2.5
Resource-rich	0.4	0.9

Sources: Foster and Briceño-Garmendia 2009; Briceño-Garmendia, Smits, and Foster 2008.
Note: Annualized averages for 2001–06 weighted by country GDP. Figures are extrapolations based on the 24-country sample covered in the AICD Phase 1.
GDP = gross domestic product.

central government spending on infrastructure in middle-income countries to 60 percent in low-income countries.

In Sub-Saharan Africa, about 40 percent of budgetary spending in water goes to O&M (table 8.1). In middle-income countries the percentage allocated to O&M is more than 75 percent of the public spending in WSS infrastructure. Resource-rich and low-income (nonfragile) countries spend most of their budgetary resources in capital investments; very little remains for O&M. In low-income countries (fragile), the public spending in O&M is close to 30 percent.

On average, in Sub-Saharan Africa governments finance 75 percent of the total budgetary spending, and the utilities contribute the remaining 25 percent (figure 8.3). The distribution of responsibilities among the central government and the utilities varies across the four typologies: In resource-rich countries, most of the public spending is financed by the central government (80 percent), whereas in low-income countries (fragile), 70 percent of the spending in the sector comes from nonfinancial public institutions (equivalent to 0.04 percent of their GDP).

In comparison with the central government, nonfinancial public institutions, such as utilities and other service providers, make little infrastructure investment (at most 20 percent of total capital investment) in both absolute and relative terms. This spending pattern reflects government control of some of the main sources of investment finance, be they royalty payments (in resource-rich countries) or external development funds (in fragile states and other low-income countries). It also reflects, to some extent, SOEs' limited capability to fund their capital investments through user fees.

Table 8.4 Public Infrastructure Spending by Institution in the WSS Sector, 2001–05

	Share of GDP (%)				*US$ (million per year)*			
	OPEX		*CAPEX*		*OPEX*		*CAPEX*	
	On-budget	*Off-budget*	*On-budget*	*Off-budget*	*On-budget*	*Off-budget*	*On-budget*	*Off-budget*
Sub-Saharan Africa	0.35	0.14	0.17	0.03	2,216	896	1,073	180
Low-Income, fragile	0.04	0.29	0.08	0.00	16	111	30	0
Low-Income, nonfragile	0.15	0.13	0.16	0.06	164	143	176	67
Middle-income	0.62	0.18	0.10	0.02	1,691	494	275	49
Resource-rich	0.03	0.05	0.30	0.02	68	121	663	54

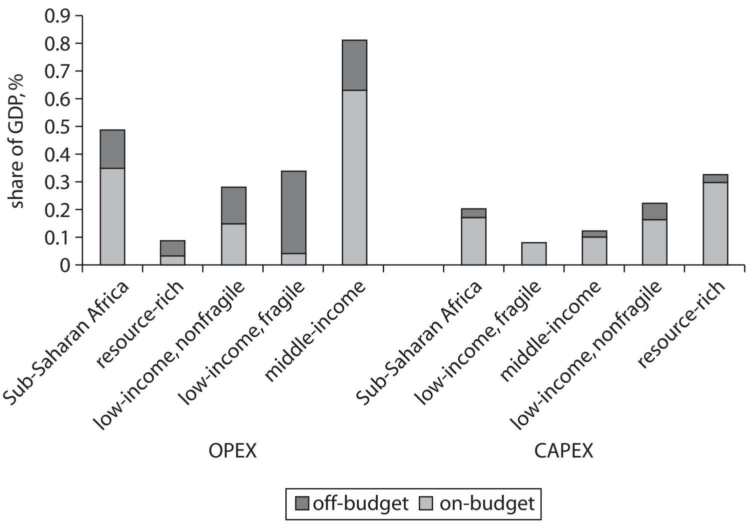
Source: Authors' calculations.
Note: CAPEX = capital expenditure, GDP = gross domestic product, OPEX = operating expenditure.

Table 8.5 Average Budget Variation Ratios for Capital Spending

	Overall infrastructure	*Water supply and sanitation sector*
Sub-Saharan Africa	75	66
Low-income, fragile	—	—
Low-income, nonfragile	76	72
Middle-income	78	66
Resource-rich	65	43

Sources: Foster and Briceño-Garmendia 2009, adapted from Briceño-Garmendia, Smits, and Foster 2008.
Note: Budget variation ratio is defined as executed budget divided by allocated budget. Based on annualized averages for 2001–06. — = not available.

Figure 8.3 Split Investment Responsibilities between Governments and Public Enterprises



Sources: Briceño-Garmendia, Smits, and Foster 2008; Foster and Briceño-Garmendia 2009.
Note: Based on annualized averages for 2001–06. Averages weighted by country GDP.

In Sub-Saharan Africa, SOE spending (off-budget) in O&M accounts at most for 30 percent of total spending on this item. The SOEs are essentially asset administrators. Interestingly, in fragile states almost 90 percent of O&M expenses are financed by nonfinancial public institutions, whereas in middle-income countries, approximately 80 percent of the spending on O&M is in the budget.

Inefficiencies within the public expenditure management systems are particularly detrimental because central governments are such major players in capital investment and O&M relative to nonfinancial public institutions. A key issue is that central governments face significant problems in executing their infrastructure capital budgets. African countries are, on average, unable to spend more than one-quarter of their WSS capital budgets. In particular, resource-rich countries executed less than 45 percent of their budgets. The poor timing of project appraisals and late releases of budgeted funds because of procurement problems often prevent the use of resources within the budget cycle. Delays affecting in-year fund releases are also associated with poor project preparation, leading to changes in the terms agreed on with contractors in the original contract (deadlines, technical specifications, budgets, costs, and so on). In other cases, cash is reallocated to nondiscretionary spending driven by political or social pressures.

Compared with the other infrastructure sectors, the WSS sector is the worst offender of unused budget allocations, in particular in resource-rich countries, where governments are able to spend barely 66 percent of budget allocations (table 8.5).

Even after Efficiency Savings, a Persistent Funding Gap

Inefficiencies of various kinds total an estimated $2.9 billion a year (0.5 percent of GDP; table 8.6). In absolute terms, the gains can be maximized for higher-income countries so that they contribute about 0.4 percent of GDP. In relative terms, the low-income fragile countries can leverage the most from exploiting the efficiency gains, amounting to 1.2 percent of GDP.

Three opportunities can be identified for efficiency gains. First, raising user charges closer to cost-recovery levels would provide more efficient price signals and help capture lost revenue of about $1.5 billion per year. Second, reducing utilities' operating inefficiencies would prevent waste of significant resources, support healthier utilities, and improve service quality, leading to savings of about $1.3 billion per year. Third, improving budget-execution rates would increase the potential of fully using resources allocated to public investment by about $0.2 billion per year. If the bottlenecks in capital execution could be resolved, countries could, on average, increase their capital spending by 4 percent without any increase in current budget allocations. For middle-income countries, an additional potential efficiency gain comes from reallocating $0.3 billion of existing spending to those subsectors in greatest need. This tactic would generate the highest economic returns, which would increase the

Table 8.6 Potential Gains from Greater Efficiency

	GDP share (%)							*US$ (million per year)*						
	Operational inefficiencies							*Operational inefficiencies*						
	Labor inefficiencies	*Losses*	*Under-collection*	*Total operational inefficiencies*	*Capital execution*	*Tariff cost recovery*	*Total*	*Labor inefficiencies*	*Losses*	*Under-collection*	*Total operational inefficiencies*	*Capital execution*	*Tariff cost recovery*	*Total*
Sub-Saharan Africa	0.06	0.07	0.07	0.20	0.03	0.23	0.45	375	425	458	1,259	168	1,450	2,877
Low-income, fragile	0.04	0.17	0.06	0.28	0.02	0.93	1.23	17	65	25	106	6	358	471
Low-income, nonfragile	0.08	0.10	0.06	0.24	0.03	0.35	0.62	87	111	67	265	39	381	685
Middle-income	0.03	0.06	0.10	0.18	0.00	0.20	0.38	68	150	274	492	8	537	1,037
Resource-rich	—	0.05	0.03	0.08	0.06	0.10	0.23	—	103	69	172	137	214	522

Source: AICD, adapted from Briceño-Garmendia, Smits, and Foster 2008.
Note: Based on annualized averages for 2001–06. Averages weighted by country GDP. Figures are extrapolations based on the 24-country sample covered in AICD Phase 1, and they are lower bounds because inefficiencies might be higher as reported in the table due to data constraints. Totals may not add exactly because of rounding errors. — = not available, GDP = gross domestic product.

impact of the current budget envelope on covering needs and raise the value for money of public funds.

At the country level, Madagascar and Mali have the highest potential gains as a percentage of GDP (1.5 percent), results that would stem in particular from tackling the underpricing of tariffs (around 80 percent of the total gains; figure 8.4). Malawi is close to Madagascar and Mali in its level of inefficiencies (almost 0.9 percent of GDP), but the gains from resolving tariffs below cost-recovery levels account for around 40 percent of the total gains, whereas the operational inefficiencies account for about 50 percent of the potential gains. Nigeria has the lowest potential efficiency gains as a percentage of GDP (0.14 percent).

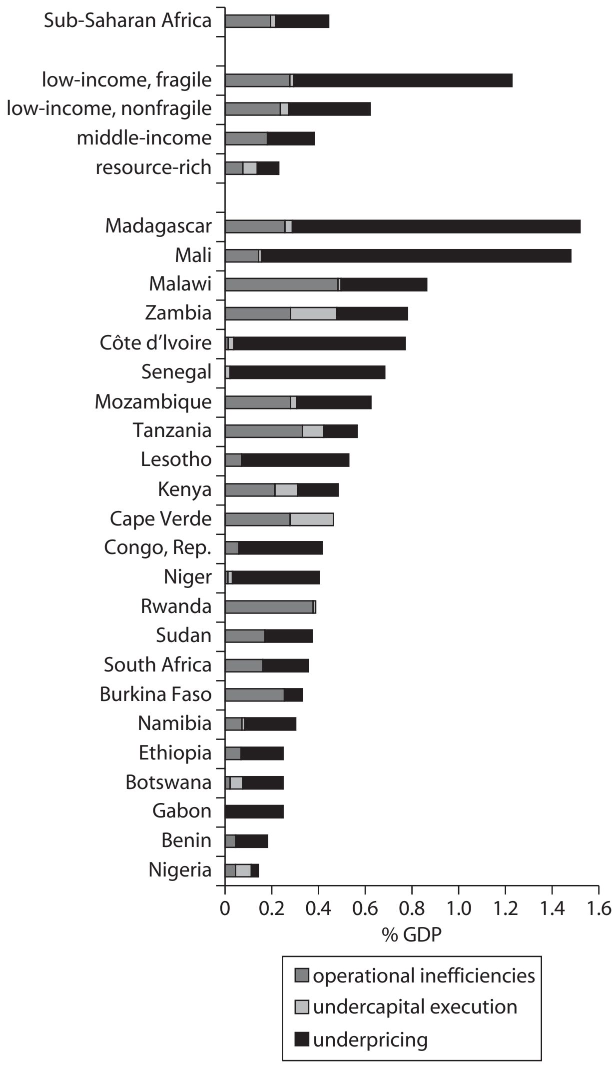
Even if all the efficiency gains are internalized, a funding gap remains. Existing spending and potential efficiency gains can be calculated from estimated spending needs to gauge the extent of the financial shortfall. Africa would still face an annual funding gap of $11.9 billion a year, or 1.8 percent of GDP, to meet the MDG for WSS (figure 8.5).

The smallest funding gap is found in middle-income countries where the highest inefficiencies are present. After tackling the inefficiencies, middle-income countries would have a negligible funding gap of $0.3 billion. In fact, for these countries, potential exists for reallocation of resources of $0.2 billion, which can be swung from O&M to capital expenditure or transferred to some other infrastructure sector. The largest funding gap remains in low-income countries (nonfragile), representing about half of the total funding gap for Sub-Saharan Africa ($5.3 billion; table 8.7).

The net annual funding gap represents 9.4 percent of the GDP of fragile states and less than 0.1 percent of the GDP of middle-income countries. The gap between the low-income (nonfragile) and resource-rich countries is 4.8 percent and 1.8 percent of GDP, respectively (table 8.8).

Although the infrastructure funding gap is primarily for capital investment ($8.6 billion), a shortfall of almost one-fourth also exists for O&M (table 8.8). In the aggregate, Africa needs to increase water infrastructure capital investment by 1.3 percent of GDP; low-income, nonfragile countries need to invest an additional 3.3 percent, and fragile states an additional 6.8 percent. The shares of GDP for middle-income countries and resource-rich countries are below the African share of GDP (0.1 percent and 1.2 percent, respectively). The remainder of the infrastructure funding gap ($3.2 billion) relates to O&M needs and is approximately evenly distributed across fragile states, low-income countries, and resource-rich countries. Middle-income countries do not face an O&M funding gap.

Figure 8.4 Potential Efficiency Gains from Different Sources



Source: Authors' compilation.
Note: GDP = gross domestic product.

Closing the $11.8 billion WSS infrastructure funding gap depends in part on raising additional funds, but it may also require taking more time to attain targets or using lower-cost technologies, such as standposts and traditional latrines.

Figure 8.5 Water Infrastructure Funding Gap

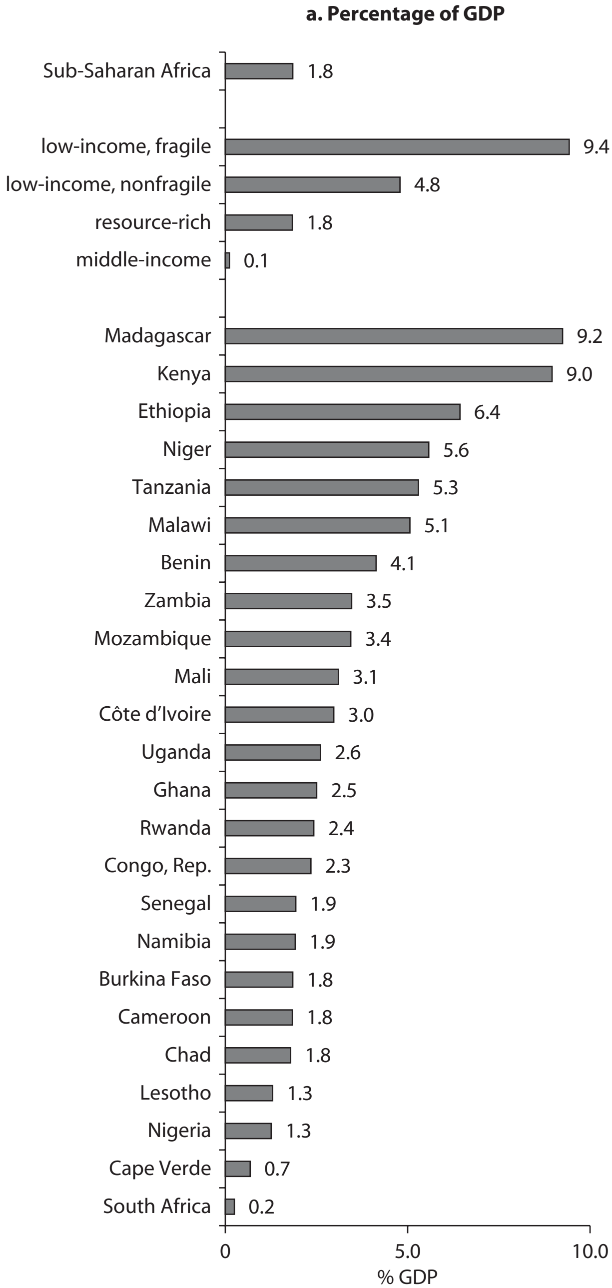


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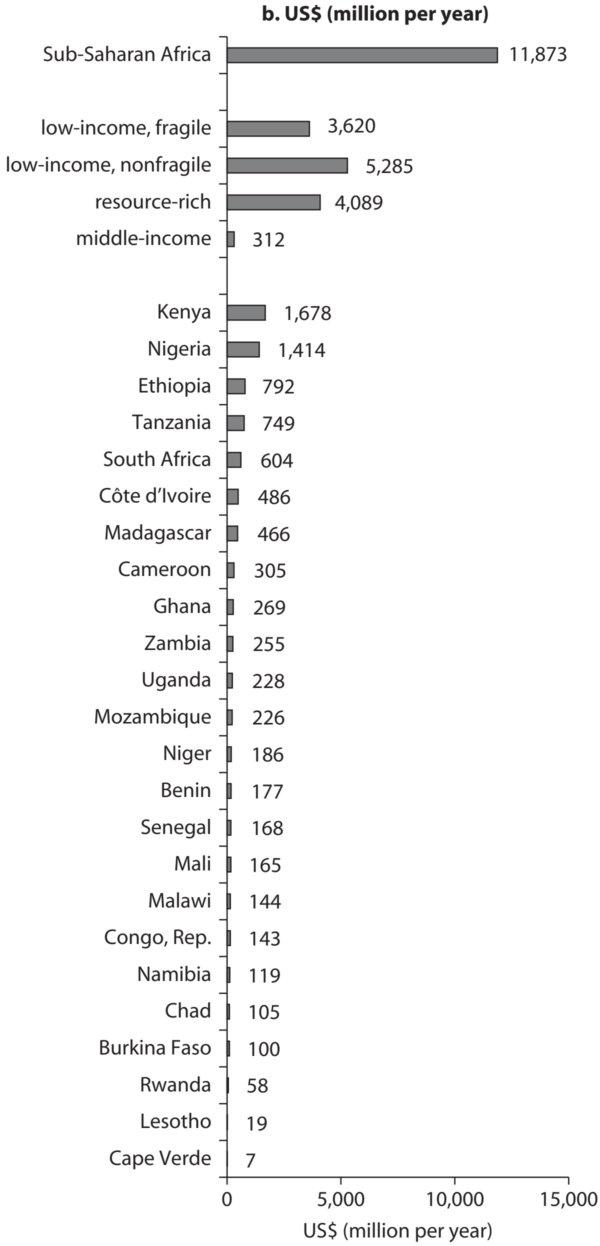
Figure 8.5 *(continued)*



Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: GDP = gross domestic product.

Table 8.7 Funding Gap

(US$ million per year)

				Sources of inefficiency			
	Total needs	*Spending traced to needs*	*Gain from eliminating inefficiencies*	*Underexecution of budget*	*Operating inefficiencies*	*Underpricing*	*Funding gap or surplus*
Sub-Saharan Africa	–22,640	7,890	2,877	168	1,259	1,450	–11,873
Low-income, fragile	–4,531	441	471	6	106	358	–3,620
Low-income, nonfragile	–7,810	1,840	685	39	265	381	–5,285
Middle-income	–3,987	2,637	1,037	8	492	537	–312
Resource-rich	–6,364	1,753	522	137	172	214	–4,089

Source: Briceño-Garmendia, Smits, and Foster 2008.

Table 8.8 Size and Composition of the Annual Funding Gap by O&M and Capital Expenditure

	Share of GDP (%)			*US$ (million per year)*		
	CAPEX gap	*O&M gap*	*Total funding gap*	*CAPEX gap*	*O&M gap*	*Total funding gap*
Sub-Saharan Africa	1.3	0.5	1.8	8,648	3,225	11,873
Low-income, fragile	6.8	2.6	9.4	2,627	993	3,620
Low-income, nonfragile	3.3	1.5	4.8	3,673	1,612	5,285
Middle-income	0.1	0	0.1	312	—	312
Resource-rich	1.2	0.6	1.8	2,696	1,393	4,089

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: CAPEX = capital expenditure.

Limited Scope for Raising Additional Finance

Limited financing sources are available, and the global financial crisis is likely to affect some of them adversely. Domestic public finance is one of the main sources of funding today, but it presents little scope for an increase, except possibly in countries that enjoy natural resource windfalls. Another point to consider is that household finance is one of the most important sources of funding today for capital investments in African infrastructure (0.3 percent of GDP; see table 8.2), mainly of sanitation facilities. It is very likely that this source will be affected by the financial crisis, but given that other forms of private participation have not been very important in the WSS sector, no concern is found on that score about the negative impacts of the downturn on global markets. In addition, ODA is an important player in financing capital investments in the sector (0.2 percent of GDP; see table 8.2). It has grown substantially in recent years, in line with political pledges, but this assistance could slow down if countercyclical assistance were put in place. Finally, local capital markets have so far contributed little to WSS sector finance outside South Africa, and there is not much expectation that they could eventually assume greater role in some of the region's larger economies.

Little Scope for Domestic Finance

A key question is the extent to which countries may be willing to allocate additional fiscal resources to the WSS sectors. In the run-up to the current financial crisis, the fiscal situation in Sub-Saharan Africa was favorable. Rapid economic growth averaged 4 percent a year from 2001 to 2005, which translated to increased domestic fiscal revenue of just over

3 percent of GDP on average. In resource-rich countries, burgeoning resource royalties added 7.7 percent of GDP to the public budget. In low-income countries, substantial debt relief increased external grants by almost 2 percent of GDP.

Surprisingly little additional resources were available during the recent growth surge allocated to infrastructure (table 8.9). The most extreme case is that of the resource-rich countries, particularly Nigeria. Huge debt repayments more than fully absorbed the fiscal windfalls in these countries. As a result, budgetary spending actually contracted by 3.7 percent of GDP. Infrastructure investment bore much of that contraction and fell by almost 1.5 percent of GDP. In middle-income countries, budgetary spending increased by almost 4.1 percent of GDP, but the effect on infrastructure spending was almost negligible and the additional resources went primarily to current social sector spending. Only in the low-income countries did the overall increases in budgetary expenditure have some effect on infrastructure spending. Even there, however, the effect was fairly modest and confined to capital spending. The low-income countries (nonfragile) have allocated 30 percent of the budgetary increase to infrastructure investments. The fragile states, despite seeing their overall budgetary expenditures increase by about 3.9 percent of GDP, have allocated only 6 percent of the increase to infrastructure.

Compared with other developing regions, public financing capabilities in Sub-Saharan Africa are characterized by weak tax revenue collection. Domestic revenue generation of around 23 percent of GDP trails averages for other developing countries and is lowest for low-income countries (less than 15 percent of GDP a year). Despite the high growth rates in the past decade, domestically raised revenue grew by less than 1.2 percent of GDP,

Table 8.9 Net Change in Central Government Budgets, by Economic Use
(% of GDP)

Use	*Sub-Saharan Africa*	*Middle-income*	*Resource-rich*	*Low-income, nonfragile*	*Low-income, fragile*
Net expenditure budget	1.89	4.08	–3.73	1.69	3.85
Current infrastructure spending as a share of expenditures	0	0.02	0.03	0	0.09
Capital infrastructure spending as a share of expenditures	–0.14	0.04	–1.46	0.54	0.22

Sources: Foster and Briceño-Garmendia, 2009, adapted from Briceño-Garmendia, Smits, and Foster 2008.
Note: Based on annualized averages for 2001–06. Averages weighted by country GDP. Totals are extrapolations based on the 24-country sample as covered in AICD Phase 1. GDP = gross domestic product.

suggesting increasing domestic revenue from current levels would require undertaking challenging institutional reforms to increase the effectiveness of revenue collection and broaden the tax base. Without such reforms, domestic revenue generation will remain weak.

The borrowing capacity from domestic and external sources is also limited. Domestic borrowing is often very expensive, with interest rates far exceeding those on concessional external loans. Particularly for the poorest countries, the scarcity of private domestic savings means that public domestic borrowing tends to precipitate sharp increases in interest rates, building a vicious circle. For many Sub-Saharan African countries, the share of debt service to GDP is more than 6 percent.

The global financial crisis can be expected to reduce fiscal receipts because of lower taxes, royalties, and user charge taxes—Africa is not exempt from its impact. Growth projections for the coming years have been revised downward from 5.1 percent to 3.5 percent, which will reduce tax revenue and likely depress the demand and willingness to pay for infrastructure services. Commodity prices have fallen to levels of the early 2000s. The effect on royalty revenue, however, will depend on the savings regime in each country. Various oil producers have been saving royalty revenue in excess of $60 a barrel, so the current downturn will affect savings accounts more than budgets. Overall, the adverse situation created by the global financial crisis will put substantial pressure on public sector budgets. In addition, many African countries are devaluing their currency, reducing the purchasing power of domestic resources.

According to recent global experience, fiscal adjustment episodes tend to fall disproportionately on public investment in general and WSS infrastructure in particular. Experience from earlier crises in East Asia and Latin America indicates that infrastructure spending is especially vulnerable to budget cutbacks during crisis periods. Based on averages for eight Latin American countries, cuts in infrastructure investment amounted to about 40 percent of the observed fiscal adjustment between the early 1980s and late 1990s (Calderón and Servén 2004). This reduction was remarkable because public infrastructure investment already represented less than 25 percent of overall public expenditure in Latin American countries. These infrastructure investment cuts were later identified as the underlying problem holding back economic growth in the whole region during the 2000s. Similar patterns were observed in East Asia during the financial crisis of the mid-1990s. For example, Indonesia's total public investment in infrastructure dropped from 6 to 7 percent of GDP during the period from 1995 to 1997 to 2 percent in 2000. Given recent spending patterns, there is every reason to expect that in Africa changes in the overall budget envelope will affect infrastructure investment in a similar pro-cyclical manner.

Self- or Household Finance

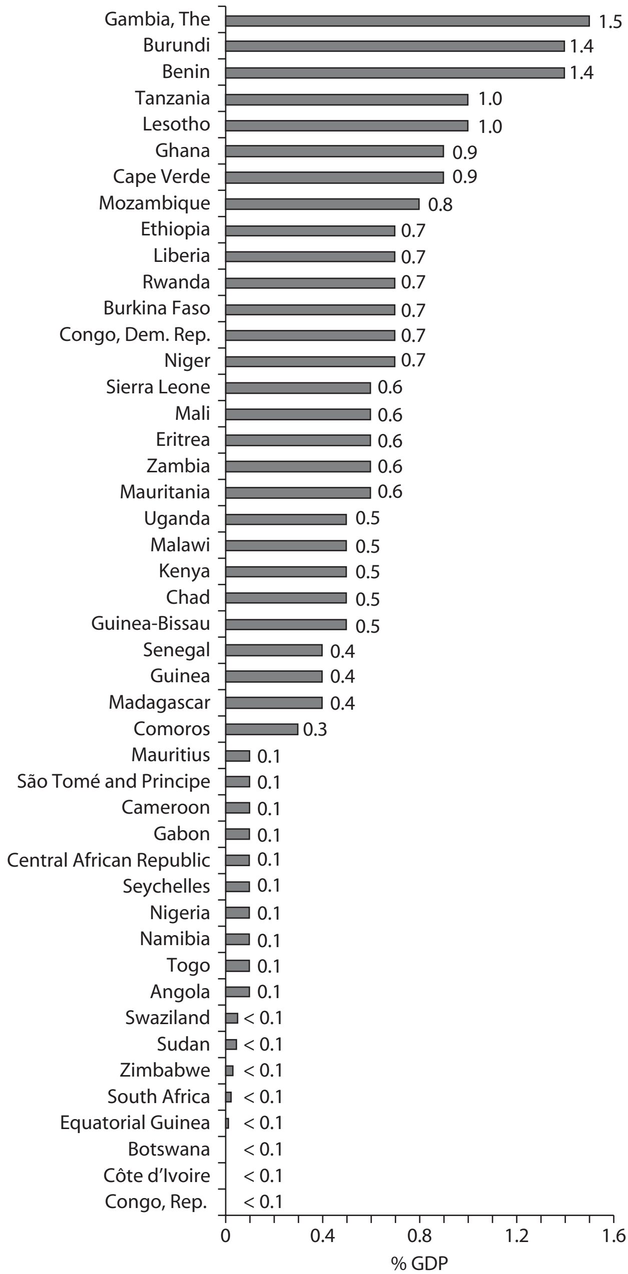
Self- or household finance has been the main source of external financing in the sanitation sector, representing almost half of the total spending in capital investment ($2.1 billion, or 0.3 percent of the African GDP; see table 8.2). These figures are largely driven by private investments at the household level in people's own sanitation facilities. Households in Africa's resource-rich countries and low-income countries (nonfragile) invest the largest volume of funds in absolute terms (almost half of the total household or self-finance for the region). Households in fragile states invest the least in absolute terms (less than $0.2 billion). Nigeria has the highest amount of the total household investment in sanitation (equivalent to $295 million), which accounts for 0.3 percent of its GDP. The financial crisis is likely to affect households' willingness to invest in new WSS facilities or improvements given the potential reductions in household income, although it is hard to make exact predictions.

Official Development Assistance

Commitments of ODA from OECD donors to water infrastructure in Sub-Saharan Africa have increased from $0.8 to $1.2 billion between 1995 and 2007. Across countries, The Gambia captures the highest level of ODA commitments as a percentage of GDP (1.5 percent of GDP), followed by Benin and Burundi (1.4 percent of GDP) (figure 8.6). In absolute terms, Tanzania and Nigeria receive the largest shares of ODA commitments in the region (around 20 percent of this source).

A significant lag occurs between ODA commitments and their disbursement, which suggests that disbursements should continue to increase in the coming years. The commitments just reported are significantly higher than the estimated ODA disbursements of $1.2 billion, or 0.2 percent of Sub-Saharan African GDP (see table 8.2). This gap reflects delays typically associated with project implementation. Because ODA is channeled through the government budget, the execution of funds faces some of the same problems affecting domestically financed public investment, including procurement delays and the capacity of low-income countries to execute funds. Divergences between donor and country financial systems, as well as unpredictability in the release of funds, may further hinder the disbursement of donor resources. Bearing this in mind, as long as all commitments up to 2007 are fully honored,

Figure 8.6 Aid Commitments for Water Supply and Sanitation as a Percentage of GDP, 2001–05



Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: GDP = gross domestic product.

ODA disbursements could be expected to rise significantly over the next few years (IMF 2009; World Economic Outlook 2008).

ODA was set to increase further before the crisis, but prospects no longer look as promising. The three multilateral agencies—the African Development Bank, the European Commission, and the World Bank—secured record replenishments for their concessional funding windows for the three to four years beginning in 2008. In principle, funding allocations to African WSS sectors totaling \$1.2 billion a year (see table 8.2) could come from the multilateral agencies alone in the near future. In practice, however, the crisis may divert multilateral resources from infrastructure projects toward emergency fiscal support. Bilateral support, based on annual budget determinations, may be more sensitive to the fiscal squeeze in the OECD countries, and some decline can be anticipated. Historical trends suggest that ODA has tended to be pro-cyclical rather than countercyclical (IMF 2009; ODI 2009; UBS Investment Research 2008; World Economic Outlook 2008; and references cited therein).

Other Financial Players: The Private Sector and Non-OECD Financiers

Most of the private investment commitments in the water sector (\$10.7 million) come from foreign participation and predominantly target Sudan (\$6.7 million, or 65 percent of the total). This number may be significantly underestimated, however, given the difficulty in capturing data on private investment coming through nongovernmental organizations and foundations when the resources do not enter the public treasuries.

Private capital flows, in particular, are likely to be affected by the global financial crisis. In the aftermath of the Asian financial crisis, private participation in developing countries fell by about one-half over a period of five years, following its peak in 1997. Existing transactions are also coming under stress as they encounter difficulties refinancing short- and medium-term debt. Given the very limited volume of private participation in the WSS sector in Africa, however, the downside risk is also limited.

Non-OECD countries financed less than \$0.2 billion worth of African WSS infrastructure annually between 2001 and 2005 or 0.03 percent of GDP (see table 8.2). Non-OECD financiers have been active primarily in resource-rich countries, mainly oil-exporting countries (Angola, Nigeria, and Sudan), which receive half of the total resources coming from non-OECD financiers (\$80 million). Just over one-third of the resources, or \$55 million, has gone to low-income countries (nonfragile).

These financiers' contribution to middle-income countries is very small ($8 million per year).

China's official economic assistance for infrastructure project quadrupled between 2001 and 2005 and reached more than 35 Sub-Saharan African countries. Most of the inflows went to resource-rich countries; in some cases, they made use of barter arrangements under the "Angola mode."[1] The WSS sector accounts for a relatively small share of China's assistance (2 percent, or $0.14 billion) when compared with the commitments made to other sectors. Most of the projects are focused on meeting immediate social needs directly related to water supply, such as smaller dams in Cape Verde and Mozambique.

How the current economic downturn will affect non-OECD finance is difficult to predict because of the relatively recent nature of these capital inflows.

Local Sources of Finance

Local capital markets are a major source of WSS sector infrastructure finance in southern Africa and the resource-rich countries, but not yet elsewhere (table 8.10); they account for about $3 billion. Local infrastructure finance consists primarily of commercial bank lending, some

Table 8.10 Outstanding Financing Stock for Water and Sanitation Infrastructure, as of 2006

Outstanding financing for infrastructure	*Bank loans*	*Corporate bonds*	*Equity issues*	*Total*	*Share of total stock (%)*	*Share of total infra-structure stock (%)*
Resource-rich	1,119	—	2	1,121	37	43
Low-income, nonfragile	350	—	—	350	11	5
Low-income, fragile	69	—	11	80	3	17
Middle-income (excluding South Africa)	103	—	—	103	3	19
South Africa	1,264	—	130	1,393	46	2
Total	2,905	—	142	3,047	100	4
Share of total stock (%)	95	—	5	100		
Share of total infrastructure stock (%)	4	—	0	4		

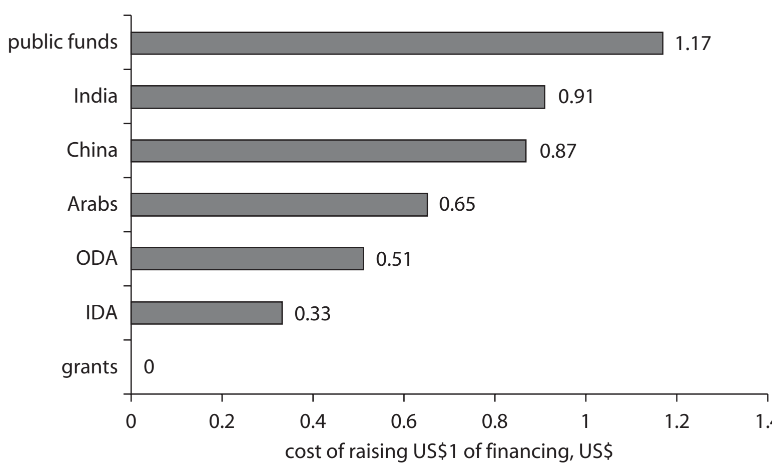
Source: Adapted from Irving and Manroth 2009.
Note: Bank loans combine transport, communication, energy, and water for the Democratic Republic of Congo, Ghana, Lesotho, and Zambia. Bank loans combine electricity, water, and gas/public utilities for Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Ethiopia, Malawi, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Uganda, and Zambia. — = not available.

corporate bond and stock exchange issues, and a nascent entry of institutional investors. These markets remain underdeveloped, shallow, and small, in particular for financing the WSS sector in fragile states. Long-term financing with maturities commensurate with infrastructure projects is scarce.[2] The capacity of local banking systems remains too small and constrained by structural impediments to finance infrastructure. Most countries' banks have significant asset-liability maturity mismatches for infrastructure financing. Bank deposits and other liabilities still have largely short-term tenors. More potential may exist for syndicated lending with local bank participation, though the increase in new loans over the 2000–06 period occurred in a favorable external financing environment. The African banking system did not feel the effects of the global financial crisis at first, but the crisis slowly but surely affected financial systems around the region and added to the already enormous challenge of developing local financial markets.

Costs of Capital from Different Sources

The various sources of infrastructure finance differ greatly in their associated costs of capital (figure 8.7). For public funds, raising taxes is not a costless exercise. Each dollar raised and spent by a Sub-Saharan African government has a social value premium (or marginal cost of public funds) of almost 20 percent. That premium captures the incidence of that tax on

Figure 8.7 Costs of Capital by Funding Source, 2001–05



Sources: Average marginal cost of public funds as estimated by Warlters and Auriol 2005; cost of equity for private sector as in Estache and Pinglo 2004 and Sirtaine and others 2005; authors' calculations.
Note: IDA = International Development Association, ODA = official development assistance.

the society's welfare (caused by changes in consumption patterns and administrative costs, among other things).[3] To allow comparisons across financing sources, this study standardized the financial terms as the present value of a dollar raised through each of the different sources. In doing so, it recognized that all loans must ultimately be repaid with tax dollars, each of which attracts the 20 percent cost premium.

Wide variation exists in lending terms. The most concessional International Development Association (IDA) loans charge zero interest (0.75 percent service charge) with 10 years of grace. India, China, and the Gulf States and Arab funds charge 4 percent, 3.6 percent, and 1.5 percent interest, respectively, and grant four years of grace.

The cost of non-OECD finance is somewhere between that of public funds and ODA. The subsidy factor for Indian and Chinese funds is about 25 percent, and for the Arab funds, 50 percent. Official development assistance typically provides a subsidy factor of 60 percent, rising to 75 percent for IDA resources. In addition to the cost of capital, the different sources of finance differ in the transaction costs associated with their use, which may offset or accentuate some of the differences.

Promising Ways to Increase Funds

Given this setting, what are the best ways to increase availability of funds for water infrastructure development? The place to start is clearly to get the most from existing budget envelopes, which can provide up to $2.9 billion a year of additional resources internally if inefficiencies are tackled, equivalent to one-fourth of the total funding gap. For middle-income countries, reducing inefficiencies would imply not only completely closing the funding gap, but also achieving total positive net savings. In particular, for Botswana this would in and of itself be enough to close the funding gap. In the case of resource-rich and low-income countries (fragile and nonfragile), reducing inefficiencies would contribute to reducing the gap by more than 10 percent.

Beyond that, a substantial funding gap still remains. Before the financial crisis, the prospects for reducing—if not closing—this gap were reasonably good. Resource royalties were at record highs, and all sources of external finance were buoyant and promising further growth. With the onset of the global financial crisis, that situation has changed significantly and in ways that are not yet entirely foreseeable. The possibility exists across the board that all sources of WSS finance in Africa may fall rather than increase, further widening the funding gap. Only resource-rich countries have the potential to use natural resource savings accounts to provide a source of financing for infrastructure, but only if macroeconomic conditions allow. The international community's agreement on a major stimulus package for Africa, with a focus on infrastructure as part of the effort to rekindle economic growth and safeguard employment, is one of the few options for reversing the overall situation.

Other Ways to Reach the MDG

Except for middle-income countries, all other countries face a substantial funding gap even if all the existing sources of funds—including efficiency gains—are tapped. What other options do these countries have? Realistically, they need to either defer the attainment of the infrastructure targets proposed here or try to achieve them by using lower-cost technologies.

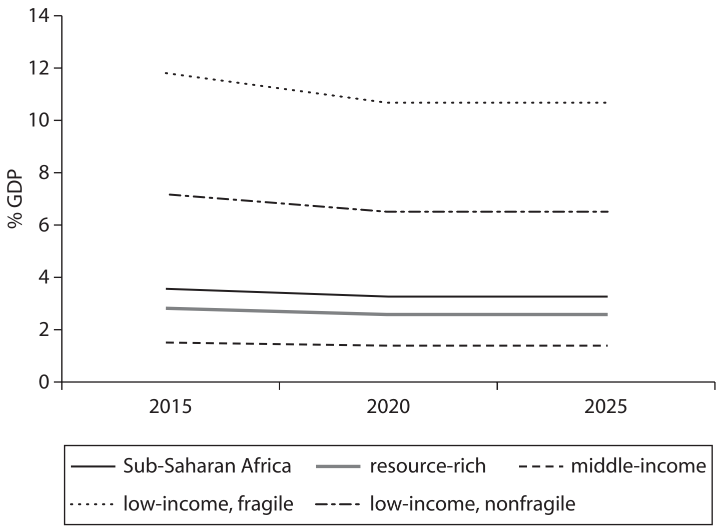
Taking More Time

Extending the time horizon for the achievement of these goals could make the targets more affordable. What if countries delay the upper bound of MDG attainment by 5 to 10 years without increasing existing resource envelopes?

One caveat to this analysis must be taken into account. The spending needs presented in chapter 7 are based on nonstandardized unit costs. Many of the variables are exogenous at least in the short run, which should guarantee that assumptions made on these variables remain valid if the analysis time horizon is not extended too long into the future, but this may not be the case for density. Africa is urbanizing rapidly and is expected to become predominantly urban by 2020. Although urban sprawl is more common in Africa than elsewhere, it is likely that 15 years from now average urban densities will be greater than those assumed here. More important, the density data set used in this analysis dates to 2000, because it is one of the very few available that observed city populations and densities at the same point in time. As density increases, network infrastructure unit costs decrease, as does the investment required on new infrastructure. Therefore, the results presented here should be taken as an upper bound of the overall spending needs that countries would face to reach the MDG by either 2020 or 2025.

As the time horizon to achieve the water and sanitation MDG is extended by five years, annual spending needs for Africa as a whole decrease from 3.5 percent to 3.2 percent of GDP per year (figure 8.8).

Figure 8.8 Spending Needs by Country Type under Different Time Horizons
(base scenario, % of GDP)



Source: Authors' calculations.
Note: GDP = gross domestic product.

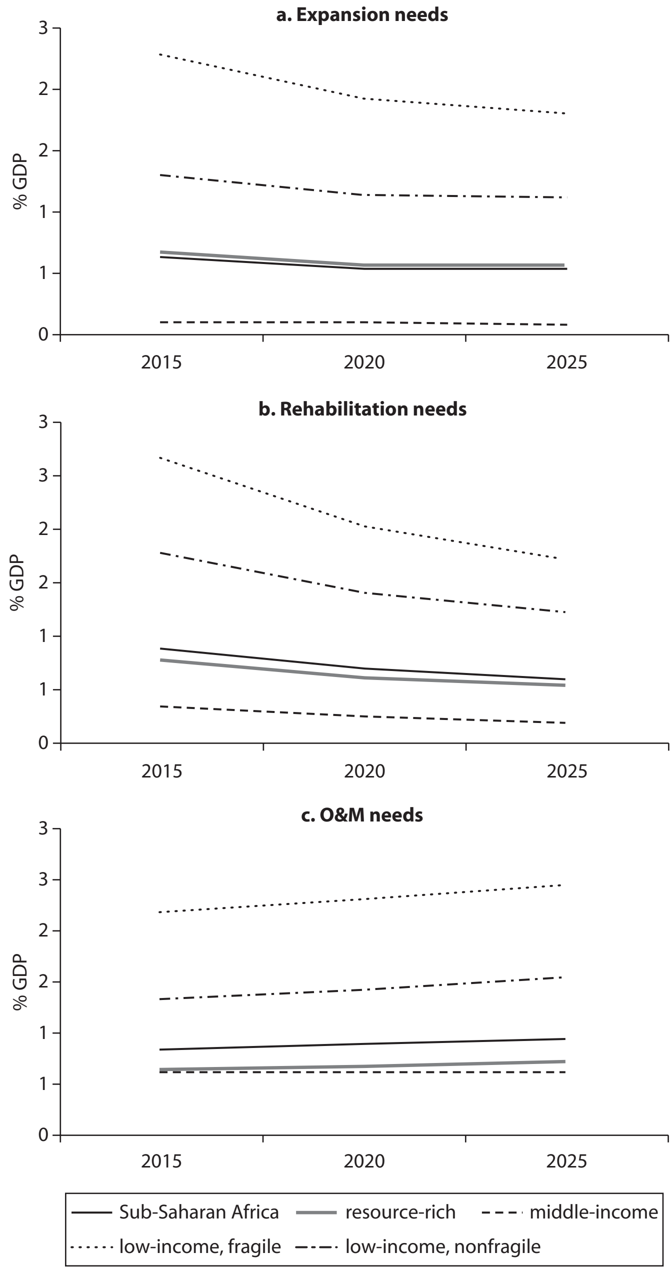
The same trend is observed across all income groups. Savings are not outstanding—annual needs decrease by less than 10 percent—but are still beneficial, especially for low-income, fragile countries.

If the time horizon is extended by an additional five years, to 2025, the decreasing trend continues, but at a falling rate. The overall annual burden for Africa lessens only marginally, as does the burden for the resource-rich and low-income, nonfragile countries. Fragile countries would save the most, yet just 1 percent of GDP per year, with overall needs decreasing from 12 percent to 11 percent of GDP. Middle-income countries would also save if they could take 10 more years to reach targets, yet they would be better off by postponing the achievement of the water and sanitation MDG by 5 rather than 10 more years.

Zeroing in on the composition of needs reveals that if countries are allowed to take more time, the annual spending to be allocated to new infrastructure decreases (figure 8.9, panel a). Although the overall number of new customers to be served rises with time as the population grows, fewer new customers per year would need to be accommodated.

Similarly, as the time horizon is extended, annual rehabilitation costs decrease (figure 8.9, panel b). In fact, this analysis considers only the

Figure 8.9 Annual Spending Needs over Different Time Horizons, by Country Type



Source: Authors' calculations.

rehabilitation backlog related to existing assets and assumes that no significant rehabilitation will need to occur on new assets, supposing that these are adequately maintained. It may be argued that some on-site facilities' life span is less than 20 years, which implies that some rehabilitation should take place at some point between 2006 and 2025. The assumptions made here, however, mainly reflect the fact that the largest rehabilitation needs originate from assets—markedly network assets—with a life span more than 20 years.

Conversely, O&M needs increase as the time horizon is extended (figure 8.9, panel c). Overall, countries will need to add a larger number of new customers, and therefore, more assets will need to be maintained.

Sub-Saharan Africa would be able to reach the MDG by 2027 if it were to tackle its utilities inefficiencies given the current levels of spending. If resource-rich and low-income countries (nonfragile) spread the spending needs over 26 to 32 years rather than 10 years, they could achieve the proposed targets within the existing spending envelopes. Fragile states would need more than 57 years to achieve the MDG targets if currents levels of spending were not changed (table 8.11). Middle-income countries could achieve the MDG's target in 21 years given the current level of spending, but this conclusion assumes they have first fully captured efficiency gains. Without such efficiency gains, the targets could not be met even over 30 years without increasing spending above current levels.

Using Lower-Cost Technologies

Using alternative lower-cost technologies to provide water and sanitation services to new customers appears to respond to both affordability and efficiency considerations. A direct water connection is regarded as the modality at the top of the water ladder for safety and time-saving reasons; similarly, septic tanks are more likely to deliver health benefits than are improved or traditional latrines. For these reasons, higher-level services

Table 8.11 Time Needed to Meet the MDG Targets with Today's Budget Envelopes

Years to reach MDG target (counting from 2006)	*Sub-Saharan Africa*	*Middle-income*	*Resource-rich*	*Low-income, nonfragile*	*Low-income, fragile*
Existing spending plus efficiency gains	21	10	26	32	57
Existing spending only	33	28	94	69	104

Source: Authors' calculations.
Note: MDG = Millennium Development Goal.

attract the attention of policy makers, but they come at a substantially higher cost. Unit cost analysis reveals that the cost of network expansion is highly sensitive to density. This is especially detrimental to African locations, generally less dense than their counterparts in other regions. When the ultimate goal is expanding access and economies of scale are not possible, nonnetwork, lower-cost technological alternatives might offer a much more efficient solution. Moreover, in some cases—and markedly within the range of on-site sanitation alternatives once the basic level of sanitary protection is reached—higher costs are associated with diminishing returns in terms of safety and health.

This analysis assumes a pragmatic scenario (as opposed to the base scenario assumed in chapter 7) assuming that all new customers are served with lower-cost alternatives: standposts and improved latrines in urban areas and protected wells and boreholes and traditional latrines in rural areas. The overall spending needs in this scenario are presented in figure 8.10.

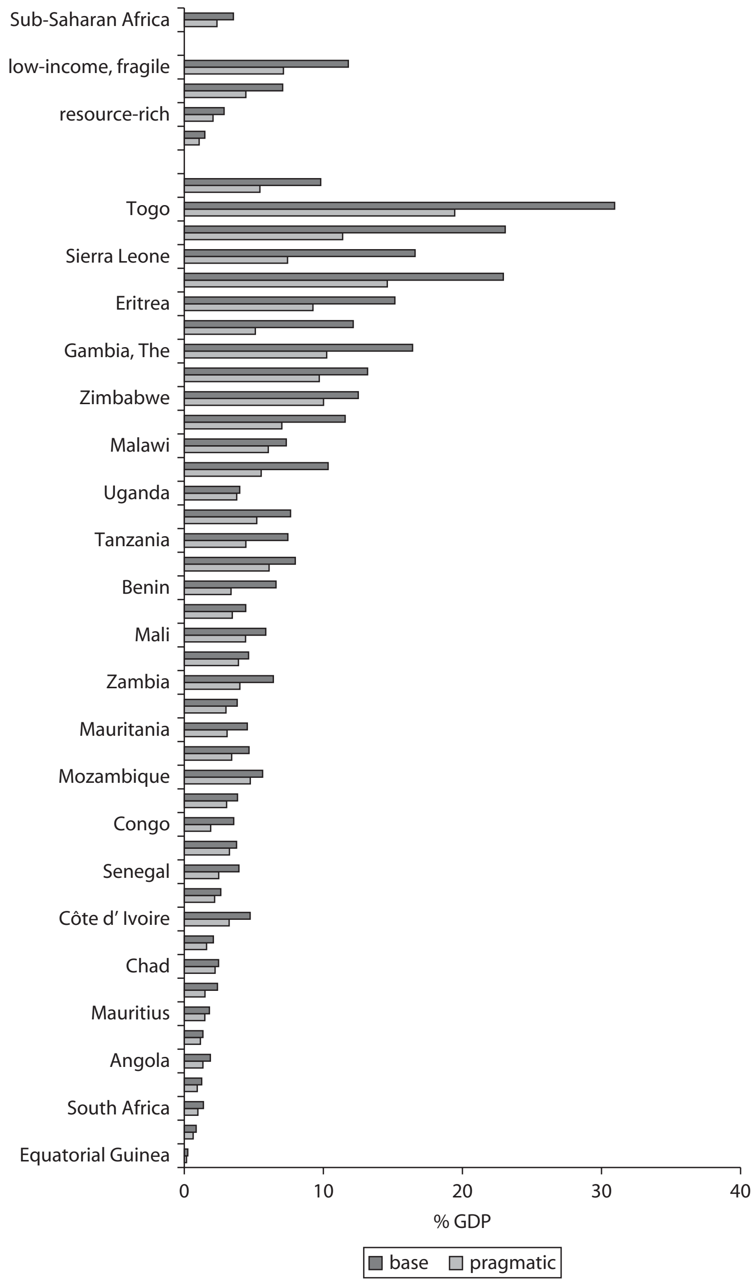
In 2015, the share of the population enjoying higher-quality services, such as a direct water connection, a sewer connection, or a septic tank, will be lower than it is today. Under this assumption, however, overall spending needs for Africa drop from 3.5 percent to 2.3 percent of GDP per year (table 8.12).

Under the pragmatic scenario, the bill looks substantially more manageable across all countries, with the majority of them required to allocate no more than 5 percent of GDP annually to water and sanitation. Equatorial Guinea, Gabon, Swaziland, South Africa, Botswana, Angola, Mauritius, Cape Verde, Nigeria, Democratic Republic of Congo, Cameroon, Chad, Senegal, Lesotho, and Burkina Faso report, in increasing order, needs below 3 percent. Zimbabwe, The Gambia, Liberia, and Togo still stand as outliers with spending needs over 10 percent of their GDP.

Overall spending needs would become substantially less prohibitive for low-income countries were the pragmatic scenario to be adopted. Compared with the base scenario, the use of lower-cost technologies makes needs drop considerably for fragile states, from 12 percent to 7 percent of GDP, and to a lower extent for low-income, nonfragile countries, from 7 percent to 4 percent of GDP. Nevertheless, the bill is still high, especially for fragile states, and largely in excess of current spending (figure 8.11). Conversely, under the pragmatic scenario, middle-income countries would need to allocate only 1 percent of their GDP to water and sanitation, and resource-rich countries, 2 percent.

Although a pragmatic scenario better matches the capacity of most low-income countries, a high-end scenario based on the use of top-quality

Figure 8.10 Spending Needs by Country under Different Level-of-Service Assumptions



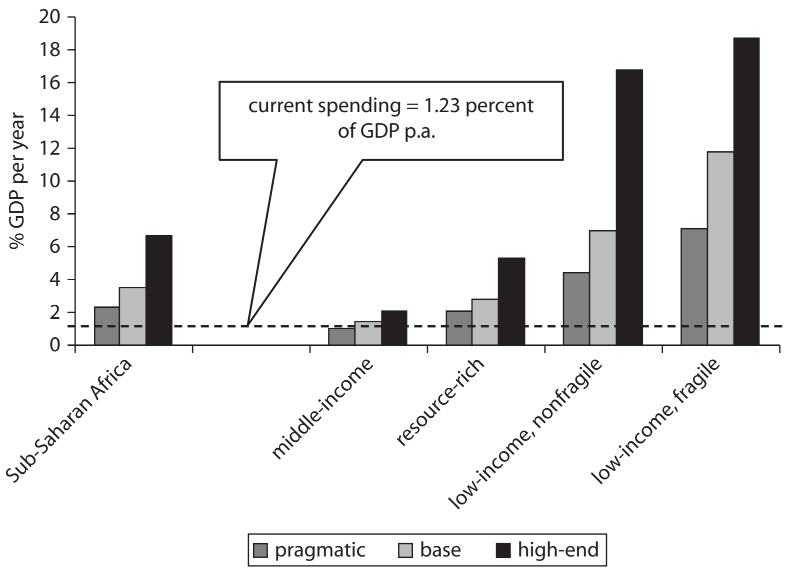
Source: Authors' calculations.

Table 8.12 Spending Needs to Meet the MDG Targets under Different Level-of-Service Scenarios

	Share of GDP (%)						*US$ (million per year)*					
	Pragmatic			*Base*			*Pragmatic*			*Base*		
	Water	*Sanitation*	*Total*	*Water*	*Sanitation*	*Total*	*Water*	*Sanitation*	*Total*	*Water*	*Sanitation*	*Total*
Sub-Saharan Africa	1.6	0.7	2.3	2.7	0.8	3.5	10,392	4,688	15,080	17,239	5,401	22,640
Resource-rich	1.3	0.7	2.1	2.1	0.7	2.9	2,963	1,636	4,599	4,718	1,646	6,364
Middle-income	0.7	0.3	1.1	1.0	0.5	1.5	2,023	862	2,885	2,733	1,243	3,976
Low-income, fragile	4.8	2.3	7.1	8.9	2.9	11.8	1,822	857	2,679	3,337	1,099	4,437
Low-income, nonfragile	3.2	1.2	4.4	5.8	1.3	7.1	3,560	1,322	4,881	6,410	1,400	7,810

Source: Authors' calculations.
Note: In the base scenario, it is assumed that the relative prevalence of WSS supply modalities will remain constant between 2006 and 2015. In the pragmatic scenario, access to new customers is granted using low-cost technologies, which provide improved safe drinking water and sanitation. GDP = gross domestic product, MDG = Millennium Development Goal.

Figure 8.11 Overall Spending Needs by Country Groups under Different Service Assumptions



Source: Authors' calculations.
Note: GDP = gross domestic product, p.a. = per annum (every year).

technologies could be considered for middle-income and resource-rich countries. If a high-end scenario were to be adopted, the bill would remain below 3 percent of GDP not only for middle-income countries such as South Africa, Botswana, and Swaziland, but also for low-income countries such as Equatorial Guinea, Gabon, and Angola. Resource-rich countries, however, would end up allocating more than 5 percent of their GDP to water and sanitation. Also, the high-end scenario does not appear feasible for low-income countries, fragile and nonfragile alike, which would be required to allocate more than 15 percent of GDP annually to water and sanitation.

The availability of alternative lower-cost technologies has the potential to reduce the funding gap by more than 60 percent (table 8.13). This implies a reduced cost of meeting the MDG by almost 5 percent of GDP for fragile states, which represents reductions in the funding gap of more than 50 percent. Similarly, if the low-income countries (nonfragile) adopted a pragmatic scenario rather than a base scenario, savings would account for as much as 38 percent, or 2.7 percent of GDP, leading to

Table 8.13 Funding Gaps under Base and Pragmatic Scenarios

	Share of GDP (%)			*US$ (million per year)*			*Reduction of the funding gap (%)*
	Base scenario	*Pragmatic scenario*	*Savings*	*Base scenario*	*Pragmatic scenario*	*Savings*	
Sub-Saharan Africa	1.8	0.7	1.2	11,873	4,313	7,560	64
Resource-rich	1.8	1.0	0.8	4,089	2,324	1,765	43
Middle-income	0.1	–0.2	0.4	312	–779	1,091	350
Low-income, fragile	9.4	4.8	4.7	3,620	1,862	1,758	49
Low-income, nonfragile	4.8	2.1	2.7	5,285	2,356	2,929	55

Source: Authors' calculations.
Note: GDP = gross domestic product.

reductions in the funding gap of more than 55 percent compared with the base scenario. For the middle-income countries, the savings would be at 0.4 percent of GDP, chiefly because these countries have high rates of access to network services whose expansion has a reduced marginal cost, which would lead the funding gap to disappear.

Notes

1. Essentially, the Angola mode was devised to enable African nations to pay for infrastructure with natural resources. In a single transaction, China bundles development-type assistance with commercial-type trade finance. A Chinese resource company makes repayments in exchange for oil or mineral rights. The China Export-Import Bank acts as a broker, receives money for the sale, and pays the contractor for providing the infrastructure. This arrangement safeguards against currency inconvertibility, political instability, and expropriation.
2. Because South Africa's financial markets are so much more developed than those of the other 23 focus countries, this section excludes South Africa.
3. The marginal cost of public funds measures the "change in welfare associated with raising an additional unit of tax revenue" (Warlters and Auriol 2005, 2).

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CHAPTER 9

Policy Options for the Water and Sanitation Sectors

Policy Options for the Water Sector

The analyses of the water sector performed by the Africa Infrastructure Country Diagnostic reveal the following key areas for policy attention.

The institutional reform agenda remains as relevant as before, even if its focus has shifted toward a more pluralistic view of public and private sector roles. The reform agenda also needs to move beyond utilities to encompass relevant government agencies and the whole public expenditure framework that underpins, and too often hinders, sector investment programs. Room for improvement can be found in cost recovery so that scarce subsidy resources are redirected to provide access among the poorest.

For meeting the needs of the majority of people who do not enjoy access to household connections to piped water, greater thought needs to be given to making standposts effective sources of urban water supply and optimizing the use of small-scale independent providers. The burgeoning use of wells and boreholes for supply in urban areas demands policy makers' attention; they must improve their understanding of this trend to develop suitable regulatory tools.

However, Africa remains a predominantly rural continent with a population of approximately 400 million people excluded from any form of utility-provided water. This segment of the continent's population often depends on unsafe supply sources, such as surface water, in addition to wells and boreholes. The central challenge is to reduce reliance on surface water through a sustainable network of water access points, most typically boreholes.

Inadequate maintenance of rural water systems reflects both institutional weaknesses and inappropriate technology choices. In addition to weak institutional capacity, undermaintenance is worsened by inadequate attention to technology choices, low pump density, restrictive maintenance systems, and lack of a supply chain to adequately maintain complex machinery. This sector needs specialized attention through either improvements to the supply chain of spare parts for rural water points, development of community-designed and -maintained small systems, or better execution of rural water funds.

The Importance of Continued Institutional Reforms

Institutional reforms are key to improving water sector performance. Countries pursuing institutional reforms create more efficient and effective sector institutions and promote more rapid expansion of higher quality services. The potential dividend is large, because addressing utility inefficiencies alone could make a substantial contribution to closing the sector funding gap in many countries.

Although the majority of African countries have embarked on the sector reform agenda, few have completed it. The experience of those countries that are farthest ahead provides some guidance for the region.

A strong correlation is found between aggressive pursuit of institutional reforms and progress toward achieving the targets of the Millennium Development Goals. The countries that have been most successful in bringing the rural population out of surface water are, without exception, among the most aggressive reformers in Africa. Benin, Côte d'Ivoire, Mozambique, Namibia, Nigeria, Senegal, and Uganda are outstanding performers in reducing the share of population consuming surface water and rank highest in rural reform. Conversely, the Democratic Republic of Congo, Kenya, Malawi, Niger, and Zambia increasingly rely on surface water and score very low on the rural reform index. Burkina Faso and Tanzania perform poorly on access expansion, which is surprising given their strong track record on institutional reforms. For moderate reformers, the results can go either way.

The degree of reform also affects how adequately rural water points are maintained. The percentage of rural water points needing rehabilitation tends to be lower for countries with more advanced rural reform processes. Thus, Benin and Uganda score high on sector reform and in maintaining rural water points. The opposite is true for the Democratic Republic of Congo and Malawi.

In rural areas, a few critical interventions can make a difference. Establishing a clear sector policy, creating a strong central capability for sector financing and project implementation, moving to greater cost recovery, and developing a system to monitor the condition of rural water points are all measures that, when implemented as a package, can boost performance. The governments can also take a leading role in initial supply-chain management and donor coordination until the private sector is capable of taking over.

In urban areas, the story is more complex. The traditional reform agenda of the 1990s has not fully proven its complete relevance to the sector. In addition, unlike in rural areas, no clear evidence is seen in urban areas that regulation has made a positive contribution to sector performance across the board.

Certain types of institutional reforms hold the key to improving utility performance. Good institutional frameworks pay off in improving utilities' efficiency. Utilities that have decentralized or adopted private sector management reveal substantially lower hidden costs than those that have not. A large effect is also associated with unbundling; however, unbundling is uncommon in Africa and is concentrated exclusively in middle-income countries whose superior performance can be explained for many other reasons.

The new reform agenda for water retains a role for private participation. Private sector participation, although controversial in implementation, has in many cases been a useful tool for improving operational performance and efficiency. Expectations that the private sector would finance new infrastructure for water utilities have not been met; negligible private capital flows are dwarfed by public and donor finance. Despite this, the private sector has contributed to expanding access, though typically with public funding.

Lease contracts may be the form of private participation best suited to African water utilities. They have provided greater scope for operational improvements by transferring more responsibility to the private sector than in a management contract. In contrast to concessions, lease contracts are recognized explicitly as requiring publicly funded investments, even in cases in which the private sector can help execute them. A key lesson from Africa's experience with lease contracts is that it is difficult to achieve seamless coordination on investment plans between the contractor and the public holding company. Incorporating clear contractual incentives for efficiency improvements—for example, by basing the contractor's revenue on ideal rather than actual performance parameters—is important.

The new agenda places greater emphasis on broader reforms to governing state-owned enterprises. Given the limited scope of private participation, state-owned utilities remain center stage. Without addressing the typical deficiencies that afflict such enterprises—including numerous and conflicting objectives, political interference, and lack of transparency—it will be difficult for the sector to exit low-level equilibrium. Three key areas for attention are internal process improvements, increased managerial autonomy, and more stringent performance monitoring. It is essential to incorporate measures to streamline corporate processes such as procurement, financial management, and performance management to strengthen commercial principles and accountability mechanisms. Measures to broaden the board of directors, increase use of external audit and independent audit of accounts, and incorporate independent directors from beyond the public sector would help to depoliticize decision making and consolidate the arm's-length relationship. Adopting performance-based monitoring arrangements that mimic private sector contracts is also of interest, but only to the extent that they create credible incentives by incorporating meaningful rewards and penalties at the personal and corporate levels and are subject to third-party monitoring.

The Benefits of More Effective Public Expenditure

The bulk of investment in the water sector is made by relevant government agencies through the budgetary process, often with external support. The existing patterns of spending clearly show that although utilities are instrumental in delivering services, the general government—using either domestic or external capital—continues to make most of the investment decisions. For this reason, a solid public investment appraisal system and strong public spending management are prerequisites for improving both urban and rural water supply.

Major bottlenecks hold back the disbursement of public investment funds. Capital budget execution ratios for public investment in water are fairly low, 75 percent on average. In many instances, the binding constraint is not availability of budgetary resources, but rather the capacity to disburse them in a timely fashion. In Tanzania, there were steep increases in budget allocations to the sector following its identification as a priority in the country's poverty reduction strategy. Disbursements increased at a much slower pace, in contrast, and no immediately discernible impact on access is seen.

The budgeting process needs to move toward a medium-term framework and make stronger links between sector objectives and resource allocations. This needs to be underpinned by clear sector plans that detail specific activities and their associated costs. It is essential that maintenance needs be incorporated into medium-term sector planning tools to prevent asset rehabilitation. Administrative processes that delay the release of budgeted funds also need to be overhauled. At the same time, procedures for procurement, disbursement, financial management, and accountability should be modernized and streamlined.

Donor resources are best channeled programmatically as budgetary support or through sectorwide projects. Given the sector's high dependence on external funds, a solid public expenditure management system for African countries also requires that donors improve the predictability of their support and make progress on streamlining and harmonizing administrative procedures. In that sense, it is preferable to focus on multidonor initiatives that pool funds to provide general budgetary support for a sectorwide program of interventions.

Technical assistance to the sector should include support to relevant government agencies for project identification and appraisal. Technical assistance to the sector has traditionally been understood as improving management practices of utilities. However, an equally important role is available for technical assistance to support government agencies in improving the framework for identifying, appraising, prioritizing, planning, and procuring investment projects. Donors can support countries in the development of good project identification and appraisal tools that systematically consider the technological alternatives for expanding access and that weigh the importance of spending on maintenance and rehabilitation against new investment.

Institutional Models to Connect the Unconnected

The role of standposts in urban water supply has the potential to expand to serve safe water to a larger number of consumers. Most countries' governments and utilities continue to focus attention on expansion of piped-water connections, but rapid urbanization and the utilities' weak financial position make this a questionable strategy to pursue so single-mindedly. Standpost use is very limited in the African urban water scene, is expanding relatively slowly, and remains concentrated among the more affluent segments of the population. Simple simulations suggest that the rate of service expansion could double if utilities shifted their investment budgets from piped-water connections to standposts. As long as urban households are inconvenienced by higher payments and longer water collection times, however, standposts will not necessarily be a superior solution, even if they are a cheaper alternative to private piped-water connections. In low-income countries, resale of water by neighbors through informal standpost arrangements is almost as prevalent as formal standposts.

The explanation of this paradox may lie in the problematic institutional arrangements associated with standposts in African cities. Utilities charge little or nothing for standpost water, and standpost revenue constitutes a negligible portion of the revenue base. This means that utilities lack a financial incentive to expand the service. Standpost operators, where they exist, often charge substantial markups that make the service prohibitively expensive and may generate significant revenue that is never captured by the utility. Quality of service provided by standposts can be very low because of both high rates of malfunction and the large numbers of people expected to rely on each one.

The solution to this conundrum is not yet clear, but it will require intensive experimentation with alternative network designs and institutional setups. Standposts cover a wide range of communal arrangements or delegated management models, some of which may be less promising than others. One option would be to increase the density of standposts to increase competition, with immediate impact on water supply quality and price. Yard taps can provide communal access to four or five contiguous households; this option lowers costs but only partially addresses the problem of maintenance and management. Whatever the approach, an important component of the solution will be to ensure fairer distribution of revenue among utilities and standpost operators or other secondary water retailers. The experiences of the handful of low-income countries that have achieved more than 20 percent urban coverage of standposts—notably Côte d'Ivoire, Rwanda, and Senegal—deserve study.

The popularity of the household resale option could also be exploited by making it an explicit part of the utility's rollout strategy. Household resale of water through yard taps appears in wide use in many African cities. Survey evidence highlights a variety of reasons why residents may find this approach preferable to official standposts. Neighbors can offer more convenient opening hours, better water pressure levels, and more convenient proximity, which reduces the time needed to collect the water. In addition, they offer more flexible payment mechanisms than either public standposts or a private connection. It is therefore advisable to give increasing recognition to this water supply modality, to remove any legal barriers to its implementation, and to consider making these household-based water retail enterprises an integral component of the utilities' expansion plans.

Ultimately, investing in utility production and distribution of water is the best policy for maintaining low-cost alternatives. Within cities, the formal and informal water markets are strongly connected, which influences the final price offered to the consumer. The greater the disruption within the formal piped-water system, the higher the price in the informal sector relative to the formal one. Increasing water production capacity and improving the efficacy of the distribution network can have a significant impact on the welfare of the unconnected as well as the connected, because it drives down the premium on alternative sources of water supply.

Accompanying Cost Recovery with Careful Social Policies

Underpricing is debilitating the water sector and slowing coverage expansion without contributing much to equity objectives. Underpricing water is contributing to utilities' financial weakness, slowing access expansion, and restraining quality of service. Because utility customers are drawn from the upper end of the income distribution, the result is a highly regressive incidence of subsidies to the sector. A large (and generally poor) segment of the urban population is paying multiples of these prices to access utility water indirectly, and in many cases more than the utility cost-recovery price.

Countries need to make progress toward further cost recovery while considering the economic circumstances of their populations. Although African households' purchasing power is quite limited, analysis confirms that operating cost recovery is a perfectly feasible objective for just about all African countries. Tariffs that recover full capital costs also look to be affordable for the richest 40 percent of the population in low-income countries, of which 10 percent already has access to piped water. There is thus little economic justification for the subsidies that exist today. Countries would be better served by recovering full costs from their existing customer base and using the resulting cash flow to accelerate access expansion in poor neighborhoods. In the longer term, however, as access to piped water increases, low-income countries will need social tariffs that provide water priced at operating cost-recovery levels for a minimum level of consumption to the substantial share of their population that cannot afford full capital cost-recovery tariffs. The key is verifying water tariffs' affordability with reference to household budgets, rather than simply assuming that they will be unaffordable.

Government entities need to become better customers. Government entities can easily capture 20 to 30 percent of total billings. They can be the worst offenders in paying bills, as well, with a significant lag in payment time. Often, they repay a large chunk of arrears with little indication of future payment schedules. This hampers efforts to sustain a robust payment culture and to improve utilities' investment-planning base.

A need is also present to rethink the design of water utility tariff structures. Most African utilities are increasing block tariffs to make water tariffs more equitable, but in reality, half of the utilities using this strategy incorporate fixed charges or minimum consumption thresholds that inflate the costs of water for poor households with modest levels of consumption. Compounding this counterproductive result is the fact that a significant share of utilities with increasing block tariffs also have very high subsistence blocks (in excess of 10 cubic meters); as a result, they end up providing subsidized water to the vast majority of consumers, rather than a targeted group of low-volume users.

Connection charges should be kept as low as possible, and subsidies could be reoriented toward connections. The majority of African water utilities levy piped-water connection charges in excess of $100, an insurmountable barrier for low-income households. Utilities intent on achieving universal access should explore ways to radically reduce connection charges to levels that are more in line with household affordability. Several alternative means of recovering connection charges are available, including offering payment plans that spread them out over time or sharing connection costs across the whole customer base through the general tariff. Connection costs may also be more suited to public subsidy than water-usage tariffs. They have the advantage of being one-time payments linked to a concrete and monitorable action that addresses a real affordability constraint. Simulations suggest that connection subsidies can be much more pro-poor than general subsidies to the water tariff, particularly if simple targeting mechanisms are used.

Toward a Better Understanding of Groundwater in Urban Water Supply

Groundwater, sourced from water wells (boreholes and dug wells), now supplies one-fourth of urban dwellers and is by far the fastest-growing source of improved water supply in African cities. Although wells and boreholes have long been a dominant source of improved water in rural areas, they have also become an increasingly important source of water supply in almost all urban areas. This is true in more than just those cities (such as Abidjan and Lusaka) where groundwater has long been a major source of utility supply. With utility coverage rates falling in urban Africa, groundwater has essentially stepped into the breach, with the fairly rapid growth of boreholes showing the appetite for lower-cost solutions. Investments in boreholes provide the opportunity to reach a wider demographic with relatively modest resources. One in four urban Africans relies on wells and boreholes for improved supply, a figure that rises to one in two urban Africans in the low-income countries. In Burkina Faso, Malawi, Mali, Mozambique, Uganda, and Zimbabwe, the share rises as high as three in four. In Malawi, Nigeria, and Rwanda, reliance on urban wells and boreholes is increasing particularly rapidly; more than 3 percent of the population gains access to this water source each year.

Too little is known about the physical, institutional, and financial characteristics of groundwater use. Household surveys provide a good picture of overall reliance but leave many questions unanswered. The prevalence of simple, shallow, hand-dug wells relative to professionally drilled boreholes is unknown, and so then is the extent to which groundwater supplies are adequately protected from direct wellhead contamination. The institutional arrangements associated with groundwater supplies are also unclear, particularly in terms of the extent to which they constitute stopgap services provided by municipalities as opposed to private or communal self-supply initiatives. Depending on the conditions and arrangements, the capital costs of such wells could be anywhere between $5,000 and $25,000 (or $10 to $20 per capita).

Extensive decentralized and uncoordinated in situ groundwater use in the urban environment raises risks of contamination by in situ sanitation. In addition to growing groundwater reliance, African cities are characterized by heavy use of low-grade in situ sanitation, mainly in the form of traditional latrines. Deployment of latrine sanitation at excessive population densities or lack of proper latrine operation can lead to increasing groundwater contamination that can affect the entire urban aquifer providing the groundwater supplies.

Furthermore, extensive unregulated use of groundwater by private actors may prevent the most rational and efficient exploitation of the resource for public water supply. In particular, it prevents cities from reaching economies of scale in groundwater exploitation and from following the principle of conjunctive surface and groundwater use that allows groundwater to play its natural role as a backup supply in times of drought.

An urgent need exists to develop an improved understanding of the benefits and risks of groundwater use in fast-growing Africa cities and towns, as well as how this varies with the hydrogeological setting. This should begin with a city-level appraisal of the quantity and quality of available urban groundwater resources; the drivers, dynamics and patterns of usage; and an assessment of the vulnerability of urban aquifers to pollution from the land surface. Creating a groundwater-monitoring framework and the promulgation of appropriate construction and operation protocols for wells and in situ sanitation facilities (mainly latrines) would help to safeguard groundwater quality, but should be accompanied by guidelines for safe use of groundwater sources. Appropriate governance arrangements also need to be put in place, recognizing the broad reach of groundwater resources, and must involve water utilities, public health authorities, and municipal agencies. They should also provide a suitable channel for public consultation.

Policy Options for the Sanitation Sector

The analyses of the sanitation sector performed by the Africa Infrastructure Country Diagnostic reveal the following key areas for policy attention.

The ultimate objective should be to provide universal access by expanding service and reducing open defecation as much as possible. Policy makers are often tempted to concentrate infrastructure enhancement efforts on the higher rungs of the sanitation ladder, a strategy that often runs counter to the needs of the majority of the population. For example, officials may channel limited public resources into sewerage networks that serve only a few people and fail to address the more urgent need to significantly reduce the incidence of open defecation. Policy decisions and infrastructure programs achieve the greatest public health gains when they take local access patterns into account. Those programs then can be augmented with low-cost initiatives to leverage household spending for latrine construction. Public spending should target helping people on the lowest rungs to move up the ladder. More expensive options should be left to households with the resources to take them up.

Complexity, a multiplicity of actors, and lack of accountability for sector leadership are the three features of the institutional framework governing the sanitation sector emerging from an institutional survey of line ministries, sector institutions, and water utilities. Unlike water, many parts of the supply chain for sanitation—hygiene promotion, latrine construction, and latrine emptying, for example—are in the hands of different public and private players, which prevents one agency from championing the sector and contributes to sanitation's falling between the cracks. The recent trend toward government decentralization has complicated the capture of adequate public resources for sanitation and allocated responsibilities to entities that lack technical capacity. Fifteen countries have adopted formal national sanitation policies, and most countries have an accepted definition of sanitation and a hygiene promotion program. Only seven countries, however, have policies that include cost recovery, and only eight countries have a sanitation fund or a dedicated budget line (in some cases funded exclusively by donors, as in Chad and Ethiopia, or by a combination of the government, sector levies, and donors). Côte d'Ivoire has the only fund financed entirely by sector levies.

Sanitation challenges vary both across and within African countries, and solutions must be tailored to individual national or regional needs. Open defecation rates remain high in some African countries, especially in rural areas. Countries often pursue solutions such as construction of traditional latrines or septic tanks that reach a small share of the population, predominantly wealthier urban residents. The policy options for each issue are presented as separate cases in this summary, and countries may need to use different combinations of these approaches to meet their national and regional challenges. The first option is to stimulate demand for sanitation and behavior change where open defecation prevails. The second is to ensure adequate supply before addressing demand in settings dominated by traditional latrines. Finally, the third is to expand access to improved sanitation across larger shares of the population, which in high-density settlements requires making sewerage systems more affordable.

Stimulating Demand for Sanitation and Changing Behavior Where Open Defecation Prevails

Unlike other infrastructure services, demand for sanitation cannot be assumed. Populations accustomed to open defecation may require a substantial change in cultural values and behavior to use a fixed-point facility. Without such change, people may not use latrines or may use them in a way that undermines the potential health benefits. A study in South India showed that when a large public investment was made in latrine construction but neglected to address the need for accompanying hygiene education, only 37 percent of men used the facilities despite 100 percent coverage (WSP-SA 2002). Hygiene education is a critical component of addressing any sanitation challenge that a country faces. Safe disposal of feces and hand washing with soap protect health in all sanitation settings. Promoting hygiene can start a virtuous cycle that builds demand for better sanitation, raises awareness of the benefits of sanitation, and establishes codes of conduct and new life standards.

Incorrect use of latrines can dramatically reduce or even reverse their health benefits. A facility is sanitary and safe because of the technology and material used and because of good practices and behaviors, such as keeping the facility contained and clean. An improved latrine that is not used and emptied correctly still poses high risks of environmental contamination and disease. It thus makes little sense to roll out a physical investment program without an accompanying promotion of hygiene and adequate ways of emptying the latrines on a regular basis. Effective hygiene promotion alone may stimulate self-financed household investment in better facilities. Too often these "soft" aspects of sanitation are overlooked in favor of the "hard" aspects, such as installing and upgrading infrastructure.

Changing behavior requires sustained communication and public education at the community level. It is important to understand people's motivations with regard to hygiene and sanitation. Health is one, but not necessarily the first: Convenience, dignity, and social status may be regarded as more important. For communitywide involvement, it is essential to adapt hygiene and sanitation promotion programs to cultural and institutional norms and then market them in language that demonstrates awareness of and respect for those customs. A successful example is the Regional Health Bureau's Sanitation Advocacy Campaign launched in 2003 in southern Ethiopia, which increased latrine coverage from 13 percent of the population to 78 percent in just two years. Encouraging peer pressure can also help. Once a community recognizes certain behaviors as desirable, there is pressure to conform. Social institution and leaders then begin to contribute, and compliance with the new standards becomes tied to one's social status.

Ensuring Adequate Supply before Addressing Demand in Settings Dominated by Traditional Latrines

Where traditional latrines prevail, the problem becomes how to upgrade them to more hygienic facilities to achieve the full health benefits of fixed-point defecation. Countries in which traditional latrines are widely used have already overcome the behavioral challenge of moving people out of open defecation. The problem is rather of improving facilities.

The debate centers on whether the main impediment to upgrading latrines comes from the supply side or the demand side.

From the demand side, low coverage of improved latrines can be explained by low household incomes and high capital costs. In addition, poor dwellers in urban slum settings often do not own their land or house and so have fewer incentives to invest in improving their living conditions.

Although traditional latrines are more affordable across all income levels, improved latrines often remain a luxury. The fact that half of African households have invested in traditional latrines in the absence of any subsidy suggests that large investment costs are affordable across the income spectrum. Yet improved latrines are a luxury good limited to the wealthiest households.

To address the affordability problem, public policy will likely have to incorporate a public subsidy for incremental capital costs associated with building improved facilities. A subsidy may have drawbacks, however, including distorted demand and markets. Subsidies can reduce the demand of households with the ability to pay, and suggesting a standard facility may encourage poor households to feel entitled to such a facility regardless of whether it is the most appropriate for their circumstances and geographic location. Widespread adoption of a standard could also discourage innovations that may lower costs.

From the supply side, low incidence of improved latrines can be explained by poor knowledge in the construction sector about required designs, lack of skilled construction workers, and shortage of materials. Access patterns already provide some clues that supply-side issues are a real constraint in Africa. First, the prevalence of improved latrines is low, even in middle-income countries, except in a handful of cases. Second, traditional latrines are used by 40 to 50 percent of the population, even among the highest-income groups, who may be able to pay for more advanced facilities.

Supply bottlenecks should be tackled first. Otherwise, subsidy resources may be wasted on households that could have financed the facilities on their own. Allowing the local market to develop also provides space for innovation that can lower the cost of improved latrines. Technological innovation is needed to secure greater health benefits with cheaper variants that are tailored to a locality's circumstances. Thus, an important starting point is a more nuanced understanding of the facilities covered by the term *traditional latrine* and the best practices for their use and maintenance.

The supply problem is compounded by a weak private sector dominated by small entrepreneurs at the local level. Constructing latrines demands skills that are not widely available, and small enterprises often do not have the resources to develop new skills or adopt new technologies.

Policies need to address supply-side limitations. Government support is best channeled toward conducting research, developing products, marketing latrines, and opening supply channels for key inputs. Training small service providers and providing access to credit can also help. The National Sanitation Program in Lesotho, established 20 years ago, is dedicated to sanitation promotion and private sector training. Households directly employ private latrine builders trained under the program, which has increased national sanitation coverage from 20 percent of the population to 53 percent.

Making Sewerage More Affordable in High-Density Settlements

In much of Africa, on-site sanitation is the most cost-effective and only practical way to secure the health benefits of the hygienic disposal of feces. On-site sanitation also has its limits, however. Water consumption rises with urban population growth, which creates the challenge of safely returning large volumes of wastewater. In addition, increased urban population density constrains the use of latrines (particularly the simpler types), which require rotation of sites and, therefore, a greater area of land than may be available. At high population densities, sewerage systems are both more suitable and more cost effective.

It is critical to reduce the cost of sewerage networks through technological innovation. Although annual population growth in Africa averages 2.5 percent, the urban population is growing at 3.9 percent. By 2020, nearly 60 percent of the African population will be in urban areas, and within 20 years the population of most African cities will have doubled. Africa's burgeoning cities will need to develop more extensive sewerage networks to deal with this influx of people. The statistics on affordability suggest that waterborne sewerage is far beyond the reach of all but the most affluent households, and the public subsidies to support such sewerage networks are equally unaffordable.

Condominial sewerage systems, a lower-cost alternative developed in Latin America, could be explored in Africa. These low-cost secondary pipe networks are built upstream of the main sewerage networks at the residents' initiative. The public collection network just touches each housing block (or condominium) instead of surrounding it. Decentralized microsystems of collection, treatment, and disposal can also replace the conventional centralized treatment system. Construction costs are reduced by using small-diameter pipes, with work partially carried out by residents. Experiences in Latin America reveal savings of up to 65 percent. Pilot condominial systems are being implemented in several African countries, most notably in the periurban areas of Dakar, Senegal. The Dakar system was expected to furnish 60,000 households (270,000 people) with on-site sanitation and to support 160 condominial schemes serving 130,000 by 2009.

Addressing Several Common Challenges for All Countries

Several common challenges cut across all sanitation settings: securing fiscal space for sanitation expenditures, coordinating the numerous players in the sector, and developing a more refined approach to measuring progress.

Securing Fiscal Space. The unglamorous nature of sanitation puts it at a disadvantage in the competition for fiscal resources. Government decentralization and poor accounting for sector expenditures make it hard to understand the exact amount of public resources allocated. It is estimated that fewer than half of the countries reported any spending on sanitation, and those that did averaged no more than 0.23 percent of gross domestic product, including both investment and operation and maintenance.

At the 2008 African Conference on Sanitation and Hygiene in Durban, South Africa, governments committed to raising public expenditure on sanitation to 0.5 percent of gross domestic product by 2010. This would require spending close to the levels needed to reach the target spelled out in the Millennium Development Goals (MDGs), but reaching the target will still be difficult because of the need to make up for lagging past performance. Better accounting of public expenditure on sanitation will also be needed to monitor progress toward the target.

Although governments are called upon to provide more resources, innovative financing approaches that help providers and operators are also needed. Cost recovery has proven to be a limited incentive because the only tariffs in sanitation are on wastewater and apply only to the minority of the population served by waterborne sewerage. Moreover, most African utilities are responsible for providing wastewater services in addition to water supply, which makes it likely that water pays for sanitation. Burkina Faso has taken an innovative approach by levying a sanitation tax as a surcharge on the water bill; funds collected are then used to subsidize access to improved sanitation facilities in Ouagadougou.

Needed—A Champion for the Sanitation Sector. Given that on-site sanitation, as opposed to waterborne sewerage, will likely continue to dominate sanitation in Africa, households rather than government will remain center stage. Even so, the government's role in promoting demand and addressing supply bottlenecks remains. Even within the public sector, dispersion and duplication of sanitation functions too often prevent one entity from leading, and as a result sanitation issues fail to be addressed by any agency.

A key policy issue is therefore to identify and empower a clear sanitation champion within the public sector. Senegal demonstrates its decision to take sanitation seriously by creating a dedicated sanitation utility. Senegal was also the first country to establish a government body at the national level—the Ministry of Urban Affairs, Housing, Urban Water, Public Hygiene and Sanitation (originally the Ministry for Prevention, Public Hygiene and Sanitation)—to coordinate sector activity. Although it may not always be necessary to create a ministry in the central government, Senegal provides an important lesson in singling out one entity with a clear mandate to lead.

Measuring Progress. Although the Joint Monitoring Programme (JMP) has made strides in monitoring progress toward the MDG target for sanitation, a commensurate effort has not been made to create detailed and frequent country-level monitoring and evaluation systems critical to guiding policy interventions. Most countries have no evaluation system, and the countries that are developing such a system have found it is not possible to provide a clear picture of the sector. In any event, monitoring and evaluation systems rarely measure the impact of improved sanitation on health, which is clearly relevant to demonstrate the first-order benefits.

At the country level, better monitoring and evaluation systems could be built by ensuring more coordination at the ministerial level—for instance, between the ministry in charge of sanitation and the ministry in charge of health. A larger role should be played at the local level, especially by the decentralized technical departments, in collecting data and monitoring progress. This would require more capacity and resources from the central government.

A limitation of the JMP's framework is the classification of traditional latrines, which will continue to dominate African sanitation. Traditional latrines include a heterogeneous collection of installations, some of which can be regarded as improved sanitation. Unfortunately, the JMP's household survey instruments, which track progress toward achieving the MDG target, cannot distinguish among the differing quality of installations within the latrine category. As a result, the data on progress in sanitation in Africa are least clear precisely where most of the progress is taking place. The precision of household survey instruments should be improved in this respect. It may also be relevant to track the intermediate goal of increasing the share of households making use of some kind of sanitation facility, even if it is an unimproved latrine.

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APPENDIX 1

Access to Water Supply and Sanitation Facilities

Table A1.1 Piped Water
(percentage of population)

	Time period (national)			Location		Expenditure quintile				
Country	*Early 1990s*	*Late 1990s*	*Early 2000s*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Benin	—	23.15	28.74	10.91	60.37	0.22	8.02	10.23	36.65	88.63
Burkina Faso	5.64	3.62	5.89	0.06	32.98	0.00	0.00	0.00	0.40	34.06
Cameroon	12.07	11.34	12.95	2.20	24.23	0.00	0.37	4.34	10.84	49.27
Central African Republic	2.65	—	—	0.00	6.24	0.00	0.00	0.00	0.00	13.26
Chad	—	3.36	4.45	0.00	21.71	0.00	0.00	0.00	0.02	22.27
Comoros	—	22.67	—	15.06	42.52	0.00	38.42	13.78	20.67	46.21
Congo, Dem. Rep.	21.00	—	15.03	0.35	40.45	0.00	0.00	0.00	6.88	58.84
Congo, Rep.	—	—	25.81	2.99	46.21	0.00	0.27	5.47	33.77	89.77
Côte d'Ivoire	23.98	27.93	—	6.73	64.58	0.00	1.73	2.62	38.23	97.63
Ethiopia	—	4.21	5.98	0.21	48.45	0.00	0.00	0.00	0.00	29.94
Gabon	—	43.03	—	8.84	55.06	0.07	6.90	30.08	78.44	99.76
Ghana	13.65	15.38	15.08	1.66	33.91	0.56	2.24	2.12	10.72	60.14
Guinea	—	9.62	9.13	1.22	28.06	0.00	0.00	0.44	1.56	43.77
Kenya	16.04	19.54	17.94	10.04	49.67	0.01	1.20	4.35	21.91	62.36
Lesotho	—	11.03	10.74	2.13	50.44	0.00	0.37	0.26	2.81	50.28
Madagascar	5.29	5.90	5.30	2.03	17.20	0.19	0.00	0.00	2.01	24.27
Malawi	6.11	7.74	6.49	1.68	32.04	0.00	0.81	0.42	1.12	30.14
Mali	—	5.66	9.06	1.86	29.25	0.24	1.27	1.25	4.48	38.34
Mauritania	—	—	17.41	9.84	27.51	0.00	0.00	5.31	25.29	56.57
Mozambique	—	6.55	6.86	0.33	19.72	0.00	0.00	0.00	0.04	34.43
Namibia	30.53	37.29	—	16.48	79.30	0.00	1.76	16.59	68.35	99.82
Niger	5.39	6.09	—	0.20	31.29	0.00	0.00	0.03	4.58	26.04
Nigeria	10.58	10.28	6.88	2.49	15.49	0.13	1.43	3.83	11.45	17.60

Rwanda	1.77	6.28	2.95	0.59	15.97	0.00	0.00	0.30	1.26	13.33
Senegal	26.60	31.10	43.36	17.68	76.76	0.92	9.08	36.24	74.59	96.48
South Africa	—	59.18	—	24.99	87.72	3.05	24.53	71.70	97.15	99.56
Sudan	—	21.12	—	9.73	37.44	0.02	0.22	5.39	44.57	77.45
Tanzania	10.23	13.78	7.36	2.86	21.87	0.00	0.00	0.20	6.92	29.72
Togo	—	17.75	—	3.11	51.30	0.99	2.22	4.98	17.28	63.35
Uganda	1.80	—	1.99	0.15	14.39	0.00	0.00	0.13	0.04	9.89
Zambia	31.41	21.03	18.32	2.73	46.43	0.00	0.12	0.28	14.67	76.75
Zimbabwe	26.68	32.75	—	4.43	93.04	0.00	11.42	6.64	49.01	98.57
Country typology										
Resourch-rich	14.65	15.10	12.01	3.18	23.52	0.08	1.02	3.95	17.34	35.39
Middle-income	63.26	56.46	52.07	22.90	87.00	2.80	22.64	66.60	92.24	97.63
Fragile states	27.01	24.30	26.09	2.85	46.56	0.05	2.08	1.65	17.28	67.45
Nonfragile, low-income	8.35	8.18	10.54	2.73	36.05	0.10	0.91	2.42	8.52	37.89
Level of urbanization										
High	24.24	22.91	21.84	7.01	38.76	0.69	5.83	17.18	31.99	49.01
Medium	24.56	23.41	21.77	3.75	41.28	0.05	1.60	2.64	20.12	64.39
Low	6.42	5.94	8.12	2.10	32.70	0.03	0.26	0.70	4.56	31.41
Level of water scarcity										
High	18.41	16.61	16.66	4.22	38.74	0.38	3.52	9.38	20.88	42.51
Low	15.95	16.63	16.37	3.24	37.81	0.08	0.90	3.08	13.60	52.44
Overall	17.60	16.62	16.57	3.92	38.39	0.28	2.65	7.28	18.46	45.81

Source: Banerjee, Wodon, and others 2008.

Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.2 Standposts
(percentage of population)

Country	*Time period (national)*			*Location*		*Expenditure quintile*				
	Early 1990s	*Late 1990s*	*Early 2000s*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Benin	—	5.49	14.12	18.74	5.94	13.36	18.07	20.17	16.18	2.83
Burkina Faso	10.16	8.29	12.74	4.03	53.21	0.00	0.00	4.76	16.92	46.85
Cameroon	22.34	23.39	26.01	9.56	43.26	0.00	17.03	28.44	49.15	35.50
Central African Republic	19.08	—	—	1.55	42.85	0.00	2.25	10.46	35.97	46.72
Chad	—	5.67	6.62	2.38	23.02	0.00	1.26	7.02	6.52	18.37
Comoros	—	26.66	—	25.31	30.19	69.10	7.95	25.62	15.37	6.75
Congo, Dem. Rep.	7.09	—	12.11	4.92	24.55	0.00	2.59	7.77	23.52	24.34
Congo, Rep.	—	—	23.49	5.34	39.71	3.86	11.29	45.58	50.46	6.20
Côte d'Ivoire	21.44	23.12	—	27.61	15.36	23.62	32.62	29.45	29.32	0.50
Ethiopia	—	11.62	15.82	12.42	40.86	0.00	4.24	17.72	20.07	37.27
Gabon	—	30.35	—	10.93	37.19	13.50	54.94	63.39	19.84	0.00
Ghana	18.65	21.18	20.48	7.89	38.14	2.48	21.59	17.06	34.99	26.99
Guinea	—	10.94	12.75	2.16	38.09	0.00	0.00	4.60	16.57	42.83
Kenya	11.15	9.41	9.44	6.70	20.45	3.08	5.16	10.21	15.26	13.53
Lesotho	—	51.68	48.04	50.15	38.35	55.03	42.97	56.23	54.95	31.16
Madagascar	11.71	11.21	17.95	10.11	46.51	0.00	0.46	5.57	33.90	49.89
Malawi	19.54	15.77	12.71	7.00	43.04	0.00	0.14	6.24	22.83	34.37
Mali	—	11.14	20.30	16.25	31.69	0.66	11.26	27.47	28.28	33.95
Mauritania	—	—	14.88	8.20	23.79	0.00	23.93	19.05	20.62	11.51
Mozambique	—	17.76	17.62	4.80	42.86	0.00	2.65	6.01	29.34	51.39
Namibia	19.21	20.80	—	21.85	18.68	13.48	29.86	38.16	22.51	0.15
Niger	11.31	12.58	—	6.76	37.48	0.00	0.00	0.00	32.26	31.00
Nigeria	13.12	13.52	9.38	5.56	16.91	3.66	6.71	8.76	13.05	14.77

Rwanda	20.92	29.40	24.71	21.83	40.60	0.00	3.45	50.51	22.74	47.55
Senegal	17.94	16.51	18.12	23.05	11.72	19.00	32.59	23.48	13.59	1.82
South Africa	—	19.25	—	30.16	10.15	30.74	47.69	17.36	0.42	0.00
Sudan	—	7.96	—	5.27	11.81	7.60	9.95	8.22	7.76	5.50
Tanzania	20.45	20.39	25.20	18.97	45.31	12.08	14.94	19.79	36.86	42.49
Togo	—	17.64	—	15.25	23.10	8.10	11.46	20.16	27.63	20.90
Uganda	4.17	—	7.23	1.24	47.49	0.38	0.20	0.85	2.68	32.34
Zambia	17.92	15.93	15.61	4.20	36.20	0.04	2.50	13.37	45.22	16.89
Zimbabwe	8.01	7.21	—	7.90	5.73	0.58	8.71	10.47	15.56	0.70
Country typology										
Resourch-rich	13.59	14.97	12.56	5.51	19.82	3.71	7.97	11.49	17.33	14.93
Middle-income	23.20	20.56	18.92	31.03	10.75	30.98	46.77	19.76	3.48	1.23
Fragile states	17.45	17.01	18.37	10.55	23.07	4.82	8.58	12.24	23.41	19.65
Nonfragile, low-income	13.11	12.62	16.17	10.76	36.23	3.11	7.57	14.27	23.13	33.66
Level of urbanization										
High	17.16	17.09	16.03	12.33	19.68	10.13	19.36	15.43	17.06	12.81
Medium	14.97	15.72	15.03	6.60	22.33	3.00	5.88	9.57	21.39	21.33
Low	12.19	11.55	15.59	10.71	38.87	2.65	5.15	14.04	21.95	34.90
Level of water scarcity										
High	14.12	13.45	14.00	9.30	20.16	5.33	10.42	11.94	14.51	19.97
Low	16.02	17.07	18.88	13.10	31.34	5.88	10.97	16.60	31.03	30.47
Overall	14.75	14.66	15.62	10.46	24.35	5.51	10.60	13.49	20.00	23.46

Source: Banerjee, Wodon, and others 2008.
Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.3 Wells/Boreholes
(percentage of population)

	Time period (national)			Location		Expenditure quintile				
Country	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Benin	—	54.71	44.93	54.40	28.15	49.70	60.09	62.41	44.20	8.23
Burkina Faso	78.58	82.30	67.66	79.45	12.89	65.35	83.06	84.16	77.14	18.61
Cameroon	28.14	26.68	32.13	48.15	15.34	46.57	55.87	33.57	19.61	5.02
Central African Republic	38.48	—	—	40.98	35.09	31.40	34.63	53.34	42.61	30.42
Chad	—	72.07	65.99	74.34	33.64	51.72	76.17	76.83	85.42	40.16
Comoros	—	46.10	—	54.50	24.19	19.09	49.72	57.46	62.13	46.00
Congo, Dem. Rep.	49.04	—	8.89	7.54	11.21	3.99	12.72	14.66	11.22	3.58
Congo, Rep.	—	—	15.35	25.46	6.31	17.75	27.05	21.40	8.45	2.09
Côte d'Ivoire	41.33	41.29	—	53.58	20.03	55.75	55.24	63.86	29.70	1.87
Ethiopia	—	6.07	9.88	10.96	1.97	5.46	13.53	11.97	10.89	7.55
Gabon	—	8.35	—	23.56	3.00	22.39	14.82	3.41	1.12	0.00
Ghana	32.51	35.33	42.10	57.41	20.61	51.25	55.55	49.40	46.18	7.95
Guinea	—	46.52	50.48	58.96	30.17	30.48	70.84	66.88	71.50	12.86
Kenya	24.96	21.98	21.64	23.54	14.04	11.78	24.99	29.60	25.52	16.48
Lesotho	—	14.97	33.33	38.40	9.97	43.52	42.64	31.93	33.42	15.00
Madagascar	15.67	23.06	21.72	22.42	19.18	18.98	17.90	18.65	28.44	24.63
Malawi	58.92	65.91	69.02	77.59	23.57	83.74	82.86	76.69	68.59	33.19
Mali	—	78.60	65.11	75.20	36.81	94.67	79.64	62.18	61.92	26.80
Mauritania	—	—	45.25	67.77	15.25	95.76	45.07	53.49	24.31	6.06
Mozambique	—	46.34	59.38	72.83	32.93	68.28	78.48	76.80	59.89	13.03
Namibia	27.26	31.57	—	47.14	0.13	66.50	51.99	34.72	4.41	0.03
Niger	75.17	71.95	—	86.85	8.18	99.00	95.15	92.01	52.15	20.31
Nigeria	31.64	44.17	53.71	56.77	47.71	59.03	57.79	52.13	48.35	51.24

Rwanda	1.53	9.77	20.21	20.68	17.65	6.16	37.13	17.96	25.34	14.96
Senegal	51.44	49.22	35.61	55.57	9.66	77.15	55.62	36.32	8.18	0.44
South Africa	—	4.07	—	8.55	0.33	8.92	7.26	3.17	0.93	0.06
Sudan	—	45.29	—	51.44	36.48	74.44	58.07	40.75	26.57	11.55
Tanzania	31.03	40.97	41.04	47.81	19.20	57.02	54.11	44.72	34.18	15.06
Togo	—	38.49	—	45.05	23.46	39.69	50.56	48.81	38.48	15.05
Uganda	40.48	—	68.23	73.25	34.52	65.55	68.72	72.30	82.22	52.11
Zambia	24.24	45.32	46.87	64.22	15.57	69.37	63.12	60.14	35.70	5.89
Zimbabwe	54.50	52.23	—	76.22	1.17	80.47	67.62	76.35	34.35	0.73
Country typology										
Resourch-rich	36.70	47.72	48.97	56.70	39.35	59.74	57.96	49.47	42.44	36.71
Middle-income	5.56	5.58	5.97	12.93	0.46	12.67	10.52	5.61	2.35	0.64
Fragile states	61.45	42.44	52.96	41.51	13.71	27.65	35.18	38.96	25.74	5.59
Nonfragile, low-income	34.37	33.55	38.33	43.36	18.14	42.68	46.63	43.21	37.69	17.20
Level of urbanization										
High	27.89	34.16	39.42	48.52	28.75	49.00	47.52	41.43	33.62	28.06
Medium	57.03	49.49	51.84	50.13	21.07	44.17	46.67	43.96	31.05	8.25
Low	33.28	32.04	36.81	40.92	16.75	38.02	43.76	40.98	38.37	20.28
Level of water scarcity										
High	34.97	36.31	41.12	44.33	28.17	44.09	46.22	42.57	37.18	25.25
Low	41.48	38.84	42.16	46.36	16.66	42.52	45.12	40.42	30.19	10.36
Overall	37.12	37.15	41.46	44.96	23.85	43.57	45.85	41.86	34.86	20.30

Source: Banerjee, Wodon, and others 2008.
Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.4 Surface Water
(percentage of population)

Country	Time period (national)			Location		Expenditure quintile				
	Early 1990s	*Late 1990s*	*Early 2000s*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Benin	—	16.51	12.13	15.87	5.50	36.60	13.82	7.04	2.90	0.28
Burkina Faso	3.91	4.87	13.42	16.21	0.50	34.63	16.51	10.75	5.33	0.04
Cameroon	35.05	37.14	27.65	39.96	14.75	53.22	26.74	33.03	18.63	6.53
Central African Republic	39.14	—	—	57.42	14.35	68.60	63.08	36.00	20.29	7.69
Chad	—	11.97	18.48	22.35	3.50	48.24	21.57	13.11	6.67	2.34
Comoros	—	2.88	—	3.49	1.27	9.72	1.33	1.34	0.40	0.47
Congo, Dem. Rep.	22.42	—	62.29	85.76	21.67	96.01	84.68	73.14	54.95	12.34
Congo, Rep.	—	—	30.28	59.11	4.52	75.88	54.68	16.78	3.76	0.13
Côte d'Ivoire	12.90	7.44	—	11.75	0.00	19.62	10.41	4.06	2.70	0.00
Ethiopia	—	78.03	67.94	76.11	7.88	94.49	81.62	69.96	68.68	24.71
Gabon	—	18.02	—	56.35	4.53	63.97	23.20	2.79	0.14	0.00
Ghana	34.37	27.35	20.12	32.36	2.95	45.35	19.96	29.72	3.96	0.60
Guinea	—	31.69	27.48	37.50	3.53	69.47	28.91	27.89	10.28	0.35
Kenya	44.66	47.00	46.35	56.34	6.20	84.21	64.54	51.83	29.15	1.66
Lesotho	—	20.44	7.67	9.15	0.87	1.37	13.73	11.39	8.42	3.46
Madagascar	65.27	59.25	55.02	65.44	17.07	80.83	81.63	75.78	35.63	1.17
Malawi	15.30	10.49	11.67	13.61	1.34	16.14	16.13	16.31	7.46	2.29
Mali	—	4.27	5.08	6.28	1.72	4.29	7.62	8.34	4.59	0.54
Mauritania	—	—	4.65	7.61	0.71	4.18	12.85	4.29	1.58	0.58
Mozambique	—	28.75	14.98	20.96	3.20	31.64	17.68	14.75	9.15	0.56
Namibia	21.00	8.30	—	12.42	0.00	17.11	14.42	7.06	2.89	0.00
Niger	3.28	2.60	—	3.16	0.19	1.00	2.86	4.66	3.16	1.54
Nigeria	42.02	27.77	23.18	30.76	8.28	33.39	29.96	28.19	16.14	8.15

Rwanda	75.41	54.07	51.43	56.29	24.58	93.72	58.60	29.86	50.19	23.42
Senegal	2.64	1.78	0.98	1.72	0.02	1.81	1.28	1.38	0.44	0.00
South Africa	—	14.40	—	31.30	0.29	53.31	14.48	3.95	0.23	0.00
Sudan	—	19.84	—	28.50	7.44	14.84	27.16	35.38	13.14	2.70
Tanzania	34.33	24.27	24.39	29.76	7.08	30.91	30.91	34.73	20.58	4.76
Togo	—	25.50	—	35.91	1.66	50.64	34.95	25.29	15.90	0.46
Uganda	53.08	—	21.59	24.47	2.19	33.70	30.41	25.28	14.35	4.07
Zambia	26.04	16.56	18.99	28.72	1.44	30.52	34.25	25.95	4.17	0.00
Zimbabwe	10.61	7.56	—	11.11	0.00	18.95	11.49	6.19	0.95	0.00
Country typology										
Resourch-rich	35.61	27.41	23.68	30.94	8.15	33.52	29.54	28.54	14.39	6.19
Middle-income	18.16	14.39	13.02	28.63	0.30	49.76	14.45	4.37	0.66	0.14
Fragile states	30.77	31.97	45.62	44.38	15.16	67.26	53.98	44.72	31.66	6.75
Nonfragile, low-income	51.41	34.55	37.42	42.17	5.66	53.87	43.78	38.65	28.36	7.93
Level of urbanization										
High	31.56	22.96	20.38	28.62	5.69	37.30	23.64	20.91	10.34	4.75
Medium	34.24	31.45	37.93	38.07	12.42	52.03	44.59	39.73	24.30	4.96
Low	53.87	37.05	41.25	45.33	7.07	59.11	49.87	43.06	33.22	9.52
Level of water scarcity										
High	45.14	31.65	32.56	39.84	5.78	48.35	36.98	32.04	22.15	7.69
Low	31.50	27.84	32.91	36.55	12.16	51.26	42.65	38.04	23.49	4.60
Overall	40.64	30.38	32.68	38.83	8.17	49.32	38.86	34.04	22.60	6.66

Source: Banerjee, Wodon, and others 2008.

Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.5 Septic Tank
(percentage of population)

	Time period (national)			Location		Expenditure quintile				
Country	*Early 1990s*	*Late 1990s*	*Early 2000s*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Benin	—	0.00	2.39	0.35	6.00	0.00	0.00	0.00	0.63	11.30
Burkina Faso	0.89	0.58	1.86	0.49	8.22	0.00	0.02	0.00	1.42	9.02
Cameroon	6.56	6.41	8.07	0.73	15.76	0.00	0.01	0.35	1.74	38.32
Central African Republic	1.11	—	—	0.11	2.48	0.00	0.00	0.00	0.31	5.26
Chad	—	0.24	1.83	0.46	7.13	0.00	0.00	0.00	1.19	7.97
Comoros	—	2.93	—	1.16	7.55	0.00	0.08	0.00	0.73	14.14
Congo, Dem. Rep.	1.56	—	1.42	0.02	3.83	0.00	0.00	0.00	0.00	6.07
Congo, Rep.	—	—	5.33	0.35	9.78	0.00	0.00	0.03	2.49	24.21
Côte d'Ivoire	14.03	12.45	—	2.26	30.07	0.00	0.00	0.00	2.15	60.26
Ethiopia	—	0.34	2.13	1.34	7.99	0.00	0.00	1.16	3.60	5.93
Gabon	—	24.50	—	4.45	31.56	0.09	0.91	4.51	21.69	95.49
Ghana	5.94	7.57	10.28	1.52	22.56	0.27	2.09	1.41	4.42	43.35
Guinea	—	2.65	2.62	0.58	7.51	0.00	0.00	0.00	1.11	12.04
Kenya	7.99	9.75	8.97	1.48	39.06	0.00	0.00	0.25	2.06	42.64
Lesotho	—	2.11	1.61	0.15	8.34	0.00	0.00	0.10	0.47	7.50
Madagascar	2.54	2.26	1.88	0.50	6.89	0.00	0.00	0.04	1.49	7.85
Malawi	2.62	3.30	3.58	0.89	17.87	0.00	0.81	0.08	0.67	16.37
Mali	—	1.12	6.05	3.01	14.56	0.00	0.03	6.86	5.54	17.93
Mauritania	—	—	1.77	0.05	4.06	0.00	0.00	0.00	0.44	8.41
Mozambique	—	3.22	2.88	0.21	8.12	0.00	0.00	0.00	0.02	14.42
Namibia	26.65	30.56	—	6.80	78.54	0.00	0.00	1.84	51.56	99.49
Niger	1.25	1.05	—	0.23	4.58	0.00	0.00	0.00	2.42	2.89
Nigeria	8.46	11.90	13.12	5.65	27.80	0.07	0.46	1.43	9.73	54.14

Rwanda	1.05	1.47	1.16	0.24	6.27	0.00	0.00	0.26	0.27	5.34
Senegal	10.62	9.07	36.04	14.15	64.51	1.10	7.46	37.24	56.93	77.81
South Africa	—	46.37	—	5.84	80.21	0.13	3.75	35.50	92.93	99.62
Sudan	—	6.42	—	1.12	14.02	0.21	0.12	1.42	6.59	31.30
Tanzania	1.41	1.66	2.75	0.47	10.12	0.00	0.00	0.00	0.93	12.84
Togo	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uganda	1.59	—	1.73	0.40	10.67	0.00	0.15	0.28	0.90	7.37
Zambia	27.13	20.69	18.09	2.11	46.92	0.00	0.12	1.07	13.65	75.85
Zimbabwe	26.25	31.45	—	1.54	95.12	0.00	11.32	5.92	42.64	99.21
Country typology										
Resourch-rich	8.94	12.41	11.18	4.08	23.63	0.08	0.32	1.25	8.32	47.82
Middle-income	49.37	44.02	40.78	5.51	79.18	0.12	3.44	32.71	87.57	95.99
Fragile states	7.13	7.21	6.65	0.85	14.48	0.00	1.43	0.75	5.87	27.15
Nonfragile, low-income	2.68	2.20	4.89	1.33	17.44	0.06	0.48	2.13	4.26	17.93
Level of urbanization										
High	17.16	17.53	18.77	5.07	38.09	0.14	1.44	8.89	24.80	60.81
Medium	7.42	9.27	6.42	0.80	14.26	0.04	0.95	0.88	6.57	26.57
Low	1.91	1.35	3.20	0.95	13.35	0.00	0.06	0.73	2.14	13.16
Level of water scarcity										
High	10.71	10.76	11.39	2.45	31.93	0.06	0.97	4.43	14.73	38.70
Low	5.53	6.59	6.49	1.64	14.45	0.06	0.42	2.52	5.36	24.75
Overall	9.00	9.37	9.77	2.20	25.37	0.06	0.78	3.80	11.61	34.06

Source: Banerjee, Wodon, and others 2008.

Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.6 Improved Latrine
(percentage of population)

Country	Time period (national)			Location		Expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Benin	—	1.46	13.87	5.15	29.35	0.00	1.06	3.67	12.78	51.88
Burkina Faso	0.71	0.25	17.92	6.81	69.55	0.09	0.83	3.06	19.84	74.35
Cameroon	0.00	23.54	26.98	13.27	41.36	0.02	0.96	24.57	63.73	45.65
Central African Republic	13.28	—	—	18.43	6.31	16.06	27.59	13.42	6.73	2.61
Chad	—	7.51	2.74	0.23	12.46	0.00	0.00	0.00	0.45	13.26
Comoros	—	20.71	—	15.33	34.74	0.00	0.32	18.06	24.41	61.82
Congo, Dem. Rep.	10.77	—	9.77	0.35	26.07	0.00	0.00	0.00	1.81	40.42
Congo, Rep.	—	—	15.07	4.11	24.87	0.22	0.62	7.74	18.88	48.03
Côte d'Ivoire	22.48	13.30	—	7.73	22.92	0.00	1.21	10.59	28.38	26.92
Ethiopia	—	0.30	0.89	0.48	3.88	0.00	0.00	0.06	0.51	3.85
Gabon	—	22.09	—	8.40	26.91	1.89	12.71	38.22	53.28	4.27
Ghana	13.19	21.84	22.63	10.93	39.04	0.92	22.06	17.24	38.59	35.18
Guinea	—	0.00	2.06	1.65	3.02	0.00	0.55	3.77	2.23	3.77
Kenya	5.57	6.19	7.96	7.12	11.33	0.00	0.21	5.92	11.88	21.82
Lesotho	—	18.01	20.78	16.93	38.49	0.00	0.76	25.40	34.27	43.83
Madagascar	30.79	4.40	49.01	44.15	66.71	0.24	20.36	66.40	76.58	82.34
Malawi	0.67	0.64	1.20	0.96	2.44	0.00	0.00	0.07	0.01	5.90
Mali	—	7.77	10.79	7.08	21.18	0.04	0.62	7.80	17.32	28.30
Mauritania	—	—	3.82	0.25	8.59	0.00	0.00	0.30	3.27	15.57
Mozambique	—	0.88	1.81	0.07	5.26	0.00	0.00	0.00	0.02	9.09
Namibia	0.40	2.74	—	3.14	1.95	0.00	0.00	6.72	7.00	0.01
Niger	12.24	12.14	—	2.14	54.93	0.09	0.06	0.29	2.24	58.42
Nigeria	0.00	6.31	2.89	1.70	5.22	0.00	0.41	2.05	5.22	6.78

Rwanda	0.00	8.16	29.32	25.87	48.42	0.00	0.40	4.07	75.40	66.82
Senegal	21.97	23.08	10.10	10.78	9.21	6.48	16.32	10.02	10.23	7.43
South Africa	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sudan	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanzania	1.32	0.93	3.69	1.06	12.17	0.00	0.00	0.09	1.25	17.11
Togo	—	18.01	—	11.55	32.82	0.00	3.94	6.72	31.79	47.69
Uganda	1.65	—	2.39	1.43	8.86	0.00	0.08	0.34	2.30	9.31
Zambia	1.39	0.38	1.56	1.25	2.12	0.00	0.25	1.19	4.43	1.93
Zimbabwe	21.18	24.96	—	35.73	2.03	6.54	23.27	57.63	36.06	0.36
Country typology										
Resourch-rich	1.63	6.63	6.39	2.26	8.04	0.02	0.44	3.71	9.35	9.62
Middle-income	0.94	0.93	1.43	1.36	0.58	0.00	0.03	1.28	1.64	1.73
Fragile states	20.28	17.07	16.23	10.34	22.22	1.38	4.36	10.33	12.43	28.80
Nonfragile, low-income	5.31	4.36	9.90	6.16	21.72	0.34	3.51	6.89	13.55	24.26
Level of urbanization										
High	4.23	9.05	8.39	3.96	11.53	0.41	3.17	5.76	13.41	12.86
Medium	10.80	9.82	10.89	5.88	14.21	0.88	2.72	5.81	5.94	19.27
Low	5.20	2.63	8.87	6.06	21.11	0.03	1.58	6.44	12.42	24.28
Level of water scarcity										
High	4.49	6.16	7.57	4.06	8.86	0.24	1.99	3.90	8.38	13.54
Low	9.73	8.12	12.45	8.38	23.38	0.64	3.36	10.33	17.01	29.49
Overall	6.22	6.81	9.19	5.38	14.31	0.37	2.44	6.04	11.24	18.84

Source: Banerjee, Wodon, and others 2008.

Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.7 Traditional Latrine
(percentage of population)

Country	Time period (national)			Location		Expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Benin	—	24.07	15.25	9.16	26.04	0.30	2.29	9.21	37.11	27.35
Burkina Faso	26.13	22.13	10.03	9.18	13.96	0.16	0.20	12.33	25.27	10.34
Cameroon	45.21	59.89	57.61	73.20	41.27	84.44	84.10	70.54	33.53	15.36
Central African Republic	59.45	—	—	40.24	85.51	0.00	41.29	75.50	89.32	91.27
Chad	—	20.52	23.62	13.25	63.82	0.00	0.26	1.72	47.00	70.07
Comoros	—	75.07	—	82.30	56.23	99.75	96.53	80.67	72.63	24.04
Congo, Dem. Rep.	71.25	—	76.08	81.75	66.27	81.80	76.96	86.03	89.81	51.22
Congo, Rep.	—	—	69.76	78.41	62.03	79.99	80.23	87.10	74.40	26.93
Côte d'Ivoire	21.13	38.62	—	35.60	43.84	3.10	29.64	84.56	65.50	12.81
Ethiopia	—	16.90	34.70	29.00	76.55	0.00	12.07	55.72	32.81	73.47
Gabon	—	50.91	—	82.93	39.63	92.59	82.89	55.12	23.79	0.06
Ghana	47.22	40.82	40.53	50.40	26.69	88.07	52.26	25.75	24.96	11.33
Guinea	—	61.09	67.44	59.32	86.86	4.41	88.32	68.51	92.93	83.64
Kenya	67.74	67.61	64.32	69.33	44.21	86.73	81.20	59.62	61.48	32.40
Lesotho	—	36.16	32.85	30.13	45.44	0.00	13.27	48.62	55.55	47.39
Madagascar	5.63	32.78	2.54	1.53	6.21	0.00	0.01	0.38	3.85	8.47
Malawi	71.63	79.46	80.67	81.84	74.46	98.52	88.26	67.01	73.84	75.57
Mali	—	63.93	62.06	61.92	62.47	77.09	71.83	47.43	61.16	52.70
Mauritania	—	—	44.35	28.27	65.77	0.00	12.51	57.66	76.79	75.26
Mozambique	—	34.78	48.01	37.91	67.88	0.00	10.27	77.30	84.02	73.05
Namibia	7.42	7.50	—	8.97	4.54	0.06	0.12	22.48	14.61	0.28
Niger	3.77	6.92	—	3.58	21.23	0.00	0.02	0.55	9.92	24.38
Nigeria	61.61	53.97	59.40	60.05	58.13	75.18	75.03	61.96	60.98	23.59

Rwanda	92.95	87.22	66.13	70.40	42.50	100.00	97.34	87.83	20.05	25.21
Senegal	28.74	35.10	31.28	38.42	21.99	56.40	38.63	24.03	24.42	12.81
South Africa	—	34.08	—	63.87	9.20	47.60	72.02	47.11	3.60	0.00
Sudan	—	48.91	—	41.49	59.55	19.34	36.79	57.45	77.46	65.73
Tanzania	82.38	84.98	79.22	80.46	75.23	87.34	74.31	80.39	85.50	68.46
Togo	—	14.92	—	6.03	35.28	2.16	4.93	5.97	13.03	48.56
Uganda	78.74	—	80.25	80.60	77.89	86.46	83.07	67.65	82.85	81.14
Zambia	42.10	51.32	53.09	56.66	46.65	14.48	70.83	79.94	78.82	21.28
Zimbabwe	13.48	14.89	—	20.78	2.33	12.00	20.61	25.24	15.86	0.33
Country typology										
Resourch-rich	57.05	57.19	54.77	55.73	56.54	60.07	65.88	60.52	61.85	31.82
Middle-income	37.23	33.01	30.36	58.24	9.58	43.76	66.72	46.14	6.11	1.88
Fragile states	56.86	54.17	65.26	50.51	58.92	45.73	58.27	71.96	72.68	42.58
Nonfragile, low-income	44.46	40.27	50.10	47.60	50.17	45.72	42.97	51.13	48.97	50.87
Level of urbanization										
High	50.93	47.82	51.35	57.35	42.05	65.65	67.68	56.80	44.76	17.13
Medium	55.17	56.15	55.06	46.10	58.91	34.01	48.32	65.14	73.88	51.64
Low	44.98	40.51	51.81	48.04	57.12	44.91	44.57	51.84	49.50	55.38
Level of water scarcity										
High	47.48	40.38	47.88	48.31	46.80	49.14	52.45	51.29	46.32	38.33
Low	54.30	60.64	61.62	55.68	56.86	51.80	57.28	68.03	68.06	44.19
Overall	49.73	47.12	52.44	50.56	50.57	50.02	54.05	56.85	53.55	40.27

Source: Banerjee, Wodon, and others 2008.

Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.8 Open Defecation
(percentage of population)

	Time period (national)			Location		Expenditure quintile				
Country	*Early 1990s*	*Late 1990s*	*Early 2000s*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Benin	—	73.75	67.67	84.71	37.47	99.48	95.48	86.75	47.92	8.67
Burkina Faso	71.64	76.56	69.96	83.30	8.00	99.64	98.89	84.29	53.07	6.02
Cameroon	12.55	9.82	7.17	12.63	1.44	15.35	14.56	4.35	0.95	0.61
Central African Republic	25.91	—	—	41.13	5.26	83.90	30.97	10.97	3.21	0.39
Chad	—	71.48	71.61	85.83	16.47	99.89	99.55	98.00	51.36	8.23
Comoros	—	0.27	—	0.37	0.00	0.00	0.73	0.30	0.40	0.00
Congo, Dem. Rep.	16.41	—	12.24	17.40	3.29	17.74	22.30	13.53	8.32	1.54
Congo, Rep.	—	—	9.53	16.65	3.16	19.21	18.73	4.75	4.15	0.77
Côte d'Ivoire	42.10	35.41	—	54.21	2.92	96.90	68.55	4.85	3.51	0.00
Ethiopia	—	82.45	62.20	69.11	11.36	100.00	87.83	42.98	63.07	16.50
Gabon	—	2.09	—	3.75	1.51	5.11	2.77	1.78	0.72	0.07
Ghana	26.52	24.00	24.57	36.90	7.28	10.74	23.46	55.11	28.63	4.12
Guinea	—	34.39	27.60	38.14	2.40	95.58	10.99	26.64	3.64	0.51
Kenya	17.79	15.86	18.29	21.84	4.02	13.27	18.33	33.97	23.87	2.03
Lesotho	—	40.41	44.65	52.67	7.65	100.00	85.70	25.70	9.63	1.25
Madagascar	61.01	60.54	46.57	53.82	20.18	99.76	79.63	33.18	18.08	1.32
Malawi	24.98	16.52	14.46	16.23	5.06	1.48	10.94	32.79	25.21	2.02
Mali	—	26.70	20.92	27.73	1.79	22.77	27.28	37.38	15.96	1.04
Mauritania	—	—	49.30	70.44	21.13	99.94	86.54	41.28	17.82	0.40
Mozambique	—	60.27	46.73	61.34	17.98	100.00	88.82	21.53	15.50	3.04
Namibia	63.56	56.60	—	79.08	11.23	99.33	98.96	65.13	19.49	0.00
Niger	82.30	79.46	—	93.78	18.22	99.86	99.53	99.01	84.75	13.46
Nigeria	29.38	26.02	24.52	32.53	8.79	24.72	24.07	34.39	23.98	15.46

Rwanda	5.95	2.96	3.32	3.45	2.60	0.00	2.23	7.68	4.22	2.55
Senegal	38.39	32.44	22.01	36.12	3.67	35.43	37.26	28.47	7.50	1.19
South Africa	—	12.78	—	26.14	1.62	50.13	11.32	2.29	0.14	0.00
Sudan	—	42.65	—	55.92	23.63	78.42	60.50	38.78	14.05	2.13
Tanzania	13.98	12.38	14.29	17.96	2.44	12.54	25.63	19.51	12.31	1.56
Togo	—	64.09	—	79.12	29.68	94.81	86.07	85.05	51.83	2.54
Uganda	17.41	—	14.78	16.64	2.31	13.26	16.33	30.22	12.26	1.78
Zambia	29.11	27.01	27.04	39.94	3.78	85.52	28.75	17.64	3.07	0.13
Zimbabwe	38.71	28.41	—	41.61	0.32	81.46	44.46	10.64	5.00	0.00
Country typology										
Resourch-rich	33.25	31.72	27.56	37.67	11.11	39.44	32.86	33.98	20.10	10.51
Middle-income	17.71	15.79	14.25	31.17	1.95	54.14	17.89	5.82	1.31	0.05
Fragile states	51.61	42.71	38.56	37.74	3.87	52.49	35.12	16.44	8.64	0.99
Nonfragile, low-income	58.44	42.73	40.33	44.67	9.67	53.81	52.81	39.49	32.59	6.18
Level of urbanization										
High	26.50	23.25	21.44	32.86	6.05	33.36	25.34	25.75	16.00	8.55
Medium	57.13	49.19	42.36	46.50	11.43	64.36	46.83	27.11	12.80	1.89
Low	59.19	43.36	41.31	44.74	8.09	55.00	53.64	40.72	35.61	6.85
Level of water scarcity										
High	53.20	41.64	38.94	44.62	10.21	50.13	42.97	38.47	29.63	8.82
Low	32.58	28.48	24.58	34.06	4.91	47.30	38.53	18.75	9.35	1.25
Overall	46.39	37.26	34.18	41.39	8.22	49.19	41.50	31.92	22.89	6.30

Source: Banerjee, Wodon, and others 2008.
Note: Location and expenditure quintile data refer to latest available year. — = not available.

Table A1.9 Annualized Change in Water Access: National
(percentage of population)

	Technology			
Country	*Piped water*	*Standpost*	*Well/borehole*	*Surface water*
Benin	1.78	1.88	–0.39	–0.40
Burkina Faso	0.69	1.40	–0.77	2.31
Cameroon	0.45	0.81	1.33	–0.99
Chad	0.23	0.26	0.73	1.20
Congo, Dem. Rep.	–0.16	1.12	–4.75	7.53
Côte d'Ivoire	1.47	0.94	1.16	–0.72
Ethiopia	0.44	1.09	0.89	–0.36
Ghana	0.26	0.30	2.09	–0.88
Guinea	0.08	0.49	1.45	–0.16
Kenya	0.09	0.20	0.40	0.86
Lesotho	0.00	–0.47	3.75	–2.45
Madagascar	0.03	1.18	0.25	0.53
Malawi	–0.09	–0.31	2.69	0.60
Mali	0.83	2.14	–0.57	0.28
Mozambique	0.16	0.28	2.95	–1.81
Namibia	1.43	0.57	1.06	–1.19
Niger	0.27	0.52	1.55	–0.02
Nigeria	–0.57	–0.66	3.60	–0.39
Rwanda	–0.39	0.33	2.51	1.81
Senegal	1.98	0.44	–0.99	–0.07
Tanzania	–1.01	1.36	0.82	0.50
Uganda	0.12	0.71	6.53	–2.75
Zambia	–0.13	0.19	0.95	0.66
Zimbabwe	1.69	–0.02	0.52	–0.42
Country typology				
Resourch-rich	–0.40	–0.41	3.03	–0.28
Middle-income	0.75	0.07	2.34	–1.79
Fragile states	0.42	0.87	–2.32	4.15
Nonfragile, low-income	0.21	0.84	1.42	–0.15
Level of urbanization				
High	–0.06	–0.22	2.75	–0.50
Medium	0.28	0.76	–1.48	3.17
Low	0.08	0.88	1.41	0.08
Level of water scarcity				
High	0.05	0.18	2.34	–0.24
Low	0.12	0.98	–0.53	1.80
Overall	0.07	0.48	1.27	0.52

Source: Banerjee, Wodon, and others 2008.

Table A1.10 Annualized Change in Water Access: Urban
(percentage of population)

	Technology			
Country	*Piped water*	*Standpost*	*Well/borehole*	*Surface water*
Benin	3.58	0.80	–1.09	0.30
Burkina Faso	3.40	4.00	–1.01	0.13
Cameroon	–0.01	1.34	0.90	0.72
Chad	1.56	2.07	–0.34	0.27
Congo, Dem. Rep.	–0.31	2.56	–0.67	3.43
Côte d'Ivoire	3.81	–0.52	0.36	–0.04
Ethiopia	4.77	–0.27	–0.23	–1.08
Ghana	–0.18	0.60	2.65	–0.21
Guinea	0.47	2.10	0.10	0.16
Kenya	0.03	–0.12	1.49	0.35
Lesotho	2.69	–0.47	0.63	–0.66
Madagascar	0.39	2.03	0.33	–0.41
Malawi	–0.64	3.01	3.10	0.10
Mali	3.00	1.25	–0.37	0.28
Mozambique	–0.12	0.80	2.31	0.39
Namibia	1.75	1.15	–0.21	–0.08
Niger	1.49	0.93	0.28	–0.12
Nigeria	–1.37	–0.63	3.99	1.06
Rwanda	–0.66	3.67	3.03	3.15
Senegal	2.28	–0.42	–0.25	–0.03
Tanzania	–3.50	3.91	1.37	0.70
Uganda	0.85	4.67	2.01	–1.98
Zambia	–0.05	1.09	0.42	0.01
Zimbabwe	2.93	0.46	–0.19	0.00
Country typology				
Resourch-rich	–0.98	–0.17	3.19	0.91
Middle-income	2.19	0.38	0.19	–0.36
Fragile states	0.99	1.65	–0.33	1.99
Nonfragile, low-income	1.20	1.53	0.94	–0.20
Level of urbanization				
High	–0.44	–0.31	3.01	0.72
Medium	0.47	1.72	0.02	1.70
Low	1.32	1.77	0.76	–0.25
Level of water scarcity				
High	0.86	0.56	1.95	0.13
Low	0.01	1.87	0.40	1.08
Overall	0.54	1.05	1.37	0.49

Source: Banerjee, Wodon, and others 2008.

Table A1.11 Annualized Change in Water Access: Rural
(percentage of population)

	Technology			
Country	*Piped water*	*Standpost*	*Well/borehole*	*Surface water*
Benin	1.04	2.46	–0.16	–0.93
Burkina Faso	–0.01	0.63	–0.37	2.81
Cameroon	–0.10	–0.77	2.46	–1.40
Chad	–0.03	–0.17	0.74	1.34
Congo, Dem. Rep.	0.04	0.31	–7.09	9.89
Côte d'Ivoire	0.44	1.77	1.37	–1.28
Ethiopia	0.04	1.55	1.02	–0.76
Ghana	–0.20	–0.55	2.33	–0.80
Guinea	0.01	–0.10	1.93	–0.45
Kenya	0.05	0.26	0.14	1.05
Lesotho	0.04	–0.66	4.25	–3.19
Madagascar	0.01	1.14	0.20	0.50
Malawi	0.03	–0.93	2.58	0.69
Mali	0.25	2.77	–1.18	0.22
Mozambique	–0.07	–0.58	3.73	–2.38
Namibia	1.18	0.30	1.75	–1.69
Niger	–0.08	0.35	2.05	0.01
Nigeria	–0.30	–0.82	3.09	–1.24
Rwanda	–0.04	–0.18	2.35	1.10
Senegal	1.25	1.09	–1.07	–0.09
Tanzania	–0.18	0.59	0.60	0.41
Uganda	0.01	0.12	7.20	–2.86
Zambia	0.19	–0.11	0.85	0.83
Zimbabwe	0.27	–0.20	1.47	–0.49
Country typology				
Resourch-rich	–0.23	–0.73	2.74	–0.97
Middle-income	0.64	–0.16	2.94	–2.40
Fragile states	0.15	0.47	–3.47	5.38
Nonfragile, low-income	0.05	0.68	1.53	–0.29
Level of urbanization				
High	–0.11	–0.44	2.55	–1.14
Medium	0.15	0.18	–2.29	4.13
Low	0.00	0.76	1.46	–0.04
Level of water scarcity				
High	–0.08	0.05	2.29	–0.62
Low	0.11	0.53	–1.03	2.24
Overall	–0.01	0.23	1.05	0.45

Source: Banerjee, Wodon, and others 2008.

Table A1.12 Annualized Change in Sanitation Access: National
(percentage of population)

	Technology			
Country	*Septic tank*	*Improved latrine*	*Traditional latrine*	*Open defecation*
Benin	0.48	2.53	–1.08	0.90
Burkina Faso	0.34	4.43	–2.25	1.04
Cameroon	0.38	0.95	0.57	–0.29
Chad	0.23	–0.52	0.90	1.60
Congo, Dem. Rep.	0.04	0.26	3.63	–0.05
Côte d'Ivoire	0.08	–1.20	4.10	–0.14
Ethiopia	0.37	0.12	3.92	–2.30
Ghana	0.70	0.61	0.79	0.61
Guinea	0.04	0.34	2.09	–0.55
Kenya	0.05	0.48	0.77	0.82
Lesotho	–0.09	0.64	–0.48	1.05
Madagascar	–0.01	6.46	–3.69	–0.84
Malawi	0.17	0.16	2.61	–0.04
Mali	1.02	0.81	1.36	–0.43
Mozambique	0.00	0.17	2.79	–1.25
Namibia	1.00	0.30	0.15	0.35
Niger	0.00	0.32	0.63	1.81
Nigeria	0.63	–0.68	2.84	0.34
Rwanda	0.00	4.59	–0.44	0.20
Senegal	3.50	–1.29	0.03	–0.84
Tanzania	0.25	0.57	0.52	0.63
Uganda	0.10	0.20	3.96	0.38
Zambia	–0.12	0.20	1.08	0.42
Zimbabwe	1.51	1.13	0.52	–1.37
Country typology				
Resourch-rich	0.53	–0.45	2.39	0.35
Middle-income	0.48	0.46	–0.15	0.68
Fragile states	0.25	0.11	3.14	–0.29
Nonfragile, low-income	0.38	0.99	1.47	–0.31
Level of urbanization				
High	0.73	–0.49	2.38	0.21
Medium	0.22	0.50	2.40	–0.31
Low	0.24	1.08	1.53	–0.25
Level of water scarcity				
High	0.44	0.25	2.24	–0.06
Low	0.34	0.71	1.59	–0.18
Overall	0.40	0.42	2.00	–0.11

Source: Banerjee, Wodon, and others 2008.
Note: VIP = ventilated improved pit.

Table A1.13 Annualized Change in Sanitation Access: Urban
(percentage of population)

	Technology			
Country	*Septic tank*	*Improved latrine*	*Traditional latrine*	*Open defecation*
Benin	1.20	5.30	–3.19	0.24
Burkina Faso	1.32	17.17	–13.07	0.15
Cameroon	0.24	0.92	1.62	0.15
Chad	0.90	–1.57	3.58	0.15
Congo, Dem. Rep.	0.15	0.76	4.70	–0.48
Côte d'Ivoire	0.48	–0.90	4.46	–0.48
Ethiopia	1.20	0.46	3.88	–2.23
Ghana	1.24	1.99	1.74	–0.09
Guinea	0.04	0.50	2.27	–0.03
Kenya	–0.07	0.60	1.97	0.27
Lesotho	0.28	0.53	0.64	–0.12
Madagascar	0.17	8.51	–5.30	–1.15
Malawi	0.87	0.41	3.27	0.98
Mali	2.32	1.69	0.66	–0.41
Mozambique	–0.43	0.62	4.22	–0.90
Namibia	1.75	0.19	0.36	0.37
Niger	–0.17	1.39	2.04	–0.19
Nigeria	0.53	–0.30	5.14	–0.20
Rwanda	0.39	6.15	2.24	0.40
Senegal	5.65	–0.05	–3.82	–0.14
Tanzania	1.12	1.82	0.17	0.28
Uganda	0.54	0.71	4.37	0.14
Zambia	0.04	0.29	0.81	0.07
Zimbabwe	2.99	0.24	0.00	–0.02
Country typology				
Resourch-rich	0.49	–0.21	4.41	–0.13
Middle-income	1.06	0.35	0.49	0.14
Fragile states	0.59	0.35	3.78	–0.37
Nonfragile, low-income	0.95	2.30	1.14	–0.53
Level of urbanization				
High	0.88	0.01	3.89	–0.18
Medium	0.45	0.91	2.93	–0.34
Low	0.81	2.31	1.29	–0.55
Level of water scarcity				
High	0.77	1.12	3.02	–0.42
Low	0.73	1.43	1.67	–0.31
Overall	0.76	1.24	2.52	–0.38

Source: Banerjee, Wodon, and others 2008.

Table A1.14 Annualized Change in Sanitation Access: Rural
(percentage of population)

	Technology			
Country	*Septic tank*	*Improved latrine*	*Traditional latrine*	*Open defecation*
Benin	0.07	0.98	0.37	0.93
Burkina Faso	0.11	1.68	–0.27	1.61
Cameroon	–0.09	–0.13	0.59	–0.24
Chad	0.07	–0.06	0.44	1.49
Congo, Dem. Rep.	–0.02	0.03	3.08	0.21
Côte d'Ivoire	0.06	–1.27	3.92	–0.40
Ethiopia	0.27	0.09	4.30	–2.76
Ghana	–0.04	–0.79	0.54	1.46
Guinea	0.07	0.28	2.11	–0.93
Kenya	0.02	0.45	0.50	0.97
Lesotho	–0.05	1.11	–0.53	0.60
Madagascar	–0.03	5.92	–3.13	–0.97
Malawi	0.04	0.11	2.47	–0.24
Mali	0.59	0.63	1.72	–0.81
Mozambique	0.01	–0.08	1.69	–0.80
Namibia	0.53	0.36	0.06	0.46
Niger	0.03	–0.06	0.28	2.46
Nigeria	0.52	–0.93	1.29	0.47
Rwanda	0.00	4.55	–1.35	0.14
Senegal	1.67	–2.08	2.64	–1.00
Tanzania	–0.01	0.19	0.64	0.71
Uganda	0.03	0.13	3.90	0.42
Zambia	0.17	0.15	1.15	0.32
Zimbabwe	–0.05	1.79	0.90	–1.55
Country typology				
Resourch-rich	0.41	–0.73	1.17	0.45
Middle-income	0.25	0.72	–0.22	0.52
Fragile states	0.00	0.05	2.85	–0.25
Nonfragile, low-income	0.16	0.57	1.66	–0.28
Level of urbanization				
High	0.43	–0.95	1.47	0.36
Medium	0.02	0.31	2.12	–0.17
Low	0.12	0.82	1.69	–0.32
Level of water scarcity				
High	0.25	–0.05	1.78	–0.01
Low	0.13	0.38	1.57	–0.14
Overall	0.20	0.11	1.70	–0.06

Source: Banerjee, Wodon, and others 2008.

Reference

Banerjee, S., Q. Wodon, A. Diallo, T. Pushak, H. Uddin, C. Tsimpo, and V. Foster. 2008. "Access, Affordability and Alternatives: Modern Infrastructure Services in Sub-Saharan Africa." AICD Background Paper 2, Africa Infrastructure Country Diagnostic, World Bank, Washington, D.C.

APPENDIX 2

Institutions in the Water and Sanitation Sector

Table A2.1 Specification of Urban Water Reform Index

Subindex	*Indicator*	*Definition*
Legislation	1. Existence of reform	0 = No reform of the water services delivery; 1 = reform of the water services delivery
	2. Legal reform	0 = No new sector legislation passed within the past 10 years; 1 = new sector legislation passed in the past 10 years
Restructuring	3. Unbundling	0 = Same entity responsible for bulk water production and distribution in urban areas; 1 = different entities responsible for bulk water production and distribution in urban areas
	4. Separation of business lines	0 = No separation of water and wastewater services from provision in urban area; 1 = separation of water and wastewater provisions in urban areas
	5. SOE corporatization	0 = No state-owned water utility corporatized in urban area; 1 = at least one state-owned water utility corporatized
	6. Existence of regulatory body	0 = No autonomous regulatory body; 1 = autonomous regulatory body
Policy oversight	7. Tariff approval oversight	0 = Oversight on tariff by line ministry; 1 = oversight on tariff by a special entity within the ministry, an interministerial committee, or the regulator
	8. Investment plan oversight	0 = Oversight on investment plan by line ministry; 1 = oversight on investment plan by a special entity within the ministry, an interministerial committee, or the regulator

	9. Technical standard oversight	0 = Oversight on technical standards by line ministry; 1 = oversight on technical standards by a special entity within the ministry, an interministerial committee, or the regulator
	10. Regulation monitoring oversight	0 = Oversight on compliance with economic regulation by line ministry; 1 = oversight on compliance with economic regulation by a special entity within the ministry, an interministerial committee, or the regulator
	11. Dispute arbitration oversight	0 = Oversight on dispute arbitration by line ministry; 1 = oversight on dispute arbitration by a special entity within the ministry, an interministerial committee, or the regulator
Private sector involvement	12. Private de jure	0 = Private participation forbidden by law; 1 = private participation allowed by law
	13. Private de facto	0 = No private participation in the three largest utilities; 1 = at least a form of private participation in the three largest utilities
	14. Private sector management	0 = No private sector involvement or service and works contracts only; 1 = management contract, *affermage*, lease, concession
	15. Private sector investment	0 = No private sector involvement, service and works contracts, management contract, *affermage*, lease; 1 = concession
	16. Absence of distressed private sector participation	0 = Canceled, distressed private sector participation; 1 = operational, concluded and not renewed private sector participation
	17. Absence of renationalization	0 = Canceled; 1 = distressed, operational, concluded and not renewed private sector participation
	18. Private ownership	0 = Concession, management, lease contract; 1 = greenfield/divestiture

Source: Banerjee, Wodon, and others 2008.
Note: SOE = state-owned enterprise.

Table A2.2 Urban Water Reform Index

Attribute / *Country*	*Legislation*		*Restructuring*			
	1. Existence of reform	*2. Legal reform*	*3. Unbundling*	*4. Separation of business lines*	*5. SOE corporatization*	*6. Existence of regulatory body*
Benin	1	1	0	0	1	0
Burkina Faso	1	1	1	0	1	0
Cape Verde	1	1	0	0	1	1
Chad	0	0	0	0	1	0
Congo, Dem. Rep.	0	0	0	1	0	1
Côte d'Ivoire	1	0	0	1	1	1
Ethiopia	1	1	0	0	0	0
Ghana	1	1	0	1	1	1
Kenya	1	1	0	0	1	1
Lesotho	1	0	0	0	1	1
Madagascar	1	1	0	1	0	0
Malawi	1	0	0	1	1	0
Mozambique	1	1	0	1	1	1
Namibia	1	1	1	0	0	0
Niger	1	1	1	1	1	1
Nigeria	0	0	0	1	1	0
Rwanda	0	0	0	1	1	1
Senegal	1	1	0	1	1	0
South Africa	1	1	1	0	1	0
Sudan	1	1	0	1	1	1
Tanzania	1	1	0	1	1	1
Uganda	1	1	1	0	1	0
Zambia	1	1	0	0	1	1
Subindex	Legislation		Restructuring			
Countries sharing attribute (%)	83	70	22	52	83	52

Table A2.2 Urban Water Reform Index *(continued)*

Attribute / *Country*	*Policy oversight*				
	7. Tariff approval oversight	*8. Investment plan oversight*	*9. Technical standard oversight*	*10. Regulation monitoring oversight*	*11. Dispute arbitration oversight*
Benin	0	1	1	1	1
Burkina Faso	1	1	1	0	0
Cape Verde	1	1	1	1	1
Chad	1	0	0	1	0
Congo, Dem. Rep.	1	0	0	1	1
Côte d'Ivoire	1	1	1	1	1
Ethiopia	1	0	0	1	0
Ghana	1	0	0	0	1
Kenya	0	1	1	1	1
Lesotho	1	1	1	1	1
Madagascar	1	1	1	1	1
Malawi	0	0	0	0	1
Mozambique	1	0	0	1	1
Namibia	0	0	0	0	0
Niger	0	0	0	1	1
Nigeria	1	1	1	1	1
Rwanda	0	0	1	1	0
Senegal	0	1	1	1	0
South Africa	1	0	0	0	0
Sudan	1	1	0	1	1
Tanzania	0	0	1	1	1
Uganda	1	0	1	1	0
Zambia	1	1	1	1	1
Subindex	Policy oversight				
Countries sharing attribute (%)	65	48	57	78	65

(continued next page)

Table A2.2 Urban Water Reform Index *(continued)*

Attribute / *Country*	*Private sector involvement*							
	12. Private de jure	*13. Private de facto*	*14. Private sector management*	*15. Private sector investment*	*16. Absence of distressed private sector participation*	*17. Absence of renationaliza-tion*	*18. Private ownership*	*Urban water reform index (%)*
Benin	0	0	0	0				51
Burkina Faso	1	0	0	0				58
Cape Verde	1							
Chad	0	0	0	0				68
Congo, Dem. Rep.	0	1	1	0	0			76
Côte d'Ivoire	1	1	1	0	1			16
Ethiopia	1	0	0	0				38
Ghana	1	1	1	0	1	1	0	40
Kenya	1	1	1	0	1	1	0	74
Lesotho	0	0	0	0				78
Madagascar	1	1	0	0	1			50
Malawi	1	0	0	0				71
Mozambique	1	1	1	1	1	1	0	35

Namibia	1	0	0	0		1	0	84
Niger	1	1	1	0	1	1	0	36
Nigeria	1	1	0	0	1			80
Rwanda	1	1	1	0	0			53
Senegal	1	1	1	0	1	1	0	44
South Africa	1	1	1	0	1	1	0	73
Sudan	1	1	0	0	1			63
Tanzania	1	1	1	0	0	0	0	79
Uganda	1	1	1	0	1	1	0	74
Zambia	1	0	0	0		1	0	73
Subindex				Private sector involvement				
Countries sharing attribute (%)	83	64	50	5	79	90	0	

Source: Banerjee, Wodon, and others 2008.
Note: SOE = state-owned enterprise. Blank cells: not applicable.

Table A2.3 Specification of Regulation Index

Subindex	*Indicator*	*Definition*
Autonomy	1. Formal autonomy: hire	0 = Appointment by government/line ministry; 1 = otherwise
	2. Formal autonomy: fire	0 = Firing by government/line ministry; 1 = otherwise
	3. Partial financial autonomy/operating budget: central government	0 = Budget fully funded by government; 1 = at least a portion of budget funded through fees and/or donors
	4. Full financial autonomy/operating budget: sector levies	0 = At least a portion of budget funded through government and/or donors; 1 = budget fully funded through fees
	5. Partial managerial autonomy/vetoing instance	0 = Veto decision by government/line ministry/others; 1 = no veto decision
	6. Full managerial autonomy/vetoing instance	0 = Veto decision by government/line ministry/others; 1 = no veto decision
	7. Multisectoral	0 = Sector specific regulator; 1 = multisectoral regulator
	8. Commissioner	0 = Individual; 1 = board of commissioners
Transparency	9. Publicity of decisions: reports only	0 = Regulatory decisions not publicly available; 1 = regulatory decisions publicly available through reports
	10. Publicity of decisions: Internet only	0 = Regulatory decisions not publicly available or available only through reports; 1 = regulatory decisions publicly available through Internet
	11. Publicity of decisions: public hearing only	0 = Regulatory decisions not publicly available or available only through reports/Internet; 1 = regulatory decisions publicly available through public hearings

Accountability	12. Appeal	0 = No right to appeal regulatory decisions; 1 = right to appeal regulatory decision
	13. Partial independence of appeal	0 = Appeal to government/line ministries; 1 = appeal to bodies other than government/line ministries
	14. Full independence of appeal	0 = No recourse to independent arbitration; 1 = possibility to appeal to independent arbitration
Tools	15. Tariff methodology	0 = No tariff methodology; 1 = some tariff methodology
	16. Tariff indexation	0 = No tariff indexation 1 = some tariff indexation
	17. Regulatory review	0 = No tariff review; 1 = periodic tariff review
	18. Length of regulatory review	0 = No tariff review or review lower than every 3 years; 1 = multiyear tariff review (greater than or equal to 3)

Source: Banerjee, Wodon, and others 2008.

Table A2.4 Regulation Index

	Attribute of regulatory agencies							
	Autonomy							
Country / *Attribute of regulatory agencies*	*1. Formal autonomy: hire*	*2. Formal autonomy: fire*	*3. Partial financial autonomy/ operating budget: central government*	*4. Full financial autonomy/ operating budget: sector levies*	*5. Partial managerial autonomy/ vetoing instance*	*6. Full managerial autonomy/ vetoing instance*	*7. Multisectoral*	*8. Commissioner*
Benin	0	0	0	0	0	0	0	0
Burkina Faso	0	0	0	0	0	0	0	0
Cape Verde	0	0	1	1	1	0	1	1
Chad	0	0	0	0	0	0	0	0
Congo, Dem. Rep.	0		0	0	1	1	1	1
Côte d'Ivoire	0	0	0	0	0	0	0	0
Ethiopia	0	0	0		1	0		0
Ghana	0	0			0	0	1	1
Kenya	0	0	1	0	0	0	0	1
Lesotho	0	0	0	0	0	0	0	0

Madagascar	0	0	0	0	0	0	0	0
Malawi	0	0	0	0	0	0	0	0
Mozambique	0	0	1	1	1	0	0	1
Namibia	0	0	0	0	0	0	0	0
Niger	0	0	1	1	1	0	1	1
Nigeria	0	0	0	0	0	0	0	0
Rwanda	0	0	1	1	0	0	1	1
Senegal	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	0	0	0
Sudan	0	0	1	0	0	0	0	1
Tanzania	0	0	1	0	0	0	1	1
Uganda	0	0	0	0	0	0	0	0
Zambia	0	0	1	0	1	0	0	1
Subindex					Autonomy			
Countries sharing attribute (%)	0	0	36	19	26	4	27	43

(continued next page)

Table A2.4 Regulation Index *(continued)*

	Attribute of regulatory agencies										
	Transparency			*Accountability*			*Tools*				
Country / *Attribute of regulatory agencies*	*9. Publicity of decisions: reports only*	*10. Publicity of decisions: Internet only*	*11. Publicity of decisions: public hearing only*	*12. Appeal*	*13. Partial independence of appeal*	*14. Full independence of appeal*	*15. Tariff methodology*	*16. Tariff indexation*	*17. Regulatory review*	*18. Length of regulatory review*	*Regulation index (%)*
Benin		0	0	1	1	0	1	0	0		25
Burkina Faso	1	1	1	1	0	0	1	0	1	1	52
Cape Verde	1	1	1	1	1	0	1	0	1	1	76
Chad	0	0	0	1	0	0			1		33
Congo, Dem. Rep.	0	0	0	1	0	0	1	0	1	0	44
Côte d'Ivoire	1	0	0	1	1	0	1	0	1	1	35
Ethiopia	1	0	1	0			1	0	0		29
Ghana	1	1	1	0	1	0	0	0	1	1	54
Kenya	1	1	1	1	1	0	0	1	1	0	60
Lesotho	1	0	0	0			0	1	1	1	27

Madagascar	0	0	0	1	1	0	0	0	0		17
Malawi	1	0	1				0	0	1		25
Mozambique	1	0	0	1	1	0	0	1	1	1	56
Namibia	1		0					1	0	0	21
Niger	1	1	0	1	1	0	1	0	1	0	61
Nigeria							1	1	0		17
Rwanda	1	1	1	0			1	0	0		46
Senegal	1	1	1	1	1	0	1	1	1	0	60
South Africa	0	0	0	1	0	0	0	0	1	0	15
Sudan	1	0	0	1	0	0		1	1	1	48
Tanzania	1	1	1	1	1	0	1	1	0		68
Uganda	1	1	1				1	1	1		50
Zambia	1	1	1	1	1	0	0	0	1		59
Subindex		Transparency			Accountability			Tools			
Countries sharing attribute (%)	81	48	50	79	69	0	60	41	70	54	

Source: Banerjee, Wodon, and others 2008.

Table A2.5 Specification of SOE Governance Index

Subindex	*Indicator*	*Definition*
Ownership and shareholder quality	1. Concentration of ownership	0 = Ownership diversified; 1 = 100% owned by one state body (central government or municipal government)
	2. Corporatization	0 = Noncorporatized (uncorporatized state owned enterprise); 1 = corporatized
	3. Limited liability	0 = Nonlimited liability; 1 = limited liability company
	4. Rate of return policy	0 = No requirement to earn a rate of return; 1 = requirement to earn a rate of return
	5. Dividend policy	0 = No requirement to pay dividends; 1 = requirement to pay dividends
Managerial and board autonomy	6. Hiring	0 = Either manager or board has not the most decisive influence on hiring decisions; 1 = either manager or board has the most decisive influence on hiring decisions
	7. Laying off	0 = Either manager or board has not the most decisive influence on firing decisions; 1 = either manager or board has the most decisive influence on firing decisions
	8. Wages	0 = Either manager or board has not the most decisive influence on setting wages/bonuses; 1 = either manager or board has the most decisive influence on setting wages/bonuses
	9. Production	0 = Either manager or board has not the most decisive influence on how much to produce; 1 = either manager or board has the most decisive influence on how much to produce
	10. Sales	0 = Either manager or board has not the most decisive influence on what to sell; 1 = either manager or board has the most decisive influence on what to sell
	11. Size of board	0 = Number of members of board lower than a given threshold (< 5); 1 = number of members of board greater than a given threshold (> 5)
	12. Selection of board members	0 = Board members appointed only by government; 1 = board members appointed by shareholders (either group of shareholder; all shareholder; other)
	13. Presence of independent directors	0 = No independent directors in the board; 1 = at least one independent director in the board

Accounting and disclosure, performance monitoring	14. Publication of annual reports	0 = Annual reports not publicly available; 1 = annual reports publicly available
	15. International Financial Reporting Standards (IFRSs)	0 = IFRSs not applied; 1 = compliance to IFRSs
	16a. External audits/existence of financial external audit	0 = No operational or financial audit; 1 = at least some form of external audit
	16b. External audits/existence of operational external audit	0 = No operational or financial audit; 1 = at least some form of external audit
	17. Independent audit of accounts	0 = No independent audit of accounts; 1 = independent audit of accounts
	18. Audit publication	0 = Audit not publicly available; 1 = audit not publicly available
	19. Remuneration for noncommercial activities	0 = No remuneration of noncommercial activities; 1 = remuneration of noncommercial activities
	20. Performance contracts	0 = No performance contracts; 1 = existence of performance contract
	21. Performance contracts with performance-based incentive systems	0 = Performance-based incentive systems; 1 = existence of performance-based incentive systems
	22. Penalties for poor performance	0 = No penalties for poor performance; 1 = penalties for poor performance
	23. Monitoring	0 = No periodic monitoring of performance; 1 = periodic monitoring of performance (at least semiannual)
	24. Third-party monitoring	0 = No monitoring of performance by third party (private sector auditor); 1 = monitoring of performance by third party

(continued next page)

Table A2.5 *(continued)*

Subindex	*Indicator*	*Definition*
Outsourcing	25. Billing and collection	0 = No billing and collection outsourcing; 1 = billing and collection outsourcing
	26. Meter reading	0 = No meter reading outsourcing; 1 = meter reading outsourcing
	27. Human resources (HR)	0 = No HR outsourcing; 1 = HR outsourcing
	28. Information technology (IT)	0 = No IT outsourcing; 1 = IT outsourcing
Labor market discipline	29. Restrictions to dismiss employees	0 = Restrictions to dismiss employees only within public service guidelines; 1 = restrictions to dismiss employees according to corporate law or contract
	30. Wages: compared with private sector	0 = Wages compared with public sector; 1 = wages compared with private sector (or between public and private sectors)
	31. Benefits: versus private sector	0 = Benefits compared with public sector; 1 = benefits compared with private sector (or between public and private sectors)
Capital market discipline	32. No exemption from taxation	0 = Exemption from taxation; 1 = no exemption from taxation
	33. Access to debt: versus private sector	0 = Access to debt below the market rate; 1 = access to debt equal or above the market rate
	34. No state guarantees	0 = At least one state guarantee; 1 = no state guarantee
	35. Public listing	0 = No public listing; 1 = public listing

Source: Banerjee, Wodon, and others 2008.
Note: SOE = state-owned enterprise.

Table A2.6 SOE Governance Index

Attributes of SOEs		*Ownership and shareholder quality*					*Managerial and board autonomy*							
Country	*Utility*	*1. Concentration of ownership*	*2. Corporatization*	*3. Limited liability*	*4. Rate of return policy*	*5. Dividend policy*	*6. Hiring*	*7. Laying off*	*8. Wages*	*9. Production*	*10. Sales*	*11. Size of board*	*12. Selection of board members*	*13. Presence of independent directors*
Benin	SONEB	1	1	0	0	0	1	1	1	1	1	1	0	0
Burkina Faso	ONEA	1	1	0	1	1	1	1	1	1	1	1	0	0
Cape Verde	ELECTRA	0	1	0	0	0	1	1	1	0	0	1	1	0
Chad	STEE	1	1	0	0	0	1	1	1	1	1	0	1	0
Congo, Dem. Rep.	REGIDESO	1	0	0	1	1	1	1	1	1	1	1	0	0
Côte d'Ivoire	SODECI	0	1	0		1	1	1	1	0	0	0		
Ethiopia	ADAMA	1	0	0	1	0	1	1	1	1	1	0	0	0
	AWSA	1	0	0	1	0	1	1	1	1	0	0	0	0
	Dire Dawa	1	0	0	1	0	0	0	0	1	1	1	0	0
Ghana	GWC	1	1	1	0	0	0	0	1	0	1	1	0	1
Kenya	KIWASCO	1	1	1	1	0	0	1	0	0	0	0	1	1
	MWSC	1	0	0	0	0	1	1	1	1	1	0	1	1
	NWASCO	1	1	0	1	0	1	1	1	1	1	0	1	1
Lesotho	WASA	1	1	0	1	0	1	1	1	1	1	1	0	1
Madagascar	JIRAMA	1	0	0	0	0	1	1	1	1	0	1	1	0
Malawi	BWB	1	1	0	1	1	0	0	1	1	1	0	0	0
	CRWB	1	1	0	1	1	1	1	1	1	1	0	0	0
	LWB	1	1	0	1	1	0	0	0	1	1	1	0	0
Mozambique	AdeM Beira	1	1	0	0	0	1	1	1	1	1		0	
	AdeM Maputo	1	0	0	1	1	1	1	1	1	1	1	1	0
	AdeM Nampula	1	1	0	0	0	1	1	1	1	1		0	
	AdeM Pemba	1	1	0	0	0	1	1	1	1	1		0	

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Table A2.6 SOE Governance Index *(continued)*

Attributes of SOEs		*Ownership and shareholder quality*					*Managerial and board autonomy*							
Country	*Utility*	*1. Concentration of ownership*	*2. Corporatization*	*3. Limited liability*	*4. Rate of return policy*	*5. Dividend policy*	*6. Hiring*	*7. Laying off*	*8. Wages*	*9. Production*	*10. Sales*	*11. Size of board*	*12. Selection of board members*	*13. Presence of independent directors*
	AdeM Quelimane	1	1	0	0	0	1	1	1	1	1		0	
Namibia	Oshakati Municipality	1			0	0	0	0	0		0			
	Walvis Bay Municipality	1			0	0	1	1	1	1	1			
	Windhoek Municipality	1			0	0	0	0	0	1	0			
Niger	SEEN	0			1	1	1	1	1	0	0	1	1	1
	SPEN	1	1	0	0	0	1	1	1	0	0	1	0	0
Nigeria	Borno	0	1	0	0	0	1	1	1	0	0		1	
	FCT	1	0	0	0	0	0	0	0	1	1			
	Kaduna	0	1	0	0	0	0	1	1	0	0	0	1	0
	Katsina	0	1	0	0	0	0	1	1	0	0	0	1	0
	Lagos	0	1	0	0	0	0	1	1	0	0		1	
	Plateau	0	1	0	0	0	0	1	1	0	0		1	
Rwanda	ELECTROGAZ	1	0	0	1	1	1	1	1	1	1	1	0	0
Senegal	ONAS	1	0	0	0	0	1	1	1	0	0	1		1
	SDE	0			1	1	1	0	1	0	0	0	1	0
South Africa	Cape Town Metro	1	0	0	0	0	0	0	1	0	0			

	Drakenstein Municipality	1	0	0	0	0	0	0	1	0	0			
	eThekwini Metro (Durban)	1	0	0	0	0	0	0	1	0	0			
	Joburg	1	1	1	0	0	0	0	1	0	0	1	0	
Sudan	Khartoum Water Corporation	0	1	0	1	0	1	0	1	1	1	0	0	0
	South Darfur Water Corporation	0	1	0	1	1	1	1	1	1	1	0	0	1
	Upper Nile Water Corporation	0	0	0	0	0	0	0	0	1	1	1	1	0
Tanzania	DAWASCO	1	1	0	1	0	1	1	1	1	1	1	0	1
	DUWS	1	1	0	0	0	1	1	1	1	0	0	0	1
	MWSA	1	0	0	1	0	1	1	1	1	1	0	0	0
Uganda	SONEB	1	1	0	1	0	1	1	1	1	1	0	0	1
Zambia	LWSC	1	1	1	1	1	1	1	1	1	1	1	0	1
	NWSC	1	0	0	1	1	1	1	1	1	1	0	1	1
	SWSC	1	1	1		1	0	0	1	0	0	0	1	1
	Subindex		Ownership and shareholder quality							Managerial and board autonomy				
	% of utilities sharing attribute	76	65	11	45	27	65	71	86	64	57	49	40	40

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Table A2.6 SOE Governance Index *(continued)*

Attributes of SOEs		*Accounting and disclosure, performance monitoring*											
Country	*Utility*	*14. Publication of annual reports*	*15. IFRSs*	*16a. External audits/ existence of financial external audit*	*16b. External audits/ existence of operational external audit*	*17. Independent audit of accounts*	*18. Audit publication*	*19. Remuneration for noncommercial activities*	*20. Performance contracts*	*21. Performance contracts with performance-based incentive systems*	*22. Penalties for poor performance*	*23. Monitoring*	*24. Third-party monitoring*
Benin	SONEB	1	1	1	1	1	1	0	0	0	0	1	1
Burkina Faso	ONEA	1	1	1	1	1	0	0	1	0	1	1	0
Cape Verde	ELECTRA	1	0	1	1	1	1	0	0	0	0	1	0
Chad	STEE	0	0	1	1	1	0	0	1	0	1	0	1
Congo, Dem. Rep.	REGIDESO	1	1	1	0	1	1	1	1	0	0	0	0
Côte d'Ivoire	SODECI	0	1	1				1	1	1	1	0	1
Ethiopia	ADAMA	0	0	1	0	0		0	0	1	1	1	4
	AWSA	0	1	1	1	1	1	1	0	1	1	1	0
	Dire Dawa	0	0	0	0	0		0	0	0	0	1	1
Ghana	GWC	1	1	1		1	1	0	1	0	1	1	0
Kenya	KIWASCO	1	1	1	1	1	1	0	1	1	1	1	1
	MWSC	0	0	1	1	1	1	0	0	0	0	1	1
	NWASCO	1	1	1	1	1	1	0	0	0	0	1	1
Lesotho	WASA	1	1	1	1	1	1	0	0	0		1	0
Madagascar	JIRAMA	0	1	1	0	0		1	0	0	0	0	1
Malawi	BWB	1	1	1	1	1	1	0	1	1	1	1	1
	CRWB	1	0	1	0	1	1	0	0	0	1	1	1
	LWB	1	1	1	0	1	1	0	0	1	1	1	1
Mozambique	AdeM Beira	1	1	1	1	1	1	0	0	1	0	1	1
	AdeM Maputo	1	0	1	1	1	0	1	1	0	0	0	1

	AdeM Nampula	1	1	1	1	1	1	0	0	1	0	1	1
	AdeM Pemba	1	1	1	1	1	1	0	0	1	0	1	1
	AdeM Quelimane	1	1	1	1	1	1	0	0	1	0	1	1
Namibia	Oshakati Municipality	0	0	1	0	1	1		0	0	0	0	1
	Walvis Bay Municipality	1	0	1	0	1	1	0	1	0	0		1
	Windhoek Municipality	1	0	1	1	1	1	0	0	1	1	1	1
Niger	SEEN	1	1	1	1	1	0	0	1	1	0	0	0
	SPEN	1	1	1	1	1	0	0	1	1	0	0	1
Nigeria	Borno	0	1	1	0	1	0	0	0	0	0	0	1
	FCT	1	1	1	0	1	0	0	0	0	1	1	1
	Kaduna	0	1	1	0	1	0	0	0	0	0	0	1
	Katsina	0	1	1	0	1	0	0	0	0	0	0	1
	Lagos	0	1	1	0	1	0	0	0	0	0	0	1
	Plateau	0	1	1	0	1	0	0	0	0	0	0	1
Rwanda	ELECTROGAZ	0	0	1	1	0	0	0	1	0	0	0	1
Senegal	ONAS	0	1	1	1	1	1	0	1	0	1		0
	SDE	0	1	1	1	1	0	1	1	1	1	1	1
South Africa	Cape Town Metro	1	0	1	0	1	1	1	1	1	0	0	0
	Drakenstein Municipality	1	0	1	0	1	1	1	1	1	0	0	0
	eThekwini Metro (Durban)	1	0	1	0	1	1	1	1	1	0	0	0
	Joburg	1	1	1	0	1	1	1	1	1		1	1
Sudan	Khartoum Water Corporation	1	0	1	0	1	0	1	1	1	0	0	0

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Table A2.6 SOE Governance Index *(continued)*

Attributes of SOEs		*Accounting and disclosure, performance monitoring*											
Country	*Utility*	*14. Publication of annual reports*	*15. IFRSs*	*16a. External audits/ existence of financial external audit*	*16b. External audits/ existence of operational external audit*	*17. Independent audit of accounts*	*18. Audit publication*	*19. Remuneration for noncommercial activities*	*20. Performance contracts*	*21. Performance contracts with performance-based incentive systems*	*22. Penalties for poor performance*	*23. Monitoring*	*24. Third-party monitoring*
	South Darfur Water Corporation	0	0	1	0	0		1	0	1	0	0	0
	Upper Nile Water Corporation	0	0	0	0	0		0	0	0	0	0	0
Tanzania	DAWASCO	1	1	1	1	1	1	1	1	1	1	1	0
	DUWS	1	1	1	1	1	0	1	1	1	1	1	1
	MWSA	1	1	1	1	1	1	1	1	1	1	0	1
Uganda	SONEB	1	1	1	1	1	1	1	1	1	1	1	0
Zambia	LWSC	1	1	1	1	1	1	0	1	0	0	1	1
	NWSC	1	1	1	1	1	0	0	1	1	0	1	1
	SWSC	1	1	1	1	1	1	0	0	1	1	1	0
	Subindex	Accounting and disclosure, performance monitoring											
	% of utilities sharing attribute	65	67	96	57	88	64	32	49	51	39	57	65

Table A2.6 SOE Governance Index *(continued)*

Attributes of SOEs		*Outsourcing*				*Labor market discipline*			*Capital market discipline*				
Country	*Utility*	*25. Billing and collection*	*26. Meter reading*	*27. Human resources*	*28. Information technology*	*29. Restrictions to dismiss employees*	*30. Wages: compared with private sectror*	*31. Benefits: versus private sector*	*32. No exemption from taxation*	*33. Access to debt: versus private sector*	*34. No state guarantees*	*35. Public listing*	*SOE governance index*
Benin	SONEB	0	0	0	0	1	1	1	0	1	1	0	55
Burkina Faso	ONEA	0	0	0	0	1	1	1	1	0	0	0	58
Cape Verde	ELECTRA	1	0	0	0	0	1	1	0	0	0	0	37
Chad	STEE	0	0	0	0	0	1	1	0		1	0	44
Congo, Dem. Rep.	REGIDESO					0	1	1	0	0	0	0	52
Côte d'Ivoire	SODECI	0	0	0	0	1	1	1	1			1	63
Ethiopia	ADAMA					0	0	0	0	1	1	0	45
	AWSA					1	0	0	0	1	1	0	50
	Dire Dawa					0	0	0	0	1	1	0	29
Ghana	GWC	0	0	0	0	0	1	1	0	0	0	0	42
Kenya	KIWASCO	0	0	0	0		1	1	0	0	1	0	56
	MWSC	0	0	0	0	0	1	1	0	0	0	0	37
	NWASCO	0	0	0	0		1	1	0	0	1	0	57
Lesotho	WASA	0	0	0	0	1	1	1	1	0	0	0	56
Madagascar	JIRAMA	0	0	1	0	0	1	1	1	1	0	0	46
Malawi	BWB	0	0	0	0	0	1	1	1	1	0	0	54
	CRWB					0	1	1	0	0	0	0	54
	LWB	0	0	0	0	1	1	1	1	1	0	0	57

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Table A2.6 SOE Governance Index *(continued)*

Attributes of SOEs		*Outsourcing*				*Labor market discipline*			*Capital market discipline*				
Country	*Utility*	*25. Billing and collection*	*26. Meter reading*	*27. Human resources*	*28. Information technology*	*29. Restrictions to dismiss employees*	*30. Wages: compared with private sectror*	*31. Benefits: versus private sector*	*32. No exemption from taxation*	*33. Access to debt: versus private sector*	*34. No state guarantees*	*35. Public listing*	*SOE governance index*
Mozambique	AdeM Beira	1	1	1	1	0	1	1	1	1	0	0	69
	AdeM Maputo	0	0	0	1	1	1	1	1	1	1	0	68
	AdeM Nampula	1	1	1	1	0	1	1	1	1	0	0	69
	AdeM Pemba	1	1	1	1	0	1	1	1	1	0	0	69
	AdeM Quelimane	1	1	1	1	0	1	1	1	1	0	0	69
Namibia	Oshakati Municipality	0	0	0	0	0	0	0			1	0	20
	Walvis Bay Municipality	0	0	0	1	0	0	0	0	1	1	0	44
	Windhoek Municipality	0	0	0	0	0	0	1	1	0	0	0	31
Niger	SEEN	0	0	0	1	0	1	1	1	1	1	0	61
	SPEN	0	0	0	1	0	1	1	1	0	0	0	46
Nigeria	Borno	0	0	0	0	0	0	1	1	1	0	0	34
	FCT					0	0	0	1	1	1	0	39
	Kaduna	1	0	0	0	0	0	1	1	1	0	0	33
	Katsina	0	0	0	0	0	0	1	1	1	0	0	29
	Lagos	1	0	0	0	0	1	1	1	1	0	0	41
	Plateau	0	0	0	0	0	0	1	1	1	0	0	31

Rwanda	ELECTROGAZ	0	0	0	1	0	1	0	1	1	1	0	50
Senegal	ONAS	0	0	0	0		1	1	1	0	1	0	51
	SDE	0	0	0	0	1	1	1	1	1	1	0	60
South Africa	Cape Town Metro					0	0	0	1	1	1	0	35
	Drakenstein Municipality					0	0	0	1	1	1	0	35
	eThekwini Metro (Durban)					0	0	0	1	1	1	0	35
	Joburg	1	1	0	1	0	1	1	1	1	1	0	66
Sudan	Khartoum Water Corporation	1	1	1	1	0	1	1	1	1	0	0	59
	South Darfur Water Corporation					0	1	1	1	1	0	0	56
	Upper Nile Water Corporation					0	0	0	1		0	0	17
Tanzania	DAWASCO	0	0	1	0	0	1	0	0	1	0	0	54
	DUWS	0	0	0	0	0	1	1	0	1	1	0	52
	MWSA	0	0	0	0	0	0	0	0	1	0	0	37
Uganda	SONEB	0	0	1	0	1	0	0	1	0	0	0	52
Zambia	LWSC	0	0	0	0	1	1	1	1	1	1	0	73
	NWSC					1	1	1	1	1	0	0	75
	SWSC	0	0	0	0	1	1	1		0	0	0	52
	Subindex		Outsourcing				Labor market discipline			Capital market discipline			
	% of utilities sharing attribute	23	15	21	28	25	67	73	67	70	42	2	

Source: Banerjee, Wodon, and others 2008.
Note: IFRSs = International Financial Reporting Standards; SOE = state-owned enterprise.

Table A2.7 Specification of Rural Water Reform Index

	Specification	*Definition*
Rural water agency	Is there a specialized rural water agency?	Yes = 1, no = 0
Rural water policy	Is there a specific policy or strategy for the rural water sector?	Yes = 1; no = 0
Map of rural water points	Is there a current map of the rural water points?	Yes = 1; no = 0
Dedicated budget/fund	Is there funding available to specifically support rural water services?	Yes = 1; no = 0
Cost-recovery policy	Is there a cost-recovery policy for rural water services?	Yes = 1; no = 0

Source: Banerjee, Wodon, and others 2008.

Table A2.8 Rural Water Reform Index

	Rural water agency	*Rural water policy*	*Map of rural water points*	*Dedicated budget/ fund*	*Cost-recovery policy*	*Rural Water Reform Index (%)*
Benin	1	1	1	0	1	67
Burkina Faso	1	1	1	1	1	83
Cape Verde	0	1	1	0	0	33
Chad	0	1	0	1	1	50
Congo, Dem. Rep.	1	0	0	1	0	33
Côte d'Ivoire	1	1	1	1	1	83
Ethiopia	0	1	0	1	1	50
Ghana	1	1	0	1	1	67
Kenya	0	0	0	1	1	33
Lesotho	1	1	0	1	0	50
Madagascar	0	1	1	1	1	67
Malawi	0	1	0	1	0	33
Mozambique	1	1	0	1	1	67
Namibia	1	1	0	1	1	67
Niger	0	1	0	0	0	17
Nigeria	1	1	0	1	1	67
Rwanda	0	1	0	1	1	50
Senegal	1	1	0	1	1	67
South Africa	0	0	0	1	1	33
Sudan	0	1	0	1	1	50
Tanzania	0	1	1	1	1	67
Uganda	1	1	1	1	1	83
Zambia	0	1	0	1	0	33
% of countries sharing attribute	46	83	29	83	71	

Source: Banerjee, Wodon, and others 2008.

Table A2.9 Specification of On-Site Sanitation Index

Indicator	*Definition*
Existence of an accepted definition of sanitation	1 = Existence of accepted definition; 0 = No accepted definition
Existence of sanitation policy	1 = Existence of policy/strategy; 0 = No policy/strategy
Existence of hygiene promotion program	1 = Existence of hygiene promotion program by the government; 0 = No hygiene promotion program by the government
Households responsible for investment finance	1 = Households responsible for financing sanitation investments; 0 = Otherwise
Government/private sector/utility/NGO/CBO responsible for technical assistance	1 = Either municipal government/private sector/water utility, NGO/CBO responsible for technical assistance; 0 = Otherwise
Government/private sector/utility responsible for desludging	1 = Either municipal government/private sector/water utility responsible for desludging; 0 = Otherwise
Government responsible for regulation	1 = Either central/local/municipal government responsible for regulation; 0 = Otherwise
Existence of cost-recovery requirement for on-site sanitation	1 = Requirement for cost recovery; 0 = No requirement for cost recovery

Source: Morella, Foster, and Banerjee 2008.
Note: CBO = community-based organization; NGO = nongovernmental organization.

Table A2.10 On-Site Sanitation Index

Country	*Existence of an accepted definition of sanitation*	*Existence of sanitation policy*	*Existence of hygiene promotion program*	*Involvement of utilities in on-site sanitation*	*Existence of a specific fund for sanitation*	*Existence of cost-recovery requirement for on-site sanitation*	*On-site sanitation index (%)*
Zambia	0	0	0	0	0	0	0
Nigeria	1	0	0	0	0		20
Congo, Dem. Rep.	1	0	0	0	1	0	33
Lesotho	0	1	1	0	0	0	33
Niger	1	0	0	1	0	0	33
Benin	1	0	1	1	0	0	50
Ghana	1	1		0	0		50
Malawi	1	0	1	0	0	1	50
Mozambique	1	1	1	0	0	0	50
Rwanda	1	1	1	0	0	0	50
Sudan	1	0	1	1	0	0	50

Ethiopia	1	0	1	1	1	0	67
Senegal	1	1	1	1	0	0	67
Uganda	1	1	1	1	0	0	67
Namibia	1	1	1	1	0		80
Cape Verde	1	1	1	1	0	1	83
Côte d'Ivoire	1	1	1	0	1	1	83
Tanzania	1	1	1	1	1	0	83
Burkina Faso	1	1	1	1	1	1	100
Chad	1	1	1				100
Kenya	1	1	1	1	1	1	100
Madagascar	1	1	1	1	1	1	100
South Africa	1	1	1	1	1	1	100
% of countries sharing attribute	91	65	82	59	36	37	

Source: Morella, Foster, and Banerjee 2008.

Reference

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APPENDIX 3

Performance Indicators of Selected Water Utilities

Table A3.1 Access to Utility Water

Country	Utility	Access, private residential water connection (% of population)						
		1995–99	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Benin	SONEB						24.6	25.0
Botswana	DWA			35.0				
	WUC							
Burkina Faso	ONEA	15.4	16.3	21.9	22.5	22.8	23.2	24.8
Cameroon	SNEC							
Cape Verde	ELECTRA		34.3	36.7	37.9	42.2	45.2	46.3
Chad	STEE							
Congo, Dem. Rep.	REGIDESO							19.0
Congo, Rep.	SDNE						22.8	24.2
Côte d'Ivoire	SODECI	28.5	30.2	29.7	29.4	30.1	30.2	29.9
Ethiopia	ADAMA					28.2	30.9	32.3
	AWSA							
	Dire Dawa						17.8	18.9
Gabon	SEEG							
Ghana	GWC			9.0	9.1	8.5	9.0	8.8
Kenya	KIWASCO						11.4	10.0
	MWSC			32.5	36.3	33.7	34.2	34.5
	NWASCO						37.4	50.9
Lesotho	WASA							33.7
Liberia	LWSR						2.7	3.0
Madagascar	JIRAMA	11.6	11.4	11.7	11.7	12.2	12.6	12.7
Malawi	BWB	23.0	22.9	22.5	22.4	25.0	24.0	25.3
	CRWB		17.8	18.0	17.6	17.9	18.8	20.4
	LWB					33.2	32.1	35.6

Mali	EDM		18.6	20.1	24.7	25.6	26.3	27.2
Mauritania	MSNE						59.1	63.0
Mozambique	AdeM Beira				11.5	11.6	11.4	10.7
	Adem Maputo				23.5	23.8	25.2	25.5
	Adem Nampula				7.3	8.1	7.7	8.1
	AdeM Pemba				14.5	14.6	15.1	15.8
	AdeM Quelimane				4.9	4.8	4.2	4.7
Namibia	Oshakati Municipality							49.3
	Walvis Bay Municipality	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Windhoek Municipality		79.4	78.1	76.6	74.9	74.3	73.1
Niger	SPEN/SEEN							
Nigeria	Borno							
	FCT							10.0
	Kaduna		50.0	51.4	50.8	50.8	50.8	48.2
	Katsina							
	Lagos				3.0	3.0	2.9	3.0
	Plateau							
Rwanda	ELECTROGAZ	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Senegal	SDE		56.9	57.9	60.8	61.5	63.7	65.8
Seychelles	PUC						96.5	96.9
South Africa	Cape Town Metro			85.6	86.6	89.0	90.6	92.4
	Drakenstein Municipality			87.0	87.9	88.7	89.5	90.3
	eThekwini Metro (Durban)			94.6	94.9	95.2	95.5	90.1
	Joburg			85.2	86.1	86.9	87.6	88.4
Sudan	Khartoum Water Corporation							26.8
	South Darfur Water Corporation							10.5
	Upper Nile Water Corporation							38.4

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Table A3.1 *(continued)*

		Access, private residential water connection (% of population)						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Tanzania	Arusha							
	Babati							
	Bukoba							
	DAWASCO							
	DUWS							33.9
	Iringa							
	Kigoma							
	Lindi							
	Mbeya							
	Morogoro							
	Moshi							
	Mtwara							
	Musoma							
	MWSA					16.5	21.1	20.1
	Shinyanga							
	Singida							
	Songea							
	Sumbawanga							
	Tabora							
	Tanga							
Togo	TdE		38.9	39.9	40.9	40.7	40.5	
Uganda	NWSC		15.1	16.0	17.1	21.4	22.8	27.1
Zambia	AHC-MMS							

	CHWSC							
	CWSC							
	KWSC							
	LukangaWSC							
	LWSC	16.3	22.1	20.5	24.1	22.3	18.5	23.4
	MulongaWSC							
	NorthWesternWSC							
	NWSC						55.1	60.1
	SWSC			36.5	36.1	40.6	53.2	58.9
	WesternWSC							
Country typology								
Resourch-rich								30.4
Middle-income								76.0
Fragile states								17.3
Nonfragile, low-income								25.5
Level of water scarcity								
High								37.4
Low								36.1
Size of the utility								
Small								35.5
Large								37.5
Overall								36.8

Source: Banerjee, Skilling, and others 2008.

Table A3.2 Distribution Infrastructure

		Kilometers of water mains per 1,000 population (km/1,000 capita)							*Kilometers of water mains per 1,000 water connections (km/1,000 connections)*						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Benin	SONEB						1.4	1.4							
Botswana	DWA														
	WUC														
Burkina Faso	ONEA	0.9	0.9	1.1	1.1	1.1	1.2	1.2	36.2	36.1	32.1	32.6	32.5	33.5	32.7
Cameroon	SNEC														
Cape Verde	ELECTRA		1.6	1.6	1.5	1.5	1.4	1.4							
Chad	STEE														
Congo, Dem. Rep.	REDIGESO							0.7							50.1
Congo, Rep.	SDNE														
Côte d'Ivoire	SODECI	1.5	1.5	1.4	1.4	1.4	1.4	1.3							21.9
Ethiopia	ADAMA							0.7							9.6
	AWSA	0.7	0.7	0.7	0.7	0.7	0.7	0.7							8.4
	Dire Dawa														
Gabon	SEEG	2.5	2.4	2.5	2.6	2.5	2.4	2.3	18.1	17.4	17.9	18.7	18.0	17.5	16.8
Ghana	GWC			0.3	0.4	0.4	0.4	0.5							
Kenya	KIWASCO						0.2	0.2						13.7	14.7
	MWSC														
	NWASCO						1.0	1.0						11.3	10.6
Lesotho	WASA														
Liberia	LWSR						0.1	0.1						25.0	22.5
Madagascar	JIRAMA	0.6	0.6	0.6	0.6	0.6	0.6	0.6	24.0	24.3	23.7	23.7	22.9	22.3	22.1
Malawi	BWB	1.5	1.4	1.4	1.3	1.3	1.3	1.2	24.7	24.3	24.0	23.3	23.8	24.3	22.6
	CRWB		3.7	3.6	3.6	4.8	5.1	5.6		115.9	112.9	113.7	151.6	155.8	160.5
	LWB	1.8	1.8	1.7	1.7	1.7	1.6	1.6						45.7	43.8
Mali	EDM														
Mauritania	MSNE														
Mozambique	AdeM Beira				0.1	0.1	0.1	0.1				4.0	3.8	3.8	3.9
	Adem Maputo											0.5	0.5	0.4	0.4
	Adem Nampula				0.2	0.2	0.2	0.2				11.2	10.1	11.2	10.9

	AdeM Pemba				0.3	0.3	0.3	0.3				10.9	10.5	9.8	9.1
	AdeM Quelimane				0.2	0.2	0.2	0.2				19.6	19.0	20.8	17.6
Namibia	Oshakati Municipality							0.4							
	Walvis Bay Municipality	7.0	6.7	6.4	6.2	6.0	5.8	5.5	36.8	35.6	30.3	29.6	28.2	28.3	27.1
	Windhoek Municipality							4.5							29.9
Niger	SPEN/SEEN	1.0	1.0	1.0	1.0	1.0	1.1	1.1			30.8	30.6	28.3	29.7	29.8
Nigeria	Borno		0.2	0.2	0.2	0.2				7.3	7.3	7.2	6.5		
	FCT														
	Kaduna			0.7	0.7	0.7	0.7	0.7						23.5	24.3
	Katsina				0.3	0.2	0.2	0.2						16.6	18.0
	Lagos				0.2	0.2	0.1	0.1				16.5	16.3	16.0	14.5
	Plateau					1.3	1.1	1.1					61.9	62.8	67.9
Rwanda	ELECTROGAZ	1.3	1.3	1.4	1.2	1.2	1.1	1.2							60.4
Senegal	SDE		1.5	1.5	1.5	1.5	1.5	1.5		24.3	23.6	22.8	22.3	21.8	20.8
Seychelles	PUC						3.9	3.9						14.7	14.3
South Africa	Cape Town Metro														
	Drakenstein Municipality			3.0	3.0	2.9	2.8	2.8			13.4	13.0	12.7	12.3	12.0
	eThekwini Metro (Durban)			4.0	3.9	3.9	3.8	3.7						17.6	17.2
	Joburg														
Sudan	Khartoum Water Corporation							0.4							10.6
	South Darfur Water Corporation							0.1							12.1
	Upper Nile Water Corporation							0.2							3.2

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Table A3.2 *(continued)*

		Kilometers of water mains per 1,000 population (km/1,000 capita)							*Kilometers of water mains per 1,000 water connections (km/1,000 connections)*						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Tanzania	Arusha														10.9
	Babati														17.3
	Bukoba														17.5
	DAWASCO														
	DUWS							0.7							4.7
	Iringa														16.1
	Kigoma						1.8	1.2						25.2	25.7
	Lindi														43.8
	Mbeya														16.7
	Morogoro														15.8
	Moshi														20.5
	Mtwara														38.6
	Musoma														18.0
	MWSA					0.6	0.6	0.6					15.8	15.1	16.1
	Shinyanga														30.2
	Singida														25.9
	Songea														29.7
	Sumbawanga														35.9
	Tabora														25.6
	Tanga														22.4

Togo	TdE		1.9	1.8	1.8	1.8	1.8			40.7	41.1	39.9	39.6	39.1	
Uganda	NWSC		0.9	0.8	0.9	1.0	1.2	1.3	28.3	27.2	25.1	23.9	24.5	26.4	22.6
Zambia	AHC-MMS														
	CHWSC														
	CWSC														
	KWSC														
	LukangaWSC														
	LWSC	1.5	1.9	1.9	2.1	1.8	1.4	1.5			67.8	62.6	58.7	54.3	46.2
	MulongaWSC														
	NorthWestern WSC														
	NWSC						1.7	1.7						24.8	23.1
	SWSC					1.4	1.4	1.4						18.7	17.0
	WesternWSC														
Country typology															
Resourch-rich								0.9							23.0
Middle-income								3.2							20.1
Fragile states								0.7							31.5
Nonfragile, low-income								1.0							25.2
Level of water scarcity															
High								1.2							29.6
Low								1.4							22.1
Size of the utility															
Small								1.4							25.9
Large								1.2							19.5
Overall								1.3							24.7

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Table A3.2 *(continued)*

		Metering ratio (%)							*Nonrevenue water (%)*						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Benin	SONEB													25.6	23.8
Botswana	DWA								23.9	21.4	23.4	24.4	24.4	26.1	27.9
	WUC											14.1			12.6
Burkina Faso	ONEA	97.4	97.5	97.9	97.9	98.0	98.1	98.2	19.5	17.1	15.9	14.0	15.2	17.0	18.3
Cameroon	SNEC														37.0
Cape Verde	ELECTRA									26.4	23.5	28.4	29.7	30.3	31.2
Chad	STEE														
Congo, Dem. Rep.	REDIGESO							28.6	45.2	38.8	36.4	38.5	44.2	37.6	40.7
Congo, Rep.	SDNE		18.6	18.7	17.9	19.3	19.5	21.0		27.7	27.7	27.8	27.7	27.8	27.7
Côte d'Ivoire	SODECI							100.0	14.2	17.7	17.5	18.8	20.2	21.7	21.7
Ethiopia	ADAMA						90.2	90.1							42.7
	AWSA								24.0	32.2	34.3	30.0	26.9	33.6	36.8
	DIRE DAWA														21.6
Gabon	SEEG								13.3	15.8	14.9	15.5	16.7	16.3	17.6
Ghana	GWC										52.0	58.0	57.0	53.0	
Kenya	KIWASCO						48.6	58.2						68.3	71.4
	MWSC										52.6	41.8	40.7	34.8	38.3
	NWASCO													40.0	37.8
Lesotho	WASA												28.1	27.9	27.8
Liberia	LWSR						52.5	65.1						7.0	28.8
Madagascar	JIRAMA	97.4	97.2	97.1	97.1	97.1	97.1	97.1	31.2	32.5	32.4	35.9	36.0	32.8	33.5
Malawi	BWB					42.7	32.9	22.6	34.3	35.6	34.0	45.8	43.6	47.0	51.1
	CRWB									28.6	26.2	26.3	28.5	18.7	16.7
	LWB							98.1	39.6	32.9	39.2	16.8	17.1	16.6	22.1
Mali	EDM				96.0	96.0	96.0	96.0				36.7	32.1	29.8	26.7
Mauritania	MSNE						100.0	99.9						30.4	32.0
Mozambique	AdeM Beira				68.0	99.2	98.5	99.9				52.1	54.2	53.1	60.1
	Adem Maputo				100.3	99.8	99.3	98.2				57.8	62.4	54.4	62.1
	Adem Nampula				100.0	100.0	99.8	100.0				27.2	43.2	45.1	44.1
	AdeM Pemba				100.8	102.6	97.7	99.1				50.9	52.9	51.2	45.0

	AdeM Quelimane				108.1	100.7	113.7	100.0				26.5	26.3	36.8	35.2
Namibia	Oshakati Municipality									12.4	28.9	24.5	34.7	28.2	20.8
	Walvis Bay Municipality	100.0	100.0	100.0	100.0	100.0	100.0	100.0	16.4	25.8	27.1	18.1	11.5	10.7	16.0
	Windhoek Municipality									19.8	18.1	18.4	20.2	10.5	13.8
Niger	SPEN/SEEN			96.3	96.2	96.9	97.1	96.8	15.8	20.9	22.6	17.2	17.4	16.9	18.8
Nigeria	Borno														
	FCT							23.6							80.0
	Kaduna						7.7	16.1		39.1	38.3	51.1	68.4	58.0	21.2
	Katsina						3.2	6.5				30.0	29.0	56.5	14.4
	Lagos											67.1	66.7	60.4	56.5
	Plateau					5.8	7.2	23.6				27.6	33.2	33.3	23.5
Rwanda	ELECTROGAZ							98.7	44.6	54.2	48.9	44.6	50.6	43.8	38.3
Senegal	SDE		111.6	116.2	112.9	115.9	116.6	117.3		25.6	22.3	21.5	20.1	19.9	20.1
Seychelles	PUC						46.1	45.0						16.7	20.3
South Africa	Cape Town Metro							60.3			10.0	20.2	36.5	16.4	18.0
	Drakenstein Municipality							60.7			12.9	12.9	12.3	14.3	11.6
	eThekwini Metro (Durban)						57.1	66.4			30.1	30.9	31.2	29.1	32.1
	Joburg							52.4			39.4	43.7	39.3	32.8	30.9
Sudan	Khartoum Water Corporation														40.0
	South Darfur Water Corporation														48.9
	Upper Nile Water Corporation														29.0
Tanzania	Arusha						90.1	100.0						34.0	34.6

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Table A3.2 *(continued)*

		Metering ratio (%)							*Nonrevenue water (%)*						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
	Babati							22.3							50.6
	Bukoba						63.9	62.0						60.0	60.0
	DAWASCO														
	DUWS							27.9						31.0	31.0
	Iringa						58.5	74.4						54.0	53.0
	Kigoma						36.1	34.8						40.0	49.0
	Lindi						11.1	18.4						86.0	75.0
	Mbeya						35.5	38.7						37.0	43.0
	Morogoro						64.9	91.8						39.0	37.5
	Moshi						100.0	82.8						60.0	33.0
	Mtwara						66.8	74.7						52.0	43.0
	Musoma						23.7	42.2						66.0	63.0
	MWSA					104.5	100.0	100.0					57.0	50.0	48.9
	Shinyanga						22.8	45.9						46.0	39.0
	Singida						33.8	36.9						56.0	49.8
	Songea						13.3	32.9						31.0	34.0
	Sumbawanga						33.8	38.4						50.0	48.0
	Tabora						59.4	68.7						28.0	28.0
	Tanga						100.0	99.5						34.0	34.0
Togo	TdE		100.0	100.0	100.0	100.0	100.0			28.4	35.4	26.5	24.3	28.0	
Uganda	NWSC	79.2	83.1	84.3	89.1	91.9	93.6	94.5		43.5	42.6	40.4	39.2	38.2	34.5
Zambia	AHC-MMS							15.0							32.0

CHWSC										60.0
CWSC					98.0					29.0
KWSC					7.0					57.0
LukangaWSC										
LWSC	32.6	33.6	38.6	38.1	33.3	58.7	57.8	59.5	55.7	56.0
MulongaWSC					16.0					61.0
NorthWestern WSC					86.0					45.0
NWSC						41.6	55.0	50.0	36.6	36.8
SWSC					73.0	51.8	49.4	50.5	56.0	56.0
WesternWSC					17.0					44.0
Country typology										
Resourch-rich					33.5					41.5
Middle-income					64.1					21.9
Fragile states					64.5					30.4
Nonfragile, low-income					73.8					40.1
Level of water scarcity										
High					60.5					33.3
Low					64.4					39.6
Size of the utility										
Small					61.2					39.4
Large					68.5					30.7
Overall					63.3					37.3

Source: Banerjee, Skilling, and others 2008.

Table A3.3 Treatment

		Samples passing chlorine test (%)						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Benin	SONEB							
Botswana	DWA							
	WUC							
Burkina Faso	ONEA			99.0	99.0	99.0	99.0	99.0
Cameroon	SNEC							
Cape Verde	ELECTRA							
Chad	STEE							
Congo, Dem. Rep.	REDIGESO		36.0	39.0	36.0	46.0	32.0	36.0
Congo, Rep.	SDNE							68.0
Côte d'Ivoire	SODECI	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Ethiopia	ADAMA							100.0
	AWSA							
	DIRE DAWA							
Gabon	SEEG							
Ghana	GWC					85.5	91.1	80.5
Kenya	KIWASCO						99.0	99.0
	MWSC							
	NWASCO						84.0	84.0
Lesotho	WASA							
Liberia	LWSR							
Madagascar	JIRAMA							
Malawi	BWB	99.9	99.8	97.8	99.8	99.9	99.9	99.8
	CRWB		90.0	91.0	89.0	87.0	90.0	93.0

	LWB	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mali	EDM					95.6	97.1	0.0
Mauritania	MSNE							
Mozambique	AdeM Beira				100.0	100.0	100.0	83.0
	Adem Maputo				100.0	100.0	83.5	99.1
	Adem Nampula				100.0	100.0	62.6	76.6
	AdeM Pemba				71.1	71.0	100.0	100.0
	AdeM Quelimane				100.0	100.0	100.0	100.0
Namibia	Oshakati Municipality				95.0	95.0	95.0	95.0
	Walvis Bay Municipality	99.0	99.0	99.0	99.0	99.0	99.0	99.0
	Windhoek Municipality							99.9
Niger	SPEN/SEEN							
Nigeria	Borno							
	FCT							100.0
	Kaduna							50.0
	Katsina							
	Lagos							
	Plateau							
Rwanda	ELECTROGAZ	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Senegal	SDE			98.6	96.6	99.3	98.6	95.1
Seychelles	PUC							
South Africa	Cape Town Metro							
	Drakenstein Municipality							
	eThekwini Metro (Durban)							
	Joburg							
Sudan	Khartoum Water Corporation							100.0
	South Darfur Water Corporation							70.0
	Upper Nile Water Corporation							40.0

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Table A3.3 *(continued)*

Country	*Utility*	*Samples passing chlorine test (%)*						
		1995–99	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Tanzania	Arusha							
	Babati							
	Bukoba							
	DAWASCO							
	DUWS							
	Iringa							
	Kigoma							
	Lindi							
	Mbeya							
	Morogoro							
	Moshi							
	Mtwara							
	Musoma							
	MWSA					93.0	95.0	98.0
	Shinyanga							
	Singida							
	Songea							
	Sumbawanga							
	Tabora							
	Tanga							
Togo	TdE		99.8	99.9	99.9	99.8	99.8	
Uganda	NWSC							
Zambia	AHC-MMS							

CHWSC							
CWSC							
KWSC							
LukangaWSC							
LWSC	95.0			80.0	74.0	83.0	81.0
MulongaWSC							
NorthWesternWSC							
NWSC			100.0	100.0	100.0	97.5	99.2
SWSC				96.0	98.0		95.0
WesternWSC							
Country typology							
Resourch-rich							78.1
Middle-income							98.0
Fragile states							63.0
Nonfragile, low-income							88.7
Level of water scarcity							
High							85.9
Low							84.1
Size of the utility							
Small							90.3
Large							65.5
Overall							84.8

Source: Banerjee, Skilling, and others 2008.

Table A3.4 Staffing

		Collection ratio (% of connections billed)							*Employees per 1,000 water connections (number/1,000 connections)*						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Benin	SONEB						93.3	115.9							
Botswana	DWA														
	WUC														
Burkina Faso	ONEA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	9.7	9.7	7.7	7.0	6.8	7.0	6.2
Cameroon	SNEC														
Cape Verde	ELECTRA				95.9	84.2	94.4	98.3							
Chad	STEE														
Congo, Dem. Rep.	REDIGESO	32.6		36.1	36.6	43.7	52.2	70.0							18.0
Congo, Rep.	SDNE		79.0	0.0	83.0	81.0	83.0	88.0		5.3	4.9	7.9	7.7	7.2	7.0
Côte d'Ivoire	SODECI		171.0	158.1	158.1	128.1	143.2	136.3							2.8
Ethiopia	ADAMA					139.2	152.5	140.1							
	AWSA			83.6	85.0	70.6	71.2	83.8							
	Dire Dawa													17.7	16.1
Gabon	SEEG								8.2	7.8	7.4	7.0	6.5	5.9	5.5
Ghana	GWC			77.0	74.0	75.0	75.0	75.0							
Kenya	KIWASCO						77.3	96.7						20.8	20.7
	MWSC				111.2	90.3	74.2	101.8							
	NWASCO						73.9	91.8						10.0	9.0
Lesotho	WASA														
Liberia	LWSR						57.0	63.0						12.6	16.4
Madagascar	JIRAMA														0.8
Malawi	BWB					100.0	100.0	100.0					15.2	15.0	13.7
Malawi	CRWB									40.8	39.3	42.0	46.4	43.3	41.3
Malawi	LWB													20.6	18.4
Mali	EDM				96.0	96.0	96.0	96.0			7.7	5.9	6.0	5.7	5.3
Mauritania	MSNE						95.0	104.6						22.8	21.8
Mozambique	AdeM Beira				100.0	100.0	100.0	100.0				23.4	21.0	19.0	19.2

	Adem Maputo			100.0	100.0	100.0	100.0				8.5	8.3	7.2	6.6
	Adem Nampula			100.0	100.0	100.0	100.0				19.2	17.4	14.9	14.9
	AdeM Pemba			100.0	100.0	100.0	100.0				24.1	24.2	21.9	21.4
	AdeM Quelimane			100.0	100.0	100.0	100.3				25.7	24.3	26.0	23.3
Namibia	Oshakati Municipality													
	Walvis Bay Municipality							11.6	11.0	9.6	9.3	8.4	8.4	7.1
	Windhoek Municipality													3.4
Niger	SPEN/SEEN		79.6	88.7	93.6	92.1	87.6			9.0	8.4	7.3	6.6	6.8
Nigeria	Borno								18.5	18.3	18.0	16.7		
	FCT						20.0							31.2
	Kaduna												23.5	23.6
	Katsina												9.5	14.4
	Lagos										11.0	10.4	9.9	8.7
	Plateau											31.8	30.0	28.3
Rwanda	ELECTROGAZ			120.0	121.0	116.4	74.5							38.6
Senegal	SDE	88.8	89.7	89.0	89.4				4.4	4.1	3.8	3.8	3.7	3.5
Seychelles	PUC					98.7	100.0						19.7	19.2
South Africa	Cape Town Metro												3.2	2.9
	Drakenstein Municipality						100.0				4.1	4.0	2.8	2.8
	eThekwini Metro (Durban)												4.2	4.0

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Table A3.4 *(continued)*

		Collection ratio (% of connections billed)							Employees per 1,000 water connections (number/1,000 connections)						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
	Joburg														2.1
Sudan	Khartoum Water Corporation							62.5							10.9
	South Darfur Water Corporation							49.3							19.2
	Upper Nile Water Corporation							8.3							9.4
Tanzania	Arusha														
	Babati														
	Bukoba														
	DAWASCO														
	DUWS						98.1	105.4							3.8
	Iringa														
	Kigoma														
	Lindi														
	Mbeya														
	Morogoro														
	Moshi														
	Mtwara														
	Musoma														
	MWSA					90.5	97.2	94.8					14.0	11.8	11.4
	Shinyanga														
	Singida														
	Songea														

	Sumbawanga														
	Tabora														
	Tanga														
Togo	TdE		97.4	63.5	87.1	72.1	54.5			15.4	15.5	14.6	13.7	12.3	
Uganda	NWSC	100.8	110.5	103.2	109.9	101.6	100.2	99.7	26.2	20.2	16.2	11.5	10.6	9.5	8.6
Zambia	AHC-MMS							82.0							
	CHWSC							76.0							
	CWSC							81.0							
	KWSC							65.0							
	LukangaWSC														
	LWSC				66.5	80.2	80.0	77.0			14.5	13.1	12.9	12.1	10.5
	MulongaWSC							58.0							
	North WesternWSC							94.0							
	NWSC							81.0						9.9	9.5
	SWSC							57.0						11.7	10.6
	WesternWSC							76.0							
Country typology															
Resourch-rich								65.0							14.5
Middle-income								99.4							5.9
Fragile states								89.8							12.4
Nonfragile, low-income								98.5							14.8
Level of water scarcity															
High								83.0							16.0
Low								88.0							10.3
Size of the utility															
Small								84.1							16.3
Large								91.9							6.6
Overall								86.0							13.1

Source: Banerjee, Skilling, and others 2008.

Table A3.5 Financial Performance

		Debt service ratio (ratio)							*Operating cost coverage (ratio)*						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Benin	SONEB						22.1	44.2						1.0	1.2
Botswana	DWA														
	WUC														
Burkina Faso	ONEA	17.5	17.2	8.5	9.5	12.1	5.8	5.1			1.0	1.1	1.1	1.1	0.9
Cameroon	SNEC														0.8
Cape Verde	ELECTRA														
Chad	STEE			113.2	19.6	34.5	20.0	35.3			3.0	3.7	2.6	3.0	4.2
Congo, Dem. Rep.	REDIGESO	1.7		2.0	2.6	4.2	7.2	11.2	0.1		0.1	0.3	0.4	0.3	0.6
Congo, Rep.	SDNE					178.9	172.6	194.6			0.0	1.0	0.9	0.8	0.7
Côte d'Ivoire	SODECI									1.1	1.0	1.0	1.0	1.0	1.0
Ethiopia	ADAMA												1.9	1.8	1.1
	AWSA								1.1	0.5	0.5	1.0	0.8	1.2	1.0
	Dire Dawa														
Gabon	SEEG								1.0	1.1	1.1	1.1	1.2	1.1	1.0
Ghana	GWC														
Kenya	KIWASCO													1.0	1.0
	MWSC												2.5	1.4	1.4
	NWASCO						218.3	51.9						1.4	2.6
Lesotho	WASA					9.2	11.9	38.5					1.3	1.2	1.2
Liberia	LWSR						182.8	30.1						1.3	1.0
Madagascar	JIRAMA														
Malawi	BWB					9.8	7.6	9.3					1.0	1.0	1.0
	CRWB														
	LWB														
Mali	EDM														0.6

Mauritania	MSNE					41.5	36.1					1.0	1.2
Mozambique	AdeM Beira									1.0	1.2	1.4	1.3
	Adem Maputo									0.8	0.6	1.0	0.8
	Adem Nampula									1.0	1.1	1.3	1.5
	AdeM Pemba									0.4	1.0	1.4	0.8
	AdeM Quilimane									0.6	1.3	1.3	1.3
Namibia	Oshakati Municipality										0.8	1.1	1.3
	Walvis Bay Municipality												
	Windhoek Municipality	5.2	5.6	5.6	5.3	5.9	5.2	1.1	1.1	1.1	1.3	1.1	0.9
Niger	SPEN/SEEN		5472.1	69.3	26.7	12.7	12.6		1.6	0.8	0.8	1.0	1.0
Nigeria	Borno												
	FCT												
	Kaduna												
	Katsina									0.9	0.5	0.6	1.1
	Lagos												
	Plateau												
Rwanda	ELECTROGAZ					1.5	3.5			3.7	3.4	1.7	0.8
Senegal	SDE				4.2	3.9	3.5	0.8	0.9	0.9	0.9	1.0	1.0
Seychelles	PUC											0.5	0.5
South Africa	Cape Town Metro		4.9	4.6	3.8	3.8			1.0	1.0	1.1	0.9	0.9
	Drakenstein Municipality				5.2	6.9					1.6	1.9	1.3
	eThekwini Metro (Durban)				2.3	2.6	2.5				0.7	0.7	0.7

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Table A3.5 *(continued)*

		Debt service ratio (ratio)							*Operating cost coverage (ratio)*						
Country	*Utility*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*1995–99*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
	Joburg														
Sudan	Khartoum Water Corporation														0.9
	South Darfur Water Corporation														1.0
	Upper Nile Water Corporation														0.0
Tanzania	Arusha														0.9
	Babati														0.6
	Bukoba														0.8
	DAWASCO														
	DUWS													1.0	0.9
	Iringa														0.8
	Kigoma														0.6
	Lindi														0.4
	Mbeya														1.0
	Morogoro														0.7
	Moshi														0.7
	Mtwara														0.9
	Musoma														0.6
	MWSA												1.1	1.4	0.9
	Shinyanga														0.5
	Singida														1.4
	Songea														0.4
	Sumbawanga														0.9

	Tabora													1.2
	Tanga													1.2
Togo	TdE	59.6	51.0	36.9	43.9	83.0			0.7	1.3	0.8	1.3	0.7	
Uganda	NWSC	4.4	3.5	3.0	2.9	4.8	4.7	0.9	1.1	1.1	1.1	1.1	1.2	1.2
Zambia	AHC-MMS													0.9
	CHWSC													0.5
	CWSC													1.1
	KWSC													1.5
	LukangaWSC													
	LWSC										0.8	0.8	0.9	1.0
	MulongaWSC													1.0
	NorthWesternWSC													0.7
	NWSC													1.0
	SWSC													1.1
	WesternWSC													0.9
.Country typology														
Resourch-rich							115.0							1.1
Middle-income							15.4							1.0
Fragile states							20.7							0.9
Nonfragile, low-income							19.0							1.0
Level of water scarcity														
High							22.2							1.2
Low							41.2							0.9
Size of the utility														
Small							17.6							0.9
Large							51.5							1.0
Overall							30.5							1.0

Source: Banerjee, Skilling, and others 2008

Reference

Banerjee, S., H. Skilling, V. Foster, C. Briceño-Garmendia, E. Morella, and T. Chfadi. 2008. "Ebbing Water, Surging Deficits: Urban Water Supply in Sub-Saharan Africa." AICD Background Paper 12. World Bank, Washington, DC.

APPENDIX 4

Tariffs

Table A4.1 Structure of Domestic Tariffs

Country	*Utility*	*Type of tariff*	*Metering ratio (%)*	*Minimum consumption (m³)*	*Fixed charge*	*Number of blocks*	*Size of first block (m³)*	*Size of nth block (m³)*	*Price of first block ($)*	*Price of nth block ($)*
Benin	SONEB	IBT	89.1	0	No	2	5	5+	0.41	0.85
Botswana	WUC	IBT	n.a.	0	Yes	4	10	25+	0.43	1.61
Burkina Faso	ONEA	IBT	98.2	0	Yes	3	6	30+	0.39	2.13
Cape Verde	ELECTRA	IBT	91.2	0	Yes	5	7	20+	0	1.2
Chad	STEE	IBT	n.a.	0	No	3	8	300+	2.67	4.67
Congo, Dem. Rep.	REGIDESO	IBT	28.2	0	No	4	10	40+	0.05	0.12
Congo, Rep.	SDNE	IBT	17.3	0	No	3	25	65+	0.2	0.3
Côte d'Ivoire	SODESI	IBT	100	9	No	3	7	20+	0.19	0.42
Ethiopia	AWSA	IBT	n.a.	0	No	4	5	30+	0.26	0.44
	ADAMA	IBT	90.1	0	No	4	5	50+	0.14	0.34
	Dire Dawa	IBT	n.a.	0	No	2	20	20+	0.52	0.73
Ghana	GWC	IBT	n.a.	0	No	4	10	60+	0.18	0.52
Kenya	NWASCO	IBT	n.a.	0	No	5	10	60+	0.6	0.6
	KIWASCO	U-shaped	58.2	0	Yes	4	5	24+	0.29	1.18
Lesotho	WASA	IBT	98.2	0	Yes	2	10	10+	0.03	0.08
Madagascar	JIRAMA	IBT	97.1	0	Yes	1	10	30+	0.3	0.61
Malawi	BWB	IBT	22.6	5	No	0	0	0	0	0
	CRWB	Flat	n.a.	0	No	4	15	85+	0.71	3.48
	LWB	IBT	98.1	0	Yes	3	4	40+	0	0.52
Mali	EDM	IBT	96	0	No	3	20	61+	0.2	1.09
Mozambique	AdeM Beira	IBT	99.9	10	Yes	3	9	30+	0	0.66
	Adem Maputo	IBT	98.2	10	Yes	3	9	30+	0	0.71
	Adem Nampula	IBT	100	10	Yes	3	9	30+	0	0.58
	AdeM Pemba	IBT	99.1	10	Yes	3	9	30+	0	0.57
	AdeM Quelimane	IBT	100	10	Yes	3	9	30+	0	0.57

Namibia	Oshakati	IBT	96.5	0	Yes	3	10	40+	0.26	0.92
	Walvis Bay	IBT	100	0	Yes	3	6	45+	0.8	2.46
	Windhoek	IBT	n.a.	0	Yes	4	6	40+	1.01	1.94
Niger	SEEN	IBT	96.8	0	No	1	0	0	0.39	0.39
Nigeria	FCT	Linear	23.6	0	No	2	30	30+	0.16	0.19
	Kaduna	IBT	16.1	0	No	3	30	1,000+	0.19	0.28
	Katsina	IBT	6.5	0	No	6	5	500+	0.44	1.09
Rwanda	ELECTROGAZ	IBT	98.7	0	No	4	20	60+	0.37	0.73
Senegal	SDE	IBT	117.3	0	No	2	15	15+	0.22	0.47
South Africa	Drakenstein	IBT	60.7	0	Yes	7	6	1,000+	0	1.86
	eThekwini	IBT	66.4	0	Yes	3	6	30+	0	1.77
	Tygerberg	IBT	60.3	0	Yes	6	6	50+	0	1.86
	Johannesburg	IBT	52.4	0	No	6	6	40+	0	1.4
Sudan	Khartoum Water Corporation	IBT	n.a.	0	No	1	0	0	0.64	0.64
	South Darfur Water Corporation	Linear	n.a.	0	No	1	0	0	0.59	0.59
	Upper Nile Water Corporation	Linear	0	0	No	3	20	40+	0.37	1.46
Tanzania	DAWASCO	IBT	70.5	0	No	2	5	5+	0.39	0.52
	DUWS	IBT	27.9	10	Yes	3	14	25+	0	0.51
	MWSA	IBT	100	0	Yes	3	24	75+	0.24	0.28
	NWSC	Linear	94.5	0	Yes	1	0	0	0.65	0.65
Zambia	LWSC	IBT	33.3	0	Yes	5	6	170+	0.25	0.55
	NWSC	IBT	n.a.	0	No	4	6	50+	0.25	0.37
	SWSC	IBT	n.a.	6	No	4	10	50+	0.3	0.47
Simple average									0.31	0.95
By utility size										
Small									0.29	0.92
Large									0.2	0.66

Source: Banerjee, Foster, and others 2008.
Note: IBT = increasing block tariff.

Table A4.2 Domestic Tariffs at Various Levels of Consumption

Country	*Utility*	*Connection fee*	*Minimum consumption (m^3)*	*Fixed charge*	*Price first block*	*Price last block*	*4 m^3*	*5 m^3*	*6 m^3*	*8 m^3*	*10 m^3*	*20 m^3*	*30 m^3*	*50 m^3*	*100 m^3*
Benin	SONEB	202.00	0		0.41	0.85	0.41	0.41	0.48	0.57	0.63	0.74	0.78	0.81	0.83
Burkina Faso	ONEA	204.90	0	2.05	0.39	2.13	0.90	0.80	0.73	0.75	0.76	0.78	0.79	1.33	1.73
Cape Verde	ELECTRA	24.24	0		2.67	4.67	2.67	2.67	2.67	2.93	3.09	3.88	4.14	4.35	4.51
Chad	STEE	0.00	0		0.22	0.47	0.22	0.22	0.22	0.22	0.22	0.28	0.34	0.39	0.43
Congo, Dem. Rep.	REGIDESO	0.00	0		0.05	0.12	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.08	0.04
Côte d'Ivoire	SODECI	256.35	9	0.16	0.00	1.20	0.04	0.03	0.03	0.02	0.06	0.30	0.45	0.57	0.71
Ethiopia	AWSA	14.44	0		0.19	0.42	0.19	0.19	0.19	0.21	0.24	0.30	0.34	0.37	0.40
	ADAMA	8.89	0		0.26	0.44	0.26	0.26	0.27	0.28	0.29	0.35	0.38	0.40	0.42
	Dire Dawa	43.33	0		0.14	0.34	0.14	0.14	0.15	0.17	0.17	0.19	0.22	0.24	0.29
Ghana	GWC	0.00	0		0.52	0.73	0.52	0.52	0.52	0.52	0.52	0.52	0.59	0.65	0.69
Kenya	NWASCO	34.41	0		0.18	0.52	0.18	0.18	0.18	0.18	0.18	0.23	0.24	0.31	0.40
	KIWASCO	104.72	0		0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.48	0.46	0.47	0.52
Lesotho	WASA	208.20	0		0.29	1.18	0.40	0.37	0.39	0.41	0.43	0.64	0.79	0.94	1.06
Madagascar	JIRAMA	0.00	0	0.30	0.03	0.08	0.11	0.09	0.08	0.07	0.06	0.07	0.07	0.08	0.08
Malawi	LWB	0.00	0	2.42	0.30	0.61	0.91	0.79	0.71	0.61	0.54	0.49	0.48	0.53	0.57
	BWB	0.00	5	0.48	0.00	0.52	0.12	0.10	0.16	0.24	0.29	0.40	0.43	0.47	0.49
	CRWB	76.04	0	2.33	0.00	0.00	0.58	0.47	0.39	0.29	0.23	0.12	0.08		
Mozambique	AdeM Beira	239.25	10	3.83	0.00	0.66	0.96	0.77	0.64	0.48	0.38	0.44	0.48	0.55	0.61
	Adem Maputo	239.25	10	3.83	0.00	0.71	0.96	0.77	0.64	0.48	0.38	0.53	0.58	0.64	0.67
	AdeM Nampula	239.25	10	3.83	0.00	0.58	0.96	0.77	0.64	0.48	0.38	0.42	0.45	0.50	0.54
	AdeM Pemba	239.25	10	3.83	0.00	0.57	0.96	0.77	0.64	0.48	0.38	0.40	0.43	0.49	0.53
	AdeM Quelimane	239.25	10	3.83	0.00	0.57	0.96	0.77	0.64	0.48	0.38	0.40	0.42	0.48	0.53

Namibia	Walvis Bay	0.00	0		0.71	3.48	0.71	0.71	0.71	0.71	0.71	0.83	1.06	1.38	1.87
	Windhoek	238.36	0		0.80	2.46	1.45	1.32	1.23	1.26	1.27	1.30	1.31	1.43	1.94
	Oshakati	23.66	0	3.85	1.01	1.94	1.97	1.78	1.65	1.53	1.46	1.41	1.46	1.57	1.76
Niger	SEEN	245.88	0	1.02	0.26	0.92	0.52	0.47	0.43	0.39	0.36	0.47	0.50	0.60	0.76
Nigeria	FCT WB	235.29	0		0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
	Kaduna	15.69	0		0.16	0.19	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.18
	Katsina WB	47.06	0		0.19	0.28	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.21	0.22
Rwanda	ELECTROGAZ	146.72	0		0.44	1.09	0.44	0.44	0.46	0.48	0.50	0.52	0.59	0.65	0.92
Senegal	SDE	153.68	0		0.37	1.46	0.37	0.37	0.37	0.37	0.37	0.37	0.65	0.92	1.19
South Africa	Drakenstein	325.01	0	1.52	0.00	1.86	0.00	0.00	0.00	0.25	0.25	0.38	0.42	0.57	0.85
	Tygerberg	203.60	0	2.02	0.00	1.86	0.00	0.00	0.00	0.34	0.35	0.52	0.72	0.94	1.40
	eThekwini	337.13	0	6.89	0.00	1.77	0.00	0.00	0.00	1.08	1.04	0.96	0.94	1.27	1.52
	Johannesburg	339.95	0		0.00	1.40	0.00	0.00	0.00	0.15	0.24	0.56	0.77	0.98	1.61
Sudan	NWC Khartoum	137.06	0		0.37	0.73	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.52
	NWC South Darfur	198.74	0		0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
	NWC Upper Nile	6.36	0		0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Tanzania	DAWASCO	20.55	0		0.39	0.52	0.39	0.39	0.41	0.43	0.45	0.48	0.50	0.50	0.51
	DUWS	16.60	0	3.95	0.00	0.51	0.99	0.79	0.66	0.49	0.40	0.40	0.42	0.45	0.48
	MWSA	15.81	0	1.11	0.24	0.28	0.51	0.46	0.42	0.38	0.35	0.29	0.28	0.27	0.26
Uganda	NWSC	30.58	0	0.92	0.65	0.65	0.88	0.83	0.80	0.77	0.74	0.70	0.68	0.67	0.66
Zambia	SWSC	33.49	0		0.30	0.47	0.30	0.30	0.30	0.30	0.30	0.31	0.33	0.35	0.41
	LWSC	50.00	0	1.24	0.25	0.55	0.56	0.50	0.45	0.42	0.39	0.34	0.33	0.35	0.36
	NWSC	0.00	0		0.25	0.37	0.25	0.25	0.25	0.25	0.26	0.27	0.28	0.30	0.34

Source: Banerjee, Foster, and others 2008.

Table A4.3 Cost Recovery at Various Levels of Consumption

		4 m³					*10 m³*					*40 m³*				
Country	*Utility*	*Price of 4 m³*	*O&M cost threshold*	*Capital cost threshold*	*Meets O&M cost threshold*	*Meets capital cost threshold*	*Price of 10 m³*	*O&M cost threshold*	*Capital cost threshold*	*Meets O&M cost threshold*	*Meets capital cost threshold*	*Price of 40 m³*	*O&M cost threshold*	*Capital cost threshold*	*Meets O&M cost threshold*	*Meets capital cost threshold*
Benin	SONEB	0.41	0.70	0.80	No	No	0.63	0.70	0.80	No	No	0.79	0.70	0.80	Yes	No
Burkina Faso	ONEA	0.90	0.75	0.80	Yes	Yes	0.76	0.75	0.80	Yes	No	1.12	0.75	0.80	Yes	Yes
Cape Verde	ELECTRA	2.67		0.80		Yes	3.09		0.80		Yes	4.27		0.80		Yes
Chad	STEE	0.22		0.80		No	0.22		0.80		No	0.38		0.80		No
Congo, Dem. Rep.	REGIDESO	0.05	0.70	0.80	No	No	0.05	0.70	0.80	No	No	0.07	0.70	0.80	No	No
Côte d'Ivoire	SODECI	0.04	0.63	0.80	No	No	0.06	0.63	0.80	No	No	0.53	0.63	0.80	No	No
Ethiopia	AWSA	0.19	0.32	0.80	No	No	0.24	0.32	0.80	No	No	0.36	0.32	0.80	Yes	No
	ADAMA	0.26	0.32	0.80	No	No	0.29	0.32	0.80	No	No	0.39	0.32	0.80	Yes	No
	Dire Dawa	0.14	0.18	0.80	No	No	0.17	0.18	0.80	No	No	0.24	0.18	0.80	Yes	No
Ghana	GWC	0.52		0.80		No	0.52		0.80		No	0.63		0.80		No
Kenya	NWASCO	0.18	1.13	0.80	No	No	0.18	1.13	0.80	No	No	0.29	1.13	0.80	No	No
	KIWASCO	0.60	0.49	0.80	Yes	No	0.60	0.49	0.80	Yes	No	0.45	0.49	0.80	No	No
Lesotho	WASA	0.40	0.16	0.80	Yes	No	0.43	0.16	0.80	Yes	No	0.88	0.16	0.80	Yes	Yes
Madagascar	JIRAMA	0.11	0.70	0.80	No	No	0.06	0.70	0.80	No	No	0.08	0.70	0.80	No	No
Malawi	LWB	0.91	0.57	0.80	Yes	Yes	0.54	0.57	0.80	No	No	0.51	0.57	0.80	No	No
	BWB	0.12	0.41	0.80	No	No	0.29	0.41	0.80	No	No	0.45	0.41	0.80	Yes	No
	CRWB	0.58	0.23	0.80	Yes	No	0.23	0.23	0.80	Yes	No	0.23	0.80		No	No
Mozambique	AdeM Beira	0.96	0.51	0.80	Yes	No	0.38	0.51	0.80	No	No	0.53	0.51	0.80	Yes	No
	Adem Maputo	0.96	0.73	0.80	Yes	No	0.38	0.73	0.80	No	No	0.62	0.73	0.80	No	No
	AdeM Nampula	0.96	0.35	0.80	Yes	No	0.38	0.35	0.80	Yes	No	0.48	0.35	0.80	Yes	No
	AdeM Pemba	0.96	0.53	0.80	Yes	No	0.38	0.53	0.80	No	No	0.46	0.53	0.80	No	No
	AdeM Quelimane	0.96	0.42	0.80	Yes	No	0.38	0.42	0.80	No	No	0.46	0.42	0.80	Yes	No
Namibia	Walvis Bay	0.71		0.80		No	0.71		0.80		No	1.26		0.80		Yes
	Windhoek	1.45	2.08	0.80	No	No	1.27	2.08	0.80	No	Yes	1.32	2.08	0.80	No	Yes

	Oshakati	1.97	1.44	0.80	Yes	No	1.46	1.44	0.80	Yes	Yes	1.48	1.44	0.80	Yes	Yes
Niger	SEEN	0.52	0.46	0.80	Yes	No	0.36	0.46	0.80	No	No	0.52	0.46	0.80	Yes	No
Nigeria	FCT WB	0.39		0.80		No	0.39		0.80		No	0.39		0.80		No
	Kaduna	0.16		0.80		No	0.16		0.80		No	0.17		0.80		No
	Katsina WB	0.19	0.06	0.80	Yes	No	0.19	0.06	0.80	Yes	No	0.20	0.06	0.80	Yes	No
Rwanda	ELECTROGAZ	0.44	0.51	0.80	No	No	0.50	0.51	0.80	No	No	0.63	0.51	0.80	Yes	No
Senegal	SDE	0.37	0.85	0.80	No	No	0.37	0.85	0.80	No	No	0.78	0.85	0.80	No	No
South Africa	Drakenstein	—	0.70	0.80	Yes	Yes	0.25	0.70	0.80	No	No	0.51	0.70	0.80	No	No
	Tygerberg	—	1.21	0.80	Yes	Yes	0.35	1.21	0.80	No	No	0.83	1.21	0.80	No	Yes
	eThekwini	—	1.56	0.80	Yes	Yes	1.04	1.56	0.80	No	Yes	1.14	1.56	0.80	No	Yes
	Johannesburg	—	1.50	0.80	Yes	Yes	0.24	1.50	0.80	No	No	0.87	1.50	0.80	No	Yes
Sudan	NWC Khartoum	0.37	0.28	0.80	Yes	No	0.37	0.28	0.80	Yes	No	0.37	0.28	0.80	Yes	No
	NWC South Darfur	0.64	0.49	0.80	Yes	No	0.64	0.49	0.80	Yes	No	0.64	0.49	0.80	Yes	No
	NWC Upper Nile	0.59	0.73	0.80	No	No	0.59	0.73	0.80	No	No	0.59	0.73	0.80	No	No
Tanzania	DAWASCO	0.39		0.80		No	0.45		0.80		No	0.50		0.80		No
	DUWS	0.99	0.42	0.80	Yes	Yes	0.40	0.42	0.80	No	No	0.44	0.42	0.80	Yes	No
	MWSA	0.51	0.19	0.80	Yes	No	0.35	0.19	0.80	Yes	No	0.27	0.19	0.80	Yes	No
Uganda	NWSC	0.88	0.60	0.80	Yes	Yes	0.74	0.60	0.80	Yes	No	0.67	0.60	0.80	Yes	No
Zambia	SWSC	0.30	0.30	0.80	No	No	0.30	0.30	0.80	No	No	0.34	0.30	0.80	Yes	No
	LWSC	0.56	0.27	0.80	Yes	No	0.39	0.27	0.80	Yes	No	0.34	0.27	0.80	Yes	No
	NWSC	0.25	0.20	0.80	Yes	No	0.26	0.20	0.80	Yes	No	0.29	0.20	0.80	Yes	No

Source: Banerjee, Foster, and others 2008.

Table A4.4 Structure of Nondomestic Tariffs

			Industrial			Government/ public institutions			Commercial			Comparison of commercial to residential price		
Country	*Utility*	*Connection charge*	*Fixed charge*	*Number of blocks*	*Price first block*	*Fixed charge*	*Number of blocks*	*Price first block*	*Fixed charge*	*Number of blocks*	*Price first block*	*Residential price at 100 m^3*	*Commercial price at 100 m^3*	*Ratio of commercial to residential price at 100 m^3*
Benin	SONEB		No	1.00	0.85	No	1.00	0.85	No	1.00	0.85	0.828	0.850	1.027
Burkina Faso	ONEA		Yes	1.00	2.13	Yes	1.00	2.13	Yes	1.00	2.13	1.729	2.151	1.245
Cape Verde	ELECTRA		No	1.00	0.78	No	1.00		No	1.00	0.78	4.509	4.533	1.005
Chad	STEE		No	2.00	0.22	No	2.00	0.22	No	2.00	0.22	0.433	0.433	1.000
Congo, Dem. Rep.	REGIDESO		No	1.00		No	1.00	0.00	No	3.00	0.01	0.040	0.006	0.144
Côte d'Ivoire	SODECI		Yes	4.00	0.48	No	1.00	1.07		4.00	0.48	0.707		
Ethiopia	AWSA		No	1.00	0.42	No	1.00	0.42	No	1.00	0.42	0.397	0.422	1.064
	ADAMA											0.424		
	Dire Dawa											0.294		
Ghana	GWC		No			Yes					2.20	0.687	2.198	3.199
Kenya	NWASCO									4.00	0.18	0.403	0.435	1.078
	KIWASCO	Yes								5.00	0.60	0.521	0.479	0.920
Lesotho	WASA	Yes	Yes	1.00	0.69	Yes	1.00	0.69	Yes	1.00	0.69	1.060	0.690	0.651
Madagascar	JIRAMA					No	2.00	0.23				0.078		
Malawi	LWB		Yes	2.00	0.49	Yes	2.00	0.45	Yes	2.00	0.49	0.572	0.540	0.944
	BWB											0.494		
	CRWB													
Mozambique	AdeM Beira		No	2.00	15.69	No	2.00	15.69	No	2.00	15.69	0.606	4.395	7.247
	Adem Maputo		No	2.00	16.75	No	2.00	16.75	No	2.00	16.75	0.674	4.689	6.960
	AdeM Nampula		No	2.00	13.88	No	2.00	13.88	No	2.00	13.88	0.542	3.885	7.173
	AdeM Pemba		No	2.00	15.02	No	2.00	15.02	No	2.00	15.02	0.530	4.207	7.935
	AdeM Quelimane		No	2.00	15.22	No	2.00	15.22	No	2.00	15.22	0.528	4.261	8.065
Namibia	Walvis Bay		No	4.00	1.99	No	4.00	1.99	No	4.00	1.99	1.869	1.993	
	Windhoek	Yes	No	1.00	1.63	No	1.00	1.63	No	1.00	1.63	1.945	1.628	0.837
	Oshakati	Yes	Yes	3.00	17.70	Yes	3.00	17.70	Yes	3.00	17.70	1.758	36.810	20.934
Niger	SEEN		No	3.00	0.85	No	1.00	0.87	No	1.00	0.87	0.759	0.871	1.148

Nigeria	FCT WB	No	1.00	7.84	No	2.00	0.47	No	1.00	0.78	0.392	0.784	2.000
	Kaduna	No	3.00	0.55	No	2.00	0.19	No	2.00	0.55	0.181	0.549	3.030
	Katsina	No	1.00	1.57	No	2.00	0.20	No	1.00	1.57	0.221	1.569	7.092
Rwanda	ELECTROGAZ	No	3.00	0.44	No	3.00	0.44	No	3.00	0.44	0.921	0.691	0.751
Senegal	SDE				No		1.62			1.62	1.193	1.616	1.355
South Africa	Drakenstein										0.848		
	Tygerberg	Yes	1.00	0.82	Yes	1.00	0.82	Yes	1.00	0.82	1.401	0.841	0.600
	eThekwini	Yes	1.00	0.88	Yes	1.00	0.88	Yes	1.00	0.88	1.518	0.953	0.628
	Johannesburg										1.606	0.375	0.233
Sudan	NWC Khartoum	No	1.00	0.73	No	1.00	0.73	No	1.00	0.73	0.519	0.734	1.415
	NWC South Darfur	No	1.00	1.41	No	1.00	1.41	No	1.00	1.41	0.636	1.407	2.212
	NWC Upper Nile	No	1.00	1.35	No	1.00	1.35	No	1.00	1.35	0.587	1.346	2.292
Tanzania	DAWASCO	No	3.00	0.57	No	3.00	0.57	No	3.00	0.57	0.510	0.573	1.123
	DUWS	No	1.00	13.04	No	1.00	13.04	No	1.00	13.04	0.484	1.767	3.649
	MWSA	No	1.00	0.47	No	1.00	0.28	No	1.00	0.40	0.264		
Uganda	NWSC	No	1.00	1.05	No	3.00	0.80	No	1.00	1.05	0.660	1.050	1.590
Zambia	SWSC												
	LWSC	Yes							3.00	0.37	0.359	0.587	1.633

Source: Banerjee, Foster, and others 2008.

Table A4.5 Structure of Sanitation Tariffs (Only Utilities with Wastewater Responsibility)

Country	*Utility*	*Connection cost*	*Tariff part of water bill*	*% of water bill*	*Fixed fee*	*Block tariff*
Burkina Faso	ONEA					Yes
Cape Verde	ELECTRA					
Côte d'Ivoire	SODECI	Yes				
Ethiopia	AWSA					Yes
Kenya	NWASCO					Yes
	KIWASCO	Yes				Yes
Lesotho	WASA	Yes	Yes	0.85		
Madagascar	JIRAMA					
Namibia	Walvis Bay				Yes	Yes
	Windhoek					
	Oshakati	Yes			Yes	
Nigeria	FCT WB meter					
Senegal	SDE with sanitation					Yes
South Africa	Drakenstein					
	Tygerberg					
	eThekwini					
	Johannesburg					
Sudan	NWC Khartoum					
	NWC South Darfur					
	NWC Upper Nile					
Tanzania	DAWASCO		Yes	0.80		
	DUWS	Yes	Yes	0.40		
	MWSA	Yes	Yes	0.50		
Uganda	NWSC	Yes	Yes	0.75		
Zambia	KWSC		Yes	0.30		
	LWSC	Yes	Yes	0.30		
	NWSC		Yes	0.30		

Source: Banerjee, Foster, and others 2008.

Table A4.6 Structure of Standpost Tariffs

Country	*Utility*	*Official standpost price (US$/m³) (1)*	*Unofficial standpost price (US$/m³) (2)*	*Official piped water price at 4 m³ (US$/m³) (3)*	*Ratio of unofficial to official standpost price (2)/(1)*	*Ratio of official piped water price at 4 m³ to official standpost price (3)/(1)*
Benin	SONEB	0.41	1.91	0.41	4.66	0.99
Burkina Faso	ONEA	0.51	0.48	0.90	0.94	1.76
Cape Verde	ELECTRA	—	9.44	2.67	—	—
Chad	STEE	—	—	0.22	—	—
Congo, Dem. Rep.	REGIDESO	0.05	1.02	0.05	20.40	0.93
Côte d'Ivoire	SODECI	0.45	0.93	0.04	2.06	0.09
Ethiopia	AWSA	0.19	0.87	0.19	4.55	1.02
	ADAMA			0.26		
	Dire Dawa			0.14		
Ghana	GWC	3.64	5.51	0.52	1.52	0.14
Kenya	NWASCO	—	1.73	0.18	—	—
	KIWASCO			0.60		
Lesotho	WASA	n.a.	2.58	0.40	n.a.	n.a.
Madagascar	JIRAMA	0.14	1.24	0.11	8.60	0.75
Malawi	LWB			0.91		
	BWB	0.29	1.16	0.12	4.00	0.41
	CRWB			0.58		
Mozambique	AdeM Beira			0.96		
	Adem Maputo	0.31	0.98	0.96	3.17	3.09
	AdeM Nampula			0.96		
	AdeM Pemba			0.96		
	AdeM Quelimane			0.96		
Namibia	Walvis Bay			0.71		
	Windhoek	1.41	n.a.	1.45	n.a.	1.02
	Oshakati			1.97		
Niger	SEEN	0.24	0.48	0.52	1.97	2.13
Nigeria	FCT WB			0.39		
	Kaduna	—	—	0.16	—	—
	Katsina WB			0.19		
Rwanda	ELECTROGAZ	0.44	1.79	0.44	4.07	1.00
Senegal	SDE	0.54	1.53	0.37	2.83	0.69
South Africa	Drakenstein			0.00		
	Tygerberg			0.00		
	eThekwini			0.00		
	Johannesburg	n.a.	n.a.	0.00	n.a.	n.a.
Sudan	NWC Khartoum	0.92	1.15	0.37	1.25	0.40

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Table A4.6 *(continued)*

Country	*Utility*	*Official standpost price (US\$/m³) (1)*	*Unofficial standpost price (US\$/m³) (2)*	*Official piped water price at 4 m³ (US\$/m³) (3)*	*Ratio of unofficial to official standpost price (2)/(1)*	*Ratio of official piped water price at 4 m³ to official standpost price (3)/(1)*
	NWC South Darfur			0.64		
	NWC Upper Nile			0.59		
Tanzania	DAWASCO	0.58	0.87	0.39	1.51	0.67
	DUWS			0.99		
	MWSA			0.51		
Uganda	NWSC	0.39	1.40	0.88	3.63	2.28
Zambia	SWSC			0.30		
	LWSC	0.19	1.67	0.56	9.03	3.02
	NWSC			0.25		

Source: Banerjee, Foster, and others 2008.
Note: n.a. = not applicable.

Table A4.7 Scorecard on Efficiency, Equity, and Cost Recovery

		Cost recovery			*Efficiency*			*Equity*						
Country	*Utility*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*Equity score*	*Efficiency score*	*Cost-recovery score*	*Total score*
Cape Verde	ELECTRA	1	1	1	1	1	1	1		1	3	3	2	8
Chad	STEE	0	0	1	1	1	1	1	1	1	4	3	0	7
Benin	SONEB	1	0	1	1	1	1	0	0	1	2	3	1	6
Namibia	Oshakati	1	1	1	1	1	0			1	1	3	2	6
Namibia	Windhoek	1	1	1	1	1	0	1		0	1	3	2	6
Nigeria	Katsina WB	0	0	1	1	1	1		1	1	3	3	0	6
Rwanda	ELECTROGAZ	1	0	1	1	0	1	1	1	0	3	2	1	6
Burkina Faso	ONEA	1	0	0	1	1	0	1	0	1	2	2	1	5
Ethiopia	AWSA	0	0	1	0	0	1	1	1	1	4	1	0	5
Ghana	GWC	1	0	1	1	0	1	0		1	2	2	1	5
Kenya	KIWASCO	1	0	1	0	1	1		1	0	2	2	1	5
Lethoso	WASA	1	0	1	1	0	1	1	0	0	2	2	1	5
Namibia	Walvis Bay	1	0	0	1	1	1		1		2	2	1	5
Nigeria	FCT WB	0	0	1	1	0	1	1	0	1	3	2	0	5
Sudan	NWC Upper Nile	1	0	1	0	1	1	0	0	1	2	2	1	5
Sudan	NWC South Darfur	1	0	1	0	0	1		1	1	3	1	1	5
Tanzania	DAWASCO	1	0	1	0	0	1	0	1	1	3	1	1	5
Uganda	NWSC	1	0	0	1	0	0	1	1	1	3	1	1	5
South Africa	eThekwini	1	1	0	0	1	1		1	0	2	1	2	5
South Africa	Johannesburg	0	0	1	1	1	1		1	0	2	3	0	5
Kenya	NWASCO	0	0	1	0	0	1	1		1	3	1	0	4
Nigeria	Kaduna	0	0	1	0	0	1		1	1	3	1	0	4
Senegal	SDE	0	0	1	0	0	1	0	1	1	3	1	0	4
South Africa	Tygerberg	0	0	0	1	1	1		1	0	2	2	0	4
South Africa	Drakenstein	0	0	0	0	1	1	1	1		3	1	0	4
Zambia	NWSC	0	0	1	0	0	1	1		1	3	1	0	4

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Table A4.7 *(continued)*

		Cost recovery			*Efficiency*			*Equity*						
Country	*Utility*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*Equity score*	*Efficiency score*	*Cost-recovery score*	*Total score*
Ethiopia	Dire Dawa	0	0	1	1	0	1		0		1	2	0	3
Ethiopia	ADAMA	0	0	1	0	0	1		1	2		1	0	3
Mozambique	AdeM Quelimane	0	0	0	1	0	0	1	0	1	2	1	0	3
Niger	SEEN	0	0	0	0	0	0	1	1	1	3	0	0	3
Sudan	NWC Khartoum	0	0	1	0	0	1		0	1	2	1	0	3
Zambia	SWSC	0	0	1	0	0	1		1	2		1	0	3
Côte d'Ivoire	SODECI	0	0	0	0	0	1	0	1		2	0	0	2
Congo, Dem. Rep.	REGIDESO	0	0	1	0	0	1	0		0	1	1	0	2
Mozambique	AdeM Pemba	0	0	0	1	0	0		0	1	1	1	0	2
Malawi	BWB	0	0	0	1	0	1			1	1	0	2	
Malawi	CRWB	0	0	0	1	1	0	0			0	2	0	2
Malawi	LWB	1	0	0	1	0	0			0	0	1	1	2
Tanzania	DUWS	0	0	0	0	0	0		1	1	2	0	0	2
Zambia	LWSC	0	0	0	0	0	0		1	1	2	0	0	2
Mozambique	AdeM Beira	0	0	0	0	0	0		0	1	1	0	0	1
Mozambique	Adem Maputo	0	0	0	0	0	0		0	1	1	0	0	1
Mozambique	AdeM Nampula	0	0	0	0	0	0		0	1	1	0	0	1
Tanzania	MWSA	0	0	0	0	0	0		1	1		0	0	1
Madagascar	JIRAMA	0	0	0	0	0	0	0			0	0	0	0

Source: Banerjee, Foster, and others 2008.

Note: IBT = increasing block tariff, LRMC = long-run marginal cost, O&M = operations and maintenance.

The scorecard is compiled on the basis of cost recovery, efficiency, and equity criteria. The scorecard adds the score against each criterion. The utility scores 1 against a specific criterion according to (1) Cost recovery: O & M cost recovery; (2) Cost recovery: Capital cost recovery; (3) Efficiency: No fixed charge or minimum consumption charge; (4) Efficiency: Metering ratio is higher than sample average (77%); (5) Efficiency: The price of the last block meets the capital cost; (6) Equity: Small piped consumers (at 4 m^3) pay less than average piped consumers (at 10 m^3); (7) Equity: Stand-post consumers pay less than small piped consumers (at 4 m^3); (8) Equity: Connection cost as a share of GNI per capita is lower than sample average (27%); (9) Equity: Residential consumers pay less than nonresidential consumers at 100 m^3 of consumption.

Reference

Banerjee, S., V. Foster, Y. Ying, H. Skilling, and Q. Wodon. 2008. "Achieving Cost Recovery, Equity and Efficiency in Water Tariffs: Evidence From African Utilities." AICD Working Paper 7, World Bank, Washington, DC.

APPENDIX 5

Affordability of Water and Sanitation

Table A5.1 Contribution of Food to Total Spending

Country	Year	*Expenditure budget (2002 US$)*								*Share of household budget*							
		National	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*	*National*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Angola	2000	102	112	37	22	56	85	121	194	46.32	45.80	58.92	58.22	59.48	56.66	53.80	38.78
Benin	2002	48	45	54	26	38	44	51	66	55.22	60.70	49.59	62.07	64.20	62.23	60.15	47.84
Burkina Faso	2003	58	55	70	33	44	53	62	80	47.92	54.20	35.57	67.88	66.00	61.90	55.60	36.30
Burundi	1998	47	45	91	13	29	39	54	81	71.83	76.80	43.47	71.84	77.13	77.67	78.33	66.29
Cameroon	2004	69	65	85	31	46	58	76	106	61.71	65.80	52.06	63.98	66.12	66.30	66.12	56.86
Cape Verde	2001	62	59	68	43	52	61	61	75	50.68	69.49	38.23	68.23	64.55	61.56	56.92	40.51
Congo, Dem. Rep.	2005	79	64	117	33	50	65	83	126	71.43	66.50	79.85	72.90	74.30	73.92	74.57	68.45
Congo, Rep.	2002	60	40	85	20	39	49	63	96	27.73	29.06	27.18	28.99	33.79	33.11	33.26	23.99
Gabon	2005	175	150	181	34	164	202	215	205	39.19	57.69	36.77	35.99	51.43	47.28	43.06	32.51
Ghana	1999	94	83	113	41	67	85	105	131	55.71	60.29	50.82	63.56	61.95	59.98	56.88	51.47
Guinea-Bissau	2005	81	72	103	35	55	65	81	138	54.41	52.25	58.59	49.44	53.71	54.55	55.50	54.84
Kenya	1997	87	81	109	42	62	77	97	119	62.35	70.03	47.30	76.96	76.42	74.72	70.91	51.77
Madagascar	2001	173	157	220	69	106	135	184	294	61.15	66.64	51.65	74.13	76.02	73.60	70.28	51.13
Malawi	2003	39	37	59	20	27	33	40	61	56.53	59.76	45.31	61.82	62.26	61.80	60.53	50.94
Mauritania	2000	114	88	150	55	79	102	125	169	50.76	50.16	51.26	59.95	58.19	55.45	53.97	44.66
Morocco	2003	191	168	209	84	138	183	237	375	43.09	54.16	38.37	52.60	51.81	48.50	44.19	35.65
Niger	2005	84	78	112	31	47	61	79	155	67.83	73.39	53.93	62.56	67.46	69.38	68.76	67.72
Nigeria	2003	43	42	45	17	32	42	50	59	50.08	57.32	43.88	55.82	61.25	60.54	56.73	40.95
Rwanda	1998	57	51	116	22	37	47	61	108	56.70	67.05	35.08	71.73	73.47	71.97	67.04	44.72
São Tomé and Príncipe	2000	127	110	141	58	81	95	120	217	60.57	70.66	55.48	77.64	75.57	71.99	68.68	51.73
Sierra Leone	2003	55	52	61	27	42	52	61	97	50.73	62.61	38.18	61.62	63.73	61.49	55.40	38.62
Tanzania	2000	39	36	51	20	29	36	42	56	65.92	68.83	59.38	71.78	70.58	71.33	68.60	60.60
Zambia	2002	62	60	67	26	42	54	67	99	63.00	74.57	49.58	70.99	72.50	0.00	70.20	54.38

Source: Banerjee, Wodon, and others 2008.
Note: Q = quintile. Year refers to year of the survey.

Table A5.2 Spending on Water Services

Country	Year	*Expenditure budget (2002 US$)*								*Share in household budget*							
		National	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*	*National*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Angola	2000	1	1	0	0	0	0	1	2	0.3	0.3	0.0	0.2	0.3	0.3	0.2	0.3
Burkina Faso	2003	0	2	0	2	2	2	0	0	0.2	2.2	0.0	5.0	3.0	2.8	0.2	0.0
Cameroon	2004	7	10	5	1	2	2	3	10	5.9	10.3	3.1	1.6	2.2	1.8	2.2	5.3
Cape Verde	2001	2	1	2	2	2	2	2	2	1.6	1.2	1.1	2.5	2.2	1.8	1.7	1.1
Chad	2001	9	4	11	3	4	6	8	14	2.5	1.7	2.6	3.4	2.7	2.6	2.8	2.1
Congo, Dem. Rep.	2005	2	1	3	1	1	1	2	3	1.9	0.9	1.7	1.8	1.7	1.4	1.7	1.6
Congo, Rep.	2002	2	1	4	1	1	2	2	4	1.1	0.6	1.3	0.9	1.2	1.3	1.3	0.9
Côte d'Ivoire	2005	4	2	4	3	4	4	4	5	1.9	1.3	1.6	3.2	2.7	2.3	1.7	1.2
Ethiopia	2000	1	1	1	1	1	1	1	1	1.5	1.5	1.3	2.0	1.6	1.6	1.5	1.2
Gabon	2005	11	6	11	1	8	9	13	12	2.4	2.4	2.2	1.4	2.4	2.1	2.7	1.9
Ghana	1999	1	0	2	0	1	1	1	2	0.7	0.2	0.7	0.1	0.5	0.4	0.5	0.7
Kenya	1997	2	1	3	1	1	1	2	3	1.7	0.8	1.5	1.6	1.7	1.2	1.3	1.3
Madagascar	2001	1	1	1	3	0	1	1	1	0.4	0.4	0.3	3.7	0.4	0.4	0.2	0.2
Malawi	2003	0	0	3	0	0	0	0	1	0.7	0.2	2.5	0.2	0.2	0.3	0.3	1.2
Mauritania	2000	11	5	14	1	5	11	10	14	4.9	2.9	4.8	1.6	3.7	5.8	4.2	3.6
Morocco	2003	9	4	10	5	6	8	9	14	2.1	1.3	1.8	2.9	2.2	2.0	1.8	1.3
Mozambique	2003	3	2	3	1	1	1	2	5	4.5	3.8	2.7	4.0	3.0	2.6	3.2	3.2
Niger	2005	5	4	7	2	3	4	5	7	4.1	3.7	3.2	4.7	4.5	4.3	4.6	2.9
Nigeria	2003	1	1	1	1	1	1	1	2	1.5	2.0	1.3	3.6	2.4	1.7	1.3	1.1

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Table A5.2 *(continued)*

		Expenditure budget (2002 US$)								*Share in household budget*							
Country	*Year*	*National*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*	*National*	*Rural*	*Urban*	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*
Rwanda	1998	8	4	8		1	1	1	9	8.1	5.6	2.6		2.9	1.6	1.5	3.5
São Tomé and Príncipe	2000	5	0	10	0	0	1	1	18	2.6	0.2	3.8	0.1	0.2	0.9	0.5	4.2
Senegal	2001	4	2	5	2	2	3	4	6	1.9	1.4	1.7	2.0	1.7	1.8	1.8	1.5
Sierra Leone	2003	2	1	2	0	0	2	2	2	1.5	0.7	1.1	0.3	0.3	2.9	1.8	0.6
South Africa	2000	6	1	8	1	1	2	4	13	1.0	0.4	1.2	0.8	1.0	1.2	1.2	1.0
Tanzania	2000	2	2	1	1	2	2	2	2	2.9	4.6	1.3	3.0	4.9	3.7	2.9	1.9
Uganda	2002	3	2	3	1	1	2	2	5	3.1	3.1	2.1	4.3	3.0	2.7	2.4	2.1
Zambia	2002	2	0	3	1	1	1	1	4	2.5	0.5	2.0	1.6	1.3	1.3	1.5	2.4

Source: Banerjee, Wodon, and others 2008.
Note: Q = quintile. Year refers to year of the survey.

Table A5.3 Affordability of Piped Water at 5 Percent Budget Threshold for Urban Households

(% of households for which 5% of household budget is less than the cost of minimum consumption)

	Cost of minimum consumption (US$)																		
Country	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
Benin	0.0	0.0	0.0	2.0	3.0	4.0	7.0	12.0	21.0	33.0	41.0	45.0	53.0	60.0	65.0	71.0	75.0	82.0	85.0
Burkina Faso	0.0	0.0	1.0	4.0	8.0	20.0	24.0	34.0	42.0	47.0	56.0	62.0	69.0	72.0	75.0	78.0	82.0	85.0	88.0
Burundi	1.0	7.0	17.0	29.0	45.0	53.0	67.0	72.0	76.0	82.0	86.0	90.0	94.0	97.0	99.0	100.0	100.0	100.0	100.0
Cameroon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	4.0	7.0	11.0	17.0	21.0	27.0	34.0
Congo, Dem. Rep.	0.0	9.0	31.0	49.0	67.0	79.0	87.0	91.0	98.0	98.0	99.0	99.0	99.0	100.0	100.0	100.0	100.0	100.0	100.0
Congo, Rep.	0.0	0.0	0.0	0.0	1.0	3.0	3.0	5.0	9.0	12.0	17.0	21.0	23.0	28.0	33.0	35.0	36.0	43.0	49.0
Côte d'Ivoire	0.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	3.0	3.0	5.0	5.0	7.0	7.0	8.0	10.0	15.0	19.0	23.0
Ethiopia	1.0	40.0	73.0	87.0	93.0	95.0	98.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	100.0	100.0	100.0	100.0	100.0
Ghana	0.0	0.0	1.0	2.0	3.0	7.0	10.0	11.0	23.0	30.0	36.0	46.0	50.0	55.0	61.0	67.0	76.0	80.0	85.0
Guinea-Bissau	0.0	0.0	1.0	6.0	22.0	38.0	56.0	65.0	73.0	81.0	85.0	89.0	89.0	91.0	92.0	93.0	96.0	96.0	98.0
Kenya	0.0	0.0	0.0	0.0	4.0	5.0	13.0	20.0	28.0	36.0	49.0	62.0	67.0	72.0	77.0	78.0	80.0	83.0	86.0
Madagascar	0.0	0.0	5.0	16.0	23.0	28.0	38.0	47.0	53.0	61.0	64.0	68.0	74.0	78.0	82.0	85.0	86.0	89.0	90.0
Malawi	0.0	2.0	13.0	32.0	49.0	66.0	71.0	78.0	81.0	87.0	90.0	92.0	93.0	93.0	94.0	94.0	95.0	95.0	95.0
Mozambique	0.0	0.0	5.0	16.0	20.0	32.0	41.0	47.0	52.0	59.0	64.0	68.0	72.0	75.0	76.0	78.0	82.0	84.0	85.0
Niger	0.0	1.0	4.0	11.0	20.0	28.0	41.0	55.0	61.0	70.0	74.0	79.0	86.0	89.0	92.0	93.0	93.0	95.0	96.0
Nigeria	0.0	3.0	7.0	10.0	18.0	23.0	27.0	35.0	46.0	57.0	69.0	78.0	85.0	89.0	93.0	95.0	96.0	97.0	97.0
São Tomé and Príncipe	0.0	0.0	0.0	2.0	5.0	13.0	20.0	29.0	36.0	46.0	57.0	64.0	72.0	77.0	78.0	81.0	84.0	87.0	87.0
Senegal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	2.0	2.0
Sierra Leone	0.0	0.0	2.0	4.0	7.0	16.0	23.0	30.0	40.0	44.0	49.0	54.0	57.0	62.0	65.0	67.0	69.0	71.0	73.0
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Tanzania	0.0	1.0	1.0	8.0	15.0	25.0	38.0	55.0	69.0	75.0	84.0	89.0	94.0	96.0	97.0	98.0	98.0	99.0	99.0
Uganda	0.0	2.0	5.0	17.0	32.0	45.0	55.0	65.0	77.0	82.0	88.0	90.0	94.0	96.0	96.0	97.0	98.0	98.0	98.0
Zambia	0.0	0.0	1.0	4.0	11.0	18.0	28.0	35.0	41.0	50.0	55.0	58.0	61.0	67.0	72.0	76.0	78.0	82.0	84.0

Source: Banerjee, Wodon, and others 2008.

Note: Year refers to year of the survey.

Reference

Banerjee, S., Q. Wodon, A. Diallo, T. Pushak, H. Uddin, C. Tsimpo, and V. Foster. 2008. "Access, Affordability and Alternatives: Modern Infrastructure Services in Sub-Saharan Africa." AICD Background Paper 2, Africa Infrastructure Country Diagnostic, World Bank, Washington, D.C.

APPENDIX 6

Funding Gap for Water Supply and Sanitation

Table A6.1 Water and Sanitation Expansion and Rehabilitation

	Water					Sanitation					Total		
US $ million (Annual)	*Expansion*	*Rehabilitation*	*CAPEX (Expansion + Rehabilitation)*	*OPEX*	*Total*	*Expansion*	*Rehabilitation*	*CAPEX (Expansion + Rehabilitation)*	*OPEX*	*Total*	*CAPEX*	*OPEX*	*Total*
Angola	158	70	228	88	316	75	58	133	125	258	361	213	574
Benin	131	40	171	86	257	16	5	22	3	25	193	90	283
Botswana	22	42	64	70	134	3	3	6	1	7	70	71	141
Burkina Faso	65	45	110	44	154	44	3	47	7	54	157	50	208
Burundi	30	30	60	15	75	28	1	29	1	30	89	16	105
Cameroon	101	126	227	110	337	44	40	84	13	97	311	123	434
Cape Verde	4	2	5	3	9	5	1	6	9	15	12	12	24
CAR	54	40	94	43	137	10	7	17	2	19	111	45	156
Chad	36	31	67	21	88	44	7	51	6	57	118	27	145
Congo, Dem. Rep.	785	259	1,044	395	1,440	97	82	179	20	199	1,223	416	1,639
Congo, Rep.	90	38	129	54	182	22	8	30	4	34	159	57	216
Côte d'Ivoire	119	80	199	134	332	250	62	312	130	442	511	264	774
Equatorial Guinea	7	1	8	4	12	2	4	6	1	7	14	4	19
Eritrea	56	32	88	37	125	18	2	20	2	22	108	39	147
Ethiopia	542	153	694	337	1,031	123	33	156	19	175	850	356	1,206
Gabon	20	16	36	31	68	4	1	5	1	6	42	32	74
Gambia	17	13	30	14	44	10	5	15	17	31	45	31	76
Ghana	135	131	266	127	393	64	6	70	9	80	337	136	473
Guinea	20	42	62	25	88	18	9	27	8	35	89	33	123
Kenya	767	437	1,204	534	1,738	89	87	176	22	198	1,380	556	1,936
Lesotho	11	15	26	14	40	8	4	12	3	15	38	16	54

Liberia	34	18	52	23	74	24	7	30	17	47	82	40	122
Madagascar	290	97	387	151	538	55	2	57	17	75	444	168	612
Malawi	63	70	133	45	178	8	20	28	3	31	162	47	209
Mali	89	77	166	74	240	31	31	63	8	71	229	82	311
Mauritania	27	22	49	22	72	6	4	10	1	11	60	24	83
Mauritius	14	27	41	47	88	3	3	6	19	25	47	66	113
Mozambique	107	53	160	55	215	73	66	140	15	155	300	70	370
Namibia	58	71	129	126	255	12	4	16	19	36	145	145	290
Niger	112	54	166	46	212	45	2	47	6	53	213	52	266
Nigeria	875	259	1,134	426	1,560	448	244	692	88	780	1,827	514	2,340
Rwanda	35	16	51	21	71	27	7	34	4	38	85	25	110
Senegal	101	53	154	95	249	40	9	50	43	93	204	138	342
Sierra Leone	103	31	134	50	184	15	1	16	2	18	149	52	202
South Africa	563	565	1,128	1,057	2,184	319	204	523	613	1,136	1,651	1,670	3,320
Sudan	634	583	1,217	601	1,818	127	113	239	33	273	1,457	634	2,091
Swaziland	9	6	15	9	24	3	5	8	1	9	23	10	33
Tanzania	410	211	621	248	869	84	71	155	29	184	776	277	1,053
Togo	235	109	344	123	467	171	6	177	23	199	521	146	666
Uganda	58	98	156	36	191	72	65	137	20	157	293	56	348
Zambia	139	95	234	102	337	36	46	82	52	134	317	154	471
Zimbabwe	81	159	240	131	371	34	12	46	10	56	286	142	427
Total	**7,225**	**4,327**	**11,553**	**5,686**	**17,239**	**2,617**	**1,352**	**3,969**	**1,432**	**5,401**	**15,522**	**7,118**	**22,640**

Source: Briceño-Garmendia, Smits, and Foster 2008.

Table A6.2 Indicative Water and Sanitation Spending Needs

	US$ (million per year)			*GDP (percentage per year)*		
Country	*Capital*	*O&M*	*Total spending needs*	*Capital*	*O&M*	*Total spending needs*
Angola	361	213	574	1.18	0.70	1.87
Benin	193	90	283	4.50	2.09	6.60
Botswana	70	71	141	0.66	0.68	1.34
Burkina Faso	157	50	208	2.90	0.93	3.83
Burundi	89	16	105	11.21	1.97	13.18
Cameroon	311	123	434	1.88	0.74	2.62
Cape Verde	12	12	24	1.18	1.21	2.38
Central African Republic	111	45	156	8.22	3.35	11.57
Chad	118	27	145	2.01	0.46	2.47
Comoros	—	—	—	—	—	—
Congo, Dem. Rep.	1,223	416	1,639	17.22	5.85	23.08
Congo, Rep.	159	57	216	2.61	0.94	3.55
Côte d'Ivoire	511	264	774	3.12	1.61	4.74
Equatorial Guinea	14	4	19	0.19	0.06	0.25
Eritrea	108	39	147	11.11	4.04	15.15
Ethiopia	850	356	1,206	6.91	2.89	9.80
Gabon	42	32	74	0.48	0.37	0.85
Gambia, The	45	31	76	9.73	6.68	16.41
Ghana	337	136	473	3.14	1.27	4.41
Guinea	89	33	123	2.73	1.03	3.76
Guinea-Bissau	—	—	—	—	—	—
Kenya	1,380	556	1,936	7.37	2.97	10.34
Lesotho	38	16	54	2.65	1.15	3.80
Liberia	82	40	122	15.44	7.51	22.94
Madagascar	444	168	612	8.81	3.33	12.15
Malawi	162	47	209	5.67	1.66	7.33
Mali	229	82	311	4.31	1.54	5.86
Mauritania	60	24	83	3.25	1.28	4.53
Mauritius	47	66	113	0.75	1.05	1.80
Mozambique	300	70	370	4.56	1.07	5.63
Namibia	145	145	290	2.33	2.33	4.66
Niger	213	52	266	6.40	1.58	7.98
Nigeria	1,827	514	2,340	1.63	0.46	2.09
Rwanda	85	25	110	3.57	1.05	4.62
São Tomé and Príncipe	—	—	—	—	—	—
Senegal	204	138	342	2.35	1.59	3.93
Seychelles	—	—	—	—	—	—
Sierra Leone	149	52	202	12.29	4.29	16.59

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Table A6.2 *(continued)*

	US$ (million per year)			GDP (percentage per year)		
Country	*Capital*	*O&M*	*Total spending needs*	*Capital*	*O&M*	*Total spending needs*
South Africa	1,651	1,670	3,320	0.68	0.69	1.37
Sudan	1,457	634	2,091	5.32	2.32	7.63
Swaziland	23	10	33	0.88	0.37	1.25
Tanzania	776	277	1,053	5.49	1.96	7.45
Togo	521	146	666	24.18	6.77	30.95
Uganda	293	56	348	3.35	0.64	3.99
Zambia	317	154	471	4.31	2.10	6.41
Zimbabwe	286	142	427	8.36	4.15	12.51
Sub-Saharan Africa	**15,522**	**7,118**	**22,640**	**2.42**	**1.11**	**3.53**
Low-income, fragile	3,282	1,249	4,531	8.55	3.25	11.80
Low-income, nonfragile	5,682	2,128	7,810	5.15	1.93	7.08
Middle-income	1,990	1,996	3,987	0.73	0.74	1.47
Resource-rich	4,605	1,759	6,364	2.07	0.79	2.86

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: GDP = gross domestic product, O&M = operations and maintenance, — = not available.

Table A6.3 Existing Financing Flows to Water and Sanitation Sectors

	US$ (million per year)								GDP (percentage per year)							
		Capital								Capital						
	O&M				PPI				O&M				PPI			
Country	Public sector	Public sector	ODA	Non-OECD financiers	PPI	Household self-finance	Total CAPEX	Total spending	Public sector	Public sector	ODA	Non-OECD financiers	PPI	Household self-finance	Total CAPEX	Total spending
Angola	—	—	15.80	70.37	0	—	—	—	—	—	0.05	0.23	0.00	—	—	—
Benin	15	11.43	59	0.00	0	13	83	98	0.35	0.27	1.37	0.00	0.00	0.30	1.93	2.28
Botswana	95	172	1	0	0	—	172	268	0.91	1.64	0.01	0.00	0.00	—	1.64	2.55
Burkina Faso	17	2	37	0	0	33	72	90	0.32	0.03	0.69	0.00	0.00	0.61	1.33	1.65
Burundi	—	—	11	0	0	—	—	—	—	—	1.40	0.00	0.00	—	—	—
Cameroon	48	36	23	1	0	19	79	127	0.29	0.22	0.14	0.01	0.00	0.12	0.48	0.77
Cape Verde	1	11	9	0	0	—	21	21	0.06	1.11	0.91	0.02	0.00	—	2.05	2.11
Central African Republic	—	—	1	0	0	—	—	—	—	—	0.10	0.00	0.00	—	—	—
Chad	0	1	27	1	0	10	39	39	0.00	0.01	0.47	0.01	0.00	0.17	0.66	0.67
Comoros	—	—	1	1	0	—	—	—	—	—	0.27	0.24	0.00	—	—	—
Congo, Dem. Rep.	—	—	48	2	0	62	—	—	—	—	0.68	0.02	0.00	0.87	—	—
Congo, Rep.	28	19	0	1	0	—	20	48	0.45	0.31	0.00	0.02	0.00	—	0.33	0.79
Côte d'Ivoire	54	13	1	1	0	92	107	162	0.33	0.08	0.00	0.01	0.00	0.56	0.66	0.99
Equatorial Guinea	—	—	1	0	0	—	—	—	—	—	0.01	0.00	0.00	—	—	—
Eritrea	—	—	6	12	0	—	—	—	—	—	0.64	1.26	0.00	—	—	—
Ethiopia	123	74	92	0	0	94	260	383	1.00	0.60	0.75	0.00	0.00	0.76	2.11	3.11
Gabon	—	—	12	0	0	—	—	—	—	—	0.13	0.00	0.00	—	—	—
Gambia, The	—	—	7	3	0	—	—	—	—	—	1.45	0.56	0.00	—	—	—
Ghana	53	23	98	0	0	31	151	204	0.49	0.21	0.91	0.00	0.00	0.29	1.41	1.90
Guinea	—	—	14	1	0	—	—	—	—	—	0.42	0.04	0.00	—	—	—
Guinea-Bissau	—	—	1	0	0	—	—	—	—	—	0.45	0.00	0.00	—	—	—
Kenya	12	34	97	2	0	23	155	167	0.07	0.18	0.52	0.01	0.00	0.12	0.83	0.89
Lesotho	7	3	14	2	0	2	21	28	0.48	0.20	1.01	0.12	0.00	0.17	1.49	1.98

Liberia	—	—	4	0	0	—	—	—	—	—	0.73	0.00	0.00	—	—	—
Madagascar	0	5	19	0	0	46	70	70	0.01	0.11	0.37	0.00	0.00	0.90	1.38	1.39
Malawi	15	3	16	0	0	6	25	40	0.53	0.12	0.54	0.00	0.00	0.22	0.88	1.41
Mali	26	7	34	1	0	—	42	68	0.48	0.13	0.64	0.02	0.00	—	0.79	1.27
Mauritania	—	—	10	29	0	—	—	—	—	—	0.55	1.57	0.00	—	—	—
Mauritius	—	—	9	6	0	—	—	—	—	—	0.14	0.10	0.00	—	—	—
Mozambique	4	9	55	0	0	35	99	103	0.07	0.13	0.84	0.00	0.00	0.53	1.50	1.56
Namibia	131	12	6	0	0	3	21	152	2.11	0.19	0.09	0.00	0.00	0.05	0.33	2.44
Niger	11	28	23	1	0	3	56	66	0.32	0.85	0.68	0.03	0.01	0.10	1.67	1.99
Nigeria	14	355	100	0	0	295	751	766	0.01	0.32	0.09	0.00	0.00	0.26	0.67	0.68
Rwanda	6	0	17	0	0	20	37	43	0.25	0.00	0.71	0.00	0.00	0.85	1.56	1.81
São Tomé and Príncipe	—	—	0	0	0	—	—	—	—	—	0.14	0.00	0.00	—	—	—
Senegal	5	9	37	14	0	49	110	114	0.05	0.11	0.43	0.16	0.00	0.57	1.26	1.32
Seychelles	—	—	1	0	0	—	—	—	—	—	0.09	0.07	0.00	—	—	—
Sierra Leone	—	—	8	0	0	—	—	—	—	—	0.65	0.00	0.00	—	—	—
South Africa	1,874	115	60	0	2	—	177	2,051	0.77	0.05	0.02	0.00	0.00	—	0.07	0.85
Sudan	—	—	12	5	7	—	—	—	—	—	0.05	0.02	0.02	—	—	—
Swaziland	—	—	1	0	0	—	—	—	—	—	0.05	0.00	0.00	—	—	—
Tanzania	15	33	143	4	1	28	209	224	0.10	0.23	1.01	0.03	0.01	0.20	1.48	1.59
Togo	—	—	2	0	0	—	—	—	—	—	0.08	0.00	0.00	—	—	—
Uganda	1	1	47	3	0	41	93	—	0.01	0.01	0.54	0.04	0.00	0.47	1.06	—
Zambia	35	67	47	1	0	9	123	158	0.48	0.91	0.63	0.02	0.00	0.12	1.68	2.16
Zimbabwe	—	—	1	0	0	—	—	—	—	—	0.03	0.00	0.00	—	—	—
Sub-Saharan Africa	**3,112**	**1,252**	**1,227**	**163**	**10**	**2,125**	**4,778**	**7,890**	**0.48**	**0.20**	**0.19**	**0.03**	**0.00**	**0.33**	**0.74**	**1.23**
Low-income, fragile	128	30	105	20	0	165	313	441	0.33	0.08	0.27	0.05	0.00	0.43	0.81	1.15
Low-income, nonfragile	307	243	783	55	2	451	1,533	1,840	0.28	0.22	0.71	0.05	0.00	0.41	1.39	1.67
Middle-income	2,186	324	101	8	2	206	641	2,827	0.81	0.12	0.04	0.00	0.00	0.08	0.24	1.04
Resource-rich	188	717	238	80	7	522	1,564	1,753	0.08	0.32	0.11	0.04	0.00	0.23	0.70	0.79

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: CAPEX = capital expenditure, GDP = gross domestic product, O&M = operations and maintenance, ODA = official development assistance, OECD = Organisation for Economic Co-operation and development, PPI = private participation in infrastructure, — = not available.

Table A6.4 Annual Budgetary Flows (*not* Traced)

Country	*US$ (million per year)*	*GDP (percentage per year)*
Angola	—	—
Benin	26	0.61
Botswana	267	2.54
Burkina Faso	19	0.35
Burundi	—	—
Cameroon	84	0.51
Cape Verde	12	1.17
Central African Republic	—	—
Chad	1	0.02
Comoros	—	—
Congo, Dem. Rep.	—	—
Congo, Rep.	46	0.76
Côte d'Ivoire	67	0.41
Equatorial Guinea	—	—
Eritrea	—	—
Ethiopia	197	1.60
Gabon	—	—
Gambia, The	—	—
Ghana	75	0.70
Guinea	—	—
Guinea-Bissau	—	—
Kenya	46	0.24
Lesotho	10	0.68
Liberia	—	—
Madagascar	6	0.11
Malawi	18	0.64
Mali	32	0.61
Mauritania	—	—
Mauritius	—	—
Mozambique	13	0.20
Namibia	143	2.30
Niger	39	1.18
Nigeria	370	0.33
Rwanda	6	0.25
São Tomé and Príncipe	—	—
Senegal	14	0.16
Seychelles	—	—
Sierra Leone	—	—
South Africa	1,988	0.82
Sudan	—	—
Swaziland	—	—
Tanzania	47	0.34
Togo	—	—

(continued next page)

Table A6.4 *(continued)*

Country	*US$ (million per year)*	*GDP (percentage per year)*
Uganda	2	0.02
Zambia	102	1.39
Zimbabwe	—	—
Sub-Saharan Africa	**4,364**	**0.68**
Low-income, fragile	158	0.41
Low-income, nonfragile	550	0.50
Middle-income	2,509	0.93
Resource-rich	906	0.41

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: GDP = gross domestic product, — = not available. Nontraced spending refers to all available spending in the sector.

Table A6.5 Public Infrastructure Spending by Sector and Institution

	US$ (million per year)				*GDP (percentage per year)*			
	OPEX		*CAPEX*		*OPEX*		*CAPEX*	
Country	*On-budget*	*Off-budget*	*On-budget*	*Off-budget*	*On-budget*	*Off-budget*	*On-budget*	*Off-budget*
Angola	—	—	—	—	—	—	—	—
Benin	0.00	14.85	0.00	11.43	0.00	0.35	0.00	0.27
Botswana	72.50	22.85	169.87	2.02	0.69	0.22	1.62	0.02
Burkina Faso	0.00	17.50	0.00	1.64	0.00	0.32	0.00	0.03
Burundi	—	—	—	—	—	—	—	—
Cameroon	0.08	48.25	4.55	31.41	0.00	0.29	0.03	0.19
Cape Verde	0.64	0.00	8.71	2.47	0.06	0.00	0.87	0.25
Central African Republic	—	—	—	—	—	—	—	—
Chad	0.19	0.00	0.78	0.00	0.00	0.00	0.01	0.00
Comoros	—	—	—	—	—	—	—	—
Congo, Dem. Rep.	—	—	—	—	—	—	—	—
Congo, Rep.	1.90	25.60	14.55	4.31	0.03	0.42	0.24	0.07
Côte d'Ivoire	6.97	47.37	12.96	0.00	0.04	0.29	0.08	0.00
Equatorial Guinea	—	—	—	—	—	—	—	—
Eritrea	—	—	—	—	—	—	—	—
Ethiopia	122.92	0.00	74.34	0.00	1.00	0.00	0.60	0.00
Gabon	—	—	—	—	—	—	—	—
Gambia, The	—	—	—	—	—	—	—	—
Ghana	3.55	48.99	3.68	18.83	0.03	0.46	0.03	0.18
Guinea	—	—	—	—	—	—	—	—
Guinea-Bissau	—	—	—	—	—	—	—	—
Kenya	12.28	0.00	33.56	0.00	0.07	0.00	0.18	0.00
Lesotho	1.47	5.41	1.67	1.18	0.10	0.38	0.12	0.08
Liberia	—	—	—	—	—	—	—	—
Madagascar	0.29	0.00	5.32	0.00	0.01	0.00	0.11	0.00

Malawi	0.75	14.32	0.96	2.37	0.03	0.50	0.03	0.08
Mali	3.51	22.03	2.07	4.73	0.07	0.42	0.04	0.09
Mauritania	—	—	—	—	—	—	—	—
Mauritius	—	—	—	—	—	—	—	—
Mozambique	4.29	0.00	8.57	0.00	0.07	0.00	0.13	0.00
Namibia	13.16	118.25	2.37	9.27	0.21	1.90	0.04	0.15
Niger	0.02	10.72	1.83	26.61	0.00	0.32	0.06	0.80
Nigeria	14.37	0.00	355.49	0.00	0.01	0.00	0.32	0.00
Rwanda	0.64	5.25	0.05	0.00	0.03	0.22	0.00	0.00
São Tomé and Príncipe	—	—	—	—	—	—	—	—
Senegal	1.30	3.33	9.35	0.00	0.01	0.04	0.11	0.00
Seychelles	—	—	—	—	—	—	—	—
Sierra Leone	—	—	—	—	—	—	—	—
South Africa	1,543.27	330.31	82.21	32.65	0.64	0.14	0.03	0.01
Sudan	—	—	—	—	—	—	—	—
Swaziland	—	—	—	—	—	—	—	—
Tanzania	10.81	3.94	32.66	0.00	0.08	0.03	0.23	0.00
Togo	—	—	—	—	—	—	—	—
Uganda	0.77	0.00	0.76	0.00	0.01	0.00	0.01	0.00
Zambia	28.59	6.50	66.28	0.47	0.39	0.09	0.90	0.01
Zimbabwe	—	—	—	—	—	—	—	—
Sub-Saharan Africa	**2,216.17**	**895.78**	**1,072.60**	**179.53**	**0.35**	**0.14**	**0.17**	**0.03**
Low-income, fragile	16.37	111.31	30.46	0.00	0.04	0.29	0.08	0.00
Low-income, nonfragile	163.85	143.30	176.09	66.73	0.15	0.13	0.16	0.06
Middle-income	1,691.14	494.38	274.59	49.34	0.62	0.18	0.10	0.02
Resource-rich	67.75	120.61	662.89	54.32	0.03	0.05	0.30	0.02

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: CAPEX = capital expenditure, GDP = gross domestic product, OPEX = operating expenditure, — = not available.

Table A6.6 Size and Composition of Funding Gap

	US$ (million per year)			GDP (percentage per year)		
Country	*Capital expenditure gap*	*O&M expenditure gap*	*Funding gap*	*Capital expenditure gap*	*O&M expenditure gap*	*Funding gap*
Angola	—	—	—	—	—	—
Benin	106	72	177	2.46	1.67	4.14
Botswana	0	0	0	0.00	0.00	0.00
Burkina Faso	72	28	100	1.33	0.52	1.85
Burundi	—	—	—	—	—	—
Cameroon	230	74	305	1.39	0.45	1.84
Cape Verde	0	7	7	0.00	0.68	0.68
Central African Republic	—	—	—	—	—	—
Chad	79	27	105	1.34	0.45	1.79
Comoros	—	—	—	—	—	—
Congo, Dem. Rep.	—	—	—	—	—	—
Congo, Rep.	117	25	143	1.93	0.42	2.35
Côte d'Ivoire	320	166	486	1.96	1.02	2.97
Equatorial Guinea	—	—	—	—	—	—
Eritrea	—	—	—	—	—	—
Ethiopia	567	224	792	4.61	1.82	6.43
Gabon	—	—	—	—	—	—
Gambia, The	—	—	—	—	—	—
Ghana	185	83	269	1.73	0.78	2.50
Guinea	—	—	—	—	—	—
Guinea-Bissau	—	—	—	—	—	—
Kenya	1,162	516	1,678	6.20	2.76	8.96
Lesotho	12	7	19	0.82	0.48	1.30
Liberia	—	—	—	—	—	—

Madagascar	322	144	466	6.39	2.86	9.24
Malawi	117	28	144	4.09	0.97	5.06
Mali	126	38	165	2.38	0.72	3.10
Mauritania	—	—	—	—	—	—
Mauritius	—	—	—	—	—	—
Mozambique	171	56	226	2.59	0.85	3.44
Namibia	107	12	119	1.72	0.19	1.92
Niger	147	39	186	4.41	1.17	5.58
Nigeria	966	448	1,414	0.86	0.40	1.26
Rwanda	41	17	58	1.73	0.69	2.43
São Tomé and Príncipe	—	—	—	—	—	—
Senegal	69	98	168	0.80	1.13	1.93
Seychelles	—	—	—	—	—	—
Sierra Leone	—	—	—	—	—	—
South Africa	604	0	604	0.25	0.00	0.25
Sudan	—	—	—	—	—	—
Swaziland	—	—	—	—	—	—
Tanzania	512	237	749	3.62	1.67	5.30
Togo	—	—	—	—	—	—
Uganda	179	49	228	2.05	0.56	2.61
Zambia	158	97	255	2.14	1.32	3.46
Zimbabwe	—	—	—	—	—	—
Sub-Saharan Africa	**8,648**	**3,225**	**11,873**	**1.3**	**0.5**	**1.8**
Low-income, fragile	2,627	993	3,620	6.8	2.6	9.4
Low-income, nonfragile	3,673	1,612	5,285	3.3	1.5	4.8
Middle-income	312	0	312	0.1	0.0	0.1
Resource-rich	2,696	1,393	4,089	1.2	0.6	1.8

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: GDP = gross domestic product, O&M = operations and maintenance, — = not available.

Table A6.7 Reducing the Funding Gap

	US$ (million per year)								GDP (percentage per year)							
				Gain from inefficiencies								Gain from inefficiencies				
Country	Total spending needs	Spending traced to needs	Gain from inefficiencies	Capital execution	Operational inefficiencies	Cost recovery	(Funding gap) or surplus	Potential for reallocation	Total spending needs	Spending traced to needs	Gain from inefficiencies	Capital execution	Operational inefficiencies	Cost recovery	(Funding gap) or surplus	Potential for reallocation
Angola	(574)	—	—	—	—	—	—	—	1.87	—	0.00	—	—	—	—	—
Benin	(283)	98	8	0	2	6	(177)	0	6.60	2.28	4.27	2.46	1.67	0.13	4.14	0.00
Botswana	(141)	141	26	6	3	18	26	126	1.34	2.55	0.17	0.00	0.00	0.17	0.00	1.20
Burkina Faso	(208)	90	18	0	14	4	(100)	0	3.83	1.65	1.92	1.33	0.52	0.07	1.85	0.00
Burundi	(105)	—	—	—	—	—	—	—	13.18	—	0.00	—	—	—	—	—
Cameroon	(434)	127	2	2	—	—	(305)	0	2.62	0.77	1.84	1.39	0.45	—	1.84	0.00
Cape Verde	(24)	12	5	2	3	0	(7)	9	2.38	2.11	0.68	0.00	0.68	0.00	0.68	0.87
Central African Republic	(156)	—	—	—	—	—	—	—	11.57	—	0.00	—	—	—	—	—
Chad	(145)	39	1	1	0	—	(105)	0	2.47	0.67	1.79	1.34	0.45	—	1.79	0.00
Comoros	—	—	—	—	—	—	—	—	—	—	0.00	—	—	—	—	—
Congo, Dem. Rep.	(1,639)	—	150	—	53	97	—	—	23.08	—	1.37	—	—	1.37	—	—
Congo, Rep.	(216)	48	25	0	4	22	(143)	0	3.55	0.79	2.71	1.93	0.42	0.36	2.35	0.00
Côte d'Ivoire	(774)	162	127	3	3	121	(486)	0	4.74	0.99	3.71	1.96	1.02	0.74	2.97	0.00
Equatorial Guinea	(19)	—	—	—	—	—	—	—	0.25	—	0.00	—	—	—	—	—
Eritrea	(147)	—	—	—	—	—	—	—	15.15	—	0.00	—	—	—	—	—
Ethiopia	(1,206)	383	32	0	9	23	(792)	0	9.80	3.11	6.62	4.61	1.82	0.18	6.43	0.00
Gabon	(74)	—	21	—	1	21	—	—	0.85	—	0.24	—	—	0.24	—	—
Gambia, The	(76)	—	—	—	—	—	—	—	16.41	—	0.00	—	—	—	—	—
Ghana	(473)	204	1	1	—	—	(269)	0	4.41	1.90	2.50	1.73	0.78	—	2.50	0.00
Guinea	(123)	—	—	—	—	—	—	—	3.76	—	0.00	—	—	—	—	—
Guinea-Bissau	—	—	—	—	—	—	—	—	—	—	0.00	—	—	—	—	—
Kenya	(1,936)	167	90	18	40	32	(1,678)	0	10.34	0.89	9.13	6.20	2.76	0.17	8.96	0.00
Lesotho	(54)	28	8	0	1	7	(19)	0	3.80	1.98	1.76	0.82	0.48	0.46	1.30	0.00
Liberia	(122)	—	1	—	1	—	—	—	22.94	—	0.00	—	—	—	—	—
Madagascar	(612)	70	76	1	13	62	(466)	0	12.15	1.39	10.47	6.39	2.86	1.23	9.24	0.00
Malawi	(209)	40	25	0	14	10	(144)	0	7.33	1.41	5.43	4.09	0.97	0.37	5.06	0.00
Mali	(311)	68	79	0	8	70	(165)	0	5.86	1.27	4.43	2.38	0.72	1.33	3.10	0.00

Mauritania	(83)	—	5	—	5	—	—	—	4.53	—	0.00	—	—	—	—	—
Mauritius	(113)	—	—	—	—	—	—	—	1.80	—	0.00	—	—	—	—	—
Mozambique	(370)	103	41	2	18	21	(226)	0	5.63	1.56	3.75	2.59	0.85	0.32	3.44	0.00
Namibia	(290)	152	19	0	5	14	(119)	0	4.66	2.44	2.13	1.72	0.19	0.22	1.92	0.00
Niger	(266)	66	13	0	1	12	(186)	0	7.98	1.99	5.95	4.41	1.17	0.38	5.58	0.00
Nigeria	(2,340)	766	161	75	52	34	(1,414)	0	2.09	0.68	1.29	0.86	0.40	0.03	1.26	0.00
Rwanda	(110)	43	9	0	9	0	(58)	0	4.62	1.81	2.43	1.73	0.69	0.00	2.43	0.00
São Tomé and Príncipe	—	—	—	—	—	—	—	—	—	—	0.00	—	—	—	—	—
Senegal	(342)	114	59	2	0	57	(168)	0	3.93	1.32	2.59	0.80	1.13	0.66	1.93	0.00
Seychelles	—	—	12	—	0	12	—	—	—	—	1.61	—	—	1.61	—	—
Sierra Leone	(202)	—	—	—	—	—	—	—	16.59	—	0.00	—	—	—	—	—
South Africa	(3,320)	1,847	870	0	400	470	(604)	204	1.37	0.85	0.44	0.25	0.00	0.19	0.25	0.08
Sudan	(2,091)	—	103	—	47	56	—	—	7.63	—	0.20	—	—	0.20	—	—
Swaziland	(33)	—	—	—	—	—	—	—	1.25	—	0.00	—	—	—	—	—
Tanzania	(1,053)	224	80	13	47	20	(749)	0	7.45	1.59	5.44	3.62	1.67	0.14	5.30	0.00
Togo	(666)	—	3	—	3	—	—	—	30.95	—	0.00	—	—	—	—	—
Uganda	(348)	—	—	—	—	—	—	0	3.99	—	2.61	2.05	0.56	—	2.61	—
Zambia	(471)	158	58	14	21	23	(255)	0	6.41	2.16	3.77	2.14	1.32	0.31	3.46	0.00
Zimbabwe	(427)	—	—	—	—	—	—	—	12.51	—	0.00	—	—	—	—	—
Sub-Saharan Africa	**(22,640)**	**7,890**	**2,877**	**168**	**1,259**	**1,450**	**(11,873)**	**0**	**3.53**	**1.23**	**2.08**	**1.35**	**0.50**	**0.23**	**1.85**	**0.00**
Low-income, fragile	(4,531)	441	471	6	106	358	(3,620)	0	11.80	1.15	10.36	6.84	2.58	0.93	9.43	0.00
Low-income, nonfragile	(7,810)	1,840	685	39	265	381	(5,285)	0	7.08	1.67	5.13	3.33	1.46	0.35	4.79	0.00
Middle-income	(3,987)	2,637	1,037	8	492	537	(312)	189	1.47	1.04	0.31	0.12	0.00	0.20	0.12	0.07
Resource-rich	(6,364)	1,753	522	137	172	214	(4,089)	0	2.86	0.79	1.93	1.21	0.63	0.10	1.84	0.00

Source: Briceño-Garmendia, Smits, and Foster 2008.
Note: GDP = gross domestic product, — = not available.

Reference

Briceño-Garmendia, C., K. Smits, and V. Foster, V. 2008. "Financing Public Infrastructure in Sub-Saharan Africa: Patterns and Emerging Issues." Background Paper No. 15, Africa Infrastructure Country Diagnostic (AICD), World Bank, Washington, DC.

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The Millennium Development Goals (MDG) have called attention to deficiencies in the quantity and quality of water supply and sanitation (WSS) globally. Although most of the world is on track to meet the MDG drinking water target, Africa lags behind. Only 58 percent of the population enjoys access to safe drinking water. According to projections, 300 million more people—almost 38 percent of the region's population, or half the number of people who currently have access to improved water—will need to be covered to meet the MDG target. Similarly, more than 2.5 billion people remain without improved sanitation worldwide; of that total, 22 percent, corresponding to more than half a billion people, lives in Africa. With the MDG deadline fast approaching, it is essential to take stock of the WSS sectors in Africa, analyze their achievements and shortcomings, and identify the sector characteristics that either advance or inhibit the population's ability to access service.

Africa's Water and Sanitation Infrastructure—Access, Affordability, and Alternatives integrates a wealth of primary and secondary information to present a quantitative snapshot of the state of the WSS sectors in Africa. It explains the sectoral institutional structures and utility performance and articulates the volume and quality of financing available over time. The authors also evaluate the challenges to the WSS sectors and explore the factors that govern the expansion of coverage over time. Finally, the authors estimate spending needs for WSS, arriving at a funding gap for meeting the MDGs. The proposed directions for the future draw on lessons learned from best practices and present the menu of choices available to African countries, bearing in mind that the challenges differ to a significant extent among countries and solutions must be tailored to national or regional conditions.

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